Taking Stock

Adding Sustainability Variables to Asian Sectoral Analysis

February 2006

Auto
Banking
Metals & Mining
Oil, Gas & Petrochemicals
Power
Pulp, Paper & Timber
Supply Chain
Technology

ESG

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Editor: Melissa Brown

Association for Sustainable & Responsible Investment in Asia

International Finance Corporation
World Bank Group

Project Sponsor:
International Finance Corporation

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Disclaimer: In light of the diversity of the Asian region, ASrIA does not guarantee that each sector report is a comprehensive survey of all potential sustainability topics. With the resources available, however, the reports make every effort to focus on key areas of relevance and to deliver data that is accurate and opinions that are objective and balanced.

All these reports are also freely available on the ASrIA website at: **www.asria.org/publications**

FOREWORD

As the private sector arm of the World Bank Group, sustainable and responsible investment in developing country firms lies at the heart of IFC's poverty alleviation mission. IFC places considerable emphasis on the environmental, social and governance (ESG) performance of its clients and investee companies. Our experience shows that, beyond doubt, successful management of these issues influences the bottom line. The social and environmental policies and performance standards that IFC applies to its own investment operations have, since 2003, been adopted by over 40 leading financial institutions through the Equator Principles, representing approximately 80 percent of global project lending.

In addition, IFC is committed to encouraging the development of new analytical work that will bring these issues into clearer focus in emerging markets equities sectors. While the impact of ESG variables on the investment process in Asia is growing rapidly, the investment community has lacked the tools necessary to assess sector-level ESG risks and opportunities. In North America and in Europe, equity investors now have the benefit of a diverse range of research providers who assess ESG variables as well as an increasingly well developed corporate and regulatory dialogue about ESG strategies. ***Taking Stock*** represents a crucial first step in developing a framework for analyzing ESG issues in Asian equity markets.

Through a focus on both the largest and highest impact sectors in Asia, ASrIA's ***Taking Stock*** offers investors an introduction to the ESG profile of Asia's most broadly held companies across a range of Asia's sectors and markets.

The reports provide important reference points for Asian investors about new ESG policy strategies and market-based initiatives which are emerging both globally and in Asia. Just as important, they identify the critical questions which alert investors should be asking Asian companies in order to evaluate ESG disclosure and performance.

Global financial markets are engaged in a dynamic process of addressing ESG trends. As the first work of its kind, it is our hope that the ***Taking Stock*** reports will highlight gaps in data and bring together Asian investors, companies, and policymakers to begin challenging old assumptions about the impact of ESG developments on Asian markets.

Clive Mason

Head, Sustainable Finance, Environment & Social Development Department
International Finance Corporation

Introduction

Melissa Brown, Executive Director, ASrIA

February 2006

Government regulation of environmental and social impacts and corporate governance is the starting point for addressing fundamental long-term investment trends in many sectors. Therefore, sustainability issues have the potential to provide a new basis for comparison between countries competing for emerging market capital.

There are very few absolute certainties in investment. Even the most basic methods for valuing stocks have been the focus of intense debate for years. And yet, one thing that many investors in Asia's growth markets have historically accepted is the proposition that Asian investors do not focus on environmental, social, and governance (ESG) issues in the same way that developed market investors do. This presents an immense challenge for investors, policymakers and companies who look to Asian capital markets for a tangible assessment of the risk and return associated with ESG impacts on new business and policy directions.

This report, therefore, represents a first step toward filling a very large gap in the Asian investment literature. In contrast with Asia, investors in developed markets have a number of independent research providers to turn to for sector and stock-specific evaluation of ESG variables. In Asia-Pacific, however, Australia and Japan are the only markets which receive systematic coverage and have a base of sustainable and responsible investment (SRI) funds actively evaluating the ESG profile of listed equities. A limited number of Asian companies have won inclusion in major global sustainability indexes such as the FTSE4Good and the Dow Jones Sustainability Index, but there is little local market recognition of the performance criteria highlighted by the indices.

This analytical gap is striking in view of the fact that Asia is the fastest growing source of sustainability risks globally due to the rapid growth of economic activity in Asia and of associated ESG impacts. Indeed, developed market companies increasingly frame their discussion of ESG risks in terms of their activity in Asia. Nonetheless, it must be acknowledged that the process for crystallizing risks in terms that Asian capital markets can address is relatively subdued. In general, this reflects lower disclosure, legal, regulatory, and legislative standards and enforcement, as well as the more limited impact of minority shareholders.

The Scope of the Reports

The purpose of ***Taking Stock*** is to begin the process of mapping the growing list of sustainability investment risks and opportunities to the Asian listed equity universe. To ensure that our analysis addresses the most broadly held

companies which are the focus of most sector-level investment research, we have focused our analysis on the leading large and mid-capitalization equities in each sector. For purposes of these reports, we are using a straightforward approach to the definition of sustainability for investment purposes:

Sustainability is a systemic concept, relating to the continuity of economic, social, institutional and environmental aspects of human society. In the terms of the 1987 Brundtland Report of the UN's World Commission on Environment and Development, sustainability is: "Meeting the needs of the present generation without compromising the ability of future generations to meet their needs." The key concept for investors is the need to address a range of environmental, social, and governance factors which will inevitably shape long-term returns as markets respond to changing resource requirements and public priorities.

In practical terms, we have worked with three broad categories of sustainability issues focused on environmental, social, and governance (ESG) factors. There is obvious and sometimes complex interaction between these three categories which can make the task of identifying discrete financial impacts challenging. For example, banks which are facing basic governance problems with borrowers, touching on issues such as land ownership and toxic waste disposal, are certain to have difficulty in assessing the environmental impact of their loan portfolios. In a similar fashion, environmental issues can also have material social and financial impacts for workers, the public, and for consumers.

The reports have been tailored to the needs of mainstream investors in Asian markets ex-Japan. While Japan, Australia, and New Zealand are of course prominent Asia-Pacific markets, it is most common for emerging market investors to focus on Asia ex-Japan. To ensure that they address an investment-oriented audience, with varying degrees of familiarity with sustainability issues, we have framed the issues in terms of investment themes which reflect competitive and financial trends typically monitored by investors. The goal was not to provide a comprehensive discussion of Asian sustainability issues because there is a vibrant and growing body of literature covering many of these issues globally. Instead, our goal is to provide a robust introduction to these issues in an investment context appropriate to Asian markets.

Taking Stock covers eight of Asia's largest and highest impact sectors. The crucial large market capitalization building blocks which dominate many Asian portfolios are banks, energy, and technology. We have added to this list, five sectors which are recognized as having the highest ESG impacts — power, pulp, paper and timber, metals and mining, autos, and supply chain companies. The issues have been addressed in a broad-based and practical context, highlighting risks, opportunities, technology developments, and emerging marketplace standards.

Where possible, we have sought to provide a clear sense of how the issues will develop in Asian markets and the factors which will help define Asian best practice. Given the paucity of investment research on sustainability issues for Asian markets, the immediate challenge addressed by these reports is to identify which issues are most material for Asian companies and investors and what impact they may have in coming years. As a result, for each sector we have

defined four broad investment themes. Three of the themes cover a medium-term timeframe spanning a two- to five-year period. This acknowledges the fact that ESG issues in Asia are still emerging. To address longer term issues, especially those which promise to offer new marketplace opportunities for Asian corporates, we have also examined the issues in a five- to ten-year timeframe which acknowledges more potential for regulatory change and innovation.

The Asian Equity Landscape

Our reference point for ***Taking Stock*** is the universe of listed Asian equities, stretching from India and Indonesia in the South to China and South Korea in the North. Given the structure and rapid growth of North Asian economies and equity markets over the past five years, Asian equity portfolios tend to be dominated by holdings in these markets. Indeed, the Hong Kong, China, Korea, and Taiwan stock markets are globally oriented markets with a rich cross-section of industrial and service sectors. They also reflect the broad-based influence of China's development as a global manufacturing hub and the corresponding growth of the Chinese listed equity universe. Hong Kong's leading listed companies include a large contingent of Chinese companies, many of which are jointly listed in both Shanghai and Hong Kong. Similarly, the outlook for Taiwan's heavily capitalized technology sector is intimately linked to China's fortunes as many of the cost competitive players in Taiwan's technology sector have sizeable manufacturing operations in China. South Korea's stock market performance, although less linked to China, reflects the country's dynamic performance in the wake of the Asian Financial Crisis and the global competitiveness of both the technology and manufacturing sectors.

Figure 1 Configuration of Asian Market Capitalizations

Regional Markets *	Market Cap ** (US$bn)	%
Hong Kong (HKSE)	1,154	28.9
Korea (Kospi + Kosdaq)	704	17.7
India (BSE)	507	12.7
Taiwan (TSE)	472	11.8
China (SHA+SZA)	402	10.1
Singapore (MB)	305	7.6
Malaysia (MB)	126	3.2
Thailand (SET)	124	3.1
Philippines (PSE) ***	112	2.8
Indonesia (JKSE)	82	2.1
Total	**3,988**	**100.0**

Market Cap Source: Bloomberg, December 2005

* Items in capitals refer to reference market indices
** As at 30 December 2005, or last official day of trading
*** Source: PSE, December 2005

A second factor contributing to North Asia's dominant position in Asian investment portfolios is the large size of many of Korea, China, and Taiwan's privatized government companies. Indeed, government privatizations have contributed significantly to the growth in "corporate" Asia as previously government-owned entities have been transferred to the private sector in banking, telecoms, energy, and power. This phenomenon has not been limited to North Asia, but the large scale of privatizations in China, in particular, has tended to reinforce regional market capitalization in favor of North Asia.

The smaller, ASEAN markets all include meaningful listed companies which are held in global portfolios and are analyzed in the sector reports. Indeed, regional variations in ESG performance necessitate a careful evaluation of a range of country level trends, especially for the high impact but smaller capitalization sectors. Some of Asia's smaller but more mature markets such as Singapore, Thailand and Malaysia show encouraging signs of moving toward higher standards of ESG performance which can provide a model for other markets.

Figure 2 Asian Markets — Diverse Sector Mix

	Commercial Banks	Real Estate	Metals & Mining	Industrials	Semiconductors	Electric Utilities	Autos	Electronic Equipment
Hong Kong	11.6%	32.0%	0.1%	11.1%	1.0%	8.2%	0.0%	1.2%
Singapore	30.4%	8.4%	0.1%	7.6%	2.0%	0.0%	0.0%	8.5%
South Korea	13.4%	0.0%	5.6%	0.7%	24.3%	2.2%	6.6%	3.0%

Source: data services

Finally, it should also be noted that the Indian equity market, which accounted for 12.7% of Asian market capitalizations at yearend 2005, has performed extremely well in recent years and includes an attractive mix of new technology companies specializing in software and IT. Given India's potential for economic and market development, we see strong support for more leadership from Indian corporates, especially over a longer term time frame.

Another variable which is reflected in our analysis is the wide variation in market structures and the resultant mix of listed sectors across Asia. While the banking sector looms large in virtually all Asian markets, the degree of industrialization varies greatly along with the focus of industrial activities. Indeed Asian markets also reflect considerable variation in natural resources across the region — both in terms of forests and mineral reserves and patterns of domestic consumption whether for local or export re-processing. For example, South Korea's metals & mining sector reflects its globally competitive steel and auto industries.

Sustainable Returns — Key Conclusions

Each sector report was designed to ask and answer the following question: what are the key investment themes which investors should be evaluating in order to analyze ESG issues in Asia? The focus is on identifying a specifically Asian investment dynamic, based on both risks and opportunities. These themes are then assessed with a view toward the probability of catalysts emerging for materialization of these issues, such as earnings or strategic impacts. Although it can be tempting to present a prescriptive argument about how we might hope markets would address ESG impacts, we have instead based our analysis on the reference points and materials which Asian investors use most commonly to assess stocks — key policy trends, company financial reports, and competitive market developments. Where appropriate we have referenced global ESG trends, especially for those sectors where global competitive dynamics are more likely to have impact in Asia. In addition, we have extended the boundaries of our analysis in considering longer term sectoral themes to reflect more potential for innovation both in the corporate and policy sphere.

Figure 3 Report Conclusions — The Structural Issues

Sectors	Cross-cutting Risks		Long-term Sector Trends	
	Poor Disclosure	Government Ownership/Regulation	Larger Role for China and India	More Global Footprint
Auto	✓	✓	✓	✓
Banking	✓	✓	✓	
Metals & Mining	✓	✓	✓	✓
Oil, Gas & Petrochemicals	✓	✓	✓	✓
Power	✓	✓	✓	
Pulp, Paper & Timber	✓		✓	
Supply Chain	✓		✓	✓
Technology	✓		✓	✓

To highlight the structural aspects of each sector — and how they shape the impact of ESG issues — the reports each include an introductory section which highlights sector composition, cross-cutting risks which affect the investment outlook generally, and longer term trends. In some instances the cross-cutting risks and longer term structural issues are extremely material and underscore themes which dominate our subsequent analysis of investment themes. Indeed, three dominant issues emerge from this aspect of the research:

Limited Disclosure of Material ESG Issues One of the most significant conclusions to emerge from our research is that Asian equity markets will struggle to value ESG issues until both government and corporate disclosure norms are improved. Asia faces a dual disclosure gap relative to more developed markets. Much of the information used in more developed markets to evaluate environmental, health, and safety issues, in particular, is publicly disclosed by governments permitting investors to form a clear view on regulatory norms. In

Asian markets, however, there is a persistent gap between legal norms and common enforcement standards which is reinforced by a lack of transparency. This has inhibited the ability of the investment community to verify regulatory trends and to push for more accurate corporate disclosure.

Government Ownership and Control Many of the largest Asian companies are effectively quasi-privatized entities which operate as an extension of the public sector. As a result, they often benefit from preferential market regulation which limits competition and dilutes the impact of stakeholders. They also suffer from backward-looking policies which can inhibit the development of the market-oriented practices crucial to recognizing ESG impacts. In some markets, government-controlled companies may emerge as sustainability leaders, but progress is often a by-product of regulatory and shareholding reforms.

Globalization and Market Development—Benefits for China and India
Two key long-term trends emerge from our structural analysis of Asian sectors. The first trend is the continued likely dominance of two of Asia's largest and fastest growing markets—China and India. We see ESG issues in Asia being framed by developments in both the economics and equity markets of these two countries. The second is that Asian markets and some of the most strategic sectors will increasingly be influenced by global trends, not local market drivers. This will pose an important challenge for local investors unfamiliar with key ESG trends shaping competition and market access elsewhere.

At the outset, we recognized that there would be both similarities to the investment analysis done in other markets as well as some significant and potentially pronounced differences, especially in sectors where Asian regulation and market-based incentives are less well entrenched than in more developed markets. Indeed, Asian investors will need to become more attuned to the importance of changing market and regulatory structures as the debate about ESG issues intensifies.

Environmental Issues Dominate, but Incentives for Change are Subdued
Across the eight sectors covered in these reports, environmental issues dominate the analysis. This reflects the concentration of environmental risks in the extractive, auto, energy, and power sectors. These impacts are of global significance, but our analysis indicates that for many companies, addressing ESG factors over the medium-term will require a willingness to invest in solutions, often without the immediate benefit of meaningful local market incentives. Indeed, other than companies with global customers, or companies operating in more developed markets, awareness of the business case for better ESG performance is low. In addition, some of the most destructive trends affecting high impact sectors are linked to low cost strategies (illegal timber) and race-to-the-bottom trends (low value-added outsourcing) which have been reinforced by cost-conscious global consumer trends.

Better Governance Standards—A Key Facilitator for E & S Performance
Just as government control of large portions of Asian market capitalization shapes the ESG landscape, so poor governance standards inhibit the ability of investors and Asian corporates to address pressing ESG issues. For example, in two of Asia's largest sectors—banking and technology—we found very little

acknowledgement of commonplace ESG factors which are now an established part of developed market investment disclosure and debate. This gap is even more pronounced in the energy, power, supply chain and extractives sectors, with few indications of board-level initiatives or disclosure improvements.

Rising Expectations Will be a Driver for Regulatory Change Traditional social risk factors affecting workplace health, safety, and livelihood issues are concentrated in the extractives and supply chain sector. It is important to stress, however, that we see a strong potential dynamic with rising incomes and expectations across Asia as a catalyst for changes in enforcement of current regulations and the adoption of higher standards affecting the power, auto, extractives, and supply chain sectors. This trend is already apparent in South Korea, Hong Kong, Singapore, and more recently China where government officials are increasingly responding to the politicization of issues such as air pollution and mine safety.

Figure 4 Report Conclusions —The Sectoral Issues

	Key Drivers				Key Impacts		
Investment Themes	**E**	**S**	**G**	**Financial Dynamics**	**Costs**	**Opportunities**	**Both**
Auto							
Air pollution	✓	✓		Higher costs, reduced revenue opportunities	✓		
Meeting tougher emissions standards	✓			Higher costs	✓		
Building new alliances	✓		✓	Improved margins			✓
Technology and innovations	✓			Improved margins			✓
Banking							
Corporate control & governance			✓	Consolidation provides economies of scale			✓
The technology bet			✓	Higher capex needed			✓
Asset quality & sustainable risk assessment	✓		✓	Improved credit quality			✓
Sustainable financial products	✓	✓		New revenue opportunities		✓	
Metals & Mining							
Rising EHS standards	✓	✓		Higher costs	✓		
Community investment		✓	✓	Higher costs	✓		
The energy appetite	✓			Margin pressure, incentives for energy efficiency			✓
Globalization and transparency			✓	More competitive pressures			✓
Oil, Gas & Petrochemicals							
Deregulation: a prerequisite			✓	More market incentives			✓
EHS: higher standards & costs	✓	✓		Higher costs but more stable margins			✓
Cleaner fuels a key constraint	✓			Premium pricing for clean fuels		✓	
Meeting the supply challenge	✓		✓	Growth but higher costs			✓
Power							
Energy efficiency	✓			More stable returns			✓
Regulatory risk		✓	✓	Higher costs	✓		
Cleaner fuels	✓			Higher costs	✓		
Pricing in the environmental costs	✓			Improved incentives for renewables			✓
Pulp, Paper & Timber							
Rising regulatory risk	✓	✓	✓	Higher costs	✓		
Sustainable supply	✓			Higher costs	✓		
Forest standards	✓	✓		Higher costs but more market access			✓
Technology & carbon sequestration	✓			New revenue opportunities		✓	
Supply Chain							
Rising labour & environmental standards	✓	✓		Higher costs	✓		
Competiting on codes and standards			✓	More market incentives			✓
Export market access			✓	More market incentives			✓
Strategic engagement		✓		More market incentives			✓
Technology							
Toxics and takeback	✓	✓		Higher costs to gain market access			✓
Transparency			✓	Higher cost of capital	✓		
Industrial policy			✓	Fewer subsidies	✓		
IPR			✓	Higher cost to develop and protect IPR			✓

Conclusions for Asian Investors

The mix of structural and sectoral conclusions which emerge from the analysis in ***Taking Stock*** has distinct implications for Asian investors. In addition to highlighting key trends which have the potential to influence country, sector, and stock performance, we believe that ESG factors have the potential to create a new investment valuation dynamic. As investors and global competitors become better versed in ESG analysis, we expect to see companies take a more strategic approach to positioning on ESG issues. This will create important opportunities for investors to evaluate new scenarios reflecting ESG variables. We see interesting opportunities to consider three key scenarios:

Survival of the Fittest: Incumbents vs. Innovators In some sectors, such as banks, it seems clear that over the medium-term the companies which are best positioned to meet rising sustainability standards are those with stronger management systems and cashflow needed to meet higher environmental and social compliance standards. In most of the sectors we have reviewed, it is already possible to identify Asian companies which have a stakeholder orientation and are seeking opportunities to improve performance on sustainability factors. The question for investors is whether ESG variables will favor the performance advantages of large market incumbents, thereby aggravating the tiering effect in many Asian markets. This could create a dynamic in which the laggards run the risk of having an increasingly concentrated sustainability risk profile. In an alternate scenario relevant to the power, metals, and supply chain sectors, it is possible to speculate that a sudden spike in energy costs, for example, could damage the prospects of incumbents with energy intensive legacy assets and favor smaller, more nimble competitors which can lay claim to an industries-of-the-future strategy.

Pricing in ESG Risks—Watch IPOs in High Impact Sectors Thanks to recent efforts to raise disclosure standards for Asian IPOs, investors in newly listed companies will tend to see higher levels of disclosure of material sustainability risks. Depending on market conditions, this will create a broader audience for the discussion of emerging risk factors, especially as regulatory processes become clearer. For private equity investors, better disclosure of sustainability risks on IPO should drive improved due diligence of investments.

The Country Risk Premium As Asia's economies and markets mature and investor understanding of ESG factors improves, sustainability issues have the potential to tilt crucial perceptions of the country level risk-reward profile. For long-term investors, this is already evident in recent discussions of comparative governance standards across the region. Given that government regulation of environmental and social impacts and corporate governance are the starting point for addressing fundamental long-term investment trends, sustainability issues have the potential to provide a new basis for comparison between countries competing for emerging market capital.

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Auto

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Auto

Sustainability

Sustainability is a systemic concept, relating to the continuity of economic, social, institutional and environmental aspects of development. In the terms of the 1987 Brundtland Report of the UN's World Commission on Environment and Development, sustainability is: "Meeting the needs of the present generation without compromising the ability of future generations to meet their needs." The key concept for investors is the need to address a range of environmental, social, and governance (ESG) factors which will inevitably shape long-term returns as markets respond to changing resource requirements and public priorities.

INTRODUCTION

The auto sector in ex-Japan Asia has seen significant changes in recent years, as the strengthening economy across the region has powered enormous growth in demand for vehicles and the consequent establishment of local production capacity. A burgeoning middle class, especially in populations as large as those of India or China, and higher per capita GDP have both encouraged international auto companies to increase production in the region and fostered the growth of domestic auto and auto components companies.

As yet, most domestic Asian auto makers, excepting Japan, are lagging in technology and product development, and they rely on multinational joint ventures ("JV"s) to supply research and development ("R&D") and technological capability. The lack of a mature and vertically integrated supply chain in Asia exacerbates this dependence on foreign JV partners.

Most domestic auto makers in Asia are lagging in technology and product development

As in other industry sectors in Asia, the role of government is critical both to the growth of the auto sector and its competitive dynamics. At the country level, government controls market access and environmental standards and, in most cases, dominates the activities of heavy industry and the oil and gas sector, which supply vital inputs to the auto sector.

...and they rely on multinational JVs to supply research and development

The region-wide growth in vehicle ownership and use, albeit from a low base, has several significant implications from a sustainability standpoint, not least pollution and traffic concerns. The auto sector has become one of the biggest generators of carbon emissions in Asia. In contrast to some industry sectors in the region, key issues and value drivers affect auto makers far more at the product level than the manufacturing level, and it is the environmental and social impacts of motor vehicles in use in Asia that are currently precipitating the most material regulatory, technological and consumer change.

Driven by international pressure on greenhouse gas emissions and domestic public concern about pollution, governments across the region have enacted tougher regulations on auto emissions and fuel efficiency, which are likely to have serious cost implications for local auto makers. The constraints governing the auto sector in the region — lagging technology and government control, especially of the fuel chain — will strongly influence the ability of companies in Asia both to comply with the new standards and to respond to industry-wide opportunities generated by regulatory change.

In the longer term, pollution concerns are likely to drive the development of new auto technologies, which may be based on cleaner diesel, alternative fuels, hybrid or fuel cell platforms. While Asian auto makers are coming under strong political pressure to produce more fuel efficient cars, the reality is that the high quality fuel required to run these vehicles properly is not currently available in many parts of the region and that major capital investment will be required to change this. Also in the longer term, it is likely that a far greater intolerance of dysfunctional road transport systems will lead to the wider introduction of demand management options, such as road pricing, tax incentives or comprehensive public transport systems, in an effort to reduce the overall vehicle volume growth in the region.

In the longer term, demand management options are likely to be more widely adopted across the region

In this report, we assess these issues in the context of Asia's most broadly held large- and mid-capitalization listed auto companies. We believe that the most important sustainability themes for investors in the Asian auto sector will be:

- **Auto-emissions and fuel efficiency** The importance of auto emissions and fuel efficiency as a proxy for sustainability
- **Meeting tougher emissions standards** The availability in practice of cleaner and alternative fuels
- **Building new alliances** Maturation of regional technological and supply chain capabilities, coupled with careful management of international JV partnerships which can deliver technological competitive advantage
- **Technology and innovations** Development in the longer term of viable lower carbon technologies, which could lead to a fundamental restructuring of the competitive dynamics of the industry

COUNTRY AND SECTOR DYNAMICS

What the sector looks like today

The listed universe of ex-Japan Asia auto manufacturers is fragmented and populated by a mixture of small caps, minority public floats and lightly traded stocks, with the exception of one or two significant global players, such as Hyundai Motor Company ("Hyundai") and its subsidiary Kia Motors Corporation ("Kia") in Korea.

Figure 1 Larger Regional Listed Auto Companies

Market	Company	Market Cap* (US$mm)
China	Denway Motors	2,497
	Brilliance China	544
	Qingling Motors	384
	Geely Auto	173
India	Tata Motors	5,454
	Maruti Udyog	4,082
	Mahindra & Mahindra	2,643
Indonesia	Astra	25
Korea	Hyundai	21,289
Malaysia	Proton	951
Taiwan	China Motor	1,380

* As at 30 December 2005, or last official day of trading

Source: Bloomberg, December 2005

Most ex-Japan Asian auto companies are vehicle assembly operations, with very little service infrastructure or in-house technological capability. Alliances and JVs shape the sector in Asia as local companies are dependent in most cases on foreign partner technology.

In addition to the listed auto makers in the region, there is a proliferation of unlisted JVs which have significant production capacity and play a leading role in the competitive dynamics of the region, such as Shanghai Automotive Industry Corporation's ("SAIC") partnerships in China with America's General Motors and with Germany's Volkswagen ("VW"). In some cases, especially in China, state owned auto companies may have a listed arm, but whether these should be viewed as true stand-alone entities is debatable. There are also a number of small to medium-sized auto makers and auto parts manufacturers, housed within diversified conglomerates around Asia.

In addition to the listed auto makers in the region, there is a proliferation of unlisted JVs

Cross-cutting issues

An analysis of sustainability issues in the Asian auto sector should consider three cross-cutting issues which are shaping the industry and the ability of both auto companies and investors to respond to critical sustainability themes.

- **High demand growth**
- **Regulatory environment drives decision making**
- **Limited disclosure**

High demand growth The last five years have seen an enormous growth in demand for vehicles across Asia. Growth began to build up during the 1990s as GDP levels in the region increased, but was temporarily derailed by the Asian financial crisis of 1997/98, which greatly suppressed demand and caused automakers to slow their capacity development. In recent years, however, that downturn has reversed and sales growth has far surpassed levels seen in the 1990s.

Growth began to build up during the 1990s, as GDP levels in the region increased, but was temporarily derailed by the Asian financial crisis

Figure 2 International Passenger Car Sales Outlook (millions of units)

		2004	2005f	2006f
US		16.9	16.9	16.8
	growth		*0.2%*	*-0.6%*
W Europe		14.5	14.4	14.5
	growth		*-1.0%*	*1.0%*
Asia		10.3	11.0	11.5
	growth		*6.8%*	*4.8%*
China		2.3	2.6	2.8
	growth		*12.2%*	*8.2%*
India		1.0	1.1	1.2
	growth		*10.4%*	*9.4%*

Source: Scotiabank, 2005

As sales growth slows in developed markets, where demand for new cars has been growing on average at 1% per year for the past 10 years[1], auto makers are increasingly looking to Asia to generate revenues.

Low vehicle penetration of the population in Asia, combined with rising per capita incomes, has both attracted global auto makers to Asia and encouraged the development of a growing domestic auto and auto parts industry.

Figure 3 2003 Per Capita Passenger Car Penetration (per 1000 population)

US	813	**Euro zone**	590
South Korea	180	**Malaysia**	147
Singapore	122	**Thailand**	27
China	13	**Indonesia**	12
Philippines	10	**India**	8.5

Source: Wards Automotive, World Bank, Society of Indian Automobile Manufacturers, Smith Barney 2005, Scotiabank 2005

China and India dominate both the demand and supply growth profile for the region.

1) China

China is already the third biggest auto market in the world and has become the battleground for global auto producers hoping to take advantage of its strong growth potential. The total market grew 15.5% in 2004 to 5.1 million units, with the passenger car market accounting for half that total. Chinese government measures to cool down its overheating economy markedly slowed the pace of sales growth in the second half of 2004 (compared to full year growth in 2003 of close to 70%), but the market has recovered in 2005. Total growth in 2005 is estimated at 10-12%[2].

By 2010, the Chinese market is expected to exceed 8 million units, making it the world's second-largest auto market behind the United States

By 2010, the Chinese market is expected to exceed 8 million units, making it the world's second-largest auto market behind the United States[3]. The Chinese passenger car market, in particular, has strong long term growth potential, commensurate with the country's economic and per capita income growth. In 2003, nearly 1.9 million new cars were sold in China, of which about a quarter were priced between US$15,000 and US$22,000.

Figure 4 Chinese Car Sales by Price Range 2003

Price Range (US$)	Market Share
4,200–8,500	18.8%
8,500–12,000	13.5%
12,000–15,000	21.0%
15,000–22,000	25.9%
22,000–32,000	17.2%
32,000 and up	3.5%
Total Cars Sold	**1.9 million**

Source: Crain Communications, Automotive News, March 15 2004

Cars have become a great deal more affordable for a large number of city dwellers, especially in Beijing and Shanghai, where a significant percentage of the population is already considered middle class. As GDP per capita increases in the country, penetration by the auto makers of the addressable universe of potential car buyers in China has fallen from 75% in 1999 to 32.8% in 2005[4], giving them significant growth opportunities.

In order to capture this potential and establish market share, most auto makers have huge capital expenditure plans for China. Among the listed Asian companies, for example, the combined annual capacity of Hyundai and Kia in China is expected to increase from 280,000 units in 2004 to 730,000 units in 2007 and 1 million units in 2008[5].

2) India

Although a much smaller market than China, India emerged as the fastest growing car market in the world in 2004, with over 20% growth. India's potential is also considerable, given the current low penetration of cars into the population and, as in China, a burgeoning middle class, especially in the cities. It is expected by Goldman Sachs to become the world's fourth largest market by 2020. The commercial vehicles segment is also robust, with annual increases of over 20% for the past three years. The total production of vehicles in India, including exports, increased from 4.2 million units in 1998-9 to 7.3 million in 2003-4 and is expected to exceed 10 million before 2010.

3) ASEAN

The markets of South East Asia are fragmented and vary according to local economic strength and government attitude to the industry. For example, the 2003 per capita penetration of cars in Singapore may seem low at 122 per 1,000 people, given the relatively high per capita GDP of the country, but reflects the high taxation regime and strong public transport network in Singapore. Conversely, in Indonesia in the first half of 2005, sales of cars and trucks rose 31% to around 300,000 units, and the Association of Indonesian Automotive Manufacturers forecast domestic vehicle sales of 550,000 for full year 2005, up 14% from 2004. These figures are driven by the strength of the economy and growing personal wealth, but also reflect the fact that the government heavily subsidises the price of transportation fuel for domestic users, which adds to the affordability of vehicle use.

Regulatory environment drives decision making Investors in Asian listed companies will be familiar with the fact that the regulatory environment is crucial to corporate decision-making, together with the fact that government plays a dominant role in the key industries which feed into most manufacturing sectors. In the auto sector across the region, government in practice dominates all key policy decisions at country level, from emissions levels and fuel efficiency to product mix and capacity expansion. In addition, government control of core industries such as oil and gas or steel production can lead to market distortions, supply constraints and pricing anomalies, which directly impact on

the auto makers and on their ability to factor sustainability issues into their strategies.

Government controls market entry: foreign auto makers may only manufacture in China as JVs with domestic companies

Government involvement in the sector is overt in China, where there is a stated policy to encourage car ownership among the population and to develop car manufacturing as a "pillar industry" of the Chinese economy. Government controls market entry: foreign auto makers may only manufacture in China as JVs with domestic companies, in which the foreign partner cannot own more than 50% and to which it must contribute technology.

Moreover, the Chinese government regularly attempts to influence the size, competitive dynamics and product mix of the auto sector. Most notably, the government actively intervened in the second half of 2004 with policies to cool the growth of the economy, which had a dramatic effect on sales volume in the sector. Policy directives were also introduced to slow the rise in new investment by local companies and tackle overcapacity in the industry.

In India, regulation is also complex and government policy plays a key role in influencing sector competitiveness. The recent strength of India's auto industry can be attributed largely to a shift in government policies since 2000 to encourage competitive manufacturing, such as export promotion zones, lower tariffs and relaxation of selected regulations.

Throughout Asia, governments usually control the major heavy industries, either via direct government ownership or with complex regulatory systems and limited market access. In many cases, pricing is set by government policy rather than the market. In the oil and gas industry, the effects of this government control are especially pronounced and impact directly on the availability of fuel supply for the auto industry.

There is very little information available on the "carbon intensity" of each company's product range and the degree to which its current profits are derived from high emissions vehicles

Limited disclosure Investors in the ex-Japan Asian auto sector face significant challenges in assessing the sustainability risks associated with individual auto makers. While the level of disclosure by multinational auto makers is relatively high, with all the majors issuing sustainability reports of some sort, Asian companies are not addressing these issues in detail. In particular, there is very little information available on the "carbon intensity" (usually defined as the amount of carbon emitted per unit of energy consumed) of each company's product range and the degree to which its current profits are derived from high emissions vehicles. Hyundai Motor is the exception among the Asian auto makers in that it issues a detailed sustainability report. Astra International in Indonesia also publishes an Astra Green Company report every year, which focuses on its environmental and health and safety management system.

Long-term sector outlook

It is likely that the sector in Asia will look somewhat different in the longer term along several different lines. It is probable, for example, that the number of listed Chinese companies will be much higher and that a sizable number of companies will be spun off from heavy industry conglomerates, just as Daewoo

Bus has emerged as a stand-alone player from the former Daewoo Motor, which was itself part of Daewoo Group in Korea.

Conversely, there is also likely to be consolidation in the industry in the region over the next few years. Both auto companies and policy makers in some countries have been forced to recognise the scale of existing overcapacity, and there has already been considerable merger activity among smaller unlisted companies, especially in China, affecting both auto makers and auto components manufacturers. SAIC's expansion over the last 24 months has generated particular media interest, as it has ventured overseas with its acquisitions of Korea's Ssangyong Motor and intellectual property from the defunct British MG Rover, reflecting a strategic push to access a new market and to upgrade its technological capabilities, independent of its JV partners in China.

In Asia's smaller countries, the large multinationals are expected to become more dominant and likely to become acquisitive, if local regulations allow. In China, an interesting question is developing as to whether foreign auto makers will be allowed to continue building brand name strength and long term market share in the country or whether, at some point, the foreign JVs will be unwound, as the government determines that domestic companies are financially and technologically ready to compete on their own against their former JV partners.

This sector-wide restructuring will be driven by a number of competitive factors: market access, technology and existing manufacturing capacity being among the most important. As the stronger local auto companies become more sophisticated in terms of marketing, brand building and service, new sources of potential competitive advantage are likely to emerge, such as auto financing. VW predicts the share of financed car purchases in China, for example, will grow to 40-50% by 2010.

THE INFLUENCE OF DOMESTIC POLITICS ON EMISSIONS

Polluting emissions have become a serious by-product of development in fast growing countries in Asia, resulting in domestic political pressure to find fixes which might be seen as proxies for longer term sustainable solutions. Air pollution statistics compiled by the World Health Organisation and the Asian Development Bank ("ADB") consistently rank major Asian cities among the most polluted in the world, with Beijing, New Delhi, Bombay, Bangkok and Shanghai among the worst. Although the Chinese government does not publish data about carbon emissions, most foreign analysts estimate that the country's carbon dioxide emission levels are now second only to the United States and are growing by 5-10% a year, the fastest increase of any major nation.

Figure 5 Annual Mean Pollutant Concentration of Selected Asia Cities, 2003

(mg/m^3 except where stated)

City	Sulphur dioxide (SO_2)		Nitrogen dioxide (NO_2)		Respirable suspended particulate (PM_{10})	
	Mean	Air Quality Standard	Mean	Air Quality Standard	Mean	Air Quality Standard
Beijing[1]	0.061	(0.06)	0.072	(0.08)	0.141	(0.1)
Delhi[2]	0.012	(0.06)	0.059	(0.06)	0.189	(0.06)
Hong Kong	0.017	(0.08)	0.06	(0.08)	0.058	(0.055)
Mumbai[3] (Bombay)	0.008	(0.06)	0.023	(0.06)	0.063	(0.06)
Seoul	0.005 ppm	(0.02)ppm	0.038 ppm	(0.05)ppm	0.07	(0.07)
Shanghai[4]	0.043	(0.06)	0.057	(0.08)	0.097	(0.1)
Singapore	0.015	(0.08)	0.024	(0.1)	0.028	(0.05)
Taipei	0.003 ppm	(0.03ppm)	0.025 ppm	(0.53)ppm	0.044	(0.065)
Tokyo[5]	0.002 ppm	na	0.027 ppm	na	0.032	na

Notes:
[1] urban area of Beijing
[2] Delhi, Town Hall
[3] Mumbai, Kalbadevi (residential)
[4] urban area of Shanghai
[5] April 2003 to March 2004
ppm = parts per million by volume
na - not available

Source: "Air Pollution in Asia: Research Primer", CLSA & Civic Exchange, April 2005

The transportation sector is the leading source of ground-level nitrogen oxides (NOx), respirable suspended particulates, carbon monoxide (CO), sulphur dioxide (SO2) and various volatile organic compounds, all of which have significant negative effects on public health. Official estimates state that vehicle exhaust emissions will account for 79% of total air pollution in China in 2005.

Air quality concerns are a new issue for the automotive industry in Asia — accustomed as it has been to an attitude of "development first, environment later"

Air quality concerns are a new issue for the automotive industry in Asia, accustomed as it has been to an attitude of "development first, environment later", and one that has material financial impacts for the sector. Climate change policies are already in place in major automotive markets around the world, forcing auto manufacturers to lower the carbon emissions profile of new vehicles. With the implementation of the Kyoto Protocol and the development of proliferating regional initiatives on climate change, governments in Asia are increasingly unable to resist the pressure on them to introduce legislation which is, at least, complementary to that being introduced in developed countries.

Moreover, public opinion in developing countries themselves is becoming increasingly aware of the effects of auto emissions, at the same time as governments are beginning to recognise the measurable costs of pollution. For example, according to the United Nations Environment Programme, India spends an estimated US$100 billion a year on the treatment of diseases caused by air pollution[6]. In China, the cost of air pollution was estimated at 7% of the

2004 GDP, or approximately US$500 billion, and is estimated to grow to 13% of GDP by 2020[7]. The level of pollution in Asia's major cities leaves no doubt as to the negative contribution to air quality being made by motor vehicles.

Emissions standards tighter across the region

Auto emissions standards across the region have tightened considerably in recent years, at least on paper.

Figure 6 Selected Regional Auto Emissions Standards

Hong Kong	• 2001 adopted Euro III auto emissions standards • 2002 mandated use of ultra low sulphur diesel fuel • 2006 adoption of Euro IV emissions standards for new vehicles
Singapore	• 2001 adopted Euro II auto emissions standards • 2005 mandated use of ultra low sulphur diesel fuel • 2006 adoption of Euro IV auto emissions standards for diesel vehicles
South Korea	• 2005 adopted Euro III auto emissions standards • 2006 adoption of Euro IV auto emissions standards • 2006 adoption of ultra low sulphur diesel fuel
Malaysia	• 1991 use of leaded gasoline phased out • 2000 adopted Euro II auto emissions standards
China	• 2000 adopted Euro I auto emissions standards for light vehicles, Euro II for heavy vehicles • 2000 use of leaded gasoline phased out • 2005 equivalent Euro II auto emissions standards for passenger cars • 2008 equivalent Euro IV auto emissions standards for passenger cars
India	• 2000 all new cars to meet Euro I auto emissions standards • 2000 banned sale of leaded gasoline • 2005-10 equivalent Euro III auto emissions standards • 2010 equivalent Euro IV auto emissions standards
Indonesia	• 2004 announced phase out of leaded gasoline • 2007 adoption of Euro II auto emissions standards
Thailand	• 1995 use of leaded gasoline phased out • 2002 adopted Euro III auto emissions standards • 2007 adoption of Euro IV auto emissions standards
Philippines	• 2003 adopted Euro I auto emissions standards • 2004 use of leaded gasoline phased out

Source: Asian Development Bank, United Nations, Government of the HKSAR, 2005

To take China as an example, the government announced new fuel economy standards in 2004, which require 32 different car and truck weight-based classes to reduce the amount of fuel used per 100 kilometres in order to meet increasingly tougher targets, to come into force in 2005 and 2008. These standards will be more stringent than the US equivalent by 2007 and will match the European Union's "Euro IV" standards by 2008. Under the regulation, if vehicles do not meet the prescribed standards, they cannot be sold, but models approved by the government before July 2005 will have a one-year grace period for both phases. In another move to encourage the use of fuel-economy vehicles, in 2004 the State Tax Bureau proposed increasing the price of fuel via taxes of 30-50%.

In 2004, only 19% of US cars and 14% of US light trucks met China's 2008 standard. It is not possible, given the information available, to assess what percentage of vehicles sold by Asian auto makers would meet the standard, but it is probably safe to assume that it is a low number. The introduction of these new policies, therefore, will have a significant impact on auto makers seeking to sell vehicles in China. While smaller vehicles could mostly meet the 2005 standards with few changes, the rules for heavier vehicles may require the auto makers to modify existing technology, which would slow their introduction of new models in the country.

Governments can use an array of incentives and penalties to support new standards

In more sophisticated economies, governments possess an array of incentives and penalties with which to encourage the population to adopt new standards. For example, when the Singapore government announced the decision to adopt the "Euro IV" auto emission standards, it introduced a special incentive package in 2004 to encourage diesel vehicle owners to comply. Similarly, the Hong Kong government provided a one-off grant of HK$40,000 for each replacement of a diesel taxi with one that runs on liquefied petroleum gas in a subsidy programme starting in August 2000. It subsequently offered a similar programme for diesel light buses[8].

In the region's developing countries, however, implementing these policies is likely to be challenging. There is much precedent in China, for example, for the government's inability to enforce its own edicts. At the municipal level, local enforcement may be more rigorous in some cases. Beijing city government, for example, is paying particular attention to pollution issues as it prepares for the 2008 Olympics. More than eighty other cities in China have banned small, polluting vehicles from major roads and central areas.

Across Asia, there is a lack of capacity to implement and enforce mass emissions standards. Air monitoring networks, which are used to measure the pollutant concentration in the air, particularly at roadsides, are in their infancy in the region. Annual inspection of vehicles in use does take place in some urban areas, but inspection data is not widely available. Moreover, in most parts of the region, there is little education and scant incentive for local officials to attempt to enforce standards.

The relatively low incomes of average vehicle owners mean that vehicles tend to stay in service for a long period, which slows the rate at which emissions control technology spreads across a country's vehicle population via purchases of new vehicles. In many countries in the region, agricultural vehicles, trucks

and two-and three-wheelers make up the majority of the auto vehicle population. Their owners tend to be rural, less well educated and considerably less affluent than urban car buyers. Many of these vehicles, moreover, are notoriously polluting. For example, Sperling, Lin, & Hamilton's recent study of three-wheeled agricultural vehicles in China found that the typical vehicle uses 1960s era single cylinder technology, whose fuel efficiency is extremely low. These vehicles consume more than 20% of all diesel fuel in the country[9].

Moreover, it is difficult to ensure that those vehicles which do possess advanced emissions control equipment are properly maintained and appropriately fuelled. There are few formal inspection and maintenance programmes at country level, and in most cases governments are not devoting adequate resources to enforce compliance.

Nevertheless, for Asian auto manufacturers, the correct response to new auto emissions and fuel efficiency legislation cannot be to rely on short- to medium-term lack of enforcement. For their contemporaries in the US and Europe, "environmental issues and costs demand a significant percentage of management attention and financial resources, and are a central concern of all R&D programmes. No automotive company can ignore the environmental aspects of its vehicles, and none do"[10]. In Asia, compliance with the new standards will require local auto companies to adopt improved combustion technologies, which is likely to involve significant costs.

Beginnings of demand management

In recent years, demand for vehicles has been fed by several factors, in addition to economic growth and greater per capital wealth. For example, subsidised petrol in many countries makes vehicles more affordable. The lack of public transport infrastructure, especially in rural areas, has encouraged public desire for individual car ownership. Governments in the region, both elected and unelected, are fully aware of the extent to which popularity depends upon delivering continued economic growth and improving domestic living standards - aspirations which increasingly include the family car.

In cities across Asia, the negative effects of mass vehicle usage have become apparent

However, in cities across Asia, the negative effects of mass vehicle usage have become apparent. In addition to pollution factors, traffic has become a significant burden upon the urban population. For example, a study begun in 1999 by the University of the Philippines' National Centre for Transportation Studies of traffic congestion in Manila found that an economic cost of about P100 billion per year was lost due to time wasted in traffic delays.

Most countries in the region are now beginning to implement some rudimentary elements of demand management and traffic rationalisation. For example, many cities have constructed new public transport systems, such as Bangkok's Skytrain, Kuala Lumpur's light rail systems and Manila's Metro Rail Transit. China has begun construction of the country's first high-speed passenger railway lines to connect major cities.

Studies in Asia have demonstrated that improvement of public transport services alone does not persuade significant numbers of car users to switch to public transport. For example, an analysis by the Ministry of Construction and the China Academy of Urban Planning and Design of 12 large cities in China showed that between 1993 and 1997 the number of public transit vehicles increased in these cities, but that the total number of passengers using public transport decreased in eight of them.

The government of Singapore has combined the "pull factor" of excellent public transport systems with two monetary "push factors", vehicle ownership control and vehicle usage control, to influence motorists to switch to alternative forms of transport. Under its vehicle ownership control policy, the government limits vehicle population growth to 3% per year, based on land and transport use projections, and potential buyers have to bid for the right to own a vehicle. Successful bidders are given a "certificate of entitlement" allowing them to own a vehicle for ten years. Vehicle usage control is managed through electronic road pricing ("ERP"). Since 1998, an electronic cordon has been placed around the most congested portion of the city and all vehicles entering this area pay a fee, which varies to reflect the traffic rush hours. ERP charges are adjusted every three months based on prevailing traffic speeds on the city roads and expressways.

Most developing countries probably do not have the resources to implement a demand management system as sophisticated as that in place in Singapore. However, it is likely that individual cities will seek to implement systems of some sort over the next decade, and there are multiple studies, many sponsored by multilateral agencies such as World Bank or ADB, under way around the region. To the extent that these schemes do have a material impact on sales of new vehicles, auto companies could see their profits affected by these kinds of initiatives in the future.

TRANSPORTATION FUEL STANDARDS AND AVAILABILITY

The availability, quality and cost of transportation fuels are key drivers that influence the auto sector across the region on many levels

The availability, quality and cost of transportation fuels are key drivers that influence the auto sector across the region on many levels. Much of the recently introduced legislation in Asia has focused on fuel efficiency standards and sought to encourage the adoption of fuel efficient vehicles and phasing out of older vehicles. While climate change and air quality concerns are undoubtedly a factor behind the introduction of this legislation, it is likely that a more immediate driver for countries in Asia has been recent energy market shocks.

Dramatic price hikes in the international oil markets over recent months have led both regulators and consumers to value fuel economy more highly. In fact, one of the most serious concerns for the Asian auto sector is that a prolonged period of higher fuel costs might dampen the growth of the market in the region as a whole, as running a vehicle becomes significantly less affordable for most of the population.

In China, higher international fuel prices seem to be translating directly into increased demand for economy model sedans, sales of which have been growing since October 2004[11]. Low average income, concerns about petrol prices and densely crowded urban areas are steering consumers towards smaller, more efficient vehicles, such as Geely Auto's economy models (which also perform well by emissions standards). Hyundai has also secured market share in China with strong sales of its economy model, the Elantra, and global auto companies are also planning to increase production of economy models for sale in China, such as the Wuling Sunshine minivan, produced by a GM JV in Liuzhou.

While increased sales of economy model cars, which show better fuel efficiency, is very encouraging from a sustainability point of view, the implications for the auto makers of such a consumer preference have a negative side, in that the margins on these models are considerably lower than on the high-end models, such as the BMWs being marketed by Brilliance China.

Political impacts on fuel price and supply security

For many years, governments across the region have sought to mitigate the impact of international fuel costs on the standard of living of the local populations by heavily subsidising the cost of fuel, including the diesel and gasoline used by the transportation industry. Indonesia was until recently selling the cheapest gasoline in the region, at approximately 26 US cents per litre, but this was almost doubled in October 2005 to 44 cents per litre. The Indonesian government has also set a target for completely phasing out gasoline and diesel subsidies by the end of 2006, and kerosene subsidies by the end of 2007, however they face strong domestic pressure to continue subsidising fuel prices.

Figure 7 Retail Price of Transportation Fuel in Asia (US cents per litre)

	Diesel	Gasoline
China	50	51
India	71	93
Indonesia	44	46
Vietnam	47	63
Malaysia	34	43
Bangladesh	41	55
Singapore	70	120

Source: South China Morning Post, 31st August 2005, Indonesia prices updated as of 1 October, 2005

The cost to government of subsidies has risen enormously as a consequence of international price rises, combined with the fact that some Asian countries are now importing significant amounts of fuel. For example, in 2004 the cost of Indonesia's fuel subsidies rose fourfold to nearly US$7 billion, an amount equal to nearly 3% of GDP. Despite the price increases in February and October 2005, the cost of subsidies in 2005 is estimated at US$13.5 billion. While the

first priority of governments in the region is to maintain economic growth and improving domestic living standards, it has become apparent that this level of financial outlay on fuel subsidies is not manageable.

At the same time, governments in Asia are also becoming aware that overwhelming reliance on fossil fuels to power their economies may not be a viable strategy for the long term. China and India are increasingly dependent on imported crude oil to maintain their current growth rates — importing over 50% and over 70% of their crude, respectively — and are acutely aware of that fact. The major energy companies in both countries have adopted aggressive international acquisition strategies to secure oil resources and ensure the availability of supply in the domestic markets.

The less developed countries in the region, in particular, are beginning to examine alternative fuel sources, such as natural gas or biodiesel, in order to develop diversity of supply and reduce their exposure to international fuel prices. However, most countries do not have a specific transportation fuels policy, and there is generally a lack of incentives for clean fuels adoption in the region, although there is selective small-scale substitution of region specific alternative fuels for conventional fuels.

This regional backdrop of growing concern about fuel prices and security of supply is a critical issue for the auto makers. At a national level, these policy concerns are likely to drive further legislation on fuel economy, such as China's proposed fuel tax of 30-50% on car petrol, which may materially alter the fleet mix in the region towards the economy segment.

Regional fuel availability

The irony of the current fuel supply chain in Asia is that while the economy car segment may benefit from policy incentives and increased consumer interest, in the short to medium-term the high quality fuel required for proper operation of higher technology fuel efficiency vehicles is likely to be expensive[12].

Asian refiners are struggling to put enough capacity in place to process crude into saleable product

Energy markets in most Asian countries remain comprehensively regulated, meaning that market access in refining and petrochemicals, as well as downstream marketing activities, is closely controlled. The petrochemicals sector across Asia, both government and private sector, does not currently have the capacity to produce the volume of cleaner fuel theoretically required by an Asian auto industry producing fuel efficient cars. At present, Asian refiners are struggling simply to put enough capacity in place to process crude into saleable product, never mind making the investment required to meet increasingly stringent clean fuel standards.

With surging demand from both the power and auto sectors, China's refining capacity is under particular strain. Small refineries with a capacity of under 60,000 barrels per day, which sell poorly refined, high-sulphur products, are estimated to supply as much as 15% of China's diesel fuel. This drove a group of foreign auto manufacturers in 2004 to urge the Chinese government to

force suppliers to clean up the substandard diesel and gasoline fuel now sold throughout the country, complaining that bad fuel ruins high-tech engines.

It is likely that only the introduction — and critically, enforcement — of more stringent government standards will lead to the uptake of more costly fuel by the auto sector at country level. The fact that enforcement of standards has been improving in India can be seen in the fact that the country has been importing approximately 80,000 barrels per day of "Euro II" standard refined diesel to meet stricter fuel standards in major cities since March 2005, as Indian refiners do not yet have the capacity to supply sufficient "Euro II" and "Euro III" fuel. The government intends that "Euro III" fuel be available in 11 major cities and "Euro II' fuel be available throughout India by the end of 2005[13].

Once demonstrable demand for cleaner fuels, driven by regulation, is in place, refiners will be forced to start investing in the upgrading and infrastructure required to make low-sulphur, high quality fuels. However, government control of the pricing regime in most countries is likely to slow this process. In environments where refiners are not able to pass through the full costs of their investments to the end-users of the fuel, companies have little incentive to make such investments.

Similar issues underlie the new fuel initiatives emerging in several countries in the region. At present, Asian oil companies are generally absent from the high end of fuels technology. The international oil majors are pioneering new technologies such as gas-to-liquids, producing zero-sulphur diesel from natural gas. This could be a viable alternative for countries like Thailand, Indonesia and Malaysia, which have natural gas resources. Compressed natural gas ("CNG") fuelled vehicles are already in use in several countries in the region, but in practice are only used for government fleets. Some countries, such as the Philippines and Thailand, are also promoting biodiesel and ethanol-mix fuels.

For all of these new fuel alternatives, scalability is the big issue for developing countries. New fuel initiatives require enormous production and distribution infrastructure, and this requires committed investment. In heavily regulated markets, that investment is likely to have to come from government; but for poorer countries this may not be feasible.

For all of these new fuel alternatives, scalability is the big issue for developing countries

The issues for investors, therefore, are complex and difficult to assess, encompassing as they do many regional policy elements. Asian auto makers are coming under strong political pressure to produce fuel efficient, affordable cars. However, the reality is that currently the high quality fuel required to run these vehicles properly is not widely available in the region. Moreover, the regulatory regime in place in most countries may not reward suppliers for introducing the necessary capacity to change this.

Asian auto makers are coming under strong political pressure to produce fuel efficient, affordable cars

These prevailing conditions indicate that the material contribution that Asia can make in the short term to the goal of lowering global auto emissions globally will be the low-cost manufacture of fuel efficient vehicles for export to markets that have the capacity to supply the ultra low sulphur diesel needed to run them.

In the longer term, cleaner fuels and alternative fuels will become more available in the region, but this will require significant regulatory and commercial movement. Investors may consequently need to take a view on the likelihood and timing of deregulation of the oil and gas sector, in addition to specific issues with regard to development and enforcement of standards for auto makers.

IMPORTANCE OF ALLIANCES IN THE ASIAN AUTO SECTOR

Alliances and JVs shape the auto sector in ex-Japan Asia

Alliances and JVs shape the auto sector in ex-Japan Asia. Local companies are dependent in most cases on foreign partner technology and operate only as complete knockdown kit assembly operations with limited technological expertise. Even the Korean auto makers, which lead the ex-Japan sector, are technology receptors, with Hyundai being traditionally allied with Mitsubishi and Kia with Ford.

Figure 8 Regional Auto Sector —Selected JVs and Alliances

	Domestic Company	International partners	Asian partners
China	Brilliance China	BMW	
	Denway Motors	Honda	
	Dongfeng	Nissan	
	FAW	Toyota	
	Geely Auto		
	Jiangling Motors	Ford	
	Qingling Motors	Isuzu	
India	Mahindra & Mahindra		Jiangling Tractor (China)
	Maruti Udyog	Suzuki	
	Tata Motors		
Indonesia	Astra	Toyota	
Korea	Hyundai Motor Company	Mitsubishi	Beijing (China)
	Kia Motors	Ford	Dongfeng Yueda (China)
Malaysia	Proton	Mitsubishi	
Taiwan	China Motor	Daimler Chrysler, Mitsubishi	
	Yulon-Nissan	Nissan	

Source: Smith Barney et al, 2005

In order to respond to local preferences and bring new products to market quickly, some global auto companies are beginning to outsource product development to JVs

The industry generally has been characterised in recent years by increasingly rapid development of new products and a growing proliferation of models. This product volume has not necessarily been positive for overall profitability, but it has started to shape customer expectations of the frequency of new model launches. In order to respond to local preferences and bring new products to market quickly, some global auto companies are beginning to outsource product development to JVs: for example, Nissan outsources some development to its Taiwanese JV, Nissan Yulon. A few individual auto makers are also carrying out their own partial product development: for example, Geely Auto in China, which

Smith Barney describes as the only private sector Chinese sedan assembler with internally developed engines and automotive gearboxes[14]. While Geely's record of moving towards internal production of key components of the car is noteworthy, it should be recognised that its engine technology has been based on externally procured Japanese engines, whose product design is altered downwards to reflect conditions in China[15].

However, as sustainability factors —fuel efficiency and emissions standards — are added into product development requirements, sophisticated R&D and strong capital resources become ever more critical to competitive success. Technology and capital is most likely to be supplied by the foreign JV partners.

In practice, this means that an investment in an Asian auto company inevitably incorporates JV risk and effectively becomes a play on the foreign partner's sustainability profile. Auto makers in ex-Japan Asia may benefit considerably from key technology alliances, such as Chinese State owned FAW Group Corporation's agreement with Toyota to produce the hybrid Prius sedan in China. However, where these alliances are not exclusive, as in Honda's JV with Denway Motors in China, competitive advantage for the local auto maker may be limited.

Immaturity of Asian supply chain

The reliance of auto companies in ex-Japan Asia on their JV partners for technology and product development is exacerbated by the immaturity of the auto supply chain in the region. In developed countries, auto makers are able to outsource development, manufacture and assembly of important sections of the car to sophisticated first tier supply chain companies. This reduces costs and also reduces product development time, which can be a significant competitive factor, as auto companies compete to bring new models to market first.

The reliance of auto companies in Asia on their JV partners for technology and product development is exacerbated by the immaturity of the auto supply chain in the region

According to Wards Automotive, in 2003 Asia had a 33% share of global production of autos and auto parts. However, this figure largely captures the growing activities of multinational JVs, together with a basic components industry in Asia. For example, manufacture of labour-intensive casted metal parts, such as engine and brake parts, is now being outsourced to Asian suppliers, especially in China and India, which can offer a cost advantage.

The trend of outsourcing these generic auto parts to Asia is accelerating as production volumes increase in the region. For example, GM and Ford have announced plans to relocate US$8 billion in parts purchasing to Asia by 2010. However, as yet, the Asian auto supply chain suffers from a lack of vertical integration and there is little capacity to provide the sort of R&D and product development support that Western supply chains currently offer. R&D expenditure in China's auto parts industry, for example, represents less than 2% of the industry's overall revenue, according to Merrill Lynch[16], and few Chinese auto parts brands are considered competitive.

Within ex-Japan Asia, Korean auto parts companies are probably the most technologically advanced, largely as a result of their supporting role for the Korean auto makers: for example, Hyundai accounts for 50% of sales of Halla Climate Control, which is considered a leader in compressor technology (used in air conditioning systems). Hyundai Mobis is the listed auto parts arm of the Hyundai Group, which exclusively supplies Hyundai and Kia. As yet, it has lacked core technology and it focuses on body frames and various automobile modules, but the company is now also pursuing technology driven alliances, such as that agreed with Robert Bosch GmbH in 2004.

India is beginning to develop regional expertise in auto engineering design and has become the ninth country in the world to design its own vehicle. Firms such as Dilip Chhabria Design in Bombay are designing and building concept cars, prototypes and limited production runs.

In the medium term, it seems likely that the auto parts industry in Asia will increase in sophistication

In the medium term, it seems likely that the auto parts industry in Asia will increase in sophistication as production volumes increase in the region, driven in part by global auto makers' desire to access cheaper component manufacturers in the region but also to replicate the kinds of supply chain structures which they find valuable in their home markets. Some global auto supply chain companies are already responding by establishing a strong presence in Asia. US auto parts supplier, Visteon Corporation, for example, has recently announced several strategic acquisitions and JVs in the region. Paradoxically, the potential bankruptcy of another leading US auto parts supplier, Delphi Corporation, could accelerate this process as the more advanced auto parts makers in Asia may have an opportunity to seize parts of its supply chain business.

For ex-Japan auto companies, capital is a critical constraint on their ability to scale up internal R&D and product development activities. As companies come to the public markets — a process which is already well under way in China - it is likely that those which make a strategic decision to apply significant amounts of the capital raised to technology improvement will put themselves in a strong position versus the competition. As both auto makers and components companies increase in sophistication, there is likely to be a movement towards vertical integration and strategic alliances across the industry chain. Already, some companies in Asia are moving in this direction, notably Visteon and China's third largest auto maker, ChangAn, which have announced a JV not only to manufacture components, but also to carry out complete engine management system development.

These industry regroupings may have significant impacts on the ability of the Asian auto makers to respond to changing industry regulation as well as consumer preferences. Auto companies with access to capital and technology, either internally or via strategic alliances across the supply chain, are likely to outperform.

THE LONGER TERM: POSSIBILITIES AND REALITIES OF NEW TECHNOLOGY

In the longer term, it is reasonably safe to assume that auto emissions and fuel efficiency standards will continue to tighten around the world and that worsening pollution and traffic in developing countries will encourage public support for such standards. Asian auto companies that aim to export vehicles to Europe or the United States — such as Brilliance China, which plans to sell sedans in Germany this year — must also comply with export market emissions standards that may be more stringent than those at home.

In response to heightening standards, alternative and lower carbon technologies are now emerging, which may transform the auto industry. Those auto makers which are able to develop lower carbon technologies ahead of competitors hope that they will reap the benefits of technological leadership, brand differentiation and enhanced profits.

In response to heightening standards, alternative and lower carbon technologies are now emerging, which may transform the auto industry

It is possible to group the main lower carbon technologies under development into four main categories.

- "Incremental technologies" i.e. modifications to the conventional gasoline-powered, internal combustion engine
- Diesel (or compression ignition) technology
- Hybrid and electric technology
- Fuel cell technology

So far, there is a great deal of uncertainty as to which technology or technologies will emerge as global winners. Based partly on prevailing regulatory regimes in their most important markets, multinational auto makers have developed different preferences for lower carbon technologies: most European auto makers display a strategic bias towards diesel, as diesel cars make up more than 40% of European car sales; US based auto makers tend to focus on fuel cell technology; Toyota and Honda show most bias towards hybrid technology.

Another potentially important area for the future direction of the auto industry is materials development. According to Amory Lovins, head of the Rocky Mountain Institute in the United States, only 13% of the fuel energy of a modern car even reaches the wheels. The rest is either dissipated as heat and noise in the engine and drive-train or lost to idling and accessories such as air conditioners[17]. Lovins argues that use of lightweight materials in car manufacture would greatly improve vehicle fuel efficiency without compromising passenger safety. Lightweight steel or advanced composite materials, such as fibreglass or carbon fibres can nearly double the efficiency of today's hybrid cars and light trucks[18]. Moreover, Lovins suggests that ultralight cars could greatly accelerate the transition to hydrogen fuel cell cars, because a greater fuel economy would require smaller fuel cells, which would be easier to manufacture affordably and would not require new vehicle storage technologies.

Only 13% of the fuel energy of a modern car even reaches the wheels

Recent years have seen several initiatives in steel technology and manufacturing processes in support of greater fuel efficiency. For example, the Ultra Light Steel Auto Body ("ULSAB") and ULSAB Advanced Vehicle Concepts programmes, sponsored by a consortium of global steel manufacturers, including Pohang Iron & Steel Co ("POSCO") of Korea and several Japanese steel makers, explored advances in lightweight design for automobiles. POSCO, one of the world's leading steel makers, has devoted significant R&D budget to advanced automotive products and could be a valuable partner to the Korean auto industry in this area in the future.

Auto companies face a considerable challenge not only in developing new technologies, but also in devising an innovation strategy and maintaining capacity across multiple technology pathways. The latter, especially, puts pressure on R&D budgets. For auto makers in ex-Japan Asia, a long term technology strategy is most likely to mean re-examining their JVs and alliances and trying to ensure that they have access to the range of most likely technologies under development.

The introduction of vehicles using new technology also presents a significant management challenge, especially for smaller auto makers, as this is likely to increase manufacturing costs significantly, at least until economies of scale in their production are built up. These costs, together with the need to pay technology royalties to JV and alliance partners, could significantly damage local companies' profitability in the short to medium term.

Governments in Asia are promoting the development of new technology with a mixture of incentives and penalties. The Chinese government, for example, is expected to issue a new set of technical standards in 2005 for the development of hybrids. The Korean government has also supported the development of hybrid vehicles and has taken part in a number of pilot programmes, which has assisted Hyundai's progress in that area.

Many new auto technologies rely on access to alternative fuels or fuels of a much higher quality than that widely available

For investors in the auto sector in Asia, it is essential to bear in mind that many of these new technologies are based on alternative fuels or existing fuels of a much higher quality than that widely available. The practical challenges involved in nationwide production, storage and delivery of, say, hydrogen for fuel cell technology or ethanol for biodiesel technology will be considerable, as will the investment in infrastructure and technology required to make it happen.

Given the involvement of government in both the auto and energy sectors, it is very likely that government will play an active role in co-ordinating between the sectors and attempting to ensure that capacity in fuel production and delivery keeps pace with commercialisation of new technology vehicles. Most countries already have national programmes to support new technologies and alternative fuels, such as India's National Hydrogen Energy Board and the Philippines' proposed National Fuel Ethanol Programme. The challenge for investors in analysing these developments is to reach an assessment of where the value of the resources provided by governments will outweigh the potential delays and competitive market distortions created by government dominance, and to identify the groupings of auto makers, fuel suppliers and regulators that may deliver real future value.

As technology and local conditions continue to push the auto industry in Asia in different directions, long term investors should also consider the possibility that the sector will not follow the precise model established in the developed countries. As the industry migrates to low cost centres like India and China, it is possible that it could fragment into separate areas of specialisation, as opposed to the traditional vertical integration of Western car companies. Currently, most Asian auto companies are assembly operations, dependent on foreign JVs for technology. Given capital constraints and practical difficulties of developing in-house technology, it might be a reasonable strategy for less sophisticated companies to continue to focus on assembly and to buy in technology from those companies in the region who are able to deliver it. For example, India is already establishing regional expertise in auto engineering design, which is lodged within independent companies that have no capacity to manufacture cars themselves. Meanwhile, the more sophisticated supply chain companies being built up in the region are likely in the future to possess superior technology to that of many of the auto assemblers.

Another key area of activity within the industry in developed markets is that of auto financing. While many of the major global companies have announced plans to build up this part of their offering in Asia, it is again possible that local companies may not follow their model. Auto financing is a potentially attractive business for the banking sector, which, at national level and with a regulated financial services environment, may well be able to maintain control of it and deny entry to the local auto companies.

Given a scenario of fragmentation and specialisation within the industry in Asia, strategic alliances, rather than vertical integration, could be the dynamic force driving strategic competition for the auto makers.

In the longer term, therefore, new technology has the potential to alter the auto industry in Asia along multiple dimensions

In the longer term, therefore, new technology has the potential to alter the auto industry in Asia along multiple dimensions. Critically, investors in the sector need to be aware that this change may not necessarily be for the benefit of the auto makers. The size of the future markets in India and China, in particular, mean that a local technological breakthrough, if successfully commercialised, might lead to dominance of that market segment in the region by Indian or Chinese auto companies. Equally, however, a potential disaggregation of the regional auto industry, and a restructuring by specialisation, could have negative implications for the auto makers, in that the margin advantages may go to the key suppliers with new technology, while the auto companies remain low value-added volume assemblers for the long term.

INVESTOR QUESTIONS FOR COMPANIES

Management

- Does management have a specific strategy on climate change issues (auto emissions, fuel efficiency) and related regulatory risk?
- Does management have specific interaction with government on these issues?
- Does management have specific interaction with JV partners on these issues?

Fleet mix

- What is the breakdown of light, medium and heavy vehicles?
- What is the breakdown of commercial and passenger vehicles?
- What percentage of the fleet is SUVs? Is this percentage expected to change in future?
- Does the fleet mix include any hybrid vehicles? Is this percentage expected to change in future?
- Does the fleet mix include any alternative fuelled vehicles e.g. CNG? Is this percentage expected to change in future?
- Which segments of the fleet are manufactured by the company itself and which by its JVs with foreign auto makers?

Compliance with domestic standards

- What percentage of the fleet currently complies with domestic fuel efficiency and auto emissions standards?
- What percentage of the fleet currently complies with published standards to be introduced in the near future?
- What percentage of the fleet currently complies with equivalent Euro IV or Euro V standards?
- What investment is required to ensure that all vehicles comply with current standards?
- When will this investment take place?
- What investment is required to ensure that all vehicles comply with published future standards?
- When will this investment take place?

- What investment is required to ensure that all vehicles comply with Euro IV or Euro V standards?
- When will this investment take place?
- How will the company fund these capital expenditures?

Exports

- What percentage of the fleet is manufactured for export?
- Do the export model vehicles currently meet all the auto emissions and fuel efficiency standards in the markets in which they are planned to be sold?
- What investment is required to ensure that all vehicles comply with standards in the markets in which they are planned to be sold?

Fuel efficient technology

- Has the company developed its own technology to manufacture fuel-efficient models?
- If not, where does it source such technology?
- Do the company's JVs with foreign auto makers have access to fuel efficiency technology from those companies? Does the company itself have access to this technology?
- Does the company have long-term agreements with technology providers?
- Are agreements with technology providers exclusive to the company?

R&D

- Does the company have a strategy for the development of alternative fuelled vehicles?
    - hybrid and electric technology
    - fuel cell technology
    - diesel (or compression ignition) technology
    - gas-based alternative fuels e.g. CNG
- Is the company carrying out research into the use of lightweight materials, such as advanced steel or composite materials, in order to improve vehicle fuel efficiency?
- How much does the company spend on R&D?
- Does the company control its own R&D or is this activity lodged exclusively in its JVs?

- Is the company taking part in any government-sponsored research programmes or pilot schemes of new auto technologies?
- What other R&D initiatives is the company undertaking?

Fuel supply

- Is the company involved in any dialogue or agreements with fuel supply companies on provision of cleaner or alternative fuels?

RESOURCES

Company websites

• Astra	www.astra.co.id
• Brilliance China	www.brillianceauto.com
• China Motor Corp	www.5230.com.tw/eng_version
• Denway Motors	www.irasia.com/listco/hk/denway/index.htm
• Geely Auto	www.geelyauto.com.hk
• Hyundai Motor	worldwide.hyundai-motor.com/index.html
• Hyundai sustainability report	worldwide.hyundai-motor.com/dataPDF/sustainability/Sustainability(ENG).PDF
• Kia	www.kiamotors.com
• Mahindra & Mahindra	www.mahindra.com
• Maruti Udyog	www.marutiudyog.com/index.asp
• Proton	www.proton.com
• Tata Motors	www.tata.com/tata_motors

Useful web-based resources

• The Auto Channel	www.theautochannel.com
• Clean Air Net	www.cleanairnet.org/caiasia
• Climate Biz	www.climatebiz.com
• Green Car Congress	www.greencarcongress.com
• International Finance Corporation (IFC)	www.ifc.org/sustainability
• WBCSD Sustainable Mobility News	www.wbcsd.org/plugins/workspace/default.asp?WSpaceId=NjE

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7 ibid
8 www.epd.gov.hk/epd/english/environmentinhk/air/prob_solutions/cleaning_air_atroad.html
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Taking Stock

Adding Sustainability Variables to Asian Sectoral Analysis

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Auto
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Sustainability

Sustainability is a systemic concept, relating to the continuity of economic, social, institutional and environmental aspects of development. In the terms of the 1987 Brundtland Report of the UN's World Commission on Environment and Development, sustainability is: "Meeting the needs of the present generation without compromising the ability of future generations to meet their needs." The key concept for investors is the need to address a range of environmental, social, and governance (ESG) factors which will inevitably shape long-term returns as markets respond to changing resource requirements and public priorities.

INTRODUCTION

"Managing other people's money entails a fiduciary responsibility that calls for higher ethical standards than in the average business"

David Lascelles, "Other People's Money: The Revolution in High Street Banking"

"Although the direct environmental impacts of financial companies such as banks, asset managers and insurance companies are limited to universal business environmental issues such as resource use, procurement in offices and business/ staff travel, there is a general consensus that they have significant indirect impacts through their lending and investment activities."

FTSE4Good/EIRIS Environmental Impact Sector Classifications for Financials

The Asian banking sector, like its counterparts globally, does not have high direct sustainability impacts. Nonetheless, the banking sector plays a crucial role in directing capital in one of the highest impact regions for environment, social and governance (ESG) risks. The ESG cost of bad credit decisions casts a long and, in some instances, irreversible shadow over development options. For example, the ability of Asian banks to respond to the current funding needs of Asia's fast-growing energy and high tech manufacturing sectors will inevitably shape Asia's long-term ESG profile. This interplay between lending decisions and Asian ESG management is amplified by the dominance of bank lending in the funding equation in Asia, making the health of the region's banks integral to Asia's ability to move toward a more sustainable development path.

The funding needs of Asia's energy and manufacturing sectors will shape Asia's long-term ESG profile

While the financial authorities have made significant headway since the Asian crisis (1997-98) in developing local capital markets, most countries are still struggling with inefficient financial systems, outdated infrastructure and maturing legal systems. Most local banks are still controlled by the government or by families, raising a significant issue of corporate control as well as corporate governance.

Reflecting this diversity, management understanding of sustainability issues in Asian-based banking institutions ranges from top-of-the-agenda for the global financial institutions operating in the region such as HSBC, Standard Chartered, and Citigroup to significantly below the radar screen for most of the locally listed players. For example, HSBC moved from 45th in 2004 to 4th in 2005 in the Accountability Rating ranking[1] of the Fortune Global 100. The large global financial institutions, particularly in Europe, have already evolved from a reactive stance to a proactive stance on sustainability[2] and some are already moving to a comprehensive sustainable banking mode.

We see a scenario where social, environmental, and governance risks have the potential to accelerate the growing divide between leaders and laggards

By contrast, financial institutions in Asia are by-and-large still in reactive mode, even when sustainability issues register on management's agenda. As a result, we see a scenario where ESG risks have the potential to accelerate the growing divide between leaders and laggards in Asian banking. As leading banks become more adept at identifying problematic ESG issues, they will be motivated to improve corporate governance, reduce credit exposure to affected

sectors, or seize opportunities to develop new risk management tools. As a result, ESG risks could easily become concentrated in the corporate loan books of less capable banks, adding to their fundamental operational challenges.

ESG risks will place new pressures on Asia's banking sector and will highlight, once again, the importance of the most basic bank disciplines, especially those linked to governance. The key ESG risks affecting the financial sector in Asia today are inextricably linked to the most fundamental trends that shape the sector. And while ESG risks have the potential to further burden banks with troubled legacy assets, there will be scope for a new generation of banks with forward-looking ESG strategies which will have the potential to tap into new consumer and product-driven market niches.

In this report, we assess these issues in the context of Asia's most broadly held large- and mid-capitalization listed banking companies. We believe that the most important sustainability themes for investors in the Asian banking sector will be:

- **Corporate control & governance** Efforts to improve bank governance will hinge on issues of corporate control
- **The technology bet** This will be crucial to establishing good governance, assessing sustainability risks, and seizing new product opportunities
- **Asset quality and sustainable risk assessment** The asset quality of Asian banks has suffered from a history of poor risk management; ESG risk assessment could provide a powerful new tool
- **ESG management —long-term differentiator** Asia's top banks will embrace sustainability themes, especially as they migrate toward consumer banking opportunities. Specialty players, such as non-bank consumer finance companies, unburdened by balance sheet problems, may also prove competitive in offering new sustainable finance products and services, permitting them to take significant market share in profitable niches of the finance industry

COUNTRY AND SECTOR DYNAMICS

What the sector looks like today

The financial sector in Asia is highly fragmented, reflecting the diversity of a region which encompasses the two most populous countries in the world, China and India, as well as some of the smallest. There is also a wide diversity of development, ranging from OECD countries such as South Korea, developed countries such as Hong Kong and Singapore, and some of the world's poorest such as

Bangladesh, North Korea and Myanmar. Banks operating in Asia cover a wide spectrum from the world's top global financial institutions to small local players.

Figure 1 Larger Regional Listed Banks

Market	Company	Market Cap* (US$mm)	Market	Company	Market Cap* (US$mm)
Hong Kong	HSBC Holdings	182,937	**Korea**	Kookmin Bank	24,726
	China Construction Bank	77,777		Woori Finance	16,182
	Standard Chartered	29,494		Shinhan	14,728
	Hang Seng	24,955		Korea Exchange Bank	9,082
	Bank of Communications	20,700		Ind Bank of Korea	7,102
	BOC Hong Kong Holdings	20,592		Daegu Bank	2,019
	Shanghai Pudong Dev Bank	4,894	**Malaysia**	Malayan Banking	11,096
	Bank of East Asia	4,567		Public Bank	5,918
	China Minsheng Banking	3,778		Commerce Asset	4,150
	Guoco Group	3,620		Hong Leong Bank	2,130
	Hua Xia Bank	2,552		AMMB Holding	1,335
	Wing Hang	2,116		RHB Capital	1,065
	Wing Lung	1,797	**Singapore**	DBS	14,832
	Dah Sing Financial Hldg	1,728		UOB	13,474
	Dah Sing Bank	1,706		OCBC	12,534
	Shenzhen Dev Bank	1,532		Hong Leong Finance	945
	Industrial & Commercial Bank of China	1,366	**Taiwan**	Cathay Financial	15,361
	First Pacific Co Ltd	1,226		Mega Financial	7,386
	CITIC Int'l Financial Hldgs	1,179		Fubon Financial	6,923
India	ICICI Bank	11,149		Chinatrust Financial	5,612
	Sate Bank of India	10,603		China Development	4,048
	HDFC Bank	4,903		Taiwan Business Bank	1,093
	HDFC Bank	4,887	**Thailand**	Bangkok Bank	4,900
	Punjab National Bank	3,264		Kasikornbank	4,062
	Bank of India	1,380		Krung Thai	3,007
	Union Bank of India	1,247		Siam Commercial	2,301
	YES Bank	410		TMB Bank	1,400
Indonesia	Bank Central Asia	4,266		Siam City Bank	1,255
	Bank Mandiri	3,380		Bank of Asia	1,075
	Bank Danamon	2,379			

* As at 30 December 2005, or last official day of trading

Source: Bloomberg, December 2005

While most of the leading banks are listed on local markets, it is significant that some of the major players in critical markets, such as the Bank of China, are not listed, or with very limited float, restricting the ability of investors to invest in some key segments of the sector. Indeed, the phased listing of China's Big Four government-owned banks which started in 2005 represents a multi-billion dollar step toward equitization of the China's banking sector. Foreign banks are active players to various degrees in most markets, depending on the market's openness to foreign investment and the particular bank's strategy. Most of the global financial institutions, such as Citigroup, Bank of America, JP Morgan Chase, HSBC, Deutsche Bank, BNP Paribas, Calyon and others are to various degrees involved in most Asian markets, as are the global investments banks such as Credit Suisse, Morgan Stanley, Goldman Sachs, Merrill Lynch, and UBS. And although the Asian insurance sector is developing rapidly, with significant participation from global companies, it is not yet a significant sector for Asian equity investors.

Many countries in Asia are significantly over-banked. For example, China's commercial bank deposits account for nearly 200% of GDP and loans in the banking system currently stand at 130% of GDP. This is also true for some of the most developed markets; Taiwan and Hong Kong have even higher banking ratios[3]. Corporate control issues affect the ability of players to execute M&A strategies in countries like Indonesia and South Korea and restrict the ability of the government to encourage much-needed consolidation in markets like Taiwan and Thailand. In many countries, the financial authorities simply lack the power to move the agenda forward, with weak regulators and central banks controlled by the government. As recently highlighted by People's Bank of China (PBOC) chief Zhou Xiaochuan, "scandals are one of the four major incentives driving reform of the mainland's banking system"[4] as they provide the stakeholder pressure necessary to push for reform.

Cross-cutting issues

The Asian crisis of 1997-1998 painfully highlighted the inefficiencies of the region's financial markets and its over-reliance on bank lending

Inefficient financial systems The Asian crisis of 1997-1998 painfully highlighted the inefficiencies of the region's financial markets and its over-reliance on bank lending as the primary source of financing. While governments have made significant headway in setting up local capital markets, most countries' financial systems still suffer from structural and efficiency problems. Regional cooperation between financial authorities has contributed to significant changes and local capital markets, particularly local currency debt capital markets, have since taken off. One example of such cooperation is the signing of swap agreements between the region's central banks to help fend off sporadic speculative attacks on their currency. Another example is the Asian Infrastructure Bond Fund[5], which was developed by the region's financial authorities to foster the development of the domestic bond markets.

Nevertheless, many financial systems remain under-developed and inefficient, with payment system infrastructure lagging behind. At the same time, the overwhelming reliance on bank lending as the primary source of capital for the region's enterprises continues to affect the financial system as a whole, with under-developed financial markets restricting the corporate sector's access to alternative sources of financing. Indeed this is one of the drivers behind decisions

by multilateral funding institutions to invest in China's banking sector. As stated by the IFC, "if you invest $10 in a bank and that bank becomes an effective financial intermediary by mobilizing savings and directing it toward borrowers that can use it most effectively, you can end up funding 150 shoemakers. The developmental impact of a good financial intermediary on an economy is huge."[6].

The concentration of banking activities on corporate banking is also both a drag on banking revenues and a potential source of defaults affecting the sector's viability and exacerbating non-performing loan (NPL) problems. The problem is especially acute in China, where bank lending accounted for between 76 and 99% of all business financing in 2001-2005[7]. Indeed, the prevailing mindset in local banks across the region has traditionally been a focus on size (total assets) before profits.

Lack of system infrastructure The lack of basic infrastructure, defined by manual local processes versus centralized automated processes and by low penetration of telephone, computer, and internet services in many countries, impairs the development of efficient financial systems. These gaps make it difficult to set up efficient clearing systems and settlements systems and are a roadblock to improved corporate governance. Under-investment in technology by most of the local players significantly impairs bank managements' ability to provide basic services and to implement strategy and control execution. For example, sweeping bank regulations such as Basel II[8] — a global capital adequacy standard — and bank reforms are extremely difficult to implement across the banking sector in Asia where local players lack the basic infrastructure necessary to set up the relevant management information systems for internal reporting.

Lack of legal infrastructure In many countries, the legal system is still under-developed, with many lacking fundamental legal structures such as basic property rights, copyright protection, and banking laws. For a sector that is heavily reliant upon a well functioning system of secured transactions, this is a significant gap. Where there exists such legislation, enforcement is often inconsistent at best. Even in countries where the rule of law stands firm, there can be uncertainty in the interpretation and enforcement of basic laws. It is not enough to simply operate within the law, the moral obligation of banks implicit in corporate social responsibility, or good citizenship, is hard to establish when the law itself is a moving target.

The moral obligation of banks implicit in corporate social responsibility is hard to establish when the law itself is a moving target

Long-term sector outlook

Many forces, strongly reinforced by global and Asian sustainability trends, are at work that will substantially alter the financial landscape in Asia in the longer term. Technology will significantly amplify the tiering effect already visible in all markets. Players with the capacity to invest in technology will be better positioned to penetrate the promising new markets of consumer finance and wealth management, while at the same time reaping the rewards, in terms of increased profitability, of increased internal processing efficiency. Moreover, as sector leaders shift from corporate banking to consumer and retail banking, major revenue and profit generators will accelerate on the back of two major forces: the ageing of the population and the increasing disintermediation of the financial market.

Consolidation will accelerate, driven by the blurring of boundaries within the financial sector and the need for scale to absorb the required technology investments. Globalisation will continue, as markets grow more integrated, with the possibility of closer co-operation between the different markets. Asian capital markets will continue to deepen, driven by the urgent need for both corporate financing alternatives to banking and for pension fund investment alternatives as ageing populations increase the demand for pension fund development. "Best-in-class" practices will be adopted often reflecting a better understanding of sustainability risk factors and an effort to provide new risk management and investment products. This dynamic will accelerate as foreign global institutions continue their penetration of local markets and as the region's dominant players become more actively involved in foreign markets.

The net effect of these trends for investors focused on sustainability issues should be greater emphasis on specific tools for effective implementation of improved corporate governance strategies. Investors will want to remain extremely attentive to operational and organizational metrics which signal progress on improved corporate governance and control at the board level, and crucially, in credit decisions. While this is a recognized priority with Asian bank regulators, the actual pace and quality of implementation will shape performance over the longer term as sector leaders and new entrants place competitive pressure on laggards. This trend will be accentuated as greater recognition of sustainable finance practices and products creates opportunities for the more nimble Asian banks.

CORPORATE CONTROL & GOVERNANCE

Corporate governance becomes a differentiating factor between leaders and laggards in the industry

Perhaps the most strategic issue for investors in the Asian banking sector will be the ability of Asian banks to define and implement more effective standards of governance. Post-Enron and post-Asian crisis, it is hardly surprising that corporate governance is identified as one of the leading preoccupations of the banking sector in various industry and international surveys. With new studies increasingly correlating good corporate governance with good company performance, corporate governance becomes a differentiating factor between leaders and laggards in the industry. In Asia, polarization is accentuated by the heterogeneity of the sector, compared to more homogeneous developed markets such as the US.

Figure 2 Corporate Governance and Key Asian Markets

Key Markets	Govt Ownership Dominance	Family Ownership Dominance	Tech Advance	NPLs	Corruption & Control	Penetration of Foreign Investors	Probability of Technology Leap Frogging	Capital System Efficiency	Legal System Efficiency
South Korea	Medium	Low	High	Medium ↓	Medium	High	High	High	High
India	Low	Low	High	Medium ↓	High	High	High	Low	Medium
China	High	Low	Low	High ↑	High	Low	High	Low	Low
Taiwan	High	Medium	Low	Medium	Medium	Medium	Medium	M/High	Medium
Hong Kong	Low	Low	Medium	Low	Low	High	Low	High	High
Singapore	Low	Low	Medium	Low	Low	Medium	Low	High	High
Indonesia	High	Medium	Low	High ↓	High	Low	Low	Low	Low
Malaysia	High	Medium	Low	Medium ↓	Medium ↓	Low	Medium	M/High	Medium
Philippines	Low	High	Low	High ↑	High	Low	Medium	Low	Low
Thailand	Low	High	Low	High ↑	Medium	Low	Low	Low	Low

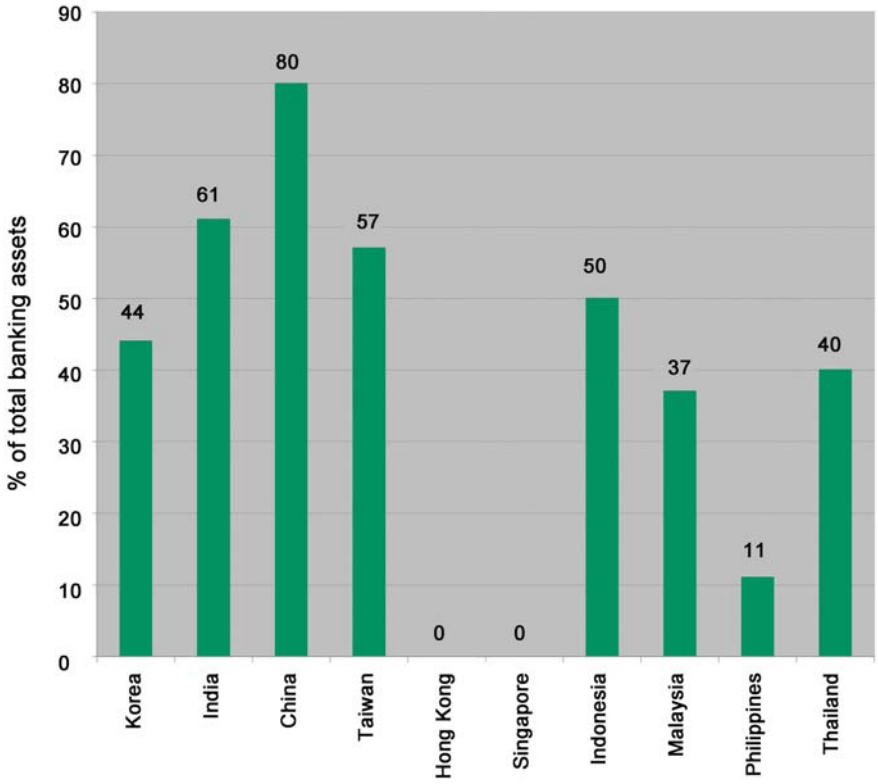
Source: ASrIA, 2005

In Asia, this particular issue takes on added significance as a result of the predominance of state-controlled and family-controlled companies in the financial sector, and as such, corporate governance is closely linked to corporate control. Foreign ownership of financial institutions remains tightly controlled in most markets, restricting the ability of better-capitalized local and foreign institutions to develop aggressive M&A strategies. Many initiatives are under way including the slow opening of China's market and the recent abolition by Taiwan authorities of the cap on foreign investment in domestic banks. In some countries the opening of the market to foreign investors has been an intricate dance, with two steps backwards for each step forward as regulators and politicians struggle to balance the promise of better sector fundamentals with domestic political pressures.

Government and family ownership shape the sector's risk profile

State ownership still dominates the financial sector in many countries in Asia. This raises a very important corporate governance issue, partly due to the particular role of banks in the economy. According to the Asian Development Bank Institute: "Greater state ownership of banks is associated with less financial development, and lower growth and productivity. [It is] associated with the level of non-performing loans and policies that restrict bank activities, reduce bank competition and stymie private sector control of banks. [It] increases the probability of banking crisis.[9]"

Figure 3 Banking Assets under Government Control, 2002



Source: data source from McKinsey "Banking in Asia, 2003", ADBI, 2005

In some cases, government ownership is partly a result of nationalization of troubled financial institutions in the aftermath of the Asian crisis and the government's key role in driving a consolidation of the financial sector and a closing down of non-viable institutions. For example, in Indonesia significant banking reform has been accomplished under the government's leadership: 70 banks were closed, 13 were nationalized, and the number of licensed banks was reduced from 240 at the time of the Asian crisis to 138 at the end of 2003. Bank Indonesia has announced plans to encourage further consolidation between the smaller banks, but the top banks in terms of assets are still government controlled. For example Bank Mandiri, the largest bank, is 70% government-owned while Bank Negara Indonesia (BNI), the third largest bank, is also state-owned.

The policy consequences of government ownership vary widely across Asia

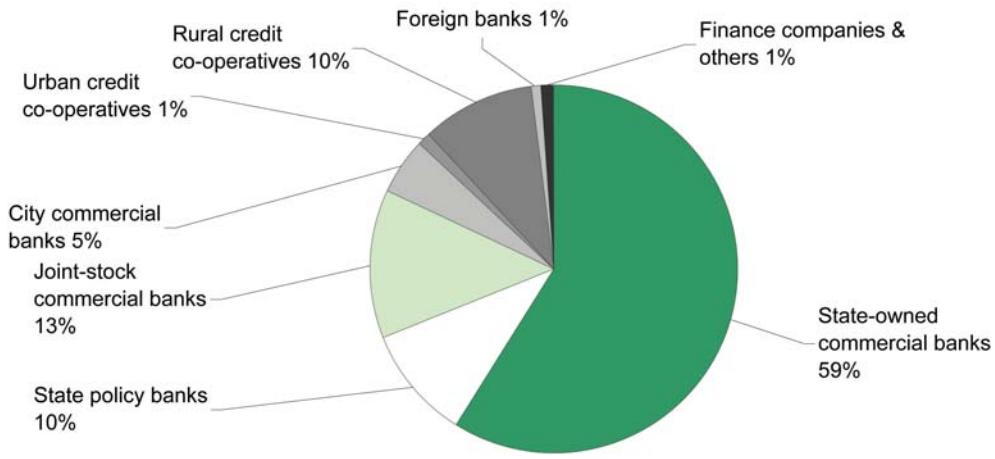
The policy consequences of government ownership vary widely across Asia however. In Malaysia, the government forced through a consolidation of the banking sector reducing the number of banks from 55 to 10 in 1998-2003. More recently, a second wave of consolidation has started with the consolidation of the Commerce Asset Holdings Berhad (CAHB) banking group, the second largest bank group in Malaysia by asset size. The group's investment banking arm, CIMB, announced on June 6, 2005 the takeover of its affiliate Bumiputera Commerce Bank (BCB). This deal creates a universal bank type entity capable of offering a full range of commercial and investment banking products, as well as a more sizeable entity able to reap economies of scale and position itself as an acquirer rather than a target in the next wave of national and regional

consolidation[10]. It is worth noting that CAHB's major shareholder is state investment agency Khazanah; the Malaysian government has made it clear that it wants to see a further round of market-led bank mergers in Malaysia and also seeks to improve corporate governance[11]. Rather than forcing the mergers through, as was the case post-crisis, the government is taking steps to encourage banks to merge.

In other cases, government control of the financial sector is a legacy issue from the past. For example Taiwan has 14 financial holding companies and 47 banks, of which 12 are state-owned, and the three largest banks (Bank of Taiwan, Taiwan Cooperative Bank and Land Bank of Taiwan) are all wholly owned by the government.

Since the Asian crisis, it is estimated that Asian governments have invested over US$500billion[12] to help their domestic banks, highlighting the critical role of banks in financing the economy and as a repository of deposits. Banks are used by governments as a device for economic development and to an extent this hobbles Asia's banking systems. On the other hand, "governments have to take responsibility when the banks get in trouble" says Terry Chan, Standard & Poors director.

Figure 4 Chinese banking sector: market share by assets, 2002



Source: Deutsche Bank Research, China Special, 9 January 2004

In China, as a result of the legacy of socialism, wholly state-owned banks dominate the market and control over 60% of the sector's total assets. Most major mainland Chinese banks are still under government control. Further to China's entrance in the WTO, the government has embarked on an ambitious program of banking sector reform, including opening the sector to foreign investors, consolidation, and privatization through overseas listing of the state-owned and state-controlled banks. Starting with the joint-stock companies — Bank of Communications and China Minsheng — the sector is slowly opening up to foreign investors. Overseas listing of the Big Four is also in process, with CCB completing an US$8 bn IPO in Hong Kong October 2005 and the other listings expected in the next 12 to 18 months. UBS estimates that overseas investors have committed US$18 billion to the Chinese banking system from Sept 2004 to Sept 2005 and that by the close of 2007 foreign banks and other

investors could conceivably control more than one-sixth of the entire Chinese banking system.

Figure 5 Overview of the Chinese banking sector

The People's Bank of China | China Banking Regulatory Commission

Big Four State-owned Banks	11 Joint Equity Commercial Banks	Three Policy Banks	Small and Mid-Sized Banking Institutions	Four Asset Management Companies	191 China branches of Foreign Banks
China Construction Bank	China Minsheng Banking Corp. Ltd.	The Export-Import Bank of China	City Commercial Banks (112)	China Huarong Asset Management Corp.	• HSBC • Citibank • JP Morgan Chase • Bank of East Asia • Standard Chartered • ABN Amro
Agriculture Bank of China	Bank of Communications	Agriculture Development Bank of China	Credit Cooperatives (39,100)		
Industrial and Commercial Bank of China	Citic Industrial Bank	China Development Bank	Trust & Investment Companies (136)		
Bank of China	Shanghai Pudong Development Bank		Leasing Companies (12)		
	China Merchants Bank				
	Guangdong Development Bank				
	Huaxia Bank				
	Shenzhen Development Bank Co. Ltd.				
	Evergrowing Bank				
	Fujian Industrial Bank				
	China Everbright Bank				

Source: "The Changing Banking Landscape in Asia Pacific" Deloitte 2004 Report

The link between government ownership and governance risks is unfortunately quite strong

The link between government ownership and governance risks is unfortunately quite strong. Government-directed and policy lending designed to favour specific industry sectors has been a consistent trait of the banking landscape in Asia, especially in China with lending to state-owned enterprises (SOEs) and in South Korea with lending to the chaebols. This in turn has resulted, in many cases, in significant lessening of asset quality in the banking sector and, in the worst cases, in high NPL ratios. This has negative affects on the growth prospects of the financial institutions, the efficiency of the financial system and the growth prospects of the economy as a whole.

Unwinding long-established lending abuses is not easy however. In some cases, government initiatives to reform the banking sector and push through better corporate governance have clashed with other government macro-economic initiatives.

For example, in Thailand, over the past year the finance minister and the central bank governor clashed over lending at state-owned Krung Thai Bank, which had rapidly expanded its loan portfolio as part of the government's policy to stimulate growth.

Many initiatives are under way to privatize government-owned financial institutions

Many initiatives are under way to privatize government-owned financial institutions and in some cases the process is nearing completion. For example, in South Korea, "the government continues to direct the sector's evolution and intends to divest itself of stakes in local banks and re-capitalize distressed financial institutions"[13]. However, in other countries progress has been impaired by vested interests, in particular labour unions concerned about the loss of jobs as a result of consolidation, as in Taiwan, as well as significant pressure from politicians seeking to protect established areas of influence, as in South-East Asia and India.

Another difficulty impairing the progress in privatization is the lack of efficiency of the financial system which restricts the sources of available financing. Despite significant progress accomplished post-Asian crisis to develop local domestic capital markets, most markets still lack the depth necessary to recapitalize ailing domestic financial institutions. Opening the market to foreign capital enables a much needed injection of funds into the sector, and also brings about the technology and know-how necessary to improve governance and efficiency, which explains why governments in markets like South Korea, Thailand and recently China have been encouraging international buy-ins. In fact, Chinese government and banking officials alike emphasize that the main driver for opening the banking sector to foreign investors is the ability to tap foreign institutions' know-how in terms of corporate governance, risk management and technology. According to UBS chief Asian economist, the Chinese authorities are following the "PetroChina model" whereby the purpose of selling to foreigners is never to get money, as most large state firms are already awash with liquidity. In fact, the government found that overseas investors provided a "one-stop shop" for enterprise reform. In most cases, the result has been better-managed, more profitable and transparent companies[14]. Javed Hamid, IFC's East Asia chief, believes that the IFC's main contribution to Chinese bank reform will come from the impact its investments and knowledge sharing have had on China's regulators[15]. The Asian Development Bank announced on 10 October 2005 that it would invest US$75 million in Bank of China to "help the lender enhance corporate governance and control systems ahead of its IPO"[16].

In many countries family groups control a significant number of local financial institutions

In many countries, particularly in South-East Asian countries such as Thailand, as well as in more mature banking markets like South Korea, family groups control a significant number of local financial institutions. This is not simply a characteristic of the banking sector, but a general characteristic of the Asia Pacific economies, which are still to a large degree dominated by family or government controlled businesses. Academic studies show that founding families play a dominant role in corporate Asia[17]. According to research done by the

World Bank, approximately two-thirds of the listed companies in Asia, and substantially all private companies, are family-run. Some commentators put family control of companies at 90% in India with tax avoidance facilitated by intra-corporate loans, misappropriation of funds, and cover-ups the result. A recent survey of 455 companies listed in Singapore and Malaysia stock exchanges found that 52% of the sample was family controlled[18]. Most companies in Asia are organized into family-controlled business groups via pyramids and cross-shareholdings[19]. In Hong Kong, analysts see a similar pattern, with owners of as little as 20% of a company's outstanding shares exercising effective control over the company in an estimated 90% of listed companies.

The ADBI 2005 comprehensive survey of banks in four Asian economies (Indonesia, South Korea, Malaysia and Thailand) and an academic report from the Chinese University of Hong Kong based on the ADBI data show that:

- 70% of the banks in the survey have concentrated ownership and are controlled by families (12%), governments (30%) or foreigners (30%)
- There exists significant political involvement in the management and governance of the banks
- The banks' governance structures are significantly related to the banks ownership and control structures, in particular family or state controlled banks tend to adopt governance structures that cater to the controlling owners
- Significant positive relationships between governance quality and performance exist in sub-samples of countries and/or control types. In particular, the non-performing loan ratio is positively related to state control while negatively related to widely held banks[20]

Governments in the region have begun to address these issues. In some cases, for example in Thailand, measures have been taken to limit single party ownership in banks to a maximum of 5%. In Singapore, the MAS forced banks to break up ties with non-banking businesses and to sell down their non-banking assets. In South Korea, after banks were forced to cut links to group companies, accounts improved significantly. As a result, the leverage ratio of listed South Korean companies was dramatically reduced from 339% of total equity in 1999 to 101% in 2004. This spectacular achievement was made possible in large part because the stock market in South Korea was already much more efficient than in most Asian countries, allowing the companies to turn to the equity markets for alternative sources of capital. This, in turn, forced companies to adopt higher corporate governance standards.

Governance basics still a challenge

While there is no definitive checklist of bank-related governance standards, the following areas set the tone for company-level governance challenges.

Board independence and roles The issue of the independence of board directors and auditors is only beginning to emerge in Asia. What constitutes a truly independent director remains the subject of much debate. In some Asian countries, the problem is compounded by the scarcity of eligible candidates and the necessity of limiting the number of directorships to a manageable figure. Strengthening the core functions of the board is also a key issue, in particular, with respect to audits. For example, when IFC invested in the Bank of Shanghai, "restructuring the board was key"[21] to the reform process. Bank of China's Annual Report 2004 highlights the changes the bank made to its corporate governance structure in order to align the bank to corporate governance practices at large international banks. This included establishing a system consisting of a general meeting of shareholders, a board of directors with three independent directors, a board of supervisors and senior management[22]. China Construction Bank (CCB), in its 2004 Annual Report, defines corporate governance as "the system by which business organizations are directed and controlled. The corporate governance structure specifies the rights and responsibilities of the different participants in the corporation, such as the executive management, operational managers, shareholders and other stakeholders, and spells out the rules and procedures for making decisions in corporate affairs"[23].

Staff compensation Bank compensation systems are largely responsible for most of the more blatant forms of corruption. The problem reflects the fact that in many Asian markets there are large branch networks with remote operations giving under-compensated managers almost complete lending authority. Often branch managers in state-owned institutions receive relatively low fixed wages geared toward civil servants. When compensation is performance-based, it is often linked to loan volume or asset size, rather than profitability. Not surprisingly, salary and compensation reforms are therefore crucial in stamping out corruption at the most basic level. Thus, financial institutions that implement performance-based compensation systems and effective corporate control over remote branches often outperform rivals as corruption cases drop. In its investments, the IFC emphasizes the importance of compensation systems linked to performance. The compensation committee at the Bank of Shanghai, for example, sets annual targets for management based not just on growth, but also on capital adequacy, non-performing loans and profits"[24]. It is conceivable that, as the commitment to sustainability and corporate social responsibility increases, the compensation system will evolve to incorporate links between compensation and "sustainable performance"[25].

Legal systems Although there have been major reform efforts undertaken in banking regulation and corporate law in Asia over the past seven years, many countries in Asia still suffer from immature legal structures. In some countries, property rights and bankruptcy laws are either non-existent or difficult to enforce, making it tricky for banks to recover debts and implement new financial techniques such as securitization. As a result, investors will continue to regard rule of law as a crucial country-level competitive variable until reforms currently under way in many countries achieve maturity.

Accounting standards One of the major pillars of governance — accounting standards — varies widely across Asia, making it more difficult to accurately assess risk in certain markets. One particularly crucial area for banks is asset valuation since many banks in Asia still routinely practice asset-based lending

One particularly crucial area for banks is asset valuation

and take assets as collateral. When the accounting standards call valuation into question, problem loans may arise. For example, IFRS standards are now forcing banks to reflect in their accounts the true value of bad loans, while Basel II forces them to set aside more capital for non-performing loans, resulting in significant impact on financial statements. Additionally, lack of disclosure and discrepancies in the definition of NPLs undermine the credibility of valuations. This has become a key differentiator for Asian banks. Indeed, those financial institutions with the resources to adopt international accounting standards should benefit from the adoption of best practices.

Taxation Another key element for accountability and good corporate governance lies in a credible tax system that is functioning, fair and progressive. Many countries in Asia still lack the tools needed to implement transparent taxation systems. Recently surfacing as a corporate governance issue, tax avoidance has started appearing on the radar screen in Asia's financial sector. The widespread use of offshore vehicles for many financial transactions in Asia, from securitizations to project finance and direct investment, has sheltered many transactions from taxation in the country of origin of the transaction. In addition, banks in some countries offer products to high net worth customers which are explicitly geared to evasion of local tax regimes. Whilst most of these are legal structures, governments and taxpayers have begun to raise questions about prevailing policies. As a result, stakeholder pressure may increase in this relatively new area of corporate governance as more publicly disclosed transactions surface.

Comprehensive governance surveys at the sector level in Asia are rare and not yet systematic. Nonetheless, one commonly cited survey, published by the Asian Corporate Governance Association and CLSA, the specialty Asian broker, provides a useful reference point for the governance performance of Asia's leading banks compared to the performance of other listed companies.

Figure 6 Asian Banks in the Top Two Quartiles of the ACGA/CLSA 2004 Survey

Hong Kong	India	Indonesia	South Korea	Malaysia	Philippines	Singapore	Taiwan	Thailand
HK Exchange	HDFC Bank	Bank Central Asia	Hana Bank	Public Bank	Equitable PCI Bank	Singapore Exchange	SinoPac FHC	Siam Commercial Bank
HSBC	HDFC	Bank NISP	Kookmin Bank	Maybank	Bank of the Philippine Islands	OCBC	Chinatrust FHC	KasikornBank
StanChart	UTI Bank	Bank Danamon	Shinhan Financial Group	RBH	Banco de Oro	DBS Group Holdings	Fubon FHC	Kiatnakin Fianance
Wing Hang Bank		Bank Rakyat Indonesia	Woori Financial Group	CIMB			Taishin FHC	Bangkok Bank
Wing Lung Bank				Commerce Asset			E Sun FHC	Tisco Finance
Bank of East Asia				AMMB				National Finance
Dah Sing Financial								
Hang Seng Bank								

Source: ACGA/CLSA "CG Watch 2004"

UNDERSTANDING THE TECHNOLOGY BET

To a greater extent than many investors realize, an investment in a bank is a bet on technology and a company's ability to manage it. As a result, whether investors are assessing the management of sustainability risks or the development of new sustainable finance products, we are implicitly discussing a bank's technology strategy. Indeed, progress on critical banking disciplines is tightly linked to technology, because so many aspects of operations rely on functioning risk management systems and management information systems. Beyond regulation, technology impacts every aspect of the banking and finance sector from processes to human resources management and new business development — making it a tangible proxy for sustainable management practices.

Technology impacts every aspect of the banking and finance sector — making it a tangible proxy for sustainable management practices

While much of the focus is on technology gaps in Asia, one of the most fascinating aspects of technology development has been the ability of Asian economies to leapfrog several stages of technology evolution to adopt cutting edge technologies. This was the case in the telecom industry where mobile phone penetration has exceeded levels found in many developed markets. The extent and ability of banking and financial institutions to capture the benefits of technological innovation to develop new businesses and enhance efficiency and profitability is a key element of risk, not only in developed countries but also in the fast growing markets of Asia. As such, technology is not only a key element of banking business sustainability per se, but also one of the three key sustainability issues in the financial sector in Asia.

The main aspects of technology as a key sustainability variable in the financial sector in Asia are all linked to corporate governance and new product development. Technology plays a key role in the areas of:

- Efficient control and risk management
- Improved processes
- Reporting and regulatory compliance
- Development of new businesses and markets

Technology: the backbone for efficient control and risk management

The banking and financial sector is heavily and increasingly reliant on technology for efficient control and risk management processes. Technological capabilities are a key for financial markets like foreign exchange, treasury including money markets, capital markets and derivatives. As countries increasingly move to adopt real time gross settlement (RTGS) payment systems, as is already the case in Hong Kong, Singapore and recently India, seamless integration of back offices into clearing and settlement systems becomes a critical differentiating factor for financial institutions.

The banking and financial sector are heavily reliant on technology for efficient control and risk management processes

As Asian capital markets develop, banks increasingly require online trading systems as firms evolve from proprietary closed platform trading systems to

open platforms involving multiple participants. These are complex systems which require the segregation of duties if the systems are to avoid "rogue trader" problems[26]. Improving price transparency through the adoption of independent data provider systems such as Reuters or Bloomberg is also crucial to more efficient markets. For instance, China announced that Reuters would become the first foreign provider of comprehensive reference rates for the state-backed bond markets[27].

Efficient control and risk management is therefore simply impossible in today's global, real-time financial markets without the necessary, and increasingly costly, investment in technology and systems. In other segments of the banking and financial markets, the role of technology in control and risk management may be less apparent, but no less important. Effective credit risk management is the essence of the business of banking, be it corporate banking or consumer/ retail banking. In recognition of the key role that efficient risk management plays, the People's Bank of China asked the IFC to help establish an institute to train the country's bankers in such neglected skills as risk assessment. As a direct result the Shanghai International Banking and Finance Institute opened its doors in April 2005[28].

Key elements for an efficient credit risk management system include:

a) Significant senior management involvement
b) Independent risk function
c) Effective internal rating/credit scoring systems
d) Effective measurement, monitoring and reporting processes
e) Accurate, reliable and accessible data
f) Implementation, evaluation and control

For instance, in terms of control of credit risk and exposure in financial institutions with far-flung locations, only efficient computerized systems allow for accurate determination of aggregate exposure and early identification of potential problems. This can be a particular challenge in countries with poor telecommunication infrastructure because it is almost impossible to implement effective risk management outside of urban centers due to a lack of local oversight. For example, in India the tele-density is one of the lowest in the region with 4.3 lines per 100 people[29].

Security issues, as a result of identity theft, credit card and check fraud, also present a new technology challenge

Security issues, which are rising in prominence around the world as a result of identity theft, credit card and check fraud, also present a new technology challenge, which necessitates additional investments to protect system integrity. For example, in Hong Kong the HKMA recently mandated the adoption of additional layers of security for online banking services. Only those institutions able to make the necessary investment in the relevant technology will be able to protect their customer franchise and avoid losses related to fraud and security issues.

Increasingly, efficient internal processes in banking and finance rely on automated, centralized processes. Most major international financial institutions have either outsourced or de-localized to offshore processing centers the

vast majority of their back-office processes. For example, both HSBC and Standard Chartered Bank have offshored their back office processes to centers based in India and China. Some international banks have outsourced the back-office processes for FX to banks specializing in such services. Nonetheless, elsewhere in Asia, many local banks, particularly legacy retail banking institutions, tend to rely on manual processes, which are highly decentralized at the local branch level, resulting in over-staffing and inefficient processing.

Traditionally, banks have trailed other industries in terms of customer profitability measurement. Until very recently even major international institutions were notoriously poor at analyzing customer profitability. In part this was a result of the focus on asset size and loan volume as opposed to profitability, and partly it was because the systems needed to aggregate the data from all sectors of the bank and implement effective cost accounting were not available. At the time of the Asian financial crisis, only a handful of the most sophisticated global financial institutions were implementing ROE based measurements, let alone risk-adjusted return on capital (RAROC). Until very recently, most banking institutions in Asia, including some of the international players, were still measuring performance in terms of loan volume and size of balance sheet.

Moving towards risk-based pricing is a crucial advance for Asian banks

To investors, the technology issue is crucial in terms of analyzing bank fundamentals. As the banking sector moves from simple volume and asset metrics to risk-based profitability and performance measurement, it becomes possible to move towards risk-based pricing. This is a crucial advance for Asian banks, which cannot be achieved without heavy investments in hardware, software, and control systems, which enable accurate measurement and efficient processing.

Industry estimates[30] point to worldwide IT investments by banks of US$174bn for 2005 with a projected growth rate of 4.9% per annum from 2005 to 2008 and with Asia showing the fastest growth rate of 7.3% per annum. For the whole financial sector, estimates point to a worldwide IT spending of US$362 Billion in 2005[31] with the strongest growth coming from the banking industry.

For example, projected 2004 IT spending by Chinese banks was estimated[32] at RMB 18 Billion (US$2.17 billion) and estimates point to a technology spending of US$6 billion for 2003-2005. This compares to total IT spending by the Big Four of only US$4.34 billion for the period 1995-2000. A recent report[33] highlighted the big increases in bank IT spending in Indonesia and estimated that Indonesian banks would spend approximately US$450 million on IT by the end of 2005.

Only those institutions able to invest in the necessary systems will be able to effectively comply in full with the newest regulations

In addition, only those institutions able to invest in the necessary systems will be able to effectively comply in full with the newest regulations, and therefore adopt best practices in terms of risk management. This will further accentuate the already gaping divide between the technology haves and have-nots. For example, the Bank of Communication established its risk management and control structure based on an international advanced model introduced by HSBC when it acquired a minority stake in the bank. The reengineering of the information infrastructure of the group, including a data centralization project, management accounting system, consolidated financial reporting system and pricing management system, is under way[34]. Indeed, one of the most prominent

debates in the banking sector currently is the discussion of regulatory burden. Prominent banking executives have called attention to the increased cost of new global and local banking regulations and reporting requirements in terms of technology investments required as well as management and staff involvement needed. For example, industry estimates point to IT investments in risk and compliance solutions topping US$ 51bn in 2004[37]. A recent survey[38] emphasized privacy regulations and compliance challenges as a main driver of IT spending for banks. As an illustration, IT investments to comply with the MiFID (Markets in Financial Instruments Directive) in the EU are estimated at GBP 8 to 12 million for a UK investment bank with annual costs estimated[39] at GBP 1.5 million.

The most significant new regulations include:

- **Basel II**[35] which affects the banking sector globally. Over 100 financial regulators worldwide have agreed to implement the Basel II principles with implementation targeted from 2006 to 2009[36]

- **Sarbanes-Oxley**[37] in the US which affects all US-listed companies as well as any company with over 300 US shareholders

- **Patriot Act**[38] in the US, and the institution of the **Financial Action Task Force**[39], for prevention of money laundering worldwide which have wide-ranging implications in terms of "Know Thy Customer" rules for banking institutions

- **EU Financial Services Action Plan**[40] with over 42 new pieces of legislation in process and **Markets in Financial Instruments Directive (MiFID)**

- **UK Reporting** rules affecting all UK listed companies

- **International Financial Reporting Standards (IFRS)** in the EU and **International Accounting Standards (IAS)** in the US

In addition, many global banks as well as some forward-looking emerging markets banks are moving to apply new standards of reporting for crucial sustainability matters, in particular environmental impacts and corporate social responsibility factors. Banks must also develop systems to monitor compliance with international compacts including:

- **Equator Principles**[41] (in project finance)
- **UN Global Compact**[42] and **UNEP FI statements**[43]
- **Global Reporting Initiative (GRI) principles**[44]
- **CERES principles**[45]
- **World Bank** and **IFC guidelines**[46]
- **EU directives** and **guidelines**[47]
- **ICC Business Charter for Sustainable Development**[48]

For example, a number of leading global institutions such as HSBC are at the forefront of technology investment in terms of Basel II compliance and also invest heavily in terms of corporate social responsibility (CSR) and environmental reporting. By contrast, few country-level Asian players have the systems in place or the management expertise required to implement such regulatory requirements. This is evidenced by the Hong Kong Monetary Authority (HKMA)'s phased implementation plan for Basel II, which divides the banks into three tiers according to technological capabilities[49].

A requirement for more technical sophistication

In the new markets of consumer finance, as well as retail banking, technology drives profitability by enabling economies of scale and freeing of resources to focus on customer service and product development. The development of new businesses and innovative products therefore requires more technical sophistication. In Asia, where retail banking and consumer finance together with wealth management are deemed by all finance industry experts to be the key markets for growth in financial services, technology will increasingly be a key differentiating factor for financial institutions.

The rise of retail banking in Asia is the result of changing demographics, high economic growth, and the rise of modern consumer economies

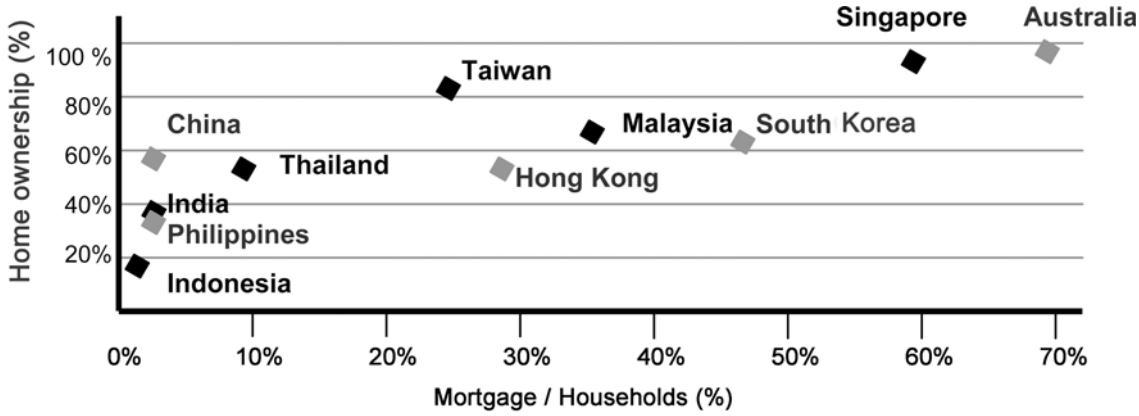
The rise of retail banking and consumer finance in Asia is the result of changing demographics, high economic growth, and the rise of modern consumer economies. Asia is home to some of the most populated countries in the world such as China, India, and Indonesia, as well as the world's fastest growing economies. As a result, the bankable population is expanding rapidly and with it the need for basic banking products on a mass-product scale. McKinsey estimates that the bankable population in Asia, defined as individuals with incomes approaching $1,000 p.a., will double from 2000 to 2010 with a concentration in Asia's 50 biggest cities — and that China and India together will account for over 70% of all new accounts.

Wealth accumulation and concentration is fast increasing. Demographic changes such as rapidly ageing populations mean that the financial needs of the bankable population will shift within one or two generations from savings to capital preservation and retirement products, particularly pensions. Governments have already started pushing through mandatory defined contribution retirement plans. For example, while Singapore had long had such a system in place, Hong Kong only enacted the MPFSO (Mandatory Provident Fund Schemes Ordinance) in 1995.

At the same time, Asian consumers are fast adopting Western standards of consumption over traditional Asian values of saving. For example, South Korean households saved a quarter of their incomes in 1988 but by 2003 banked just 6.1%.

In China, consumer spending is rising fast, reaching double-digit year-over-year levels in early 2005. Key target areas for banking growth across Asia include mortgages, credit cards and consumer finance. For example, mortgage penetration is still low in key growth markets such as China and India where 1.8% of households own mortgages, compared to saturated markets like Australia with 68%.

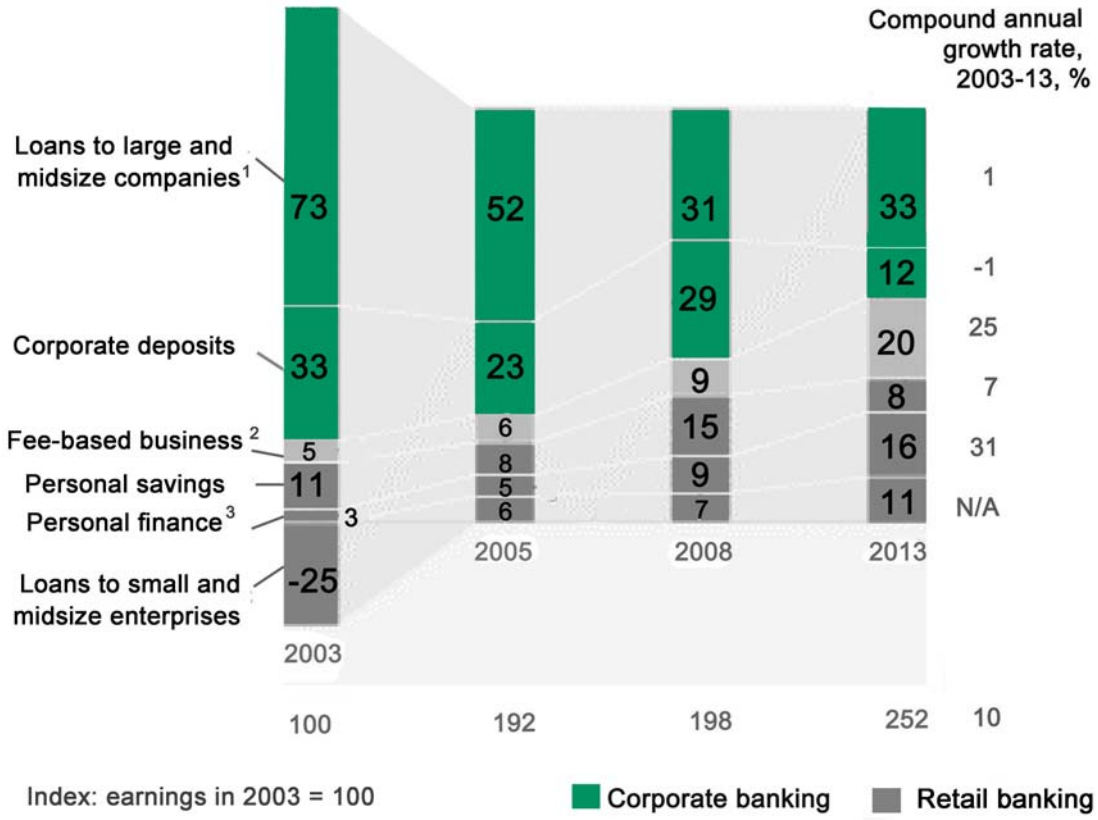
Figure 7 Home Ownership Versus Mortgage/Households



Source: Analysis of Mortgage Market Trends, UBS Research, 24 March 2005

In China, research by McKinsey clearly points to the emergence of consumer banking and consumer finance as a key driver of growth for the financial sector:

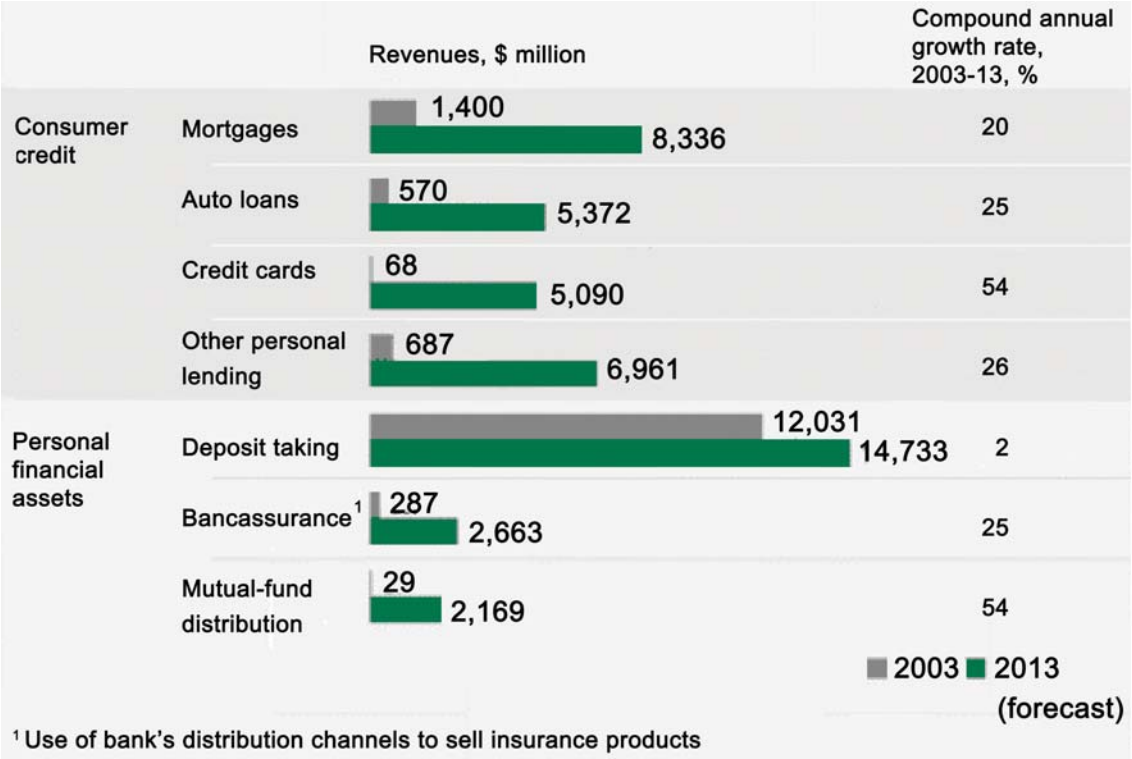
Figure 8 Retail Rising: Forecast Earnings by Source for China's Banking Sector, in %



[1] Includes commercial paper (short-term unsecured promissory notes)
[2] For both corporate and retail banking
[3] Includes credit cards, personal loans

Source: McKinsey Quarterly, Retail Banking in China, 2004

Figure 9 An Industry's Future: Forecast Banking Revenues in China by Type of Product



Source: McKinsey Quarterly, Retail Banking in China, 2004

Increasingly, the industry leaders will be those capable of capturing on the one hand the potential of growth markets such as consumer finance whilst on the other hand improving their efficiency and performance in more traditional areas such as corporate banking. Technology will play a critical role as a differentiating factor. Moreover, it serves as an important proxy for identifying which Asian banks have the resources necessary to implement the types of risk management and product development strategies of interest to sustainability investors.

ASSET QUALITY & SUSTAINABLE RISK ASSESSMENT

The hottest, most debated issue related to the banking and finance sector in Asia is without contest asset quality. In other words, to what extent will a bank's assets, namely its earning assets of loans and securities, be repaid in accordance with their agreed terms? How does the asset quality of banks relate to sustainable development and corporate responsibility? Deloitte succinctly states the case, "The prevalence of NPLs in Asia can be traced to corporate governance and credit risk management weaknesses in the financial sector."[50] As a result, the status of NPLs in the Asian banking sector serves as the fundamental backdrop to the management of ESG risks in credit portfolios. Indeed, as Asian banks begin price ESG risks into their credit portfolios, we

The hottest, most debated issue related to the banking and finance sector in Asia is without contest asset quality

expect to see higher NPLs on legacy loan portfolios and more resilient credits where banks respond to emerging challenges.

Figure 10 Asset Quality Basics

Key components of asset quality measures include:

- Total Loans — metrics evaluating loan portfolio composition and vulnerability of loan book to macroeconomic upheavals
- Non Performing Loans —NPLs are generally defined as loans in which the borrower is not making the required payments of interest and/or principal
- Loan Loss Reserves
- Loan Loss Provisions
- Loan Write-Offs

Why is asset quality so important? There are three main reasons:

- Accounting systems report interest income when it is earned (accrual accounting) not when it is collected => net income and profit overstatements if asset quality is not taken into account
- NPLs if not repaid represent impaired assets = irretrievable losses to the bank and these losses translate into a reduction of the bank's capital
- Any capital lost must be replaced. Unless new capital is injected, it must come from profits

What are the key considerations when examining the asset quality of banks?

- The definition of key terms. For example, the exact definition of NPL can vary by country
- Does the definition take into account collateral or not?
- Degree of management discretion in identification and definition
- Treatment of accrued income from loans later deemed NPLs. Net income is distorted if accrued interest income is not collected

Building sustainable balance sheets

In Asia, many investors are concerned in particular about the high level of NPLs in the sector. According to the 2004 Deloitte NPL survey, the most likely leading cause of the high level of NPLs — both official and estimated — lies in poor corporate governance and weak credit risk management.

What are the main reasons for the deficiency in credit risk management in Asia? According to Deloitte, management of a bank's credit portfolio requires a culture focused on credit risk, robust policies and procedures, well-trained

staff, and constant management and oversight[51]. On all four counts, there are severe deficiencies in Asian banks, particularly the legacy local players. Most local players have not evolved much beyond asset-based lending which relies upon collateral and have little to no expertise in cash-flow analysis, not to mention cash-flow forecasting. With much of the decision-making in effect decentralized at the branch manager level, the approval process is fraught with lack of controls. Basic separation of functions, crucially including the separation of risk management from lending function, may be lacking, as is corporate control. Even when forward-thinking management has adopted credit policies, the lack of implementation at local level is a key issue.

With much of the decision-making decentralized at the branch manager level, the approval process is fraught with lack of controls

Figure 11 Challenges for China's Bank Regulators

China Banking Regulatory Commission (CBRC) deputy chairman Shi Jiliang made a critique of the state banks just three days after the results were released on January 13, 2005. " The Bank of China [BOC] and China Construction Bank [CCB] have shown some preliminary progress, but their task ahead is very onerous ... the state banks have the same defects as state companies, with low efficiency, poor internal management and 'everyone eating out of the same pot'. They have an enormous amount [of work] to do to change their true nature, stop a worsening of their assets and change from being state banks into real commercial banks," he told an international seminar in Beijing. "If we analyze the figures coolly and include the assets from the two banks that were transferred and use the original specifications, then the NPL amounts rose to some extent. This is certainly a matter of great concern."

Source: SCMP "Regulator takes state lenders to task on bad-loan figures", 21 February 2005

Another critical component in the NPL problem is the fact that many banks in Asia derive the lion's share of their revenues from corporate banking, which is the source of the majority of NPLs. Newer players, which have concentrated on consumer banking and consumer finance, have to a large extent avoided crushing NPLs. However, a lack of basic credit disciplines can prove problematic in fast-growing consumer credit markets as well. Banks in both South Korea and Taiwan, the unchecked exponential growth of credit cards has resulted in significant portfolio losses.

In the wake of the Asian financial crisis, many countries have made significant progress towards addressing the crucial issues of NPLs by implementing more stringent regulations. Indonesia, Malaysia, South Korea and soon Taiwan, are implementing an international style five-category loan classification system to bring about much needed transparency. However, implementation is rendered difficult by loan misclassification and debt payment rescheduling. The latter in particular is a common practice, in large part linked to the prevalence of relationship lending. By rescheduling over-due debt, the banks avoid classifying these assets as non-performing but also ignore the true nature of the risk. The bank therefore ends up rolling over non-performing assets on its books. As a result, many analysts estimate that the true level of NPLs in the banking sector in Asia is vastly under-reported, resulting in the application of ad hoc discounts to book-linked metrics when valuing Asian banks.

Many analysts estimate that the true level of NPLs in the banking sector in Asia is vastly under-reported

Following the Asian crisis, many governments have acted to reduce the crushing burden imposed on the financial system by the high level of NPLs. Many NPL resolution techniques have been used to varying degrees of success, including bank self-management, public auctions, private sales, securitization, limited auctions and joint ventures.

Chief among the strategies for NPL resolution has been the use of Asset Management Companies (AMCs) set up to help struggling banks dispose of the worst of their non-performing portfolio to specialized companies set up for that purpose. Some of the AMCs have been successful at dealing with the NPLs portfolios post-Asian crisis. However, in some cases it is difficult to ascertain the real efficiency of the asset disposal process. For example, recently a Chinese AMC was bidding to acquire the assets of another AMC. In some cases, AMCs are stretching the notion of disposing of bad loans. For example, recently Cinda Asset Management was discussing a fund management joint venture with Australia's First State Investments[52].

Figure 12 NPL Amounts and Reductions, in Billions US$

	NPLs in all Financial Institutions	NPLs in AMCs *	Gross Reductions of NPLs in Financial Systems since Asian Financial Crisis **	Special NPL Law/NPL body
Japan	330 (b)	112 (c)	600	RCC/IRCJ
China	307 (a)	107	200	4 AMCs
Taiwan	19.1	N/A	50	None
Thailand	18.8	5	95	5 AMCs
Philippines	9	N/A	N/A	Bangko Sentral, DoF
Indonesia	16.9	5	37	IBRA
India	29.9	N/A	N/A	SARFAESI
South Korea	15	45	125	KAMCO
Total	746	274	1,107	

* Estimated unresolved NPLs still in government AMCs

** Estimated gross reduction in financial system NPLs due to restructuring, reclassification, repayment, transfer to AMCs/Bad Banks, or write-offs

(a) No official government statistics available. Calculated estimate includes the 5-tier classification for: 4 SOCBs, 11 stock banks, and 3 policy banks, as well as the 4-tier classification for the 112 city banks. Excludes financial institutions in rural areas.

(b) Based on 35.5 trillion yen as of March 2003 at foreign exchange rate of 107 yen = US $1

(c) Includes 4.6 trillion yen and 4.7 trillion yen in unpaid balance acquired by The Housing Loan & Credit Management Corporation (HLCMC) and the Resolution and Collection Bank (RCB), respectively, in addition to 2.5 trillion yen in unpaid balance acquired by the Resolution and Collection Corporation (RCC) and foreign exchange rate of 107 yen = US $1. HLCMC, which required loans from Housing Loan Finance Cooperatives: and the RCB, which acquired loans from the failed financial institutions, were merged and created the RCC in April 1999.

N/A - Not applicable

Source: Ernst & Young, Asia Pacific Financial Solutions, 2004

Winners and losers — how ESG risk assessment could make a difference

Against this backdrop of NPL pressure, we see the potential for various shifts in the asset quality of Asian banks as ESG risks are addressed more actively in the marketplace. Perhaps the most material would be added pressure on poor credit disciplines due to a rise in borrowers' and lenders' liability resulting from stricter ESG regulations. Indeed, as more forward-looking ESG regulations are adopted and enforced, weak companies may face increased difficulties in financing the investments necessary for compliance. This will result in a new layer of credit risk. Given the strong influence of state-directed policy lending, which typically favors heavy industry state-owned enterprises, a case can be made that banks with large exposure to high ESG risk sectors could be significantly more affected by increased NPLs than financial institutions which escape from such policy lending.

Companies with weak ESG disciplines face increased difficulties in financing the investments necessary for compliance

Examples of this trend are beginning to emerge within Asia. In China in particular, where state-owned enterprises control the bulk of the extractive and heavy industries, more rigorous enforcement of environmental regulations limiting emissions has the potential to push some of the ailing SOEs into bankruptcy, triggering a new wave of NPLs. A second aspect of this trend could be a concentration of growing ESG risks in banking markets with generally lower environmental standards. For example, there have been recent reports that Chinese FDI in Vietnam and Cambodia has been motivated by a desire to offshore production facilities to countries with less restrictive environmental and social protection standards.

ESG risks pose another layer of credit risk for banks with exposure to China's SOE sector

This is particularly relevant at the level of credit risk management especially as it influences lending policies. Most global financial institutions have taken at least preliminary steps to address ESG risks in lending policies. Initially this was done in response to efforts to address large scale contaminated land liabililties through legislation. More recently, global banks have realized the need to develop industry-specific lending policies to guide credit policies in global markets which may not have well-established local policies for high impact industry sectors such as pulp and paper or extractives.

The local and global pressures for ESG risk assessment are becoming more relevant for Asian banks. Key drivers over the next several years could come from various directions, but two areas bear particular attention. Contaminated land remediation policies have proven crucial in forcing banks to price in risks to loans and collateral. Although few formal policies enforcing liability for land contamination have been tested in Asia, a legal framework is beginning to emerge as the public becomes more concerned about health impacts, especially in new urban centers. As Asian banks begin to fund their emerging multinationals, they are increasingly being exposed to regulatory and credit risks linked to overseas ESG risks. As a result, we expect Asia's leading banks to begin to seek the same risk management tools as their global counterparts.

New contaminated land policies and overseas lending could increase the pressure for ESG risk management

Figure 13 Environmental Risk Management — The Credit Basics

According to the Environmental Bankers Association, common strategies for integrating environmental risk management "include the basic building blocks of risk management — identification, assessment, control, mitigation and monitoring. Each of these can be successively integrated with conventional credit risk underwriting using the 5 C's of credit: cash flow, collateral, character, capacity and conditions specific to considering environmental risk." Key tools in the process may include loan documentation or covenants which obligate the borrower to monitor and mitigate specific environmental risks throughout the life of the loan.

Source: Your Financial Institution and the Environment, Environmental Bankers Association

Perhaps the leading example of a systematic effort to address ESG-linked credit risks is the Equator Principles for project finance, which are based on IFC guidelines. Project finance funding is most common for large-scale infrastructure or industrial development projects, many of which have high environmental impacts. In addition to the Equator Principles, there are a range of investor and banking sector led groups which focus on the the ESG impacts of financial institutions such as the United Nations Environmental Program's Finance Initiative (UNEP FI) and CERES. Asian participation in these groups is to-date somewhat limited with only three signatories from Japan and one from Australia to the Equator Principles. However, a more diverse group is participating in the UNEP FI initiative, with good representation from institutions in Australia, Japan, and the Philippines. Notable Asian signatories include Kookmin Bank, the Export Import Bank of Korea, Bank Negara Indonesia, Thai Investment and Securities Public Company, Bank of Shanghai, and a full complement of Philippine banks.

Figure 14 Equator Principles — Social and Environmental Due Diligence Standards

Most leading global banks — including many active in Asia — are Equator Principle signatories

The Equator Principles are a voluntary set of guidelines for managing environmental and social issues in project finance lending, developed by leading financial institutions. They are based on the environmental and social standards of the IFC, and apply globally to development projects in all industry sectors with a capital cost of $50 million or more.

The approach used under the Equator Principles includes:

1. Categorization of a project according to its environmental and social impacts using IFC's screening procedures

2. Based on the categorization process, borrowers may have to complete an Environmental Assessment addressing the environmental and social issues identified

3. The Environmental Assessment will take into account the Environmental, Health and Safety Guidelines for all countries. However, for projects in low-income, lower-middle income and upper-middle income countries (as defined by the World Bank), it will also take into account the Safeguard Policies

4. In high-impact projects, borrowers will undertake appropriate consultation with affected local stakeholders and develop an environmental management plan that addresses mitigation and monitoring of environmental and social risk

Banks active in Asia which are signatories: ABN Amro, Bank of America, Bank of Tokyo Mitsubishi, Barclays, Calyon, Citigroup, Credit Suisse, Dresdner, HSBC, ING, JP Morgan Chase, Manulife Financial, Mizuho Corporate Bank, Rabobank, Standard Chartered, Sumitomo Mitsui Bank, WestLB, Westpac

Source: IFC, 2005

Although global banks operating in Asia are increasingly alert to reputation-damaging ESG risks in their loan books, the awareness level for domestically oriented financial institutions generally remains very low. Sustainability issues thus become another differentiating factor between Asian banks through their credit policies: the more ESG-aware the lending policies, the lower the risk of non-performance in the asset mix. It is highly likely that the less sophisticated and capable banks in Asia will end up with a higher concentration of high ESG risk loans and NPLs than the more sophisticated and ESG aware institutions.

THE LONGER TERM: NEW OPPORTUNITIES FOR BEST-IN-CLASS PLAYERS

We see potential for sustainability issues to create a new competitive dynamic

Over the longer term, we see potential for sustainability issues to create a new competitive dynamic which will offer clear competitive benefits to those Asian banks and financial services providers which are capable of providing best-in-class performance on sustainability variables and new sustainability products. A mix of internally oriented strategic moves and new product development will drive this process. The rationale is straightforward: it has the potential to sharpen banks' risk management capabilities and, in combination with moves toward consumer banking, to add a new avenue for product differentiation.

We may be approaching an inflection point

Historically Asian bank valuations have been dominated by country-level variables, tracking local credit cycles with the overall quality of regulation to a large degree determining the quality of assets. We may be approaching an inflection point, however, with sustainability variables emerging as a differentiating factor with the potential to influence company-level valuations. This would reflect the different opportunity sets of Asian banks, which have the potential to benefit from globalization and technology leadership in their home markets. For these banks, sustainability variables offer a new tool for defining competitive advantage versus less capable local competitors.

New incentives for regional and country-level leaders

Initial signs of this competitive dynamic are already evident in Asia. For example, on a stock-specific level, large global financial institutions such as HSBC are already among the "best-in-class" in corporate governance, irrespective of which markets they operate in, driven by consumer and shareholder pressure in their markets of origin. In South Korea, market leaders such as Kookmin Bank and Shinhan Financial Holdings have begun to articulate their own governance and sustainability priorities. This is influenced by a desire to keep in step with global banks such as Citigroup and Standard Chartered, which have expanded their footprint in South Korea through sizeable local acquisitions.

In China a range of small and large banks has sought foreign investment largely to address governance and technology transfer issues

This trend has also been reinforced in China as a range of small and large banks has sought foreign investment largely to address governance and technology transfer issues. Indeed, the effectiveness of this strategy will gain a high profile market test as China's Big Four commercial banks complete their initial public offerings and begin trading over the next year. The importance of HSBC's strategic investment in China's Bank of Communications was prominently cited as a positive in the Bank's June 2005 listing on the Hong Kong Stock Exchange. The key role that the IFC has played in fostering reform in the six small to midsize banks in which it invested in China has opened the way for other foreign investors. IFC's efforts in fostering good governance practices have also led to changes in the banking legislation and regulation in China, which in turn is making it possible for top international banks to invest in the sector[53].

India's HDFC Bank and YES Bank benefit from clean balance sheets and sustainable finance strategies

Meanwhile, selected new banks can also have a competitive advantage in embracing new practices because they lack many of the legacy issues of the older generally state-owned local banks. This can be seen with rising competitors such as HDFC Bank in India which, like its parent company the Housing Development Finance Corporation, specializes in consumer-related lending. YES Bank, a newly listed Indian bank, also offers Asian investors a timely opportunity to evaluate the prospects for a new financial institution which is seeking to bring global sustainability practices to a fast growing Asian market.

Figure 15 YES Bank's Sustainable Business Model

YES Bank's CEO Rana Kapoor states that "we seek to identify areas that have high growth potential. Tomorrow's winners will be those businesses that address and incorporate sustainable development in their business practices. We aim to lead by example and highlight innovative corporate sustainability benchmarks that demonstrate the increasing integration of sustainability with business approaches."

Financing projects under development include:

- A USAID backed loan program which will target small- and medium-sized industry investments in clean energy technology
- A US$30 mn private equity fund for cleantech projects and equipment manufacturers
- Providing strategic financial advice to back Global Education Management Systems' effort to establish a new system of 600 schools in India

Source: Corporate Voice — Rana Kapoor, The Financial Express, October 30, 2005

Other factors will contribute to the development of ESG-linked business strategies across the sector and across Asia, particularly the fast adoption of technology by Asian consumers. Mobile phone, TV/cable/satellite, and Internet penetration is already high and increasing rapidly in less developed Asian markets, bringing with it more channels for consumer awareness. This is creating better informed and more aware consumers, employees and shareholders with better access to new ways of disseminating information. Increased use of the internet and text messaging in Asia also has the potential to result in more stakeholder activism in areas such as environmental protection, corporate governance, social responsibility and related ESG issues as well as in politics. Indeed, some countries are already cracking down on such technology. For example, in August 2005, Malaysia ordered phone companies to register all holders of pre-paid services and in May, Thailand moved to register users of pre-paid phones[54].

New consumer technologies will create markets for financial products and lead to disintermediation and fragmentation with the possibility that the best new

New technologies offer new strategies for reaching underserved banking markets

opportunities will migrate away from less agile traditional banks. As India's software and IT industry continues to expand, it may create new, off-the shelf systems which will lower the cost of new technology implementation, benefiting the financial institutions capable of investing in such systems — both in terms of monetary and human investment. Indeed, the development of new delivery channels for accessing remote populations which are currently unconnected, and as such unbankable, is another important area of growth and possible profitability for financial institutions, particularly in the more populous countries like India, China and Indonesia. The use of new technologies to by-pass infrastructure gaps and address basic banking needs of hitherto under-banked populations can yield significant returns for banks that are able to invest in the relevant technology and systems, as well as promoting economic development.

For example, development of financial services delivered through mobile handsets to reach bankable populations in remote areas can pay off handsomely. A 2001 study by McKinsey, pointed out that "consumers and businesses in emerging markets were likely to find mobile financial services more attractive than do their counterparts in developed markets, because they have fewer alternatives." It is expected that some Asian countries will "move directly from a paper-based payment system to a mobile one without ever having to build an extensive wired POS or ATM network". Another application for mobile financial services is credit cards. In a new development illustrating the way Asian nations are leapfrogging technology phases, ICICI Bank and AirTel are now offering a product that offers VISA credit card services on a cellular customer's SIM card. Such a product is only available in a few countries around the world, including Malaysia, South Korea, Thailand and Finland[55].

Growing markets for sustainable financial products

Just as we expect strategic competition amongst Asia's banks on sustainability variables, there is also considerable potential for product competition as banks seek to adapt established sustainable finance tools for growing Asian markets. This effort will focus on products which span the consumer, investment, risk management, and service sectors of financial markets.

There is also considerable potential for product competition as banks seek to adapt established sustainable finance tools for growing Asian markets

With the rise of environmental protection and issues relating to climate change, as well as Asia's vulnerability to weather-related catastrophes, it is expected that regulatory constraints related to such issues will increase across Asia and the world. The extent of regulation and the awareness of such issues vary from country to country. However, environmental issues are expected to progress rapidly to the front of the agenda for extractive and manufacturing industries, and followed by consumer-related industries. Significant investment will be needed to upgrade production facilities to state-of-the-art standards and to adopt new, cleaner and more efficient technology. Therein lays a great opportunity for banks to provide financing solutions to these needs, as eloquently put by James Cameron, founder of Climate Change Capital:

"We have a great mission, much as the 19th century merchant banks financed great technological innovation and massive social projects. The climate change

problem is inspiring for engineers. I have a deep conviction that there is a design and engineering response to climate change that is truly exciting to invest in.[56]"

Real-estate and property lending provides significant opportunities

Such loans might typically be providing project finance for construction of new facilities or for cleaning up and upgrading existing facilities and for introducing new technologies. Banks active in project and infrastructure financing and with sophisticated, ESG-aware credit risk management, should be the primary beneficiaries of such activity. They would undoubtedly also be linking up with supranationals and agencies such as IFC and the World Bank to devise innovative and ESG-compliant financing. One such example would be the initiatives developed under the auspices of the China-US Center for Sustainable Development, with pilot projects for ecologically balanced living communities in Huangbaiyu and six major cities. This project, which has won the support of China's leaders, relies on funding being raised by local governments. Opportunities, therefore, arise for banks and financing institutions to participate in such sustainable initiatives through carefully engineered financing structures[57]. In areas such as real estate lending and property development, financing of ecologically sound structures would provide a new area of development, particularly as traditional buildings are often energy inefficient and major polluters, contributing to 40% of carbon emissions in the UK for example[58].

In the space of a year, carbon trading has become a rapidly developing market for banks

Another area offering competitive advantage to banks with extensive risk-management capacity is the emerging market of carbon emission trading and its derivatives. This follows the coming into force of the Kyoto treaty, which has been signed and ratified by most countries in Asia with the notable exception of Australia[59]. In the space of a year, most big banks have developed a growing awareness of the market, trades have picked up, and interest is surging as a result of the banks' existing exposure to energy markets[60]. That large global companies, which are the banks' core corporate banking and investment banking customers, are actively lobbying for the implementation of a global system of emissions trading, has clearly played a leading role in spurring on the banks interest.

Heightened international scrutiny over the end use of funds creates a significant area of ESG risk

In areas such as investment banking, heightened international scrutiny over the end use of funds raised through equity or debt, capital markets transaction will increasingly affect leading investment banks participation in large public offerings. For example, the public outcry over the end use of proceeds from a US$1 billion bond issue by Chexim has affected the reputation of the US investment banks that lead-managed the issue[61]. Similarly, public reaction to evidence that prison labor was used by listed company Henan Rebecca Hair Products, China's largest wig maker, has negatively affected the reputation of six of the world's largest financial institutions which had purchased minority stakes in the firm under the QFII scheme[62]. Managing reputational risk will increasingly steer financial institutions clear of participating in transactions where the fall-out from failure to meet good governance and CSR standards can reach the point of threatening the viability of the institution itself. Such was the case with Banco Delta Asia in Macau, which had to be taken over by the government in the face of a run, started after the US Treasury department made public allegations of money laundering practices related to North Korean transactions.

An ageing population and growing consumer awareness of ESG issues opens the door to SRI funds

The potential for offering investment products in Asia is expanding rapidly, as individuals and firms look to diversify their savings away from plain bank deposits. With a rapidly aging population, the demand for retirement oriented products will also increase. In tandem with increasing awareness of ESG issues, this opens the door to the development of sustainable and responsible investment (SRI) funds, which have already made significant headway in Europe and the US. As more research corroborates the link between good governance and good performance, the appeal of SRI funds will broaden to the general public and should tap broader demand. Banks that are well positioned to structure and/or deliver investment products efficiently should be the biggest beneficiaries of this new product opportunity. Increasingly the distribution of funds is being de-coupled from product design and management. For SRI funds, this could mean that local players with a distribution network and a consumer franchise might become beneficiaries of the growing interest in such funds among their customer base. Local players that invest in the technology necessary to leverage their distribution and customer base assets will clearly be well positioned to benefit from this development.

Banks are taking increasing interest in the micro-finance market

Micro-finance also promises to emerge as a growth area that can help banks reach under-served communities. The Grameen Bank, one of the most frequently cited successful examples of micro-finance, originated in Asia and has inspired a growing number of microfinance initiatives around the world. Many micro-finance initiatives are under way in various Asian markets, particularly in the most populated nations such as China, Indonesia and India. Micro-finance is now reaching 80 million people in about 70 countries. Banks are increasingly getting into the act. Citigroup has provided US$17 million in grants to 178 partners involved in microfinance during the past 5 years. The Deutsche Bank Microcredit Development Fund, initiated by Deutsche Bank, provides loans to non-profit microcredit lenders. ABN AMRO Bank runs programs in Brazil and India[63].

Possibilities for banks include bringing investment banking skills to bear in the area, for example arranging capital raising and venture capital to assist in the expansion of existing successful micro-finance initiatives.

ECM and DCM transactions related to sustainable project finance provide opportunities

Other areas of investment banking ESG-related opportunities include equity capital markets (ECM) and debt capital markets (DCM) transactions related to sustainable project finance. Examples would be the financing of renewable energy projects or environmental preservation and water treatment projects. Another example would be corporate advisory in the area of M&A between Asian and foreign companies. For example, Veolia Environment has invested US$800 million in China in 10 water treatment projects and two facilities that generate power with methane gas released from solid waste. Veolia raised debt financing for the projects from financial institutions[64].

Mobile banking, POS technology and pre-paid cards offer interesting new product potential

As technology now makes it possible to efficiently process small transactions and provide mobile banking (including POS technology), the need for local branches is reduced. Commercial banks are increasingly focusing on the potential from this segment of the market, where demand is estimated at more than US$300 billion versus a current supply of US$4 billion[65]. For example, prepaid cards are increasingly being touted as a way to develop new markets hitherto considered unbankable or financially excluded, because such prepaid cards do

not require card holders to undergo a credit check or have a bank account to get a card[66]. Another application, luncheon or service vouchers, is being evaluated for implementation in Asia by non-bank service providers such as Accor[67].

Sub-prime consumer financing is being introduced into Asia

Other opportunities include developing the sub-prime consumer finance market. For example, HSBC is planning to adapt sub-prime consumer financing technology from its US affiliate in Asian markets for introduction into Asia. In this, as in many other cases, technology is a key differentiator. Institutions that can invest in the relevant technology, and/or have efficient processes, will be able to profit significantly from the opening of these new markets.

The fast growth of private equity in the region offers the opportunity for financial institutions to invest in SRI initiatives

Another promising growth area is sustainable private equity. The fast growth of private equity in the region offers the opportunity for financial institutions to invest in SRI initiatives in areas such as renewable energy, new sustainable businesses, and environmental strategies such as contaminated land clean up. Indeed, the cleantech investment arena holds particular promise in Asia due to both the emerging demand for cleantech products and processes as well as the attractive economics associated with low cost Asian manufacture of new technologies which have mass market potential. Leading players in this segment differentiate themselves with management skills in specific technologies, ESG project due diligence, and value enhancement through ongoing management inputs.

Many opportunities exist, given the inefficiency of existing systems to provide much needed services, across the range of hardware and software services. Clearing and settlement systems, trading platforms and ratings agencies are all in need of investment and partnership. The IFC, for example, has been leading the way by investing in firms providing key elements of financial system infrastructure, such as ratings agencies, credit-scoring firms, and by introducing ESG-aware policies to its investees. Leading foreign providers such as Experian[68], the world's biggest credit scoring company, and Lexis-Nexis Group[69], a leading database information provider, are investing in China as the government increasingly opens the market to best practices. Technology and efficiency again provide important differentiators as to who is in a position to capitalize on such opportunities.

INVESTOR QUESTIONS FOR COMPANIES

Lending policies

- What is the exact definition of non-performing loans?
- What proportion of revenues and net income come from corporate lending today and 5 years ago?
- What type of credit screening processes do you have in place, particularly in corporate banking?
- Do you take ESG variables such as environmental risks into account in the credit screening and credit evaluation process?
- Is there any area of exclusion in your lending policy such as high risk ESG sectors?
- Have you prepared detailed policy papers on any sectors or issues, such as climate change?

Compliance and standards

- Have you, or do you plan to, sign any environmental principles or guidelines such as UNEP FI, EU Guidelines, World Bank/IFC guidelines, Equator Principles?
- Do you have, or plan to apply for, environmental certification such as ISO 14001?
- Who are your regulators? What are the latest developments in terms of regulation of the banking industry in your market? How is your bank coping with the changes and what steps have you taken to improve compliance?
- Is your bank planning to comply with Basel II requirements? What is your time-frame in terms of implementation?

Management & internal investment

- What is the amount of investment in technology today and over the next three years and what is the breakdown between maintenance and new technology?
- Do you use performance-based compensation systems? How do you motivate branch managers? Describe your performance measurement systems.
- Please detail your internal or external training policies for staff on ESG related issues.

Opportunities

- What opportunities do you see in terms of sustainable finance products for your bank?

RESOURCES

Company websites

• Bangkok Bank Public Co.	www.bbl.co.th
• Bank of China	www.bank-of-china.com/en/static/index.html
• Bank of Communications	www.bankcomm.com/jh/en/index.jsp
• Cathay Financial Holding Co. Ltd	www.cathayholdings.com.tw/new/eng/index.htm
• China Construction Bank	www.ccb.cn/portal/en/home/index.shtml
• Commerce Asset-Holdings Bhd	www.commerz.com.my
• DBS	www.dbs.com/home
• Fubon Financial Holdings Co. Ltd	www.fubongroup.com.tw/fubon_english/index.htm
• Hana Bank	www.hanabank.com/info_new/eng/eng_main.jsp
• HDFC Bank Ltd	www.hdfcbank.com/nri/others.htm
• Hong Leong Bank Bhd	www.hlb.com.my
• HSBC	www.hsbc.com
• ICICI Bank Ltd	www.icicibank.com
• Kasikornbank Public Co.	kasikornbank.com/GlobalHome/EN/homepage.html
• Korea Exchange Bank	www.koexbank.co.kr/english
• Krung Thai Bank Public Co.	www.ktb.co.th/cgi-bin/frontweb/eng/index.pl
• Lippo Bank	www.lippobank.co.id/english
• OCBC	www.ocbc.com.sg/global/main/index.shtm
• Standard Chartered Bank	www.standardchartered.com/global/index.html

Examples of sustainability reporting

• Bank of China, 2004 Annual Report	Corporate Governance section page 27 & 28
• Bank of Communication	Interim Report 2005, page 8
• China Construction Bank, 2004 Annual Report	Corporate Governance section page 14
• HSBC CSR reports and updates	www.hsbc.com/hsbc/csr
• PBOC report	Cited in FT, 27th May 2005
• Standard Chartered Bank	www.standardchartered.com/corporateresponsibility

Useful web-based resources

• Asian Bonds Markets information	www.asianbondsonline.adb.org/regional/market_infrastructure/key_market_participants.php
• CERES Principles	www.ceres.org
• Equator Principles	www.equator-principles.com
• Financial Insights Indonesian Banking	www.financial-insights.com
• Industry IT Spending 2005-2009	www.europa.eu.int/scadplus/leg/en/lvb/l24210.htm
• Global Reporting	www.globalreporting.org
• ICC Charter	www.iccwbo.org/home/environment_and_energy/charter.asp
• International Finance Corporation	www.ifc.org/sustainability
• India: statistic from "Doing business in India"	www.ebusinessforum.com/index.asp?layout=newdebi&country_id=IN&country=India&channelid=6&title=Doing+e-business+in+India
• Kyoto Protocol	www.unfccc.int/resource/docs/convkp/kpeng.html
• UN Global Compact	www.unglobalcompact.org
• UNEP FI	www.unepfi.org

Laws and regulatory information

• Financial Action Task Force website	www.fatf-gafi.org/pages/0,2987,en_32250379_32235720_1_1_1_1_1,00.html
• Summary information on Patriot Act of 2001	www.fas.org/irp/crs/RS21203.pdf
• Summary information on Sarbanes-Oxley Act of 2002	www.aicpa.org/info/sarbanes_oxley_summary.htm

Basel II information

• Detailed information on Basel II is available on the BIS website	www.bis.org/publ/bcbsca.htm
• View the presentation to LEGCO on the HKMA website	www.info.gov.hk/hkma/eng/legislative/index.htm
• For a view on state of preparedness of banks in Asia for Basel II implementation, see Ernst & Young "Asia Pacific Basel II Survey presentation at	www.ey.com/global/download.nsf/China_E/050124_Presentation_English/$file/050124_Presentation_English.pdf
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- Financial Times, 6 September 2005. *"An information explosion"*
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- SCMP, 7 September 2005. *"Phone technology a ringing headache for Asian nations"*
- SCMP, 17 August 2005. *"Banks buy into jail-labour firm"*
- SCMP, 21 February 2005. *"Regulator takes state lenders to task on bad-loan figures"*

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Taking Stock

Adding Sustainability Variables to Asian Sectoral Analysis

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Sustainability

Sustainability is a systemic concept, relating to the continuity of economic, social, institutional and environmental aspects of development. In the terms of the 1987 Brundtland Report of the UN's World Commission on Environment and Development, sustainability is: "Meeting the needs of the present generation without compromising the ability of future generations to meet their needs." The key concept for investors is the need to address a range of environmental, social, and governance (ESG) factors which will inevitably shape long-term returns as markets respond to changing resource requirements and public priorities.

INTRODUCTION

Asian metals, mining, and building materials companies have a uniquely high sustainability risk profile. The extractive, metals processing, and cement industries have high environmental impacts with an equally complex array of related social and governance impacts. While legal and regulatory remedies have been brought to bear on developed market players, there remain complex challenges for investors attempting to analyze the risks associated with operations in developing countries, with fewer formal mechanisms for regulation and dispute resolution.

This is a highly diverse sector, covering a range of industries and corporate practices. On one end of the spectrum are publicly listed Asian steel producers, global leaders in their industry who have embraced sustainability issues as a means to reduce operating risk and differentiate themselves from the second tier operators. The steel industry as a whole has embraced the benefits that energy-saving and good community relations bring to its business for the long term. The larger Asian companies in this sector set protocol on a variety of industry standards based on their size and growing scope as they become the front-runners in global business expansion. Beyond the first level of world-class companies, the smaller Asian operators in this sector have much work to do — a reality that will have a direct effect on both their short-term profitability and long-term viability.

The steel industry as a whole has embraced the benefits that energy-saving and good community relations bring to its business for the long term

On the other end of the spectrum are the Asian extractive mining companies which are just beginning to attract attention in global equity markets, and have much to do to better manage sustainability risks and their long-term growth prospects. The universe of listed Asian mining companies is dominated by government-owned entities, smaller privately owned companies often with a combination of foreign and government or government-linked shareholders, and subsidiaries of global multinationals. Still heavily government influenced, Asian mining companies typically base their sustainability policies on little more than regulatory compliance. By contrast, foreign companies operating in Asia have often paid a high price for relying on policies strictly based on compliance with a regulatory framework that is murky and inconsistently administered. Scarred by these incidents, many global multinationals active in the region have improved transparency and practices to go beyond regulations that are just beginning to be addressed, if at all, by the Asian players.

Asian extractive mining companies are just beginning to attract attention in global equity markets

This wide variance of approach, level of focus, and disclosure on sustainability issues creates numerous challenges for investors. Although sustainability risks and their effect on operating results are beginning to be discussed within the traditional analysis of the sector, it is still very much secondary to discussions of supply and demand, life cycle and commodity pricing. However, in these energy-intensive, highly intrusive, yet lucrative industries, tied so closely to both government-owned businesses and economic development, issues of sustainability can have vast influence over a company's profitability and equity value. We look at four issues, which we feel warrant attention by investors in order to fully understand the risk profile and value of an investment in the metals and mining industry. These issues are explored against the backdrop of four key subsectors: metals mining, coal mining, metal processing (aluminum and steel) and cement.

The sub-sectors have some similarities as well as differences which will be highlighted. In this report, we assess these issues in the context of Asia's most broadly held large and mid-capitalization listed metals, mining, and building materials companies. We believe that the most important sustainability themes for investors in these companies will be:

- **Rising EHS standards** Rising regulatory standards will result in higher costs as companies invest to meet tougher safety, environmental, and health standards
- **Community investment** Successful projects often require investment in community-linked infrastructure if long-term returns are to be realized
- **The energy appetite** High energy needs make these industries vulnerable to changing energy policies
- **Globalization and accountability** Longer term, management of higher risk projects, accelerating globalisation, and new transparency initiatives will reinforce the materiality of sustainability variables

COUNTRY AND SECTOR DYNAMICS

What the sector looks like today

Asia plays a central role in the metal, mining and cement industry, both as a supplier of raw and finished materials and increasingly as a driver of demand

Asia plays a central role in the metal, mining and cement industry, both as a supplier of raw and finished materials and increasingly as a driver of demand as global commodity markets respond to the needs of Asia's growing processing industries. A significant portion of the world's natural resource reserves is based in the Asian region. One would expect that exploration in the region could well produce higher reserves. Reserve prospects in many countries in Southeast Asia are still quite good, with indications of undeveloped reserves in Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Thailand and Vietnam. China ranks second in world coal production, according to the International Council on Metals and Mining (ICMM).

Figure 1 Selected Mineral Reserves in Asia

Mineral	Reserves (% in Asia)
Bauxite and Aluminum	17%
Copper	10%
Iron Ore	19%
Lead	14%
Nickel	16%
Zinc	17%

Source: MMSD 2002 and ICMM 2005

Asia is also a large and growing consumer of metals and minerals as the global supply chain shifts from developed industrial countries to Asia. According to the Mining, Minerals and Sustainable Development (MMSD) 2002 report, Asia consumes more than a third of most of the world's metals and minerals including aluminum (35%), lead (30%), zinc (40%), copper (39%), nickel (40%), gold (61%), and coal (36%). These figures are increasing as the region, particularly China and India, develops. China alone took the position of largest consumer of coal and iron ore in 2003, according to ICMM at 26% and 31% of global consumption.

Figures for steel production and consumption mirror that of the minerals sector. Asia is a major producer and consumer of steel and steel products.

Figure 2 Global Crude Steel Production (million metric tonnes)

China	220.1
European Union	183.8
Japan	110.5
United States	90.4
Russia	62.7
South Korea	46.3
Ukraine	36.9
India	31.8
Brazil	31.1
Taiwan	18.8

Source: International Iron & Steel Institute (worldsteel.org) Sustainability Report 2004

China has pushed world steel production up by one third over the last five years, producing 27% of the world's steel. While China's exports of steel have been rising in 2005, a large proportion of the steel produced is still used domestically. While there has been much speculation concerning the durability of the current steel cycle, over the near term, secular growth in China's demand for resources seems well established in line with broader economic and industrial trends such as the growth of the auto and white goods sectors. India also plays a major role in steel production and consumption. Industry experts expect India's role in this market to continue to increase. India's consumption of finished steel rose from 14.8 million tonnes in 1991-92 to an estimated 34 million tonnes in 2004-05.

The listed Asian metals, mining and cement sector is dominated by companies in North Asia — China, Korea, and Taiwan — as well as those in India. Most of the larger listed companies operate in the production side of the business — steel, aluminum and cement — and hold quite prominent positions as global players in their industries. These companies are paving the way as the new Asian corporate giants, expanding into foreign markets and, in some instances, setting the standard for Asian business practices in the areas of sustainability.

The listed Asian metals, mining and cement sector is dominated by companies in North Asia — China, Korea, and Taiwan — as well as those in India

Coal and certain other extractive industry players are up and coming as the new larger public companies, particularly again in China and India. Many of these companies are the result of government privatizations, particularly in China where the government is focused on consolidating its coal industry. The

Chinese government has identified five key players to be the main coal producers in the country, allowing these players to sell minority stakes to bring in new capital and technology, and using bankruptcy as a mechanism for consolidating smaller, less efficient operations. The new publicly listed companies in the sector are increasingly being required to meet international expectations on governance, controls, disclosure, and accountability in order to attract overseas investors.

While the extractive mining industry is very active in other parts of Asia, particularly in resource-rich countries such as Indonesia and Papua New Guinea, companies in this region are predominately privately owned joint ventures between a local owner and a foreign partner with a global footprint. Those companies that are public have smaller market capitalizations and are less actively traded. However, many of the risk factors which apply to the larger publicly listed companies also apply to these companies and will be discussed as appropriate.

Figure 3 Larger Regional Listed Metals & Mining Companies

Industry Segment	Market	Company	Market Cap* (US$mm)
Iron and steel	China	China Shenhua Energy	19,949
		Baoshan Iron and Steel	8,947
		Maanshan Iron and Steel	2,135
		Angang New Steel	1,492
		Chongqing Iron and Steel	266
	India	Tata Steel	4,673
		Jindal Vijayanager	657
		Essar Steel	277
	Korea	Posco	17,591
		INI Steel	1,912
		Dongkuk Steel	1,151
	Taiwan	China Steel	8,025
		Tung Ho	441
		Yieh Phui	436
		Sheng Yu	236
Nonferrous metals and coal	China	Yanzhou Coal	3,432
		Zijin Mining Group	2,322
		Aluminium Co of China	1,984
		Jiangxi Copper	1,607
	India	Hindalco	21,450
		Aditya Birla Group	9,000
		Vedanta Resources	4,298
		Nalco	3,106
	Indonesia	Bumi Resources	1,501
	Thailand	BANPU	870

* As at 30 December 2005, or last official day of trading

Source: Bloomberg, December 2005

Foreign-owned entities in the region operate under a range of corporate structures. As mentioned, in Southeast Asia, the foreign mining company is typically a joint venture partner with a local entity, operating a single production company or mine. Key examples are PT Freeport and Indaro Coal in Indonesia, among others. Placer Dome, Rio Tinto, and BHP Billiton are also active in the region through directly owned subsidiaries. Foreign owners could be a major or a junior mining company, such as Sino Gold or others structured as a foreign owned joint venture with assets only in Asia. Another avenue for foreign participation in Asian metals and mining companies exists via equity investments in publicly listed entities. Recent examples include Anglo American's US$150million investment in China Shenhua Energy.

Foreign owned entities play a critical role in shaping the competitive landscape and frequently set the standard on sustainability practices

While this report focuses on the publicly listed, Asian-operated companies in the region, foreign owned entities play a critical role in shaping the competitive landscape and frequently set the standard on sustainability practices. These companies are providing funding and investment opportunities, of course, but also, with their more complete disclosure and media focus, offer insights into both best and worst practices in the industry. This is particularly so in the extractive side of the sector where disclosure is at a minimum and the impact of sustainability risks is still relatively hidden by local operators. Intense pressure from stakeholders based on poor performance in the past has been successful in getting the issues onto the table of most global companies within the industry. There are still questions as to whether these companies are fully addressing the issues, particularly in the extractive industries. However, global sector leaders have, to varying degrees, embraced sustainability policies which now provide not only a framework by which to compare local entities but also to assess the investment impact of sustainability management practices.

Cross-cutting issues

To assess the investment impact of sustainability risks associated with the metals and mining industry, it is important to identify cross-cutting sustainability themes which shape the industry. Due to the diversity of the sector, we find more cross-cutting risks for the metals, mining, and building materials industries than are common to other more uniformly configured sectors. Key issues are:

- **Commodity pricing**
- **Inconsistent disclosure**
- **Government involvement**

Commodity pricing The key revenue driver for the sector is the undeniable influence of global markets on commodity and product price. In the extractive industry, global commodity pricing is often the dominant factor controlling revenue, typically without the benefit of adjustment for company or country-specific energy or operating cost variables. For the production side of the industry, such as steel, the key driver is supply and demand for the finished product, with neither energy costs nor raw material costs a direct pass-through. As both a key supplier and consumer of product, Asia, particularly China and India, exerts significant influence on the global marketplace.

Companies in the region often rely on government subsidies in the form of preferential energy and other tariffs to keep profit margins in line

Thus, Asia plays a crucial role in the global supply and demand picture for metals and mining products. However, companies within the industry have little control over the price of their product, with the ability to improve profitability limited to cost management or production expansion, rather than pricing mechanisms. At the same time, companies in the region often rely on government subsidies in the form of preferential energy and other tariffs to keep profit margins in line. In addition, domestic demand for strategically important commodities is often shaped by import tariffs or restrictive quotas to protect local companies.

The result has often been pressure on expenses related to health, safety and the environment. New technologies and energy sources that reduce costs are an opportunity and benefit to companies in managing their cost structure. How issues of sustainability associated with these issues play out in Asia is an important element in determining which players will be able to preserve operating margins in a sector which searches to control costs as a counterweight to cyclical commodity pricing swings.

Inconsistent disclosure Inconsistent disclosure and limited comparable statistical data are distinct impediments to complete analysis of the diverse sustainability risks of metals and mining companies in Asia. While some companies are notable for their disclosures, there is little consistency in reporting, even in terms of more traditional items such as accounting standards, reserve valuations and governance implementation. As a result, it is not possible to substantiate key aspects of corporate performance without relying on a patchwork of corporate disclosures, many of which have a strong public relations tone but little data support.

Figure 4 Global Reporting Trends in Mining — KPMG 2003

Disclosure	Traditional Mining Bases*	Emerging Countries
Resource and Reserve Information	90%	<20%
Executive Remuneration	90%	<20%
Corporate Governance Practices	100%	50%
Formal Risk Assessment Processes	95%	8%
Environmental and Social Issues	92%	NA

**Australia, Canada, South Africa, UK, US*

NA - Not Available

Source: Commodities Now, 2003

The above chart shows that disclosure is an issue in the emerging markets in general, not just in Asia. While the global players are more forthcoming with information, even with the major players there are issues, as Trucost found in its December 2004 study of disclosure of environmental issues by thirteen of the largest metal miners. According to Trucost, "investors are not adequately

informed about key risk areas, particularly heavy metal emission and the management of tailings dams". These are both key environmental issues, which can have a significant impact on clean-up and reclamation costs, and hence profitability. However, the global focus is on more disclosure not less, with the ICMM and the Global Reporting Initiative (GRI) agreeing on a standard of reporting for the sector (2002). Asian companies that want to tap global capital will need to address these standards.

Companies operating in the global marketplace disclose significantly more than their counterparts

We see the trend toward more disclosure in the sector in Asia as well. Companies operating in the global marketplace such as POSCO, China Steel, and Tata Steel disclose significantly more than their counterparts operating in predominantly domestic markets. Newly listed companies accessing the global equity markets such as China Shenhua, Vedanta Resources, and Yanzhou Coal have more significant disclosures than those with more regional equity focus.

The level of disclosure has increased in recent years, with China Shenhua Energy, the most recent public listing at the time of this report, disclosing considerably more than many of its counterparts. Other players such as Sheng Yu Steel of Taiwan, which is more than 60% owned by Japan's Yodogawa and Toyota Tsusho, have provided extensive reports and indicators on both the environmental and social reporting level, reflective of the focus of their key investors.

It is clear from the direction of reporting in Asian companies that the trend is towards more: more issues, more indicators, and more disclosure on issues of health and safety, environment and governance. While it is not entirely fair to say that the companies that do not report on these issues are not tracking or managing the risks, it is increasingly a red flag when disclosure is limited.

Government involvement The role that governments across the globe, and in Asia, play in this industry is a material consideration. Natural resources are considered key industries for many economies and are typically subject to tight government control. The processing and production of metals using critical natural resources is also considered a key building block of many nations' economies. The companies that began in these industries were often government-owned to start and typically remain highly regulated, with a focus on strategic supply relationships. State and local governments have control or influence over many aspects of the sector in Asia, which has an affect on corporate risk profiles at many levels. This influence can fall into several broad categories:

- **Land and mineral rights** In line with global trends, mineral ownership in Asia is maintained by the state in most countries. Metal, mining and cement companies are awarded concession rights by the central government to extract key resources for a fee. Concession terms can change at the discretion of the government. Because terms for the granting of these licenses can be opaque, there have been many instances whereby a change in government power can put into question whether a company has a right to operate a certain project

- **Equity ownership** Many of the listed companies in the sector were initially state-owned. Although there have been a number of listings,

Although there have been a number of listings, involving minority stakes, many of the companies remain government controlled entities

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- **Supply chain influence** Many companies, particularly those that were once government owned, are required to source necessary raw materials, energy, and other supplies from designated suppliers. Transport services and power supply are often derived from state-owned entities

- **Import / export controls** Governments in the region regulate import/ export of the products in the sector in order to ensure sourcing and sales meet government policy on industrial and economic development. Pricing, taxes, duties, and fees are all within the sphere of government influence

- **Preferential tariffs and subsidies** Several companies in the region are either harmed by or benefit from preferential tariffs set by regional governmental bodies. In the energy intensive industries, preferential energy rates are offered to allow local producers to be more globally competitive

- **Operating regulations** Environmental, health and safety standards are the clear top issue here. In most countries, regulations are in place but enforcement is inconsistent. This trend also affects foreign ownership, granting of production licenses, reserve recovery rate requirements, mining and production rights and new production facility approvals

Figure 5 Government Involvement in Certain Regional Companies

China Shenhua	83% owned by state-owned company after sale of new equity. Government set recovery rate requirements, transportation on government rail systems, power tariffs and dispatch
Yanzhou Coal	58% owned by state owned company; reliant on parent for power, health and employee benefits
Chalco	45% owned by state-owned entity; reliant on government subsidized energy source
China Steel	Partial ownership by state-owned entity
Vedanta Resources	Subsidiaries partially owned by state-owned companies. Equity sale from state-owned entities not yet legally approved. Restrictions on payments from operating units to Vedanta as parent, at which level equity and bonds are held

Source: ASrIA 2005

Long-term sector outlook

We see two key trends for the sector over the longer term. The first is further globalization as well established players increase their presence in Asian markets, typically via acquisitions. The metals and mining industry has seen a recent

wave of mergers and acquisitions both within countries and beyond borders. Certain countries, most notably China, are focusing on consolidating the industry within their borders to control and maintain profitability. However, across the globe, the metals and mining industry has been experiencing a wave of consolidations through acquisition in an attempt to reach new markets and reserves, and to lower costs. The race for resources is also taking companies further and further afield in search of higher-grade, longer-life reserves, bringing an unprecedented era of globalization to the sector.

The metals and mining industry has seen a recent wave of mergers and acquisitions both within countries and beyond borders

While we see many examples of the traditional structure whereby a Western MNC takes on projects in resource-rich less developed countries such as Indonesia, China, and Philippines, we are also seeing examples of Western MNCs purchasing equity stakes in large, privatized metals and mining companies in Asia — thereby exerting influence at a shareholder level rather than running the operations themselves.

The Western MNC is not the only player involved in this global expansion. Asian companies are also getting into the act. Many companies are purchasing single properties and projects, both in Asia and elsewhere. For example, there have been Chinese purchases of mines in countries such as Papua New Guinea as well as in Africa. There is additionally a new class of Asian company that has grown big enough to become a new MNC. As these companies travel offshore, they find their competition stiffer and need to compete at a global level. Steel companies such as POSCO, China Steel, and Tata Steel are examples of the new Asian MNC which are striving to meet global sustainability standards. And some players are doing well at setting the standards. Steel Dynamics, a research firm specializing in the steel industry, named Tata Steel the best-managed firm in Asia based on issues of profitability, ethics, environmental management, and competitive positioning among others. However, the question still remains as to how quickly standards are being implemented and the extent to which standards are being implemented in offshore as well as home facilities.

Asian companies are growing big enough to be the new MNC's

Perhaps the most interesting phenomenon is the foray of global Asian players into properties in the West, in markets such as Canada and the U.S., where the license to operate will inevitably be determined by more sophisticated communities and better developed regulatory and legal mechanisms.

The second key trend is accelerated growth and new listings by Asian players. Many governments in the region, notably China, see privatization as a means to attract both capital and technology to their metals and mining industry, and indirectly to their overall development. Indeed, one crucial question for investors will be the extent to which the listing process can become an effective tool for funding higher performance standards for China's emerging sector leaders, many of which have lacked resources to address sustainability challenges.

OPERATING CHALLENGES: RAISING ENVIRONMENTAL, HEALTH AND SAFETY STANDARDS

As impacts have risen and public expectations have matured, governments have begun to move toward more active enforcement

Investors in the Asian metals and mining sector have traditionally looked past the sustainability standards of Asian operators, confident that neither regulators nor markets were ready to enforce developed market norms. As impacts have risen and public expectations have matured, however, governments have begun to move toward more active enforcement. For investors, this will mean higher and sometimes unexpected costs as companies are forced to anticipate a new pattern of stricter regulation. Though it is also notable that adoption of higher project standards may also help mitigate project risks and the potential of unexpected risk-related costs further down the line.

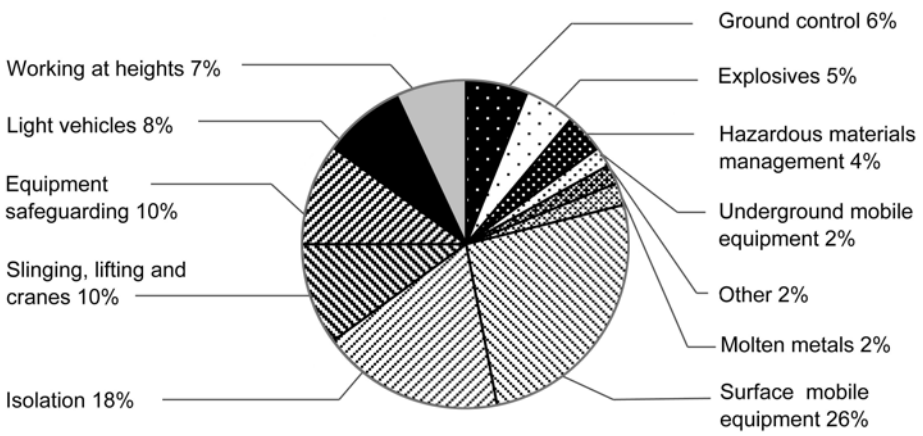
The metals and mining business, by its very nature, is disruptive to the environment with operations that carry significant environmental, health and safety (EHS) risks. A review of sustainability reports prepared by industry leaders quickly highlights issues of key concern in the area of environmental, health and safety:

Environmental issues The overall impact on air, land, and water quality is key. Disruption to natural habitats and biodiverse areas, energy usage and supply, greenhouse gas and other emissions, water usage and supply are key issues of importance. During the life of a project, one of the most crucial considerations is how waste products — especially mine tailings and other major effluents such as sludge — are handled. In the steel industry, recycling is possible. However, where mining effluents have leaked or been dumped into rivers, ground-waters or the sea it can lead to major pollution issues which can become global as well as local headline news, with major impacts on the reputations of mining companies as well as creating potential costly clean-up and litigation costs. See the Newmont Mining example, Figure 11.

Health issues Key issues which affect human health are elevated noise levels, air quality and chemical emissions, dust and residue in mining operations which affect respiration, direct and water-based exposure to toxins and chemicals with adverse health consequences. Health and medical standards, communicable diseases such as AIDs, and other health issues prevalent in mining communities are important issues that are beginning to be addressed in the Asian context.

Safety issues Simply put, safety is measured by injuries and fatalities. As an example, BHP's sustainability report graphically demonstrates incidents of safety concern in their organization, and highlights graphically the typical safety concerns related to mining (although percentages of incident will differ):

Figure 6 Significant Safety Incidents by Fatal Risk Control Protocol and Incident Type



Source: 2001/02 to 2003/04 — BHP Sustainability Report

The level to which Asian players address the issues of sustainability varies considerably and is highly dependent upon the industry. The global steel players such as POSCO and Tata Steel have fully integrated sustainability programmes, with emphasis on environmental, health, and safety standards in line with their counterparts in other parts of the globe. Indeed, Asia's leading metals companies are increasingly in step with global reporting norms for the extractive industries in terms of integrating, managing, monitoring and reporting on sustainability issues. However, reporting by these companies is substantially better than the limited disclosure common to the smaller players in Asia.

It is notable that few Asian companies have set the bar beyond government compliance

Despite the emergence of examples of better sustainability reporting, it is notable that few Asian companies have set the bar beyond government compliance. It is argued by many NGOs that even the multinational players revert to local government compliance when operating overseas, even if such standards are below the standards of their home country. This clearly illustrates the point that government compliance as a standard has significant drawbacks:

- Regulatory levels are by no means standardized from country to country

- In most countries, it is not a question of EHS standards existing, but how these regulations are interpreted, monitored and enforced. With low governance and transparency standards in many resource-rich Asian countries, these questions are not always clear, and can be subject to sudden change with little public consultation. Companies may be open to greater risk than can be quantified by relying on such inconsistent standards

- Government is one of the important stakeholders with which companies must contend. Government compliance alone may or may not meet the needs of the other stakeholders, especially in a region where political

change is bringing a new and more diverse range of views to bear on development choices

The question then arises as to what standards a company in the industry should operate under. Global organizations such as the Global Mining Initiative, World Steel Organization, Cement Sustainability Initiative and others are attempting to address the issues and set the standards for companies in the industry.

Health, safety and labor supply — key issues for China

China has come under global scrutiny due to the large number of mining related deaths in the country's large and geographically diverse mining sector

To illustrate the point of how EHS issues are becoming more material in the region, we can look to rapid changes in the enforcement of mine safety in China. China has come under global scrutiny due to the large number of mining related deaths in the country's large and geographically diverse mining sector. In 2004, more than 6,000 coal miners died, accounting for 80% of such deaths worldwide. In the first three months of 2005, the number of coal mining incidents increased 21% over the comparable period to 1,113.

One of the most recent incidents, at the Daxing mine, is sadly a typical example. In this incident more than 100 people died due to flooding in the mining shaft. ''This is a typical case in which mine owners make money, miners lose their lives and the government pays the bill,'' Li Yizhong, State Administration for Work Safety director, was quoted as saying. Li has publicly pledged to strengthen safety supervision in China, but has also publicly expressed concern about the effect of corruption on the process.

Li subsequently noted that there are five main types of collusion between government and coal mines: i) officials or SOE leaders invested in small coal mines; ii) officials set up coal mines or helped their relatives to set up illegal coal mines; iii) officials accepted bribes to issue certificates illegally; iv) officials assisted illegal coal mine operations; v) officials helped conceal coal mine accidents.

The chief causes of mining disasters can therefore be summarized as lack of management rigour and discipline, poor culture of safety and poor enforcement of regulations, often due to corrupt regulators who also are owners or part owners.

The negative pressure and embarrassing publicity pressed the Chinese government to start taking action. In February 2005, the work safety agency was upgraded to a full ministry, with a new head, to strengthen the office's ability to get things done. A full plan of action including stronger guidelines, legal framework, and tougher law enforcement is being discussed. Higher compensation for victims is also being considered. Critics have blamed the lack of enforcement and supervision of safety standards, not the existence of the laws themselves. Corruption and confusion as to which level of government is responsible for enforcement, as well as conflicts of interest resulting from

ownership of mining companies by employees of regulatory bodies and government entities (for the most part undisclosed), further contribute to the problem. Thus, the real test will not be on what regulations and standards are put in place, but how strictly these are enforced.

However, the government's attempts to force government officials to relinquish their financial stakes in coal mining have proceeding apace, as reported by the Beijing News (2 November 2005). According to the paper, by 20 October, 4,578 officials had reported investments in coal mines totalling 653 million yuan (US$80.5 million). Of the amount, 473 million yuan (US$56 million) has been withdrawn. Those who have withdrawn shares from coal mines include 3,002 civil servants and 1,576 heads of State-owned enterprises.

What this means for the mining companies and the investors in these companies is, at least initially, more costs. The Chinese government put aside Rmb3 billion (US$800 million) to improve safety in state-owned mines. Private enterprises are expected to make similar investments. In its recent 2004 annual report, Yanzhou Coal disclosed a 5% increase in costs per tonne of coal sold from FYE 2003 to FYE 2004 due to improvements in safety standards (accounting for 20% of the total increase in costs during the year). This amounted to an increase of RMB 4.90 per tonne of coal sold, or a total increase of RMB159.5 million spent in 2004 due to increased safety standards. Although a small percentage of its total RMB 10.6 billion revenue, it does demonstrate that funds are being earmarked for safety improvements. China Shenhua Energy stated in its May 2005 offering memorandum that it "may be required to devote substantial financial and other resources" to comply with strengthened safety regulations in China. For those companies that do not sufficiently ensure safety standards for their workers, hefty fines and regulatory sanctions can be expected on top of lost production time.

It is interesting to note that Hong Kong listed Chinese mining companies, in response to the perception of rising operating risks, now lead the region in disclosures on this topic, based on the most recent public offering disclosure statements. There is scope for improvement however. While the current cost of safety standards is outlined, what the companies are actually doing to ensure safety is not quite clear, leaving one to wonder if the efforts are sufficient or even in line with global standards.

Hong Kong listed Chinese mining companies, in response to the perception of rising operating risks, now lead the region in disclosures on this topic

Indeed, while investors need to be alert to hard investment costs, there are also important investments resulting in higher operating costs which need to be made in staff. The safety problems faced by Chinese companies are partially a direct result of a lack of trained safety professionals in China and the region who can identify and rectify problems before they become catastrophes. Ironically, the dismal safety record of many of the players in the industry only adds to the negative image that mining and metals companies have had in recent years, and this has contributed to a severe global shortage of qualified skilled and semi-skilled workers wanting to go into the industry.

According to recent comments by Paul Mitchell of ICMM, the current total number of students in university mining courses in the United States is 578, only a quarter of what is was in 1938, despite the explosive growth in the overall number of students from 1938 to 2005. The shortage is even greater in

Asia. Combine a reduction in the number of students studying these industries and operating methodologies, that in both the extractive and production sides of the business are becoming increasingly technical, and the sector seems certain to face continued challenges in building the infrastructure needed to cope with higher standards.

Ok Tedi copper mine: corporate lessons and business losses

For Asian investors focusing on the potential impact of higher standards, it is important to appreciate the scale of losses that can result from projects which inaccurately assess and manage the environmental and social risks. Some of the best researched examples of problems in the region involve foreign-invested joint ventures due to the disclosure obligations common to foreign companies.

The Ok Tedi gold and copper mine in Papua New Guinea provides a vivid example of the complexities faced by mining companies in managing and assessing EHS risks. Ok Tedi was majority (52%) owned by BHP until 2001. BHP's initial mining plan called for tailings to be managed through landfill and damming. However, landslides and other topographical changes curtailed this plan. The tailings were then disposed of in the local river resulting in polluted waterways, dying fish and disruption to local livelihoods such as fishing, as well as evidence of illness among the local population.

BHP determined that the environmental impact and the resultant cost to clean up the project and continue operations was not economically viable, and decided to close the mine. There was an outcry from the local community who derived their livelihood from the mining company village and its operations, and pressure from the local government which was earning revenues from the operations, not to close the mine but to come up with a solution to solve the environmental problems.

Figure 7 Unwinding the Ok Tedi Debacle

"It is clear that the environmental damage caused by the Ok Tedi mine is greater than expected when the mine opened and that it is now a serious problem affecting many people along the Fly River system.

However, it is essential to bear in mind that any hasty and poorly planned decision to close the mine could have had even worse consequences for the well being of these people and for Papua New Guineans generally."

The Prime Minister, Sir Mekere Moratau, on 26 September 2001, announcing approval by the National Executive Council of an agreement for the withdrawal of BHP Billiton from the mine

"Ok Tedi is a complex issue for BHP, with competing environmental impacts and social and economic benefits. We have indicated to the other shareholders that we thought the best approach to this dilemma was to close the mine early. However, the PNG Government does not want the mine to close earlier than ten years from now which would be its economic life. We understand the reasons for its position.

As a result we have come to the view that it would not be appropriate for BHP to have any direct involvement with the mine beyond the point at which all parties can agree on how best we exit."

BHP Chairman, Don Argus, at the 2000 BHP Annual General Meeting

Source: OK Tedi Mining Perspectives

Once the scope of environmental damage was acknowledged, the interests of the government and the mine operators diverged. After lengthy discussions and negotiations, BHP's shares were transferred to a new entity, PNG Sustainable Development Programme Ltd. which would re-deploy dividends from the project back into community programmes. BHP agreed to provide $100 million in an interest free loan for environmental cleanup and other projects and to relinquish its rights to future earnings from the operations.

The cost to BHP: The total project cost was US$1.9 billion, twice the expected amount. BHP took a write-off of US$416 million in assets in fiscal year 2002 as a result of the transfer of the shares. The company agreed to provide a US$100 million interest free loan for funding of the new project company, plus dredging costs of US$35 million per year. In the year that the write-offs were taken, earnings per share were reduced 7% as a result of the write-offs. Additionally, the company paid what must have been extensive legal costs and undoubtedly suffered a cost in terms of management time. A previous claim in 1996 resulted in an out of court legal settlement of US$28.6 million. If the tailings issue had been adequately addressed at the outset, via an adequate EHS assessment, the costs of an acceptable solution could potentially have been assessed upfront and might therefore have been built into the financial model. It was an expensive lesson for the company which has subsequently become a frontrunner in sustainability practices, going on to win the 2005 Company of the Year Award from the Business in the Community Awards.

The Ok Tedi case provides a concrete example of how badly managed environmental risks can destroy project economics

The Ok Tedi case provides a concrete example of how badly managed environmental risks can destroy project economics. In the absence of full disclosure, the task for investors in Asia is to assess the compliance and risk appetite of managements and local governments. It is increasingly clear that Asian governments are re-evaluating previously lax standards. In a number of countries around the region, name and shame strategies are becoming increasingly common as are rapid and tough regulatory sanctions, raising the potential for an unexpected and inevitably higher pattern of EHS spending.

As the long-term costs of bad EHS enforcement have become clearer, Asian regulators have come under greater pressure to implement higher standards for the Asian listed universe of metals and mining companies. The first phase of this process — more aggressive enforcement for foreign-invested joint ventures — is already evident as the Ok Tedi example makes clear. At the same time, the Chinese government's strategy of requiring higher EHS spending by listed companies is a clear indication that the issues now have a distinctly local relevance as public expectations about EHS impacts rise.

For Asian investors, this will mean that cost models and earnings expectations for Asian metals and mining companies will need to take into account higher spending levels as companies come under pressure to meet more realistic EHS spending levels. This process also has the potential to introduce a new level of uncertainty as investors, typically focused largely on commodity pricing cycles, will need to factor in a regulatory cost cycle as Asian governments move toward more aggressive enforcement.

PROJECT REALITIES: ASSESSING NECESSARY COMMUNITY AND INFRASTRUCTURE INVESTMENTS

Due to the broad impacts of projects in the extractive and metals sector, the license to operate is a crucial element of corporate strategy

Perhaps the most fundamental concept in corporate social responsibility is the "license to operate" — the ability of a company to enjoy sustained support, not just from shareholders but also from communities, regulators, and customers. Due to the broad impacts of projects in the extractive and metals sector, the license to operate is a crucial element of corporate strategy and a company's ability to realize long-term project returns. In the previous section, we highlighted the need for specific operating cost items crucial to addressing the mitigation of EHS risks. A second, and equally significant, cost component is long-term investment in infrastructure and community resources. These costs, which are dominated by fixed asset investments in transportation, housing, schools and hospitals, provide the basis for the type of long-term community engagement necessary to support a company's license to operate. For investors in Asia, the challenge is to assess whether companies have a realistic or merely reactive stance on this crucial area of spending.

Figure 8 Mining and Minerals Sector — Shaping the License to Operate

The mining and minerals industry faces some of the most difficult challenges of any industrial sector and is currently distrusted by many of the people it deals with day to day. It has been failing to convince some of its constituents and stakeholders that it has the 'social license to operate' in many parts of the world, based on the many expectations of its potential contributions:

- Countries expect that minerals development will be an engine of sustained economic growth
- Local communities expect that the industry will provide employment, infrastructure and other benefits that counter the risks and impacts they experience and will leave them better off than when the project started
- The industry's employees expect safer and healthier working conditions, a better community life and consideration when their employment ends
- Local citizens and human rights campaigners expect companies to respect and support basic rights, even when they are operating where governments do not monitor standards
- Environmental organizations expect a much higher standard of performance and that the industry will avoid ecologically and culturally sensitive areas
- Investors expect higher returns and have shown considerable concern about the industry's financial results
- Consumers expect safe products produced in a manner that meets acceptable environmental and social standards

Source: WBCSD 2002, Breaking New Ground: Sustainability in the Mining Sector

The metals and mining industry requires land acquisition and new development for continued and sustained growth. With each acquisition and new development project comes a number of related community, infrastructure, and capital investment projects necessitated by the need to both gain acceptance in the community and develop the necessary labor force and infrastructure to support the operations. The further afield the race for resources extends, the more likely that infrastructure is not in place for these projects, and the more the need for up-front investment to support the projects. Effective engagement with the local communities and other potential interested stakeholders at early stages of the planning process is potentially one effective way of assessing local concerns and needs as well as drawing on local knowledge which may have a relevance to the project. Such engagement may positively inform projects and help reduce the potential of project investment risks. Additionally, most countries require that any environmental and social impact of operations be minimized and the land restored to usable condition at the end of the project. A sensible and environmentally and socially sensitive closure plan is also as vital as a well-constructed operational plan. It is just as important to calculate the costs associated with these remedial project plans and the impact of those costs on share value, as it is to calculate the production profile and reserve analysis of the project.

A sensible and environmentally and socially sensitive closure plan is as vital as a well-constructed operational plan

In its extensive work on the mining sector, the WBCSD highlights the following social issues as crucial for successful project implementation: relocation, migration, infrastructure improvements, health, education and social change. We would add general labor supply issues and the distribution of benefits between local and either national or international communities as additional challenges. If any of these issues are not addressed, the result is all too often a disruption to the business, either as a result of social tensions, social strife, or lack of human and other resources for the business.

The first step for any green-field project is to address the concerns of inhabitants currently making their living in the region of the project. A requirement for approval for business licenses from most governments requires a plan to address relocation of inhabitants. Adequate compensation and equitable treatment of local inhabitants can prevent common and potentially controversial disputes over land rights and local consent.

Migration to the operations site is another issue that can complicate efforts to establish and maintain local consent. Indeed, the lure of employment and the need for workers with scarce skills often brings in new workers and residents to the community. If not handled well, or if the local community does not feel that it has been equitably treated, tensions can brew and social clashes and disturbances may occur. Tensions may be between local people from different regions, or between foreign workers and locals, or between any transplanted group and other inhabitants.

There are two approaches to sourcing labor, with advantages and disadvantages. The first is the fly-in/fly out approach whereby workers work but do not live at the site, and the second is to bring workers in from an outside location and set up a company town to support the operations. The former is less disruptive to the local community, but does not necessarily bring similar economic benefits to the local community. The costs are also high in

terms of travel and wear on the employees who are working away from family and familiar surroundings. The second method is easier for employees, brings income through support services to the local community, and also allows for training and knowledge transfer for future job prospects for local workers. However, the social impact is greater, and closure of the operations becomes more complicated in order to ensure that the local community is not left completely devoid of sustainable livelihoods.

Better access to health and education is one of the most important community benefits that can be offered by companies operating mining projects in remote areas

Better access to health and education is one of the most important community benefits that can be offered by companies operating mining projects in remote areas. Improved educational programmes and facilities are generally offered to employees and their families. Once established, however, they often become community resources.

Originally, community support was considered adequate to provide the physical improvements: school buildings, medical centers, and community centers. Global players and best-practitioners in the sustainability realm now see the need to support and grow the training and development of the community for best benefit while the facilities are operational, and to ease the transition when the operations are closed. Schools with teachers, books, and supplies, are financed by the company. Medical centers with staff, health insurance and health education are other offerings. These benefits are offered to employees to ensure a supply of healthy workers for the operations, as well as to others in the community to offer a broader range of acceptance in the community.

Figure 9 BHP's Strategy on Community Investment

The resources industry has had a chequered history in relation to creating a sustainable positive legacy. It has tended to take a paternalistic approach with limited community consultation and has been inclined towards technical solutions such as the building of infrastructure (schools and hospitals) without focusing on the need to engage communities in the process or to train and develop local people to manage these facilities.

We recognise a need to more actively involve communities in our development programmes if the programmes are to achieve truly sustainable long-term outcomes, and to do this effectively we must increase the relevant skills and expertise of people within the Company. It is only by building human and social capacities within the community that we will leave a valuable legacy that outlasts the operation itself and ensures a positive future for communities beyond resource extraction.

Source: BHP 2005

Within the listed universe of Asian metals and mining companies, we can look to two examples of Asian companies offering support for the community in which it operates, and the positive affect it has on both the community and the business.

In India, there is an expectation of company support for the community. Tata Steel demonstrates this point strongly in the services it offers to its company town, Jamshedpur, and the neighboring community. Tata installed sanitation and clean water sources to the town. It supported the building of schools, hospitals and community centers, as well as financial support for the schools and medical centres (staff and supplies) as well as the cost for the community to attend these programmes through tuition payments and free health and medical benefits. Commentators have noted that, in many respects, Tata provides a cradle-to-grave corporate welfare system that is perhaps uniquely possible in India due to its low cost structure. The company has trimmed operations to make it more global-efficient and competitive, cut its work force in half, and yet still pays salaries to its laid off workers — and it hasn't had a strike in 75 years. The company town itself has signed onto the UN Global Compact Citizen's Programme supporting environmental, social and labor rights. Tata Steel lists as one of its key sustainability challenges its obligation to meet rising quality of life expectations in the communities it serves.

In India, there is an expectation of company support for the community. Tata Steel demonstrates this point strongly

While not all companies can afford to provide lifelong salaries to laid-off workers, Tata Steel is not alone in realizing that community support is vital for smooth operations and avoidance of strikes and work stoppages. While most companies in the region are far from offering the levels of support provided by Tata, some form of housing, medical and training support are often provided to employees. Many companies offer community development programmes, particularly related to education, health and alternate livelihood training.

Banpu, the Thai coal and power company, has also worked to reduce social impacts and build human resource capacity for its operations through a community development programme. Banpu Village was formed when villagers were forced to relocate upon expropriation of their land by the Thai government. Banpu came in as the mining sub-contractor, paid compensation to the villagers, established them in a new location, provided alternative housing and provided community infrastructure. The company has also established a skills development programme and other training initiatives to train potential workers as well as provide alternate livelihoods for the local community.

The key concern for investors when evaluating a company's community investment is whether actions have been taken in consultation with a variety of stakeholders and whether enough has been done to meet the needs of both the company and the local community in order to curtail resentment, replace lost livelihoods and provide for a sustainable way of life both during and after the project life. The second related concern is the projected cost of these programmes and whether they have been adequately accounted for in the overall project budget as up-front project costs.

The key concern for investors when evaluating a company's community investment is whether actions have been taken in consultation with a variety of stakeholders

While the cost of community support activities is often not large, projects requiring significant infrastructure investment often face material long-term investment commitments. Indeed, companies with operations in remote locations must often provide their own infrastructure for basic utilities such as access to water, power and transportation. For the operator, these investments are a necessary cost, while for the local community provision of reliable utilities is often a valuable benefit which can change the economic dynamics of a community. For the investor, the issue is whether there is value in the provision

of such infrastructure projects as stand-alone assets and how the assets are valued by the company. China Shenhua and Yanzhou Coal both support their own local railway system to bring coal to the national railway line.

Using Yanzhou as an example, purchasing the local railway from its state-owned parent made sense for the operations: instead of paying a fee to the parent company, Yanzhou can now pass the cost of transport on to its customers and realize additional revenue. However, it is uncertain whether the railway will have value, or what the value would be upon closure of the coal mine. The value of the railway would be directly in line with the restoration and reclamation plans of the land at the mine site. While the cost of the transportation system would be depreciated over time, the asset is held at a value equal to the cost of purchase less disposition value. The disposition value, and how that was obtained, is not disclosed. An incorrect valuation would lead to a write-off of the asset upon mine closure or sale, which would have a direct impact on the profit and loss statement.

Finally, a key consideration in metals and mining projects is mine closure. This touches on environmental issues because companies are legally required in most countries to restore affected land to a usable state. Mine closure also raises important social issues related to the community and what is left for the community when the company as benefactor goes away. Most companies include restoration costs in the project budget, with reserves held against these costs. Given the sensitivity of mine closure, community sustainability plans are often built into mine closure plans to ensure smooth transition for the community.

Although most Asian mining companies claim to include the costs of associated community projects, environmental restoration and other capital costs into project costs with funds established in reserve for future costs, it is difficult to judge whether these reserves are sufficient. Any costs beyond the reserves are expensed directly out of corporate earnings. This raises two issues for investors: (1) upfront costs for projects are high, often with a substantial period of operating losses before the projects reach profitability. The higher the upfront costs, the more pressure is placed on producing a strong revenue stream quickly in order to reach the breakeven point and produce project returns acceptable to investors, and (2) if estimates on costs are wrong, the effect can often be a direct hit to corporate profits with potential impact on share valuation. Quantifying future costs and needs is difficult and, as sustainability requirements change, so can the costs to meet these requirements. As a result, companies and investors must be alert to changes that might materially affect the profit profile of the project and its effect on company valuation.

ASIAN STEEL, ALUMINUM, AND CEMENT: WATCH THE ENERGY APPETITE

For investors in Asia, one of the biggest challenges can be to make a correct assessment of pending policy changes. This is a particularly important issue for investors in energy-linked sectors due to the history of heavy government involvement. For investors in the metals, mining and building materials sector, the question of how Asian governments manage local power and energy policies is of growing importance as rising global energy costs have placed pressure on existing pricing and subsidy structures which have traditionally benefited large users.

For investors in Asia, one of the biggest challenges can be to make a correct assessment of pending policy changes

Figure 10 High Energy Usage — A Growing Risk?

POSCO requires a staggering amount of energy each year and the reduction of energy consumption has been a key element to improve cost competitiveness.

POSCO Website

Aluminium production requires a continuous supply of electricity in large quantities...Electricity cost is the second largest production cost component of our primary aluminium production. All of our five smelters benefit from various policies that allow them to purchase electricity at reduced prices. If these preferential treatments are cancelled by the PRC government or not renewed upon expiration, or if electricity prices or charges were to increase for any reason, this would increase our unit production cost for primary aluminum and have an adverse effect on our financial condition and results of operations.

Chalco 10 — K 2004

[Cement production is] an energy intensive process. It requires the equivalent of 60 to 130 kilograms of fuel oil and 110 kWh of electricity to produce one ton of cement (depending on the cement variety and the process used).

WBCSD — Cement Sustainability Initiative Report

The production of metals is one of the most highly energy intensive industries. As a result, companies operating in this sector tend to be among the highest energy consumers in most countries. Short-term increases in energy costs cannot, in most cases, be passed on to the customer due to the constraints of commodity market pricing. Fuel and electricity costs directly affect profit margins, with a company's ability to source energy resources at favourable prices a determining factor for profitability and corporate viability.

For investors, there are two near-term energy-linked risks for Asian metals and building materials producers. First, is the need to address new operating policies appropriate to higher energy costs. Second, is the need to assess country- and company-level greenhouse gas emissions. In both cases, a company's risk exposure will reflect not only company usage or emissions

patterns, but the ability of Asian governments to move toward more responsive policies which reflect longer term policy realities.

China's policy toward the Aluminum Company of China (Chalco) illustrates this point well. Chalco has been awarded preferential electricity prices by the Chinese Government, and this is clearly recognized as vital for the company to continue to maintain its margins and profitability. However, China is also looking to enforce its "coal-cost-pass-through" policy by increasing electricity prices. In trying to support its coal production, aluminum production and utilities sector, the government is caught in a conflict as policies which assist one sector are bound to be a detriment to the other. Any decision by the government on dealing with this dilemma will inevitably have an effect on the companies operating in that sector.

Most companies in the metals sector are focused on finding and maintaining inexpensive sources of energy. The companies that can benefit from favourable energy prices through government subsidies or long-term supply contracts fare well while these contracts are in place. However, the risk to company profitability is that government policies change or contracts expire with replacements at less favourable terms. There are experts who predict that these contracts and policies will change as they become economically unviable for governments to maintain.

POSCO and China Steel both have trend-setting operations that derive electricity from internal sources

Most companies that have the means put considerable financial resources and efforts into looking for energy alternatives and new operating technologies which are energy-efficient. POSCO and China Steel both have trend-setting operations that derive electricity from internal sources: either through electric power recovery facilities or conversion of production gases for power generation. For example, POSCO has ventured directly into the power sector with investments in independent power projects both in Korea and elsewhere. China Steel recaptures process steam and has developed a secondary source of income by selling the power. The major players in the cement industry are researching and developing processes which rely on recycled material for energy, rather than traditional energy sources, as a means to increase supply and reduce costs. The gap between those companies which can afford to put resources behind technology developments and those that cannot will surely widen as time goes on, with the potential effect of encouraging further consolidation in the industry.

The second key effect of the energy intensity of the sector is the fact that, as key consumers of energy sources, the sector is also a key producer of C02 and other greenhouse gases. As Asian governments begin to address global obligations to rethink greenhouse gas emissions, the region's leading metals companies are certain to face pressure to take steps to reduce their direct and indirect emissions. While direct obligations under the Kyoto Protocol are limited across the region, Asian governments and large emitters are all studying the effectiveness of the EU Emissions Trading Scheme and other market-based tools for encouraging lower emissions.

THE LONGER TERM: HIGHER RISK, GLOBALIZATION, AND NEW TRANSPARENCY INITIATIVES

We see three major sustainability-linked trends which have the potential to influence investment opportunities in the metals, mining and building materials sector over the longer term. Over the next five to ten years, the metals, mining and building materials sector in Asia will make a transition to a more mature, globally oriented business model which will increase the likelihood that nagging and often unaddressed sustainability challenges will become a more transparent part of corporate cost structures. For investors, this will mean that traditional cyclical investment strategies may need to be tempered by an assessment of the potential for higher cost structures as companies are obliged to make a more public commitment to sustainability management.

There are three principal drivers for this transition:

- New projects will have higher risk and cost structures
- Globalization and consolidation will make better sustainability practices a focus for competition
- Greater transparency

For the mining sector, the challenge of moving to a more sophisticated model for project management will be a natural response to fundamental realities of the sector. Across Asia, there remain large remote areas where mineral reserves have not been fully evaluated or exploited. Indeed, much of the incremental development in the Asian mining sector will take place in increasingly distant settings which lack basic transportation or community infrastructure. Many of the remaining reserves will also be more technically difficult to exploit as easy access surface deposits have already been developed in many countries.

For the mining sector, the challenge of moving to a more sophisticated model for project management will be a natural response to fundamental realities of the sector

For most mining companies, the most profitable opportunities for expansion come from projects which have a multi-stage development profile, making it possible to leverage off existing infrastructure and equipment investments. As mineral exploitation in Asia gathers pace, however, the mix of new project opportunities for most players is shifting toward higher risk and higher cost projects in increasingly remote locations. This is a trend which can be clearly observed as global mining companies and more experienced Asian players seek to move into new Asian markets. The projects typically offered to new market entrants almost inevitably demand much higher levels of investment in infrastructure, especially transportation, as well as in more sophisticated technologies.

Companies pursuing projects in countries with rich potential reserves, such as Indonesia and China, are typically offered market access only in exchange for commitments to significantly higher risk and higher cost projects. This trend has obvious implications for investors evaluating sustainability issues because these projects, almost by definition, have greater exposure to sustainability risks and tend to require more sophisticated development strategies.

This trend toward higher cost projects dovetails with the second trend which we see emerging in the metals and mining sector over the longer term — accelerating globalization and consolidation. With Asia's rising importance in commodity materials markets, both as a supplier of resources and end product and also as a processor and consumer, it is inevitable that major players have been looking to increase their presence on the ground. Indeed, in the wake of the Asian Economic Crisis, the cement sector saw a number of significant transactions as global players such as LaFarge, Holcim, and Cemex bought stakes in prominent local companies. All of these investments have brought with them fresh capital, technology expertise and a commitment to higher sustainability standards.

While global players may have been guilty of violations of sustainability norms in Asia in the past, it is now apparent that the global players tend to bring higher standards to bear on projects which they undertake. Indeed, the Chinese government frequently makes demonstrated EHS performance a key criterion in considering foreign partners for domestic projects. This is often one key area where global players can claim a meaningful competitive advantage over better positioned domestic players. At the same time, Asian governments are increasingly willing to see undercapitalized local players which are incapable of meeting basic sustainability standards be taken over by larger players. In many countries, this marks a departure from past policies that tended to treat metals and mining as strategic national industries which were often protected from foreign competition and ownership.

Recent developments in Indonesia, China, and India offer vivid reminders of the complex political and business ramifications of managing EHS risks

Ongoing globalization and consolidation will accentuate the focus on long-term competition in the sector, a move that has the potential to enhance the competitive importance of long-term project management and sustainability. Recent developments in Indonesia, China and India offer vivid reminders of the complex political and business ramifications of managing EHS risks. While the Indonesian government has pursued a highly public conflict with the Indonesian subsidiary of Newmont Mining, the Chinese government has become increasingly willing to sanction even the largest companies for violations of EHS regulations.

Figure 11 Newmont Mining: How Stakeholder Problems Can Multiply

Perhaps the most recent example of a complex conflict stemming from unaddressed stakeholder issues in the Asian mining sector involves Newmont Mining in Indonesia. The Minahasa Mine is a gold mining operation in Sumatra, Indonesia. A local environmental NGO has taken on the plight of certain villagers who claim they developed skin diseases and other health problems from exposure to water from the local bay, allegedly polluted by the mine tailings that were released into the bay in a submarine disposal tailing system. Conflicts between Newmont and the local community have a long history and have touched on a classic range of sustainability issues:

- Controversies over the land rights grant and the payment of concession fees to the central government
- Legal conflicts over the project's obligation to pay local versus national taxes
- Concern over the management of the mine closure process and impacts on the local community
- Disputes about the appropriateness of a submarine disposal technology for mine tailings which is not used in developed countries

It is premature to assess the full impact of this dispute on Newmont, but the controversy has highlighted a range of problems for investors in terms of disclosure, near-term financial impact and other projects. According to a review conducted by Trucost, Newmont failed to mention project environmental issues in its 2003 financials, although it was mentioned in 2004. Trucost also states that Newmont was seeking to bar motions related to the Indonesian operations at its 2005 shareholders meeting. The company has increased its accruals for environmental obligations and reclamation costs, which has a direct impact on company profitability. Trucost calculated a "damage" value of US$65 million, which would represent a 15% hit to 2004 earnings of US$450 million if realized. In addition, there is the potential negative effect on Newmont's future business in Indonesia, as well as, more importantly, their current business in Sumbawa, east of Java, at Batu Hijau. Batau Hijau is Asia's second largest copper mine and a current producer of copper and revenue for Newmont. The Batu Hijau operation also utilizes the submarine disposal method for tailings although further offshore and deeper into the sea.

The lack of verifiable disclosure on a broad range of sustainability issues is notable for all but the largest and most global Asian metals and mining companies

Earlier in this report, we highlighted poor disclosure as a cross-cutting issue for the sector. Indeed, the lack of verifiable disclosure on a broad range of sustainability issues is notable for all but the largest and most global Asian metals and mining companies. Disclosure on sustainability challenges is noticeably higher for foreign companies involved in Asian projects. Moving forward, however, it is clear that pressure for improved disclosure — both for investors and for the public — is rising often as a result of pressure from Asian governments which are increasingly using access to equity market funding as a tool for improving standards. A second source of pressure will be competitive pressure as the top tier of Asian metals and mining companies begin to seek access to overseas resource and product markets where regulators and the public insist on a higher standard of disclosure. This dynamic has been readily apparent as Asian companies increasingly seek to invest in more tightly regulated markets which rely on higher disclosure standards to establish a company's license to operate.

The metals, mining, and building materials sector has increasingly become a focus for industry standard-setting and disclosure exercises which have the potential to shape the competitive landscape. Efforts by leading developed market competitors, such as those championed by WBCSD, reflect the realization that individual companies stand to benefit from more proactive industry-wide efforts to define acceptable standards. As Asian governments ratchet up EHS standards and more Asian companies venture overseas, it is natural to expect that more Asian companies will recognize the competitive advantages of being able to demonstrate an ability to meet international performance standards.

One crucial part of the motivation for meeting more transparent standards is that it provides a bulwark against often inconsistent and unpredictable demands made by host governments. While local companies often pride themselves on an ability to win projects by relying on political access for competitive advantage, companies operating outside of their home markets are routinely vulnerable to outsized demands and opaque political practices. Indeed, this is one area where many Asian companies have yet to define clear or transparent norms. As more Asian companies expand activities around the region and further afield, this has the potential to become a differentiator for companies looking to avoid higher than normal "taxes."

The concept of tracking mineral sources for their adherence to sustainability principles is just beginning to be explored in the metals and mining sector

A final driver for greater transparency will be supply chain considerations. The concept of tracking mineral sources for their adherence to sustainability principles is just beginning to be explored in the metals and mining sector. Just as in other sectors — most notably retail and wood products — discussion has initially focused on questions about the location and conditions surrounding raw material sourcing. For example, BHP has conducted product stewardship and life cycle studies of some of their products to determine energy efficiency along the process. Placer Dome is working with WWF to develop a sustainable supply chain certification similar to that of the wood products industry. Many of the global cement and steel companies are investing in new products and technology which are more energy efficient, such as cement alloys and lighter metals for cars which can reduce fuel consumption. This has the potential to reinforce the widening gap between top-tier companies that can afford to keep up with these trends and new technology, while the laggards struggle to fund new initiatives.

INVESTOR QUESTIONS FOR COMPANIES

For extractive industries

Management

- Do you have a sustainability policy? Do you have an environmental management system?
- What was and is your engagement process with stakeholders? Who are these stakeholders?
- Do you report on ESG issues at the project level?

Project specific policies

- Are your operations in conservation areas? Will bio-diverse or sensitive forest or land be affected?
- Do any of your projects involve resettlement of local inhabitants?
- What programmes do you run in the community? How are your operations viewed in the community?
- Do you source your workers locally or bring them in from other areas?
- What training programs do you run for your workers?
- What processes do you use for the extraction of metal? Do you use environmentally sensitive chemicals or emollients?
- What do you do with the waste products from your mines?
- Where do you source your water? Do you recycle water? What do you do with waste water and liquids?
- How do you handle tailings?
- How do you control dust residues?
- How do you ensure ventilation in the mine?
- How do you manage noise from operations?
- What regulations do you follow? What permits do you have? Who signed them and when?
- Where do you source your power? What is your power source?
- What is your loss day injury rate?
- What safety measures do you have in place?

- Have there been any strikes or work stoppages?
- To whom do you sell your materials?
- How is it transported?
- Do your operations requiring the damming of any waterways? Have the environmental affects of this been addressed?
- What are the terms of your mining concession agreements, resource sales agreements and land rights agreements?
- Are there other key contracts and agreements which are crucial to your operations? Who signs them and when?
- Do you source supplies locally?
- What provisions and plans have you made for restoration after the mine ceases operations?

Strategic issues

- How much do you invest in R&D and new technologies?
- What are your plans for expansion, either locally or in other markets?
- What environmental provisions have you made?

For steel and metal production

Management

- Do you have a sustainability policy? Do you have an environmental management system?
- What was and is your engagement process with stakeholders? Who are these stakeholders?
- How transparent is your ESG reporting on individual projects?

Project specific policies

- How are waste and dust handled?
- What are recycled products used for?
- From where do you source your energy supply?
- What steps are you taking to be more energy efficient?
- From where do you source your water supply? Do you recycle wastewater?

- Are you using recycled materials or providing waste product for recycling where appropriate?
- What processes do you use?
- How do you reduce noise?
- What programmes do you run in the community?
- Where do your workers come from?
- What regulations do you follow? What permits do you have? Who signed them and when?
- What safety safeguards do you have in place?
- Have there been any strikes or work stoppages?
- To whom do you sell your materials?
- How is it transported?
- How much do you source your supplies locally?

Strategic issues

- How much do you invest in R&D and new technologies?
- What are your plans for expansion, either locally or in other markets?
- What environmental provisions have you made?

APPENDIX

The International Iron & Steel Institute established 11 indicators of sustainability. An average for each indicator was determined using inputs from the major global players, many of which operate in Asia (POSCO, China Steel, Tata Steel. Nippon Steel and other players). These indicators make a good beginning assessment of sustainability for the industry.

Indicator:		Calculation	Average %
Profitability	Investment in new processes and products	% of Revenue	6.0
	Operating Margin	% of Revenue	8.9
	Return on Capital Employed (ROCE)	% of Capital Employed	9.5
	Value Added	% of Revenue	3.2
Environmental Indicators	Greenhouse Gas Emission Produced	Tonnes of CO2 / Tonne of Crude Steel	1.6
	Material Efficiency	%	96.8
	Energy Intensity	GJ / Tonne Crude Steel Produced	19.0
	Steel Recycling	% of Crude Steel Produced	42.3
	Environmental Management Systems	% of Total Employees and Contractors Working in Registered Production Facilities	85
Social	Employee Training	Training Days / Employee	6.3
	Lost Time Injury Frequency Rate	Frequency / 1 Million Hours Worked	7.8

Source: International Iron & Steel Institute

RESOURCES

Company websites

Aditya Birla Group	www.adityabirla.com
Aluminum Co of China	www.chalco.com.cn/stock_en/p_StockDisplay.asp
Angang New Steel	www.ansteel.com.cn/english/egsjj.html
Banpu	www.banpu.co.th
BHP	www.bhpbilliton.com
Boashan Iron and Steel	www.baosteel.com/plc/english/indexe.htm
Bumi Resources	www.bumiresources.com
China Steel	www.csc.com.tw/indexe.html
Chongqing Iron and Steel	www.cqgt.cn
Dongkuk Steel	www.dongkuk.co.kr/english
Essar Steel	www.essarsteel.com
Hindalco	www.hindalco.net
INI Steel	www.inisteel.com/eng/index.php
Inmet	www.inmetmining.com
Jindal Vijayanagar Steel Limited	www.jvsl.com
Jiangxi Copper	www.jxcc.com
Krakatau Steel	www.krakatausteel.com
Maanshan Iron and Steel	www.magang.com.cn/eng/aboutus.htm
Nalco	www.nalcoindia.com
Newmont Indonesia	www.newmont.co.id
Newmont Mining Corp	www.newmont.com
OK Tedi	www.oktedi.com
Orissa Mining	www.orissamining.com
POSCO	www.posco.co.kr
Placer Dome	www.placerdome.com
Rio Tinto	www.riotinto.com
Sheng Yu	www.syg.com.tw
Tung Ho	www.ths.com.tw/HomeEg/Index.html
Vedanta Resources	www.vedantaresources.com
Yanzhou Coal	www.yanzhoucoal.com.cn
Yieh Phui	www.yiehphui.com.tw/engTEST.htm
Yusco	www.yusco.com.tw

Examples of sustainability reporting

- BHP — www.bhpbilliton.com/bb/sustainableDevelopment/reports.jsp
- China Steel — www.csc.com.tw/csc_e/hr.html
- Newmont MIning — www.newmont.com/en/social/reporting/index.asp
- OK Tedi — www.oktedi.com/odf/links/reports.php
- Placer Dome — www.placerdome.com/sustainability.htm
- POSCO — www.posco.co.kr/homepage/docs/en/culture/dn/2004_POSCO_SR_EN.pdf
- Rio Tinto — www.riotinto.com/library/microsites/SocEnv2004/intro/100_welcome.htm
- Tata Iron and Steel — www.tatasteel.com/corporatesustainability
- Vedanta Resources — www.vedantaresources.com/uploads/Sustainable%20Development%20Report.pdf

Company public offering reports

- Aluminum Company of China — Hong Kong Stock Exchange
- China Shenhua Energy Company Limited Offering Statement 25 May 2005 — Hong Kong Stock Exchange
- Vedanta Resources — www.vedantaresources.com
- Yanzhou Coal — www.yanzhoucoal.com.cn/mygsbak/myen/mmain.htm

Useful web-based resources

- Cement Sustainability Initiative — www.wbcsdcement.org
- Extractive Industries Transparency Initiative — www.eitransparency.org
- Global Mining Initiative — www.globalmining.com
- Global Reporting Initiative — www.globalreporting.org
- IISI Steel University — steeluniversity.org
- International Council on Mining and Metals — www.icmm.com
- International Finance Corporation — www.ifc.org/sustainability
- International Institute of Steel — www.iisi.org; wwwl.worldsteel.org
- United National Environment Program — www.uneptie.org/pc/mining
- World Bank — www.worldbank.org/mining
- World Business Council for Sustainable Development — www.wbcsd.ch

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Taking Stock

Adding Sustainability Variables to Asian Sectoral Analysis

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Researcher: Stephen Fleming
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Sustainability

Sustainability is a systemic concept, relating to the continuity of economic, social, institutional and environmental aspects of development. In the terms of the 1987 Brundtland Report of the UN's World Commission on Environment and Development, sustainability is: "Meeting the needs of the present generation without compromising the ability of future generations to meet their needs." The key concept for investors is the need to address a range of environmental, social, and governance (ESG) factors which will inevitably shape long-term returns as markets respond to changing resource requirements and public priorities.

INTRODUCTION

The major oil, gas, and petrochemical firms of the developed world have long been among the listed companies most closely scrutinized by investors and activists concerned with sustainability and corporate social responsibility. Albeit with varying levels of alacrity, majors such as British Petroleum, ExxonMobil, Royal Dutch/Shell and ChevronTexaco have disclosed extensive operating data, complied with regulation, and responded to a broad set of stakeholder demands. The oft-repeated mantra of good corporate citizenship appears to have been systematically internalized and translated into reasonably consistent operating and investment practices. Extraction, processing, transport and use of the products themselves remain inherently politically sensitive, ecologically disruptive, and subject to the risk of high impact accidents. However, inappropriate conduct, while perhaps more common at smaller or private firms and in the industry at large, is a rare commodity at the major listed firms. The "social license to operate" is too important to risk through carelessness or pursuit of short-term gain.

Not so in the developing markets of Asia. The major listed firms of the region reflect their operating environments, which are characterized by regulatory frameworks and legal contexts which are often inconsistent or under development, legacy assets and practices from the period prior to market liberalization, and pell-mell economic growth which has stretched the ability of firms to engage in long-term planning and to meet burgeoning demand for product. Although major oil, gas, and petrochemical (OG&P) firms such as PetroChina, ONGC, PTT, and CNOOC are appropriately considered to be Asian blue chips, they generally are in the early stages of dealing with issues related to sustainability, governance, and responsiveness to broad stakeholder interests. As highly visible, highly profitable firms, Asian oils are likely to find themselves unwittingly thrust into roles as sustainability pioneers, taking some of the first arrows as sustainability issues inevitably gain greater prominence in the minds of regulators, consumers, investors, and other stakeholders positioned to influence value returned to shareholders.

Major Asian firms are generally in the early stages of dealing with issues related to sustainability, governance, and responsiveness to broad stakeholder interests

As this report shall examine, Asian OG&P firms are broadly exposed to significant sustainability-related risks, yet as regionally published equity research reveals, the general community of analysts and investors expends little effort evaluating the impact these risks could have on shareholder value. We contend that investors who consider four key sustainability-related investment themes will be better positioned to manage important categories of risk in their portfolios and capture opportunities presented by an emerging focus on sustainability in the region.

In this report, we assess these issues in the context of Asia's most broadly held large- and mid-capitalization listed OG&P companies. We believe that the most important sustainability themes for investors in Asian OG&P companies will be:

- **Deregulation: a prerequisite** Deregulated markets, characterized by competition and an end to subsidies and price controls, are inherently more efficient and sustainable, but regulatory change will alter competitive dynamics and produce regional winners and losers

- **Rising EHS standards** Environmental, health and safety risks remain unlikely to cross the threshhold of materiality near-term, but proactive management of these risks will mitigate future costs

- **Cleaner fuels** Air pollution problems will drive a regulatory push toward cleaner fuels. In an environment of deregulated pricing and chronic refining capacity shortages, firms that invest in advanced fuel technology and global scale infrastructure will lay the foundation for sustainable long-term performance

- **Meeting supply challenges** While concerns about imminent "peak oil" may be debatable, the world faces long-term energy supply challenges which will be felt acutely in Asia, with rapidly rising demand and limited reserves. The increasingly visible push to control overseas "equity oil" highlights this sustainability issue, as firms make large, long-lived investments in often unfamiliar, politically unstable, ecologically sensitive, or strategically contested regions

COUNTRY AND SECTOR DYNAMICS

What the sector looks like today

The listed universe of large cap Asian OG&P firms is concentrated in a handful of countries that have engaged in the disaggregation and privatization of formerly state-owned national oil companies (NOCs). South Korea, India, Thailand, and China have moved down this path to varying degrees, dividing various former national monopolies into competing firms with different geographic focus, product mix, and market reach.

Figure 1 Larger Regional Listed Oil, Gas & Petrochemicals Companies

Market	Company	Market Cap* (US$mm)
China	Petrochina	146,624
	Sinopec	48,712
	CNOOC	27,800
India	ONGC	37,194
	Reliance Industries	27,522
	Indian Oil	14,439
Korea	S Oil	7,939
	SK Corporation	6,696
	LG Chemical	3,668
Taiwan	Nan Ya Plastics	10,183
	Formosa Petrochemical	8,653
	Formosa Chemical and Fibre	8,537
Thailand	PTT	15,457
	PTTEP	7,558
	Thai Oil	3,167

* As at 30 December 2005, or last official day of trading

Source: Bloomberg, December 2005

National oil companies dominate the sector

Elsewhere in the region, governments have retained full ownership of NOCs; Malaysia, Indonesia, Vietnam, and the Philippines are notable examples. Although NOCs or their successor listed firms have generally dominated oil markets straight through from exploration and production to refining and marketing, the international oil companies (IOCs) have made significant inroads in Asian markets, gaining traction upstream in exploration and production and in refining where local capital and expertise were in short supply, or downstream in marketing, typically where nations were net importers. The IOCs, however, have seldom regained the presence and market share enjoyed prior to past nationalizations of oil assets. Generally speaking, however, national autarky has given way to a patchwork of ownership and market participation, hastened by WTO-driven liberalization, and by rapidly increasing reliance throughout the region on foreign sources of oil, gas, and petrochemical feed stocks.

Cross-cutting issues

As a backdrop to serious consideration of sustainability issues in the Asian OG&P sector, investors should consider three crosscutting issues, which shape the industry today:

- **Rapid demand growth**
- **Government ownership**
- **Limited disclosure**

Rapid demand growth Global energy markets were caught flat-footed in 2004 by a surge in demand from developing Asia. The International Energy Agency's 2004 demand growth estimate of 15.6% for China headlined a global "demand shock" which helped to drive oil prices to record nominal levels. While the 2004 China growth is widely seen as an aberration driven by short-term factors, it should be viewed in a context of sustained regional demand growth which has propelled China and India into the ranks of the world's largest energy consumers, and that will continue to exert demand pressure on global oil and gas markets. Investors looking at developed-market oil majors are accustomed to evaluating a torrent of new projects and activity. Yet as a percentage of the total invested capital, the activity of Asian firms is unprecedented in its scale, and the efficiency and productivity of long-lived assets put in place today will affect the sustainability outlook for many years to come.

Figure 2 Asian Oil Demand Growth & Share of Global Total

Country	Share of Global Demand 1993 (%)	Average Annual Growth 1984-1993 (%)	Share of Global Demand 2003 (%)	Average Annual Growth 1994-2003 (%)	Demand Growth 2003 over 2002 (%)
China	4.6	5.3	8.0	6.5	10.8
India	2.0	4.8	3.1	5.6	1.9
South Korea	2.5	12.9	2.9	2.3	1.0
Taiwan	0.9	5.9	1.1	2.9	4.2
Malaysia	0.5	5.6	0.7	3.4	6.4
Indonesia	1.2	5.1	1.4	3.9	1.5
Thailand	0.8	8.7	1.0	2.8	6.2
Singapore	0.8	8.5	0.9	1.3	-3.9
Japan	8.2	1.7	7.0	-0.5	2.1
Other Asia	1.2	4.4	1.5	3.0	-1.9
Regional Totals					
Asia (excl. Japan)	14.5	6.5	20.7	4.4	4.9
North America	30.9	1.1	30.8	1.3	1.8
Europe & Eurasia	30.8	-0.9	25.3	0.0	0.9
Total World	100.0	1.2	100.0	1.4	1.9

Source: BP Statistical Review of World Energy, 2004

Developed-country OG&P firms typically experience cyclicality that is correlated to global energy pricing, which in turn generally follows broad macroeconomic cycles in the major economies. Although Asian OG&P firms have seen some cyclicality, they have experienced little of the capacity-rationalizing pressure unpleasantly provided by cyclical downturns. As a result, a great deal of uneconomic, inefficient activity occurs behind subsidies and protections in capacity-constrained markets.

Many Asian governments still exert significant influence on ostensibly private firms

Government ownership Asian nations have yet to take aggressive steps to divest majority stakes in their listed former NOCs, and governments retain controlling interests in nearly all of the major firms in the OG&P sector. Many Asian governments, aware that electoral majorities or other forms of legitimacy depend upon affordable energy and the economic growth it drives, still exert significant influence on ostensibly private firms. This in turn leads to acquiescence to unsustainable regulatory frameworks, or to putting capital at risk in projects that do not always serve the interests of all shareholders equally and which put national policy goals ahead of the interests of financial investors.

Figure 3 Government Ownership in the Asian OG&P Sector

Country	Company	% Direct Government Ownership	Principal Shareholder
China	Petrochina	90	Chinese Government
	Sinpoec	65	Chinese Government
	CNOOC	71	Chinese Government
	China National Petroleum Corporation	100	Chinese Government
	Zhenhai Refining & Chem	39	Sinopec, 71%
	Shanghai Petrochemical	31	Sinopec, 56%
	Beijing Yanhua Petroleum	39	Sinopec, 70%
	COSL	62	Chinese Government
	Jilin Chemical	60	Petrochina, 67%
	Yizheng Chemical Fibre	23	Sinopec, 42%
India	ONGC	74	Government of India
	Reliance Industries	0	Ambani Family, 46%
	Indian Oil Corporation	82	Government of India
	GAIL	57	Government of India
	HPCL	51	Government of India
	BPCL	66	Government of India
Thailand	PTT	69	Government of Thailand
	PTTEP	44	Government of Thailand
	Thai Oil	34	PTT, 49%
	Aromatics Thailand	32	PTT, 46%
S. Korea	S-Oil	0	Saudi Aramco, 35%
	SK Corporation	0	SK Group Companies, 15%
	LG Chemical	0	LG, 34%
Taiwan	Chinese Petroleum Corporation	100	Government of Taiwan
	Formosa Petrochemical Corporation	0	Formosa Plastics, 32%
Indonesia	Pertamina	100	Government of Indonesia
Vietnam	Petrovietnam	100	Government of Vietnam
Malaysia	Petronus	100	Government of Malaysia
Philippines	PNOC	100	Government of Philippines

N/A - Not applicable

Source: Company disclosures and analyst reports

Figure 4 Contrasting Views on Government Ownership

"'I can tell you that the government does not interfere with our business,' Wang says forcefully. 'I think people should look at PetroChina's performance. We are truly an independent company.'"

Wang Guoliang, PetroChina CFO

Quoted in "Do More, Say Less", www.cfo.com, December 29, 2003

"CNPC owns approximately 90% of our share capital. This ownership percentage enables CNPC to elect our entire board of directors without the concurrence of any of our other shareholders. CNPC's interests may sometimes conflict with those of some or all of our minority shareholders. We cannot assure you that CNPC, as controlling shareholder, will always vote its shares in a way that benefits our minority shareholders."

PetroChina, SEC Form 20-F, FY2003

Remarkably little information is available regarding many areas of key concern for sustainability-oriented investors

Limited disclosure Limited disclosure by firms and incomplete compilation of government statistics severely curtail the ability of investors to assess many key aspects of company performance in Asian OG&P firms, with a particularly large gap in terms of sustainability metrics. While detailed discussion of a variety of backward looking operating performance metrics and forward looking risk factors is common in the reports of developed nation oil majors, Asian investors are left guessing to an extent which would surprise many investors in major non-Asian markets. The issue of disclosure has received greater attention recently and in some areas of note, such as accounting for reserves, progress has been made. Nevertheless, remarkably little information is available regarding key areas of concern for many investors. Concerns are likely to include disclosure of concession terms and payments consistent with "publish what you pay" practices, discussion of environmental practices and potential environmental liabilities, and quantification of greenhouse gas emissions. The lack of disclosure does not mean that managements are not measuring, analyzing and managing the risks involved per se, however the absence of material disclosure can quite justifiably lead investors to worry that significant unacknowledged sustainability risks could threaten shareholder returns.

Long-term sector outlook

The OG&P sector is currently dominated by large firms due to the manner in which initial privatization was conducted, and we anticipate that large firms will continue to dominate the landscape for the foreseeable future. Scale is a key differentiator, and large firms will enjoy inherent advantages in the pursuit of scale, with preferential access to capital markets a key issue. The immense amounts of capital required to build world-class, large-scale refineries and petrochemical complexes will keep the number of new entrants relatively low. Furthermore, we expect to see increasing pressure on smaller players that are unable to play the scale game, likely ensuring that OG&P will remain a game for giant national champion firms.

Government control will almost certainly continue for the short- and intermediate-term, although gradual divestment should continue. For instance, the Chinese Government will likely sell off large portions of its stakes in major firms as part of efforts to address the non-tradeable A share problem, yet it is unlikely that it would relinquish majority control. Deregulation, on the other hand, will proceed at a more rapid pace, and we believe that downstream markets in all major Asian economies will be fully open to international competition within two years as WTO-induced regulatory change proceeds. Upstream will likely remain the preserve of domestic champions; however, we expect that governments will keep a tight grip on all aspects of OG&P markets that are linked to energy security concerns. Although governments will likely take steps to shield citizens from extreme price volatility, we expect that prices will be fully deregulated in the intermediate-term.

In the long term, we expect that perhaps five to seven Asian firms will join the ranks of the largest global oil firms, serving large domestic markets, entering international markets, and participating in upstream projects globally. Asian majors will be just as dependent as their developed market counterparts on imported feedstocks, sourced primarily from the Middle East. Virtually all of these firms currently have sustainability footprints which differ considerably from the major international oil companies, yet we believe that investors will be able over time to meaningfully identify the more strategically oriented and better managed firms which proactively address sustainability risks and deliver superior shareholder value.

Virtually all Asian OG&P firms currently have sustainability footprints which differ considerably from that of the major international oil companies

DEREGULATION OF MARKETS AND PRICING: A PREREQUISITE FOR SUSTAINABILITY

Efficiency of operations and economically appropriate product pricing are key components of OG&P sustainability, yet Asian firms generally fare poorly in these areas compared to the international oil majors often with severe environmental and social consequences. Access to upstream resources has been exclusively or preferentially granted to domestic firms, and market access both in refining and petrochemicals, as well as downstream marketing activities, has been similarly curtailed. Former public sector firms have in recent years made significant progress in rationalizing various aspects of their businesses, yet price controls, subsidies, legacy business practices, and strict regulation of domestic competition continue to distort markets and diminish the sustainability of growth.

Change has come steadily in the last few years, and there is reason to believe that deregulation will continue to make significant strides in the major Asian OG&P markets. Privatization remains a factor, and governments will likely divest portions of their stakes in major firms, or will continue to sell state assets to private firms. Subsidies have come under fire, since governments can ill afford major outlays necessitated as oil prices have risen, and since increasingly import-reliant nations now see the full price tag for subsidies that were previously

masked by below-market allocation of domestic production. Competition will continue to rise as WTO-induced market deregulation opens the doors to new international competitors, and as increasingly entrepreneurial home markets and improving access to capital yield a crop of new entrants. In all, the prospects are good that deregulatory trends will lead to improved overall industry sustainability.

OG&P regulation is the most significant single ESG variable for investors to consider as they invest in this largest of all Asian market sectors

While continued market and price deregulation will be a force for sustainability at the national level, regulatory change will generate very different outcomes for the players in various segments of the various markets in the region. Sustainability-oriented investors, anticipating further deregulation and engaging management with the right questions, may be able to identify firms which can improve financial performance over the longer term. Additionally, investors can track the progress of OG&P deregulation to gain insight into the ability of various regional governments to adopt sustainable, market-based industrial policy, thereby capturing a valuable data point for use in determining overall country asset allocation in broad regional portfolios. In our view, OG&P regulation is the most significant single sustainability variable to consider in this largest of all Asian market sectors.

Figure 5 Regulatory Status of Asian Nations with Publicly-Traded Oil Sectors

	China	India	South Korea	Thailand
Overall Regulatory Status				
	Regulated	Regulated	Deregulated	Regulated
Competition				
Upstream	Low. Limited to major domestics; first new domestic entrant in May	Medium, with new entrants	N/A	Medium, limited gov't licensing
Refining & petrochemicals	Low but increasing; new entrants, rules easing for foreign investment	Medium, with new entrants, foreign and domestic	High, multiple domestic and foreign players	Medium. Market dominated by domestic players
Downstream/ marketing	Medium, but increasing; market expected to open to limited foreign competition in 2006	Low, but increasing; foreign competition expected to increase	High, multiple domestic and foreign players	High, multiple domestic and foreign players
Pricing				
Consumer subsidies	Yes	Yes	No	Yes, but soon to be discontinued
Who bears subsidy cost	Refiners-guidance prices limit margins	Both oil marketers and gov't; gov't scheme spreads subsidy burden across oil industry sectors	N/A	Government-direct subsidy
Prospects for Change				
	Good. Indications that price controls may be eased, though still politically sensitive in rural areas. Refining, marketing and petrochem. sectors opening with WTO rules changes	Good. Comprehensive deregulation passed in 2002, but implementation depends on domestic politics. Competition in all segments likely to increase	N/A	Good. Gasoline subsidies ended on Oct. 2004, diesel in June 2005

N/A - Not applicable

Source: ASrIA, 2005

As highlighted earlier in the Sector Dynamics portion of this report, regional governments have maintained a high level of ownership in the industry, maintaining nominally privatized firms as handmaidens to government industrial policy, rather than as independent economic actors. A great deal of political vigor is required to overcome the inertia and vested interests of existing systems, and with the firms themselves either enjoying protection or enjoined from complaining, regulatory change comes only haltingly.

It is important to recognize that the politics of deregulation can be damaging in the short-run, even if the long run economic benefits appear to be clear. Firms are major employers, providing jobs to many. In 2004, PetroChina employed 424,000 to generate US$46.9b in revenues, while ExxonMobil employed 86,000 to generate US$298.0b — a 31x higher ratio of employees to sales. Inexpensive fuel is popular with political constituents, and fuel riots last spring in the Philippines and Indonesia vividly demonstrate the political downside to reducing subsidies. Governments throughout the region, both elected and unelected, are fully aware of the extent to which legitimacy rests upon delivering the economic goods, and are understandably reluctant to change. HSBC analyst Vidyadhar Ginde captured this tension in a February 2005 report: "An upcoming election-free year in India (February 2005 - May 2006) offers the prospect of an overhaul of the domestic regulatory regime. Such an overdue reform would help restore pricing power to the sector and potentially dramatically improve the profitability profiles of Indian downstream oil companies."

Distorted markets, unintended consequences

Studies have found that subsidies of LPG and kerosene, intended to help the very poor, transferred wealth to the non-poor

Regulated and subsidized hydrocarbon markets have frequently led to distortions and unintended consequences which have harmed the sustainability profile of the industry. Furthermore, it is difficult to discern the degree to which intent has even factored into much policymaking due to the lack of data and understaffing of key oversight bodies. Subsidies have frequently been justified as a commendable redistributive policy with environmental and public health benefits, and yet it is not clear these policy ends are achieved. A jointly sponsored United Nations Development Program (UNDP) and World Bank study, "Access of the Poor to Clean Household Fuels in India" (2003), found that subsidies of LPG and kerosene intended to help the very poor in fact transferred wealth to the non-poor. More than 60% of the value of the kerosene subsidy went to urban households in the top half of the income distribution, with other subsidy value claimed through black market sales of subsidized kerosene to industrial users. Meanwhile 90% of rural households continued to consume agricultural wastes, wood, and other free biomass fuels.

Perhaps the most significant distortion comes in terms of efficiency, since consumption patterns have been shaped in the absence of signals indicating the true cost of energy. While consumers in less developed countries typically face higher costs of capital than developed market consumers, necessarily skewing rational economic behavior away from capital investments in efficiency and toward variable cost consumption of fuels, the subsidies prevalent in Asia have heightened the propensity to indulge in over-consumption of inexpensive and often highly polluting fuels. While the table below can be expected to show variability based on the composition of national economies (with developed

nations showing reduced energy intensity due, perhaps, to a higher proportion of low-energy-intensity services), Asian economies clearly are making less efficient use of fuels than their developed country counterparts.

Figure 6 Energy Intensity of National Economies (2003)

	Total Energy Use (mm tons of oil equiv.)	Gross Domestic Product ($US billions)	Kg. of Oil Equiv. per US$ of GDP
China	1199.3	1573.7	0.76
India	345.3	600.6	0.57
Thailand	74.0	143.0	0.52
Indonesia	107.0	208.3	0.51
Brazil	181.4	492.3	0.37
South Korea	212.0	605.3	0.35
Australia	115.6	522.4	0.22
United States	2297.8	10978.5	0.21
Germany	332.2	2403.2	0.14
United Kingdom	223.2	1794.9	0.12
Japan	504.8	4300.9	0.12

Source: World Bank, BP Statistical Review of Energy, 2004

Figure 7 Subsidized Consumption in Indonesia: An Unsustainable Addiction to Cheap Oil

On February 28, 2005, the Indonesian government announced 29% price hikes on transport fuels — 32.6% for gasoline and 27.3% for diesel fuel. Riots ensued, as the prospect of paying US$0.68 per gallon (2,400 rupiah/liter) for gasoline rocked the country. The value of these subsidies, both as direct outlays and as foregone revenue to Pertamina, the government-owned national oil company, estimated by the World Bank to total nearly 40 trillion Rupiah (US$3.3B), exceeds 10% of the government budget. A major price hike in 1998 sparked street protests that contributed to unrest in the months prior to the fall of the Suharto regime. Keith Bradsher, writing in the New York Times, reported that "already, the 29 percent increase has provoked large street demonstrations and even fistfights on the floor of Parliament. The political debate in Indonesia now is over whether to roll back the increase or simply form a committee to study whether to roll it back. Further increases in fuel prices are no longer even under public discussion."

Although Indonesia held the rotating OPEC presidency in 2004, it was actually a net importer of oil for the first time in the second half of the year. A decade of under-investment due to a complex range of factors brought exploration activity to a 30-year low and resulted in declining production. However, consumption growth has outstripped economic growth over 1983-2003 period; dollar-denominated GDP growth averaged 4.56%, while the volume of oil consumption grew an average of 4.73%. Subsidies have distorted consumption patterns, leading to a situation that is increasingly unsustainable in economic, environmental, and political terms.

Sources: World Bank; Indonesian Petroleum Association; BP Statistical Review of World Energy; "Oil Wealth Wasting Away in Indonesia," NYTimes, March 19, 2005; "Indonesia Torn by Fuel Price Protests," The Standard (HK), March 2, 2005

Regulatory change will come, pace uncertain

Although the high level of regulation in the Asian OG&P sector is highlighted in figure 5, it also showed a highly dynamic landscape in which news of major policy changes comes seemingly daily. In addition to the simple reality that sustainable development relies on more accurate economic signals and that these rapidly growing nations are increasingly adopting market-based industrial policies, we believe that three additional factors have hastened the liberalization of the sector:

- **High oil prices** The real costs of subsidies have increased significantly over the last two years, highlighting the distortion caused by generous subsidy regimes

- **WTO** Many nations in Asia, most notably China, are preparing for new foreign market entrants; deregulation of markets has been essential, and nations have taken steps to prepare domestic firms for an increase in competition. In China recently, PetroChina and Sinopec have aggressively expanded marketing networks in advance of expected foreign competition

- **Increasing import reliance** As the mix of domestic consumption shifts rapidly toward market-priced imports, implicit subsidies (unrealized resource rents) become explicit payments due in cash, creating pressure in favor of deregulation. It is interesting to note that the US oil price control system managed by the Texas Railroad Commission with prices managed by allocating production & transport quotas lost its effectiveness around 1970, just as domestic production peaked and import reliance surged upward. In Asia, we may see that similar exogenous factors induce unexpected changes and hasten the pace of reform

A fourth factor which is a key driver for change in many developed countries, will likely have limited impact in the foreseeable future:

- **Global warming** Few long-term issues are as significant as reduction of carbon emissions, yet the prospects for near-term impact in Asia are less apparent given the absence of market price incentives and clear government policies. Future approaches to reducing aggregate carbon emissions will include fuel switching which will increase gas demand, and reduction of growth in oil demand, both of which will impact the Asian OG&P sector. We believe that, aside from the need to increase operational efficiency within the OG&P sector, policies to address global warming will be directed primarily at the power and transport sectors as end users of fuel, with limited direct impact on fuel providers. Approaches such as carbon taxes can have impact, but will have limited efficacy without prior meaningful industry and price deregulation

Ending subsidies is a key step toward sustainability

In our view, deregulation is therefore the most significant issue for sustainability-oriented investors to consider as they make investment decisions regarding individual companies, and as they make asset allocation decisions across the different countries of the region. The discipline of market forces, long absent,

has the potential to do more, more rapidly, than any other factor in increasing the efficiency of the OG&P sector, while an end to subsidies will reduce economic deadweight losses and contribute materially to sustainability by rationalizing energy consumption patterns.

Individual companies stand to lose or gain from deregulation, as protected market positions are eroded or upended, or as price controls and implicit subsidy burdens are reduced or eliminated. One rare example of equity research examining the deregulation issue is a May 2005 report entitled, "High-Octane Growth" by HSBC analyst Henik Fung, which contemplated the potential impact of fuel price liberalization on Chinese refiners. Refiners currently must acquire feedstocks through their own upstream affiliates or via the market, but must sell product within a narrow price band around a government-set national reference price. For example, Sinopec reports indicate that in 2004, 76% of its refinery feedstock was purchased at market prices from third parties, placing significant pressure on profits should reference prices not be reset to account for global crude price fluctuations. Fung considers a number of scenarios for price regulation, ranging from continued controls in a high oil-price environment, in which refiners face a mounting subsidy bill that could dramatically reduce profits, to full liberalization, in which refiner profit margins could improve as much as 50%. The choices made as the Chinese Government manages fuel affordability, long-term supply and demand balances, and competitiveness of domestic oil companies, will directly impact returns for investors.

As we also argued at the beginning of this section, successful implementation of OG&P sector reforms is a good indicator of the sustainability trajectory of the nations of the region. Energy inputs are a significant cost factor across the entire economy, and efficient delivery of fuels and reduced subsidy bills and deadweight losses will improve national competitiveness.

EH&S : A PROXY FOR MANAGEMENT QUALITY

The prevailing view in the investment community in Asia is that environmental, health, and safety (EH&S) risk is largely immaterial to investment returns. This has been borne out in experience as few major problems have come to light, and as those that do are quickly resolved, typically settled in an extra-legal context, often not warranting a footnote. This view prevails in developed markets as well but for different reasons: mature firms have learned to manage risks that have yet to be systematically addressed in Asia. ExxonMobil, for example, chastened and recovered from the Valdez disaster, now discloses oil spill figures in terms of teaspoons per million barrels shipped. Research on environmental and social impacts of the energy sector by Goldman Sachs suggests that even major high impact events, such as spills and refinery explosions, have no discernable extended impact on share price performance if markets regard them as a one-off occurrence. Nevertheless, developed market examples of major industrial liabilities in oil and other industries are not difficult to find, whether involving PCBs, asbestos, or MTBE fuel additives.

While we believe that EH&S risks are being systematically underestimated in Asia, we are not certain that awareness of this aspect of the sustainability agenda will help investors identify issues with the potential to have a material impact on returns over the medium-term. Although the liabilities have the potential to be very large, the materiality threshold is also quite high for these large firms. Ultimately, in the absence of meaningful disclosure, these risks remain unknowable at present.

EH&S risks are being systematically underestimated in Asia

However, sustainability-oriented investors have come to understand that a firm's "social license to operate" and reputation can have important bearing on a firm's ability to prosper. We also are of the opinion that EH&S performance is a good indicator of general management competence, a view that has gained currency with developed market sustainability investors. The ability to control processes and prevent incidents, rather than to simply pay off aggrieved parties in the aftermath of sloppy operation, demonstrates a level of ability to manage difficult issues which will have intangible but significant benefits elsewhere in the business.

Running hard to meet demand increases risk

Demand for virtually all oil, gas, and petrochemical products has consistently outstripped supply in global markets over the last two years, and the industry is racing to address chronic under capacity. The situation is particularly acute in Asia, where many analysts are forecasting refinery utilization rates in the high 90% range for at least another 2-3 years, despite massive expected capacity additions. As a result, many individual refineries are operating over their rated capacity levels, achieving greater than 100% capacity factors. In petrochemicals, the domestic Chinese industry can only meet an estimated 45% of China's current annual demand, and some analysts estimate that existing plants are running at as much as 110% of rated capacity, running equipment extremely hard and postponing scheduled maintenance to capture high margin additional revenues. Even many grossly inefficient and potentially dangerous legacy plants are kept running, since subsidized feed stocks, protected markets, and fully depreciated asset bases enable them to put up nominally profitable numbers while providing employment, despite high levels of EH&S risk. Pollution remediation equipment can be expensive to operate, and can incur high parasitic losses, so managers have been known to simply shut off the equipment to increase output, knowing that any environmental citation or fine from local authorities will have an inconsequential impact.

High capacity utilization raises EH&S risks

Employees and societies already bear risks and external social costs associated with poor EH&S practices. It is therefore not unreasonable to conclude that over time, regulatory and legal changes, along with rising social pressure, will lead companies to bear a greater portion of the total costs, whether through preventive investment or remedial compensation. While some nations in the region have relatively advanced legal systems and open public discourse and media coverage, others will seek to keep a lid on disclosure of EH&S impacts. Even so, riots in April 2005 in Huaxi, Zhejiang Province over excessive chemical pollution show that public reaction to abusive practices cannot be suppressed indefinitely. An additional cost consideration arises from the over utilization of

Over time, regulatory and legal changes, and rising social pressure, will raise costs for companies

assets, since plants running over capacity for extended periods will experience more significant wear and tear, shortening their productive lives, and increasing the likelihood of disruptive failures that could take a plant offline for an extended period of time. Although shareholders are clearly pleased by high profits today, it is not clear that optimal long-term outcomes are being achieved.

Figure 8 Industrial Accidents in China —The Kaixian Gas Leak

On the night of December 23, 2003, a uncontrolled leak at a gas well released methane with high concentrations of toxic hydrogen sulfide gas in Kaixian County near Chongqing, killing 243 and injuring more than 4,000 others. It was determined that negligence was the cause of the accident. Wu Yaowen, Deputy General Manager of CNPC, PetroChina's parent company, was fired as a result. Ma Fucai, PetroChina's President & Chairman, resigned under pressure and six PetroChina employees were sentenced to jail terms from three to six years for their roles in the incident. In January 2004, in response to the PetroChina disaster, Beijing stepped up an industrial safety initiative begun in October 2002 to try to reduce the number of workplace deaths (2003 official numbers: 4,200 coal mine deaths, 14,675 from all industrial accidents).

Although the intense media outcry and public attention on the case catalyzed an encouraging response on the part of the authorities, certain aspects of the Kaixian incident highlight stark ongoing differences between developing Asia and the developed world. PetroChina settled with victims out of court, providing a total of US$3.6mn in compensation, an amount equivalent to US$15,000 per fatality, excluding the fact that a large portion of the settlement went to compensate the injured. In an environment such as the US, where the actuarial value of a life is generally considered to exceed several million dollars, a settlement of this sort would simply not be an option.

EH&S visibility and costs will rise over time

EH&S variables could shape international opportunities

It is unclear that EH & S issues in and of themselves are going to have a material impact on investor returns, despite the tremendous social significance of the issue. Investors looking to achieve superior near-term and intermediate-term returns by identifying firms which outperform on EH&S criteria may find themselves disappointed. For fund managers employing screens to eliminate offenders from "clean hands"-type SRI portfolios, EH&S-based screening will likely eliminate all China holdings, while the impact on Thai and Indian holdings will be moderate, and on South Korean firms limited.

Taking a longer term view, EH&S issues may be material for investors in two ways. First, these issues are complex and difficult to manage, and leadership in this area may be indicative of management strength in other areas. We believe that firms that are progressive enough to take a proactive EH&S stance are more likely to adopt forward-looking approaches in a variety of areas, rather than simply continuing with a business-as-usual approach. Secondly,

as we shall discuss at greater length later in this report, Asian firms are moving rapidly to expand operations into international markets, particularly with a focus on acquiring reserves. EH&S performance, while somewhat intangible compared to the monetary value of bids for resources, may become a factor for firms and nations entertaining offers from Asian firms. Therefore more is at stake than just financial returns, and good EH&S performers may gain an edge in the race for resources.

CLEANER FUELS: A CHALLENGE & OPPORTUNITY FOR ASIA

Air pollution statistics compiled by the World Health Organization and the Asian Development Bank consistently rank major Asian cities among the most polluted in the world, with Beijing, New Delhi, Mumbai, Bangkok, and Shanghai among those receiving dubious honors. While major stationary emissions sources such as coal-fired power plants may accurately be singled out as the largest contributors to air pollution, the transportation sector is the leading source of ground-level nitrogen oxides (NOx), respirable suspended particulates (RSP), carbon monoxide (CO), sulphur dioxide (SO2), and various volatile organic compounds (VOC), all of which have significant negative effects on public health and quality of life. Any solution to the air quality problem will require change on many fronts, most notably in terms of power sector emissions regulation, adoption of improved combustion technologies in both power and transport, and more stringent standards for vehicular and diesel generator exhaust. Primary responsibility will rest with government and market regulators and with the end users of fuels, as they adopt new equipment and technologies to increase efficiency and reduce emissions.

The emissions problem will primarily be addressed by regulators and by fuel consumers; nevertheless, the OG&P sector must necessarily play an important role

Nevertheless, the OG&P sector will be effected and investors will find several major criteria on which to differentiate firms. First, while coal and oil have played a significant role in the Asian power sector, firms are seeking to achieve greater diversification of fuel supply and are attempting to introduce natural gas-fired generation into the power mix. OG&P firms will need to make significant infrastructure investments to produce, transport, and distribute the liquefied natural gas (LNG) necessary to make this transition. Secondly, firms will need to upgrade refining capacity to produce fuels which meet higher standards of cleanliness, most particularly in terms of sulphur content. Many of the most efficient and low-emitting engine technologies cannot function on insufficiently refined high-sulphur fuels. Finally, OG&P firms will eventually need to invest in development or acquisition of technologies for alternative fuels, such as gas-to-liquids (GTL) and will even need to consider options such as biofuels (biodiesel, ethanol, etc.), once ecologically appropriate, non-subsidy-dependent options emerge.

The capital investment necessary to build natural gas infrastructure, clean fuel refining capacity, and to eventually adopt alternative fuel technology will be immense, and investors will be challenged to determine where best to deploy capital. Nevertheless, we believe that the trend towards adoption of

cleaner fuels will benefit from an unusually strong tailwind as governments across the region move to address air pollution issues which are taking a significant public health and quality of life toll on increasingly affluent populations.

Natural gas — the clean fuel of the future

Natural gas has come to comprise a steadily increasing proportion of total energy consumption in developed country markets in recent decades. In North America and Europe, demand generally has been satisfied by regional production and via extensive pipeline networks extending into such major reserve areas as Canada and Russia. Natural gas-fired power plants are less expensive to build and operate, enjoy greater thermal efficiency than oil or coal-fired plants, are significantly less carbon-intense than other fossil fuel options, and have very low emissions profiles.

Major Asian emerging markets have had limited access to natural gas

The major energy markets of emerging Asia, however, have not had ready access to natural gas. China and India both have unusually low consumption levels due to a lack of indigenous resources, although Thailand, Malaysia, and Indonesia have had significant domestic production giving rise to meaningful local gas markets.

Figure 9 Developing Asia Has Lagged in Adoption of Natural Gas — Total Energy Consumption By Fuel Type

	Oil	Natural Gas	Coal	Nuclear Energy	Hydro electric
China	23%	3%	68%	1%	5%
India	33%	8%	54%	1%	5%
Indonesia	50%	30%	18%	0%	2%
Malaysia	44%	47%	6%	0%	3%
Thailand	52%	32%	13%	0%	2%
Asia Pacific	36%	11%	45%	4%	5%
North America	40%	25%	22%	7%	5%
South & Central America	47%	21%	4%	1%	27%
Europe & Eurasia	32%	33%	18%	10%	6%
Middle East	50%	47%	2%	0%	1%
Africa	40%	20%	32%	1%	6%
World Total Mix	37%	24%	26%	6%	6%

Source: BP Statistical Review of Energy 2004, US Department of Energy, EIA, 2005

The prospects are extremely good for rapidly increasing natural gas consumption in both India and China

The prospects are extremely good, however, for rapidly increasing natural gas consumption in both India and China, as numerous proposed pipelines and LNG terminals will enable gas to reach end-users from distant gas producing regions. Asian firms are moving aggressively to develop gas infrastructure, even in advance of the development of end user markets. CNOOC, for example, is developing a series of LNG terminals along the Chinese coast even though these terminals do not have industry standard gas offtake agreements in

place. PetroChina and its parent company, the unlisted Chinese National Petroleum Corporation (CNPC), are developing pipelines to bring gas from Kazakhstan and from western gas fields within China. In the Indian market, ONGC and GAIL are developing pipelines to bring gas from Burma, Bangladesh, and potentially from Iran. LNG terminals are also in development. Although current spot pricing for gas has risen strongly, giving coal a more significant price advantage in power markets at present, pricing in long-term purchase agreements remains competitive. We do not expect short- and intermediate-term price rises in gas to interrupt the long-term shift toward gas in the Asian fuel mix.

Improving fuel standards — a crucial driver

Asian refiners will need to make significant investments to meet increasingly stringent fuel cleanliness standards

While Asian refiners will need to make significant investments to meet increasingly stringent fuel cleanliness standards, right now they are struggling simply to put enough capacity in place to process crude into saleable product. As Indian and Chinese imports have surged, domestic refiners have increasingly been forced to rely upon sour (high sulphur) Middle Eastern crude oils versus the sweeter domestically produced crudes. As a result, significant additional desulphurization capacity must be brought online in order to produce high-quality distillates.

In the absence of sufficient capacity, many small "teapot" refiners, estimated to supply as much as 15% of China's diesel fuel, have sold poorly refined, high-sulphur products which have contributed to air quality problems. Similar small-scale refineries (<60,000bpd) are common across Asia. Ironically, high international demand for sweet crudes has led to record sweet/sour price spreads, and China actually exported high-priced sweet Daqing crude equivalent to 5% of national consumption in 2004. These exports were offset by sour crudes which were presumably subsequently improperly refined. A final affront is the residual fuel market, in which low-end diesel and heavy bunkers with sulphur contents exceeding 2-3% versus unrefined Daqing crude at 0.1% are sold directly to transport and industry, with these fuels contributing disproportionately to the air pollution problem.

Fuel standards will improve but medium-term capacity is limited, and government standards will need to be enforced in order to ensure uptake of more costly fuel. Only coherent and enforceable government policy will reward refiners for producing cleaner, more sustainable fuels. From March 2005, India, where enforcement of standards appears to be more systematic, was importing approximately 80,000 barrels per day of clean Euro II standard refined diesel to meet fuel standards in major cities, despite sufficient domestic lower-standard diesel refining capacity. Responding to government calls to reduce air pollution in Beijing, PetroChina has introduced Euro III standard (mandatory European Union 1999 standard) gasoline at Beijing-area service stations, although it appears that the company does not have the capacity to extend this quality fuel beyond the capital at this time. Over time, adoption of Euro IV (2005) and Euro V (2008) standards will enable use of the advanced particle traps, catalytic converters, and other vehicular emission control devices which may be required in the future.

Figure 10 Low Cost Vehicles or High Impact Polluters?

Although seen by some as a triumph of socially "appropriate technology," the three-wheeled agricultural vehicles ubiquitous in rural areas of China actually present a significant sustainability challenge. Twenty-two million CRVs (Chinese Rural Vehicles), most of which cost less than US$300, serve as diesel-powered "mules" in the Chinese agricultural sector, and are a critical component of the rural economy. A recent analysis of fuel consumption patterns in China, however, revealed that CRVs consume more than twenty percent of all diesel fuel, far more than previously recognized. The typical CRV uses 1960's era, single cylinder engine technology — remarkably simple and easy to maintain, but a disaster from an efficiency and emissions standpoint. Sperling, an academic expert, argues that some basic technology transfer could nearly double CRV fuel efficiency and dramatically reduce emissions. Although more expensive, increased efficiency would provide an attractive return on investment, even more so if diesel prices are deregulated. Although much can be done by major OG&P firms to increase energy sector sustainability on the production side, some of the lowest hanging fruit, and much of the most fertile ground for policy solutions, will come on the consumption side through the introduction of truly appropriate technology in the transport sector.

Source: Sperling, Lin, & Hamilton, "Rural Vehicles in China: Appropriate Policy for Appropriate Technology," Transport Policy, January 2005

Asian firms are technology laggards

Asian oils are absent from the high end of fuels technology

At present, Asian oils are absent from the high end of fuels technology. The international oil majors are pioneering new technologies such as gas-to-liquids (GTL), producing zero-sulphur diesel from plentiful natural gas in distant markets. As Asian firms increasingly look further afield for reserves in locations where the scale required for LNG may be unachievable, GTL may be an important alternative. Biofuels are another example of clean fuel technology receiving little attention in Asia, even as progress is made elsewhere on products such as sugarcane ethanol in Brazil and emerging cellulosic ethanol technologies in the US. Finally, Asian oil companies make little pretense about developing renewable energy technologies. We believe that it will be some time, perhaps more than a decade, before investors will be able to meaningfully differentiate between Asian OG&P firms on the basis of commitment to clean energy technology.

Asian firms which proactively move to make investments in advanced refining and clean fuel technologies will be more attractive to SRI investors

Developed market traditional SRI investors frequently apply simple screens to select firms with higher-than-average gas/oil reserve mixes, but we believe that this approach, while desirable from the standpoint of favoring gas as a cleaner-burning, less carbon-intensive fuel, is ill-suited to the analysis of Asian oil firms, which with few exceptions generally have extremely limited gas reserves. We believe, instead, that Asian firms, in fact, will be better judged in the medium-term based on how successfully they take the more basic step of moving toward production of the low-sulphur, consistently high-quality petroleum-based fuels which are a crucial component of a vehicular pollution solution. We believe that fuel quality standards will be tightened in Asia, and that firms which proactively move to make investments in advanced refining and clean fuel technologies may well produce better returns in the medium term.

The success of this portion of the sustainability thesis, however, hinges on the progress of deregulation, as discussed previously. In environments where refiners

are compelled to internalize a significant portion of the overall subsidy burden via price controls, firms could perversely suffer from making such investments.

However, in a deregulated environment, highly refined fuels, likely to remain in short supply globally for some time, will command a premium which may translate into significant income gains for major supplier companies.

LONGER TERM SUPPLY: THE RACE FOR RESOURCES

"Simply put, the era of easy access to energy is over. In part, this is because we are experiencing the convergence of geological difficulty with geopolitical instability...although political turmoil and social unrest are less likely to affect long-term supplies, the psychological effect of those factors can clearly have an impact on world oil markets, which are already running at razor-thin margins of capacity...with the growth in Asian demand, China, Japan and Southeast Asia as a region are by far the largest importers of oil and gas and are particularly dependent on the Mideast. And as a result, we are seeing the beginnings of a bidding war for Mideast supplies between East and West."

David O'Reilly, Chairman & CEO, ChevronTexaco Corporation,
Keynote Address at CERAWeek Conference, February 15, 2005

China, India, and other regional economies have emerged as major net importers of oil, gas, and petrochemical feed stocks and products, and it is probable that they will continue for many years to increase both their total quantity of imports, as well as their share of aggregate world demand. The demand shock that has hit the global oil market over the last two years has highlighted the impact that Asian economies could have on worldwide energy demand in coming decades, and the industry is scrambling to make large new investments in production capacity.

To meet rising demand, major Asian oil firms are adopting a resource seeking strategy. While they dominate, or even monopolize, domestic production, they are increasingly stepping up efforts to obtain international upstream resources to help ensure availability of supply in domestic markets. The pace of upstream investment has increased substantially in the last two years, and major moves into distant oil provinces, particularly those made by China and India, have received extensive attention in the global financial and political press.

The move beyond protected home markets is fraught with risk for Asian oil firms

Investors will recognize that the move beyond protected home markets is fraught with risk for Asian oil firms, as companies that have comfortably operated as protected domestic NOCs must learn a new set of skills to compete abroad against experienced IOCs that are at the top of their game. We believe that firms will encounter the greatest difficulty in areas most familiar to SRI investors. Anticipation of risks associated with local politics and stakeholder groups, EH&S impacts and enforcement, and geopolitical dynamics will yield an edge in

evaluating the prospects of these major firms as they venture into unfamiliar territory.

Figure 11 Environmental and Social OG&P Performance Indicators

Sustainable Asset Management, in its corporate sustainability assessments, reviews the following criteria to assess OG&P companies' performance and policies:

Environmental Dimension

- Advanced Environmental Management System
- Biodiversity
- Climate Strategy
- Refining/Cleaner Fuels
- Releases to the Environment
- Renewable Energy

Social Dimension

- Occupational Health & Safety
- Social Impacts on Communities

Source: Sustainable Asset Management (SAM)

The supply challenge is real

Developing Asia possesses limited oil and gas reserves. Although domestic reserves can support Asian production at current levels for longer periods than will likely be seen in North America, rapid demand growth will place increasing pressure on the relatively mature oilfields of China and India. In 2004, China passed Japan to become the world's second largest oil importer, and Indian demand is experiencing similar rates of growth.

Figure 12 Asian Energy Reserve Levels

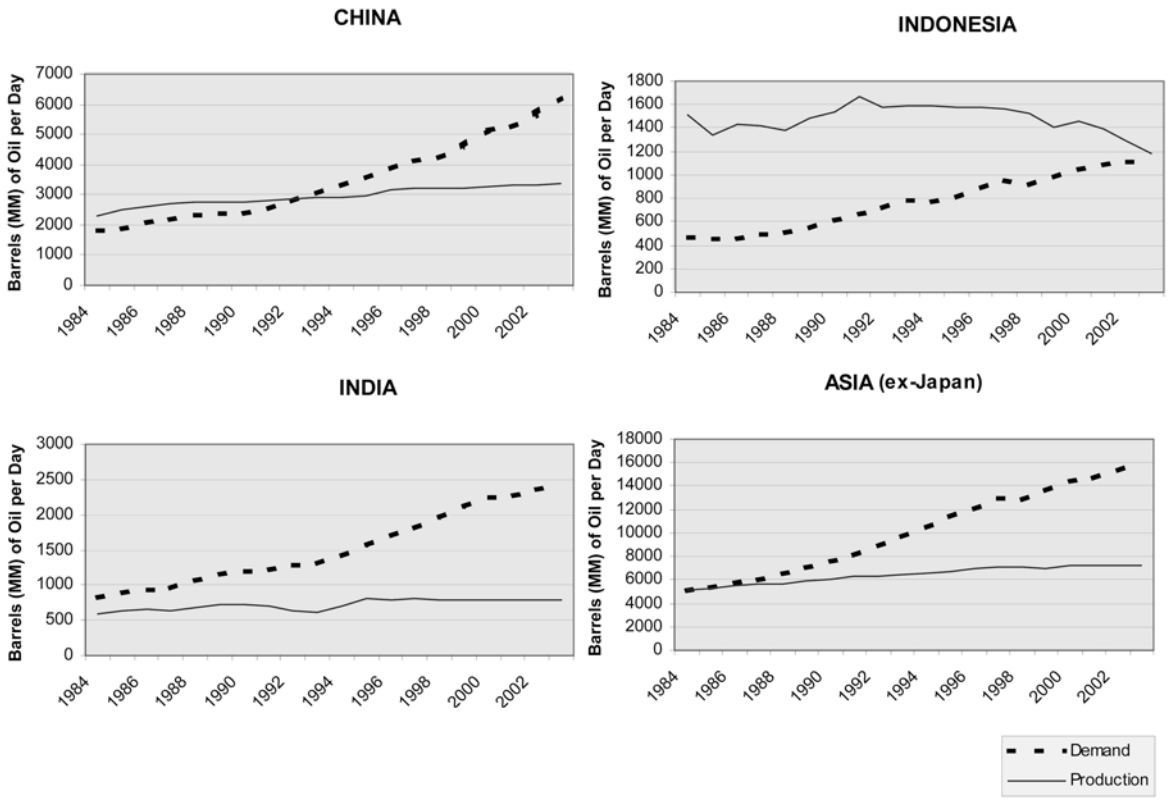
OIL RESERVES					
	Proven reserves at yearend (billions of barrels):			2003 Share of World Total (%)	Res. To Prod. Ratio.
	1983	1993	2003		
China	18.2	29.5	23.7	2.1	19.1
Indonesia	10.1	5.2	4.4	0.4	10.3
India	3.6	5.9	5.6	0.5	19.3
Thailand	-	0.2	0.7	0.1	8.7
Brunei	1.5	1.3	1.1	0.1	14.1
Vietnam	-	0.6	2.5	0.2	18.4
Malaysia	2.6	5.0	4.0	0.3	12.5
Other Asia	1.1	1.2	1.3	0.1	15.4
Total Asia	37.1	48.8	43.3	3.7	16.4
North America	95.2	91.0	63.6	5.5	12.2
Europe and Eurasia	100.1	80.4	105.9	9.2	17.1
Middle East	396.9	660.1	726.6	63.3	88.1
Africa	58.2	60.9	101.8	8.9	33.2
S&C America	33.7	79.1	102.2	8.9	41.5
Total World	723.0	1,023.6	1,147.7	100.0	41.0

GAS RESERVES					
	Proven reserves at yearend (billions of barrels):			2003 Share of World Total (%)	Res. To Prod Ratio.
	1983	1993	2003		
China	0.8	1.0	1.8	1.0	53.4
Indonesia	1.2	1.8	2.6	1.5	35.2
India	0.5	0.7	0.9	0.5	28.4
Thailand	0.1	0.2	0.4	0.2	22.3
Brunei	0.2	0.4	0.4	0.2	28.3
Vietnam	-	0.1	0.2	0.1	76.7
Malaysia	1.4	1.8	2.4	1.4	45.0
Other Asia	1.1	1.8	1.9	1.2	32.9
Total Asia	5.5	8.2	10.9	6.1	43.4
North America	10.4	8.8	7.3	4.2	9.5
Europe and Eurasia	40.5	63.6	62.3	35.4	60.8
Middle East	26.4	44.4	71.7	40.8	>100
Africa	6.3	10.0	13.8	7.8	97.5
S&C America	3.2	5.5	7.2	4.1	60.6
Total World	92.7	141.1	175.8	100.0	67.1

Source: BP Statistical Review of Energy, 2004

In China and India, and now even in Indonesia, demand is rapidly outstripping domestic production, and the trends look set to continue indefinitely. As a result, developing Asia will almost unavoidably find itself increasingly dependent upon imports from other regions, most particularly from the Middle East. Although the global supply/demand balance will continue to ebb and flow and with it pricing, the sudden arrival of two energy-hungry economic powerhouses portends an extended period of strong demand growth.

Figure 13 Asian Energy Production & Consumption Trends



Source: BP Statistical Review of Energy, 2004

Energy security: driving the push overseas

Growing import dependence is leading Asian governments to take energy security issues increasingly seriously, and government-controlled firms are inevitably among the instruments of policy. Recent oil price hysteria has fueled the fears of Asian governments, as concerns over potential oil price "superspikes," particularly painful to oil intensive economies, or the possible peaking global production, have given energy Cassandras the upper hand. With the legitimacy of governments inextricably linked to delivering economic prosperity, aggressive steps are being taken to ensure that the oil keeps flowing. China now imports more than 50% of its oil, and India more than 70%, and it is reasonable to

expect that these nations would undertake to develop measures to cushion supply interruptions, to protect those sources in place, and to develop more diverse sources of supply.

Figure 14 Peak Oil: The Ultimate Sustainability Challenge for the OG&P Sector

Many sustainability investors have taken note of the ongoing debate between "Hubbertians" and "Cornucopians," opposing camps in a discussion of the long-term outlook for energy supply. The Cornucopian view has long been supported by a reality in which regular discoveries of new oil and gas reserves, coupled with technological innovation, has increased global production steadily. Much faith has been put in markets and the belief that high oil prices would spur the innovation and justify the capital investment necessary to raise production for the foreseeable future.

Hubbertians hold that only a finite amount of oil can be squeezed from a stone, infinite capital and innovation notwithstanding. Many in the industry, including many notable petroleum geologists, believe the world is approaching a peak in total oil production. M. King Hubbert, longtime chief geologist for Shell Oil, first advanced the "Peak Oil" thesis in the late 1950s, when he predicted, based on patterns of oil discovery, economics of extraction, and an assumption that oil resources were finite, that oil production in the lower 48 US states would peak in the early 1970s and decline thereafter, following a bell-shaped curve. Hubbert's predictions proved remarkably prescient, and present-day adherents to the theory of "Hubbert's Peak" have extended his methodology globally, asserting that production, peaking this decade, will never rise much beyond current levels. This view contradicts mainstream projections from the US Department of Energy and the International Energy Agency, which predict that oil production will continue to rise from current levels of roughly 80 million barrels per day, toward 120 million barrels per day by 2025.

The jury will not be back anytime soon, and the world will likely continue to experience broad swings in oil prices, driven by normal macroeconomic cycles, which will appear, at times, to vindicate each side. The recent surge in investment will likely yield production increases, but it is unclear if this will offset dwindling production at mature fields. The world has seen no major "supergiant" discoveries since the early 1990s, and although "proved" reserves continue to rise (partly as a function of accounting rules), new finds have fallen steadily. The global economy depends on fossil fuels, and emerging Asia will demand its share. The prospect of "peak oil" amplifies many challenges regarding energy availability and affordability, the geopolitics of supply and energy security, and the need for investments in efficiency and alternative energy sources. It may be the most fundamental sustainability issue facing the both the oil industry and the world economy today.

Source: ASrIA, 2005

This is exactly what has transpired in recent years. Both China and India are developing energy stockpiles modeled loosely after the US Strategic Petroleum Reserve, which holds crude oil stocks equivalent to roughly five weeks of US domestic consumption. China is currently building tanks in Zhejiang province with capacity to hold 31 million barrels of gasoline (equivalent to approximately one week of domestic consumption), and plans are under development for a stockpile that can hold supplies equaling three months of national consumption. India has also proposed a stockpile that would hold 37 million barrels of crude

(two weeks of consumption). The desire to protect energy supply lines has also become a more visible component of national policy, and this has likely been a major factor in the expansion of military forces. More than 40% of China's oil imports travel from the Middle East, through the notoriously insecure Straits of Malacca, and energy concerns are among the reasons why China is making moves to develop a deepwater navy capable of projecting power far from home. The national security significance of energy has heightened tensions between Asian neighbors as well as interest in offshore resources has breathed life into territorial spats over various uninhabited atolls, rocks, and islands, heightening potential military issues.

Diversity = Security

The most meaningful form of energy security, however, is diversity of supply, and it is in developing new sources of energy that Chinese and Indian firms have been most notably active to make up for a major shortcoming. The contrast is at times quite striking: at the start of 2004, ExxonMobil had 35 billion barrels of reserves outside the U.S., TOTAL had 22 billion barrels outside of France, and PetroChina had just 1 billion barrels outside of China. To make up for the gap, Chinese firms are estimated to have made overseas oil investments totaling between US$15 billion to $40 billion since 2000, while Indian firms invested between US$4 billion and $10 billion during the same period.

Figure 15 Energy Policy Meets Foreign Policy

"Wenran Jiang, an expert in Chinese foreign policy at the University of Alberta, said 'many in the West viewed the Unocal offer [by CNOOC] as part of China's coordinated assault on foreign markets, a sign of economic vigor'. In China, he said, 'the energy quest is seen as a belated, disorganized, even desperate rush to meet basic security needs. They feel threatened, with their back in a corner, forced to pay high prices to Western companies', Mr. Jiang said. 'For them, this is a matter of the survival of the regime.'"

Joseph Kahn, "China's Costly Quest for Energy Control"

Source: New York Times, June 27, 2005

The effort to lock in supply diversity has led Chinese and Indian firms to pursue "equity oil" in a manner which does not always appear to be economically rational. Although global energy and futures markets have evolved such that oil is a truly fungible commodity, the push for equity oil harkens back to the old days of dedicated, bilateral product flows. While major IOCs typically are willing to pay between $25-33/barrel for proven reserves, anecdotal market evidence indicates that Asian firms appear to be paying significant premiums in exchange for guaranteed product flows. Nevertheless, Chinese and Indian firms continue to make aggressive moves into a long list of nations, including Kazakhstan, Russia, Sudan, Myanmar, Vietnam, Iran, Angola, Syria, Libya, and Ivory Coast.

Overseas engagement presents new sustainability challenges

As the list of nations below makes evident, overseas engagement can be a politically sensitive affair. Oil firms are finding themselves on the front lines, dealing with issues of geopolitical significance, while juggling new human rights and environmental challenges. As discussed in the environmental, health, and safety section of this report, the imperfect track record of Asian firms can exacerbate tensions involved in operating in new overseas locales. Most challenging in the long-term, however, is the significant engagement that Chinese and Indian firms have in nations where regimes face serious legitimacy issues. Although oil revenues may help regimes maintain control, domestic political turmoil or international sanctions could threaten the ability of firms to obtain energy supplies. Furthermore, firms viewed as enablers of oppressive regimes could find themselves in a difficult position if regime change does eventually occur.

Oil firms are on the front lines, dealing with issues of geopolitical significance, while juggling new human rights and environmental challenges

Figure 16 Sustainability Challenges in Engagement with Oppressive Regimes

Location	Issue	Players Involved
Myanmar	Military usurpation; slave labor and other human rights abuses	India developing plans for US$1B gas pipeline; Thailand gets 20% of gas from Myanmar
Uzbekistan	Unelected government; recent massacre of democracy protesters	China signed US$600M joint exploration deal weeks after Andijan massacre
Iran	State sponsor of terrorism under international sanction	Sinopec in $100B, 25-year deal for gas; GAIL in $50B, 30-year deal for gas
Sudan	Civil conflict exacerbated by struggle to control oil resources; genocide in Darfur	ONGC and CNPC (40% stake) are main shareholders in Sudanese national oil company

Source: ASrIA, 2005

China's decision to abstain from the recent UN vote on Resolution 1593 to refer Sudanese war crimes in Darfur to the International Criminal Court highlights how oil-related interests can trump human rights considerations. Sustainability investors can do little but choose not to invest in such firms. Harvard University, not known to adhere to sustainability practices in the management of its US$22 billion endowment, divested its ownership stake in PetroChina following the vote, despite having never divested from South Africa during Apartheid, nor having taken an activist stance on other investment issues.

The engagement of major Asian OG&P firms with such countries as Sudan, Iran, Myanmar, and Uzbekistan may make them inherently unsuitable or ineligible for a majority of sustainability-oriented portfolios. For sustainability oriented investors, however, where firms are responding to trends for improved disclosure it is possible to differentiate between firms, and to choose firms which appear to be on a path toward greater sustainability.

The involvement of China and CNPC in Angola is a troubling example of oil firms acting in a manner damaging to sustainable development. The Eximbank of China last March provided a US$2 billion development loan to the government of Angola in order to pave the way for greater CNPC involvement in the African nation; repayment was guaranteed in part by oil. The loan, much of which will be spent on projects involving Chinese firms, was accepted by the Angolan government over a package on offer from the International Monetary Fund. The IMF package reportedly had been hung up because of disclosure and anti-corruption provisions, while the Chinese made no such demands. Chinese oil firms continue to resist participation in the Extractive Industries Transparency Initiative (EITI), and sustainability investors have little information with which to determine if firms are supporting unsustainable practices in their pursuit of resources. However, EITI is not the only source of information. CNOOC, Petrochina and Sinopec have overseas listings and filings which will exert some pressure on them to be more transparent and responsive on these issues.

Figure 17 A Pakistani-India Pipe Line May Help Reduce Traditional Rivalries

GAIL's plan to transport Iranian gas via a pipeline through Pakistan presents a difficult but somewhat more hopeful example. Although the plans violate the US Iran-Libya Sanctions Act (ILSA) and could be scuttled due to pressure from the US on Pakistan, the pipeline project would serve to create new economic interdependence between Pakistan and India, two nuclear-armed rivals who until recently appeared to be at the brink of military conflict. In this instance, a questionable gas project could serve to reduce military and political tensions, potentially dramatically improving the investment and sustainability climate of the entire region.

While sustainability investors should make efforts to differentiate between various international energy projects, they should also consider the inherent difficulty of managing international projects and the challenges associated with entering foreign markets. A lack of focus can be particularly difficult. For example, Chinese firms are currently pursuing projects in more than 40 different countries. Not only does this create challenges for analysts and investors, but it signals a separate set of questions about the ability of Asian OG&P companies to develop the resources necessary to manage sustainability issues across a range of geographies and cultures. As we have seen time and again, this requires a robust combination of top level commitment and the patient development of internal skills and external partnerships.

INVESTOR QUESTIONS FOR COMPANIES

Compliance, standards and disclosure

- Does your company's senior management participate in a regular policy dialogue with the government?
- In what timeframe do you expect your firm to join international standards bodies and conventions, such as the Extractive Industries Transparency Initiative?
- What is the timeframe on which you expect to begin to disclose key sustainability data, such as emissions, spills, and safety performance?

External risk assessment

- What government approvals are necessary to shut down legacy assets, and do you expect management autonomy to increase?
- What impact would complete deregulation of fuel pricing have on profitability of the different portions of your business?
- When acquiring reserves and foreign assets, what are your firm's assumptions about long-term energy pricing?
- How does your firm assess political risk as it enters production agreements overseas?

Management and internal investment

- What internal disciplinary policies are in place to prevent environmental and safety violations?
- When your company undertakes a new exploration or production project, what policies do you follow on environmental impact assessments and community engagement?
- What impact does over-utilization of assets have on plant longevity?
- What are your company's plans regarding continued operation of non-"global scale" refining and petrochemical facilities?
- What is your firm's ability to adapt quickly to cleaner fuel standards, and what capital investments would be required?
- What plans are in place to increase natural gas production and distribution?
- What clean fuels R&D projects are underway, and what are the budgets?

RESOURCES

Company websites

- Bharat Petroleum Corp. Limited — www.bharatpetroleum.com
- China National Offshore Oil Corporation — www.cnooc.com.cn/defaulten.asp
- Chinese Petroleum Corporation (Taiwan) — eng.cpc.com/tw
- Formosa Petrochemical Corporation — www.fpcc.com.tw
- Formosa Chemicals & Fibre — www.fcfc.com.tw
- Gas Authority of India Limited — www.gailonline.com
- Hindustan Petroleum Corp. Limited — www.hindustanpetroleum.com
- Hyundai Oil Refinery Corporation — www.oilbank.co.kr/english/index.jsp
- Indian Oil Corporation — www.iocl.com
- Korean National Oil Corporation — www.knoc.co.kr/stat/eng/index.htm
- Oil & Natural Gas Corporation — www.ongcindia.com
- Nan Ya Plastics — www.npc.com.tw
- PetroChina — www.petrochina.com.cn/english
- Petronas — www.petronas.com.my
- Pertamina — www.pertamina.com
- Philippines National Oil Company — www.pnoc.com.ph
- PTT — www.pttplc.com/en/default.asp
- PTT Exploration & Production — www.pttep.com/en/index.asp
- Reliance Industries — www.ril.com
- Sinopec — www.sinopec.com
- SK Corporation — eng.skcorp.com
- S-Oil — www.s-oil.com/eng/index.html
- Thai Oil — www.thaioil.co.th/index_eng.php

Examples of sustainability reporting

- Amerada Hess — www.hess.com/downloads/reports/ehs/us/2003/home.htm
- British Petroleum — www.bp.com
- ChevronTexaco — www.chevrontexaco.com/cr_report/2003
- ExxonMobil — www.exxonmobil.com/corporate/Citizenship/Corp_citizenship_home.asp
- ONGC — www.ongcindia.com/hse.asp
- Pertamina — www.pertamina.com/englishversion/ourcommunity/social.html
- PetroChina (2002 report) — www.petrochina.com.cn/english/jkaqhhj/pdf2002/jkaq2002.pdf
- PTT — www.pttplc.com/en/ptt_core.asp?page=cr
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- Chinese Petroleum and Chemical Industry Association — www.cpcia.org.cn/english/english.htm
- Energy Foundation: China Sustainable Energy Program — www.efchina.org
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Taking Stock

Adding Sustainability Variables to Asian Sectoral Analysis

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Auto
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Power

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Sustainability

Sustainability is a systemic concept, relating to the continuity of economic, social, institutional and environmental aspects of development. In the terms of the 1987 Brundtland Report of the UN's World Commission on Environment and Development, sustainability is: "Meeting the needs of the present generation without compromising the ability of future generations to meet their needs." The key concept for investors is the need to address a range of environmental, social, and governance (ESG) factors which will inevitably shape long-term returns as markets respond to changing resource requirements and public priorities.

INTRODUCTION

Few sectors offer an Asian investor better insights into a country's ability to focus on long-term sustainability issues than the utility sector. This is a sector where the environmental and social impacts are significant, the capital costs for companies are immense relative to local capital markets, and the fuel decisions frequently touch on a country's most strategic foreign policy choices. As a result, the Asian power sector poses a broad array of investment questions which have the potential to change the risk-reward profile for investors and for Asian societies for years to come.

Few sectors offer an Asian investor better insights into a country's ability to focus on long-term sustainability issues than the utility sector

The Asian power sector has been shaped by two over-riding imperatives: the need to satisfy extremely rapid growth in demand for electricity and the need to create market-oriented power companies which can compete in more liquid global capital markets for the funding needed to meet Asia's electric power needs. Most of the companies represented in the listed equity universe have been players in a crucial period of modernization and economic growth. In an effort to reshape a largely government owned and controlled sector, there have been a range of experiments in power sector restructuring and privatization. Most are Asian blue chips with large asset bases and relatively stable earnings. Unlike their developed market counterparts, however, most lack both a competitive market orientation as well as a developed sustainability profile. This makes it difficult to simply map developed market sustainability issues to Asia's less diverse power sector landscape.

This combination of rapid demand growth and limited strategic flexibility which shapes the power sector in Asia results in a broader based set of sustainability questions than would be the case in developed markets where companies are building clear technical expertise against a backdrop of active government policy formation. As a result, over the medium-term, we see a scenario where investors assessing sustainability variables will need to focus on the better capitalized traditional power companies with the resources to pursue newer, more energy efficient technologies. It will also be crucial to evaluate which Asian governments have the ability to implement more forward-looking power sector policies which take into account a growing constellation of environmental and social risks. Over the longer-term, we expect to see a range of new entrants with business models more focused on specific opportunities in renewables and cleantech services.

In this report, we assess these issues in the context of Asia's most broadly held large- and mid-capitalization listed power companies. We believe that the most important sustainability themes for investors in Asian power companies will be:

- **Thermal efficiency** Primary energy efficiency — the ability of a power plant to convert fuel into electricity — is a powerful proxy for sustainability which highlights the operating skills of different operators

- **Regulatory risk** Regulatory structures shaping the Asian power sector are in the midst of change, reflecting emerging environmental and social impacts, and a web of complex policy choices

- **Making progress on cleaner fuels** Most Asian governments and power companies would like to move toward cleaner fuels, but the financial impact of switching to cleaner fuels will be high

- **Pricing in the environmental risks** Over the longer term, the management of environmental risks and opportunities will emerge as the key differentiator and promises to create opportunities for a new set of sector players

COUNTRY AND SECTOR DYNAMICS

What the sector looks like today

The largest listed Asian power companies tend to come from the more developed Asian countries which have large privatized government power companies. The size and composition of the listed universe is also a reflection of policy decisions concerning the structure of the industry. The sector features a mix of:

- traditional vertically integrated power companies with generation, transmission, and distribution assets

- unbundled power companies which specialize in generation

- unbundled power companies which specialize in transmission and distribution (T&D)

For example, the largest listed Asian power company by market capitalization — Korea Electric Power Company or KEPCO — is a vertically integrated power company which accounts for roughly 96% of all generation and which also controls the electricity grid, which handles transmission and distribution. Elsewhere in the region, Tenaga Nasional remains government controlled and has a similar profile to KEPCO with exposure to generation, transmission, and distribution.

Figure 1 Larger Regional Listed Power Companies

Market	Company	Market Cap* (US$mm)
China	Huaneng Power	8,501
	Datang	3,796
	China Power International	1,031
Hong Kong	CLP	13,978
	HKE	10,571
India	Tata Power	1,914
Korea	Kepco	24,191
Malaysia	Tenaga Nasional	8,463
	YTL	3,039
Philippines	Meralco	327
Thailand	Ratchaburi	1,454
	ECGO	1,043

* As at 30 December 2005, or last official day of trading

Source: Bloomberg, December 2005

While government control is the norm, Hong Kong's two vertically integrated power companies, CLP Holdings and Hong Kong Electric, are unique within the Asian power sector due to their history of private ownership and a growing focus on power projects outside of their home market. The independent power producer market in Asia is still limited in scope with Thailand's EGCO, Ratchaburi, and Malaysia's YTL as the most prominent listed company examples. India's power sector is still largely in government hands although Tata Power and the energy and power conglomerate Reliance Energy are beginning to emerge as more dynamic players with a strong private sector orientation.

The independent power producer market in Asia is still limited in scope

Across the region, there are also differences in the nature and extent of government ownership, with government shareholders ranging from policy-oriented development banks to more local, passive arms of the government. In the Chinese power sector, for example, government shareholdings dominate the ownership structure, but ownership tends to reflect a more diverse range of government-linked entities, some of which operate at the provincial level. This is also true in India where the state electricity boards traditionally owned the transmission and distribution infrastructure. The three most prominent pending privatizations — Singapore Power, TaiPower (Taiwan), and Electricity Generating Authority of Thailand (EGAT) — are all fully integrated power companies with ownership concentrated in the hands of the central government. In all three markets, however, there have been experiments in market liberalization, especially in the generating sector, which has resulted in significant independent power producer (IPP) investments. Nonetheless, strategic and market considerations have delayed proposed listings as governments have worked to address questions concerning market structure and also public expectations concerning future tariffs and arrangements covering current employees.

Cross-cutting issues

Any analysis of the Asian power sector must take into account three cross-cutting issues which have shaped the sector and promise to influence the impact of sustainability themes.

High demand growth Sustainability issues associated with the power sector — especially the focus on cleaner fuels and renewable energy — have grown in importance for developed market investors, especially with the launching of the EU Emissions Trading Scheme in January 2005. This provides companies in EU member countries with a market for buying and selling carbon emissions credits. In Asia, however, the debate over carbon policy issues is only slowly gathering momentum and the over-riding policy question remains the focus on access to electricity and reliability of supply. For example, in India today it is commonly estimated that as much as half of the population has no access to electricity. Elsewhere in the region, the rapid economic growth of the 1990's resulted in constant challenges for Asian policymakers as they raced to meet rising public expectations for jobs and for energy hungry amenities like air conditioning. With electricity demand growth averaging 5-10% annually through the 1990's, Asian power companies and bureaucrats have concentrated their focus on upgrading generation capacity to larger, more efficient units and improving grid operations. Indeed, efforts to fund this growth lay behind the privatization efforts which are shaping the Asian listed power sector today.

In Asia, however, the over-riding policy question remains the focus on access to electricity and reliability of supply

Figure 2 Asian Power Demand Growth: Fast and Faster

	Average Annual Growth 1990-2002 (%)	Highest Growth (%)	Installed Capacity (GW)
Bangladesh	6.8	12.1	3.4
China	8.3	11.9	338.3
Hong Kong	4.4	13.5	11.6
India	6.1	9.1	120.3
Indonesia	7.8	13.7	25.6
Japan	2.4	6.7	237.9
Malaysia	9.6	16.2	13.8
Pakistan	4.5	10.7	12.5
Philippines	5.1	10.0	13.4
Singapore	7.1	11.6	7.7
South Korea	9.8	11.7	54.5
Sri Lanka	7.2	13.3	1.0
Taiwan	5.4	9.1	30.1
Thailand	8.2	13.3	23.2
Vietnam	12.5	19.3	4.2

Source: Energy Information Administration (EIA), 2002

The most striking governance aspect of the Asian listed power sector is the fact that the controlling shareholder is, in most instances, the government

Government ownership The most striking governance aspect of the Asian listed power sector is the fact that the controlling shareholder is, in most instances, the government. Government control over the competitive landscape forces the sustainability analyst to draw a careful distinction between the strategic and operational choices which are the province of management and those which are controlled by the government. This is a crucial point because most Asian power companies are strategy takers — they respond to opportunities provided by governments but often have little discretion to shape them. In practical terms, this means that they rarely control fuel choices, technology options, or distribution strategies. As a result, many of the bedrock sustainability issues are hard to analyze accurately in Asia without first understanding the policy stance of different Asian governments, which generally remain very focused on efforts to plan and fund significant system growth in conventional fuels.

Figure 3 Government Shareholding of Asian Power Companies

		Government Ownership (%)	Market Value (US$ bn)	Yield (%)
CLP Holdings	HK	0	13.8	4.8
Datong Power International	China	> 50	4.3	3.6
EGCO	Thailand	25	0.9	4.3
Hongkong Electric	HK	0	9.5	4.9
Huaneng Power International	China	>50%	11	3.9
KEPCO	Korea	54	15.1	4.5
Ratchaburi	Thailand	45	1.4	4.5
Tenaga	Malaysia	70	9.5	1.6

Source: analyst reports

Limited disclosure Investors in the Asian power sector face meaningful challenges in assembling a complete picture of government and corporate policies related to the power sector. While discussions of operating strategy and strategic risks, which touch on generation mix, thermal efficiency and environmental and social impact, are relatively common in developed markets, most Asian companies do not address these issues in even forward looking public disclosures. Asian power companies are beginning to make a more diligent effort to highlight their activities in the environmental arena. However, many of these disclosures are incomplete and most fail to outline financial impacts, potential new requirements, or development options. In general, the discussion is limited to compliance issues, not strategic or business considerations. Government disclosure of key regulations and sector policies is frequently limited as well, making it difficult for the public and outside investors to assess policy implementation.

Long-term sector outlook

Moving forward, we expect more and more diverse players in the listed universe

Several distinctive trends will come into play over the next five to ten years. The first is greater diversity. The Asian listed power sector is currently dominated by government-linked power utilities which are in various stages of privatization. Moving forward, we expect more and more diverse players in the listed universe. This trend is already evident in high growth markets like India where non-traditional, but well established, companies are beginning to enter the power sector. Indeed, companies like Reliance Energy, while broadly exposed to energy and power, bring related sector experience without the limitations of links to the legacy regulated sector. In China, we are also seeing energy companies such as China National Offshore Oil (CNOOC) move into the power sector to capture downstream markets.

In the meantime, we expect the heavily regulated markets with cautious competition to permit new entrants in the generation segment, but only if market conditions are relatively stable. Asian policymakers were careful observers of the turbulent U.S. market deregulation experiment, especially the California debacle, and remain comfortable in taking only limited steps toward market-based mechanisms which could increase efficiency but introduce price volatility. Finally, we believe that new opportunities, especially in the renewable energy, distribution and services realm look promising. Depending upon the pace of market development, the Asian power market could support the emergence of a range of innovative service providers in areas ranging from demand-side management to emissions trading. Supporting this trend will be growing policy support for market-based tools, which will force both producers and consumers to bear more of the long-term cost of energy and power sector environmental impacts.

ENERGY EFFICIENCY — A PROXY FOR SUSTAINABILITY

Given the different strategic context for listed Asian power companies, investors evaluating sustainability variables must re-cast the developed market list of issues to define themes which have the potential to drive valuations in Asian markets. Indeed, given Asian governments' high level of control over the power sector's commercial and strategic options, it is crucial for investors to identify those areas where management can act autonomously to implement strategy. With fuel and generation mix decisions largely fixed over the medium term, the focus must shift to operational decisions which are within management's control. These focus on questions of capital spending and equipment choice, operations and maintenance, and demand management. In addition, there are important operational variables such as system design, maintenance cycles, and workforce issues, especially for vertically integrated power companies involved in transmission and distribution.

From a sustainability perspective, perhaps the highest impact operating issue is thermal efficiency

From a sustainability perspective, perhaps the highest impact operating issue is thermal efficiency. While global sustainability-oriented investors tend to focus on power companies which have the most environmentally friendly generating strategies, the challenge in Asia is more basic. It must be to identify those companies which do a good job of operating the asset mix which they have, regardless of whether it meets the developed market ideal, and to identify those companies which have the ability to work toward a higher efficiency generation mix. This basic conservation strategy delivers a broad range of economic and environmental benefits. Indeed, thermal efficiency looks at the most basic issue in the electricity industry — how efficiently a power plant converts primary fuel sources, such as gas or coal, into electricity. It is, therefore, a fundamental measure of environmental efficiency. The less efficient the generator, the more fuel which must be burned, thereby raising resource needs and costs. Crucially, a cleaner, more efficient, "burn" typically results in lower emissions of critical pollutants such as greenhouse gases, sulphur dioxide (SOx), nitrous oxide (NOx), and particulates.

Figure 4 Thermal Efficiency Norms — Getting Better?

Generator type	Thermal Efficiency	Key Technologies
Coal-fired	30-40%	Clean coal technologies, flue gas desulphurization
Single-cycle gas	30%	Lacks the steam cycle
Combined-cycle gas	40-55%	Rated efficiency approaching 60%

Source: ASrIA, 2005

The key variables for thermal efficiency

The key variables for thermal efficiency are determined by fuel type, technology, and operation and maintenance standards. Combined-cycle gas units, which can burn either piped gas or reconstituted LNG, can achieve the highest thermal efficiency. These units use gas combustion to drive jet engine-style turbines. By capturing high temperature waste gases from the first combustion cycle,

combined cycle units then run a second cycle using the heat which is retained from the first cycle. With a multi-utility or co-generation strategy, other efficiencies can be realized and process outputs such as steam and purified water can be sold.

There have also been significant efforts to improve the thermal efficiency of coal generating technology in recent years. Meaningful improvements result from new strategies in fuel management such as fluidized bed systems, pulverizing and washing the coal. Supercritical steam systems are now coming into use in Asia and permit the steam to be heated to much higher temperatures which can result in efficiency gains. These units deliver significantly higher thermal efficiency and have the potential to deliver operational savings due to more efficient fuel usage patterns. Another technology which is in the advanced development stage but may become economically viable for coal-rich countries like China is integrated coal gasification (IGCC) which can be used to convert coal to a gas which can fuel combined cycle turbines. At the other end of the process, there are also well-established technologies for controlling emissions, such as flue gas desulphurization, which are only beginning to be standard for large units in China, thanks to tougher standards for new facilities.

Figure 5 Commitments to More Efficient Capacity

Datang:	Investing in supercritical coal-fired units
HPI:	Proposed combined cycle gas units; using fluidized bed technology; supercritical coal-fired units
CLP:	Expanding its existing combined cycle gas facility at Black Point; evaluating commitments to LNG; monitoring IGCC for use in Australia
HKE:	New commitment to LNG and combined cycle gas technology
KEP:	More combined cycle LNG units

Source: Company reports

The challenge for a good power company, however, is to improve thermal efficiency over time, taking into account potential technological improvements, the impact of changing fuel types, and obsolescence of the equipment. Obviously, the most important strategy for many companies will be to make key investments in new, more thermally efficient facilities as they increase their installed capacity. Cost-benefit trade-offs are inevitably a factor in these business decisions, as well as prevailing cost recovery schemes, which determine how a utility is paid for its investments and services.

Investors can draw material conclusions about management's ability to anticipate regulatory trends and implement efficiency strategies based upon choices about new technologies. This is also a factor when evaluating corporate policies toward retro-fitting older and existing facilities. Indeed, older units, especially coal-fired plants, typically have the worst thermal efficiency and are most likely to be the most polluting plants in a company's generation mix. If the facility represents an important share of baseload generation, however, it may be in service for a number of years if well maintained. Rather than milking an older, fully depreciated but inefficient plant, forward-looking operators are increasingly looking at strategies which can raise thermal efficiency and reduce air pollution to extend a key facility's useful life.

Figure 6 Thermal Efficiency: Coal at the Low End, Gas at the High End

CLP	
CLP Power Hong Kong (CCGT + coal)	39%
GPEC India (CCGT)	49%
Ho-Ping Taiwan (coal)	39%
Hongkong Electric	35%
China--Coal Fired Units	
Large units (600MW)	40%
Medium units (300MW)	35%
Small units (135MW)	30%

Source: Company reports, analyst estimates

Continual investment in maintenance strategies for existing facilities, as well as process improvements which can be used to improve fuel handling and reduce downtime, are crucial. Indeed, good operations and maintenance strategies can ensure that a competitive facility is more efficient overall and has a high availability rating, permitting the unit to take advantage of favorable demand conditions. In addition to assessing a plant's thermal efficiency, it is also possible to look at how much electricity the power plant itself consumes. This "self-use" can vary considerably between facilities and reflects the difference between gross and net generation. For example, it ranges from 3.4% to 8.5% for the coal-fired plants operated by newly listed China Power International.

High utilization rates can also be a huge challenge for operators in markets where demand growth is outpacing the growth of newly installed capacity. In China, in particular, high capacity factors, signalling heavy, extended output from key facilities is the norm in many areas. Not only does this result in deferred maintenance, but it can also result in early degradation of facilities and less efficient thermal conversion.

The next efficiency target for power companies is to raise standards for transmission and distribution systems

The next efficiency target for power companies is to raise standards for transmission and distribution systems. These backbones to the power system — high voltage transmission systems paired with lower voltage local distribution systems — are responsible for significant thermal losses as power is delivered to consumers. The losses can range from less than 5% in a well-functioning system to more than 10% if a system has been permitted to degrade and pilferage is also common. Good design, as well as careful maintenance and regular upgrades, are the key to lower transmission and distribution losses.

Cost-effective strategies for shaping demand

A third strategy which is important for monitoring a vertically integrated power company's commitment to efficient and cost effective resource usage is demand-side management. This is a strategy for shaping consumer demand patterns so that the system caters to a more efficient demand profile. The key issue for power system designers is to be able to meet peak demand — the

largest amount of power demanded at any given time. Needless to say, depending upon prevailing weather or industrial production cycles, peak demand may be significantly higher than average demand. As a result, good system planning often uses pricing incentives to dampen peak demand trends, especially in countries where peak demand comes in the early evening when factories are still operating and residential users go home and turn on their air conditioning units.

Figure 7 KEPCO on Demand Management

Principal measures are time-of use rate schedules, mostly for large-scale customers, and a progressive rate structure for residential use of electricity. Other measures include incentives from a public benefit fund for peak load reduction by adjusting vacation or repair schedules and for average load reduction during summer peak hours as well as Government encouragement of measures in building construction (such as use of ice-storage air conditioners) to reduce electricity use and the provision of loans on favorable terms by Government-controlled financial institutions for energy conservation projects with recommendations of the Korea Energy Management Corporation.

Source: KEPCO 20-F SEC filing, 2003

There are a range of very cost-effective strategies which can be used to influence consumption patterns and reduce capacity and capital spending requirements. These include peak demand pricing penalties and discounted tariffs for interruptible supply, which gives the system operator the right to cut power to certain users. By working with consumers, power companies can ensure that existing capacity is used in the most efficient possible way so that marginal new units are not added to the system simply to service unusual, low frequency demand spikes.

Figure 8 Demand Mix

	Industrial	Commercial	Residential	Transport & Infrastructure
CLP	10%	39%	25%	26%
HKE	5%	74%	22%	
KEPCO	51%	34%	15%	
Meralco	29%	36%	34%	1%
Tenaga (approximate)	50%	30%	20%	

Source: Company reports

There is significant variation amongst Asian listed power companies in terms of customer mix. This can determine the range of options a power company has in terms of improving efficiency and implementing innovative demand-side policies. For example, industrial consumers are typically quite responsive to price-based signals and can often adjust production schedules to meet alternative supply-demand constraints. For residential consumers, adjusting to new supply scenarios is often dependent upon the energy efficiency standards of the base housing stock and for common household appliances.

There is significant variation amongst Asian listed power companies in terms of customer mix

Figure 9 Lighting: a Case Study in Energy Savings

The amount of energy used from lighting varies from industry to industry, but typically, lighting accounts for approximately 15% of the electrical load in industry. In offices, the lighting may account for 50% of the electrical load. By having an understanding of the lamps, ballasts, luminaires and control options available today as well as the techniques used to develop efficient lighting, lighting can be produced that is energy efficient, cost effective and yields a higher quality of light.

Source: Brian Cook, originally published in Power Engineering Journal, IEE, October 1998

For investors looking at Asia's power sector, the issue of thermal efficiency and energy efficiency more broadly is a crucial long-term issue which has the potential to become even more significant as Asian governments develop policies to limit carbon emissions and address higher energy costs. Currently, CLP Holdings is the only Asian power company which has publicly outlined a competitive rationale for developing a more energy efficient asset mix, although it is clear that other companies are beginning to take similar, but less well articulated steps. On a medium-term view, investors will find companies coming under pressure to do a better job of addressing both potential policy changes and margin pressures due to less favorable energy pricing. This should have the effect of making thermal efficiency a more strategic consideration than was the case in the past.

To address this scenario, investors can consider several strategies:

- Look for those companies which have an installed capacity base with meaningful, near-term potential for improved thermal efficiency. This can provide a hedge against volatile fuel prices and potentially stricter policies on emissions

- Identify those Asian power companies which have country-appropriate experience in newer technologies. Most operators will face higher capital costs as they invest in more efficient plant and equipment. Indeed, scaling up these new technologies is difficult and the more sophisticated players may have a competitive advantage

- Be cautious about companies which do not display a commitment to high quality operations and maintenance norms. New, more efficient technologies generally require new technical capabilities. Without this, efficiency gains can prove elusive

REGULATORY RISK — WILL ASIAN GOVERNMENTS PROVIDE INCENTIVES FOR CHANGE?

Over much of the past ten years, investors in the global and Asian power sectors have learned to place a high priority on the regulatory outlook. Indeed, sector performance has often been dictated at the country level, with regulatory changes serving as the key driver for performance. We expect this trend to persist over the medium-and longer term. As a result, for investors, it will be crucial not just to assess company level variables, but also the country policy context which will shape new opportunities and, quite crucially, returns for listed power companies.

Sector performance has often been dictated at the country level with regulatory changes serving as the key driver for performance

We believe that the crucial medium-term regulatory policy issues shaping impacts on social, environmental, and governance risks will be:

- New tariff and rate of return structures
- Grid development
- Public dialogue about policy choices

These issues are all firmly rooted in any conventional analysis of the sector, and given the stage of development of Asian power markets will play a crucial role in determining the ability of Asian power companies to respond to sustainability challenges. Indeed, without clarity on market structures and rate of return parameters, companies have strong incentives to delay efforts to move toward more fuel efficient but potentially higher cost technologies. Long-term plans on grid structures are also crucial, especially as companies consider smaller scale and renewable technologies. And finally, stakeholder participation in key policy decisions is a crucial variable, especially where public support for the power sector has flagged due either to service problems or social and environmental impacts.

A dominating country-level variable

Compared to power markets in North America or Europe, Asian power markets remain tightly regulated and offer few explicit incentives for more fuel efficient or renewable technologies. Although there have been limited experiments with competitive bidding by independent power producers and power pools, prices are generally regulated with reference to a target price level or rate of return on assets. Despite this, Asian power companies do experience pricing pressure and, in some markets, de facto price competition, but it is typically filtered through a layer of government or regulatory control.

Figure 10 Asset-Based Returns and Little Competition

	Tariff Structure		Competition	Structure
China	Cost plus	medium	limited	Only generators are listed. 5 large gencos. 2 large grids.
Hong Kong	Asset-based	high	no	CLP and HKE are vertically integrated. Scheme of Control review pending. Expect lower RORB.
Korea	Asset-based	medium	no	KEPCO is vertically integrated. Gencos have been corporatized. Wholesale power market and IPPs. Deregulation on hold.
Malaysia	Asset-based	medium	no	IPPs control 40% of generation market. Tenaga is vertically integrated.
Philippines	Asset-based	low	no	Napocor (generation) is unlisted. Meralco business is distribution. Some IPPs.
Thailand	Asset-based	high	limited	2 listed IPPs. EGAT is vertically integrated. Some reform plans in process.

Source: ASrIA, 2005

Over the medium-term, investors should expect more regulatory volatility than we have seen over the past five years

Over the medium-term, investors should expect more regulatory volatility than we have seen over the past five years. While fundamental regulatory changes are still pending in India and the Philippines, crucial revisions in existing norms are pending in Hong Kong, China, and Malaysia. The Chinese power sector continues to move toward a more formal and transparent regulatory structure. The weak link has been reconciling the government's priority on low cost power with a system which still struggles to mobilize scarce resources toward meeting rapid demand growth. Indeed, rates of return across the sector are low by global standards and there are often significant lags between fuel price moves and subsequent tariff adjustments. Nonetheless, China is supporting the development of gas for the power sector both through the West-East pipeline and the importation of LNG. Leading companies such as Huaneng Power and Datang have formal plans to develop gas-fired units. What is somewhat less clear, however, is how these higher variable cost units will be treated under current tariff regulations.

By contrast, Hong Kong, which has long enjoyed generous reserve margins and highly reliable service, is reviewing its return structure. Hong Kong's privately owned sector has benefited from the region's most stable and profitable regulatory environment. As a result, it will be important to watch regulatory developments in 2006 as the Hong Kong government finalizes its review of the Scheme of Control for implementation in 2008. Both CLP Holdings and Hongkong Electric are technically sophisticated players and have increased their exposure to clean piped gas and LNG combined cycle units. In addition, both companies have announced plans to install wind turbines while CLP has made a formal commitment to increase renewable power to account for 5% of total generating capacity by 2010.

In Malaysia, investors have an unusual opportunity to observe efforts to improve what has been an ineffective regulatory structure. Tenaga Nasional has historically carried a range of public and private sector obligations, linked to providing employment and subsidizing power, which hurt efficiency and made it difficult to gain public support for needed tariff increases. Over the past year,

however, Khazanah Nasional, which holds 38% of Tenaga's stock on behalf of the government, has implemented a series of key performance indicators which have the potential to drive performance improvements.

While investors are well-positioned to assess changes in policy and regulatory regimes, it is also important to keep a careful eye on developments affecting the operation of transmission and distribution grids. This has historically been a harder area for the investment community to track due to the lower level of transparency and often complex technical issues. Nonetheless, grid constraints often shape longer term policy options, such as the ability of power rich regions to transfer or trade power with other areas with different time of use or seasonal demand patterns. Underdeveloped grids can also be a barrier to renewable sources, undermining the economics of potential projects because they are not capable of efficiently dispatching small power providers with irregular availability. Finally, grid development and sophisticated transmission and distribution schemes are essential when implementing demand-side pricing strategies.

Underdeveloped grids can also be a barrier to renewable sources, undermining the economics of potential projects

Stakeholders have been missing from the regulatory equation

The final crucial element of assessing regulatory outcomes is stakeholder involvement. This is often the least well-analyzed element of the regulatory equation in Asia, as public opinion is increasingly fluid and conventional investment logic does not always highlight latent risks. Across Asia, as development has transformed the economic landscape, governments are facing growing opposition to polluting power plants, a range of complex labor disputes involving workers at large government-owned companies, and recurrent questions about the service standards of key power utilities. In the past, governments and their power companies were able to dodge questions of how they were operating as long as power was provided and tariffs were manageable. Moving forward, it is obvious that boards of directors, company management, and their government counterparts will find it harder to shed responsibility, especially for companies whose global peers have demonstrated a broader range of business models.

Figure 11 New Strategies from NGOs Will Push the Debate

One of the key concerns with utilities in many countries has been poor financial and technical operating performance and bad service. In most electricity systems this is paralleled with a major disconnect between the utility and the consumers they serve. When utilities are made accountable to their customers, for example by transparently setting and reporting standards on issues such as transmission losses, theft, quality of service and reliability, and when they face penalties for failing to deliver, the financial and technical operating performance can be expected to improve, irrespective of ownership.

Source: WWF From Free Markets to "Our Power", The Jakarta Post, December, 2004

Across the region, coal-fired power plants have frequently been a target for protests due to higher environmental and community impacts

There have been numerous examples of public opposition to new power plants in Asia and to changes affecting tariffs and service, especially for consumers. For example, proposed privatization exercises in Korea and Thailand have faced significant opposition from labor groups concerned about job cuts and by consumer groups focused on potential tariff hikes. In Hong Kong, worsening air pollution triggered a range of public protests in 2004-2005 as public groups pushed for cleaner power technologies. Across the region, coal-fired power plants have frequently been a target for protests due to higher environmental and community impacts. Protests against nuclear facilities have been somewhat less common, although opposition is well-established in Korea where nuclear power plays a significant role in the installed capacity mix.

Due to the twin risks of rising air pollution and carbon emissions, we believe that Asian governments and regulatory authorities will come under greater pressure over the medium-term to demonstrate more appropriate regulatory responses. In general, it would appear that the risk is on the downside for those power companies which have not been pro-active in addressing the implications of their environmental and social impacts. By contrast, in markets like Malaysia, where the government is working with Tenaga to improve performance and public recognition, regulatory risk has the potential to fall.

CLEANER FUELS — WHO HAS FLEXIBILITY?

Fuel diversification has long been a hallmark of good power sector policy. This lesson has been painfully learned in Asia where a number of countries, especially in North Asia, lack affordable sources of domestic fuel. With the advent of high oil prices and a global re-assessment of energy markets in response to the developing world's growing demand, the question of fuel mix — whether at the country or company level — has become much more central to the investment equation. Indeed, over the next two years, a number of Asian power companies will face the challenge of diversifying into new fuel and generation technologies.

Increasing the mix of clean fuels will inevitably tilt both the country and company risk-reward profile

For investors in Asian power companies, increasing the mix of clean fuels will inevitably tilt both the country and company risk-reward profile depending upon the following variables:

- Domestic fuel options
- Ability to implement high capital cost alternatives — LNG and nuclear
- Do power companies have the resources to take on the cost of developing energy infrastructure

Access to cleaner fuels will shape competition

For investors, domestic resource endowments continue to shape the winners and losers in the energy and power sectors. For example, Thailand and Malaysia have benefited from the development of offshore natural gas reserves in the Joint Development Area. In China, large coal reserves and a commitment to large scale hydro programs has shaped the power sector. By contrast, Hong Kong, South Korea, and Taiwan have limited domestic resources, forcing them to rely on a diversified mix of relatively high cost power sources including nuclear and LNG.

Figure 12 Country Fuel Mix —Nuclear and Renewables

	Conventional Thermal	Hydroelectric	Nuclear	Non-hydro Renewables
	(%)	(%)	(%)	(%)
Bangladesh	94	6	0	0
China	75	25	1	0
Hong Kong	100	0	0	0
India	75	21	2	1
Indonesia	81	17	0	2
Japan	71	9	19	0
South Korea	71	3	25	1
Laos	3	97	0	0
Malaysia	85	15	0	0
Pakistan	70	28	3	0
Philippines	67	19	0	14
Singapore	100	0	0	0
Sri Lanka	45	55	0	0
Taiwan	68	15	17	0
Thailand	87	13	0	0
Vietnam	50	50	0	0

Source: EIA data, 2005.
Non-hydro renewables includes geothermal, solar, wind, wood, and waste. Hong Kong data does not reflect nuclear power produced in China for Hong Kong use.

Another aspect of the domestic resource mix which must be addressed in looking at country resource endowments is the country's ability to manage the trade and foreign exchange impact of long-term dependence upon imported hard currency fuels. For some of the most import-dependent countries, such as South Korea, this has reinforced the power sector's already centralized regulatory structure. Similarly in China, Malaysia, and Thailand, the need to allocate valuable domestic resources has given government-controlled energy companies a significant say in the development of the power sector. This introduces a layer of risk for power sector investors as companies are often constrained in looking at the most cost-effective or sustainable generation options.

In China, Malaysia, and Thailand, the need to allocate valuable domestic resources has given government-controlled energy companies a significant say in the development of the power sector

Figure 13 Country Thermal Fuel Mix

	Coal	Gas	LNG	Diesel
China	✓✓	✓	planned	✓
Hong Kong	✓	✓	planned	✓
India	✓	✓	✓	✓
Korea	✓		✓	✓
Malaysia	✓	✓✓		✓
Philippines	✓	✓		✓
Singapore	✓	✓		✓
Taiwan	✓		✓	✓
Thailand	✓	✓		✓

Note: EIA data 2005, ✓✓ indicate dominant fuel; diesel units are typically older, peaking units

Perhaps the most important fuel choice strategy which is beginning to shape power company investment choices in Asia revolves around LNG and nuclear. Following Japan's lead in the 1980s, both South Korea and Taiwan moved to diversify away from oil-fired generation and into LNG and nuclear. China and India have followed more recently, taking advantage of new LNG projects and a desire to introduce alternative, and less polluting, fuels. While increased commitments to nuclear have been strategic national choices, it is clear that they will also be characterized — with some controversy — as responsible efforts to minimize carbon emissions.

Decisions to commit to nuclear and LNG have had huge implications for long-term infrastructure investments which, due to the high cost, must often be shared by government and private sector companies in both the energy and power sector. In addition, introducing these two fuels and their respective technologies into the generation mix can fundamentally restructure power market dynamics and pricing for consumers.

For example, nuclear power plants, although very costly to build and de-commission, have low variable operating costs and are typically dispatched whenever available, forming a key element of a country's baseload supply. By contrast, LNG is generally viewed as the best way to work a low pollution fuel into the Asian fuel mix for countries without local access to piped gas. Committing to LNG is a costly proposition, however, because of the significant amount of infrastructure — receiving terminals, pipelines, transportation — which is required. In order to use LNG economically, it is often necessary to pair the needs of the power sector with a long-term plan to provide gas to industry and to households in order to smooth out seasonal demand. In markets like Korea, household electricity consumers effectively cross-subsidized the build out of Korea's household gas network by paying high prices for power generated by the country's LNG-fired capacity.

The example of Korea's decision to commit to LNG is a useful one because it underscores the potentially significant impact that these decisions can have on consumers and other stakeholders. Unfortunately, one consequence of government control and the lack of transparent regulation is that the Asian public has often been excluded from policy discussions touching on these

issues. At the same time, power company management, employees, and customers have often struggled to find appropriate forums for resolving disputes. On balance, this can result in added risk to sector investors as we enter a period of flux in assessing new fuel choices. The matter is further complicated by developments in renewable and clean technology use, which suggest that economic assumptions in favour of building nuclear and LNG infrastructure could be vulnerable to a range of new cost dynamics.

Expect more convergence between energy and power companies

Investors tracking these issues will need to factor-in one additional aspect of the move away from low cost thermal fuels. As noted above, the energy acquisition and infrastructure issues linked to LNG and nuclear frequently complicate the traditional private sector power model preferred by some investors where companies can bargain for cost competitive fuel contracts. Given the scale of necessary investments in the energy and power sector over the next five years in Asia, we believe that investors will see greater convergence between the power and energy sectors.

In China, key energy sector sponsors of LNG terminals are proposing their own power projects

To some extent, this is already evident in CLP Holdings' recent decision to propose a new LNG terminal for Hong Kong, to supply its combined cycle gas units. In China, key energy sector sponsors of LNG terminals are proposing their own power projects to create demand for imported LNG. At the same time, the leading conventional power players in China are investing in gas-fired projects, despite the fact that gas pricing and related power tariffs are still unclear. In India, investors face a different and more positive scenario, where the ability to shift away from high cost naphtha to LNG promises to significantly improve the economics of a number of power projects.

For investors, the market dynamics in favor of new and cleaner fuels has the potential to sharpen the differences between state-controlled power companies and private sector players. Near-term the risk will be higher in markets where the pricing dynamics of fuels such as LNG are not yet clear. There will be an opportunity, however, for those power companies which can use the financial and technical resources to gain a first-mover advantage on cost competitive, clean fuels. At the same time, investors will need to assess the quality of government policy moves carefully. Indeed the perceived cost of fuel choices typically includes only hard capital costs, not the type of policy initiatives which emerge as governments begin to price in the impact of air pollution or carbon emissions.

THE LONGER TERM: NEW OPPORTUNITIES AS ENVIRONMENTAL RISKS ARE PRICED IN

As we shift the investment analysis to a longer-term time frame, a number of sustainability issues loom much larger for investors in the Asian power sector. Indeed, the question shifts from a consideration of a country's or company's ability to improve efficiency or make incremental shifts toward cleaner fuels to a debate about the ability of governments to embrace new environmental policy strategies. For investors, it naturally becomes a question of which incumbents have the ability to capitalize on new opportunities, or whether new entrants, unburdened by legacy assets, will enjoy better opportunities.

Environmental strategies will be a key long-term differentiator

On a ten-year view, we see strategies linked to environmental variables as a key differentiator at both the country and company level. The critical issue at the country level will be the ability of Asian governments to provide incentives for cleaner fuels, new technologies, and new consumption patterns. There are risks for incumbent players in the Asian power sector which fail to anticipate policy shifts and for new entrants who underestimate both the time and costs associated with switching. This dynamic creates an important role for financial tools such as emissions trading, which can help price in environmental impacts, giving market participants more accurate incentives for adjustment.

We believe that the key drivers for long-term sustainability-oriented investment options will be:

- The development of a new global and regional consensus which addresses Asia's growing environmental impacts, especially carbon emissions
- A resolution of the debate about the ability of new nuclear and large scale hydro units to provide an alternative to thermal technologies
- The emergence of market-based solutions tailored for the Asian electricity sector
- The commercialization of renewable and demand-side management technologies which can leverage off of Asia's demand dynamics

Without doubt, the most pressing environmental issue for sustainability investors is the global impact of rising carbon emissions. To date, Asian governments, outside of Japan, have taken only modest steps to address the potential impact of the region's growing carbon emissions. This reflects the fact that only three Asia-Pacific countries, Japan, Australia, and New Zealand, are covered

by the Kyoto Protocol carbon emissions targets which came into force on February 16, 2005. Of the three Asia Pacific Annex 1 countries, only Japan faces an obligation to reduce carbon emissions. New Zealand is expected to meet a flat target and Australia, which has not ratified the protocol, would be entitled to let emissions rise by 8%.

Figure 14 Kyoto Protocol: The Basics

The Kyoto Protocol is essentially the rulebook for the United Nations Framework on Climate Change which was initiated in 1992 with the backing of 166 signatories. Annex 1 parties accounted for 55% of carbon emissions in 1990 and many will now be asked to reduce emissions to meet 1990 levels.

The Kyoto Protocol is a legally binding agreement under which industrialized countries will reduce their collective emissions of greenhouse gases by 5.2% compared to the year 1990 (but note that, compared to the emissions levels that would be expected by 2010 without the Protocol, this target represents a 29% cut). The goal is to lower overall emissions from six greenhouse gases — carbon dioxide, methane, nitrous oxide, sulphur hexafluoride, hydrofluorocarbons (HFCs), and perfluorocarbons (PFCs) — calculated as an average over the five-year period of 2008-12. National targets range from 8% reductions for the European Union and some others to 7% for the US, 6% for Japan, 0% for Russia, and permitted increases of 8% for Australia and 10% for Iceland.

Source: UNEP, 2005

Over the next few years, however, we believe that Asian investors will face a changing landscape as Asia's surging carbon emissions become an issue of concern as the policy world begins to focus on policies which can build on the Kyoto Protocol's initial reach. This is a discussion which will inevitably center on policy developments in China and India, both of which are forecast to record sizeable increases in their shares of estimated carbon emissions by 2025. For China, this is a simple reflection of the size and rapid growth of China's power sector and the negative consequences of the coal-heavy generation mix. Currently it appears that the Chinese government is taking preparatory steps by raising emission standards and technical specifications for new, large-scale coal-fired power plants built by the better capitalized power groups.

Asian investors will face a changing landscape as Asia's surging carbon emissions become an issue of concern

Figure 15 World Carbon Dioxide Emissions by Region, Reference Case 1990-2025

	2001	2001 % of Total	Projection 2025	2025 % of Total	Avg. Annual % Change 2001-2025
North America	6,613	27.7	9,659	26.0	1.6
Western Europe	3,465	14.5	4,022	10.8	0.6
Industrialised Asia	1,556	6.5	1,962	5.3	1.0
• Japan	1,158	4.%	1,356	3.7	0.7
• Australia/New Zealand	398	1.7	605	1.6	1.8
Former Soviet Union	2,399	10.0	3,393	9.1	1.5
Eastern Europe	748	3.1	920	2.5	0.9
Developing Asia	6,012	25.2	11,801	31.8	2.9
• China	3,050	12.8	6,666	18.0	3.3
• India	917	3.8	1,834	4.9	2.9
• South Korea	443	1.9	720	1.9	2.0
• Other Asia	1,602	6.7	2,581	7.0	2.0

Source: EIA, 2005

The first step for greater action on carbon and other emissions in Asia is undoubtedly the establishment of a new global compact on carbon emissions which addresses the carbon emissions of fast-growing countries such as China and India. The second step will be greater clarity on whether nuclear power and large scale hydro will be viewed by the Asian public and capital markets as safe and fundable responses to the demand for emissions reductions. While India is focusing on increased investment in gas-fired capacity, the Chinese government is proposing a multi-pronged strategy which includes large increases in LNG-fired, nuclear technology, and hydro. Indeed a significant reinvigoration of China's nuclear power program is taking place. This is obviously a strategy which will evoke a mixed response from some camps, given that China has yet to establish policies for disposal of nuclear waste.

Policies toward nuclear and large-scale hydro will shape opportunities for renewables

This renewed focus on nuclear power is not just a Chinese phenomenon. Similar policy discussions are taking place in Japan and Korea. What has been missing from the discussion so far is any indication of whether policymakers are motivated to develop strategies for stakeholder consultation and alternative energy scenario analysis. Without public dialogue, it remains uncertain whether nuclear power can win broad-based support as an acceptable long-term technology fix. Policy consensus on this issue will be important to monitor. There is inevitably a risk that, to the extent that large scale responses to the carbon challenge win favor, incentives for distributed solutions and renewable projects may remain peripheral in as much as the scale of the typical nuclear facility is larger than even a large-scale wind farm by as much as a factor of 10.

Without public dialogue, it remains uncertain whether nuclear power can win broad-based support

Similar questions have been asked about the role of large scale hydro as a factor in country level renewables commitments. This is material because large scale hydro, such as the 18.2 GW Three Gorges Dam, has attracted criticism from a number of quarters. There remains broad-based interest in smaller scale hydro, especially run-of-river strategies, but there is considerable debate about whether large scale hydro can deliver long-term social benefits. Indeed, the high capital costs, technical challenges, environmental impacts, and resettlement issues can often undermine the other apparent advantages of hydro power.

Against this background of policy development and debate about capacity options, it seems obvious that the first new investment catalyst for investors looking at longer term developments will be opportunities to work with market-based policy tools such as Clean Development Mechanism (CDM) credits, emissions trading, and clean-tech business strategies. The Kyoto Protocol is already resulting in funding for projects which have the potential to generate credits under the CDM. The CDM is a financial tool which will give countries facing emission reduction targets an opportunity to buy credits earned from projects in developing countries which promise to cut emissions below an identified baseline, thereby representing greenhouse gas savings. The Development Bank of Japan and the Japanese Bank for International Cooperation have been active in this area with a pioneering Asian Carbon Fund which will buy CDM credits to help Japan meet its Kyoto targets. A broad range of other groups have launched carbon funds which will provide capital for projects which qualify for CDM certification.

Figure 16 Examples of Asian CDM Projects

- A coal mine/coal bed methane utilization project in Northeastern China which is expected to reduce carbon emissions by capturing and using methane which would otherwise be released in the mining process
- A 6.5 MW biomass based power generation project in India which would use rice husks as a source fuel
- An 11.2 MW waste heat recovery boiler at an India copper smelter owned by Sterlite Industries
- The Khorat Waste To Energy Project in Thailand which will utilize waste biogas methane produced at the largest Thai starch production facility
- A 32 MW small hydro project in Maguan Daliangzi in Yunnan in southern China which will substitute for coal-fired generating capacity
- A demand-side program which will improve the energy efficiency of the humidification towers at Jaya Shree Textiles in India
- An applied biogas technology project in Chumporn, Thailand for advanced waste water management which will shift treatment from open air methane release to a closed biogas digester system
- The 250 MW Sihwa Tidal Power Plant in South Korea

Source: UNFCCC, ADB, 2005

In addition to CDM — which creates clear financial incentives for energy saving projects — we expect to see a number of countries in Asia experiment with a combination of tougher regulations on carbon emissions, energy efficiency, and air and water pollutants. In many instances these tighter standards will be reinforced by the implementation of better enforced "polluter pays" strategies for fees. For investors in some markets, this process will be easy to track depending upon the level of financial disclosure. For example, the Chinese power companies now regularly disclose fines paid for breeching government targets.

Watch for experimental cap and trade

On a five year view, we expect better enforced regulatory mechanisms to be augmented by a series of experimental cap and trade arrangements and eventually more formal emissions trading markets. Cap and trade systems combine a formal "cap" which limits emissions with a trading system which permits companies which cannot meet the target to purchase credits or allowances from those companies which can beat their targets. There are, of course, a number of uncertainties about the shape and potential for success of these emerging marketplaces. Nonetheless, the policy debate is now maturing and there is a clear recognition that emissions trading markets offer an effective strategy for pricing in the impact of carbon, SOx, and NOx emissions.

Figure 17 Conditions for Successful SO_2 Trading Schemes

1) marginal SO_2 abatement costs differ among emissions sources;
2) the problem is regional or global in scope;
3) emissions can be accurately and consistently measured;
4) there is a strong legal basis for emissions trading; and
5) administrative institutions have sufficient capacity to administer the program

Source: Jintian Yang and Jeremy Schreifels, OECD Paper, 2003

Figure 18 Renewables Targets Identified

	Target	Implementing Laws	Distinctive Technologies
China	10% of installed capcity by 2010	Law passed in 2005; feed-in tariff; regulations under development	Large hydro
India	10% of new capacity through 2012	Feed in tariffs at state level; Ministry policies and financial incentives	Wind
Indonesia	Not determined	Feed-in tariff passed in 2002 for small producers	
Japan	1.4% of generation by 2010	Laws in place since 1980; renewable obligation certificates	
Korea	7% of generation by 2010	Law passed in 1987; feed in tariff, tax incentives and support funds	Waste to energy
Malaysia	5% of generation by 2005		
Philippine	Double capacity to 4.7 GW by 2013	Some financial incentives	Geothermal
Singapore	35MW of solar by 2012		Solar
Thailand	8% of primary energy by 2011	Renewable funding through small power producer program	Biomass

Source: "Renewables 2005: Global Status Report", REN21

The combination of more balanced power sector policies and new tools creating tangible financial incentives for cleaner power will create a more favorable environment for a range of new power sector investment opportunities outside of traditional investments in power stations or distribution grids. A number of Asian governments have now passed framework legislation supporting emerging renewable energy technologies. Here we see a mix of strategies with some countries articulating fixed targets for renewables, as a percentage of total installed capacity or as a percentage of generation. The effectiveness of implementing legislation remains a key question, however, as governments have opted for a range of strategies with incentives channelled by feed-in tariffs, renewable obligations, and by subsidized funding.

Although there are still significant challenges for alternative energy project developers, a combination of lower cost technology, better project design, and CDM credits has significantly improved the outlook for the sector. At the

same time, specialized investors in the sustainable private equity sector and better targeted loan funds are providing a new infusion of capital with a better understanding of the financial dynamics of the Asian power sector. As a result, we see a range of new opportunities developing in the following areas:

- **Renewable energy projects** ranging from wind power, biogas, biomass, and solar to small run-of-river hydro projects. Wind and small-hydro projects appear to be garnering particular interest near-term in countries with the right mix of weather and hydrology. Thailand has attracted interest in biomass projects, which may provide best-practice examples for projects which can be pursued elsewhere. Solar technologies continue to have applications in rural areas for off-grid applications and continued innovation may result in scalable applications

- Potentially **innovative large scale technologies** such as more fuel efficient technologies such as IGCC, low cost fuel cells, and clean coal technologies. Given Asia's existing energy resource mix, technologies which can increase efficiency or mitigate impacts will continue to attract attention, especially as conventional power companies are drawn into the effort to reduce emissions

- Watch for **public-private partnerships** as innovative technologies which can be manufactured locally make their way into pilot applications

- **Cleantech solutions** offering more energy efficient products and processes. Cleantech encompasses a range of demand and supply-side solutions which reduce environmental impacts in agriculture, energy, manufacturing, transportation, and water. This has the potential to be a particularly fast-growing market segment, especially if Asian governments begin to price in environmental impacts. More energy-efficient industrial processes, benefiting from new materials and technologies, will be a key opportunity in Asia as global supply chains extend the demand for Asian manufactured products

- **Demand-side applications** which have the potential to reduce demand by cutting energy requirements for power intensive industrial, commercial, and residential applications. More sophisticated energy management systems, new building materials, and more energy efficient white goods have been a traditional focus in this area. In some countries, governments have created incentives for power companies to pursue strategies for "avoided" power which is often more economic than the construction of new baseload capacity

The most interesting opportunity for conventional Asian equity investors will be to identify those technologies which have the potential to be scaled up for application in both regional and global markets. Given the size and income dynamics of Asian consumer markets, the concept of a breakthrough technology or service which can leverage off of the Asian demand base and make previously high cost technologies affordable for the mass market has long been the investment ideal. With more favorable regulatory and market dynamics now in the offing, we see better odds for sustainability-oriented investors in this sector.

INVESTOR QUESTIONS FOR COMPANIES

Internal policies and targets

- What are your current efficiency levels for your largest facilities by fuel type?
- Is the trend expected to improve and by how much over the next five years?
- What are the target thermal efficiency standards of new facilities which you intend to complete over the next five years?
- Who is responsible for setting policy for fuel choice and generation mix?
- If you have T&D assets, do you have a strategy for reducing system losses?
- Do you use demand-side management tools to shape peak demand trends?
- Does your board of directors review the company's environmental performance on a regular basis?
- How much do you spend on R&D?

External policies, dialogue and disclosure

- Are there provisions for public dialogue about power sector investment?
- Has the tariff structure been reviewed to determine if there are cross-subsidies built into the current tariff structure?
- Do you have discretion to make the investments needed to retro-fit existing assets, or do you have to seek regulatory approval for additional investments?
- What triggers will be necessary for increased environmental disclosure: government or stock exchange requirements?
- If public concerns about air pollution were to become more serious, how would your company respond?
- Does your company participate in international electricity sector forums to follow trends in equipment and technology?
- Does your company's senior management participate in a regular policy dialogue with the government?

Policy on KPIs

- Do you have any plan to adopt publicly disclosed KPIs?
- Does the government or your regulator use KPIs to monitor your performance?

Policy on LNG

- If your company uses LNG, what are the terms of the off take agreement?
- Are there any provisions which would permit your company to "bank" LNG if the demand environment changed and you could not take planned off-take?

Policy on nuclear fuel

- What plans does your company have for disposal of spent nuclear waste?
- How do you account for decommissioning expenses related to any nuclear facilities and how often are these accounting standards reviewed?
- Are your nuclear facilities insured in the event of an accident or leakage at the plant?

RESOURCES

Company websites

- CLP Holdings www.clpgroup.com
- Datang www.dtpower.com
- EGCO www.egco.com
- Hongkong Electric www.hec.com.hk
- HPI www.hpi.com.cn
- KEPCO www.kepco.co.kr
- Ratchaburi www.ratch.co.th
- Tenaga www.tnb.com.my

Useful web-based resources

- Carbon Disclosure Project www.cdproject.net
- Cleantech Venture Network www.cleantech.com
- International Finance Corporation www.ifc.org/sustainability
- The Katoomba Group www.ecosystemmarketplace.net
- UN Framework Convention on Climate Change www.unfccc.int

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Taking Stock

Adding Sustainability Variables to Asian Sectoral Analysis

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Sustainability

Sustainability is a systemic concept, relating to the continuity of economic, social, institutional and environmental aspects of development. In the terms of the 1987 Brundtland Report of the UN's World Commission on Environment and Development, sustainability is: "Meeting the needs of the present generation without compromising the ability of future generations to meet their needs." The key concept for investors is the need to address a range of environmental, social, and governance (ESG) factors which will inevitably shape long-term returns as markets respond to changing resource requirements and public priorities.

INTRODUCTION

The development of the Asian pulp, paper and timber sector is influenced by a suite of issues including weak political institutions, social conflict, unsustainable management of natural resources, lack of transparency, pervasive illegal practices and complex national regulation. These issues represent both risks and opportunities for investors in Asia's pulp, paper and timber companies.

The sector is nothing if not complex from a sustainability standpoint, largely due to the sector's dependency on raw materials from natural and plantation forests often in remote and inaccessible locations. It supplies a range of wood products to global markets, with raw materials sourced from some of the world's most fragile environments. The sustainable management of these materials is a significant global challenge and is essential to secure the long-term sustainability of Asian based companies operating in the sector.

The sector is highly capital intensive and the financial community plays a significant role in its development. The relatively short-term outlook of mainstream investors, however, is often at odds with the longer-term objectives of sustainable forest management, a tool which is fundamental to addressing the existing and emerging sustainability risks.

In this report, we assess these issues in the context of Asia's most broadly held large and mid-capitalization listed pulp, paper & timber companies. We believe that the most important sustainability themes for investors in Asian pulp, paper & timber companies will be:

- **Forest law enforcement, governance and social conflict** Increasing regulatory risk as a result of poor forest law enforcement and continuing social conflict is likely to plague the sector in the long term
- **The sustainable supply of raw materials** Security of sustainable supply is a crucial long-term value driver for the regions' relatively small listed universe of pulp, paper and timber companies
- **Emerging good practice standards** Whilst Asian listed pulp, paper and timber companies would appear to lag their developed market peers in responsiveness to the sustainability agenda, emerging good practice standards provide new competitive opportunities
- **Technology and carbon economy** New technology and evolution of the carbon economy provide both long term risks and opportunities

COUNTRY AND SECTOR DYNAMICS

What the sector looks like today

China has emerged as a dominant force in the wood products market, both regionally and globally

Historically, the pulp, paper and timber industry has been consumer driven by developed economies. However, a look at the current top five leading countries in terms of production, consumption, import and export of the main forest product categories globally, reveals China as a leading producer, consumer and importer of wood products. From both a global and particularly a regional perspective, it is clear that since the late 1990s China has emerged as a dominant force in the wood products market place.

Figure 1 Market Overview: Top Five Leading Countries Globally in the Pulp, Paper and Timber Sector (2003)*

Wood Product	Production	%		Consumption	%		Imports	%		Exports	%	
		A	W		A	W		A	W		A	W
Industrial Roundwood	USA			USA			**China**	**51**	**23**	Russia		
	Canada			Canada			Finland			USA		
	Russia			**China**	**46**	**8**	**Japan**	**24**	**11**	New Zealand		
	Brazil			Brazil			Sweden			**Malaysia**	**65**	**5**
	China	**43**	**6**	Russia			**Korea**	**14**	**6**	Canada		
Wood Based Panels	**China**	**57**	**20**	USA			USA			Canada		
	USA			**China**	**59**	**21**	**China**	**30**	**8**	**Malaysia**	**38**	**9**
	Canada			Germany			**Japan**	**28**	**8**	Germany		
	Germany			**Japan**	**14**	**5**	Germany			**Indonesia**	**33**	**8**
	Indonesia	**10**	**3**	**Korea**	**9**	**3**	UK			**China**	**18**	**4**
Wood Pulp	USA			USA			**China**	**48**	**17**	Canada		
	Canada			Canada			USA			USA		
	Finland			**Japan**	**35**	**7**	Germany			Sweden		
	Sweden			**China**	**31**	**6**	Italy			Brazil		
	Japan	**43**	**6**	Finland			**Korea**	**17**	**6**	Finland		
Paper, Paperboard	USA			USA			USA			Canada		
	China	**38**	**12**	**China**	**40**	**13**	**China**	**47**	**10**	Finland		
	Japan	**31**	**9**	**Japan**	**29**	**10**	Germany			Germany		
	Canada			Germany			UK			Sweden		
	Germany			UK			France			USA		

W – World, A - Asia

* Indicating contribution of Asian companies to Asian (A) and World (W) trade.

Data Source : Food and Agriculture Organisation of the United Nations Forest Products Yearbook 1999-2003

Other important players in Asia include Japan and the Republic of Korea mainly as importers, and both Indonesia and Malaysia mainly as exporters. Despite China's increasing importance, there has historically been little consolidated information published on the growth of the China market and its implications. In response to this, in 2004 the International Forestry Review (IFR) published a special edition comprising a series of up to date research papers focusing on this topic. The following assessment draws upon elements of IFR's research, details of which are provided in the resources section of this report.

Figure 2 Sector Dynamics within the Region (2003)

Roundwood Responsible for 43% of the region's industrial roundwood production, China is a leading producer of softwood and jointly with Indonesia, a leader in the production of hardwood. It also dominates roundwood consumption and is responsible for 53% of imports in the region. On the export side, Malaysia accounts for 65% of trade.

Note: Roundwood is all wood removed whether round or split, including sawnwood , veneer logs, pulp wood. Industrial roundwood includes roundwood used in the production of other goods including saw logs, veneer, pulp wood — round and split wood and excluding wood fuel.

Wood-based panels China accounts for 57% of wood panel production in the region, and with Japan is also a lead importer. Malaysia and Indonesia are leading exporters of wood based panels accounting for 38% and 33% of Asian exports respectively.

Wood pulp Japan and Indonesia are leading producers of wood pulp with 43% and 23% of the Asian market respectively, although China is not far behind with 17%. Japan and China are also leading consumers of wood pulp, being responsible for 48% of imports in the region, followed by Korea and Japan with 17% each. The export of wood pulp is dominated by Indonesia accounting for 82% of wood pulp exports in the region.

Paper, paperboard Accounting for 38%, 40% and 47% respectively, China is Asia's leading producer, consumer and importer of paper and paperboard, followed by Japan. It is also the region's leading exporter of paper and paperboard followed by Korea, Indonesia and Thailand.

Source: Based on statistics sourced from the Food and Agriculture Organisation of the United Nations Wood Products Yearbook 2003

Wood which supplies the Asian pulp, paper and timber sector is harvested from:

- state/government owned forests including government regulated concessions/tenures
- non-forest land
- areas zoned for agricultural development
- operations in other regions such as Africa and South America

Timber has traditionally been sourced unsustainably, largely from clear felling natural forests. However there is an increasing trend towards harvesting from fast growing high yield (FGHY) plantations, such as species of acacia, albizia and eucalyptus, in an attempt to offset potential shortfalls in wood supplies. In order to establish plantations of such species, it is, however, often necessary to first clear fell what is most likely natural forest land. Significant deforestation has taken place in major producing countries and several countries are now considered to be past 'peak harvesting'.

Figure 3 Status of Timber Production

Country	Overall status	Comment	* De-forestation rate 1990 -2000 (%)
Cambodia	Past peak harvesting	Exploring increased plantation development. Chinese investors active in this area	0.6
Indonesia	Past peak harvesting, de-forestation significant and declining logging due to depletion of accessible forest resources. Deforestation rate – 1.6 million hectares annually	Natural forests unlikely to sustain wood processing sector, without investment in plantations. Significant processing capacity, but struggling to operate at full capacity. Plantations under development, but most mills rely on mixed tropical hardwoods harvested from natural forests	1.2
China	Logging ban introduced in 1998. Significant variation exists in estimates of timber forests	Statistics indicate that remaining natural forest in China is young and significant illegal logging and overcutting persists. Plantation forests do not yet provide sufficient quantities of fibre to satisfy demand. Serious data discrepancies exist in all major statistical areas**	-1.2
Laos	Past peak harvesting		0.14
Malaysia	Past peak harvesting. Forest products exports 30% of total government revenues in Sabah and Sarawak		1.2
Thailand	Past peak harvesting. Deforestation slowing down	Invested extensively in plantations, however, the success of plantations is debatable	0.7
Myanmar	Large scale timber production, relatively limited plantations, heavy reliance on natural forests. Deforestation severe. Production in border areas thought to be peaking	At current harvesting rates border areas responsible for supplying timber to China have between 10 and 15 years of economically accessible resources remaining	1.4
PNG	Large scale timber production, relatively limited plantations, heavy reliance on natural forests. Most already allocated to concessions	Expected to have fully allocated its forestlands within 3 to 6 years, exhausting natural forest timber resources after another 10 years. Small processing industry	0.4
Vietnam	Past peak harvesting. Deforestation severe but stabilized	Increasing plantation development, but productivity poor	(0.5)

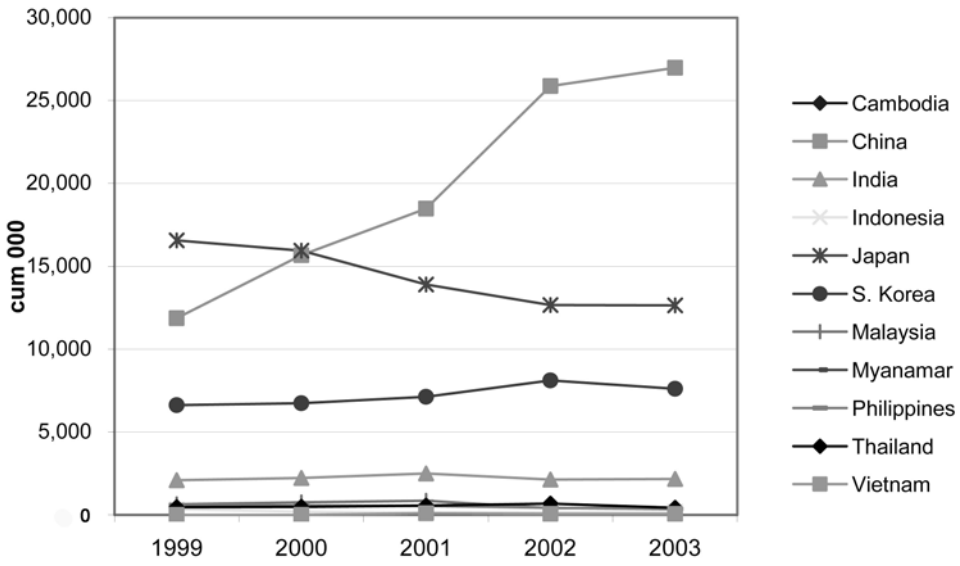
* Data sourced from the World Bank's Little Green Data Book,2005

** An Assessment of China's Forest Resources, G Bull, S Nilsson, 2004

Source: data synthesized from Kartsegiris et al 2004

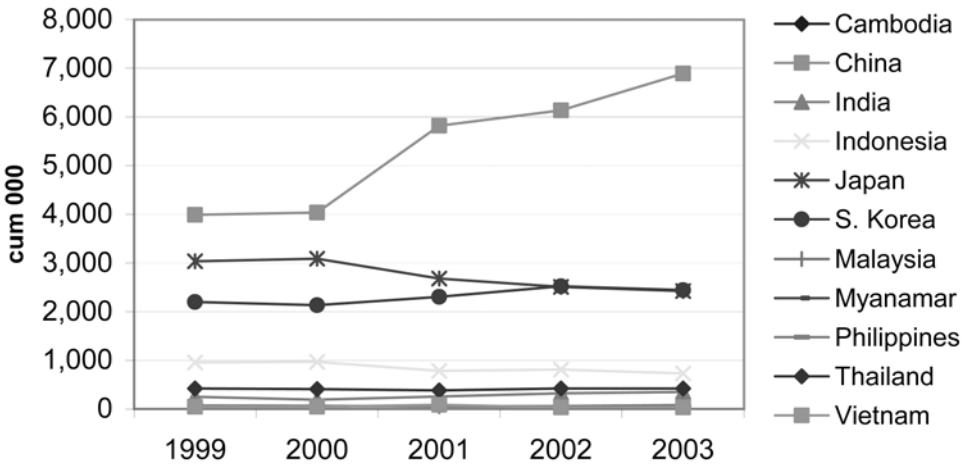
Demand for timber and wood products, however, continues to rise. The rapid increase in Chinese demand for wood products is perhaps the most striking trend. From 1999 to 2003, China's industrial roundwood imports doubled, rising from 11 million Cu.m to over 26.31 million Cu.m with a commensurate change in value from US$1.4 billion to US$ 2.85 billion. Top suppliers include Russia, Malaysia, Papua New Guinea and Gabon. Wood pulp imports have shown similar growth, rising from 11% of the global market in 1999 to 17% in 2003, nearly half of which is supplied from three countries: Canada, Indonesia and Russia.

Figure 4a Roundwood Imports Asia 1999-2003



Source: Food and Agricultural Organization, yearbook 2003

Figure 4b Wood Pulp Imports Asia 1999-2003



Source: Food and Agricultural Organization, yearbook 2003

Chinese demand has been triggered by logging restrictions

China's escalating demand for imported timber has been stimulated by the Government's decision in 1998 to restrict domestic logging. The restrictions were imposed in response to widespread flooding along the Yangtse River, which was largely attributed to deforestation. These restrictions were initially applied to state owned forests in 12 provinces and later extended to 18 provinces. It's estimated that 41.8 million ha of natural forests are affected, with an estimated reduction in harvest of 19.9 million m^3 by 2003[1]. The overall outcome has been escalating imports from within the region.

In terms of the landscape of pulp, paper and timber companies, the listed universe in Asia is relatively small. As of March 2005, only 42 Asian stocks had market capitalizations of over US$100 million and only five over US$500 million. Total market capitalization of the sector in Asia is in the region of US$15-16 billion. Of these companies, 12 are Chinese and seven of the larger stocks are ranked by PwC amongst the 100 largest pulp, paper and timber companies in the world.

Figure 5 Larger Regional Listed Pulp, Paper & Timber Companies

Market	Company	Market Cap* (US$mm)
China	Shandong Chenming	625
	Shandong Huatai	326
	Fujian Qingshan Paper	169
	Jilin Forest	154
	Henan Ying-A	144
	Shandong Bohui	141
	Minfeng Special Paper	135
	Yueyang Paper	134
	Zhejiang Kan Specialty Materials	125
	Fujian Nanzhi	110
	Shanying Paper	109
	Mudanjiang Heng Feng Paper	94
Hong Kong	Lee & Man Manufacturers	1,056
India	Ballarpur Industries	404
Indonesia	Indah Kiat (APP)**	618
	Tjiwi Kimia (APP)**	428
	Fajar Surya Wise	242
	Barito Pacific	155
Korea	Hansol Paper	765
Taiwan	Yuen Foong Yu Paper	534
	Chung Hwa Pulp	237
Thailand	Advance Agro PCL	338

Market Cap Source: Bloomberg, December 2005

* As at 30 December 2005, or last official day of trading

** APP's subsidiaries Indah Kiat and Tjiwi Kimia are listed on the Jakarta and Surabaya Stock exchanges

[1] PwC note that insufficient reporting information in China limits the number of China based companies included in the top 100

[2] Although delisted, the Indonesian APRIL Group continues to be one of the largest pulp, paper manufactures in Asia.

Figure 6 Landscape of the Asian Pulp, Paper and Timber Listed Universe

Country (Stock Exchange)	Companies Listed*
China	12
Hong Kong	2
India	1
Indonesia	5
Korea	5
Malaysia	8
Taiwan	5
Thailand	3

*Companies with a market capitalization over US$100 million.

Of the listed companies above, the majority are paper/pulp/building product companies. Three are in the forestry industry: Malaysia (2) and China (1).

Although small, the listed universe of Asian pulp, paper and timber companies is important to the sector globally

Although the listed universe of Asian pulp, paper and timber companies is relatively small, the sector has significant direct and indirect impacts on both the global industry and financial market developments in Asia. The sector is highly capital intensive in nature with capital costs for pulp production estimated to be in the region of US$ 1,000 per tonne of annual capacity. As a result, despite the small size of the listed universe, it is structurally important to the sector's development.

The 1990s saw tremendous growth in Asian pulp and paper capacity as investments from a range of sources poured into the sector, arguably with limited due diligence by the investment community as to general operating, social and environmental risks. Recent research[2] indicates that since 2000, pulp/paper producers in developing countries and those in transition raised US$37.8billion in debt and equity.

Funding for the sector is primarily provided by banks rather than equity markets. Driven by recognition of sustainability risk factors, some of the larger financial institutions such as IFC, Citigroup, JP Morgan, ING Barings, HSBC, ABN Amro, and Rabobank have adopted formal policies and safeguards to control and, in some cases, restrict lending to the forestry sector. A number of leading banks have also signed the Equator Principles which aim to provide a framework for financial institutions to manage environmental and social issues in project financing. It is worth pointing out, however, that since financing patterns of the sector do not generally involve project finance, the banks need not apply these principles to the majority of their pulp, paper and timber funding. Nevertheless some banks do apply the Equator Principles to financial products in addition to project finance.

Figure 7 The Equator Principles

The Equator Principles —'a framework for financial institutions to manage environmental and social issues in project financing'

An initiative based on the International Finance Corporation (IFC) guidelines, the Equator Principles provide guidance for managing social and environmental issues associated with the financing of development projects with a total capital cost of $50 million or more. Institutions that adopt the Principles should categorize all loans according to the Principles' set of criteria and place conditions on, monitor and even reject loans which raise questions on or conflict with the Principles's ESG policies and processes. www.equator-principles.com

Finance institutions that have adopted the Equator Principles (as of 27/2/06) include:

ABN AMRO Bank, N.V.Banco Bradesco, Banco do Brasil, Banco Itau,,Banco Itau BBA, Bank of America,BMO Financial Group, BTMU, Barclays plc, BBVA, BES Group, Calyon, CIBC, Citigroup Inc., Credit Suisse Group,Caja Navarra, Dexia Group, Dresdner Bank, EKF, FMO, Fortis, HSBC Group, HVB Group, ING Group, JPMorgan Chase, KBC, Manulife, MCC, Mizuho Corporate Bank, Millennium bcp , Nedbank Group, Rabobank Group, Royal Bank of Canada, Scotiabank, Standard Chartered Bank, SMBC, The Royal Bank of Scotland, Unibanco, Wells Fargo, WestLB AG, Westpac Banking Corporation

Nevertheless, leading financial institutions have been challenged when lending to the sector, including the well publicized allegations by Rainforest Action Network against the U.S. banks Citigroup and JP Morgan. It is, therefore, of little surprise that there is also increasing pressure by the NGO community to re-evaluate lending and underwriting commitments to the sector.

Cross-cutting issues — disclosure

Asian companies provide less readily accessible disclosure of ESG risks than their European and North American counterparts. In general, disclosure in Asia focuses on the traditional environmental risks arising from the operation of pulp and paper mills rather than focusing on the wider ESG risks of the sector, such as raw materials supply.

The issue of disclosure within the sector is likely to remain a significant challenge for investors

Listing documents, sustainability reports and annual reports are the main vehicles for disclosure of ESG issues by global pulp, paper and timber companies. As of mid 2005, 26 such companies worldwide had reported with reference to, or in accordance with the Global Reporting Initiative (GRI), including Georgia Pacific, International Paper, Sappi, Stora Enso, UPM Kymmene and Weyerhauser. These companies have taken the opportunity to report on and provide insights into global best practices such as the strategic importance of recovered fibre and use of recovered paper as a raw materials source.

In Asia, reporting by companies in the sector is limited. Examples include Siam Kraft Industry's (a subsidiary of the Siam Cement Group) Sustainability Report and Hansol Paper's Environmental Report. A number of Asian companies such as Advance Agro and Barito Pacific also provide limited environmental and social disclosure on their websites, albeit to varying degrees.

Forward looking and transparent companies will develop and disclose strategies for the use of raw materials

Not surprisingly, those companies that have faced high profile ESG related problems, such as Barito Pacific, APRIL and APP are more candid about the sustainability risks of their operations. Lack of informative disclosure on ESG issues can be considered a missed opportunity as forward looking and more transparent global companies take the lead. In Asia, APRIL has taken the lead on such disclosures, providing substantive details of its raw material supplies, expected yields and plans for attaining a sustainable supply to fuel its operations.

Beyond the company level, there is also inadequate country trade data. According to the International Tropical Timber Organisation (ITTO), several countries do not currently provide accurate industry data, making it difficult to provide complete sector risk assessments. There are also significant discrepancies between ITTO trade data and the UN FAO global trade data. Illegal activities further exacerbate the challenge of obtaining reliable trade data.

The issue of disclosure within the sector and availability of robust data on the sustainability risks is, therefore, likely to remain a significant challenge to investors analyzing the sector, particularly with respect to the Chinese pulp, paper and timber companies.

Long-term sector outlook

The sector is set to experience dramatic structural changes including geographical shifts in demand and supply

The sector is set to experience dramatic structural changes including geographical shifts in demand and supply which pose both sustainability risks and opportunities. The pulp, paper and forest products industries are classic cyclical sectors. The demand for forest products is closely linked with GDP and is heavily influenced by housing markets, hence it is not surprising that emerging markets and high growth economies, such as China, are significantly pushing up global demand for the industry's products.

Despite concerns over raw material supplies, it is clear that further expansion is on the horizon with significant planned and current investments emerging in Asia and globally. This is likely to trigger further debt financing, listings and re-listings in the region as well as secondary offerings, particularly for Chinese pulp, paper and timber companies. The Indonesian companies APP and APRIL are thought to be considering re-listing in the future.

As pressure on combating illegal logging continues to mount globally, we also expect both the public and private sector to step up environmental procurement requirements , demanding wood products from sustainable sources as evidenced by chain of custody and certification schemes.

Given the constraints on raw material supplies we also expect to see opportunities for technology development with respect to non wood fibre pulp production as well as continued increasing demand for recovered fibres.

INCREASING REGULATORY RISK FUELS THE SUSTAINABILITY CHALLENGE

Two issues that have historically characterized the pulp, paper and timber trade in Asia are illegal wood and social conflict. Sector leaders will likely spend significant resources in addressing these issues, or face increasing regulatory risk and an unstable operating environment.

Generally, government owned forest land in Asia is typically leased to private enterprises through forest concessions. Abuse of this concession system in Asia would appear to be common and in part facilitates much of the illegal activity and social conflict facing the sector. These concessions provide a mechanism for allocating forest harvesting rights to a third party, usually private companies and communities. Depending on the country, concessions require payment of specific fees and impose numerous conditions on the concession holder, including limitations on the extent of harvest as well as requirements relating to reforestation and penalties for damage. They can be long-term in the range of 20-35 years, a period notably longer than the time horizons of Asia's mainstream investors. Concession agreements are not generally disclosed and, reportedly, problems frequently arise due to inadequate management and oversight. Weak forest law enforcement and governance in managing concessions therefore provides a fertile environment for unsustainable and illegal practices and social conflict, and can pose a potential business risk for concession holders.

Abuse of the concession system facilitates much of the illegal activity and conflict facing the sector

Illegal logging: set to remain the overriding sustainability challenge

The definition of legality with respect to the timber trade is a subject of much debate which further compounds the challenge in tackling the issue, particularly in defining the extent of the problem.

Illegal logging is typically defined as:

- harvesting timber without authority /in violation of national laws
- harvesting timber without and/or in breach of concession permit requirements
- failure to declare harvests to avoid taxation and other legal payments
- violation of international trading agreements
- use of false documentation

Source: Adapted from "illegal logging" as defined in AF&PA, 2004

The supply of illegal wood to the pulp, paper and timber trade globally is a significant sustainability issue which raises the question of financial risk as well as ethics. Both the scale and the pervasive nature of illegal logging in Asia threatens the reputation and branding of companies operating within the sector and incurs significant losses in taxation and other revenues of local governments. It also impacts the profitability of companies operating in the sector legally and is becoming a significant international trade issue. Recent research published by the American Forest & Paper Association indicates that illegal logging is responsible for depressing world market prices for timber by an average of 7-16%[3].

Indonesia has been a focal point for the illegal logging debate, and has the highest rate of illegal logging in the region

Indonesia has been a focal point for the illegal logging debate. With an estimated 60%[4] of its timber production from illegal sources, it has the highest rate of illegal logging in the region. The country's decentralized system of control has exacerbated the situation and reportedly facilitated widespread corruption and mismanagement of forest tenures. Land clearing activities in the country continue to be licensed by district forestry agencies that do not have the appropriate provincial authorisation and in fact directly contravene government regulations against the issuance of such licenses[5]. In light of this, the Ministry of Forestry is currently undertaking a review of the validity of industrial timber plantation licenses issued by Governors or heads of districts. It has been reported[6] that 34 companies received licenses from heads of districts in Riau to clear 289,809 ha of natural forest, mainly for customers APRIL and APP.

If Indonesia were to significantly reduce illegal logging, it has been estimated that between 3.5 and 4 million m^3 would need to be replaced by other suppliers in the three key markets for Indonesian lumber — China, Malaysia and Japan[7].

Other countries where illegal logging is significant and inevitably impacts international trade include China and Russia. China is significant with respect not only to reported illegal activity in the form of logging over quotas, but also as one of the word's largest importers of timber and pulp from countries with poor forest law and governance such as Indonesia, Russia and Myanamar.

The impact of illegal logging on both the environment and local communities can be devastating. The problems range from the permanent loss of extremely valuable forest land, with high biodiversity, to instances of violent social conflict with local communities.

Figure 8 Biodiversity

Biodiversity may be defined as the variability among living organisms, including the variability within and between species and within and between ecosystems; biodiversity is fundamental to survival for many plant and animal species. The world's forests are exceptionally rich in biodiversity. They provide habitats for the majority of terrestrial species and are important both economically and socially.

Given the changing market dynamics and increasing pressure on forest resources in the region, the problem of illegal wood is unlikely to be solved in the short-term and will remain a significant sustainability risk at least for the medium term, despite on-going national and multilateral efforts to combat the problem. This stems from the nature of these activities which have largely been facilitated by a mixture of weak rule of law, corrupt political institutions and complex local laws and regulations. This is not to mention the sheer range of interests that can be involved including government officials such as customs officers and the military; multinationals; regional brokers and dealers; and members of the local communities themselves. Indications are that Asian companies in the sector are further introducing similarly unsustainable practices overseas as they continue to invest in operations in countries such as Africa, Russia and South America[8]. The recent activities of the Malaysian company Rimbunan Hijau in Papua New Guinea and related allegations over labour abuses illustrate the potential for lower standards to be introduced away from home markets.

Multi-lateral and bilateral efforts which aim to address these issues include:

- **Forest Law Enforcement and Governance (FLEG)** where timber producing counties have declared their intention to address illegal wood

- **Forest Law Enforcement, Governance and Trade (FLEGT)** led by the EU, the FLEGT Action Plan addresses voluntary partnership agreements, public procurement, private initiatives, and financing and investment safeguards. EU member states are engaging producers in bilateral negotiations to further partnerships in implementing the EU's Timber Licensing system. This involves exporting countries providing a certificate of origin to customs of the importing country

- **Memorandum of Understandings** China and Indonesia have signed an MOU to address illegal logging, although it would appear that little progress has been made following the initial announcement of the agreement

Importantly, the legality of timber is becoming a trade issue. European markets are increasingly demanding independently verified legal wood products and timber from suppliers as a condition for their entry into European markets. This is a significant issue for Asian pulp, paper and timber companies as this requirement extends to Asian suppliers.

"Illegal logging activities in neighbouring countries have become such a critical issue that buyers in the UK are now asking for legality certifications to prove that plywood they purchase are from legal sources"

Jaya Tiasa Annual Report, 2004

Addressing the problem of illegal wood should be a priority for companies in the sector. Those that disclose sustainability information generally state their intention to use only legal wood and cite certification, audits and Chain of Custody (COC) systems as the mechanisms by which this is achieved. Chain of-custody is the route taken by raw materials from the forest to the consumer

and a COC system should be able to determine the custodian of timber at any point in the supply chain. These systems typically can involve procedures, documentation and, in some cases, sophisticated wood tracking and labeling systems, such as radio frequency identification labels (RFID). However COC systems can be logistically difficult and expensive to implement alongside various national schemes. There are also two internationally recognised chain of custody systems:

- the Programme of Endorsement of Forest Certification (PEFC)
- the Forest Stewardship Council's (FSC) own scheme

However, lack of mutual recognition of the different schemes has created some confusion.

For investors, the key to addressing the issue of illegal wood is evidence of robust and audited COC and timber tracking systems

For mainstream investors, the key to addressing the issue of illegal wood is without doubt evidence of robust and audited COC and timber tracking systems, on the basis that companies which are unable to provide assurances of legality are exposing themselves to unacceptable regulatory and reputational risk. The increasing pressure of deforestation on raw material supplies in the region, at least in the short to medium term, is also expected to increase the likelihood of illegal logs entering the market place and further fuel global concerns over deforestation. Without doubt, illegal logging is set to remain a significant sustainability risk to companies operating in the sector. Companies which can demonstrate legal supplies will inevitably increase their attractiveness to investors and place themselves in a stronger competitive position as global markets increasingly demand evidence of legality.

Figure 9 Examples of Companies Addressing Legal Wood

Asia	**APP**	Despite allegations over the legality of its timber, APP reports that it implements its own COC system and provides verification that pulpwood entering its mills is legal.
	APRIL	APRIL reportedly has a wood purchasing policy to prevent the purchase of illegal wood, such that wood tracking audits are conducted for verification. In response to customer requests, APRIL indicates that a COC system is implemented to demonstrate that paper it supplies is from plantation fibre (acacia), distinguishing it from mixed hardwood. Riau Andalan Pulp & and Paper (part of the APRIL Group) still reportedly rely heavily on supplies from natural forests. Therefore only a small portion of its paper production is from plantation fibre.
	Barito Pacific	Barito Pacific reports that it is progressively implementing a COC and timber tracking system. Greenpeace has however recently accused the company of trafficking in illegal logs.
	Jaya Tiasa	Jaya Tiasa reports that it has previously engaged the Tropical Forest Trust to verify legality of supplies.
World	**UPM-Kymmene**	UPM reports that it implements a GIS tracking system to trace the origin of imported wood from Russia. It ensures that all of its European operations have certified COC systems. To address the differences in certified COC schemes, globally UPM plans to implement a generic COC system covering all forest certification schemes. The aim is to show the real share of certified fibre in its products.
	Stora Enso	Stora Enso use traceability systems as the means to ensuring all wood and fibre originate from legal sources and strive for third party verification systems through ISO or Chain of Custody.

Social conflict creates an unstable operating environment

Throughout Asia, there is significant dependence on forest resources by local communities. This dependence creates an extremely sensitive environment within which pulp, paper and timber companies operate. Without sufficient due care, diligence, a strong legal framework and enforcement, unsustainable logging activities and pulp mill operations can further impoverish rural communities and can lead to social conflict. Such conflict is complex and highly variable depending on demographics, the value of wood resources, the occurrence of illegal logging and local governance.

Where land is appropriated for plantations or logging purposes, the issue of ownership and tenure of forestry assets in Asia is typically the root cause of social conflict associated with the sector. In addition, conflict occurs between communities and pulp/paper companies as a result of environmental pollution from pulp and paper mills affecting community land, property and livelihoods. Such social conflict has gained prominence in Asia due to a range of factors including:

- level of dependence of local communities on forest resources throughout Asia. As an example, the International Institute for Environment and Development (IIED) estimates that in India 15% of the population derives some subsistence from forest land
- loss of livelihood through land-take and inequable distribution of the benefits of logging
- concessions implemented without engagement of the affected communities and consideration of landuse rights
- adverse environmental impacts from plantations and the operation of pulp mills affecting local livelihoods
- loss of access to resources and loss of property rights
- land tenure issues such as the marginalization of forest dwelling communities that have no formal property rights, or rights of access
- poor working conditions for locals employed in the industry

The investment community may not be aware that there have been violent demonstrations and even occurrences of death associated with the activities of pulp, paper and timber companies. The extent of such conflict is rarely widely reported in the general media. Several listed companies have been involved in instances of social conflict as a result of their operations and in some instances have lost legal judgments. Examples of Asian companies which have faced community problems include:

- **Barito Pacific** has been forced to cease operations at its forestry management units in Moluccas as a result of local riots

- **Indah Kiat (APP subsidiary)** Indigenous people's land rights have created social conflict with the Sakai people over claims of clear-cutting forest lands in Riau province, Indonesia. Conflict involved blockading the road between the pulp mill and the plantation supplying wood

- **Advance Agro** Local villagers from Laemkowchan village, situated close to one of Advance Agro's mills in Thailand, have reportedly encountered problems including lack of water affecting their rice paddies as a result of nearby eucalyptus plantations, soil degradation and the ingress of polluting water

- **APRIL** As detailed in its 2004 Sustainability Report, APRIL faces ongoing land disputes with the Gunung Sahilan community in Sumatra, Indonesia. The conflict started in 1993 when APRIL was granted land which was disputed to belong to Gunung Sahilan. There followed disruptive action including road blockades. Although some settlements have been reached, claims against the company are still being made. Nearly one quarter of APRIL's total concession area of 330,000 hectares has been subject to various land claims

- **Rimbunan Hijau** Part owner of a the listed company Jaya Tiasa, the Malaysian logging firm Rimbunan Hijau and one of its financiers Citigroup have been the subject of intense public criticism over allegations concerning the company's behaviour in Papua New Guinea, including human rights abuses as well as illegal harvesting and trafficking of timber. Citigroup has subsequently announced that Rimbunan Hijau will need to comply with Cititgroup's Environmental and Social Policy to qualify for financing

Although social conflict is a significant challenge to the sector, some companies endeavour to reduce the associated risks through improving community relations at the grassroots level. This may involve engaging local communities, purchasing fibre from community land and implementing land dispute resolution procedures. Dealing with local communities, however, requires understanding of often complex situations, communication and mediation skills. Without these competencies, successfully addressing social conflict and negating the associated risks is unlikely to be successful.

Figure 10 The Case Of Asia Pulp & Paper (APP)

Headquartered in Singapore and one of the largest paper companies in the world, APP is the holding company for Sinar Mas subsidiaries in the pulp and paper sector. Listed on the New York Stock Exchange in 1995 and delisted six years later, APP announced in 2001 that it could no longer repay its debts estimated to be between US$11 and 13 billion, the world's largest debt default in the emerging markets. The company had previously raised US$311 million, US$228 million and US$400 million in three offerings in 1995,1997 and 1999 respectively, in addition to significant funding though bank loans and bond issues. Two of its subsidiaries Indah Kiat and Tjiwi Kimia are still listed on the Jakarta and Surabaya stock exchanges. Indah Kiat accounts for approximating 70% of APP's pulp output.

Closer examination of APP's actions indicate that many of the sustainability risks highlighted in this paper are applicable to the company and, in conjunction with the Asian Crisis and low global pulp and paper prices, may have contributed to the difficulties now facing the company.

Heralded as a low cost producer in the 1990s, APP had a competitive advantage as the holder of concession rights to over 500,000 hectares of tropical hardwood forests in the region. Throughout the 1990s, APP embarked on an ambitious expansion strategy, investing heavily and increasing its production capacity, notably with an eye on the expanding China market. This strategy however did not appear to address several sustainability risks, perhaps the most significant being the sustainable supply of raw materials to fuel new production capacity, such that:

- A significant proportion of production capacity was met by clear cutting natural tropical forests both legally and illegally. Clear cutting natural forests even legally is a strategy which not only gives rise to significant social and environmental impacts, but which also result in serious damage to the company's reputation
- Even with significant investment in plantations, it would be several years before the new capacity could be supplied by sustainable plantations. In the meantime, APP likely incurred further costs by buying in raw materials or sourcing materials from natural forests. It is unclear how much the shortfall in meeting capacity contributed to APP's financial problems; however, it is worth bearing in mind that wood fibre reportedly accounts for about 60 percent of Indah Kiat's costs
- The legality of some of APP's wood supply was questionable. Indah Kiat was prosecuted for utilizing illegal timber
- Land-take for APP plantations, suppliers logging practices and the impacts of APP's pulp paper mills affected local communities causing community unrest and social conflict and, in some instances, successful legal action against the company

Although APP now has a sustainability action plan, the company continues to be embroiled in controversy regarding these very same issues. Notably, the feasibility of the plan has been subject to criticism by industry experts. In April 2005, a subsidiary of APP commenced operations of its new pulp mill in Hainan, China, constructed with investment of 9.5 billion yuan (US$1.15 billion). The mill, with an annual capacity of 1 million tons of pulp, is reportedly the largest of its kind in China. Concerns are being raised over the sourcing of the requisite raw materials to feed such large capacity. In parallel, APP's logging activities in Yunnan Province, China, have been the subject of legal action with the State Forestry Administration taking official action. In addition, there have been protests boycotting APP's products.

In 2004, research by WWF Indonesia[9] indicated that in 2003, APP's Indonesian pulp mill consumed in excess of 4,000,000m^3 of illegal timber authorized from land clearing permits licensed by district governments without the appropriate provincial authorization. This amounted to 47% of Indah Kiat's timber consumption.

CHINA IS RESHAPING ASIAN AND GLOBAL DEMAND

Companies face potential raw material deficits

The question of both global and regional raw materials supply is crucial and companies may face potential raw material deficits as production capacities rise across the region. Between 1996 and 2003, growth in pulp production capacity in Asia represented over 65% of global growth with Indonesia and China responsible for much of this. Indeed, one of the most striking factors is shaping the outlook for the pulp, paper and timber sector in Asia is China's increasing demand for wood products and its importance as a producer, consumer and trading partner.

Recent research on China's pulp and paper sector by He and Barr[10] provides medium-term forecasts covering the period 2003-2010 indicating that, for paper and paperboard, aggregate demand is predicted to increase by as much as 42%, with a commensurate increase in domestic production. Demand is expected to increase most significantly for printing and writing paper, as well as containerboard, which rely on virgin wood fibre more than the other grades. China alone is expected to account for over 30% of growth in global paper and paperboard consumption.

He and Barr also predict rising demand for fibre furnish, with aggregate demand estimated to increase by as much as 48% with an upper estimate of 62%. In terms of individual contributors, wood pulp demand is estimated to increase by as much as 65%, with domestic production expected to account for 50% of the growth, the remainder coming from imports. Recovered paper demand is predicted to increase by 80%, with domestic collection of recycled paper expected to account for 50% of this demand growth.

Against this background of increasing demand for paper, paperboard and fibre furnish, non-wood pulp is expected to decrease by 15%. Notably, in recent years the PRC Government has closed down many highly polluting non-wood pulp mills. However, indications are that technological developments in chemical recovery may be able to address some of the pollution problems associated with non-wood pulp production.

Figure 11 Definition of Raw Materials

Paper and paperboard includes newsprint, printing and writing paper, tissue, containerboard, boxboard

Fibre furnish includes wood pulp, non-wood pulp, recovered paper

Non-wood pulp includes bamboo, bagasse, reeds, wheatstraw

Note: Timberwood vs pulpwood production — timber production relies on felling of old growth forests for the most prized logs. Pulpwood production relies on harvesting large monoculture farms of fast-growing species. Market pulp — pulp produced for sale on the market as opposed to pulp produced to supply an integrated paper mill.

As He and Barr point out, these estimates imply increasing pressure on domestic wood supplies and the need for increased imports as well as significant new domestic capacity. Due to the requisite land and infrastructure requirements, the latter is expected to result in the establishment of green field mills in addition to capacity expansion. Due diligence by the financial community on a range of issues such as water availability, land tenure, supporting infrastructure and labour supply, will therefore be essential in assessing whether companies can meet growth forecasts at acceptable costs.

China is in the midst of an aggressive programme to develop the pulp, paper and timber sector

To meet its growing demand, China is in the midst of an aggressive programme to develop the pulp, paper and timber sector. In its tenth 5 year plan covering the period 2001-2005, the Chinese government stated its intention to prioritise pulp and paper capacity expansion with a focus on the south eastern provinces. In 2001, the State Development and Planning Commission issued a list of 42 priority pulp-paper projects for the integration of fibre supply, wood pulp production and high-grade paper production[11].

In an attempt to fuel the requisite investment and fund the new and expanding capacity, the Central Government's intention, as with other sectors, is to invite foreign investment. Such investment is being invited to fund a forestation and paper making program that is expected to involve Yuan 200 billion (US$ 24 billion). The authorities will reportedly allow qualified paper making companies to float shares on the stock market and will encourage the merger, joint ventures and regrouping of state-owned enterprises with private and foreign investors. Capital to fuel this development is proving to be relatively low cost, with the Government providing a range of financial subsidies and tax incentives to potential financiers and investors.

Asian companies, both listed and non-listed, that are known to be investing in China are provided in figure 12. These companies are inevitably susceptible to the risk of raw material deficits and the associated sustainability issues.

The increasing demand for recovered paper may provide some short term opportunities for venture capital investors, particularly in relation to China where such recycled fibre is already in high demand and expected to rise, and where collection systems are currently insufficient to maximise paper recovery. However, it is worth bearing in mind that as estimated by He and Barr, recovered paper is likely to account for as much as three quarters of the new growth in China's overall fibre demand from 2003 to 2010 and this is likely to have "a profound effect" on the global market. Industry experts in this area reportedly believe that ultimately China will be unable to satisfy its demand for recovered paper from imports as well as its domestic market. The end result being to potentially drive up world prices of recovered paper, possibly pushing the balance back in favour of wood pulp. The opportunities to be gained from use of recovered paper therefore remains an area for further research.

Figure 12 Examples of Pulp/Paper Capacity Expansion Projects in China (US$ millions)

Company	Capacity 1000 t/a	Pulp/paper Grade	Location	Timing
Asian Listed Companies				
Lee & Man Paper Manufacturing	250 350 400	Unbleached testliner Recycled Testliner	Jiangsu Jiangsu Guangdong	2004 2004 2005
Shandong Chenming	400	Folding boxboard	Shandong	2005
Shandong Huatai	450	Newsprint	Shandong	2005
Yuen Foong Yu Paper	500 500	Testliner Testliner	Jiangsu na	na na
Yueyang Paper	300	Folding boxboard	Hunan	na
Total	**3,150**			
APP and APRIL				
APP Hainan Jinhai pulp	1000	Bleached hardwood	Hainan	2005
APP Ningxing Zhonghua	700	Pulp duplex board	Zheijiang	2004
APP Gold East paper	700	Coated wood free	Jiangsu	2005/200
APRIL	400	Uncoated wood free	Guangdong	2006/200
APRIL	1000	Hardwood	Shandong	na
Total	**3,800**			
Other: non listed companies and/or international companies	**6,780**			
Total	**13,730**			

Note: In addition, Chung Wha Pulp & Paper and Shinmoorim Paper are also reported to be involved in expansion projects in China.

na - not available

Source of data: Jaako Poyry Consulting, Presentation in Beijing, September 2004

Shandong Chenming in its Annual Report 2004 indicates that its work for 2005 will include:

"Building a network of production bases and purchasing process. Establish wood supplying base by means of joint venture, to establish an integrated wood, pulp, paper production chain"

On the international front, examples of key industry players which have recently invested in, or are assessing the feasibility of Chinese ventures include some of the biggest names in the sector such as Stora Enso, International Paper, Oji Paper, UPM Kymmene Corp. Notably, at the end of 2004, UPM withdrew from a proposed plantation joint venture in China reportedly because of local conditions including the overall availability of wood in the region and the cost of wood[12].

As a result, China's pulp, paper and timber sector is in transition from an industry characterized by a large number of small polluting non-wood pulp mills to one depending on large capacity and capital intensive wood pulp mills built

to international standards. The development of Bleached Kraft Pulp (BKP) capacity, however, is constrained by limited supply of local raw materials since it requires high quality raw materials from plantations. There is also likely to be an increase in mechanical pulp mills which use smaller diameter lower quality wood, have a higher fibre yield, use less wood, and are smaller in scale than chemical pulp mills.

China's pulp, paper and timber sector is in transition from a large number of small polluting non-wood pulp mills to large capacity and capital intensive wood pulp mills

The nature as well as the extent of pulp and paper capacity expansion projects taking place, particularly in Southern China, is a cause for concern. Projects are being planned and executed on what would appear to be a fast track basis, often within the same locality and without sufficient feasibility studies. There is a very real risk that China's forest resources will be insufficient to meet forecast demands in the region. Industry estimates indicate this situation could persist for the next 20 years, despite the central Government's ambitious plans on plantation development.

Without a sustainable supply of raw materials to fuel China's expanding pulp, paper and timber sector, operations will likely be increasingly dependant on relatively higher cost imports from countries such as Russia, Indonesia, Thailand and Myanmar, where illegal logging is also pervasive and sustainable forestry management is not widely practiced. The question of wood shortages in China remains a subject of much debate within the industry and a fibre shortage seems likely.

The question of wood shortages in China remains a subject of much debate within the industry and a fibre shortage seems likely

This situation has significant implications concerning the associated sustainability risks. For Asian investors, this scenario inevitably places a higher priority on raw materials supply and the development of sustainable fibre strategies. In terms of attracting finance, an integrated mill is more likely to attract investment than a non integrated mill, which may have difficulty in securing raw material supplies.

Suitable plantation land is a scarce resource

It is expected that wood fibre to meet forecast pulp capacity in China will be sourced almost exclusively from plantations. Indeed, one of six main programmes for the State Forest Administration in China is guiding extensive plantation development, which includes significant plans for the south eastern provinces.

As an alternative to clear felling natural forests, the expansion of sustainably managed fast growth high yield plantations (FGHY) plantations can be beneficial. Advocates maintain that such plantations reduce pressure on existing natural forest resources and assist in meeting capacity requirements as a result of high yield short rotations, thus placing less reliance on buying in raw materials in a costly market.

When planned and managed properly, such plantations can arguably prevent soil erosion and flooding and offset CO_2 emissions. On the other hand, it is argued that fast growing species such as Acacia and Eucalyptus can significantly lower the water table and deplete the soil of nutrients. There is also a risk in

countries, where legal enforcement and political institutions are weak that natural forest is purposely cleared for plantations and or illegitimately claimed as being degraded and therefore open to clearance for plantation establishment.

Based on estimates of known current projects/plans in South China as at the end of 2004, as presented by Barr and Cossalter, projected pulp capacity could, if all plans go ahead, be in the region of 5,500,000 tonnes per annum for the medium to long term. Based on a scenario of a relatively low Mean Annual Increment (MAI) figure of 12-18 m^3/ha/yr, reflecting the generally poor soil conditions of eucalyptus plantations in most parts of coastal Guangxi and Hainan, the net plantation area requires ranges between 2.3 to 1.5 million hectares.

Recognising that yields are highly variable, such that higher quality plantations can achieve yields more in the region of MAIs 25-30 m^3/ha/yr and assuming a higher percentage of the cut i.e. 95% available for commercial use, an alternative scenario developed for this paper estimates a net plantation area of between 800,000 and 960,000 hectares. However, it should be borne in mind that such yields reportedly represent less than 20% of the total area planted in Guangdong[13].

The land required for plantations to accommodate these scenarios, regardless, is substantial. The two scenarios also highlight the challenge to investors in ascertaining data where there is a high degree of variability such as site specificity and where there are few reliable benchmarks.

Figure 13a Projection of Plantation Area Required to Meet Increased Pulp Capacity —Scenario 1: lower MAI, lower commercial volume

Capacity Pulp	Required Wood	Net Plantation Area Required		
adt/yr	M^3	MAI – 12 m^3/ha/yr	MAI - 15 m^3/ha/yr	MAI - 18 m^3/ha/yr
5,500,000	**22,825,000**	2,376,000	1,902,000	1,584,000

Assumptions: wood required is based on the assumption that 4.15m^3 of roundwood is needed to produce 1.0 Adt of Bleached Hardwood Kraft Pulp (BHKP). Net plantation area is based on the assumption that plantations are managed on a 5 year rotation and 20% of harvested volume is not commercial.

Adt - air dried tonnes , MAI – Mean Annual Increment

Source: Data reproduced from Barr and Cossalter, 2004

Figure 13b Projection of Plantation Area Required to Meet Increased Pulp Capacity —Scenario 2: increased MAI, increased commercial volume

Capacity Pulp	Required Wood	Net Plantation Area Required	
adt/yr	M^3	MAI – 25 m^3/ha/yr	MAI - 30 m^3/ha/yr
5,500,000	**22,825,000**	961,202	800,931

Assumptions: wood required is based on the assumption that 4.15m^3 of roundwood is needed to produce 1.0 Adt of Bleached Hardwood Kraft Pulp (BHKP) (base on Barr and Cossalter, 2004). Net Plantation area is based on the assumption that plantations are managed on a 5 year rotation and 5% of harvested volume is not commercial.

Adt - air dried tonnes , MAI – Mean Annual Increment

Source: ASrIA, 2005

Despite the Government's plans for plantation development, there are currently no widely accepted and accurate estimates of land availability. Indeed, recent research by Bull and Nilsson[14] indicate discrepancies between Government and independent research statistics on resource availability. There are also conflicting reports as to the ability of China's forest resources to meet competing demands for wood, including wood for fuel, protection of biodiversity and for water catchment purposes. Waste land, community and farm land is expected to be the main resource for the wood products industry, which in itself raises a number of risk factors concerning the cost effectiveness of securing the requisite resource base and potential social conflict. Furthermore, the piecemeal and fragmented nature of China's plantation base, as well as hilly topography and inadequate supporting infrastructure, raise further questions over the establishment of cost-effective commercial plantations of the kind required by the pulp, paper and timber industry.

Detailed research by Barr and Cossalter[15] into the plantation base for two significant integrated pulp/paper projects in China (APP Hainan and the UPM Fuxing Mill[16] in Zhanjiang) indicate that pulpwood deficits are a real issue for companies seeking to develop capacity in China's south eastern provinces.

Major producers elsewhere in the region have also failed to achieve their targeted fibre yields from plantations, with the result of having by necessity to source wood elsewhere and extend the planned time period to meet the requisite yields. This has reportedly been a problem for Indonesian producers such as Indah Kiat, Wira Katva Sakti and APRIL.

On reviewing recent research into the development of plantations in China, we see a number of material risks associated with large scale plantations, including[17]:

- low soil fertility
- excessive use of high performing clones giving rise to lack of diversity and increased susceptibility to pests and disease

- loss of production through typhoon damage. The effects of typhoons is considered by some industry experts to be potentially significant and under evaluated

- potential over-harvesting and illegal logging as indicated by discrepancies in removal statistics

- lack of sufficiently robust data on forest growth and resources

The issues related to raw material supplies are significant for all companies operating in the region. However, those companies which are expanding capacity rapidly in China, particularly the south eastern provinces, are at most risk of raw material deficits and legal wood issues, given the uncertainty over forest resources and the constraints to establishing commercial plantations.

Pulpwood deficits are a real issue for companies in China's south eastern provinces

We see fibre supply developing as a crucial issue for investors and funders. While in the past, investors were encouraged to look only at high growth demand drivers, fibre supply constraints have the potential to undermine margins for less capable operators. As correct assessment of raw material supplies is a key determinant of earnings growth, failure to obtain sufficient and consistent supplies is therefore likely to lead to share price correction. Companies with their own plantations will arguably be in a stronger position than those who buy in pulp should the shortage in raw material supply be realized. An important issue from an investors' perspective is, therefore, a company's decision as to whether it leases timberland for the longer term or buys from private suppliers. The ability of plantation yields to meet mill production capacities in this context requires careful examination.

If projects being executed and planned over the period 2004-2008 are completed, projections of increasing market pulp capacity alone suggest a possible 20-25% rise in global capacity. A significant portion of this production capacity is coming on line and being planned in Asia, most notably in China. However, there is increasing pressure on forests resources in the region to meet competing demands, due to a combination of log bans such as those in China, reduced concessions and reduced harvesting, particularly in Malaysia and Indonesia.

GOOD PRACTICE STANDARDS ARE SHAPING THE COMPETITVE ENVIRONMENT

Sustainable forest management standards are becoming the sector's de facto enforcement tool

The industry's customer base is demanding timber and wood products from legal and sustainably managed sources

Given the complex regulatory environment and operating risks facing the sector, sustainable forest management (SFM) standards and certification schemes are emerging as the primary mechanisms whereby pulp, paper and timber companies can demonstrate effective management of sustainability risks. The industry's customer base is slowly but surely demanding that wood products are from legal and sustainably managed sources. In addition, the requirements of finance institutions and prominent buyers, including both the public and private sectors, is driving the demand for SFM schemes. Whilst this development is clearly beneficial in terms of reducing sustainability risks, it can be confusing to investors since numerous standards now exist. Such standards include:

- global schemes such as the Forest Stewardship Council (FSC) Certification Scheme
- national schemes such as Indonesia's standard developed by Lembaga Ekolabel Indonesia (LEI) and the Malaysian Timber Council's Timber Certification Scheme
- regional schemes such as the Sustainable Forestry Initiative (SFI)
- individual company schemes often developed with reference to the elements of other schemes such as FSC

"The multiplicity of forest certification systems is impractical for us, and confusing to our customers. We are therefore working to encourage the mutual recognition of different forest certification schemes"

Stora Enso Annual Report, 2004

Although currently no one scheme is being universally adopted by companies in Asia, the FSC scheme is growing in recognition internationally. In response to the proliferation of schemes, WWF and the World Bank have formed an alliance which recognizes 11 essential criteria for certification schemes[18]. The Alliance further aims to have 200 million hectares of the world's production forests independently certified by the end of 2005, however, it would appear that only 10% of this original target will be reached within this timeframe.

The United Nations Economic Commission for Europe (UNECE)[19] estimates that certified forests, largely plantations, represent less than 6.5% of the total extent of forests globally, with the majority being in Europe and North America.

Figure 14 Sustainable Forest Management Certification Schemes —FSC Certification

The most recognized of the various schemes is the Forest Stewardship Council's (FSC) Forest Management (FM) and Chain of Custody (COC) Schemes which are generally considered to contain all necessary elements for ensuring responsible forest management. FSC certification provides third party verification by an accredited certification body that a company is managing its forestry operations in line with FSC's internationally recognised standards. The COC certification provides a further guarantee, in relation to the production of FSC-certified products, that the integrity of the wood from certified forests is maintained throughout the processing chain.

Ten principles are the basis of FSC forest management standards:-

Compliance with Laws and FSC Principles	Environmental Impact
Tenure and Use Rights and Responsibilities	Management Plan
Indigenous People's Rights	Monitoring and Assessment
Community Relations and Workers' Rights	Maintenance of High Value Forests
Benefits from the Forest	Plantations

The majority of wood entering pulp/ paper mills in the Asia Pacific region is not certified

Not surprisingly, the majority of wood entering pulp and paper mills in the Asia Pacific region is not certified, and Asia's contribution to FSC certification globally is just 1% of the 53 million hectares certified globally. However, some companies in the region are aligning themselves with the requirements of schemes such as FSC and LEI. To date, none of the larger listed Asian companies had FSC or LEI certification for their operations, although some are reportedly working towards it.

Another important trend in the sector is the increasing use of COC to provide verification of the legality of wood. UNECE estimate in their 2004-2005 Forest Product Annual Market Review that COC certificates increased by 30% from the previous year, reaching a total of 6000 certificates issued by FSC and PEFC. China is reported to have the highest volume of COCs outside UNECE and is now producing certified products for export , mainly to North America and Europe.

As well as certification schemes which are beginning to influence the sector, there are also other initiatives designed to address the issue of sustainable forest management e.g. the Forests Dialogue (TFD) and those involving forest trade networks, such as the Global Forest Trade Network (GFTN). GFTN is a WWF initiative which is focused on "eliminating illegal logging and improving the management of valuable and threatened forests", through the development of trade links between companies concerned about sustainable forestry. Supporters currently include the Tropical Forest Trust (TFT), Lembaga Tropika Indonesia (LATIN), Smartwood, SGS Qualifor, The Nature Conservancy (TNC), GTZ Sustainable Forest Management Project, the European Union Forest Liaison Bureau, Tropical Forest Foundation (TFF), and Center for International Forestry Research (CIFOR), Lembaga Ekolabel Indonesia (LEI), Forest Stewardship Council (FSC) and ProForestIn the Asia Pacific region.

For producers, certification is increasingly about market access

Some of the world's largest paper companies, as well as retailers of wood products, support certification schemes. International Paper, Georgia-Pacific and Weyerhaeuser all state a commitment to sustainable forestry by supporting the Sustainable Forestry Initiative (SFI), and Stora Enso is committed to maximising wood sourced from certified forests. For producers, certification is increasingly about market access. Moreover, access to capital is increasingly influenced by forest certification. Finance institutions which either consider or require FSC or similar certification schemes and management initiatives as part of forest sector investment policies include IFC, HSBC, ABN Amro, JP Morgan Chase and Rabobank.

For customers, there is increasing interest in sustainable wood as a result of consumer demand in both private and public sectors. The Swedish retailer IKEA supports FSC certification and through its Staircase Model requires suppliers to progressively achieve certification. Home Depot gives preference to the purchase of wood and wood products originating from certified forests wherever feasible, and B&Q has recently committed its key stores to COC certification. Purchasing certified products is increasingly being seen as an effective risk management tool.

In Asia, the market place is not driven by certified products as it is in developed countries. However, international consumer demand is a potential driver. The fact that prominent international buyers sourcing wood from Asia are requiring sustainable forest management provides an indication that certification is likely to increase in importance in Asian markets.

Figure 15 Example of Asian Companies

APRIL	Planning for LEI certification for 159,000 hectares of its fibre plantations in Indonesia, with final certification in the first half of 2005.
Barito Pacific	Certifying its forestry operations through audits undertaken by Independent Assessment Institutions (IAI) which meet FSC and LEI requirements. Anticipates increasing demand from international markets for labelled products.

In addition to these industry focused schemes, there are also the more process-related standards ISO 14001:2004 Environmental management standard[20], OHSAS 18001 Occupational Health and Safety[21] and the Social Accountability Standard SA 8000. It is extremely common place for companies in the sector, including Asian listed companies, to be ISO 14001 certified. However, investors should bear in mind that certification does not guarantee an absolute level of environmental performance, nor that material sustainability risks are being managed.

From an investor's perspective, on a medium-term view the emergence of market driven standards and certification schemes have the potential to become a key strategic tool. As global customers become more focused on sustainable supply, there will be a meaningful opportunity for those suppliers who can deliver certified pulp and timber. Investors should view certification to ISO 14001, OHSAS 18000 and SA 8000 as a starting point for further analysis and not the end point[22].

THE LONGER TERM : EMERGING RISKS AND OPPORTUNITIES

Two crucial investment drivers

Two emerging investment issues with positive and negative implications over the longer term are new technology and carbon management and sequestration.

Research and development of new technology As pressures on raw materials supply in the region are expected at least for the medium term, companies are, as a matter of strategic development, responding by implementing research programmes to increase plantation yields. In particular, many companies are undertaking R&D into the use of clones. Whilst this has obvious benefits from a business perspective, there are also significant risks. In China for example, recent research by Barr and Cossalter has raised concerns over the lack of genetic diversity in large scale plantations in Western Guangdong, as the expansion of eucalyptus plantations has not been supported by the ongoing selection of new and superior clones such that "The new clonal eucalyptus plantations of western Guangdong lack the minimum threshold of diversity that would place the risks of pest disease at a reasonable or acceptable level."

The literature points to the fact that despite extensive research, 90% of plantations in the province consist of only three clones. More worryingly, it further highlights a new disease in the region which has recently caused concern amongst plantation managers.

The risk to companies involved in plantation establishment is further heightened by the interest of NGO activist groups regarding the use of genetically modified organisms. This is a highly emotive subject and raises ethical issues which are highlighted by the role forests play in ecosystems and their importance to local livelihoods. The lack of reliable baseline data on forest resources and COC issues further heighten the potential risk to such companies should problems related to genetic diversity in Chinese plantations occur.

Figure 16 Examples of R&D

Advance Agro	A genetic engineering research programme in the development of fast growth trees
APP	Targeting to reach a Mean Annual Increment (MAI) of 70m^3/ha/year for its industrial plantations. Although such a figure is regarded by some industry experts as being extremely optimistic
APRIL	Genetic deployment department established to manage the deployment of genetic materials in plantations
Ballarpur	Identification and production of high yielding clones
Jaya Tiasa	Developing new hybrids for site adaptability

In addition to this research, there are increasing opportunities for new technologies that are less reliant on wood fibre, particularly tropical hardwood such as:

- rubberwood to be used as an alternative for valuable tropical hardwoods such as ramin, meranti and teak amongst others. Malaysia is, however, currently considering restricting exports to secure supplies for the local market
- the processing of coconut oil into some furniture and household products
- use of bamboo in reconstituted panels and board product as a result of new technologies
- the use of smaller diameter plantation logs for certain products as opposed to larger logs from natural forests
- the use of palm oil and palm oil fibre in mechanical and chemical pulping processes
- substitution between hardwoods and soft woods is also being researched, as a possibility, as technology improves
- new substitutes for finished wood products such as medium density fibreboard, (MDF), oriented strand board (OSB) and particle board are increasingly being used as a more resource effective substitute for plywood, requiring fewer logs per unit volume of product
- Use of straw pulp — work is progressing in advancing technology to address chemical recovery issues which have led to some of the pollution problems associated with the production of straw pulp

As carbon markets develop, there are emerging opportunities for companies to engage in carbon sequestration activities

Carbon management and sequestration — a risk and opportunity As carbon markets develop, there may be emerging opportunities for pulp, paper and timber companies to engage in carbon sequestration projects. These opportunities may present themselves in the form of Clean Development Mechanism (CDM) projects under the Kyoto Protocol, or as independent initiatives by organizations to establish carbon management strategies (this last is most likely in developed countries). Such projects have the potential to provide an additional revenue stream for Asian companies in the sector through payment for sequestered carbon. Given the increasing market demand for sustainable forest management, there is also the opportunity to gain a competitive edge. However it should be recognized that currently there appears to be no universal consensus concerning the management and monitoring of such projects.

Carbon sequestration describes the capture and storage of carbon by soils, forests and the ocean. The term 'carbon sink' refers to the location /reservoir of storage such as forests. Carbon can be sequestered both by planting forests or protecting them. As an example, a strategy for offsetting carbon emissions could be the use of reduced impact logging (RIL) as demonstrated by the Malaysian company Rakyat Berjaya Sdn. Bhd and the New England Power Company of Massachusetts, USA[23]. RIL is already encouraged on traditional environmental grounds since its aim is to substantially reduce the damage to the forest incurred in the logging process. However, it is also now recognized as a means of sequestering carbon since it reduces carbon released as a result of damaged/dead biomass. Although RIL is more expensive than conventional logging, the payment for the sequestered carbon is intended to cover these additional costs. Such an initiative thus provides the opportunity to improve sustainable forest management at no extra cost and potentially gain a competitive edge by responding to market demands for such management.

Currently, the extent of potential forestry sequestration projects is unclear and the carbon sequestration market is complex, with many imponderables such as accepted verification methods. Australia has, however, made some progress in this area[24]. Not surprisingly there is also extremely limited disclosure on carbon related risks and opportunities by the listed companies reviewed. For countries where deforestation is significant such as Indonesia, Thailand and Vietnam, there may also be the potential for increased incremental costs associated with the progressive loss of carbon sinks.

Figure 17 Energy Use, Carbon, and Climate Change is Important to the Pulp, Paper and Timber Sector

- After the burning of fossil fuels, land use change (due largely to deforestation) is a significant cause of increasing carbon in the atmosphere. As carbon sinks, forests have the potential to absorb one tenth of global carbon emissions. Deforestation is estimated to be responsible for the build-up of up 30% of atmospheric carbon globally over the past 150 years and, therefore, conserving forests as well as sequestering carbon through forest projects are important variables in the carbon economy
- Pulp and paper production is energy-intensive; however mills can generate substantial quantities of energy for their own needs through the use of black liquor from kraft pulping and other residues, such as bark as a fuel for cogeneration, providing stream and electricity. Chemical pulp mills can export energy and integrated pulp/paper mills are likely to be substantially self sufficient in heat and power. Paper mills and mechanical and recovered paper processes are net energy users. Notably, energy consumption can vary significantly from company to company
- Forests, and therefore the raw materials of the industry, are themselves vulnerable to the effects of climate change. Impacts of climate change are thought to affect 1,600 million hectares of existing tropical forests

As demands for renewable energy increase, wood fuel is potentially an important source of energy as an alternative to fossil fuel. However, the increase in wood fuel inevitably means the loss of forest land, assuming it is not plantation supplied. Wood fuel currently amounts to 40% of forestry products world wide (including industrial roundwood, sawnwood, wood-based panels, pulp, paper) and 62% in Asia.

Figure 18 The Kyoto Protocol — The Basics

The Kyoto Protocol and the Pulp, Paper and Timber Sector: UNFCCC and the Kyoto protocol have significant implications for the pulp, paper and timber sector. Following its entry into force, developed nations (Annex 1 countries) that have ratified the protocol must adhere to carbon emission reduction targets based on 1990 levels as a baseline. Specifically, changes in carbon stocks through afforestation, deforestation and reforestation are to contribute to meeting commitments. An instrument of Kyoto, the Clean Development Mechanism (CDM), allows such countries to achieve reductions in national emissions through investing in carbon reduction initiatives in developing countries and thereby obtaining credits.

Based on the European Union Directive 2003/87/EC, pulp/paper companies in Europe are covered by the European Union Greenhouse Gas Emission Trading Scheme (EU ETS)

The adoption of new technology, which places less dependency on wood resources and which possibly facilitates additional revenue streams from sequestered carbon, will in the medium to long term potentially provide opportunities for mainstream investors. For integrated pulp and paper companies, investors need to carefully examine the ability of companies to develop cost effective commercial plantations that can yield a sustainable supply of wood. This is crucial to the successful operation of such companies in the sector. In the longer term investors should also be seeking to identify and encourage forward thinking companies which have at least started to strategically address the issue of carbon management.

INVESTOR QUESTIONS FOR COMPANIES

Corporate policy

- What is the source of your raw materials, plantations and/or clear felling for natural forests and / or recovered fibre?
- What strategy is employed to ensure a sustainable supply of raw materials?
- Does your company have a carbon management strategy? How does your company view carbon sequestration?

Regulatory issues

- How does your company keep abreast of the changing regulatory environment and assess regulatory risk?
- How much, if any, timber required for your operations is sourced from certified forests?
- How does your company ensure that timber supplied is from legal sources?
- What are your companies practices and/or intentions regarding Forest Products Certification?
- How does your company address the issue of land tenure?
- How does your company deal with conflicts which may arise as a result of the company's activities?

Operating issues

- What types of research and development does your company engage in?
- How does your company keep track of developments in consumer markets and how does your company respond to ESG consumer trends?

RESOURCES

Company websites

• Advance Agro	www.advanceagro.com
• Asia Pacific International Resources Holdings Ltd.	www.aprilasia.com/ process_products.html
• Asia Pulp and Paper	www.asiapulppaper.com
• Ballarpur Industries —Annual Report 2003-2004	www.bilt.com
• Barito Pacific	www.ebarito.com
• Hansol Paper	www.hansol--paper.com/main.htm
• International Paper	www.internationalpaper.com
• Jaya Tiasa	www.jayatiasa.net
• Stora Enso	www.storaenso.com
• UPM Kymmene Corp.	w3.upm-kymmene.com
• Weyerhauser	www.weyerhaeuser.com

Examples of Sustainability Reporting

• APRIL 2004 Sustainability Report —Moving Forward	www.aprilasia.com/news/ SR2004_final.pdf
• Ballarpur Industries —Annual Report 2003-2004	www.bilt.com
• Barito Pacific	www.ebarito.com
• Hansol Paper Environmental Report 2000	www.hansol--paper.com/ 2_investment/3_annual_report.htm
• International Paper	www.internationalpaper.com/PDF/ PDFs%20for%20Papers/ sustainability_repor1.pdf
• Shandong Shenming —Annual Report 2004	www.cninfo.com.cn/finalpage/2005-03-29/15151595.PDF
• Stora Enso Sustainability Report 2004	search.storaenso.com/mini/2004/files/ pdf/big/SE_SR_GB.pdf
• Siam Kraft —Sustainability Report 2002	www.siamkraft.com/GRI% 20Report%202001.pdf
• UPM Kymmene Corp.	w3.upm-kymmene.com/upm/internet/ cms/upmcms.nsf/$all/68EF26ED0B00CA 32C2256F7E0049B07E?OpenDocument &qm=menu,8,0,0
• Weyerhauser	www.weyerhaeuser.com/environment/ sustainability/default.asp

Useful web-based resources

• Centre for International Forestry Research (CIFOR)	www.cifor.cgiar.org
• Confederation of European Paper Industries —Comparative Matrix of Certification Schemes	forestandtradeasia.org/files/CEPI_matrix.pdf
• Forest Stewardship Council	www.fsc.org/en
• International Finance Corporation	www.ifc.org/sustainability
• International Tropical Timber Organisation	www.itto.or.jp
• Programme for Endorsement of Forest Certification Scheme	www.pefc.org/internet/html

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- Pulp & Paper 2004. *"China the Final Frontier"*
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- Spek, M, 2005. *"An Appraisal of Risk Assessment and Safeguard Procedures Applicable to Pulp Mill Investments"*. CIFOR 2005

End notes

1 Food and Agricultural Organisation — Forest Plantation Thematic Papers — The Role of Plantations as Substitutes for Natural Forests in Wood Supply. Lessons from The Asian-Pacific Region

2 Spek, M, 2005. *"An Appraisal of Risk Assessment and Safeguard Procedures Applicable to Pulp Mill Investments"* CIFOR 2005

3 AF&PA, 2004. "Illegal" Logging and Global Wood Markets: the Competitive Impacts on the US Wood Products Industry

4 ibid

5 WWF Indonesia , January 2004. Legality And Cost Of Timber Consumed By APP's Mills In Indonesia

6 WWF Wahli, Jikalahari, July 2005. Logging Moratorium for Companies with Questionable Industrial Timber Plantation Licenses

7 AF&PA, 2004. "Illegal" Logging and Global Wood Markets: the Competitive Impacts on the US Wood Products Industry

8 For information on the activities of companies overseas refer to *"Increased Investment and Trade by Transnational Logging Companies in Africa, the Caribbean and the Pacific, Implications for the Sustainable Management and Conservation of Tropical Forests, Nigel Sizer, Dominic Plouvier, WWF, 2000"*

9 WWF Indonesia, January 2004. Legality And Cost Of Timber Consumed By APP'S Mills in Indonesia

10 International Forestry Review Vol.6(3-4), 2004. China's pulp and paper sector: an analysis of supply-demand and medium term projections

11 Cossalter C, Canberra, April 2004

12 ibid

13 Personnel communication Christian Cossalter, July 2005

14 International Forestry Review Vol. 6(3-4), 2004. An Assessment of China's forest resources

15 International Forestry Review Vol 6 (3-4), 2004. China's Development of Plantation-based Wood Pulp Industry: Government Policies, Financial Incentives and Invetment Trends

16 UPM has since pulled out of the venture

17 For further information refer to Barr C.and Cossalter C., 2004

18 Questionnaire for Assessing the Comprehensiveness of Certification Schemes/System (www.forest-alliance.org)

19 Forest Products Annual Market Review, Timber Bulletin Volume LVII (2004), No.3, United Nations Economic Commission for Europe

20 ISO 14001:2004 Environmental management systems —Requirements with guidance for use

21 OHSAS 18001 —Occupational Health and Safety Assessment Series Standard

22 ASrIA Briefing Note: ISO 14001: 2004 What do Investors Need to Know (www.asria.org/publications)

23 A collaborative project with CIFOR (www.cifor.cgiar.org)

24 For further information refer to www.forest.nsw.gov.au/env_services/carbon/credits/default.asp

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Sophie le Clue, Associate Director of Association for Sustainable & Responsible Investment in Asia. Sophie has a background in environmental protection. She started her career in the UK in 1989 working for an engineering consultants before moving to Hong Kong, where she has gained 13 years experience in environmental assessment and research in the Asia Pacific region. Her experience includes working on sustainability related issues for both the private sector in a consultant capacity as well as for the non profit sector. For several years she has been involved in sustainable development initiatives in Hong Kong and has been devoting time to furthering the interest and knowledge of sustainability and sustainable development locally through working with corporates, government and business associations, and including specific training to inform finance institutions about environmental and social considerations in project lending.

Taking Stock

Adding Sustainability Variables to Asian Sectoral Analysis

February 2006

Auto
Banking
Metals & Mining
Oil, Gas & Petrochemicals
Power
Pulp, Paper & Timber
Supply Chain
Technology

Supply Chain

Researcher: Sophie le Clue
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Sustainability

Sustainability is a systemic concept, relating to the continuity of economic, social, institutional and environmental aspects of development. In the terms of the 1987 Brundtland Report of the UN's World Commission on Environment and Development, sustainability is: "Meeting the needs of the present generation without compromising the ability of future generations to meet their needs." The key concept for investors is the need to address a range of environmental, social, and governance (ESG) factors which will inevitably shape long-term returns as markets respond to changing resource requirements and public priorities.

INTRODUCTION

An increasingly actively debated topic in sustainable investment today is how investors should respond to the impact of globalization on supply chains. What questions should investors ask when companies move away from long-standing manufacturing and sourcing models with relatively transparent standards to new strategies which increasingly rely on distant suppliers who may have lower labour, environmental and governance standards? As companies have expanded their footprint beyond national boundaries, they have become harder to analyze because traditional sustainability metrics, typically defined in developed markets, are often an awkward fit for developing markets with different legal and regulatory structures. This mismatch has led some investors to simply pull back from companies with large exposure to Asian supply chains. Others have responded by relying on a range of standards, codes of conduct and voluntary corporate disclosure to assess whether companies are investing in supply chains which can meet the needs of global consumers and investors. Finally, some investors look to Asian supply chains, predominantly to take advantage of lower costs, regardless of low standards.

As companies have expanded their footprint beyond national boundaries they have become harder to analyse

The analytical challenge will inevitably become even more complex as globalization of supply chains gains momentum. Most companies describe their supply chains in strategic terms, but typically the discussion highlights only first order cost savings. As competitive pressures rise, however, we are seeing both the consolidation of suppliers as retail buyers reduce the number of suppliers and a new push to define truly strategic relationships with core suppliers. Furthermore, as supply chains restructure and Original Equipment Manufacturers (OEMs) rely more heavily on suppliers for a range of services including design, engineering as well as manufacturing, the development of industry sectors is likely to hinge on supply chain performance in different localities. This re-ordering of the global supply chain means that investors must take a much closer look at how companies are managing their supply chains and how well managed these suppliers are themselves.

From an investor's perspective, key insights into global supply chains can be gained by looking at the emerging universe of listed supply chain companies in Asia. If Asia is to become the world's manufacturing hub, we need to begin addressing the question of how these companies compare to their global counterparts on sustainability variables and how they compare to each other.

The materiality of the supply chain is evident. Research indicates that companies with good supply chain performance have stronger financial performance, and importantly that companies are acknowledging supply chain management's growing potential as a 'front-office' tool[1]. A clean and transparent supply chain has the potential to become a strategic asset for top tier suppliers. Conversely, poor supply chain performance can result in investment risks and reduce shareholder value[2].

A clean, transparent supply chain can be a strategic asset for top tier suppliers

Such sustainability issues go to the heart of the competitive challenge for supply chain companies. How do such companies add value in a business which features scorching price competition and in some sectors where customer-supplier business practices undermine the formation of long-term business relationships?

Orientation towards sustainability issues can be a differentiator

Consequently, there are both marketplace issues to address, such as standards and quality, as well as infrastructure issues, such as enforcement of labour and environmental laws and market access for developing country players. Performance on, or at least conscious orientation towards, sustainability issues can be a differentiator due to changing labour market conditions, rising domestic consumer market standards, tougher environmental enforcement and emergence of a global consumer marketplace —all of which place pressure on companies relying on a one-dimensional approach to cost management.

In this report, we assess these issues in the context of Asia's most broadly held large and mid-capitalization listed supply chain companies. We believe that the most important sustainability themes for investors in Asian supply chain companies will be:

- **ESG performance** Performance on environmental, social and governance (ESG) issues remain a crucial reference point for suppliers and investors to manage broad-based supply chain risks
- **Sustainability codes and standards** Sustainability codes and standards will continue to shape industry's competitive dynamic for leading brands and key suppliers
- **Export market access** To stay ahead of the pack, supply chain companies must be responsive to international pressures as a result of increasing exposure to international standards
- **Strategic engagement** The development of long term strategic partnerships between buyers and suppliers in the supply chain provide longer term opportunities

COUNTRY AND SECTOR DYNAMICS

What the sector looks like today

Supply chain companies do not constitute a coherent sector by the norms of traditional industry classification. Instead they constitute a sector defined by some of the most strategic and commercial trends affecting global markets. According to Ganeshan and Harrison, supply chains may be defined as: "a network of facilities and distribution options that performs the functions of procurement of materials; transformation of these materials into intermediate and finished products; and distribution of these finished products to customers."[3]

Figure 1 Supply Chain Participants

Supply chain participants include:

Original Equipment Manufacturers (OEMs) Companies that assemble products from components that are sourced from suppliers. Products may be designed by the OEM.

Original Design Manufacturers (ODMs) A contract manufacturer that uses its own designs.

Own Brand Manufacturers (OBMs) OBMs are typically OEMs that have upgraded from production expertise to the design and subsequently sale of own brands and effectively competes with its original customers e.g. Hyundai, Samsung, Episode, Giordano.

Branded Retailers (also known as branded marketers) Typically responsible for design and marketing, using contracted factories for manufacturing e.g. Nike. Products generally retail through chains and/or brand outlets.

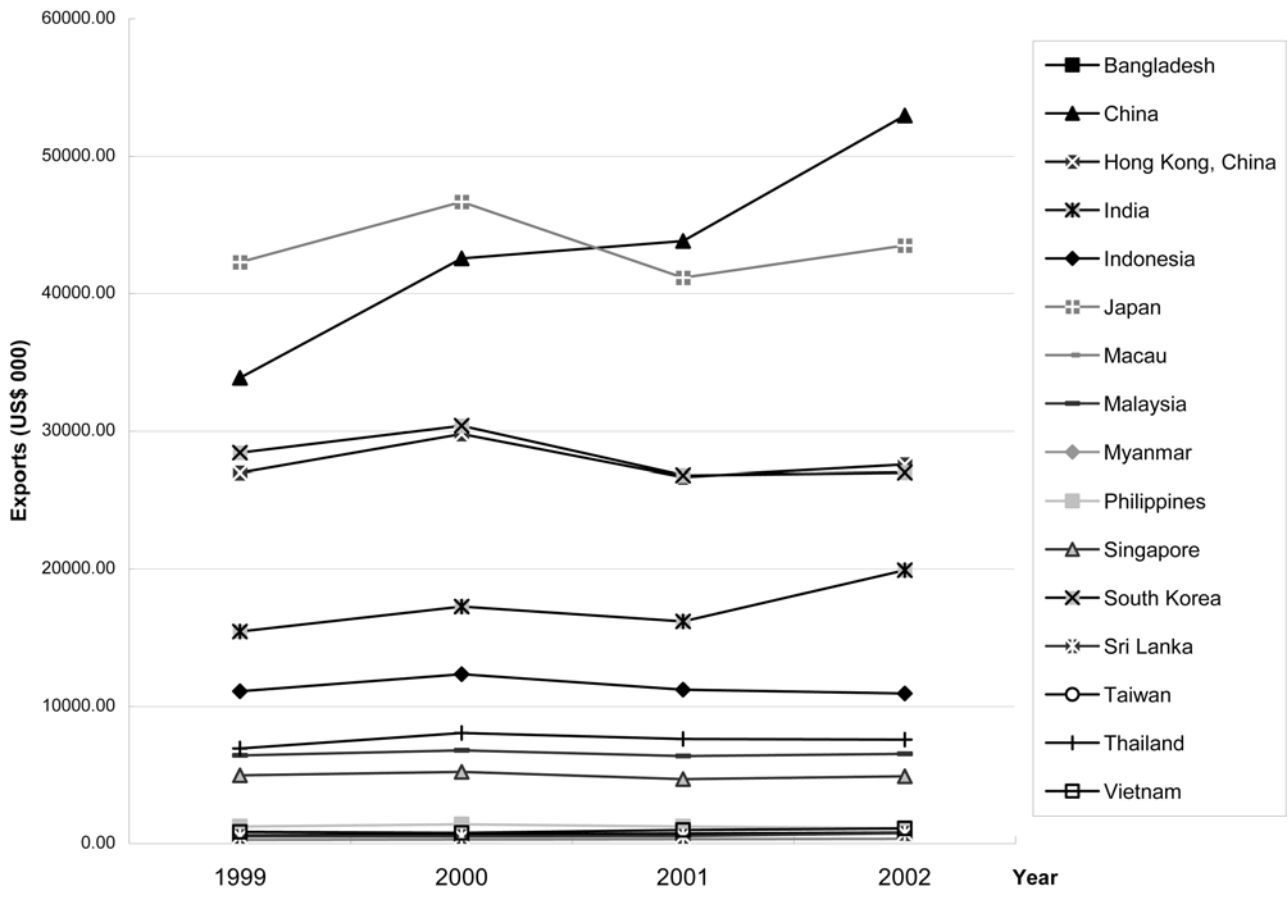
Speciality Retailers Typically responsible for design and marketing of specific brands e.g. Gap Inc. is responsible for the Old Navy, Banana Republic and Gap brands. Such retailers generally use contracted factories for manufacturing.

As a result of trade liberalisation following the creation of the European Union (EU), the North American Free Trade Agreement (NAFTA) and the World Trade Organisation (WTO), we are seeing significant growth in global supply chains and a dramatic increase in outsourcing. The business rationale for the globalization of supply chains is simple: advances in communications and transportation, as well as the diversification of consumer markets, has made it possible for companies to take advantage of low labour and operating costs in developing countries. In addition, the segmentation of business — increasingly separating product design from manufacturing, marketing and distribution — has made it possible to push capital costs down for suppliers, raising returns for brand companies. Outsourcing to and procurement from Asian supply chain companies is increasingly common in a variety of industry sectors including auto parts, information, communication and technology (ICT), light industry, food, retail and consumer goods including textile and apparel (T&A). This paper draws on data and examples from the ICT, textile/apparel/footwear and auto parts sectors, as a base for discussing the sustainability risks associated with Asian supply chains.

China has emerged as a key link in Asian supply chains

Global trade statistics clearly illustrate the increasing levels of outsourcing to Asia and the value of exports from Asian countries. As expected, China has emerged as a key link in the supply chains of the region. It is estimated that 59% of North American manufacturers currently source components or material from China[4], and this is forecast to increase significantly in the near future (Figures 2 and 3). European manufacturers also source significantly from China and this is similarly expected to increase.

Figure 2 Basic Manufactured Goods



Source: Global Market Information Database SITC Classification 6 — Manufactured Goods (including leather/ runner manufactures, textile, yarn, fabric, manufacture , metals, paper, paperboard) (fob-freight on board)

Figure 3 Sourcing: Top Destinations — North American and Western European Manufacturers

Sourcing: top destinations for North American manufacturers			
Region/ Country	**Future presence**	**Current presence**	**Future growth**
US/Canada	**85%**	**84%**	**26%**
China	68%	59%	58%
Mexico	53%	49%	24%
Western Europe	49%	44%	12%
Other SE Asia	42%	36%	22%
Eastern Europe	39%	31%	18%
Japan	37%	30%	13%

Sourcing: top destinations for Western European manufacturers			
Region/ Country	**Future presence**	**Current presence**	**Future growth**
Western Europe	**78%**	**75%**	**19%**
Central Europe	59%	55%	18%
Eastern Europe	56%	51%	36%
China	50%	40%	41%
US/Canada	43%	37%	15%
Other SE Asia	35%	28%	20%
Japan	28%	23%	8%

Note: The figures show the percentage of US manufacturers sourcing from each country

Source: Mastering Complexity in Global Manufacturing — A Deloitte Research Global Manufacturing Survey, 2003

Figure 4 presents a snapshot of sectors in Asia, where supply chains are active. The listed universe of supply chain companies in the automotive and T&A sectors is relatively small and is dominated by Chinese, Hong Kong, Korean Taiwanese and Thai companies. The ICT sector on the other hand is much larger by market capitalization and is dominated by Korea, Taiwan and China.

The listed universe of supply chain companies is relatively small

The vast majority of supply chain companies in Asia are, however, not currently listed and many are part of joint ventures with key customers and technology suppliers. As an example, of the approximately 800 suppliers that Nike uses in Asia, only a few would appear to be listed. Over the next five years, however, a number of the more successful supply chain companies are expected to become listed companies as their capital requirements increase. Examples of Asian listed supply chain companies are provided in Figure 4.

Figure 4 Larger Regional Listed Supply Chain Companies

Industry Segment	Market	Company	Example of Customers	Market Cap* (US$mm)
Autos parts	India	Thai Carbon Black	Bridgestone, Michelin, Goodyear, Sumitomo, Dunlop	163
	Indonesia	Astra Otoparts TBK PT	Ford, Daewoo, Kia, Hyundai, Merecdes Benz, General Motors BMW, Bimantara, Chrysler, Chevrolet, Daihatsu	220
	Korea	Hankook Tire	ND	2,138
Textile, footwear, apparel	Hong Kong	Yue Yuen Industrial Holdings	Adidas, Calvin Klein, Kenneth Cole, NikePolo Ralph Lauren, Reebok	4,523
		Weiqiao Textile	Fountain Set Group, Texwinca	1,675
		Texwinca Holdings	ND	958
		Luen Thai Holdings	Express/Limited Brand, Liz Claiborne, Polo Ralph Lauren	266
		Eagle Nice International (Holdings)	Nike	157
	Taiwan	Far Eastern Textile	ND	2,754
		Nien Hsing Textile	US Garment market (retailers and brands)	408
Electronics	Hong Kong	BYD	Motorolla, Nokia	832
		Nam Tai	Sony Eriksson/Entertainment, Texas Instruments, Seiko, Canon, Texas Instruments, Toshiba	155
		Gold Peak	Sanyo	91
	Singapore	Flextronics	Dell, HP	5,988
	Taiwan	Taiwan Semiconductors Manufacturing Corporation	ND	47,034
		United Microelectronics Corporation	ND	11,173
		Foxconn Technology	Dell, HP, Nokia, Sony **	2,797
Wholesale/ distribution	Hong Kong	Li & Fung	Coles Supermarkets, Disney, American Eagle, Carters	5,661
		Linmark		183

Market Cap Source: Bloomberg, December 2005

* As at 30 December 2005, or last official day of trading

** www.overclockersclub.com

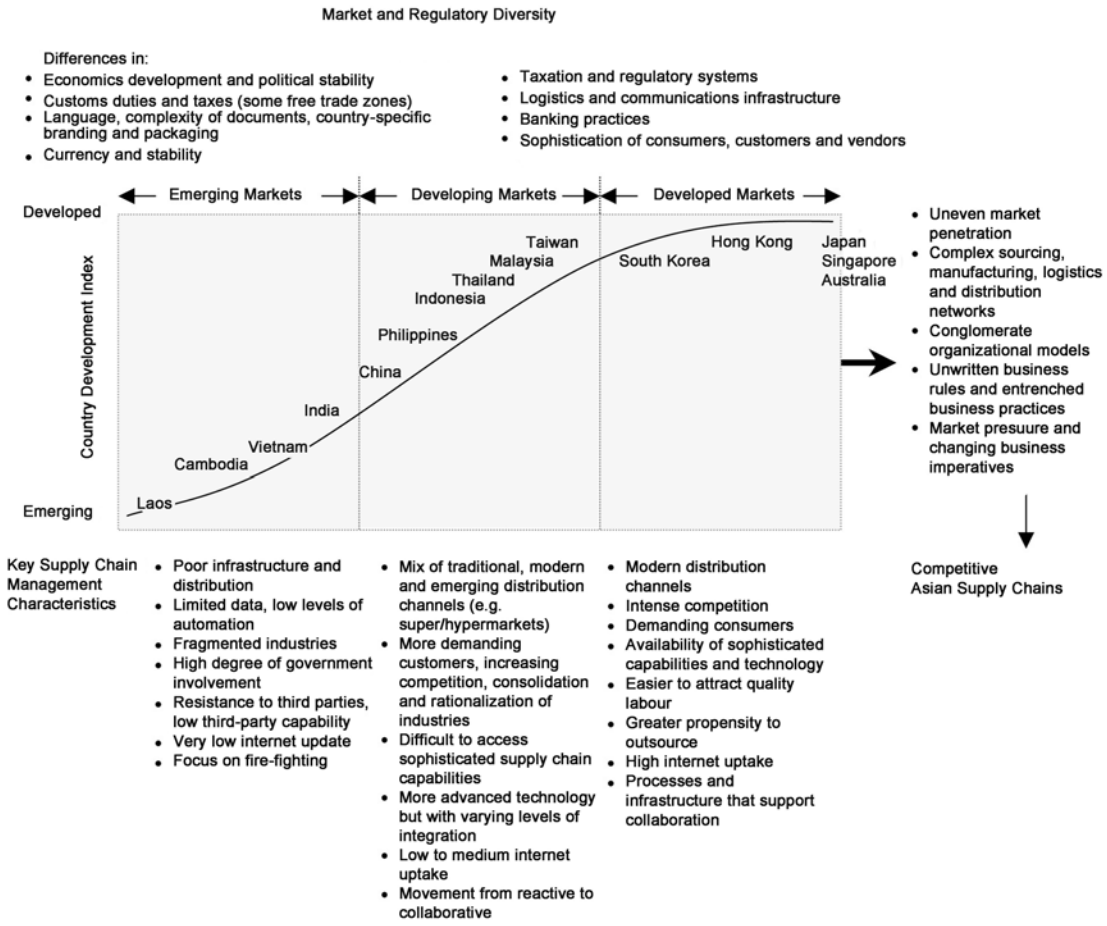
ND - not determined

Although Asia has become a focal point for outsourcing by many global brands, in terms of sustainability performance supply chains in the region are considered by industry experts to lag those typical of developed economies. The reasons for this lacklustre performance include:

- complexity of local laws, regulation and business practices
- poor enforcement
- lower environmental, labour, health and safety standards
- governance issues including lack of accountability, transparency, disclosure and corruption
- insufficient network and transport infrastructure
- technology and awareness gaps

On a country level, the more advanced Asian economies such as Singapore and Hong Kong with their highly developed infrastructure, legal frameworks and advanced technology, lead the pack in terms of supply chain competitiveness. Taiwan, Malaysia and Thailand follow, with China, although a growing haven for supply chains, notably lagging behind.

Figure 5 Factors Influencing Supply Chain Competitiveness in Asia



Source: Supply Chains in Asia: Challenges and Opportunities, Accenture 2003

Cross-cutting issues

Where supply chains are structured around low cost business models as they are predominantly in Asia, a number of challenges arise. Indeed, recent research by Accenture indicates the following challenges currently facing Asian supply chain companies[5]:

- lower levels of visibility over inventory and demand
- poor levels of forecast accuracy and demand management
- higher inventory carrying costs, lower inventory turnover and lower levels of accuracy control
- less understanding of customer and consumer needs and required service levels
- excess infrastructure (too many nodes in the network)
- lower levels of process and system standardization
- data transparency
- lower use of reliable performance measures

Some of these aspects can be indicative of poorly managed operations, which can put pressure on other performance areas, such as environmental workplace conditions. As an example, poor forecast accuracy can lead to short lead times and pressure on workplace overtime. Indications of problems include increased worker turnover, reduced productivity and reduction in product quality.

A brief overview of the supply chain dynamics and trends within the three industry sectors discussed in this report is provided below:

Outsourcing within the automotive sector is on the rise and analysts point to Ford and GM's announcement to increase combined purchasing in Asia from US$1.2bn in 2004 to US$8bn by 2010[6] as a clear indicator of accelerating Asian outsourcing and procurement. The automotive sector in Asia has experienced an influx of foreign OEMs and suppliers into the marketplace as well as an increasing number of mergers and acquisitions, which has resulted in some consolidation. The sector is a good example of transformation from a vertically structured supply chain, with OEMs responsible for design and assembly, and first and second tier suppliers responsible for manufacturing parts, to a more complex structure with suppliers as global firms responsible for design, engineering and co-ordination of manufacturing and assembly[7]. Traditional OEMs are becoming 'Vehicle Brand Owners'. Also see the related Auto Report for a more detailed discussion of this issue.

In the ICT sector, more than 90% of the world's computers, digital cameras and mobile phones are produced in the low-wage manufacturing centers of Asia[8]. Outsourcing to the region began in the 1960s with semi-conductor firms taking advantage of low labour costs in Singapore, Hong Kong, Thailand and Malaysia especially for testing and assembly. This was followed by the computer industry and the further evolution of contract manufacturers into more technologically advanced manufacturing. In the past decade, outsourcing through electronic manufacturing service (EMS) providers has taken off as manufacturers strived to add value to their contract manufacturing services.

A decade ago, EMS was a $10 billion industry. Today it has increased by a factor of ten and market analysts predict this will rise further to $250 - $275 billion by 2007[9]. Leading brands such as Hewlett Packard (HP) are now outsourcing both manufacturing and design to global suppliers such as Flextronics and Hon Hai, which provide a full range of these services from key Asian hubs. In addition, the services provided by specialist design capabilities have increasingly been contracted to original design manufacturers (ODMs). ODMs will invest in research and development and retain the intellectual property rights. Outsourcing in the sector is an important foreign exchange earner for several countries in the region including Malaysia, Thailand, South Korea, Taiwan and Indonesia.

The T&A sector provides many of the critical reference points for discussion of sustainability issues in the supply chain

While other sectors are now more prominent in outsourcing in terms of the value of trade flows, the T&A sector provides many of the critical reference points for discussion of sustainability issues in the supply chain. The sector has a long history of outsourcing to low cost labour markets in Asia and other developing regions. This reflects the high labour component in total costs of this traditionally low margin industry, most notably for the apparel industry. The landscape of the industry is however set to change. The final phasing out of textile and apparel quotas in accordance with the WTO Agreement on Textiles and Clothing (ATC), has resulted in widespread debate over the potential structural changes likely to occur as a consequence. In the run up, a view widely held by the popular press as well as by many industry experts and analysts, was that the demise of quotas would accelerate textile and apparel exports from low cost countries such as those in Asia. China in particular was widely anticipated to be the overall winner in the medium to long term, although others pointed to the potential industry strengths of India as well as Sri Lanka and also Bangladesh, providing a significant competitive challenge.

"China is expected to become the supplier of choice for most US importers (the large apparel companies and retailers) because of its ability to mask almost any type pf textile and apparel product at any quality level at a competitive price..."

Source: The United States Trade Commissions, January 2004, cited in "The Future of the Apparel and Textile Industries: Prospects and Choices for Public Private Sector Actors"

Retailers and wholesalers were also considered to be potential beneficiaries because manufacturers' consolidation is likely to result in improved efficiencies, which in the supply chain should translate to shorter lead times and higher quality merchandise.

In practice, indications are that the outcome may not be quite as straightforward as predicted, due to a range of factors. According to the Harvard Centre for Textile and Apparel Research[10], factors which are coming into play include public policy choices such as tariffs and the prevalence of the lean retail model, leading retailers to prefer suppliers in relatively close proximity to their outlets rather than focussing on the traditional decision factors such as the low labour costs for example of Chinese manufacturers. Although exports of some apparel items to the US reportedly increased by over 1000% in the months immediately following quota removal, the imposition of 'safeguard quotas'[11] imposed on certain Chinese apparel imports, is also muddying the

waters. Indeed, market adjustment may proceed, but with some disruptions and delays likely as importing countries will have the right to impose safeguard quotas through 2008, in line with the agreement for China's accession to WTO. In addition, the effect of bilateral agreements such as those between the US and producers in other countries should not be underestimated. Such agreements may have the potential to slow China's growth in this area, as the US seeks quota deals with other countries.

Indian textile manufacturers on the other hand are also proving to be a stronger prospect than predicted in some areas of the industry. As an example, India is reportedly beating off Chinese competition in the supply of towels to the US, due primarily to a few dynamic companies[12]. Nevertheless, concern still remains over India's competitiveness in the T&A industry due to constraints such as longer lead times, relatively lower labour productivity and reliability of delivery. Consequently conjecture remains as to whether India will be able to fight off China as the preferred supplier post 2008, when the safeguard quotas imposed on China are lifted.

Figure 6 WTO Multi Fibre Agreement (MFA) and the Agreement on Textiles and Clothing (ATC)

The Multifibre Agreement (MFA) was created in 1974, restricting trade in wool, man-made fibre and cotton. In 1994, the Agreement expired and was replaced by the WTO Agreement on Textiles and Clothing (ATC), a transitional agreement requiring the removal of all quotas by 1st January 2005.

MFA is largely considered to be responsible for globalising and fragmenting textile and apparel production as buyers sought textile and apparel supplies from regions which had not fulfilled allocated quotas.

Possibly in response to the changing environment, suppliers, such as Hong Kong-listed Texwinca Holdings Ltd., are also expanding their product portfolios and branching into areas of product design and own brand manufacturing. Texwinca's brands include Baleno, IPZone and Bambini. The development of own brand labels by retailers is also facilitating this process.

Figure 7 Outsourcing Trends —Examples of Global Brands 2004

Sector	Company	Country	Value of Outsourcing US$ (billion)		Number of Suppliers	
			Global	Asia	Global	% Asia
Electronics	Hewlett Packard	US	52	37	7000 (700 key)	71
	Samsung	Korea	8.9 60% of sales			
Textile & apparel	Nike	US			830 factories	59
	H&M	Sweden			700	60

Note: Example of outsourcing by first tier suppliers: — Flextronics procured US$14.0 billion of components in FY 05

Source: Company reports

The analysis of Asian supply chains takes into account two cross-cutting issues which have significant influence on the investment themes discussed: fragmentation and consolidation; and limited and uninformative disclosure.

Fragmentation and consolidation The structure of Asian supply chains varies across industry sectors reflecting different competitive conditions, regulatory regimes and shifting conditions in both supplier and customer markets.

Consolidation at both ends of the supply chain is an emerging issue in a number of industry sectors

Consolidation at both ends of the supply chain is an emerging issue in a number of industry sectors, and according to some commentators is expected to be a dominant theme that will dictate future supply chain structures in the region. If this proves to be the case, supplier consolidation should in the longer term result in less fragmented, more transparent supply chains and ultimately provide the opportunity for those in the supply chain to take advantage of economies of scale. For sustainability performance this bodes well. However, reflecting the complexity of supply chains within the region, there is a somewhat conflicting dynamic in the form of companies hedging their bets against supply chain risks and therefore seeking to second source from potentially lower cost countries and suppliers. This is particularly relevant given the increasing reliance on China as a supplier base. In addition, there are alternate views on the extent of consolidation likely to be achieved. For example in the apparel industry, some industry experts suggest that we will see an influx of new manufacturers into the market, seeking to take advantage of a quota free environment and the relatively low cost to entry.

Another interesting dynamic to watch is the transition of OEMs to OBMs and ODMs. As suppliers reportedly take on increasing responsibilities throughout the supply chain, the traditional top-down relationships between buyer and supplier will inevitably change.

As a result of these issues, commentators have struggled to apply useful metrics to evaluate trends which are fundamental to the business strategies influencing Asian listed suppliers. Despite consolidation in some industry sectors, there is still significant fragmentation in other industry supply chains. As globalisation progresses, we believe more and more supply chain companies will add value and increase services to maintain and/or attain higher margins. This inevitably means more risk.

Limited and uninformative disclosure From an analytical perspective, disclosure is a significant challenge facing mainstream investors interested in listed supply chain companies. While investors have adequate opportunity to monitor the intentions of global brands towards their supply chains through corporate reports and websites, effective disclosure on sustainability issues by the supply chain companies themselves is often limited. Indeed, leading brands are raising the bar for reporting. As an example, Nike has recently released the names of all of their contract factories.

On the supplier side, disclosure is notably limited. Information pertaining to overall environmental, health & safety/labour policy, strategy and implementation, social responsibility and particularly labour relations are not widely disclosed and also generally not cited as business risks in listing documents. Reference to issues such as strategic alliances and strategies for

meeting customers' sustainability requirements is equally limited. Even sector leaders such as Li & Fung, which are listed on the Dow Jones Sustainability Index, take a conservative approach to disclosure.

There are inevitably exceptions as demonstrated by Luen Thai Holdings Limited, which candidly discloses the business risks that labour issues pose to its operations. Luen Thai is a significant employer in the apparel industry with over 17,000 employees of which close to 16,000 are in production. Its customers include well known branded apparel makers and retailers such as Express/ Limited Brands, Liz Claiborne, Polo Ralph Lauren. The relevant industry risks disclosed include:

- sensitivity of the groups' customers to social responsibility standards
- potential increases in the minimum wage
- changes in occupational health and safety rules or regulations or human rights laws

The unusual disclosure on these issues in the offering documents is likely driven by the fact that in 2002 the company settled a class action, filed against it and 32 other organizations, on behalf of apparel workers. The settlement required the company and its subcontractors to make changes in labour practices at facilities in Saipan including the payment of overtime as well as compliance with minimum wage requirements.

In the absence of direct disclosures, investors have the option of attempting to gauge a company's exposure to key sustainability issues, such as labour conditions, by monitoring simple metrics such as changes in workers employed and the labour component of cost of goods sold. The disclosure of operational characteristics and management practices can also highlight issues which have implications for labour conditions and specifically overtime practices, e.g. the link between product quality control procedures and often un-paid re-working.

Investors have the option to gauge a company's exposure to key sustainability issues by monitoring simple metrics

Long-term sector outlook

Ongoing pressure on product prices looks set to continue as new retail models keep the focus on high volume, low margin goods, product cycles shorten as technology evolves, and retailers and wholesalers demand shorter lead times, while continuing to demand the same or improved quality. Consequently, pressures on demand planning are likely to persist with potential knock on effects down the supply chain. In addition, increasingly stringent environmental standards in both developed and developing markets are affecting product design. This creates an extremely challenging environment for supply chain managers. Often the result is continued pressure on supplier margins.

LABOUR AND ENVIRONMENTAL CHALLENGES SHAPE SUPPLY CHAIN RISKS

Supply chains are a crucial factor in maintaining a competitive edge in today's increasingly global and liberal marketplace. Buyers, whether OEMs, retailers or branded manufacturers/marketers, continue to levy cost, quality and time pressures on their suppliers who are required to deliver the right product, in the right quantity to the right place, on time. This pressure inevitably translates to cost cutting at the supplier level, often with material implications for sustainability performance and risk exposure for the entire supply chain.

It is therefore not surprising that global outsourcing as a cost minimization strategy has created supply chains in Asia characterised by poor labour conditions and sub-standard environmental performance. Recent research by Impactt on supply chain companies in Asia[13] clearly indicates that badly managed workplaces with sub-standard labour conditions are also inefficient, unproductive workplaces, and concluded that a direct correlation can be drawn between long overtime hours and falling productivity. This is a view that directly contradicts the common presumption that low labour costs effectively offset lower productivity. The most fundamental social and environmental issues are thus driving investor efforts to assess the growing impact of global supply chains.

Figure 8 Sustainability Issues in Asia's Supply Chains

Labour conditions in Asia's supply chains can often be characterised by:

- low wages often below the legal minimum
- no/limited benefits
- excessive overtime and sub-optimal productivity
- a predominance of young female workers
- various forms of worker discrimination
- child labour
- forced labour
- inadequate and/or ineffective union representation
- high employee turnover
- large percentage of migrant workers
- use of penalty systems
- exposure to hazardous processes and materials with inadequate safeguards in some high risk industries

Although the significance of these issues is influenced by a suite of structural and country specific factors, such as demographics, politics and regulatory structure, in general terms they are considered pervasive and are to a greater or lesser extent common to Asian supply chains.

It is perhaps more difficult to generalise regarding environmental issues since the breadth and complexity of issues is dependent on specific industry as well as country characteristics. However, typical environmental issues that pose a risk to supply chain companies in the short to medium-term include:

- use of hazardous materials and improper use, storage and disposal of toxic materials and land contamination
- inadequately treated effluent discharges and pollution of water courses
- waste generation and resource use, e.g. energy & water
- waste air emissions, e.g. particulates, sulplur oxides

Labour market changes undermine low cost labour strategies

Labour issues are at the core of sustainability risks in Asia's supply chains

Labour issues are at the core of sustainability risks in Asia's supply chains, where abundant low cost labour is often the driver behind outsourcing to developing countries. In China, the seeming abundance of cheap labour may have lulled the unwary into a false sense of security, as reports of migrant labour shortages in Southern China continue to dominate the national press. China accommodates an abundant supply of labour, notably the estimated surplus of 150-200 million rural workers who remain untapped in the countryside. Labour shortages however are emerging in certain industry sectors such as the ICT sector and in certain localities such as the south eastern manufacturing hub including such cities as Guangdong, Shenzhen and Dongguan. In terms of job occupation, young assembly line female workers are also reportedly in short supply. Surveys by the Guangdong Statistics Bureau support these views[14] indicating that :

- there will be an estimated shortfall of 1 million migrant workers in 2005
- companies are already experiencing difficulties in recruiting new workers, with Hong Kong invested companies experiencing the most difficulty
- obvious shortages are apparent in different regions in the electronics, toy and textile industries

The Bureau goes on to cite the following as the major reasons for the shortages:

- rapid economic growth increasing the demand for migrant workers
- low wages
- failure to protect labour rights
- young migrant workers seeking higher living standards
- investment in the agricultural sector increasing farmers' incomes

Labour costs may rise faster than investors expect

Labour shortages are expected to be a long-term issue due to the rising number of labour intensive enterprises, the slow pace of economic restructuring and persistent low wages[15]. These shortages are expected to bring about structural changes in the labour market, with the emergence of higher wages and the speeding up of labour reforms. Analysts further argue that we will see labour costs rising faster than investors expect (Figure 9). Wage discrepancies will slowly but surely be addressed as employers start to pay required contributions[16]. Within the investment community, the consensus is that wage gaps will narrow across Asia and that returns to labour-intensive industries will fall as a result.

Figure 9 Factors Influencing Supply Chain Competitiveness in Asia

Hourly labour cost comparisons, US$										
	1999	2000	2001	2002	2003	2004E	2005E	2006E	2007E	2008E
India	0.48	0.53	0.58	0.65	0.69	0.75	0.82	0.89	0.98	1.07
China	0.53	0.59	0.69	0.80	0.92	1.08	1.24	1.40	1.58	1.79
Thailand	1.20	1.10	1.00	1.10	1.20	1.30	1.30	1.40	1.40	1.50
Mexico	1.30	1.60	1.70	1.80	1.70	1.70	1.70	1.80	1.90	1.90
Hong Kong	5.50	5.60	6.00	5.80	5.40	5.40	5.40	5.40	5.50	5.70
Taiwan	5.50	5.80	5.70	5.60	5.80	6.00	6.30	6.70	7.10	7.50
Korea	7.30	8.20	7.80	9.20	10.40	11.50	12.40	13.30	15.20	16.90
US	19.10	19.80	20.60	21.30	21.80	22.20	22.80	23.50	24.30	25.00

Source: Chinese Textile/Apparel Manufacturing, The Big Bang in 2005, Goldman Sachs, 2004

The risk for companies building on supply chains in apparently low cost labour markets like China is that underlying labour market conditions can change rapidly and undermine unsophisticated cost minimization business models. Indeed, recent wage and working condition improvements in China are beginning to mark steady, if uneven, improvement as Beijing seeks to ensure that economic gains are more accessible to migrant workers.

Occupational health and safety (OHS) in Asia's supply chains also presents a significant challenge, with unsafe working conditions and practices being commonplace. Industry commentators, however, point out that OHS is an area where governments are becoming increasingly responsive and that in some areas, foundations are being laid to address the problems.

Figure 10 Increasing OHS Regulations are Redressing the Balance

During the period 2000-2001, China's State Council Central Office released 184 rules, regulations and related documents on OHS. Departments and ministries of the State Council published another 135. Relevant departments in provinces, municipalities and autonomous regions issued a further 107. The sheer weight of administrative excess is exacerbated by the fact that rules, regulations and documents of this type have various levels of authority and must not contradict the law. Although the Chinese legal system is not based on precedent, officials may need to refer to all sets of rules when attempting to determine the various level of responsibility for breaches of OHS regulations; that is, whether the law, government, specific department, company, or some other body is accountable. In addition there are over 1,000 OHS standards.

Source: Stephen Frost, CSR Asia, September 2005

Figure 10 (continued)

In Hebei, the government will pay rewards to people who report unsafe factories to the authorities.

The Huizhou government signed agreements with the two Gold Peak factories where workers were exposed to cadmium, which stated that the factories must not terminate the employment of any infected worker and that medical expenses should be paid, even if the worker leaves the factory voluntarily.

Regarding standards, a Chinese national standard for OHS management systems (GB/T 28001-2001 system) has been introduced and more recently, the Chinese national standard for the textile and apparel sector CSC900T was launched and is soon to be followed by up to 20 industry related job procedures covering areas such as chemical safety and fire safety.

Source: CSR Asia Weekly - Volume 1. Week 24, 2005

The materiality of these issues to the investment community is evident since non compliance with regulations and enforcement activities can give rise to reputational damage as well as having financial implications where cost structures change as a result. As an example, the Chinese Ministry of Health (MoH) has reportedly vetoed new investments in Guangdong on the basis of insufficient investment in OHS.

HIV/AIDS in the workplace is a significant business risk in terms of increased costs and damaged profit margins

On the health side, HIV/AIDS in Asia continues to be a problem as infections continue to rise. Experience in Africa has shown that HIV/AIDS in the workplace is a significant business risk in terms of increased costs and damaged profit margins, most notably for companies that are labour intensive, have not recognised the problem and do not implement any intervention programmes[17]. In addition, research indicates that where government policy and action is weak, companies may effectively end up compensating for such government inaction[18]. Indications are that in Asia, both China and India in particular, are experiencing epidemics, albeit in hot spots. Supply chain companies operating in these regions need to consider the possible consequences of HIV/AIDS on their operations and develop appropriate intervention programmes and strategies.

Supply chain companies that continue to discriminate against HBV carriers are exposing themselves to reputational risk

Undeniably, viral diseases such as HIV/AIDS and HBV (Hepatitis B) are also a source of workforce discriminatory practices. China has one of the highest HBV infection rates in the world and until recently, discrimination against employing those with HBV was sanctioned by government regulations. However, in January 2005, the government introduced a new medical check up standard which stipulates that HBV carriers are eligible for work within the civil service, provided that liver function is normal[19]. These standards are effectively guidance for companies operating in China. Unlike HIV/AIDS testing which is prohibited under ILO codes of practice on employment, HBV testing is not prohibited and is therefore likely to continue, resulting in continued discrimination. HBV is an issue of concern as supply chain companies that continue to discriminate against those who have contracted the disease are vulnerable to reputational risk and the attentions of increasingly focused NGO activist groups. Notably, Flextronics was recently criticized publicly for discrimination against HBV carriers[20].

Environmental problems: new standards, new risks

Equally important, are the range of environmental issues which, if not addressed, may threaten operational efficiency and increase the likelihood of exposure to litigation or regulatory sanctions. Whilst such issues are industry specific, there are a number of more generic areas where supply chain companies should be able to demonstrate effective risk management. Investors should note that leadership in performance on labour issues does not necessarily go hand in hand with leading performance on environmental issues, as evidenced by recent research by ISIS[21]. Given the rapid pace of regulatory change on both labour and environmental issues in Asia, poor disclosure or limited management focus can signal inadequate risk management across-the-board.

Supply chain companies in Asia face a range of environmental issues which pose varying degrees of risk. Some of these issues may be national or local in nature and industry specific such as the handling of toxic materials in the ICT sector, whereas some attain significance on a more regional or global scale such as air emissions including greenhouse gases and particulates, water scarcity and energy use.

Figure 11 New Environmental Issues — Agricultural Land Conversion

The continuing controversy over China's conversion of agricultural land for industrial development is material to investors. The controversy is a result of numerous issues including: concerns over food security as productive agricultural land is lost; illegal land acquisition by developers; corruption; poorly defined property rights; disenfranchised local communities; ensuing social conflict and threatened social stability. In 2004, the Government suspended all non essential conversion of agricultural land for six months. Reportedly over 4000 development zones were cancelled and plans for the use of 24,900km^2 of land planned for development zones were axed.

The response of most supply chain companies to these environmental issues in terms of risk management whether process or product-related, invariably depends on external pressure, whether it be of a regulatory nature, from shareholders and advocacy groups, or the market itself. The customer/supplier relationship also has a fundamental influence on the development of innovative environmental solutions as well as compliance with codes and standards, as discussed previously.

Environmental risk management in the supply chain continues to revolve around management systems, such as ISO 14001[22]. A second approach, which is particularly appealing during periods where input costs such as energy are rising, is eco-efficiency, which focuses on production strategies designed to reduce the ecological impact of production processes. According to the World

Business Council for Sustainable Development (WBCSD), critical aspects of eco-efficiency which may also be addressed in a management system are:

- reduction in the material intensity of goods or services
- reduction in the energy intensity of goods or services
- reduced dispersion of toxic materials
- improved recyclability
- maximum use of renewable resources
- greater durability of products
- increased service intensity of goods and services

Many listed supply chain companies in Asia are certified to ISO 14001. Often this will be in response to the specifications or encouragement from leading branded customers such as Philips, Ford Motor Company, Dell and Toyota, to name a few.

Figure 12 Leading Brands Requiring ISO 14001 Certification —Two Examples

The Ford Motor Company requires ISO 14001 certification from all of its suppliers with manufacturing facilities. The requirement affects about 5,000 of Ford's production and non-production suppliers.

Dell has requested that all first tier suppliers attain ISO 14001 and OHSAS certification by the end of 2004. 96% achieved this and Dell are working with the remaining 4%. Regarding OHSAS, 79% met the target.

Some leading brands do not require ISO 14001 certification of their suppliers but instead stipulate that suppliers must adhere to specific environmental requirements which may be beyond regulatory requirements, such as restricting certain chemical substances or encouraging the use of water efficient production. Compliance with any standard inevitably has cost implications and ISO 14001 is no exception. Certification and the requisite third parties audits are in themselves relatively inexpensive. However substantial capital investment, for example in the form of hardware, may be necessary in order to comply with the standard, depending on existing pollution control practices and ultimately environmental performance.

Sustainability investors should be cognisant of the fact that ISO14001 is not an absolute performance standard

When analysing a certified company, sustainability investors should be cognisant of the fact that ISO14001 is not an absolute performance standard and does not guarantee a high level of performance. Certification simply indicates the implementation of a management system and management controls which meet the standard's specification. Since ISO 14001 is applicable to all organizations, large or small, complex or simple, two identical companies may be certified but have attained quite different levels of performance. Investors should also be aware that:

- different certification bodies have different interpretations of the standard and some are noticeably less strict than others

- the certification scope may not include all parts of the company and should therefore be diligently checked. Investors should determine whether any of the organisation's activities which may pose an environmental risk have been omitted from the scope and therefore the system

- certification bodies receive accreditation from the International Accreditation Forum which provides some assurance of the impartiality, independence, experience, competence and reputation of the certification body. However, not all certification bodies are accredited

- in some countries where corruption is problematic, an ISO 14001 certified company may not have adequately met the standard's requirements and therefore harbour significant risk in some areas, despite having successfully passed the certification and ongoing surveillance audits

Nevertheless, if a company does have an environmental problem or is high impact in nature, the existence of an ISO 14001 certified EMS should speed up the risk analysis since all relevant information should be accessible. Comprehensive disclosure, however, is not a requirement of the standard.

CODES AND STANDARDS — MORE COMPETITION IN AN UNLEVEL PLAYING FIELD

"The drive to meet rising global standards of one kind or another is affecting just about every multinational FORTUNE 500 company"

WBCSD

Codes and standards, however imperfect, are a factor in shaping supplier practices

Analysis of supply chain companies brings the investor face to face with the issue of voluntary national and international environmental and labour standards, as well as corporate codes of conduct. Providing social and environmental guidelines, these standards and codes are a proxy for enforcement where often comprehensive national laws and regulations are rarely or inconsistently enforced. In response to immense NGO pressure over poor sustainability performance, and in some cases after suffering significant reputational damage, a number of leading brands have adopted and imposed standards and codes on their suppliers, typically through a top down approach. The issue for investors is that these codes and standards, however imperfect, are a factor in shaping supplier practices, driving corporate disclosure and are becoming a reference point for industry competition.

Some leading brands do not require ISO 14001 certification of their suppliers but instead stipulate that suppliers must adhere to specific environmental requirements which may be beyond regulatory requirements, such as restricting certain chemical substances or encouraging the use of water efficient production. Compliance with any standard inevitably has cost implications and ISO 14001 is no exception. Certification and the requisite third parties

Figure 13 Examples of Codes of Non Company Specific Environmental/Social Codes of Conduct and Standards

The Worldwide Responsible Apparel Production Scheme (WRAP)	Apparel certification programme	**ISO 14001 Environmental management system-requirements with guidance for use**	International certification standard
Ethical Trading Initiative (ETI)	An alliance of corporates, government and NGOs promoting the implementation of voluntary codes and standards on labour issues	**OHSAS 18001 Occupational Health & Safety**	International occupational health and safety management system specification
Fair Labour Association (FLA)	The FLA conducts independent monitoring and verification to ensure that the FLA's Workplace Standards are upheld where FLA company products are produced	**SA8000**	Social Accountability Standard for socially responsible employment practices
FTSE4good	New labour standards as part of the FTSE4good Indices	**CSC9000T China Social Compliance 9000 for the Textile and Apparel Industry**	National management system standard
Electronic Industry Code of Conduct	Voluntary code covering labour, health and safety, environmental and management issues	**Global Compact**	United Nations initiative in the form of principles that companies can sign up to
Business Social Compliance Initiative (BSCI)	Provides standardized management tools which address working conditions. It also provides a common European monitoring system for social compliance		

Figure 14 Examples of Companies that are Members of FLA and ETI

FLA (examples)		**ETI (examples)**	
adidas Salomon	Nordstrom	Dewhirst Group	Mothercare
Eddie Bauer	Patagonia	Flamingo Holdings	New Look Retailers
Gear for Sports	Phillips-Van Heusen	Fyffes Group	Next
Gildan Activewear	Puma	Gap Inc	Pentland Group
Liz Claiborne	Reebok	Levi Strauss & Co	Peter Black
New Era	Top of the World	Madison Hosiery	Tesco
Nike	Zephyr Graf-X	Marks and Spencer	The Body Shop International
		Monsoon	WH Smith

Suppliers must comply with numerous standards imposed by customers

The introduction of codes and standards has created a competitive dynamic affecting both ends of the supply chain. At the customer level, it has resulted in the birth of multiple codes and standards, as an increasing number of brands join their market peers. HP, for example, has introduced its code of conduct to 98% of its purchasing expenditures. On the supply side, this has created immense pressure for suppliers to comply with numerous standards imposed by different customers, creating what many regard as an un-level playing field plagued by free riders. This is particularly a problem in commodity markets where mid-tier companies have no stake in market standards. The top-tier companies therefore tend to insist on strategies which will obligate as many players as possible to participate.

The situation in Cambodia provides an interesting example where buyers are sourcing because of higher labour standards, which in this case has resulted from an agreement between the Cambodian and U.S. governments and the International Labour Organisation (ILO). The resulting improved compliance with international labour standards has seemingly provided Cambodia with a competitive advantage, as demonstrated by the continued presence of such leading brands as Gap Inc., following the removal of quotas from other low cost countries such as China. Gap has in fact committed to capacity building in Cambodia's garment manufacturers with a view to addressing such issues as quality, productivity and turnover rates.

Figure 15 Cambodia, Trade and Social Standards in the Textile and Apparel Industry

Since 1999, the US Government and the Cambodian Government entered into an agreement linking trade with social standards. In essence, the US agreed to increase garment quotas placed on Cambodia, providing that Cambodia could demonstrate compliance with national and international labour standards. Monitoring to ensure that the standards were being met was undertaken by the ILO. ILO also aimed to improve standards in Cambodian factories. Although criticised by labour groups due to problems with ILO reports and the placing of the burden for improved performance on the supplier and not on the multinationals that source from them, the monitoring has been extended and is now known as the Better Factories Cambodia Project, with the ILO and the Cambodian Government working in partnership.

Source: The ILO in Cambodia, Asian Labour Update. Cambodia: UN labour body expands monitoring of Cambodia's garment factories, Asian Labour News, February 2005

Compliance with standards has traditionally been monitored through audits conducted by the customers as well as third parties. This approach, however, has arguably created numerous problems including resource intensive multiple audits often against different codes and standards, and the creation of barriers between buyers and suppliers. Failure to comply can lead to loss of orders and cancelling of contracts which, depending on the proportion of the customer's business, can be a significant risk to take. As an example, in 2004, Gap Inc. revoked approval for 70 factories for compliance violations. Inevitably, a buyer that has a high percentage of production capacity is able to influence a supplier more effectively. Indeed listed suppliers frequently cite reliance on a small number of customers for the majority of their turnover as a risk factor.

Whilst a successful audit may indicate to the unwary that all sustainability risks are in order, in reality this may be far from the truth. Double book-keeping by suppliers to pass audits is now widely accepted as common practice, particularly in China's supply chains. Furthermore the vested interests of third-party auditors and reported corruption can, as much anecdotal evidence would suggest, similarly taint audit results. Consequently, on paper the sustainability risks may appear to be managed, but in practice, the risks remain.

Leading brands are seeking to develop long term strategic partnerships with their suppliers

Recognising the limitations of the strict compliance approach, leading brands are beginning to move away from reliance on monitoring and auditing by seeking to develop long term strategic partnerships with their suppliers, with the aim of facilitating compliance with standards through engagement and capacity building. Supplier companies that have the capacity to respond effectively to these customer requirements will have the potential to develop a competitive advantage. The Impactt study,[24] which focused on means to reduce overtime in the Chinese supply chains of brands including Debenhams, Hennes & Mauritz, Kingfisher, New Look, Pentland/Ellesse and Sainsburys, clearly demonstrated that moving away from the compliance/audit approach and instead working to improve internal quality and productivity management systems, can materially improve labour conditions and affect the bottom line.

The study further illustrated the following business benefits:

- a reduction in reworking of at least 25% with significant implications for worker overtime
- reduced worker turnover
- increase in total monthly pay despite the fact that workers were working fewer hours due to improved worker productivity

The reality is that, even with an abundance of well meaning codes and standards, no company can on its own solve the labour and environmental problems and mitigate the associated risks persisting in Asia's supply chains. Consequently, in addition to advocating engagement and investing in long term strategic partnerships to address this situation, leading brands are consolidating codes and standards through collaborative industry-based networks. Collaboration is visible in both the apparel, and more latterly, the electronics sectors.

Figure 16 Overview of Benefits Identified Through the Impactt Study

The Impactt project identified a number of benefits which could be accrued by the relevant parties including the workers themselves, factory managers and purchasing companies. However these benefits should not be taken for granted without recognising that there are still challenges to achieving such positive outcomes.

Workers clearly benefited from reduced hours, increased number of days off per month and increased pay. In addition to which, relationships between managers and workers improved through less tension and increased respect, leading to better team working. The project also brought other unexpected improvements that made a real impact on workers' quality of life, such as better food and recreational facilities.

Factory Managers benefited as reduced working hours moved the respective factories towards legal compliance. This change also improved relationships with international customers. Factory managers also gained savings on factory

overheads such as utilities and special overtime allowances, thereby lowering production costs. Reduced worker turnover also brought financial and management benefits to the factory.

Managers gained through improving their quality management skills. At the start of the project, factories collected some quality data in accordance with customer requirements. In most cases this data was not used to analyse problems or support improvements. Through the project, factory managers learned what data to collect for quality and output/productivity and how to display, analyse and use this data in order to drive productivity improvements that benefited their business.

Purchasing Companies benefit from enhanced relationships with key suppliers, better service from suppliers in terms of controlled delivery and improved product quality, and reduced reputational risk.

The primary challenge for purchasers is the need to work with suppliers over an extended period of time on issues of hours and pay rather than demand immediate compliance. This means understanding the pressures on factories, having realistic expectations of achievable changes and rewarding factories for honesty, even when this reveals 'non-compliances'. Purchasing companies need to work with the factories to incentivise and support incremental change in order to rebuild the trust that has been eroded by overly strict compliance practices.

A significant issue identified by the purchasers involved in the project is the companies' ability to replicate the model across supply chains in a resource and cost-efficient manner. There is also a need to build understanding and skills around these issues both in purchasing companies and in the supply chain. A specific element of this challenge is the need to build local capacity and expertise in order for factories to have access to support that can be tailored to their needs.

Source: Extracted from: An SRI Perspective on The Impactt Overtime Project

Figure 17 Examples of Collaboration on Codes of Conduct

Examples include:

- Nike, Gap and Patagonia plus several other apparel companies and several nonprofits have agreed to develop uniform standards and a shared inspection system through a project known as 'the joint initiative on corporate accountability and workers' rights'
- Although characteristically there is generally less collaboration within the ICT sector, mainly because the sector demands greater autonomy due to intellectual property aspects of the business, Dell, IBM and HP have developed the Electronics Industry Code of Conduct. Along with Solectron, Sanmina-SCI, Flextronics, Jabil and Celestica, these companies were the first to adopt the code in October 2004, shortly followed by Cisco, Intel and Microsoft. It would appear the intention is to make conformance with the code integral to doing business within the sector
- Through the Global e-Sustainability Initiative (GeSI), leading ICT brands and the electronic industry code of conduct implementation group are looking to publish a supplier self assessment questionnaire
- The National Retail Federation of the US, the Retail Council of Canada and Reebok established the Fair Factories Clearinghouse to provide a database of company audit results

We believe that leading supplier companies will be those that can respond to codes and standards stipulated by customers, demonstrate commitment to continuous improvement and express a willingness to engage with customers. At the same time, these companies should:

- develop capacity in human resource, EHS and quality management
- provide a high level of transparency
- invest in people and systems
- where standard-setting remains a controversial area, engage with a range of public sector and civil society groups

Because much of the debate about ESG issues in the supply chain has been focused on the performance of the T&A sector, this sector is generally considered to be more advanced in addressing supply chain sustainability risks. In contrast, the ICT sector, which generally regards itself to be cleaner and more sophisticated than the T&A industry, is only just beginning to acknowledge the issues despite having a high risk profile from the environmental and labour perspective. Industry experts believe that given the comparative inactivity in the electronics sector on sustainability issues and the limited scope of industry standard-setting, the electronics sector is a likely target for future NGO campaigns.

For investors in industries supported by global supply chains, the adoption of codes of conduct and industry standards should be taken as a signal that sustainability issues have the potential to begin changing the competitive landscape. Codes and standards are in many industries a defensive move intended to give industry participants a safe harbor. As companies begin to adopt differentiated supply chain strategies, however, the cost and performance implications of compliance will become much more material. At the same time, investors will want to evaluate how Asian supplier companies build and protect their credibility. Just as investors have grown cynical about brands with codes but little performance data, Asian investors will learn to link sustainability compliance with other performance metrics.

THE INFLUENCE OF ESG REGULATORY HURDLES ON EXPORT MARKET ACCESS

Asian supply chain companies are being exposed to the demands of the international market place and the requirements of increasingly stringent international regulation. Indeed, access to developed markets is often contingent upon the manufacturers' ability to meet detailed product content and performance specifications. Export market access is therefore increasingly being influenced, or even controlled, by ESG regulatory hurdles. The ICT sector provides a good example of the issues and risks that supply chain companies are now facing as a result.

Rapid obsolescence of ICT products has resulted in a highly visible and significant e-waste

Campaigns over poor working conditions, health effects and environmental performance of the ICT sector are gaining momentum with a particular focus over the past year on high tech waste. The rapid development of technology and resulting obsolescence of ICT products has resulted in a highly visible and significant e-waste problem. E-waste often requires new and expensive collection and recycling programs in user markets. In addition, significant attention has been focussed on the export of e-waste for recycling to Asia, where workers are consequently exposed to harsh working conditions including exposure to toxic materials. In response, the EU has developed directives which specifically address these issues.

Figure 18 EU Directives — Setting the Standard for Market Access

The Restriction of Certain Hazardous Substances (RoHS) Directive (becomes effective from 1st July 2006)

The Directive requires the substitution of various heavy metals such as lead, mercury, cadmium, hexavalent chromium and brominated flame retardants polybrominated biphenyls (PBB) or polybrominated diphenyl ethers (PBDE) in new electrical and electronic equipment from 1 July 2006. Manufacturers of EEE outside of Europe must also abide by this legislation if the equipment is imported into an EU member state. It is intended that this will provide incentives to design electrical and electronic equipment in an environmentally more efficient way which takes waste management aspects fully into account.

Source: europa.eu.int/comm/environment/waste/weee_index.htm

The Waste Electrical and Electronic Equipment (WEEE) Directive (effective from 13th August 2005)

Responding to the rapid growth in electrical and electronic equipment constituents in waste streams, the WEEE Directive aims to reduce the quantity of electrical waste by making equipment producers responsible for financing the end of life costs. The Directive sets out requirements on criteria for the collection, treatment, recycling and recovery of WEEE. In the UK for example, WEEE Regulations specify that waste producers must register with the National Clearing House (NCH), provide annual data to NCH, finance the costs of collection, treatment and recovery and environmentally sound disposal and report evidence of this to NCH.

Source: www.dti.gov.uk/sustainability/weee/WEEEguidance_draft.pdf

Directive on the Eco-design of Energy-using Products (EUPs) (adopted by the European Parliament July 2005)

The directive is intended to improve the environmental performance of energy-using products by establishing rules for eco-design and ensuring that disparities among national regulations do not become obstacles to intra-EU trade. It defines conditions and criteria for setting requirements for environmentally relevant product characteristics (such as energy consumption). The EU expects that products which fulfil the requirements will benefit both businesses and consumers by facilitating free movement of goods across the EU and by enhancing product quality and environmental protection.

Source: europa.eu.int/comm/enterprise/eco_design/

Figure 18 (continued)

Registration, Evaluation and Authorisation of Chemicals (REACH)

The EU's REACH proposal increases the responsibility of industry to manage the risks from chemicals and to provide safety information on the substances. Manufacturers and importers will be required to gather information on the properties of their substances, which will help them manage them safely, and to register the information in a central database. A Chemicals Agency will act as the central point in the REACH system: it will run the databases necessary to operate the system, co-ordinate the in-depth evaluation of suspicious chemicals and run a public database in which consumers and professionals can find hazard information.

Source: europa.eu.int/comm/environment/chemicals/reach.htm

Note: REACH has proved to be extremley controversial due to the potential expense and the implications to the chemical industry worldwide and not just in Europe. After 2 years of negotiations, the European Parliament adopted the legislation in November 2005. The chemicals industry appears to have won some concessions, in as much as the list of substances to be tested has been reduced from 30,000 to 15,000.

The implications of introducing such requirements are significant for the Asian supply chain given its importance as a manufacturing base for ICT products. Taking the WEEE and RoHS directives as examples, whilst there is still much debate over the impact on companies in Asia, there seems to be some consensus on the reality of significant financial consequences. Companies in the electronics sector affected by the legislation must modify their manufacturing and design processes to comply. In doing so they must spend time and resources on testing and monitoring and also temporarily managing separate streams of compliant and non-compliant inventory. As an example, Dell has already banned hexavalent chromium, PBBs, PBDEs and cadmium and has aggressive goals to restrict the use of other substances such as lead, mercury and non-regulated halogenated flame retardants in its products in advance of legal requirements. However, an important customer such as Dell demands such standards, then this may provide the impetus to raise the standards for other customers. Compliance with RoHS is anticipated to be a significant challenge both technically and logistically.

Countries such as South Korea, Japan and China are developing their own legislative standards

Asian countries such as South Korea, Japan and China are responding by developing legislation similar to WEEE. In 2003, the Korean Ministry of the Environment introduced an Extended Producer Responsibility Scheme which imposes mandatory recycling amounts on certain products including electronic and electrical equipment. The scheme is based on a deposit refund framework which has been in place since 1992. These schemes have provided an invaluable opportunity for Korean companies to place themselves in a favourable position in terms of preparing for and complying with the WEEE directive. Korea's regulations addressing the requirements of WEEE are anticipated to come into force in 2008.

The situation that many companies in Asia are now faced with as a result of WEEE and RoHS is not new, as illustrated by experiences of the automobile sector and the introduction of the EU End of Life Vehicle Directive (ELV) in 2003, nor will it be the last. As globalisation of supply chains has bought such international requirements much closer to home, both the preparedness and demonstrable ability of supply chain companies to anticipate and respond to end-user market standards is crucial.

The expansion of the global supply chain therefore has had tangible impacts on consumer attitudes about corporate social responsibility. Black box manufacturing strategies are no longer respected if it means that consumers and importing governments cannot judge the sustainability impacts of the supply chain and product life cycle costs. This is not just a developed market issue. Globalization means that Asian companies are increasingly asked by Asian consumers about production standards and CSR. Consequently, both the preparedness and demonstrable ability of supply chain companies to respond to end-user market standards is certain to become a bigger issue both for Asian suppliers and home grown brands.

Figure 19 An Example of Addressing RoHS —LTK Cables (subsidiary of Hong Kong-listed Gold Peak)

In addressing the RoHS requirement, since 2003 LTK has required that products containing any of the prescribed six hazardous substances have to be re-designed or withdrawn. Suppliers are required to sign an agreement declaring that the raw materials are free from hazardous substances. Meanwhile, third party laboratory test reports are used to verify their materials' compliance. In house laboratory tests are performed to ensure that products are compliant.LTK is working with Underwriters Labotarories' (UL) Restricted Substances Compliance Solutions (RSCS) programme as its core compliance programme which serves as the starting point for the company meeting future regulations globally. UL's compliant components database further assists in sourcing suppliers who are compliant in the regulations.

Source: LTK Cables, 2005

THE LONGER TERM: A SHIFT TO STRATEGIC ENGAGEMENT

From carrot-and-stick strategies to engagement and investment

Supply chains consist of a complex network of organisations often with different and conflicting objectives

Clearly, the globalised business model is increasing the complexity of supply chains and raising the bar for supply chain management. As traditional vertically integrated business models morph into supplier networks, buyers are faced with an increasing number of diverse suppliers and service providers located thousands of miles from home base. These supply chains consist of a complex network of organisations often with different and conflicting objectives and which are increasingly discussed in terms of three key strategic characteristics: agility, alignment, and adaptability/flexibilty[25]. Whilst there seems little doubt amongst industry analysts and supply chain experts that, aside from cost effectiveness, these characteristics are in fact prerequisites of superior supply chain performance, the globalization of supply chains has

arguably created additional pressures in addressing these requirements and in all likelihood has complicated sourcing and inventory management.

The links of any supply chain are forged through relationships between buyers and suppliers. These relationships may constitute purely contractual alliances or they may constitute strategic partnerships. Whichever model is chosen, relationships and their development are crucial to managing the sustainability risks within the supply chain and are a significant influencing factor on the supply chain's agility and flexibility. Buyer/supply alignment is an important factor in ensuring that conflicting objectives of suppliers and their customers are managed.

Generally speaking, no one party is responsible for poor supply chain performance in the sustainability context. Indeed, we are beginning to see leading brands acknowledging that the conditions they impose on suppliers, which may be a result of internal policies and poor supply chain and quality management at the company level, are very much part of the problem. As an example, it is not uncommon for companies to get demand forecasts wrong by up to 40-60%, with lead times being far in excess of customer requirements. Inaccurate forecasting by buyers has obvious and significant implications for production and is likely to perpetuate unsatisfactory working conditions as well as potentially resulting in management issues such as increased worker turnover.

There is an increasing trend of leading global brands developing strategic partnerships with suppliers

Against this backdrop, we are seeing an increasing trend of leading global brands developing strategic partnerships with suppliers with the intention of forging long term relationships. Brands such as adidas-Salomon, Nike, HP, Dell, Gap Inc. are clearly being driven by recognition of sustainability impacts and supplier partnerships to provide the opportunity to integrate sustainability issues into their business models.

As customers deal with fewer suppliers, opportunities are created for relationship development, making it possible to solve structural sustainability problems rather than relying on a more traditional carrot and stick approach. Short-term impacts of higher standards can be mixed, however. While over the longer term higher standards should translate into broad-based economic and social benefits, social goals can be compromised when underperforming factories lose business due to poor standards. The "ethical unemployment" dilemma is one which has troubled activist groups and increasingly brands are seeking ways to identify and work with underperforming suppliers rather than simply walk away.

Investors must be alert to pricing, quality, and performance terms across the supply chain to understand suppliers' competitive position and sustainability performance

Overall, we believe that supply chain partnerships will be a crucial feature of successful long-term global business models. Companies that have aligned, flexible and responsive supply chains will lead the pack in mitigating sustainability risks. The task for investors in Asian supplier companies is to become better informed about the issues which are shaping supply relationships, especially new non-price variables. This has historically been an opaque issue with Asian suppliers often reluctant to characterize their key customer relationships in transparent or strategic terms. Indeed, the proliferation of multi-tiered supply chains often means that the key brand company driving demand may be two tiers away from the Asian listed supplier. As a result, investors should be alert to pricing, quality and performance terms across the supply chain in order to

accurately understand a given supplier's competitive position and sustainability performance.

Structural shifts as suppliers aim for higher margins

Japanese auto makers Toyota and Honda provide interesting insights in the supply chain context. Indeed, their supply chain strategy highlights the structural differences between sectors which can influence supply chain dynamics. For the leaders in the Japanese auto sector, maintaining relationships with specialised suppliers has generally taken priority over seeking suppliers defined by low labour costs. Where supply chains involve skilled workers and the development of technological expertise, such as the requisite design and engineering skills in the auto sector, suppliers will have greater leverage over their customers, effectively increasing supplier switching costs. The design and engineering skills of first tier suppliers also places them strategically at the forefront of addressing the longer term and somewhat inevitable demand for more fuel efficient and cleaner vehicles. Those suppliers that are in the longer term able to rise to the challenge and engineer solutions will position themselves to gain market share.

By comparison, the apparel sector is largely dependent on unskilled workers and relies significantly on low wage cost advantages. As a result, switching between contract manufacturers is relatively easy, widely practiced and therefore does not engender the development of partnerships. It is not uncommon for listed companies, such as Luen Thai Holdings Ltd., to cite the fact that the company has no long term contracts with any of its customers as a risk factor. Strategically, Luen Thai provides a good example of a company in the apparel sector that is beginning to increase its leverage with customers though extending its services throughout the supply chain, essentially adding design and logistics skills to preserve margins. With its Design-to-Store strategy, Luen Thai intends to adopt a collaborative end-to-end approach to satisfy the needs of its customers at every stage of the supply chain including design, product development, material management, production and delivery of finished goods to store. "Design-to-store calls for strong partnership and sound infrastructure on IT systems and logistics. As a result of such collaboration, our customers save costs by eliminating waste and redundancies from the supply chain".

Similarly, footwear manufacturer Yue Yuen is expanding its position upstream and downstream of the manufacturing process creating a vertically integrated supply chain, which also has additional benefits in the form of more effective information exchange. Yue Yuen states a key shareholder driver as being a business model emphasising strong partnerships with global brand customers.

Figure 20 Yue Yuen's Model

A leading supplier of branded athletic apparel and footwear, Yue Yuen is teaming up with leading players in the upstream footwear material production to provide fully integrated services in the upstream material supply chain. To accelerate its downstream vertical integration Yue Yuen has entered into a joint venture agreement with a leading logistics provider — offering fully integrated supply chain and logistics solutions that shorten lead times for inbound materials and outbound products.

Source: Yue Yuen Industrial (Holdings) Limited Company Fact Sheet

Another critical dynamic in the apparel sector is the issue of second sourcing as buyers endeavor to hedge against risks associated with reliance on suppliers in one locality, the SARs epidemic being a case in point. If consolidation progresses, buyers will need to think strategically about second sourcing. This situation can be both good and bad for sustainability. On the negative side, buyers choosing to source cheaply from low cost suppliers can perpetuate sustainability problems in the supply chain.

INVESTOR QUESTIONS FOR COMPANIES

For investors, we see considerable value in pushing beyond first-order questions about pricing and volumes to explore whether listed Asian supply chain companies are capable of a making the investment needed to become a top tier supplier. The key issues of concern to quality sensitive brands are linked to suppliers' ability to invest in workforce training to reduce health and safety risks and improve yields. Dialogue with Asian companies about these critical areas of production software often yields valuable insights into the competitive issues which shape gross margins over the medium term.

Customer relationships and compliance

- How would you describe your operational relationship with your key customers?
- What policies, systems, and strategies does your company have in place to address environmental, social, heath and safety issues?
- Do key customers request sustainability related information?
- Do customers undertake audits and if so, to what standards?
- What is the structure of customer payment? For example are there penalties for late delivery?
- How is compliance monitored?
- Where companies are certified, what are the main risks and hazards identified?

Internal management

- What are the figures and trends regarding employee turnover?
- How is training provided to ensure that employees are sufficiently skilled? Is induction training provided?
- Regarding compensation schemes, how are workers paid-are incentive schemes/penalty systems implemented?

Disclosure

- What is the timeframe on which your firm expects to disclose key sustainability data such as governance, safety and environmental performance?

Strategic management

- What is your firm's ability to monitor and respond to changing international regulations, such as product content and performance specifications?

RESOURCES

Company websites

• BYD	www.byd.com.cn
• Dell	www.dell.com
• Flextronics	www.flextronics.com
• Gap Inc.	www.gapinc.com
• Gold Peak	www.gpbatteries.com.hk/html/company/index.html
• Hewlett Packard	www.hp.com
• Li and Fung	www.lifunggroup.com
• Luen Thai Holdings Ltd.	www.luenthai.com/index.htm
• Nike	www.nike.com
• Phillips	www.phillips.com
• Samsung sdi	www.samsungsdi.co.kr
• Texwinca	www.texwinca.com
• Thai Carbon Black	www.thaicarbon.com/index.htm
• Yue Yuen	www.yueyuen.com

Examples of sustainability reporting

• 2004 Social Responsibility Report, Gap Inc.	www.gapinc.com/public/documents/CSR_Report_04.pdf
• 2005 HP Global Citizenship Report, Hewlett Packard	www.hp.com/hpinfo/globalcitizenship/gcreport
• Dell Sustainability Report, Fiscal Year 2005	www.dell.com/downloads/global/corporate/environ/2005_Sustainability_Report.pdf
• FY04 Corporate Responsibility Report, Nike	www.nike.com/nikebiz/nikebiz.jhtml;bsessionid=ZN3HCT2EZ01BMCQCGJDSF4YKAIZEQIZB?page=29&item=fy04
• Phillips Sustainability Report 2004, Phillips	www.philips.com/about/sustainability
• Sustainability Report 2004, Samsung SDI	www.samsungsdi.co.kr/contents/en/companyinfo/sustain_01.html
• Toyota Environmental & Social Report 2005	www.toyota.co.jp/en/index.html

Useful web-based resources

• EICC Supplier Code of Conduct	www.hp.com/hpinfo/globalcitizenship/environment/pdf/supcode.pdf
• Ethical Trade Initiative (ETI)	www.ethicaltrade.org
• Fair Labour Association (FLA)	www.fairlabour.org
• Global e-sustainability Initiative (Gesi)	www.gesi.org
• Hong Kong Stock Exchanges and Clearing Limited — Investment Service Centre	www.hkex.com.hk/listedco/listconews/sehk/search.asp
• International Finance Corporation (IFC)	www.ifc.org/sustainability
• International Labour Organisation (ILO)	www.ilo.org
• ISO14001	www.iso.org
• OHSAS 18001	www.ohsas-18001-occupational-health-and-safety.com/index.htm
• SA8000	www.cepaa.org
• Worldwide Responsible Apparel Production	www.wrapapparel.org

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8 World Council for Sustainable Development

9 PwC, 2004. *"Electronic Manufacturing — EMS at a Crossroads"*

10 Frederick H. Abernathy, Anthony Volpe, and David Weil. *"The Future of the Apparel and Textile Industries: Prospects and Choices for Public and Private Actors",* Harvard Center for Textile and Apparel Research

11 Safeguard quotas are temporary protection (generally quantitative restrictions) given to domestic industries in order to allow them the time required to adjust to potentially damaging import surges. Most safeguard measures are regulated by Article XIX of GATT 1994 (as interpreted by the WTO Agreement on Safeguards), but some agreements have their own rules, for example textiles and clothing, and agriculture- source: www.wto.org/english/thewto_e/minist_e/min96_e/textiles.htm

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Taking Stock

Adding Sustainability Variables to Asian Sectoral Analysis

February 2006

Auto
Banking
Metals & Mining
Oil, Gas & Petrochemicals
Power
Pulp, Paper & Timber
Supply Chain
Technology

Technology

Researcher: Stephen Fleming
Editor: Melissa Brown

Association for Sustainable & Responsible Investment in Asia

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Sustainability

Sustainability is a systemic concept, relating to the continuity of economic, social, institutional and environmental aspects of development. In the terms of the 1987 Brundtland Report of the UN's World Commission on Environment and Development, sustainability is: "Meeting the needs of the present generation without compromising the ability of future generations to meet their needs." The key concept for investors is the need to address a range of environmental, social, and governance (ESG) factors which will inevitably shape long-term returns as markets respond to changing resource requirements and public priorities.

INTRODUCTION

The technology sector stands as one of the major success stories of Asian export-led economic development, and a large and diverse set of listed regional firms has captured a significant share of the global market for technology products. Over time, Asian firms have succeeded in moving up the technology food chain, such that they now dominate entire market segments, including contract manufacturing, memory production and chip packaging, and TFT-LCD manufacture. Analysts are sanguine regarding the outlook for continued cyclical growth in both new product categories and in domestic consumer markets, and existing firms and numerous new entrants continue to march up the value chain, moving into product design, software and services. The industry is dynamic and globally competitive, serving as an engine for growth, development and wealth creation in the region.

While many investors conceive of the tech sector as a paradise of private sector innovation and intense, efficient competition, we contend that it is important to recognize that regulatory frameworks and government activity relating to the environment, industrial policy and the functioning of capital markets and legal systems are all relevant to equity valuations. Asian technology firms have prospered in environments that have been low-cost and loosely regulated, yet that also have been protected, subsidized and benefiting from public goods such as education, infrastructural support and funded research and development. Loose enforcement of intellectual property rights has also contributed to the early competitive success of the sector. The sustainability of these practices, and the possible need to transition to new approaches, will have direct bearing on the competitiveness of firms and nations in the region, and will impact investment returns in both the short- and the long-run.

Asian technology firms have prospered in environments that have been low-cost and loosely regulated, yet also protected, subsidized and benefiting from generous provision of public goods

Asian technology equity research is dominated by a focus on technological innovation, growth trends, product cycles and competitive issues. This reflects the short-term, trading-oriented research calls common to the volatile, cyclical, momentum-driven world of tech stocks.

However, we see evidence that investors can benefit from incorporating aspects of sustainability analysis in their evaluation of Asian technology equities. In this report, we assess these issues in the context of Asia's most broadly held large- and mid-capitalization listed technology companies. We believe that the most important sustainability themes for investors in Asian technology companies will be:

- **Toxics and takeback** Increased regulation of toxic materials in many end markets, product recycling and "takeback" requirements, environmentally-friendly product design and tightening regulation of manufacturing waste and pollution streams will all likely impact the competitiveness of Asian technology manufacturers, and have the potential to influence valuations in both the short- and long-run

- **Transparency** Shortcomings in these areas have direct bearing on the sustainability of technology industry development, and investors should be mindful of how careful consideration of these issues can help investors to manage important categories of portfolio risk

- **Industrial policy** The technology sector has benefited greatly from government policies intended to support key export industries, and equity investors have arguably enjoyed significantly enhanced returns as a result. Investors should ponder the sustainability of various subsidies, tax breaks and market protections, and will recognize that policy changes, even those seemingly far removed from the tech sector, have the potential to impact the long-term trajectory of returns

- **Intellectual property rights** The development of legal frameworks to provide strong intellectual property (IP) protections will be vital as firms seek to innovate and expand margins, and that is likely the most significant long-term sustainability issue facing the Asian technology sector. Investors seeking stable returns should target firms investing in long-term R&D capability, and they should overweight national markets that encourage investment through strong IP protections

COUNTRY AND SECTOR DYNAMICS

What the sector looks like today

The listed universe of ex-Japan technology stocks is highly diverse, with some very large cap diversified players

Asian technology firms, producing both hardware and software products, as well as an emerging variety of information technology services, comprise approximately US$350 billion of the US$2.5 trillion Asia ex-Japan equity markets. The listed universe of ex-Japan technology stocks is highly diverse, with a limited group of very large-cap diversified players, dozens of large-cap manufacturing firms, a handful of large IT services and outsourcing firms and perhaps hundreds of mid-, small- and micro-cap names occupying a wide variety of niches in the global technology food chain.

Figure 1 Larger Regional Listed Technology Companies

Market	Company	Market Cap* (US$mm)	Market	Company	Market Cap* (US$mm)
China	Lenovo	4,086	**Taiwan**	TSMC	47,034
	SMIC	2,477		Hon Hai	22,093
	Baidu.com	2,064		Foxconn Technology	11,345
	Sina Corporation	1,284		UMC	11,173
India	Infosys Tech	18,141		Media Tek	10,396
	Tata Consultancy	18,075		Asustek	8,796
	Wipro	14,477		AU Optronics	8,696
	Satyam Comp Serv	5,271		Chi Mei Optoelectronics	7,551
	HCL Technologies	3,831		High Tech Comp	6,694
	i-flex Solutions	1,807		Acer	5,661
Singapore	Venture Corporations	2,232		Quanta	4,545
	Chartered Semi	1,961		Powerchip	3,674
	STATS ChiPAC	1,341		Compal	3,168
South Korea	Samsung Electronics	96,954			
	LG Philipps LCD	14,970			
	LG Electronics	12,379			
	Samsung SDI	5,301			
	Samsung EM	2,869			

* As at 30 December 2005, or last official day of trading

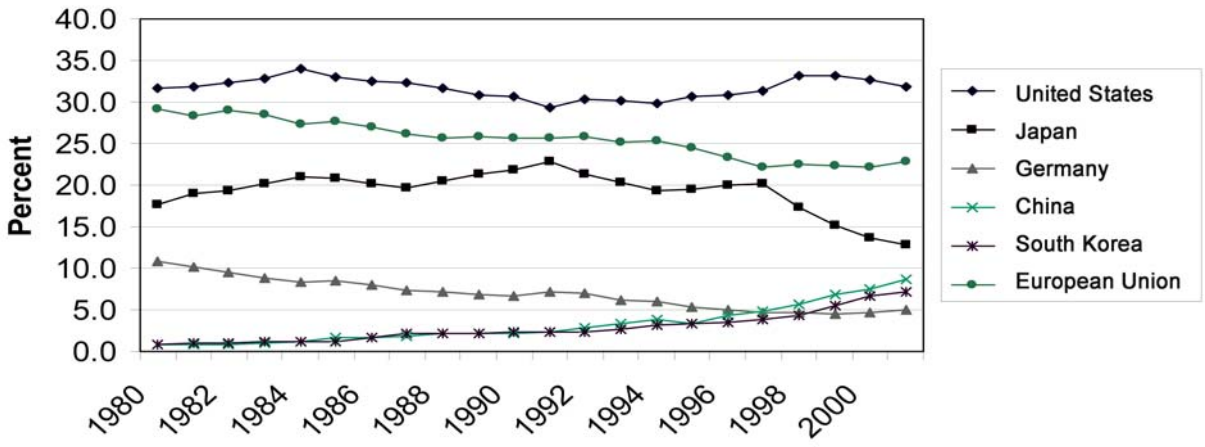
Source: Bloomberg, December 2005

While large capitalization names are headquartered in Korea, Taiwan, and to a lesser extent, India, the entire region participates in the industry, with semiconductor fabrication facilities, assembly operations, component manufacturers and services firms located in virtually every country. Different from many other industries in the region, direct government ownership or government control is fairly limited, as small private enterprises have rapidly grown into major firms, or as early government-owned interests were diluted to immateriality.

Korea

The Korean tech landscape is dominated by major chaebol-type firms such as LG and Samsung. These are broadly diversified across a large set of technology and consumer electronics segments, exhibit some vertical integration and have a relatively high level of brand recognition. Samsung, in particular, has emerged as a successful global brand and is the dominant player in a national industry that leads global production in both TFT-LCD and memory chips. Korea has an emerging dynamic tech economy that encompasses software developers, IT service providers and communications technologies driven by the highest broadband penetration rate of any major country in the region.

Figure 2 National Share of Global High-Tech Market, 1980-2001



Source: Global Insight

Taiwan

Taiwan is home to many of the world's most successful tech manufacturing operations, with particular concentration in semiconductor fabrication, LCD production and high-end contract manufacturing. Well known firms such as TSMC and Hon Hai have spawned a vast web of manufacturing and engineering firms that dominates the higher-value-added end of the Asian manufacturing spectrum and which supports an increasingly vibrant domestic R&D ecosystem.

China

China has emerged as the dominant national player at the low-end of the technology value chain, as major global firms have moved many low-value-added manufacturing operations offshore. More recently, both international firms and domestic players are increasingly building the ability of their Chinese operations to compete in higher-value-added areas. Domestic Chinese firms such as Ningbo Bird, TCL and Lenovo have risen to prominence serving emerging Chinese consumer markets.

India

India has a less-developed technology manufacturing base, but its large pool of highly educated, English-speaking labor has enabled the emergence of a set of internationally competitive IT services providers that is broad and deep, and poised for continued strong growth. The tech industry has grown at a 28% CAGR since 1998, and with revenues forecast to exceed US$28B in 2005, it accounts for 4.1% of Indian GDP, up from 1.2% in 1998.

Malaysia, Thailand, Philippines

Localized regions with reliable infrastructure, attractive labor pools and generous government incentives have attracted significant technology investment.

Although these countries have supported few major domestic technology firms, they are dotted with the operations of major Japanese, Korean, Taiwanese and Western technology firms.

Cross-cutting issues

Rapid growth, difficult cyclicality, relentless pressure to reduce costs

Asian firms have captured huge portions of virtually all areas of the technology market

While some technology product categories have matured in recent years, others are experiencing rapid growth. In virtually all categories, Asian nations, hosting both domestic and international players, have made dramatic gains in global share, and domestic manufacturers have fared disproportionately well as production has continued to migrate to the region from other geographies. Asian firms, enjoying lower operating costs, inexpensive capital and significant direct and indirect subsidies, have been able to capture huge portions of virtually all areas of the technology market, and the momentum continues to build, as network effects and supply chain proximity boost the concentration of activity in the region.

Asia appears well positioned to capitalize on many of the major trends emerging on the hardware side of the technology equation. First, the next PC upgrade cycle, driven by the long-awaited Microsoft Longhorn/Vista release, will boost a PC components and assembly sector that, excluding microprocessors, has shifted almost entirely to Asia. Second, the explosive growth of the display sector and its extension into the television market, which is discussed in greater detail below, has been entirely dominated by Asian producers. Third, the mobile phone handset segment, including new 3G phones, is rapidly shifting manufacturing to Asia and a number of new Asian firms have emerged to serve domestic markets. Other drivers will likely include the next generation of game consoles, portable media players, networking equipment and others, all of which are dominated by Asian firms. Memory chip production, in both the more mature DRAM segment and the exploding non-volatile/flash segment, is an Asian stronghold.

Although growth is generally strong, virtually all of these segments are characterized by boom-bust cyclicality, constant margin pressure and intense competition. Firms that do not control key intellectual property or process technology are particularly exposed. However, even those that have made significant investments to support innovation are subject to the same overriding imperative: to reduce costs as rapidly as possible and by whatever means possible. In this environment, sustainable labor practices and environmental conduct are often casualties of perceived competitive necessity. For further discussion of the influence of labour issues, see the related Supply Chain report, section: Labour and Environmental Challenges Shape Supply Chain Risks.

- **The display market illustrates tech manufacturing dynamics**

  The market for display devices is illustrative of many of the trends that play out repeatedly in various segments of the technology manufacturing sector. TFT-LCD displays are one of the largest emerging categories of technology hardware products, and revenue growth has been explosive,

driven by demand for notebook PCs, flat-panel displays, mobile phones, and more recently, flat panel televisions. According to DisplaySearch, a market research firm, the TFT-LCD segment grew 45% in 2004 to US$48.5 billion, up from $33.5 billion in 2003. Including digital light processing (DLP) and other Asian-dominated display segments such as plasma, industry revenues totaled $62.2 billion in 2004.

Figure 3 TFT-LCD Statistical Snapshot

Supplier	Q2:05 Market Share (%)	Y/Y Unit Growth (%)	National Market Share (%)		
				Q2:04	Q2:05
LG Philips LCD	23.4	98	Japan	11.5	9.5
Samsung	20.2	52	Korea	45.2	44.6
AU options	13.9	68	Taiwan	43.0	45.0
Chi Mei Opto.	11.3	89	China	0.2	1.1
Sharp	6.6	52			
Others	24.7	51			
Total	100.0	66			

By Application		
Category	Y/Y Unit Growth (%)	Y/Y ASP Decline
Notebook PC Panels	30	40
LCD Monitors	45	40
LCD TV	84	25

Source: DisplaySearch, Nikkei, Electronics Asia

Immense capital spending has driven capacity up to a point that threatens to swamp demand

A virtuous cycle of innovation, rising demand and falling costs has driven growth, yet immense capital spending of roughly $35 billion over the past two years has driven capacity up to a point that threatens to swamp demand, savaging average selling prices and margins. DisplaySearch estimates that enough capacity will be in place by the end of 2005 to produce 100M LCD televisions, and nearly 150M by the end of 2006; this rapid run-up of supply will require unusually strong demand growth, or further price erosion may ensue. All the major players are expecting to gain share, yet many industry observers expect oversupply to result and for a shakeout to come in due course. Nevertheless, at the time of this writing, TFT-LCD players continued to announce significant additional 7G capacity expansions.

As TFT-LCD products become further commoditized and cost pressures become more intense, manufacturing and investment will likely migrate to low-cost locations. DisplaySearch figures already show Japan losing share despite the presence of early leaders such as Sharp and Hitachi, Korea just holding on despite massive investment, and Taiwan making significant gains. China also has the potential to gain rapidly, depending in part on the performance of TCL, a major Chinese TV producer, as it enters the market in partnership with Thomson.

Whether in memory chips, hard disk drives, or technologies yet to be developed, this boom-bust dynamic will likely persist, as will the progressive migration to low-cost manufacturing centers. In this environment, the ability to innovate, to protect intellectual property, and, to a lesser extent, to build a recognizable consumer brand, will likely be among the best ways to build an enduring strong competitive position, and to escape the bruising competition inherent to the commodity end of technology markets.

The ability to innovate and to protect intellectual property will be crucial to a strong competitive position

- **Software & services**

Markets for software and services are gaining greater prominence in Asia, though still small in comparison to manufacturing. Enthusiasm for consumer-oriented opportunities has driven the emergence of a number of gaming and internet firms, as investor interest in nascent Chinese firms such as Baidu, Shanda, Sina, CTrip and others demonstrates. Despite much hoopla and its US$2.5B market capitalization, Baidu reported just $8.4 million in revenues in the June quarter, suggesting that while growth expectations are enormous, the current market is in a very early stage of development. Consumer oriented software and services markets are more mature in Korea and Taiwan, driven by higher incomes and high broadband penetration rates, yet few global scale firms have emerged.

The situation is quite different in commercial software and services, and the success of a group of Indian firms has received a tremendous amount of attention in recent years, heralding the emergence of a group of Asian firms with an opportunity to enjoy growth that is less cyclical and less prone to margin erosion. Tata, Infosys and Wipro, able to service global clients in the age of seamless internet communications, are capitalizing on a large labor pool of technically competent, English speaking workers in a domestic environment that provides legal protections for intellectual property and increasingly, a friendly, post-permit Raj regulatory environment.

Limited disclosure Investors in the Asian technology sector face significant challenges in assessing the sustainability risks associated with individual technology firms. Disclosure from large multinational technology firms is generally good, as firms have responded to CSR pressure with extensive sustainability reporting. Inclusion in sustainability indexes such as the FTSE4Good and the Dow Jones Sustainability Index (DJSI) has played a role in encouraging the stronger disclosure standards provided by a wide variety of firms, including such Japanese technology firms as NEC, Hitachi and Sharp. However, tech firms in the remainder of Asia have not generally met the same disclosure standards common to their Japanese competitors.

Consumer-facing firms have generally sought to bolster their reputations as non-polluting, socially responsible firms whose products provide ample social benefits. At Asian firms, however, sustainability reporting is either limited or non-existent. Although many firms presumably comply to some extent with the requirements of purchasers which are seeking to ensure sustainable practices within their supply chains, direct disclosure to investors is limited, and is therefore difficult to incorporate into the investment process.

Long-term sector outlook

The outlook for the sector looks good for continued increases in global market share

The technology sector in Asia will likely continue to develop at a rapid pace, and despite the inevitable turbulence of boom and bust cycles, the outlook is good for continued increases in global market share. At the low end of manufacturing markets, low costs, subsidies and favorable government policy will likely continue to be key factors. High cost manufacturing destinations such as Korea and Taiwan will increasingly experience the "hollowing out" phenomenon that has already progressed to a far greater extent in Japan. China will likely be the principal beneficiary of this trend, particularly if government policies, lending practices and labor costs remain largely unchanged. India may also emerge as an attractive destination for manufacturing, although current rapid growth is starting from a small base — India's 2002 total tech hardware production of $3.6B was dwarfed by that year's $20.8B tech output of Shenzhen alone. The continued prosperity of Korea and Taiwan and the success of the higher-value-added elements of the industry elsewhere will depend to an increasing extent upon the success with which firms are able to defend investments in research and development through intellectual property protections. Korea has made strong progress in this regard, Taiwan has lagged, and China has thus far recused itself from serious consideration of the issue.

Software and IT services will likely continue to be dominated by India which will capture the lion's share of growth. Indian firms have already demonstrated global competitiveness and will likely continue to take share from large western firms such as EDS, IBM, and other consultancies. Strong intellectual property protections and legal systems position India and Singapore well in this regard. Other countries that find the right combination of educated workforce, legal protection for IP and incentives, will likely do well. A key challenge for much of Asia in the coming decade will be to nurture innovation and to enable the development of global technology firms which will be able to escape the treadmill of relentless price competition in commoditized markets.

The rise of large domestic consumer markets, particularly in China and India, will likely drive a wide variety of changes in the industry. Large consumer-facing firms will face challenges of brand building, and although consumer awareness of sustainability issues will likely remain low, firms that cultivate a reputation for sustainable corporate practices may benefit as increasingly affluent consumers consider the impacts of their product choices.

ENVIRONMENTAL CONSIDERATIONS GAINING IMPORTANCE

Technology firms have generally benefited from a sustainability "halo effect," since IT-enabled gains in productivity and resource-use efficiency have made immense contributions to increasing the long-term sustainability of economic activity globally. However, the industry's legacy of producing toxin-laden products in an environmentally damaging, resource-intensive manner continues to come under scrutiny. Investors assessing sustainability issues

should familiarize themselves with the environmental issues facing the technology industry, as Asian governments and increasingly affluent Asian consumers may grow progressively more aware of, and perhaps intolerant of, certain forms of social costs associated with rapidly becoming the technology workshop of the world.

Regulation of toxic substances creates new risks

Although Asian governments are unlikely to be at the vanguard in promoting consumer protection regulation, Asian firms will face new, but manageable risks in ensuring that their products and sourced components are in compliance with such regulations in other parts of the world. In 2003, the European Union passed the Restriction on Hazardous Substances Directive (RoHS) mandating that a wide range of products meet strict new guidelines regarding toxic material content. Effective from July 1, 2006, the use of lead, cadmium, mercury, hexavalent chromium and PBB and PBDE flame-retardants will be heavily restricted, if not in fact effectively banned.

Sony learned a difficult lesson early, when 1.3 million PlayStation game consoles were seized in 2001 by Dutch authorities for illegal cadmium loadings in electric cabling, causing financial losses from lost sales and rework estimated to have totaled US$93 million. Sony ran afoul of local Dutch regulations, but with the formal implementation of RoHS next year, similar rules will govern markets across the entire EU.

Regulations governing toxic content in technology products raise the stakes in supply chain management

Given the strong link between toxics management and tougher standards for market access, it should not be surprising that the vast majority of technology manufacturers have now taken steps to ensure compliance with various local and RoHS requirements in their products and in all sourced components. There remains room for concern, however, because the absence of similar regulations in large Asian markets, most notably in China, creates the possibility that toxin-bearing components made through older and cheaper processes will remain common in products intended for regional use and could find their way into other parts of the electronics supply chain. As investors look at sourcing and supply chain practices for technology manufacturers in Asia, they should be aware of the financial and reputational risk involved with possible violation of RoHS requirements.

Product "takeback" is a new issue for consumer-facing tech firms

Passed in conjunction with the RoHS Directive, the EU's Waste Electrical and Electronic Equipment (WEEE) Directive sets collection, recycling and recovery targets for all types of electrical goods sold within the European Union. The WEEE addresses the problem of "e-waste", which has received increasing attention in recent years from a variety of NGOs and advocacy groups. The

Silicon Valley Toxics Coalition has reported extensively on the issue of electronics recycling in the US, while Greenpeace has researched the high levels of local contamination near recycling workshops in China and India where valuable materials are smelted out of some of the nearly 50 million tons of electronic equipment disposed of annually.

While the problem of e-waste will likely not impose significant new direct costs on Asian tech firms, there may be indirect fallout from not proactively addressing the problem. While leading developed market, consumer-facing brands such as Sony, Philips and Hewlett Packard have undertaken extensive efforts to "green" their products through their entire lifecycle, many emerging Asian brands such as BenQ and even some maturing ones such as LG Electronics appear to be at a much earlier stage of awareness of the importance these issues may hold as consumers seek to differentiate between the numerous brands available in the channel. Also, see the Supply Chain report, section: The Influence of ESG Regulatory Hurdles on Export Market Access.

Cost reduction — mixed impacts on sustainability

Cost containment does not always result in an improved sustainability profile

The constant imperative to reduce costs and improve product performance generally serves to reduce the impact of new products on a per-unit basis. Next generation products typically weigh less due to reduced materials use, require less power due to lower lifetime carbon impact, and are produced in factories that relentlessly cut costs wherever possible, often through increasing control of processes which, by improving yields, reduce waste. Investors should bear in mind, however, that cost containment does not always result in an improved sustainability profile, and the substitution of inexpensive labor for expensive capital, while reducing overall costs, can frequently increase waste, reduce quality and increase worker exposure to toxins. While resulting liabilities may appear low at this time, many firms may in fact be in the process of creating long-term liabilities with a high level of materiality.

Figure 4 Low Cost Batteries — Sustainability Tradeoffs

BYD Company Limited (HK: 1211) is a successful Shenzhen-based battery producer. Founded in 1995, the company has rapidly captured market share from manufacturers in Japan and elsewhere, and is now the largest maker of nickel-cadmium (NiCd) batteries in the world, and the second largest producer of lithium ion batteries. BYD employs 36,000 workers, mostly young women, at its campus in Shenzhen, China.

BYD's original listing prospectus cites a "unique production process" which "takes advantage of the abundant human resources in the PRC and adopts a labour intensive production process...adopting manual labour for procedures requiring less accurate techniques." BYD has undercut the precise, highly-automated, capital-intensive production processes common in Japanese battery factories, and its competitive advantage rests almost exclusively on cheap labor.

BYD presents two sustainability challenges. First, although no problems have surfaced publicly, many BYD employees, working in minimal protective gear, now manually assemble Ni-Cd batteries and risk exposure to metallic cadmium, which can be absorbed through the skin and lungs, causing a host of long-term health problems. Second, the firm's low 1% R&D spending rate exposes its relative lack of investment in technology; in the meantime, it has likely made use of IP developed by Japanese firms, and one lawsuit brought by Sanyo was settled early in 2005. Over the long run, employee health problems from extended exposure to cadmium could pose a risk to BYD, although in the current Chinese legal environment it is unlikely that this risk would prove material. Additionally, low levels of R&D investment threaten to undermine future battery innovation on a global scale if high-cost producers are unable to maintain R&D investment in the face of price competition from BYD. BYD is a good example of tech sector-driven economic development in the Chinese Pearl River Delta region, yet the nature of its success poses difficult tradeoffs for sustainability-oriented investors.

Sources: BYD Website, NE Asia Online, BYD Prospectus

Poor process control and a focus on short-term cost reduction can result in spectacular failures

Poor process control and a focus on short-term cost reduction can result in spectacular failures. This was recently seen with Abit Computer, a listed Taiwanese PC motherboard manufacturer, which has been linked to a US$442M write-off by Dell Computer for costs associated with replacing and servicing defective motherboards in its OptiPlex line of PCs. In what has been described as a cost reduction effort, Abit engineers used capacitors which proved unsuitable in the product, leading to electrolyte leaks and product failure. While such incidents are rare and may serve as wake-up calls for others in the industry, they underscore the risk for investors when inadequate process control and competitive pressure lead to major errors, whether they be in product quality, environmental compliance, or other areas of the business.

Managing environmental impact of production remains important

The environmental impact of technology manufacturing is not inconsequential, and investors should seek to verify that portfolio companies are not needlessly incurring long-term liabilities, and that they are actively minimizing costs through efficient use of power, water and other inputs. A modern, high-end semiconductor lab can use as much water as a city of 100,000 and tens of megawatts of electricity, and thus can have a significant impact on its local environment.

In the US, much has been made of the environmental contamination caused by such major firms as IBM, Fairchild Semiconductor, Intel and others during the early stages of the technology manufacturing boom from the 1950s through the 1980s. Groundwater plumes of leaked toxic chemicals, soil contamination and other toxic releases have resulted in 29 US EPA Superfund sites in Santa Clara County (heart of Silicon Valley) alone. Employee lawsuits over exposure to toxic chemicals, particularly organic solvents thought to be responsible for "cancer clusters", persist as liabilities for many major technology firms. Although most contemporary manufacturing processes have been developed to limit the potential for creating environmental liabilities in highly-regulated, litigious settings such as the US, Asian investors should keep in mind that firms continually run the risk of creating material long-term liabilities.

OEMs will have little difficulty dropping virtually any supplier in order to clean up their supply chains, exposing firms and their investors to declines in revenue

Perhaps the most obvious and immediately material risk for technology manufacturers is the possibility of losing major OEM customers. The products of most Asian technology firms have limited differentiation and are often fungible and easily replaced by other vendors. In an environment in which local and international activists are increasingly likely to publicize incidents of contamination or worker exposure to toxics, OEMs will have little difficulty dropping virtually any supplier in order to clean up their supply chains, exposing firms and their investors to potentially catastrophic declines in revenue. Also see the Supply Chiain report, section: Cross-cutting issues.

THE IMPACT OF TRANSPARENCY, GOVERNANCE & CAPITAL MARKETS

Standards for transparency in Asia are low

Financial disclosure inadequate

Standards of disclosure in the technology sector are not considered to be out of line with other industries in the region, and listed firms generally comply with accounting rules and disclosure standards promulgated by regional exchanges and governments. However, Asian tech sector disclosure is weak relative to standards in developed markets, and even US-listed Asian firms can be surprisingly opaque. Particularly troubling in the tech sector is the accounting treatment of, and disclosure requirements for, joint ventures, which are

increasingly common as firms link up to share technology, pool resources for immense capital spending projects, and to penetrate markets around the region. IAS 31 has tightened up disclosure requirements as of this year, yet both equity accounting and proportionate consolidation leave gaps in the level of information available to investors about both control and financial results in specific joint ventures. As many firms report an increasing percentage of net income from joint ventures, particularly among Taiwanese tech conglomerates, investors should demand greater disclosure to gain better insight into the sustainability of the reported financial performance of firms.

Figure 5 Limited Transparency in the Chinese Technology Sector

Huawei [a maker of telecom equipment] is ostensibly privately-owned, although many of its shares are owned by the local state telecoms authorities to which it has sold equipment. It enjoys a US$10bn low-interest credit line from the China Development Bank, whose mission is to make concessional loans in support of state policy goals. Huawei's ties to China's military have long been the subject of speculation. For the most part, Huawei seems to act independently. Yet, so much about the firm's parentage is obscure that one can never be entirely sure.

Source: *"Chinese Bids Reveal Complexity of State Ownership"*, Financial Times, August 8, 2005

Sustainability disclosure limited in most instances

In October of 2004, an industry initiative called the Electronics Industry Code of Conduct (EICC) established guidelines for participating firms in key areas of sustainability. The EICC seeks to govern conduct in three categories of firms: original equipment manufacturers (OEMs), original design manufacturers (ODMs), and electronic manufacturing services (EMS) providers. The EICC sets specific and detailed goals on practice and disclosure in five key areas: labor, health & safety, environment, management systems and ethics. Founding members include IBM, Dell, Hewlett-Packard, Flextronics, Celestica, Jabil, Sanmina SCI and Solectron. Additional firms, including Cisco, Sony, Microsoft, Intel and others, have subsequently adopted the EICC. EICC compliance is emerging as a focus for sustainability reporting at most member firms which publish comprehensive annual sustainability reports.

No Asian firms have adopted the EICC and sustainability disclosure is virtually non-existent

At this time, no Asian firms have adopted the EICC (and even in Japan, only Sony appears to have adopted the EICC), and sustainability disclosure is virtually non-existent. Samsung published a 2004 "Green Management Report" which details a wide variety of practices contributing to reduced emissions and pollution, product recycling, safety & health practices and community engagement, but this sort of report does not exist at other large-cap Asian (ex-Japan) technology firms. Even TSMC, a prominent Asian component of the Dow Jones Sustainability Index, provides remarkably little information to investors regarding practices of interest to most sustainability-oriented investors. In the absence of disclosure regarding sustainability metrics, Asian tech investors lack the disclosure tools crucial to assessing the materiality and potential impact on returns of these sustainability-related issues.

Corporate governance standards are insufficient to mitigate risk

The technology sector is particularly prone to JV abuse

Problems related to inadequate corporate governance standards in Asia have been extensively documented, and the technology sector is also prone to abuse. Investors will look for independent boards and simple capital structures with sufficient protections for minority shareholders. Joint venture (JV) structures are also subject to governance risk since reduced transparency and transfer of control can limit the extent to which investors can monitor the behavior of management. The technology sector is particularly prone to JV abuse, both due to the frequency with which firms create JVs to pursue new product opportunities, and due to the scale of the value transfer when firms pledge key IP and process technologies to non-wholly-owned entities.

Capital markets subject to manipulation and inefficiency

The pronounced volatility of technology stocks enhances the opportunity for abuse from insider trading and share manipulation. Although such abuse can be rationalized as a "victimless crime", selective disclosure passes losses on to the investing public which undermine the health of capital markets in the region. Conversations with analysts, investors and company officers reveal a market culture with a short-term focus and a strong appetite for rumor and hot stock tips that extends from the boardroom to the assembly line, creating a situation where investors are often caught in a zero-sum game. Sustainability-oriented investors can benefit through the recognition of the importance of regulation aimed at curbing such abuses and will need to stay alert to market-level changes in enforcement of securities laws as Asian governments continue their march toward higher standards.

INDUSTRIAL POLICY: THE ROLE OF ASIAN GOVERNMENTS

To varying extents across much of Asia, technology firms have been the beneficiaries of deliberate, long-term, government-led industrial policies. Mercantilist trade practices, targeted subsidies, tax abatements and holidays, and other techniques have been marshaled to support the growth of the technology sector to a greater extent than in virtually any other industrial sector. Careful government policy, perhaps as much as Asia's feted tech entrepreneurs, should be credited with success in capturing global market share. Bank lending has financed a much greater portion of the capital expansion of the technology sector than in other parts of the world, partly due to less mature capital markets, but also due to government intervention in the allocation of capital. Numerous government-sponsored technology parks, such as Hsinchu in Taiwan or Suzhou in China, have frequently provided tech firms with cheap land, reliable and subsidized utilities, extensive tax breaks, waivers on a variety

of regulations and other subsidies that have promoted the rapid expansion and competitiveness of clusters of activity in the technology sector. Other government policies, ranging from fixed exchange rate regimes to intellectual property enforcement policies that benefit domestic producers, have also played important roles in shaping the modern Asian tech sector. Investors considering the long-term prospects of the industry should consider whether or not current industrial policies can be sustained in the long-run and whether or not change may come due to underlying economics, WTO rules interpretation and implementation, or shifting levels of popular political support for certain practices.

Policies promulgated to promote the development of the technology industry are unlikely to change rapidly anywhere in the region, but sustainability-oriented investors will likely have greater awareness that such policies come with considerable price tags attached. As the industry matures and populations grow more affluent, taxpayers may grow less willing to provide generous support to technology firms. Support for direct subsidies and giveaways may falter, or such practices may be curtailed in the face of WTO regulations. In economies where direct bank lending constitutes a large portion of the funding for technology-related capacity expansion, the ability of politically influenced lenders to efficiently allocate capital is uncertain. Frequent predictions of dire consequences for the banking sector in China and elsewhere have generally come to naught in recent years; however the risk is a real one, and could prove particularly acute if a technology downturn coincides with recession in any of the Asian economies. During the Asian Financial Crisis, the Korean public shouldered a significant portion of the bad debt incurred at overextended chaebols, and Hynix, a restructured Hyundai spin-off, re-emerged as a global technology competitor thanks, effectively, to a large public bailout. The willingness, or for that matter, the ability of governments to provide such support should be a concern for investors.

INTELLECTUAL PROPERTY RIGHTS: SUSTAINED GAINS FROM INNOVATION?

Increased protections for intellectual paroperty will be critical to the sustained long-term development of Asian economies

The issue of intellectual property rights (IPR) has emerged as a source of considerable controversy within Asia and a source of conflict with trading partners. The developing economies of the region maintain a reputation for misappropriation of designs, processes and technologies which would enjoy significant protection under copyright or patent law in most developed nations. Burgeoning regional trade surpluses with the United States and other nations have elevated the significance of the problem and have prompted calls for new protections for, and stricter enforcement of, IPR —which is an important basis for developed-country comparative advantage. While a loose approach to IPR has contributed significantly to economic development in the region, helping to grow manufacturing capacity and to provide affordable goods to consumers, the continuance of existing IPR policies could pose a growing threat to future economic development in the region. Beyond the overt and immediate danger of new restrictions on trade, a lack of intellectual property protection will have a pernicious and chilling effect in the long-term on domestic innovation, as

incentives for investment in R&D are eroded by an inability to effectively monetize intellectual property. We believe that increased protections for intellectual property will be critical to the sustained development of higher-value-added economic activity in developing Asia, and that without reform, Asian firms will face increased resistance in international markets. Investors will increasingly recognize the importance of this issue and will seek to invest in firms building long-term R&D capability, and to overweight national markets that encourage investment through strong IP protections.

Non-observance of intellectual property rights is common in Asia

Software piracy is a well-documented area of intellectual property theft, and countries with three of the top five national piracy rates are in Asia

Most casual observers of Asia will be familiar with street-level sales of counterfeit DVDs and handbags, but the problem runs deep with some analysts estimating that counterfeit goods, including auto parts, electronics and pharmaceuticals, constitute as much as one third of industrial output in China. In the technology sector, software piracy is a well-documented area of intellectual property theft, and countries with three of the top five national piracy rates are in Asia: Vietnam, China and Indonesia. Even in India, where a significant domestic software industry has emerged, high piracy rates undermine a sector which already exports product worth more than three times the value of the domestic market. The chilling effect that the prevalence of piracy has on domestic software production is evident in the lack of major domestic packaged software firms throughout much of the region.

Figure 6 Software Piracy in Asia

	2004 Piracy Rate (%)	Est. Annual Industry Losses (US$m)
China	90	3,655
Hong Kong	52	116
India	74	519
Indonesia	87	183
Malaysia	61	134
Philippines	71	69
Singapore	42	96
South Korea	46	506
Taiwan	43	161
Thailand	79	183
Vietnam	92	55
United States	21	6,645
Japan	28	1,787
France	45	2,928
United Kingdom	27	1,963

Source: Business Software Alliance, IDC, 2005

In technology hardware markets, the intellectual property situation is murkier. Firms participating in export markets or in the supply chains of major international firms must comply with end-market IP regulations or risk loss of contracts and lawsuits — frequently brought in jurisdictions which take an unfavorable view on patent infringement. Output for domestic markets, however, is another matter and cheap, generic products, liberated from the costly burden of royalties, are widely available. Large consumer hardware brands, increasingly dominant in wealthier Asian markets such as Korea and Taiwan, are generally in compliance with IP rules for their finished products, but much remains unclear about IP usage in manufacturing process technology. Virtually all commentators on intellectual property rights in China agree that violation is common and flagrant, enforcement is minimal and that near-term prospects for significant improvement are dim.

IP investment is essential

IP investment is essential for defensible margins and long term global competitiveness. Innovation and development of intellectual property will enable Asian firms to establish enduring competitive advantage in global markets and to get off a treadmill of ferocious competition based on lowest cost manufacturing. Firms will not be able to leap to technological leadership overnight and a long-term commitment will be necessary to nurture national R&D capability. Firms will need to make long-term investments and nations will need to invest in education and adopt well-designed measures to protect IP and encourage innovation. As governments begin to address this area, investors will need to differentiate between various corporate and national strategies and to assess where the most effective investments in IP are being made.

Firms will need to make long-term investments to protect IP and encourage innovation

Development of local standards is a risk IP promotion strategy

One controversial method of encouraging domestic development of intellectual property is to establish unique standards which empower domestic firms while shutting out foreign competition. Korea has pursued domestic standards in the past, and China is now the principal user of this tactic. The establishment of a local standard, for which local firms will frequently hold key patents, enables firms to dominate a domestic marketplace; but it can also reduce the ability of firms to compete in international markets where other standards prevail.

There are several recent examples of this practice. The Chinese government is currently pushing the TD-SCDMA wireless standard for 3G networks in an effort to circumvent WCDMA and CDMA2000 standards, as well as a domestic "EVD" standard, distinct from global DVD standards. Another example came in 2003 when the Chinese government declared that all wireless LAN chipsets would need to use the Chinese-developed WAPI security protocol. This would have forced foreign firms to license the Chinese standard, tilting the playing field toward domestic producers since foreign producers would lose the scale economies gained by shipping the same products in numerous international

markets. The WAPI requirement was dropped only in the face of forceful lobbying by the US government.

The advantage bestowed by leadership in a domestic standard-based market is a mixed blessing for firms, which may enjoy enhanced profits at the expense of global competitiveness. If these profits enable rapid capital accumulation and investments in long-term R&D, then globally competitive national champion firms may yet emerge, though a positive outcome is by no means certain. The only certainty is that the approach will yield considerable economic deadweight losses for the host nation in the process. This risk is apparent in efforts by the Chinese government to promote, through public-sector procurement policies, Linux-based open source software products. Although cost savings may result from forsaking Windows-based software for products supported by Chinese firms such as Red Flag Linux, there is a substantial risk, as with Linux-based products in other markets, that lack of functionality, applications and support may leave users stranded, potentially facing high costs in an underfinanced standard. In a market where software piracy is unchecked, users may be inclined to choose "free" Windows applications over "free" Red Flag Linux applications, leaving domestic developers to wither in the absence of meaningful IP protection.

Figure 7 Government Intervention and a Domestic Standard Play Havoc with 3G Adoption in China

As 3G wireless networks roll out around the world, progress in China is stalled as the industry awaits the outcome of a standards debate. Chinese mobile carriers expected to receive 3G licenses in 2005, but observers now expect that licenses may not be issued until late 2006 or later. Expectations for a capital spending boom have been reined in from north of US$30 billion to as little as US$10 billion over the next three years, and even that has been cast into doubt. While 2G mobile uptake continues rapidly (China now has 330mn mobile subscribers, yet only a 26% penetration rate), the market for high-end handsets and advanced services is in limbo.

Underlying the 3G delay is a standards battle as the Chinese Academy of Telecommunications Technology (CATT) backs the homegrown TD-SCDMA standard over the WCDMA and CDMA2000 standards prevalent in the rest of the world. Although framed as a debate over the best technology, the dispute is clearly driven by business considerations. The Asian Wall Street Journal estimates that Chinese firms would face royalties of up to 25% if they adopt foreign 3G standards, versus 2G royalties closer to the 8% level, and that these costs could eliminate much of the competitive advantage that Chinese firms have enjoyed in recent years; royalty payments to Qualcomm and other western firms could exceed $7.5 billion over the next five years by some estimates. Another rather banal consideration is that CATT is a majority shareholder in Datang Mobile, which would, along with Huawei and ZTE Corporation, benefit greatly from TD-SCDMA adoption.

If China goes ahead with TD-WCDMA, then domestic firms will doubtless capture market share from Western vendors and enjoy increased short-term profitability. Those profits may, in turn, fund R&D which could better enable Chinese firms to compete globally, although the effectiveness of this mercantilist strategy remains to be seen.

Sources: *"China Eases up on 3G"*, Asian Wall Street Journal, June 30, 2005;
"China's IP Standoff", Asian Wall Street Journal, July 5, 2005;
"Facing the China Challenge", Boston Consulting Group, June 2004

Foundation for strong R&D capabilities is being built

Despite the current dominance of developed market IP, Asian technology firms are well positioned to build world-class research and development capabilities. Globalized R&D operations will enable Asian firms to set up research centers in developed countries while capitalizing on returning expatriates and strong domestic educational systems.

Figure 8 Annual Engineering Degrees Awarded by Country, Science and Engineering Articles by Geography

	Number of Degrees Awarded	Science and Engineering Articles by Geography			
Country	(Bachelor level degrees only, figures in year 2000)	**Country**	**1988**	**2001**	**% Change**
China	291,563	**United States**	177,700	200,900	13
EU-15	179,929	**Western Europe**	143,900	229,200	59
Japan	104,478	**Asia**	51,800	113,600	119
Russia	82,409	China	4,600	21,000	354
India	59,536	India	8,900	11,100	25
United States	56,508				
South Korea	26,587				
Taiwan					
Mexico	24,184				
Poland	21,618				

Source: US National Science Foundation, 2002

Nevertheless, the current R&D situation is somewhat difficult to ascertain since many listed Asian firms do not break out research and development expense as a separate P&L item in published financial disclosures. Greater disclosure in this regard will enable investors to assess this critical sustainability metric.

Frameworks to protect IPR are emerging throughout Asia

The outlook for intellectual property protection is improving, but much remains to be done to create a fertile environment for innovation. While external pressure, perhaps driven by the US or the WTO, will occasionally bear fruit, the battle for IPR enforcement will ultimately be a domestic political battle waged by various interest groups. When enough stakeholder groups realize that their long-term interests are best served by robust IP protection, the tide may begin to turn against IP abusers, and robust and impartial protective mechanisms may eventually emerge.

One argument against patent enforcement is that the system is unjust, forcing consumers to overpay for products. Tao Xinliang, the dean of the School of Intellectual Property at Shanghai University, was quoted in The New York Times saying that "we must make sure that prices are reasonable, that the whole family of mankind can enjoy the fruits of production...things should operate in such a way as to make rich people richer and poor people richer too, as opposed to making rich people richer and poor people poorer." This viewpoint, while perhaps morally justifiable, seemingly disregards the negative impact on innovation. A similar argument has been marshaled in India against high pricing for patented western medicines since many could not afford patented medicines, but the momentum shifted critically in recent years. In March of this year, the Indian parliament passed new intellectual property protections with the enthusiastic support of the domestic pharmaceutical industry, which now supports policy that enables the protection of its own intellectual property. Indian drug companies, which filed for more than 800 international patents last year alone, now expect a torrent of foreign direct investment to support innovation; and software makers are similarly optimistic.

Only 18% of all Chinese patent applications since 1985 have been from international applicants

In China, halting steps forward are being made, although the general lack of impartial legal systems and robust enforcement undermines progress. Many IP-related laws were passed prior to WTO accession in 2001, but administrative and enforcement mechanisms remain inadequate. The State Intellectual Property Office, charged with administering patents, is viewed as under-funded and understaffed, and currently faces a three-year backlog of unread patent applications. A hodgepodge of agencies with overlapping jurisdiction has also led to many foreign firms abandoning efforts to protect IP in China, and only 18% of all Chinese patent applications since 1985 have been from international applicants. Since Chinese patent applications account for less than one percent of the total filed in Europe and the US, the imbalance suggests that foreign firms do not consider a China filing worthwhile. The Chinese Venture Capital Association will likely continue to clamor for more meaningful IP protections, but the momentum has yet to shift.

Ironically, it is the US legal system that is one of the most important arbiters of Asian IP disputes as Asian firms are increasingly suing each other's American subsidiaries for patent infringement. TSMC extracted a US$175 million settlement from SMIC when it added claims in US courts to a complaint that had been languishing in a Taiwanese court. Settlements of this magnitude highlight the potential materiality of IP infringement suits and help support the view that this particular sustainability issue has the potential to impact equity valuations.

Figure 9 Asian Firms Slug It Out in US Courts

When IP protections in Asia have proven insufficient, Asian firms have turned to courts in the United States to defend their intellectual property. Taiwan Semiconductor Manufacturing Corporation (TSMC, based in Taiwan), the world's largest provider of semiconductor foundry services, sued Semiconductor Manufacturing International Corporation (SMIC, based in Shanghai) for patent infringement, in Taiwan in January 2002, but when this case failed to proceed expeditiously, they filed new claims in the US Federal District Court in December 2003. Although these charges were initially dismissed, TSMC re-filed an expanded set of claims in California State Superior Court in April 2004 as well as in the US Federal District Court, and additionally filed a complaint with the US International Trade Commission. Since both firms had significant sales and operations in the US, and were both publicly listed on US exchanges, the jurisdiction of the courts was clear. In January 2005, SMIC agreed to a US$175mn settlement with TSMC requiring cash payout over a six year period. The settlement costs amount to nearly 3% of revenues, and almost a quarter of SMIC's reported net F2004 profits.

In another case, Hitachi Global Storage Technologies sued Chinese hard disk drive manufacturer GS MagicStor in December 2004 for infringement of patents related to the design and manufacture of Hitachi's 1" HDDs. GS MagicStor had begun to supply drives for Apple Computer's popular i-Pod, and Hitachi filed suit in the US Federal District Court for the Northern District of California after determining that its patents had been infringed. Hitachi had significant operations in the US, considering that in 2003 it had purchased IBM's California-based HDD business, but GS MagicStor had only a sales subsidiary. Nevertheless, the court appears to have jurisdiction in the matter, and the case is proceeding.

Source: SMIC SEC Form 20-F 12/31/04; Hitachi GST website, PC World Magazine, ZDNet

INVESTOR QUESTIONS FOR COMPANIES

Compliance and standards

- What systems does your firm have in place to ensure that all components meet RoHS requirements?
- What steps are you taking to monitor all the links in your supply chain for compliance, and how sure are you that your firm is not exposed to risk of fines or, more significantly, product impoundment and recall?
- Are you familiar with the Electronics Industry Code of Conduct (EICC)? What impact do you think that adoption of such a code would have on your business?
- In consumer-facing parts of your business, how do you intend to approach product takeback requirements? In the absence of government takeback regulations, do you view takeback as a competitive differentiator in consumer markets?

Internal management policies

- What internal disciplinary policies are in place to prevent environmental and safety violations?

Disclosure

- What is the timeframe on which you expect to begin to disclose key sustainability data, such as environmental citations, carbon emissions, and other?

Strategic management

- How do you determine where to locate new manufacturing facilities? What sort of tax abatements and other government support are you able to receive from various jurisdictions?
- How do you approach the issue of intellectual property? In what countries do you file for patents?
- What are your views regarding the current level of legal protection for your intellectual property? Do you believe that stricter enforcement would help your business?

RESOURCES

Company websites

- Abit Computer www.abit.com.tw
- Acer Inc. www.acer.com
- Asutek www.asus.com
- AU Optronics www.auo.com
- BenQ www.benq.com
- BYD Company Limited www.byd.com.cn
- Chartered Semiconductor Manufacturing www.charteredsemi.com
- Chi Mei Optoelectronics www.cmo.com.tw/cmo/english
- Compal Electronics www.compal.com
- Foxconn www.foxconn.com
- HCL Technologies www.hcltech.com
- I-Flex Solutions www.iflexsolutions.com
- Infosys www.infosys.com
- Lenovo www.lenovo.com/us/en
- LG Electronics www.lge.com
- LG Philips LCD www.lgphilips-lcd.com
- Philips Electronics www.philips.com
- Powerchip www.psc.com.tw
- Samsung Electronics www.samsung.com
- Samsung SDI www.samsungsdi.co.kr
- Satyam Computer Services www.satyam.com
- Taiwan Semiconductor Manufacturing Co. www.tsmc.com
- Tata Consultancy Services www.tata.com/tcs
- United Microelectronics Corporation www.umc.com
- Wipro Technologies www.wipro.com

Examples of sustainability reporting

- Hewlett Packard www.hp.com/hpinfo/globalcitizenship
- IBM www.ibm.com/ibm/environment
- Intel www.intel.com/intel/finance/gcr04/intel_gcr_2004.pdf
- Microsoft www.microsoft.com/mscorp/citizenship
- Philips Electronics www.philips.com/about/sustainability
- Samsung www.samsung.com/AboutSAMSUNG/ELECTRONICSGLOBAL/SocialCommitment
- Sony www.sony.net/SonyInfo/Environment
- UMC www.umc.com/English/about/images/environment_report_eng_1.pdf

Useful web-based resources

• Business Software Alliance	www.bsa.org
• Electronics Industry Code of Conduct	www.hp.com/hpinfo/globalcitizenship/environment/pdf/supcode.pdf
• Electronic News	www.reed-electronics.com/electronicnews
• European Recycling Platform	www.erp-recycling.org
• Intellectual Property Department, Government of the Hong Kong SAR	www.ipd.gov.hk
• International Data Corporation (IDC)	www.idc.com
• International Finance Corporation	www.ifc.org/sustainability
• National Association of Software and Services Companies (India)	www.nasscom.org
• Semiconductor Equipment & Materials Int'l	www.semi.org
• Semiconductor Industry Association	www.sia-online.org/home.cfm
• Silicon Valley Toxics Coalition	www.svtc.org
• Technology Policy & Assessment Center, Georgia Institute of Technology	tpac.gatech.edu
• State Intellectual Property Office of the PRC	www.sipo.gov.cn/sipo_English/default.htm
• US EPA PFC Reduction/Climate Partnership for the Semiconductor Industry	www.epa.gov/highgwp/semiconductor-pfc/overview.html
• U.S. National Science Foundation	www.nsf.gov

Papers & further reading

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About the Author

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ABBREVIATIONS

ADBI	ASIAN DEVELOPMENT BANK INSTITUTE
AMC	ASSET MANAGEMENT COMPANY
ATC	AGREEMENT ON TEXTILES AND CLOTHING
BHKP	BLEACHED HARDWOOD KRAFT PULP
BKP	BLEACHED KRAFT PULP
BOT	BUILD, OPERATE AND TRANSFER
CAGR	COMPOUND ANNUAL GROWTH RATE
CDM	CLEAN DEVELOPMENT MECHANISM
CLS	CONTINUOUS LINKED SETTLEMENT
CNG	COMPRESSED NATURAL GAS
COC	CHAIN OF CUSTODY
DCM	DEBT CAPITAL MARKETS
DRAM	DYNAMIC RANDOM ACCESS MEMORY
ECM	EQUITY CAPITAL MARKETS
EHS	ENVIRONMENAL HEALTH AND SAFETY
EIA	ENERGY INFORMATION ADMINISTRATION
EICC	ELECTRONICS INDUSTRY CODE OF CONDUCT
EMS	ELECTRONIC MANUFACTURING SERVICES
ESG	ENVIRONMENT, SOCIAL & GOVERNANCE
ETI	ETHICAL TRADING INITIATIVE
EU ELV	EU END OF LIFE VEHICLE DIRECTIVE
EU ETS	EU GREENHOUSE GAS EMISSION TRADING SCHEME
FDI	FOREIGN DIRECT INVESTMENT
FGHY	FAST GROWING HIGH YIELD
FLA	FAIR LABOUR ASSOCIATION
FLEG	FOREST LAW ENFORCEMENT AND GOVERNANCE
FLEGT	FOREST LAW ENFORCEMENT, GOVERNANCE AND TRADE
FM	FOREST MANAGEMENT
FOB	FREIGHT ON BOARD
FSC	FOREST STEWARDSHIP COUNCIL
FX	FOREIGN EXCHANGE
GENCOS	GENERATING COMPANIES
GESI	GLOBAL E-SUSTAINABILITY INITIATIVE
GIS	GEOGRAPHIC INFORMATION SYSTEM
GRI	GLOBAL REPORTING INITIATIVE
HBV	HEPATITIS B
HKMA	HONG KONG MANAGEMENT ASSOCIATION
HFC	HYDROFLUOROCARBONS
IAI	INDEPENDENT ASSESSMENT INSTITUTIONS
IAS	INTERNATIONAL ACCOUNTING STANDARDS
ICC	INTERNATIONAL CHAMBER OF COMMERCE
ICMM	INTERNATIONAL COUNCIL ON MINING AND METALS
ICT	INFORMATION, COMMUNICATION AND TECHNOLOGY
IFC	INTERNATIONAL FINANCE CORPORATION
IFR	INTERNATIONAL FORESTRY REVIEW
IFRS	INTERNATIONAL FINANCIAL REPORTING STANDARDS
IGCC	INTEGRATED GASIFICATION GAS COMBINED CYCLES
	INTEGRATED COAL GASIFICATION COMBINED CYCLES
IIED	INTERNATIONAL INSTITUTE FOR ENVIRONMENT AND DEVELOPMENT
ILO	INTERNATIONAL LABOUR ORGANISATION
IP	INTELLECTUAL PROPERTY
IPP	INDEPENDENT POWER PRODUCERS
IPR	INTELLECTUAL PROPERTY RIGHTS
IT	INFORMATION TECHNOLOGY

ITTO	INTERNATIONAL TROPICAL TIMBER ORGANISATION
KPI	KEY PERFORMANCE INDICATOR
LCD	LIQUID CRYSTAL DISPLAY
LEI	LEMBAGA EKOLABEL INDONESIA
LNG	LIQUID NATURAL GAS
M&A	MERGER AND AQUISITIONS
MAI	MEAN ANNUAL INCREMENT
MDF	MEDIUM DENSITY FIBREBOARD
MFA	MULTI FIBRE AGREEMENT
MIFID	MARKETS IN FINANCIAL INSTRUMENTS DIRECTIVE
MIS	MANAGEMENT INFORMATION SYSTEMS
MMSD	MINING, MINERALS AND SUSTAINABLE DEVELOPMENT
MNC	MULTINATIONAL CORPORATION
MOU	MEMORANDUM OF UNDERSTANDING
MPFSO	MANDATORY PROVIDENT FUND SCHEMES ORDINANCE
MW	MEGA-WATT
NAFTA	NORTH AMERICAN FREE TRADE AGREEMENT
NPL	NON-PERFORMING LOAN
NOX	NITROUS OXIDE
OBM	ORIGINAL BRAND MANUFACTURERS
ODM	ORIGINAL DESIGN MANUFACTURERS
OECD	ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT
OEM	ORIGINAL EQUIPMENT MANUFACTURERS
OHS	OCCUPATIONAL HEALTH AND SAFETY
OSB	ORIENTED STRAND BOARD
PBBS	POLYBROMINATED BIPHENYLS
PBDES	POLYBROMINATED DIPHENYL ETHERS
PEFC	PROGRAMME OF ENDORSEMENT OF FOREST CERTIFICATION
PFCS	PERFLUOROCARBONS
POS	POINT-OF-SALES
PPA	POWER PURCHASE AGREEMENTS
PWC	PRICE WATERHOUSE COOPERS
RAROC	RISK-ADJUSTED RETURN ON CAPITAL
RFID	RADIO FREQUENCY IDENTIFICATION
RIL	REDUCED IMPACT LOGGING
ROE	RETURN ON EQUITY
ROHS	EC DIRECTIVE ON THE RESTRICTION OF THE USE OF CERTAIN HAZARDOUS SUBSTANCES IN ELECTRICAL AND ELECTRONIC EQUIPMENT
RORB	RETURN ON RATE BASE
RTGS	REAL TIME GROSS SETTLEMENT
SFI	SUSTAINABLE FORESTRY INITIATIVE
SFM	SUSTAINABLE FOREST MANAGEMENT
SIC	STANDARD INDUSTRIAL CLASSIFICATION
SITC	STANDARD INTERNATIONAL TRADE CLASSIFICATION
SOE	STATE OWNED ENTERPRISES
SOX	SULPHUR DIOXIDE
SUV	SPORTS UTILITY VEHICLE
T&A	TEXTILE AND APPAREL
T&D	TRANSMISSION AND DISTRIBUTION
TFT LCD	THIN FILM TRANSISTOR
ULSAB	ULTRA LIGHT STEEL AUTO BODY
UN FAO	UNITED NATIONS FOOD AND AGRICULTURE ORGANISATION
UNFCCC	UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE
WBCSD	WORLD BUSINESS COUNCIL FOR SUSTAINABLE DEVELOPMENT
WEEE	EC DIRECTIVE ON WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT
WRAP	THE WORLDWIDE RESPONSIBLE APPAREL PRODUCTION SCHEME
WTO	WORLD TRADE ORGANISATION
WWF	WORLD WIDE FUND FOR NATURE

ABOUT ASrIA

The Association for Sustainable & Responsible Investment in Asia

www.asria.org

ASrIA is a not for profit, membership association dedicated to promoting corporate responsibility and sustainable investment practice in the Asia Pacific region. ASrIA's members include investment institutions managing over US$4 trillion in assets, however membership is open to any organisation which has an interest in sustainable investment.

ASrIA has taken a leadership role in promoting sustainable investment in Asia since our founding in 2001. ASrIA has run conferences, seminars and workshops, and published wide-ranging research on SRI issues. ASrIA has also created a very wide network of organizations and individuals interested in the broad range of policy issues and investment strategies which are essential to the implementation of SRI in Asia. ASrIA's website, www.asria.org, is the primary resource for SRI in Asia, attracting over 4,000 page views per day and over 5,000 subscribers to our regular e-bulletin.

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www.ifc.org

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