



**CHINA: ECONOMIC REGULATION OF LONG - DISTANCE TRANSMISSION  
AND URBAN GAS DISTRIBUTION**

Public-Private Infrastructure Advisory Facility  
The World Bank  
The Institute of Economic System and Management, SCORES

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This report (discussion paper) presents the results of a sector analysis and research that is published to encourage discussion and comments within the oil and gas community in China and for dissemination to parties interested in sector reform in other countries.

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## **PREFACE**

This report is one of the results of the joint project, “Study on China’s Oil and Gas Sector Regulatory System,” which was implemented by the World Bank and the Institute of Economic System and Management, which is part of the State Council Office for Restructuring the Economic System (SCORES) during the second stage of the study. The results for the first stage were published in March 2001 under the title “Modernizing China’s Oil and Gas Sector: Structure Reform and Regulation” (the Joint Report). Overall policy framework, as well as concepts of structure reform and the establishment of a modern regulatory regime, were elaborated systematically in this Joint Report. The present report is a summary of the conclusions obtained from an in-depth study of issues concerning the establishment of modern regulation in the downstream gas sector within the scope of the Joint Report.

This report was funded by the Public-Private Infrastructure Advisory Facility (PPIAF) as a part of the project on the Implementation of the Regulatory Framework for China’s Downstream Gas Sector. It responded to the March 2000 Terms of Reference (TOR) (see Appendix 1) and took as a given the GOC’s general objectives to introduce competitive market forces wherever possible in the oil and gas sector and its specific policy objectives for the gas industry. Because of the key role of prices in terms of competition and market functioning. The report also recommended a schedule for the deregulation of gas prices. A subsequent report will present the proposed legal framework.

The joint report proposed that a start be made toward implementation of the recommended new style of oil and gas regulation. It suggested that the downstream gas industry is an obvious area for such a “demonstration project” in modern regulation. This proposal has been followed up by means of the project on the “Implementation of the Regulatory Framework for China’s Downstream Sector” supported PPIAF, which was carried out by consultants and a Bank team working jointly with a counterpart team led by the Institute of Economic System and Management.

The work began in July 2000 and was followed by missions in October and December 2000 and in March 2001. Active participants in the meetings included officials and experts from the State Development Planning Commission, State Economic and Trade Commission (SETC), Ministry of Construction, State Council Office for Legislative Affairs, PetroChina Company Limited, China Oil and Petrochemical Company (SINOPEC), and China Offshore Oil Corporation, as well as representatives from relevant local governments and urban gas distribution companies (UGDs) of Beijing, Shanghai, Chongqing, Hefei, Chengdu, and Wuxi. The report was then drafted by Bank experts and consultants on the basis of rich information and valuable comments provided during these discussions. Senior staff of the Institute for Economic system and Management, SCORES organized, chaired and fully participated in these meetings and revised all versions of this report.

The consultants and World Bank team highly commended the Chinese counterparts’ work; the institute was most appreciative of the World Bank experts’ effort, ingenuity, and efficiency. At the same time, the two sides were sincerely appreciative of the active cooperation of all other parties concerned. The feedback and comments provided by experts from these institutions were very helpful, although it is recognized that the points of view expressed in this report may not be consistent with the opinions of all of the different institutions that were consulted.

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The list of experts who participated in the Joint Working Group meetings is attached as Appendix 2.

## ACRONYMS AND ABBREVIATIONS

ABC	Activity-based costing
Bcm	Billion cubic meters
BG	British Gas
Capex	Capital expenditure
CAPM	Capital Asset Pricing Model
CCA	Current cost accounting
CER	Commission for Electricity Regulation in Ireland
CNOOC	China National Offshore Oil Corporation
CNPC	China National Petroleum Corporation
CPI	Consumer price index
CSRC	China Securities Regulatory Commission
DGM	Dividend Growth Model
DV	Deprival value
E&D	Exploration and development
EFET	European Federation of Energy Traders
EU	European Union
FERC	U.S. Federal Energy Regulatory Commission
GOC	Government of China
GJ	Gigajoule
HCA	Historic cost accounting
IOC	International oil company
IPO	Initial public offering
ITSA	Interruptible Transportation Service Agreement
LDC	Local distribution company
LNG	Liquefied natural gas
MAR	Market-to-asset ratio
MDQ	Maximum daily quantity
NAV	Net asset value
NEB	Canadian National Energy Board
NPC	National People's Congress
NPV	Net present value
NTS	U.K. National Transmission System
O&M	Operation and maintenance
OCM	On-the-Day Commodity Market
ODV	Optimized deprival value
GEMA	U.K. Gas and Electricity Markets Authority
Opex	Operating expenditure
ODRC	Optimized depreciated replacement cost
ORC	Optimized replacement cost
PPIAF	Public-Private Infrastructure Advisory Facility

PSC	Production-sharing contract
PSO	Public service obligation
R&C	Residential and commercial
RONA	Return on net assets
RP	Receipt point
RPI	Retail price index (in the United Kingdom)
SAPCI	State Administration for the Petroleum and Chemical Industries
SCORES	State Council Office for Restructuring the Economic System
SDPC	State Development Planning Commission
SETC	State Economic and Trade Commission
SINOPEC	China National Oil and Petrochemicals Corporation
SOE	State-owned enterprise
TOR	Terms of Reference
TSA	Transmission Service Agreement
UAG	Unaccounted-for gas
UGD	Urban gas distribution company
WACC	Weighted average cost of capital
WTO	World Trade Organization

A glossary of special terms is provided at the end of the report (Appendix 7)

## 1. EXECUTIVE SUMMARY

### *1.1 The Background*

In 1998 the Government of China (GOC) reorganized the oil and gas sector and began a reform of the state-owned companies in the sector with the objective of creating market-oriented, efficient, internationally competitive energy companies.

In 1999 the GOC asked the World Bank for advice on establishing a new market-oriented, modern regulatory framework for the oil and gas sector. The Bank and its Chinese counterpart team, whose core membership was drawn from the Institute of Economic System and Management, State Council Office for Restructuring the Economic System, formed a joint working group. They prepared a report on oil and gas sector reform that set the framework for further work.<sup>1</sup>

The downstream gas regulatory framework proposal is an outgrowth of efforts going back to the 1998 oil and gas sector reform and is consistent with international practices.

The present report builds on these previous efforts directed toward reform of the oil and gas sector and focuses on the implementation of a regulatory framework for the downstream natural gas sector, in particular on the economic regulation of the sector. It explains the need for regulation, describes the institution that is needed to implement it, explains the principles and techniques that should be applied, and proposes changes for the transition toward modern regulation, as well as changes in the regulation of gas commodity prices.

Countries in North and South America and in Europe, and others such as Australia and New Zealand, have already experienced the favorable economic effects of gas market opening combined with modern regulation. This opens up for China the vision of an expanding, efficient gas market, drawing supply from multiple sources, served by growing long-distance transmission and urban distribution systems, all contributing to economic growth, energy supply diversity, and a cleaner environment.

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<sup>1</sup> It was published under the title “Modernizing China’s Oil and Gas Sector: Structure Reform and Regulation,” March 2001 (the “Joint Report”).

### *1.2 Long-Distance Transmission and Distribution Systems: The Case for Economic Regulation of Natural Monopoly*

Transmission and distribution, together with storage and shipping operations, are the principal activities of the downstream gas sector. Economic regulation involves control and direction, by an agency of government, of those businesses that are characterized by monopoly and are therefore not adequately disciplined by competitive forces. Typically, gas transmission is a natural monopoly; for example, there is room for only one efficiently sized West–East pipeline. Typically again, monopoly status is usually conferred on gas distribution businesses, to achieve efficient use of capital and reduce urban network congestion; for example, usually, there is only one authorized gas distribution business in most Chinese cities.

Modern economic regulation of natural monopolies is essential for China's expanding gas industry.

Regulation deals principally with the prices charged for monopoly services, the terms of access for third parties to use those services, and their quality. In turn, this may require regulation of such matters as entry to the gas business and of large new investments in it.

Modern regulation is essential to China's expanding gas industry, which is to increase its share of energy markets from 2–3 percent now to 6 percent or to higher percentage by 2010. It will prevent abuse of market power by the owners of monopoly transmission and distribution systems, foster the progressive development of competition in the supply of the gas commodity over those systems, and enhance the value of listed gas businesses in a world where investment is attracted by the opportunities for good investments and the presence of a sound regulatory framework.

### *1.3 Creating the Legal Instrument for Monopoly Regulation and Market Oversight: A Gas Law and Its Coverage*

A gas law should be enacted that defines the objectives for the industry, the parts to be subject to regulation, the legal instruments to be used to provide related authorizations, and the broad principles of oversight. It should also introduce and define the composition, authority, and activity of the regulatory agency, namely the Gas Regulatory Commission. Under the law, regulation should in principle apply to all natural gas transmission, distribution, storage, and marketing activities that exhibit natural monopoly characteristics, regardless of ownership, size, vintage, or geography. The regulatory agency's mandate should include the responsibility to enhance competition, but should not extend to promoting natural gas or the natural gas industry. Such a law will give confidence to investors by providing the basis for a stable and predictable regulatory framework.

A suitable primary law is needed to facilitate future reforms and make the framework predictable.

### *1.4 The Government Regulatory Institution: A Gas Regulatory Commission*

China needs a specialized downstream gas regulatory agency, preferable designed in the form of a “one window” organization, so as not to fragment sector regulation.

#### *Duties and Powers*

The commission’s duties include approving (or rejecting) a number of activities in the downstream gas industry: major capital projects, tariffs, terms of access and quality of service, codes of conduct, and rights to participate in industry activities, as well as monitoring and reporting on gas market development. To carry out these duties, the commission needs powers to gather information, hold inquiries, receive applications for approvals, grant those approvals, require compliance with its decisions, assess penalties, and deal with appeals.

The task of modern gas regulation should be entrusted to a specialized commission, whose organization, power, working procedures, and behavior are modeled on international practice and subject to general policy direction.

#### *Controls on Powers*

The commission is subject to controls in three main areas: the control of possible abuse of powers; control over the degree of independence from the policy level in making major final decisions, and control over use of any power of delegation to local regulatory agencies. The resolution of disputes between the commission and the regulated entities and the clarification of the regulatory agency’s jurisdiction are other areas requiring definition.

#### *Organization and Procedures*

The international tendency is toward a commission format with several members taking collective decisions with the support of working staff of the commission. The gas law should address two procedural matters: first, whether the decisionmaking level should itself hear the evidence in particular cases or whether this should be done at a staff level; and second, whether and to what degree the regulatory agency’s procedures should be more, or less, formal.

#### *Staff and Resources*

The commission needs to have competent, well-motivated staff and adequate funding for staff and other support. There is an international trend to treat “regulation” as a service for which the regulated entity has to pay a fee. These fees, whether for specific services or in the form of a levy on regulated activities, such as pipeline throughputs, are used to cover the regulatory agency’s costs. It is recommended that the regulated entities pay for the commission’s costs by way of levies on their activities or fees for regulatory services rendered, rather than the costs being met by the government out of general tax revenues.

#### *Transparency and Independence*

These are the essential characteristics of modern regulation. Thus, all the applicable laws and regulations are made public, interested parties are notified of applications made to the regulatory agency

and are given an opportunity to have their views heard, and the reasons for the resulting decisions are published. As to independence, decisionmakers have security of tenure and reasonable economic security. They are also subject to conflict-of-interest provisions, including relationships with regulated entities. Provisions referring to the commission's behavior should also include limitations on other employment and investment activities. Finally, communications between the policymaking level and the commission must not deal with the merits of any case that is being dealt with.

*Delegation of Powers*

The delegation of powers to the provincial or municipal level is recognized as a politically sensitive and administratively complex issue in a large and diverse country. Delegation, particularly as it relates to regulation of transmission pipelines and distribution systems wholly within a province, merits further study. If it is undertaken, however, provincial and municipal levels should be required to adhere to national guidelines.

*1.5 Principles for Downstream Gas Regulation*

The commission requires principles to guide its economic regulation of transmission and distribution. Successfully applied, they will result in low-cost but profitable regulated businesses, lower costs of gas to consumers, and higher returns to producers.

*Monopoly Franchising*

It is legitimate for governments to try to ensure that scale economies are captured, that no unreasonable duplication of service exists that may cause congestion of urban networks, and that the gas industry's structure enables it to provide high-quality service at minimum cost. The grant of a monopoly, or exclusive franchise, facilitates the capture of economies of scale.

*Transmission*

In general, justifying the grant of an exclusive right for a transmission system is difficult. This is because the potential for increased interconnection of currently non-interconnected transmission pipeline systems deprives the franchise concept of much of its meaning. Therefore, transmission pipelines in most newly developing gas industries are not granted an exclusivity to serve an area or route. Conversely, they do not have a statutory obligation to provide service, in the way that distribution utilities usually have.

*Distribution*

Exclusivity in the provision of transportation service makes sense because, in addition to ensuring that economies of scale and scope are achieved, it avoids the congestion of pipeline networks that would result from several companies operating in the same geographical area. Distribution utilities are therefore almost always granted an exclusive franchise, or monopoly, for the

Sound principles call for franchising of gas distribution, with a corresponding obligation to serve customers, and for the authorizing of "unbundled" transmission pipelines, on a nonexclusive basis, to provide open access service at prices related to costs but that encourage efficiency.
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provision of a gas transportation service within a given geographical area, frequently a municipality. The granting of exclusivity, however, is matched by an obligation to provide and maintain connections to consumers in the franchise area.

#### *Gas Supply*

Exclusivity may also be granted to supply the gas commodity in a distribution franchise, but limiting this exclusivity to a specific number of years is recommended, particularly for large-volume consumers. Distributors, however, should be given the exclusive right of supply to small users to avoid the necessity for the extensive investment needed to manage a diversity of supply to small users.

In all cases, distribution, as well as transmission, service offerings, and prices, are regulated to avoid abuse of the monopolist's dominant position.

#### *Terms and Conditions of Service*

The gas transmission business should be “unbundled” to separate the provision of transmission services from the supply of the gas commodity. Pipelines should be defined as contract carriers, which provide service to users who contract to purchase capacity for a specific period and pay for that capacity whether they use it or not. This lowers the pipelines' investment risk and tends thereby to reduce financing costs and therefore tariffs. For distribution systems, common carrier status is appropriate, under which users have neither rights to capacity, nor obligations to pay for it. As gas market restructuring proceeds, large consumers connected to distribution systems should be allowed to access gas supplies directly, rather than being obliged to buy through the distributor.

#### *Open Access*

Transmission pipelines should provide nondiscriminatory open access to their facilities, so that any party—gas producers, consumers, or marketers—willing to comply with the terms of service and pay the tariff can have access to the pipeline's services. Unbundling, together with open access to the pipeline, is the key to creating a functioning market for the gas commodity.

#### *Tariffs (Prices for Services)*

The level of tariffs should be related to costs, but with provision for incentives to efficiency being provided by some type of performance-based regulation. The structure of tariffs should be designed to achieve efficiency in cost allocation, preferably by means of a two-part rate with a high fixed capacity charge that reflects the high proportion of the pipeline's costs that are fixed, and a small commodity charge related to the small amount of variable costs.

### *1.6 Techniques for Downstream Gas Regulation*

Techniques flow from principles and relate separately to transmission and distribution.

#### *Transmission*

To ensure the open access principle, transmission companies will have to establish business procedures expressed in codes of conduct, codes of operations, and transmission service agreements (TSAs). To bring about nondiscriminatory open access, owners will have to properly separate their transmission and gas supply functions. The practicalities of this separation are most conveniently and efficiently established, and enforced, in a code of conduct. The code of operation will set out the general terms and conditions of access to transmission pipelines. TSAs will be governed by the business rules set out in the code of operations and will set out the specific terms of service and its price provided by a transmission business to individual users of its system. These documents and business behaviors will be subject to guidance and monitoring by the regulatory agency.

As to tariffs, the time-tested “cost of service” method, applied to the calculation of an initial tariff, will achieve the principle of cost basing, while there is a spectrum of techniques available to pursue the principle of cost efficiency in tariff design.

Large new expenditures will be scrutinized for purposes of inclusion in the cost of service in accordance with the principle of cost-based tariffs. Before giving its approval, the commission may also require confirmation that engineering, health, safety, environmental, and land use planning requirements have been met.

#### *Distribution*

Initially this sector will continue to provide a “bundled” gas-plus-distribution service to customers of all classes. The focus of regulation will be on making sure that distribution margins are large enough to ensure that the companies are properly financed to undertake the necessary expansion of the sector. This is a result of applying the principles of fair return to the investor and cost-based rates.

Eventually application of the open access principle will require special regulatory techniques, starting with the separate accounting of distribution from gas supply and marketing services. After a policy decision is made to allow certain customers to access gas supplies directly, codes of conduct, codes of operations, a distribution service agreement and distribution tariffs will have to be developed.

Applying the principles requires effective separation of transmission and supply, clear definition of access services, and a sound basis for pricing these services. These techniques are also relevant for distribution, but only when a measure of corporatization is achieved.

### *1.7 The Gas Commodity: The Case for Market Pricing with Regulatory Oversight*

Conditions can be created for a functioning gas commodity market, in which price controls can be phased out and replaced by regulatory oversight of contracts and pricing. This is because gas markets upstream of the purification plants are not inherently characterized by natural monopoly.

Presently about one-quarter of gas is sold at low “in-Plan” prices reset annually, mainly for fertilizer manufacture. There are still some negotiating constraints on the higher and more flexible “out-Plan” prices. PetroChina is the dominant supplier, and there are a few large buyers. This will change as the structural changes recommended in the Joint Report take place.

Even existing control mechanisms cannot be justified, however. The economic self-interest of sellers and buyers expressed in bilateral negotiations should produce an economically viable range of prices. Thus:

- Gas prices to final consumers cannot be maintained for extended periods appreciably above those of competing fuels, taking account of relative heating values and convenience of use. For short periods, prices to final consumers might rise above those levels, when peak demand exceeds the capacity of the gas supply infrastructure. In these circumstances, the allocation of available supplies by the price mechanism is particularly important.
- Gas prices to producers must, on average and over time, be at least equal to or exceed the total or “full cycle” costs of gas production, which include exploration and development (E&D) costs.

The likelihood is that negotiated prices would move within the above range, reflecting the pressures of gas suppliers looking for markets and of gas distributors and consumers seeking supplies. Pricing on this basis is economically preferable to government price-setting.

It is therefore recommended that the GOC continue to move away from direct price controls. Prices should instead be established by negotiation between producers (presently the state-owned enterprises (SOEs)) and gas buyers (presently mainly distribution companies), thereby extending to all gas suppliers the practice of negotiating prices now used in the offshore areas and in the Tu-Ha Region by PetroChina.

A gas price oversight function should be entrusted to the downstream gas regulatory commission and, prior to that, to the interim regulatory agency, as follows:

Negotiated prices are economically preferable to government-set prices and should be progressively extended, with regulatory supervision.
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- The regulatory agency would instruct gas buyers and sellers that all negotiated transactions should be set out in the form of gas purchase contracts that would set out the terms and conditions of the deal. (Transitional provisions would have to be made to allow any existing contracts to be exempt from oversight until they were renegotiated.)
- To ensure that appropriate market principles were followed, the regulatory agency could issue guidelines setting out the broad parameters for terms and conditions.
- The regulatory agency could require submission of all gas purchase contracts for monitoring purposes.
- Because the distributors may lack a strong commercial incentive to minimize their gas purchase costs, the regulatory agency should be authorized to limit the pass-through of such gas costs by distributors to their customers, if the prices exceed those negotiated by other distributors in circumstances considered by the regulatory agency to be similar.
- The problem of the loss by the fertilizer industry of the subsidy implicit in the low “in-Plan” gas prices is recognized. Ideally these implicit subsidies should be replaced by explicit budget subsidies as a transitional measure to a fully competitive environment for this industry.

### *1.8 Transitional Changes in the Interim Regulation Period*

The Joint Report envisages a flexible, pragmatic transition for both regulatory and market structure change over five years corresponding with the 10<sup>th</sup> Plan. Interim regulation refers to the concept of an organization headed by an interim regulatory agency. That official would gradually coordinate, relative to new objectives, the regulatory work of existing agencies and ministries. The interim regulatory agency would also endeavor to fill in the gaps in those existing functions; develop the permanent framework; oversee, monitor, and report on the progress of regulatory reform; and, later in the transition period, effect a smooth handover to the permanent regulatory commission.

Five transitional steps need to be taken to move through interim regulation to the recommended permanent downstream gas regulatory regime.

#### *Expected Results*

It is assumed that certain fundamental principles of modern regulation are adopted, particularly regulatory independence, transparency and, eventually, the creation of a sound legal framework. The transitional changes will result in the creation of a new organizational structure, initially under the interim regulatory agency, later the permanent regulatory commission, and in modern regulation applying to gas transmission and distribution. The interim regulatory agency, assisted by a small, well-trained core team, would establish close working relationships with

relevant ministries and agencies, pursuant to a State Council implementation directive. It would perform a “buffer function” between regulated companies and the ministries and agencies, in anticipation of the “single window” regulatory interface that would later be provided by the regulatory commission.

### *Recommended Steps to Achieve the Goals*

For the interim regulatory agency to achieve the GOC’s policy goals to create a modern regulatory framework, five principal steps are recommended: (a) the State Council issues an implementation directive; (b) the office of the interim regulatory agency is created and staffed; (c) “gaps” in existing regulation are identified and plugged; (d) laws and regulations needed to create the permanent regulatory regime are drafted and sent to the National People’s Congress (NPC); and (e) the implementation of that regime when enacted. The interim regulatory agency would also monitor and report progress in the areas of market change and regulation.

The scope of the interim regulatory agency’s activity should be comparable to that of the eventual regulatory commission in respect of project approval, tariffs, terms of access, and quality of service of monopoly businesses. Special attention will have to be given to interdepartmental relationships because of their great importance for the success of interim regulation. In operational terms, necessary activities include inventorying of regulated enterprises; creation of a data base on them; the public filing by those businesses of information about such matters as rates and access; and then regulatory implementation, first on a voluntary basis, alternatively or additionally on a complaints basis, eventually actively using the authorities available in the interim period.

### *1.9 Policy Recommendations*

China needs to improve its energy structure to reduce air pollution, introduce new technologies improve energy efficiency, so as to meet its increased energy demand. Accomplishing this would provide an excellent opportunity for the development of natural gas as a kind of clean energy, and gas could also play an important role in the development of China’s economy.

To achieve the objective of the government, market competition should be progressively introduced into non-monopolistic activities in the oil and gas sector. Direct control of gas prices should be replaced by regulatory oversight of prices and of other conditions in negotiated contracts to ensure optimal resource allocation in gas commodity markets. At the same time, monopoly businesses, like long-distance gas transmission (“transmission”) and urban gas distribution (“distribution”) companies, should be promptly brought under modern regulation to protect consumer interests against the abuse of dominant position, to foster

The GOC’s objective is to establish a downstream gas regulatory framework.
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competition in the gas commodity market, and to help attract new investment to this industry.

There is therefore an urgent need to create a downstream gas regulatory framework, expressed in a gas law that takes account of China's needs and circumstances. In this new framework, the main tasks of downstream regulation should include regulation of (a) tariffs for transmission and distribution services, (b) conditions for third party access, (c) the quality of these services, and (d) a code of conduct. A regulatory commission operating in accordance with principles of transparency and independence should be established. The responsibilities of the regulatory commission also include the approval of applications for major investment projects. The government should provide the necessary legal instruments through a Gas Law. Pending enactment of such a law, transitional measures should be employed to apply existing regulation to new objectives, such as modernized pipeline tariffs and access terms.

Regulatory principles, such as the unbundling of gas sales from gas transportation, open access to pipelines, and cost-based pipeline pricing with efficiency incentives can then be applied, drawing on a variety of techniques representing international best practices.

The implementation of these recommendations on the introduction of modern economic regulation to the downstream gas sector would contribute to a rapid expansion of Chinese gas industry and the development of China's economy and energy industry.

## **2. CHINA'S GAS INDUSTRY: POLICY OBJECTIVES AND THEIR ACHIEVEMENT BY ECONOMIC REGULATION**

This chapter first summarizes the Government of China's (GOC's) assumed policy objectives for the gas sector, so as to broadly situate the discussion of downstream economic regulation. Comments are provided on the international experience of gas market reform from which those objectives in part derive, and a "vision" is then sketched of China's gas industry 5–10 and 10–20 years out. Definitions are provided of the downstream sector and of the scope of its regulation. Next the case is made for the need for such regulation in a sector increasingly affected by market forces, with special attention therefore being given to regulation and the evolution of competition. The current Chinese situation respecting gas industry regulation and competition is then discussed, and the chapter concludes with an analysis of the need for a gas law and with comments on the relationship between policy and regulation in the resulting regulatory framework.

### *2.1 The Government of China's Policy Objectives for the Sector*

The report takes as a given the GOC's general policy objective to introduce competitive market forces wherever possible in the oil and gas sector and in its specific objectives for the gas industry. The general policy is clear, although its specific outworking requires senior-level decisions that are not yet taken.

### **GOC Objectives and Their Origin**

Assumptions on the objectives are derived from the joint work of the World Bank, the Institute of Economic System and Management, and other Working Group participants. They are considered in more detail in the Joint Report, published in March 2001.

Because the policy objectives of the GOC are the starting point for this report, they are summarized below, especially the concrete objectives regarding the downstream gas sector.

- GOC policy to increase the share of natural gas in the country's energy balance from about 3 percent currently to 6 percent or more by 2010. This will involve adding about 60 billion cubic meters (Bcm)—that is, a gas demand about as large as Italy's—to current consumption of about 20 Bcm annually.
- *Introduction of competitive market forces wherever possible.* Market forces are seen as the best means to achieve efficient utilization of all resources. They should be introduced, encouraged, and given as much scope as possible to operate in all energy commodity markets, including natural gas. Generally speaking, market forces cannot be introduced in transmission and distribution, which are businesses characterized by natural monopoly.
- *Phasing out of remaining gas allocations and remaining gas price controls.* This process of phasing out the allocation of gas volumes and the use of in-Plan prices has already been started by a policy decision of the GOC. This phase-out is needed to provide correct price signals to gas producers, to ensure economically sound allocation of supplies to markets, and to provide incentives for gas development.
- *Freeing up of gas trading.* Gas trading has been essentially a monopoly of the SOEs for oil and gas. Although the newly amended "Regulations for Exploiting Onshore Petroleum Resources in Cooperation with Foreign Parties" has already removed the strict restrictions that hindered international oil companies (IOCs) from marketing their production-sharing contract (PSC) profit

oil and gas, there is still no similar clear regulation concerning gas, and the opening of marketing businesses is also very limited.<sup>2</sup> Consistent with the objective of introducing competitive forces, however, it should be clarified that PSC partners everywhere should be allowed to market profit gas directly, on an individual basis, at prices established through buyer-seller negotiations, provided solely that conditions for access to pipeline transportation are met.

- *Provision of open access for the commodity on gas transmission lines.* It is essential to the development of a functioning market for the gas commodity that transmission businesses should be required to operate as open-access transporters of gas. This means that nondiscriminatory access should be provided to all applicants for transmission services that are prepared and able to meet the terms and conditions of service.
- *Progressive corporatizing of urban gas distribution systems.* These systems should be liberated from the constraints of municipal ownership to diversify the ownership of assets, enable better financing and active marketing.
- *Introduction of modern regulation of facilities having monopoly characteristics and the creation of appropriate regulatory institutions.* Where competition cannot be relied on to create a fair market environment and pricing mechanism so as to safeguard consumers' interests, regulation is introduced as a substitute for competition. Prices and service conditions of the monopoly therefore require the approval of the regulatory agency to avoid abuse of monopolistic power. In the downstream gas sector, this would be a regulatory commission, ultimately forming part of a comprehensive up- and downstream regulatory framework for the whole oil and gas industry.
- *Transition with interim regulation.* Initially, there would be a five-year transitional period ("the transition") during which an interim regulatory agency would take measures to achieve the objectives set by government for the transition. The transition would be flexible and pragmatic, with further specific decision points along the way. It is important, however, that the permanent regulatory commission(s) should be in place by the end of 2005 at the latest, coincident with important events, such as the completion of the 10<sup>th</sup> Plan and China's full accession to the World Trade Organization. Clearly, if the absence of a modern regulatory regime is seen by potential investors as a risk factor, risk would be reduced and confidence increased if the transition were shorter.
- *Provision for the monitoring of the operation of gas markets and progress of regulatory reform in the gas sector.* The regulatory agency should be empowered to have the responsibilities of monitoring the operation of gas markets and the progress of regulatory reform. It should provide information and data of value to all gas industry participants, including all levels of government. This agency should also determine and report on the implementation of measures to achieve policy objectives and on the degree to which those objectives are being achieved, for example in the introduction of competitive forces in terms of implementation of regulatory steps and the results of taking those steps.

### Comments on the Objectives

As to the objective of introducing competitive market forces wherever possible, a reservation has to be entered concerning competition in gas supply at the retail level. Retail competition is certainly desirable in the longer term. However, it should only be considered when the market and the commercial arrangements underpinning it have developed much further.

Concerning the phase-out of remaining gas price controls, care will have to be taken to ensure recognition of the market value of gas as determined by consumers and to allow those market price

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<sup>2</sup> According to the new regulations, oil discovered and developed onshore by an international oil company (IOC) as a result of a PSC would generally be purchased by Chinese oil companies. It may also be marketed using other means acceptable to both Chinese companies and IOC partners of the PSCs. The regulations relating to petroleum marketing within the Chinese territory should nevertheless be observed.

signals to flow back to the gas producer. This must of course include the flow back to the foreign interests who, as PSC partners, have invested in exploration and development (E&D) of gas resources.

As to the freeing up of gas trading, this is an important element of recommended policy. Realistically, however, it may be some time before the growth in the number of gas producer-sellers reaches the point where there is workable competition in the wholesale market.

### *2.2 International Experience and China's Policy Objectives*

The policy objectives in section 2.1 flow in part from knowledge of the experience of the structure, operation, and regulation of gas markets in Western Europe and North America.

One of the most important energy policy "discoveries" of the last 20 years is that markets can be made to work in respect of natural gas, just as they do for agricultural and mineral commodities. This means that, through the price mechanism, the free working of markets will continuously equilibrate supply and demand.

Policymakers in North America were driven to experiment with this "market solution" in the early 1980s, by which time it had become apparent that solutions involving a growing burden of regulation were not working. Every price, in every transaction was subject to government control and regulation, the end uses of natural gas in the United States were under government direction, and international trade in gas was strictly controlled. As a result, and despite a pressing policy need for clean indigenous energy, gas supply appeared to be in doubt, gas markets had shrunk by more than 20 percent in 10 years, there was no room for innovation, and new investment was not coming into the business.

Market-oriented national policies were introduced in the United States and Canada from the mid-1980s. The conditions were created for sellers and buyers of gas to make their own transaction arrangements. Gas commodity prices were deregulated progressively in the United States and in two quick steps in Canada. Regulation focused on the natural monopolies of pipelines and distribution systems and on measures to foster the functioning of the markets for the commodity, natural gas, that flows through those systems. Those measures, dealt with later in this report, were principally the "unbundling" of gas sales and transportation activities, and the provision of open access to gas pipelines and, later, distribution systems.

This "revolution" in policy and regulation reinvigorated the North American gas industry, attracted many new players and new ideas, brought supply and demand into balance, stimulated both supply and demand and paved the way for the "convergence" of the gas and electricity industries. The new approach to policy and regulation has been highly successful. Governments have withdrawn from their unsuccessful attempts to manage the industry, the free market has been welcomed by producers and consumers, and very little political controversy has attended these changes.

Similar developments took place in the United Kingdom and in parts of Latin America in the 1990s and are now occurring in continental Western Europe. In countries with previously state-owned gas industries, for example, Argentina, sector restructuring took place as a precondition of policy and regulatory change.

The United Kingdom provides an example of the importance of sector restructuring preceding or, at least, accompanying the development of a regulatory framework. British Gas (BG) was listed as a vertically integrated transportation and supply business in 1986. Vertical integration does not properly allow commodity market competition, and much of the next 10 years was spent trying to establish an appropriate structure for the gas industry to facilitate both effective regulation and self-sustaining competition. Both these objectives have not been successfully achieved.

Given that the three major Chinese oil and gas enterprises—PetroChina, China National Oil and Petrochemicals Corporation (SINOPEC), and the China National Offshore Oil Corporation (CNOOC) have been listed—the issue of restructuring will need to be approached with caution. Investor confidence may be dented if the structure of the companies at listing is subsequently altered. This is a matter for GOC, which must balance this concern with the significant benefits that are generated by an appropriate industry structure.

Further comments on international experience in the structure, operations, and regulation of gas markets are provided in Appendix 3.

### 2.3 A Vision of China's Future Gas Industry

A gas demand of some 80 Bcm annually, which would reflect approximately 6 percent of China's 2010 energy needs, is certainly large enough to function on a market basis and therefore to achieve the efficiencies associated with such a design. In this light, the "vision" in Box 2.1 is projected.

#### **Box 2.1: A Vision of China's Future Gas Industry**

The *long term*—after, say, 15–20 years of development—vision of China's gas industry and of the functioning of its markets is one in which:

- Numerous sources of gas supply exist—national, pipeline imports, liquefied natural gas (LNG) imports, conventional gas sources, as well as new ones, such as coal bed methane.
- An extensive network of transmission pipelines is in place, which is integrated in the sense that various supply basins, including gas-prone coal basins, can access diverse geographical markets and vice versa.
- Development of distribution is much greater than at present.
- Pipelines provide access on an open, nondiscriminatory basis.
- Large gas users have open access to distribution facilities.
- Considerable gas is used in the generation of electric power.
- Many buyers and sellers of gas are competing, so that the price of the gas commodity is formed by competition.
- The principle of openness has been followed successfully. Large amounts of information are available regarding, for example, spot and future gas prices, pipeline and distribution tariffs and pipeline and distribution terms and conditions of service.

Clearly, this is not an industry structure that will develop overnight. The purpose in discussing it is not to attempt to predict what will happen and when. Rather, it is to present the vision as a frame of reference to develop recommendations about gas sector regulation. It is realistic to expect significant progress in the next decade. For example, if the recommendations of the Joint Report—and of this and subsequent reports—are followed, one can envisage an industry structure with the following characteristics evolving over the *medium term*, namely the next five to ten years:

- Growing supply from national sources, including supply from PSCs, is supplemented by LNG and possibly by pipeline imports.
- New pipelines are built from basins to markets.
- Vigorous distribution expansion takes place, resulting in part from listings and the availability of new sources of investment.
- The use of gas in electric power generation is increasing, in some cases "anchoring" new pipelines.
- The number of competing gas sellers, perhaps 10–15, is growing, as is the number of direct buyers, resulting in the development of a working competitive market for in gas supply.
- Gas is flowing over open-access pipelines whose rates are "incentive" in nature.
- The regulatory transition has been completed and permanent up- and downstream regulatory commissions are established.

### 2.4 Achieving the Vision: Economic Regulation of the Downstream Sector

It is necessary to define the terms “downstream gas sector,” which is only one component of the total industry, and “economic regulation.”

#### The Downstream Gas Sector

Box 2.2 explains the meaning given to “downstream” and other terms pertinent to the discussion in this report. The report does not address regulation of the exploration, development, and production (“upstream” operations), or the gathering and processing or purification (“midstream” activities) of natural gas to be received by transmission pipelines.

##### **Box 2.2: The Downstream Gas Sector**

By “downstream” is meant principally the commercial activities of:

*Transmission:* In the case of onshore gas, “long-distance transmission”\* means the transportation of marketable pipeline gas from the exit of the processing (purification) plants\*\* to the connection with power plants or other large consuming installations supplied directly off the transmission pipelines and to the connection with urban gas distribution systems at the city gate (“transmission”). In the case of offshore gas, it means the transmission of marketable pipeline gas from the landfall, where that gas is processed offshore and from the exit of the onshore plant, where processing takes place at that location. In the case of imported liquefied natural gas (LNG), the transmission of marketable pipeline gas from the exit of the gasification plant, to the connections described above.

- *Distribution:* The transportation and distribution activities carried out by urban gas distribution systems from the city gate to the consumer's meter.
- *Storage:* The underground storage of gas.
- *Marketing:* The businesses of selling gas for consumption or for resale, whether those activities are carried out by long distance gas transmission entities, urban gas distribution systems or by organizations that are not engaged in the activities of transmission, distribution or storage.

By “gas” is meant methane, rather than liquefied petroleum gases such as propane and butane. These products should only be subject to elements of downstream gas industry regulation to the extent they are delivered to final consumers by network pipelines.

\* The term “long-distance transmission” is in general use in China. It is synonymous with the term “high-pressure gas transmission” and should not be taken to imply any particular distance of transmission.

\*\* Note that this definition therefore excludes the typical pipeline from offshore producing wells to the onshore purification plant. In international practice, such pipelines are generally regarded as part of the “upstream” business. To the extent that economic regulation is required, for example, to provide nondiscriminatory access for third parties, it would be dealt with by the upstream regulatory commission.

#### The Scope of Economic Regulation of the Downstream Gas Sector

By “regulation” is meant “government control and direction of those activities of business enterprises that are not subject to adequate disciplining by competitive forces.”

The purpose of economic regulation is to substitute as far as possible for the action of competition in sectors characterized by monopoly, whether natural or conferred, and dominant market positions of business owners. Put another way, economic regulation's task is to prevent monopolists from making excess profits and instead to allow them the opportunity of earning returns consistent with those in other sectors of the economy exhibiting similar levels of business risk.

Generally speaking, gas transmission and urban distribution are one of the following:

- Conferred monopolies (granted by the state or a municipality, also called “administrative monopolies”).
- Natural monopolies (arising because of economies of scale and resulting in the market’s supporting only one firm, for example, in respect of a pipeline from one producing basin to one gas market).
- Both conferred and natural monopolies.

Gas storage activities, too, may present monopoly characteristics, perhaps because geological conditions do not permit the economic development of several storage fields serving the same gas market.

The scope of economic regulation of the downstream gas industry relates to five principal matters (1–5 below) and a possible sixth one (6 below):

1. Investment in new and expanded gas transmission, distribution, and storage facilities and, eventually, the abandonment of service provided through such facilities (to approve the related costs for pricing purposes).
2. The prices charged for transmission, distribution, and storage services and for any gas supplied as part of those services (“bundled” sales and transmission or sales and distribution service).
3. The terms of access by third parties to the use of those services.
4. The quality of service provided to users and customers of those services, principally having to do with reliability.
5. The conditions under which owners of transmission, distribution and storage businesses that have monopoly characteristics may engage in gas sales activities that involve use of their own transmission, distribution and storage equipment at the same time as it is being used by other competing gas sellers.
6. The (different) conditions under which entities that are not owners of such businesses, or entities that are owners but whose sales activities do not involve the use of their own transmission, distribution and storage equipment, may engage in gas sales activities.

The regulation of these matters in turn requires regulation of such other areas as entry to gas businesses (“franchising,” “licensing,” “certification,” or “qualification” of fitness to enter these businesses in terms, for example, of financial capability).

The report is *not* significantly concerned with the technical regulation of such matters as health, safety, and environmental protection. They are, of course, different in kind. They are also different in the mode of implementation. On the one hand, technical regulation, generally speaking, requires administrative implementation with little discretion, its measures applying equally to all industry players. Economic regulation, on the other hand, frequently involves the exercise of discretion that reflects differences in commercial circumstances.

### **The Coverage of Downstream Gas Regulation**

As a matter of principle, there should be no exceptions to the coverage of downstream gas regulation. This means that, when policymakers have selected the activities to be subject to regulation (for example, transmission, distribution, storage, or marketing), all enterprises engaged in these activities should be brought under the authority of the regulatory agency. There should be no exceptions based on, for example, ownership (state, municipal, or private), size (pipeline length), vintage (established versus new enterprises), or geography (provinces, autonomous regions, cities). Instead, the matter of possible exceptions should be left to the regulatory agency, who may base his decision on, for example, the presence or absence of market power by the owners of the particular enterprise.

### **Additional Activities in the Regulation of Downstream Gas**

The subsection above, The Scope of Economic Regulation of the Downstream Gas Sector, relates to the “classical” activities of a downstream gas regulatory agency. The following supplemental comments address matters that were raised in the Joint Working Group’s discussions.

#### ***Encouragement of Competition***

Effective economic regulation of downstream gas will assist in achieving the fair working of markets for the commodity natural gas, for example, by ensuring that there is no undue discrimination in the prices (“tariffs”) charged by regulated monopolies and in the access provided to their services.

Some gas regulatory agencies have adopted as a practice the encouragement of competition both in the market for the commodity (natural gas) and between the pipelines that carry it. Both the Federal Energy Regulatory Commission (FERC) in the United States and the National Energy Board (NEB) in Canada have adopted this practice. In the United Kingdom, the mandate of the downstream gas regulatory agency, the Gas and Electricity Markets Authority (GEMA), requires that it should promote competition in respect of the commodity.

Particularly given the GOC’s policy objectives (section 2.1) and the assessed state of competition in China’s gas industry (section 2.6), it would be appropriate to give the downstream gas regulatory agency a mandate to enhance competition in the industry. It is therefore recommended to do so.

#### ***Financial Viability of Regulated Entities***

Effective regulation will give the monopolist the opportunity to earn a fair return on his investments, but it will not guarantee that such a return will be achieved. In some jurisdictions, a policy choice has been made to give the regulatory agency a mandate to ensure, to the extent possible, the financial viability of the regulated companies that are regulated monopolies.

It may be appropriate to confer such a mandate on China’s downstream gas regulatory agency, and it is therefore recommended to do so. This would tend to encourage new investment in the sector. The requirement for such a mandate may prove to be much greater for urban distribution than for long-distance transmission. Indeed, the contractual arrangements that typically underpin investment in long-distance transmission will normally eliminate the justification for such a mandate. In contrast, the steps being taken to ensure the commercial viability of urban gas distribution companies (UGDs) may require specific regulatory guidance and support. However, the mandate would need to be defined carefully to ensure that it matched the specific and transitional circumstances where such regulatory intervention was required.

#### ***Promotion of the Natural Gas Industry***

It would not be in keeping with established theory or practice of regulation for the regulatory agency to actively “promote” natural gas, the gas industry or particular development projects. On the other hand, effective regulation can facilitate the establishment and growth of a modern gas industry. Indeed the provision of a sound regulatory framework and its wise implementation may be regarded as a precondition for a successful industry.

It would not be right to give a promotional responsibility to China’s future downstream gas regulatory agency. This is a job for the gas industry players. It is therefore recommended not to give promotional responsibility for gas to the regulatory agency.

## **Economic Regulation of Downstream Gas and the Achievement of China's Policy Objectives**

The sound economic regulation of the downstream gas industry, involving ultimately the enactment of a gas law and the creation of a regulatory commission and, in the meanwhile, the establishment of an interim regulatory agency, is a necessary but not alone sufficient condition for achievement of the policy objectives assumed in section 2.1. Also required is the implementation of policies to enhance E&D activity, to free up gas trading, phase out existing allocations and price controls, and reinvigorate the distribution sector. As well, large investments will be needed in exploration, development, purification, transmission, distribution, and gas utilization equipment. These issues were addressed in the Joint Report and, with the exception of gas price deregulation, are not further dealt with in this report.

### *2.5 Achieving the Vision: Why Is Regulation Needed?*

The scope of economic regulation of downstream gas is discussed under section 2.4. In this section, the case is made for applying such regulation in the context of the vision of China's future gas industry set out in section 2.3.

## **The Economic Case for Regulation**

The realization of the "vision" of China's gas industry sketched in Box 2.1 and the implementation of the regulation presented in section 2.4 would show that the gas industry in china takes as its premise that the market forces of competition will result in an industry that produces the greatest possible benefits to the country. Why is regulatory intervention needed with respect to the economic aspects of downstream gas in such a reformed industry? The following sections answer this question in relation to the business activities in the sector: transmission, distribution, and the purchase and sale of gas. They also relate it to the valuation of listed enterprises and to the introduction of market competition.

### *Transmission and Distribution Tariffs*

Transmission companies (at least in the early stages of industry development) and distribution systems are "natural" monopolies because large economies of scale and scope exist, and the unit costs of providing natural gas transportation and distribution services decline over a wide range of capacity. That is, the minimum cost per unit of transportation and distribution exists only when such systems are very large. Having several systems serve the same route would result in the transportation and distribution cost per unit of capacity being high relative to what it would be if service were provided by one system. In the case of distribution, the congestion that would be caused by competing systems is also a factor in favor of restricting entry to a single service provider. Therefore, it is socially desirable that monopolies exist for transmission (at least in the early years of development of the gas industry) and distribution (probably for an indefinite period).

That transmission and distribution systems are monopolies, however, implies that they have "dominant" positions that give them *market power*. Such market power, if unchecked, could be used to charge tariffs that would provide the system owners with high profits, but that would prevent users of the system from benefiting from the economies of scale and scope. As a consequence, less gas would be transported and distributed than would be justified by the economic costs of moving it. This in turn implies that the production and use of gas would be lower than justified by the true economics of production and use, respectively.

Market power has the further disadvantage that there is little incentive for monopoly companies to provide a broad range of services or to be innovative in the provision of service and in reducing capital and operating costs.

Finally, market power gives the transmission and distribution companies the ability to discriminate among users of their services with respect to tariffs and with respect to the terms and conditions on

which service is provided. Left unchecked, such power could lead, for example, to priority being given to affiliate companies of the pipelines and distributors. This, in turn, would lead to distortions and inefficiencies in the gas industry.

Thus, economic regulation of transmission and distribution companies is required to

- Ensure that economies of scale are achieved.
- Prevent tariffs from being greater than required to cover appropriate capital and operating costs—including a rate of profit large enough to induce companies to invest in the industry—of providing the service.
- Prevent the companies from using their dominant positions to discriminate among users in tariffs and other terms and conditions of service, including access to the systems.

### **Regulation and the Evolution of Competition**

It is important that the regulatory framework be devised so as to allow the progressive introduction of competition into the gas supply and transportation chain (from the wellhead to the point of consumption) as the industry develops. Competition may be introduced into three sets of activities in the gas supply chain:

- Competition in the supply of gas to final consumers.
- Competition in the provision of supply support services.
- Competition between pipelines.

The introduction of competition may be viewed as extending in two dimensions. In general, competition will be introduced initially in the first of these activities (the supply and purchase of gas) and subsequently and progressively into the remaining two. This is an increase in the scope of competition. Simultaneously, the extent of competition will be expanded within each activity.

China is only just starting to create a competitive gas sector. There is still a considerable amount of market planning and, so far, there is little competition in the supply and purchase of gas. Therefore, no particular concern exists at present about the monopoly characteristics of gas pipelines. As government controls are relaxed and removed, however, and as more suppliers appear in the gas market, the pipeline monopolies will have to be properly regulated so that their owners' dominant position in the market for gas transportation does not distort the developing competitive market for gas as a commodity. The concept is therefore one of phasing in commodity market competition and pipeline regulation in parallel with each other.

### ***Competition and Regulation in Supply***

Every country and jurisdiction that has contemplated the introduction of competition in the gas supply chain has begun by focusing on competition in the supply of gas from primary sources, that is domestic gas producers and import sources, whether by pipeline or in the form of liquefied natural gas (LNG). The principal precondition is that potentially competing suppliers and buyers of gas exist. The key question then is *what are the terms and conditions of access to transportation services that allow suppliers and buyers of gas to complete their transactions?*

The larger the number of consumers that are eligible to access competing suppliers, the greater will be the extent of competition. In the early stages of development of the gas industry, bilateral *negotiations* typically take place between individual suppliers on the one side, and UGDs or large industrial gas consumers on the other. Large industrial consumers will receive their gas either directly from the transmission system or from UGDs. In these cases a regulatory agency will need to ensure that transportation (either by a transmission company or a UGD) is provided on a nondiscriminatory basis.

Thus, the regulatory agency will exercise control over the price and quality of transmission and distribution service.

As the industry develops, the regulatory agency may be called upon to arbitrate in the bilateral negotiations about the price of the gas commodity when buyers and sellers fail to reach agreement.

In the early stages of gas industry development, it will be too costly for small consumers (households and small commercial establishments) to buy gas directly from upstream producers and marketers. Rather, the UGD will provide a bundled (or packaged) transportation and distribution service. In this case, in addition to its regulation of the distributor's transportation activities, the regulatory agency will oversee the final prices of the gas commodity to the customers of the UGDs.

Increased interconnection of pipeline systems and an increasing number of gas buyers tends to increase competition in the gas commodity market and generate the conditions for *wholesale competition*. As this occurs the need for regulatory oversight of the gas commodity market declines. The regulatory agency will need only to monitor the operation of the gas commodity market to detect any abuse of a dominant position or the exercise of market power. An active regulatory role remains, however, with respect to the tariffs and terms and conditions of access to transmission and urban distribution pipelines.

Eventually, when the industry is well developed (for example, as in the United Kingdom and North America), it may be feasible for even the smallest-volume consumers to buy gas directly from upstream producers or marketers (*retail competition*). At this stage, the same type of regulation is applied to urban transportation companies as to transmission companies; that is, their tariffs and conditions of access continue to be regulated, but regulation of their gas buying and selling is reduced.

If competition does not exist but there is potential to introduce it, the job of regulation is to promote its introduction and to foster its development. If competition does not exist and there is no potential to introduce it, the job of regulation is to attempt to replicate the outcome of competition. As the extent of competition is increased in the gas chain of production, transmission, and distribution, the scope and extent of regulation may be decreased.

Just as regulation is meant to ensure that monopolistic industries operate efficiently, however, so is it important that the activity of regulation itself be conducted in an efficient manner. This objective of regulatory efficiency raises a number of issues, such as the organization of regulation (to avoid duplication and overlap), the staffing of the regulatory commission (well-trained, change-minded commissioners and support staff), the delegation of powers to regional commissions (sensitivity to local conditions and possible savings in administrative costs; see Chapter 3) and, perhaps most important, regulatory techniques (incentive regulation of transmission pricing versus traditional cost of service methods; see Chapter 5).

### *2.6 The Current Situation: Regulation and Competition*

The preceding commentaries on the desirable content of downstream gas economic regulation and on the outcomes in terms of competition in the gas commodity market require an assessment of the current Chinese situation in these areas.

#### **Regulation**

Insofar as economic regulation is presently being practiced, it focuses on the approval of investment in the gas transmission infrastructure and the setting of transmission rates. These activities are performed by the State Development Planning Commission (SDPC). Certain broad policy responsibilities for downstream gas that would have regulatory implications reside in the State Economic and Trade Commission (SETC) as a result of the dismantling of the State Administration for the Petroleum and Chemical Industries (SAPCI) at the end of 2000. The regulatory tasks concerning urban gas distribution

are currently implemented by the Ministry of Construction. Local governments, however, are in charge of setting distribution tariffs.

Approval of investments for infrastructure, above a defined threshold, is carried out by the SDPC as part of the comprehensive monitoring and control of most investment in the China's economy. It is not specifically tailored to the needs of an industry having natural monopoly characteristics. Because the tariffs of such industry should be regulated, however, it is necessary to take into account the effects of investment approvals on the rates that would be charged by gas pipelines to recover the related costs. To evaluate these effects more accurately and to make corresponding decisions, it appears more appropriate to give the regulatory commission the responsibility of investment approval, in view of the rich experiences and knowledge of its commissioners and supporting staff in the sector.

Similarly, the setting of transmission tariffs does not appear to be done with particular regard to the issues faced by the pipeline business, such as helping to ensure that capital requirements are met, providing efficiency incentives, and encouraging capacity utilization.

A preliminary assessment of this tariff (presented in the final section of Appendix 4 as an "Example of Tariff Determination") suggests that the current tariff may be higher than a recovery of efficient costs would require. Applying this tariff would create a major problem for some urban gas companies. The much lower negotiated tariff, however, may result in the transmission service provider and gas supplier underrecovering its costs. This undermines the incentive to invest.

There appears to be no government regulation of the terms of service of transmission pipelines as they would relate to such matters as access to pipeline services by third parties.

Finally, there is no clear distinction between the GOC's policymaking function and its regulatory function. The organizational separation of these functions is an important aspect of international best regulatory practices.

To conclude, from the foregoing, presently no comprehensive regulatory and legal framework or regulation of the downstream gas industry exists. For the most part authority is exercised by ad hoc, inconsistent regulations rather than by laws, and some important gaps remain in the coverage of these regulations.

### **Competition**

The Chinese gas industry, although long established in certain regions, is still at a rather early stage of physical development. It is characterized by a number of "basin-to-market" supply and pipeline projects with limited interconnections. Regional transmission grids are being developed with an extension of supply to urban distribution customers in Sichuan Province in southeast China. Several large-scale pipeline infrastructure investment projects are in the planning stages.

These planned pipeline projects will exploit proven reserves and facilitate a significant increase in the market penetration of natural gas. They create the possibility of constructing interconnects to existing basin-to-market developments. Increased interconnection of this nature would have the potential to provide the physical infrastructure that is required to support the development of a wholesale gas market in China. For a functioning competitive market to develop, however, there must be competing sellers and buyers of gas.

The gas industry is dominated by three vertically integrated oil and gas companies—PetroChina, SINOPEC, and CNOOC (partially listed in April 2000, October 2000, and February 2001, respectively). In a similar manner to the geographical fragmentation of the gas industry, these enterprises tend to operate in separate geographical areas. PetroChina is the dominant provider of onshore transmission

services. The CNOOC has exclusive right to cooperate with foreign parties in offshore gas development.

As a first step to increasing competition, the Joint Report calls for the Chinese companies to exercise their rights to explore for and develop gas throughout China. The report contains other recommendations to increase activity and competition among the Chinese companies, partly with a view to creating stronger upstream supply markets for oil and gas.

All the SOEs have entered into PSCs with IOCs. Some of the PSCs have resulted in the discovery, development and, in a small number of cases, marketing of natural gas (for example, those with the CNOOC). It is vitally important for the development of a competitive gas market, as well as for the general health of the upstream petroleum industry, that foreign PSC partners be allowed to market gas directly to consumers. For such direct sales to take place, of course, other required conditions, such as pipeline access, must also be fulfilled.

Clearly, competition in China's gas market is limited at the moment. There are, however, the makings of a competitive environment in terms of the possibility for expanding operations by the SOEs and their PSC partners with the deepening of the planned reform of China's monopolistic industries. Also, the prospect of significant transmission pipeline development with the possibility for interconnects supports the tentative conclusion that the physical conditions for a competitive gas market are likely to emerge in the foreseeable future.

The presence of gas volume allocations and subsidies to some consumers through "in-plan" gas prices, affecting about one-quarter of natural gas supplies, is one of the most important impediments to the optimal use of gas resources. They also act as disincentives to the mobilization of financial resources required for further development. Their presence is also a barrier to the development of competitive gas markets. A schedule for the deregulation of gas prices is proposed in Chapter 7.

### **Vertical Integration**

The initial obstacle to gas market competition in the United Kingdom that resulted from the vertical integration of BG when first listed has been noted. Clearly, there is a need to ensure that vertical integration in the natural gas chain does not unduly constrain the development of a competitive market for this commodity.

According to international experience, a degree of integration by contract, from production to transmission, distribution, and large-volume consumption, is likely going to be a feature of China's developing gas industry. The driver for such integration is the need to provide security for the large investments that are going to be required in each link of the gas chain as it develops. Thus, back-to-back contracts will probably be needed to secure gas field development and to ensure the financing of new transmission facilities and the large, consuming units, such as power plants that will "anchor" the gas demand.

### *2.7 The Gas Law, Policy, and Regulation*

The requirements to create a proper economic regulatory system for the downstream gas industry include a gas law, which would provide an enduring policy framework for the industry and provision for generic policy guidance to the regulatory agency, while securing independence in the continuing process of regulatory decisionmaking.

### **The Gas Law**

To bring about the reforms envisaged in the recommendations of this report, as well as those of the Joint Report, the GOC will have to promulgate a law in which the elements of the new policy and regulatory framework are set out. Such a law would, among other things, define the following in respect of natural gas:

- The objectives for development of the gas industry and for competition in the transmission, distribution, and sales of gas.
- The broad principles to be applied in implementing government oversight
- The parts of the industry to be subject to continuing regulatory oversight.
- The legal instruments (regulations and therefore regulation-making powers) to be used in authorizing activities of those parts of the industry subject to continuing oversight.
- The composition, authority, and activity of the agency to be responsible for the oversight.

### **The Policy Framework**

Promulgation of the framework law would be a milestone event in the transition. It is desirable that subsequent changes in the law be infrequent and related only to compelling circumstances. This would help create an environment of regulatory stability. The law then establishes the “policy framework” governing the gas industry.

### **Policy Guidance to the Regulatory Agency**

It is a principle of modern economic regulation that the regulatory agency takes decisions in individual cases, independently of the policy side of government. Effective separation of policy and regulation is crucial to developing investor confidence that regulatory decisions will be taken on the basis only of the evidence put before the regulatory agency in individual cases.

At the same time, it is also acknowledged that the policymaker has the continuing role and responsibility to create the general environment in which regulation takes place and has the authority to give generic guidance to the regulatory body.

A comprehensive policy framework established by the gas law would ideally set out the conditions under which such guidance could be given and the means for conveying it.

### **Regulatory Decisionmaking**

As noted and as is discussed in detail in subsequent chapters, however, the continuing oversight of segments of the industry will involve a series of decisions from time to time relating to specific activities of individual companies. Decisions will have to be made on a continuing basis, such as in the area of approving or rejecting applications by companies, mainly in transmission and distribution, with respect to various activities, such as pipeline access and rates or prices for services.

As is noted in the Joint Report, regulatory activities are best left to an agency (generally called “the regulatory agency” or the “regulatory commission” in this report) that receives its mandate from the policy side of government. Though the regulatory commission is an agent of the government, it operates independently of the political authorities in making its decisions in particular regulatory commission cases. At the same time, it is responsive to the broad environment created by the policymakers.

### *2.8 Recommendations*

The following is a summary of the recommendations on the scope of downstream regulation, the regulatory commission's mandate, the future of retail competition, and the purpose of a natural gas law:

## 2. China's Gas Industry: Policy Objectives and Their Achievement by Economic Regulation

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1. Downstream gas regulation should in principle apply to all natural gas transmission, distribution, storage, and marketing activities that exhibit natural monopoly characteristics, regardless of ownership, size, vintage, or geography.
2. The regulatory commission's mandate should include the responsibility to ensure, to the extent possible, the viability of regulated enterprises and to enhance competition.
3. Competition in retail gas supply, although desirable in the long term, should only be considered by the regulatory commission when functioning markets have been established in other parts of the gas industry.
4. A natural gas law should be enacted to embody the main elements of regulatory commission policy and to put in place the framework for the regulation of the downstream segment of the natural gas industry.

### 3. THE GAS REGULATORY COMMISSION

This chapter starts with a definition of some terms. It then lists the principal duties of the gas regulatory commission and the reasons for them. The powers the commission will need to carry out those duties are outlined, along with the possible delegation of them to the regional or provincial level. The controls on those powers are also discussed. The regulatory commission's jurisdiction, organization, procedures, staffing, funding, and reporting are dealt with in succession. Attention is given to ensuring transparency of the commission's process and its independence in decisionmaking. Ways of obtaining public input are touched on. Powers of regulated entities in the matter of obtaining pipeline rights of way are then elaborated. Finally, there is a comment on the place of the regulatory commission in the government structure and an illustrative narrative regarding the exercise of the commission's responsibilities.

#### 3.1 Definitions and Context

By "duties" is meant the things that the gas regulatory commission will have to do in respect of the regulated entities. Project authorization, rates, access terms, and codes of behavior are the key duties of the commission. By "powers" is meant the authorities that the commission will be equipped with to carry out those duties. "Jurisdiction" means the field of activity where the powers can be exercised.

The term "regulatory commission" is used as a short form for the permanent gas regulatory agency because it exercises its functions vis-à-vis the downstream industry. The comprehensive downstream commission envisaged in the Joint Report, section 3.3, will, of course, have responsibilities for health, safety, and environmental protection that are not dealt with here.

This chapter looks forward to the time when the "appropriate regulatory institutions" are being considered in the context of policy decisions about the gas law and the drafting of that law itself. It is also, of course, relevant to the aspects of the interim regulatory agency during the transition period (see Chapter 6). A point at issue, dealt with partly in Chapter 6, however, is the degree to which the interim regulatory agency can be equipped similarly to the permanent commission(s).

#### 3.2 Duties

The principal duties of a gas regulatory commission, and the reasons for performing them, are as follows:

- *To grant (or deny) project authorization.* This is the approval of a new project, typically meaning the construction of entirely new pipelines or major extensions to existing pipelines. The West–East Gas Pipeline Project<sup>3</sup> is an example of a project that will require government authorization and that, if a modern gas regulatory commission existed, would desirably be authorized by that entity. The reason for regulating project authorization is to assess capital costs on which a regulated return will be earned, to avoid duplication with other pipelines (avoid waste) and to ensure that economies of scale are achieved (economic efficiency). The commission may also make a determination as to

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<sup>3</sup> The West–East Natural Gas Transportation Pipeline Project, announced by the GOC July 12, 2000, is to transport natural gas from both the Tarim gas fields and the Changqing gas field in western China to Shanghai.

whether the project proponent has the technical and financial capability to successfully complete the project. It may also inquire whether the gas supply to the project and the gas markets it is to serve are adequate for the gas quantities to be transported. In some jurisdictions, project authorization by the gas regulatory commission will only be granted after careful examination of engineering, health, safety and environmental issues. The present discussion is concerned only with economic regulation. A comprehensive downstream commission, however, would have the technical capability to undertake such a broader examination and authorization.

- *To approve (or reject) rates (tariffs).* The prices or tariffs applied for by regulated businesses require approval of the regulatory commission. This is because of the presumption that the owner of these businesses is a monopolist or otherwise holds a dominant position in the market for the services provided. The purpose is to ensure that rates are not above the levels that would arise in a competitive market.
- *To approve (or reject) terms of access to and quality of service.* The conditions of access to regulated services are approved by the regulatory commission, because of the same assumptions about the monopoly or dominant position enjoyed by the business owner. The purpose is to prevent undue discrimination in the provision of such services and to ensure that the quality of service meets acceptable standards.
- *To approve (or reject) Codes of Conduct.* Instruments are in place to govern the behavior of owners of monopoly gas transmission and distribution businesses when they are affiliated with other entities in the gas business. The purpose is to guard against potential abuse of dominant position. The codes of conduct would be proposed by the regulated entities, probably based on model terms and conditions approved by the policymaker and implemented by the commission.
- *To qualify (or deny) enterprises the right to participate in gas industry activities.* The regulatory commission may be required to approve and license market participants on criteria of “fitness” to take part in downstream gas industry activities. This is not a classical regulatory task having a basis in economic theory and practice. It is, however, a role that has devolved to the gas industry regulatory agency in some jurisdictions.
- *To deal with regulatory commissions in adjacent countries on border-crossing pipelines.* China’s gas requirements may dictate the development of trade with neighboring countries in pipeline natural gas. These international projects will presumably be subject to a regulatory regime in those countries, parallel with the operation of China’s regulatory regime. The projects will be integrated in an engineering and operational sense. It will be important for regulatory actions relating to the construction and operation of international pipelines to take place in parallel in each country and to be mutually consistent. In this connection, China’s downstream gas regulatory commission should be authorized to deal cooperatively with counterparts in neighboring countries.
- *To monitor and enforce compliance with all laws and regulations that fall within the jurisdiction of the commission, and apply any penalties that are provided in those laws and regulations.* The commission needs to have the authority to enforce its decisions and to ensure in other respects that laws and regulations for which it has responsibility are observed. There is therefore usually a provision in the gas law entitled “offenses and penalties.” It provides that persons, companies, and the officers and employees of those companies who refuse to obey the regulatory commission’s orders or otherwise contravene laws and regulations that constitute the jurisdiction of the commission are guilty of an offense and it provides appropriate penalties.
- *To monitor and report on gas market development.* The downstream gas commission is probably the best placed, within government, to monitor and report on the development and functioning of gas markets. It would do so in relation to the GOC’s objectives for the sector. The commission could also be required to report on the progress of regulatory reform and its results. This regular reporting would, depending on the subject matter, be both on a confidential basis to the minister responsible for the commission and on a public basis to inform all industry stakeholders. The confidences, to be decided by the commission, would relate to commercially sensitive information and to policy matters reported by the commission to the minister.
- *To handle transitional activity.* Where an existing gas industry is coming under modern downstream regulation for the first time, it is normal for the regulatory commission to grant blanket approvals

for all existing facilities, rates, and other tariff provisions, and for participation in regulated businesses. These approvals would automatically signify that the affected businesses were being brought under the commission's jurisdiction. It could then, over a period, and in an orderly manner, critically examine whether to bring about changes in any of the conditions under which these business activities were being conducted.

### *3.3 Powers*

#### **Powers of the Regulatory Commission**

The regulatory commission must be equipped with a "toolbox" that it can use to implement its mandate. Its powers would include those needed to do the following:

- Gather information, including the authority to compel the provision of information by regulated entities to the commission.
- Hold inquiries about matters within the commission's jurisdiction.
- Receive applications from regulated entities, to do things (for example, build a pipeline) or to grant approval for things (for example, codes of practice) that come within the commission's jurisdiction.
- Hold hearings if necessary, to gather and examine information and hear arguments regarding these applications.
- Keep confidential, where appropriate, information gathered as a result of the above activities.
- Make decisions based on this gathering of information and hearing of arguments.
- Give orders and approvals to carry out those decisions (for example, approval to charge a certain schedule of rates or orders to construct facilities on a pipeline to receive gas from a customer).
- Put conditions in those orders and vary them.
- Enforce those orders.
- Grant exemptions.
- Assess penalties against entities and persons that breach those orders or are otherwise in conflict with applicable laws and regulations.
- Deal with appeals from those orders.
- Work cooperatively with foreign regulatory commissions in respect of international gas pipelines.

To an important degree, these powers are similar to those of a court of law. Indeed, the North American model for the regulatory commission is to create it as a specialized court, taking discretionary decisions governing enterprises' activities in a particular economic sector using court-like procedures.

#### **Delegation**

This is a potentially important matter in a country as large and regionally diverse as China. The primary issue is whether the regulatory commission should have the authority to delegate its powers to a provincial or municipal administration and, if so, under what conditions. The following three subsections provide background for this discussion based on the Joint Report.

#### ***Existing Structures below the State Level***

Administrative structures already exist, particularly in respect of aspects of gas industry technical standards and commercial arrangements, at the provincial and municipal levels. On the one hand, these structures and the people who run them are experienced, adapted to local conditions, and familiar with the entities subject to their oversight, such as urban gas distribution systems. On the other hand, this form of administrative control, broadly described, has been unduly responsive to local social and political conditions, resulting in the distribution enterprises being compelled to operate non-commercially and prevented from properly playing their important role in an expanding national gas industry.

#### ***International Practices***

In a number of federal states, such as Australia, Canada, Russia, and the United States, the constitutional division of powers gives the state or provincial governments responsibility for economic activities that are wholly within their boundaries. As a result, in those countries, within-state or within-province oil and gas activities are regulated at that level. This means activities like oil and gas well drilling and gas distribution. The federal (national) government's responsibilities relate to such activities as offshore oil and gas and gas transmission systems that cross state boundaries.

Typically, a U.S. state where gas is both produced and distributed will have two commissions. Its oil and gas commission will be responsible for engineering, environmental, safety, and possibly reservoir management issues in the upstream. The public utility commission will exercise discretionary powers in respect of the gas distribution downstream, having regard to its natural monopoly characteristics.

In most cases, this state or provincial regulation is longstanding, its practitioners are experienced, and it is carried out responsibly. Quite apart from the constitutional division of powers aspect, there is much to be said for the local regulation of activities that are purely local in character, always with the provision that national policies and objectives are not adversely affected.

#### ***Policy Considerations Regarding Delegation of Regulatory Commission Authority in China***

China is not a federal state. Its constitution and regional governmental structures are not comparable with those of any other national state in the way that, for example, Australia, Canada, and the United States present broadly analogous constitutional models in terms of federal and state or provincial responsibilities.

It is recommended that the matter of “downwards” delegation of regulatory authority in China undergo further careful study. On the one hand, it is politically sensitive and administratively complex. On the other hand, it involves reallocation of interests among all links of the gas chain.

It is also recommended that, if it is decided that delegation should take place, the local authorities should be required to observe national standards for regulatory processes and adhere to national guidelines in such areas as return on investment, the design of tariffs and, eventually, access principles. Unless this is done, the country's urban gas distribution systems will not be able to fulfill their important role in helping achieve the GOC's objective for penetration of the energy market by natural gas. Arguably, guidance provided to the local level should be specific rather than generic, and it should extend to prescribing the rate of return for regulated businesses.

#### ***Delegation as an Aspect of the Regulatory Commission's Responsibilities***

The previous paragraphs address delegation as a broad policy issue. In the narrower context of the responsibilities of the regulatory commission, careful controls on the use of any delegation power would have to be in place. For example, delegation should only be possible to a provincial administrator that meets certain predefined conditions of competence and independence. The delegation could be made conditional on the use by the delegated commission of certain predefined procedures, for example, the calculation of allowable tariffs for gas distribution services.

The potential advantage of delegation to the provincial level is that the regulatory agency might then be better able to take account of local circumstances in carrying out duties in respect of regulated entities whose activities take place wholly within one province. The concept is one of “bringing the regulatory agency closer to the regulated entity.” There might as well be administrative economies in terms of reduced travel on commission business.

The potential disadvantage of this kind of delegation is the risk, already noted, that policy and regulatory objectives for the Chinese gas industry that will be increasingly national in scope would be sacrificed in favor of purely local considerations and interests.

Subordinate matters relating to delegation are the authority to delegate minor regulatory issues for information-gathering purposes or even for decisionmaking, to single members of the commission or to commission staff. These are matters of detail that need not detain us here.

#### **Controls**

Controls over regulatory powers include three aspects: first, control against possible abuse of the regulatory commission's powers; second, control over the degree of finality in decisionmaking by the regulatory commission; and third, control over the use of powers of delegation. This section deals with these three aspects of controls.

#### ***Control against Abuse***

It is most important to provide for the exercise of control by a third party to guard against possible abuse of the regulatory commission's powers. That third party could be a court superior in law to the regulatory commission, or it could be a policymaking arm of government. For example, issues of procedural fairness or jurisdiction could probably best be dealt with by a superior court. Such matters might relate to allegations that the commission did not fairly and properly apply its procedures. As to jurisdiction, the potential complaint might be that the commission either exceeded its jurisdiction and tried to do something that it was not authorized to do, or that it failed to properly do something that it should have done. On the latter point, not only must a commission not exceed his powers, it must also not fail to exercise them when required or invited to do so. In any cases mentioned above, appeals could be dealt with by a superior court.

In Canada and the United States, energy regulatory commissions are "supervised" in this regard by the civil courts. In Canada, the courts are authorized to deal only with questions of law or jurisdiction, not with the "rightness" of the tribunal's decisions.

In the United States, the courts can review commissions' decisions on much broader grounds, and they have in effect become another level of regulatory decisionmaking. It is not recommended that such broad powers being given to the courts in respect of energy regulation in China.

In Argentina, decisions of a jurisdictional nature made by the gas regulatory commission can be appealed at the National Court of Appeal. In the United Kingdom, the decisions of GEMA are subject to review by the Competition Commission. That review can result in a completely different set of findings and decisions than the authority may have made. Beyond the level of the Competition Commission, the available grounds for review by the civil courts are very narrow.

It is recommended that provision be made in any gas law for the regulatory commission's decisions to be appealed to the civil courts where an applicant considers that the commission has dealt unfairly, has not properly considered the evidence in the particular case before it, or has exceeded its jurisdiction. In this connection it is noted that the China Securities Regulatory Commission (CSRC) has recently been taken to court on a matter of procedural fairness.

#### ***Control over the Degree of Finality in Decisionmaking by the Regulatory Commission***

This second type of control is on the extent that the commission can make final decisions. Careful thought needs to be given to the question as to what, if any, final decisionmaking powers should be retained by the policy side of government.

Issues such as the appropriate tariff or conditions for a particular type of regulated service are best left entirely to the regulatory commission. However, when it comes to matters like the approval of very large investments, such as major pipelines like the West–East pipeline or LNG projects by regulated entities, policy issues may be present. They might include resource development, regional, foreign currency, and foreign trade considerations. All these issues need to be considered comprehensively by the policymaker ahead of making the final decision. Three basic options in terms of the authority to be reserved for the policymaker are as follows:

- The right to approve the regulatory commission’s decision (a “right of veto”).  
*Or alternatively:*
- The right to send the decision back to the regulatory commission for reconsideration.  
*Or, more radically:*
- The right of the policymaker to change the decision.

The latter course is not recommended, because of the uncertainties that would be created for investors.

In the United States, as a generalization, there is no political control over the decisionmaking of energy commissions. In Canada, at the federal level, the government has no authority over the regulatory commission’s decisions on pipeline rates or access terms, but it retains the right of veto over decisions about pipeline construction (more than 40 kilometers) and about major gas exports.

In the United Kingdom, the distinction is observed between the policy function and the regulatory commission’s function in government. The minister responsible for energy matters has the power to vary decisions on natural gas, which the Competition Commission has made, but only where there are issues of policy and industry structure arising. Such issues typically do not arise where the decisions of the Competition Commission deal with tariffs, prices, and quality of service. Note from the previous subsection, Control against Abuse, that Competition Commission decisions only arise on appeal from decisions of GEMA.

The foregoing deals with political control over the regulatory commission’s decisions once they have been made. An alternative approach to the large investments issue, not elaborated here, would be to create a “filter” mechanism before an application is made to the regulatory commission. Under this concept, a project, such as a large new pipeline or an LNG import terminal, could not proceed to the stage of regulatory applications and review until it had received clearance at the policy level.

#### ***Control over Use of Powers of Delegation***

A third area where policy-level control should be considered is in the matter of delegation of powers to regional, provincial, or municipal authorities. The provision might be for delegation to be granted on the recommendation of the regulatory commission and with the approval of the policymaker.

Generally, the laws establishing North American commissions do *not* provide for delegation of their powers. This is largely because, as noted, both Canada and the United States are federal states. There is therefore a preexisting division of powers between the central and provincial governments. Energy regulation conforms to this division as outlined in subsection above, International Practices. In other words, downstream gas laws do not provide for delegation of the regulatory commission’s powers because the constitutional division of powers between the central and regional governments (states, in the United States, provinces in Canada) already provides a basis for regional commissions to be established.

### *3.4 Jurisdiction*

By “jurisdiction” is meant the definition of the areas in which the regulatory commission is competent to act.

#### **Areas of Regulatory Commission Authority**

The commission should have the exclusive authority over gas transmission pipelines, gas distribution systems, underground gas storage facilities, and the selling of gas for consumption or resale, in respect of the following matters:

- Construction and expansion.
- Rates (tariffs) charged for the use of their services.
- Terms and conditions, other than price, for their use by others.
- Terms and conditions, other than price, of services provided to others.
- Terms and conditions under which the owners of these facilities may enter and take part in activities involving the purchase and sale of natural gas.
- Terms and conditions under which organizations that are not engaged in the activities of transmission, distribution, or storage may enter and take part in activities involving the purchase and sale of natural gas.
- To receive, deal with, and resolve complaints from one or more parties and to make binding arbitration decisions in respect of disputes about gas pricing and other gas transaction issues where there is no control of prices, allocation, or other transactional matters by another agency of government.

The foregoing jurisdictional areas are broad, but they are necessary to provide the basis for effective, modern regulation of the downstream gas industry and to form a coherent whole.

Other areas of jurisdiction might be conferred on the regulatory commission or be retained by another agency of government. These other areas include the grant of franchises or authorizations for entities to engage, on an exclusive basis, in gas distribution operations; the certification or qualification of entities to take part in downstream gas industry operations of various kinds—transmission, distribution, storage, and trade; and the responsibility, as a matter of jurisdiction, to foster competition in gas markets. It is recommended that further and favorable consideration be given to including these three areas of responsibility in the regulatory commission’s mandate.

This matter of the commission’s jurisdiction can be expressed in another way. It means that no one can construct, open, operate, or abandon facilities for transmission, distribution, or storage of gas without that body’s approval. Similar prior approval would be required to charge a rate or apply conditions of service in any of the three areas of activity.

The rationale for granting this broad authority is simple. In the matter of jurisdiction, it is in principle desirable to deal in absolutes and therefore to avoid such issues as “shared jurisdiction” and uncertainties as to what matters do or do not fall under regulation.

#### **Disputes**

A wide range of disputes can arise that might involve the following:

- The regulatory commission and regulated entities.
- The regulatory commission and entities that use the services of regulated companies.
- Regulated entities and their users.

There is no single way in which such disputes can best be dealt with.

In terms of the commission and regulated entities or persons using their services, it is sound practice to make provision for the commission to review and, if necessary, vary its decisions upon an appeal from an affected entity.

The issue of control against abuse of the commission's powers has been dealt with in the subsection below, The Decisionmaking Level.

The commission may have a role in dealing with disputes between regulated companies and the users of their services, possibly providing mediation services. If such mediation results in an outcome on which the commission must rule by way of a formal regulatory decision, an obvious conflict of interest arises. In those circumstances, it may make more sense for the parties to seek arbitration or mediation services provided by a third party, that is experienced in alternate dispute resolution methods. The ultimate forum for resolution of such disputes in China is the civil courts. In the process of arbitration by a third party, the gas regulatory commission may provide clarifications of any of its decisions that are in dispute between regulated entities and the users of their services.

#### *3.5 Organization*

##### *The Decisionmaking Level*

The law establishing the gas regulatory commission would typically define the basic organizational framework, leaving the detailed development of the organization to be filled out by the senior members of the commission upon their being appointed.

The basic elements to be defined are as follows:

- Who has the power to select and appoint the decisionmaking level of the commission?
- Who is responsible to take the commission's decisions—one person or a group?
- If those decisions are to be taken by a group, what is the composition of the group, and what are its decisionmaking powers (that is, how many members are required to take a decision)?
- Who is the chief executive of the commission?
- What are the provisions for the commission to receive funding, hire staff, obtain other necessary resources, and deal with other agencies of government, for example, in getting support for its activities?

##### **Alternatives for the Decisionmaking Level**

The alternatives in international practice are as follows:

- The single decisionmaker, for example, the Director General of GEMA in the United Kingdom.
- The commission, which is the established practice in North America and which is being adopted in Latin America and some parts of Europe, involving decisionmaking by a group of perhaps three to seven people.

The single decisionmaker model may be constituted with some kind of advisory board, within the commission, reflecting various viewpoints. This is the developing situation in the United Kingdom.

The composition of the tribunal may be designed to reflect various interests (producer, consumer, regional), as well as different professions that the government feels should be represented on the commission. This matter of "composition" may be set out in the law. Or it may be determined as a matter of administrative practice by the authorities responsible to appoint it.

In the case of a tribunal commission with several members, the law might specify “staggered terms” for the appointees so that their mandates will expire and the members will be renewed or replaced over a period. This of course avoids the potential for disruption and uncertainty if all the commission members’ terms run out at the same time.

The chief executive is the single decisionmaker in the first model or the chairman of the commission in that alternative design. In either case, provision might be made in the law for a secretary or chief operating officer to have day-to-day responsibility for running the commission.

The second model of decisionmaking level is recommended for Chinese policymakers’ reference. Internationally, there is a clear trend toward establishing gas regulatory commissions with several decisionmaking members and with the chairman as the chief executive office. Experience suggests that this is a good model for sound decisionmaking and for effective management of the commission’s staff and business. However, the choices that are ultimately made must, to a large extent, reflect Chinese experience and practice of government.

#### **The Working-Level Organization**

This subsection addresses the issue of organization below the decisionmaking level that is assumed to be set out in law.

There is no “international best practice” for organization of the regulatory commission and its staff. At least three basic models are or have been present among the large number of North American regulatory commissions:

*Organization by profession.* Subdivisions of staff would be organized along professional lines, for example, of accounting, economics, engineering, and law. For purposes of dealing with applications to the commission and related decisionmaking, a series of temporary organizations would be created following the matrix organization principle. That is, working groups with representatives from each of the professional subdivisions, would be constituted to provide analysis and advice to the decisionmakers in respect of particular issues. This approach is now regarded as somewhat outdated.

*Organization in relation to regulatory activity.* Multidisciplinary staff groups are created that respond to particular duties of the commission. Thus, in the United States, the FERC has traditionally organized its staff in part by “offices,” such as the Office of Pipeline Regulation, that deals with all aspects of the regulation of interstate pipelines. Another office would deal with the regulation of hydroelectric dams, and so on.

*Organization by “business unit.”* This is considered a more modern type of staff organization and has been adopted in Canada by both the federal commission, the NEB, and the leading provincial commission, the Alberta Energy and Utilities Board. Under it, the staff are organized into business units, some of which serve mainly external clients and others internal needs. Thus, the Applications Business Unit provides staff services to all applicants to the board, gives analysis and advice to the decisionmaking level, and prepares the reasons for the decisions taken at that level. The Operations Business Unit is responsible for all regulatory operations, for example, carrying out audits and inspections. The Commodities Business Unit deals with oil, gas, and electricity commodity matters and supports the decisionmakers in the small remaining amount of electricity commodity regulation. Units serving mainly internal clients are Information Services and Corporate Services. Additionally, professional leaders provide advice to decisionmakers and guidance to professional staff in the areas of economics and engineering.

In most commission organizations, legal services are provided from a central point to all clients. The requirement for such services varies greatly, depending on the basic procedural approach followed (the

subsection below, Procedures That Should Be Addressed in Law), and is greatest with the commission model, which involves adversarial regulatory procedures.

#### *3.6 Procedures*

##### **Procedures That Should Be Addressed in Law**

Two matters of procedure need to be addressed in law: first, whether the decisionmaking level in the commission should be directly involved in receiving and dealing with evidence respecting individual cases, or whether this responsibility should be at a staff level. For example, in the Canadian model, it is the decisionmakers, the commission members, who must receive and deal with evidence and preside at any public proceeding. In the U.S. model, this activity is often conferred on a specialized group of “administrative law judges” who are part of the commission. The evidence in particular cases, together with the law judge’s review of the case and decision in it is what comes forward to the decisionmakers in the commission. The approach to be adopted in China will reflect at least in part the country’s legal tradition, but there is much to be said for direct involvement by the decisionmakers in receiving and assessing evidence and making decisions based directly on it.

Second to be addressed in law is whether the commission’s procedures should be rather formal, or whether there should be a greater degree of flexibility afforded to the decisionmaker. The legalistic approach is followed universally in North America. It results in formal proceedings in which lawyers play an important role. Evidence is given under oath where the proceedings are public and witnesses are cross-examined by lawyers.

There is some feeling that the formal and adversarial nature of North American processes has in the past produced unsatisfactory results. In recent years, however, there has been a trend, within this system, for the negotiation of settlements between parties adverse in interest to each other (for example, pipeline shippers and pipeline owners) with the settlement then being presented to the commission for examination and approval (or rejection).

The alternative to the formal approach is to allow the decisionmaker to gather evidence less formally, to conduct bilateral negotiations with parties interested in a particular case, and to take a decision on the basis of that evidence and negotiation. This is somewhat the approach followed by the United Kingdom’s Director General of GEMA.

Again, Chinese legal procedures will be a factor in deciding which model will be chosen. The best features of the North American model, however, according to which decisions are clearly based on factual evidence put before the commission and are reasoned in relation to those facts, should be considered as a model for China.

##### **Procedures That May Be Addressed in Law**

The commission’s legislated responsibilities will include the duty to receive and deal with applications in its field of jurisdiction. The legislation establishing the commission may address how various classes of applications are to be dealt with, whether in written proceedings or by means of a public hearing. Alternatively, these matters may be left to the commission to decide.

By way of example, in Canada the legislation establishing the NEB prescribes different procedures for dealing with applications to construct new pipelines, depending on whether they are 40 kilometers or more in length. That legislation also gives the government the authority to define the types of gas exports (volume and term) that are to be subject to more rigorous or less rigorous scrutiny by that board (“board” is another name for commission).

The legislation may also prescribe how proceedings are to be conducted, or generic guidance in this matter may be provided by the country's legal system. Alternatively, the commission may be left to develop its own procedures. Where matters of procedure are left to the commission, the legislation should define its authority to make relevant and enforceable regulations and provide guidelines.

In the United Kingdom and Europe, regulatory commissions appear to have some scope within their legislative boundaries to develop their own procedures, pursuant for example to a legislated general requirement that they should consult with interested parties. It is a matter for further consideration to what extent this scope should be provided to China's gas regulatory commission. On the one hand, there is a case for allowing the commission to develop procedures based on its practical experience of regulation and close contacts with parties using its processes. On the other hand, there is a case for retaining a considerable degree of policy control on its procedures and some investors may be uncomfortable if the commission is given much scope for administrative discretion. Therefore, a point of balance should be found in between.

#### **Working-Level Procedures**

There are no "international best practices" in regard to procedures for a commission's work. Some elements, however, seem to be common to many regulatory entities and which essentially respond to the needs of the work that has to be accomplished. They are enumerated below:

- *The secretary.* A single point of contact between the commission and its "stakeholders" is desirable; that is, the regulated entities and those parties who have an interest in their activities. The position, sometimes laid down in law, is that of a secretary. The secretary receives (and acknowledges) all incoming applications and correspondence, responds to inquiries, arranges meetings with stakeholders, and publishes all commission decisions.
- *The secretariat or archiving function.* Record-keeping is very important, in terms of receiving, storing, and retrieving all materials filed by stakeholders, as well as correspondence and decisions. As soon as an application or representation is received by the commission, a file is created, and all subsequent related materials are sent to it. As a generalization, the principle of transparency (see section 3.10 below, Transparency) requires that all such files be available for public view.
- *The broader information function.* Regulatory agencies necessarily accumulate large amounts of data about the financial and operating activities of regulated companies. These data are usually collected according to regulations that provide for gathering them on a uniform basis. The storage, retrieval, and manipulation of these data is an important function in a commission.
- *The description of internal document flows and related action steps.* In the interest of operational efficiency and also because of the importance of consistency in dealing with regulatory issues, it seems normal to predefine the flows of documents within the commission and responsibilities for dealing with those documents. For example, an application is received by the secretary from a pipeline for a new tariff. It is provided by the pipeline in the number of copies prescribed by the commission (maybe 20). One copy is archived, another put on public file in a viewing location, and the others are distributed to the commission decisionmakers and the support staff. An established procedure then sets out who is responsible to do what with the application, for example, where the staff are organized by professional group, to identify a project manager and select a project team to begin analysis of the application and recommend to the decisionmakers how it should be dealt with.
- *The description of practices and procedures for interaction by the commission with regulated entities.* These define the way the commission will deal with applications that are found to be complete and ready for decisionmaking. They are of course public documents.
- *The preparation and release of the commission's decision.* This reverts to the matter of internal procedures whereby the staff is instructed on the preparation of the reasons for decision, and arrangements are made for their approval by the decisionmakers and for printing and publication, including holding it confidential until publication.

#### *3.7 Staffing*

The selection of decisionmakers and their support staff is a critically important step in establishing and maintaining a strong organization.

International practice tends to be for the decisionmaking level of commissions (in the United States and Canada, commission members; in the United Kingdom, a single decisionmaker) to be appointed by the chief executive of the government, of the jurisdiction involved. Thus, under “presidential” systems of executive government such as the United States and Argentina, the appointments are made by the president and approved by the appropriate branch of the legislature (in the United States, the Senate, in Argentina by means of an opinion from a Congress Commission). Under “parliamentary systems” of executive government, such as in Australia, Canada, and the United Kingdom, the appointments are made by the prime minister. The legislature is notified of the appointment and can discuss but not change it.

No defined procedure exists for the selection of persons to occupy the decisionmaking level in tribunals in the United States and Canada. In Canada, however, there are elements of a selection process in that applications are invited for these jobs, a list of qualified persons is created, and recommendations are put forward to the prime minister by the minister responsible for the agency. This process is to be recommended.

Regardless of how these important choices may be made, it is necessary to select people who are of good character, experienced in business and administration, well educated, and strongly motivated to serve the public interest.

In regard to staff to support the decisionmakers, again international practice appears to be for the chief executive or the chief operating officer of the commission to be made responsible for staffing. The normal practice is to select staff on the basis of merit by open competition.

In regard to both the decisionmakers and the staff that supports their work, it is normal to provide for the full range of necessary professional skills, such as accounting, business, economics, law and, in the case of the “comprehensive regulatory commission,” engineering and environmental science.

#### *3.8 Funding*

The provision of adequate financial resources for the commission is an important issue, partly related to the principle of “independence,” but broader than that.

International experience shows that some commissions have been handicapped by lack of staff and other resources so that they have been unable to properly discharge their responsibilities. Others have lost staff. And there have no doubt been cases where decisionmaking was corrupted by the fact that the decisionmakers and/or their staffs were too poorly paid to resist the temptations put before them by persons having a special interest in the outcome of those decisions. It is therefore necessary to clearly address the financial resources of the regulatory commission to ensure a salary level that is comparable with those of the regulated entities in the sector and an adequate funding for fulfilling their responsibilities.

#### **Alternatives for Funding the Regulatory Commission**

The regulatory commission is a part of the government. The commission’s budget should therefore be subject to some external control and approval, the nature of which will depend on the particular budgeting and approval processes used in China.

Three basic approaches appear to be used internationally:

- The traditional approach has been to treat the commission like any other government department and to meet its costs out of the general tax revenues.
- A more modern and increasingly common approach regards “regulation” as a service for which the user, that is, the regulated company, has to pay a fee. There are two alternatives:
  - To create a schedule of fees for specific services that will generate sufficient funds to cover a predetermined proportion of the commission’s total expenses. Such a schedule might provide for fees to be paid for all sorts of services, from receiving information from the commission to having inspections and audits performed to dealing with applications for pipeline construction, pipeline rates, or conditions of access and issuing the required approvals. This approach was previously followed in the United States by the FERC and by GEMA in the United Kingdom, to recover part of their total costs.
  - To establish a levy on the activities of regulated companies that will generate the required funds. The levy would be determined in relation to expected industry activity and designed to cover the requisite portion of the commission’s total expenses. This approach is followed by ENARGAS in Argentina and by the Canadian NEB. In Canada the levy applies to the throughputs of regulated gas pipelines (and oil pipelines and electricity exports for those other elements of the board’s regulatory activities). It is designed to cover virtually 100 percent of the board’s costs.
- The composite approach blends revenues from fees for service or levies on industry activity with general tax revenues, in a predetermined proportion. In the past, the \$40 million annual budget of the Alberta (Canada) Energy and Utilities Board was met 50 percent from each source. In the United Kingdom, the government provides GEMA with an amount of funds sufficient to balance its total budget after allowance for the revenues collected from licensing. The international tendency, however, has been for governments to require an increasing proportion of the regulatory commissions’ needs from fees for service or levies.

#### **Regulatory Independence and “ Industry Funding”**

The question arises whether the funding of the regulatory commission by fees for service or levies is likely to impair its independence. Based on Canadian experience of the past nine years, the answer is clearly “no.” This is largely because the direct means of funding the agency is its government-approved annual budget. The fact that the counterpart of that budget is a matching flow of funds from regulated companies does nothing to influence the NEB’s decisionmakers or staff.

#### **Regulatory Independence and Salary Levels**

No matter what the decision is on funding choices for the regulatory commission, it is critically important that both its decisionmakers and its supporting staff should have salary levels and enjoy other benefits (pensions, benefit plans) that will attract and retain technically competent, experienced, and enthusiastic people.

This, together with the conflict of interest rules for behaviors of decisionmakers and staff, is the best practical means of securing independence. In Canada, the NEB has been granted the status of a special agency of government. Within its overall government-approved budget, it is able to develop its own scale of salaries and benefits for employees that reflects its own needs, together with such factors as the competition in the job market from the oil and gas industry, including the regulated companies.<sup>4</sup>

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<sup>4</sup> The Board is located in Calgary, the oil and gas capital of Canada, where salaries are very high when the industry is prospering.

### **Assessment of the Likely Resources Needed for Downstream Gas Regulation**

It is not possible to anticipate quantitatively what might be the resources needed by the gas regulatory commission to deal with the economic regulation of this industry segment.

Two points are nevertheless worth making. First, larger resources may be required in the transition than in the long-term permanent regime. This is because of the need to develop the regulatory framework, as well as carry out ongoing regulation. The ongoing regulation will initially involve a significant one-time effort to design and set up systems, for example, for collecting, storing, and manipulating financial and operating data from the regulated entities.

Second, modern, efficient economic regulation along the lines discussed Chapter 4 does not involve large resources on the part of the regulatory commission. It is efficient both in terms of its low costs to the regulated entity and to the regulatory agency. Typically, for example, issues of pipeline access tend to disappear once the concept is accepted by the pipeline industry and embodied in their terms of service by pipeline companies. The setting of pipeline rates in the United Kingdom under the recommended “RPI minus X” approach is done for terms of several years. The same is true in North America of settlements of pipeline rates made by the pipeline companies with their stakeholders and approved by the regulatory commission.

#### *3.9 Reporting*

Provision should be made in the law for the regulatory commission to report regularly on its activities. This is in part an element of control over potential abuse of power. It is in part an element of transparency.

Reporting should take at least two forms: reporting to the responsible minister and reporting to the public.

The minister, or more generally, the policy side of government should have the right and responsibility to receive reports on any policies that the regulatory commission has developed to deal with decisionmaking issues before it, on its agenda, and on any particular problem areas, for example, issues of staffing or funding. This reporting, which would never address particular regulatory decisions, would be confidential.

The regulatory commission should be required to report at least annually, comprehensively, and within a defined lapse of time (say, four months) after the year-end on its activities during a calendar year. This reporting would summarize its activities in terms of decisionmaking, and provide any information that can be made public about its assessment of the workings of the regulatory system, the functioning of gas markets, and data about the gas industry.

#### *3.10 Transparency*

The Joint Report emphasizes the importance of transparency as a characteristic of new style regulation and goes on to describe it in the following terms.

The principal features of transparency are as follows:

- The laws, regulations, guidelines, and codes of practice used by the regulatory commission must be publicly known.
- All proceedings before the commission relating to such matters as applications for approvals and complaints about the activities of regulated enterprises should be made public as they are received.

- The proceedings held to deal with applications, complaints, and the like, whether public hearings or written ones, must be open to all parties who have a legitimate interest in the outcomes.
- In those proceedings, all parties must be fairly treated and be given an opportunity to be heard.
- The decisions that result must be based on the facts put before the commission and interpreted in the light of the relevant laws and regulations. The decisions and the reasons for them must also be made public.
- The commission must periodically report to the government and the public on its activities.

#### 3.11 Independence

It is a cardinal principle of modern economic regulation that decisions in individual cases should be taken by the commission, on the basis of the evidence before it and applying whatever general and publicly known principles and techniques of regulation may be extant at any one time. Independence of this sort should be provided for in the relevant legislation and safeguarded in all subsequent practices. This will greatly enhance the regulated community's confidence in the commission's fairness and contribute importantly to the climate for investment by all parties in the sector.

To ensure the commission's independence, measures are required in at least six areas as to decisionmaking members of the commission: tenure; economic security; limitations on other employment and investment activities; behavioral requirements; and provisions as to the relationship and communications with the policy level of government and as to the financial resourcing for support of the commission in terms of staffing, accommodation and budgets.

- *Tenure.* The decisionmaking member or members of the commission should be appointed for a defined term of years (suggest 3-5, but note the point about "staggered terms" made under the subsection above, Alternatives for the Decisionmaking Level), subject to good behavior (that is, a member could only be dismissed if found guilty of an indictable offense).
- *Economic security.* The members should be assured of an adequate salary and related benefits, based on comparability with conditions in the industry that is being regulated (see also under the subsection above, Regulatory Independence and Salary Levels).
- *Limitations on other employment and investment activities.* The provision should be either that the commission members may not accept any other employment, paid or unpaid, or that they may only accept other employment that is not in conflict with their duties as commission members, and subject to the approval of the policy level. In some jurisdictions, limitations on employees' activities extend into a "cooling off" period of 12 to 24 months after they cease to be commission members.
- *Behavioral requirements.* It may be desirable to legislate certain behavioral requirements for commission members, for example, that they should not be allowed to accept gifts or hospitality above a predefined value level and that they may not hold private meetings with persons or corporations who have or may have cases pending before the commission.
- *Communications.* Communications between the policy level and the commission should be defined in law. In particular, it should be provided that there may be no communication on the "merits" of any case that is before the commission or that may come before the commission. Also, any communication from the policy level to the commission that may have a bearing on the way it disposes of applications before it should be made public, that is, they should have the nature of a generic policy direction.
- *Financial resources and staffing.* Finally, to ensure the "reality" of independence, it is necessary to provide in legislation that the commission will receive financial resources and staffing authority sufficient to properly discharge its responsibilities.

### *3.12 Public Input*

It is important that the commission's practices be reasonably responsive to the needs of the stakeholders, without impairing its independence, objectivity, and efficiency in making decisions. In this connection, and also for the sake of keeping informed and up to date about the condition of the industry that it regulates, it may be appropriate from time to time to receive public input. This can be done by means of public meetings, conferences, and workshops, as well as by bilateral meetings with interested parties. In the case of the latter, minutes should be kept and made available on the public record, and any discussion should make no reference to any particular decision of the commission, actual or pending.

Well-organized trade associations can be useful to the commission for providing coordinated views on, for example, of an industry sector. In China, the SOEs and other investors in future regulated downstream gas businesses will undoubtedly have ideas on appropriate regulation that they will make known to policymakers and to the commission when it is established. In most countries national associations representing petroleum producers, energy pipelines, gas distributors and industrial gas consumers provide interfaces with central and local regulatory commissions. Examples of such associations in North America are the Canadian Energy Pipeline Association and the U.S. Interstate Pipeline Association. The China Gas Association might provide such a function in its country.

### *3.13 Powers of Regulated Entities*

#### **Powers to Obtain Rights of Way**

The commission will have the authority to deal with applications put before it by regulated entities. Where it grants an approval for something to be done by such an entity, the commission should be able to confer on the regulated entity certain powers that may be needed to do what has been approved (for example, collect a pipeline rate or build a pipeline).

The most important power that the government or the commission can confer on a pipeline is the authority to take land (right of way) needed for pipeline construction and operation and to prevent alternative uses, such as mining, that would impair the pipeline's safe operation. This is a valuable—some would say essential—power for a pipeline company to have. It cannot of course be unconstrained. Provision therefore needs to be made to define the conditions, including compensation for affected landowners (the state) and land users (farmers, municipalities, enterprises), according to which a pipeline that has been approved by the commission can take land for right of way. It is understood that procedures for compensation of land users are well established in China.

Similar comments apply to the probable need for gas distribution entities to be granted powers to obtain rights of way for the construction and operation of distribution network.

#### **Powers to Collect Approved Rates**

The power to collect from a customer the price or rate that the Commission has approved for the service provided is also potentially important and valuable. In the Chinese context it may provide a means to deal effectively with collection problems that may be facing some pipelines and, especially, gas distribution utilities.

#### **Limitations on the Powers of Regulated Entities**

The counterpart of the authority granted to the commission is a limitation (control) on the powers of the regulated entities. The activities of gas transmission, distribution, and storage will be defined and the following sorts of limitations imposed:

- No person to construct, alter, expand or abandon transmission, distribution or storage facilities without approval of the commission.

- No person to engage in the commerce of gas (sell, resell) or charge rates or set conditions of service for gas transmission, distribution, or storage, without approval of the commission.

The assumption has to be made that the commission will act in a rational manner. Under this assumption, if competing facilities were available to serve a given regional gas market, for example, in regard to gas storage, it would be expected not to exercise its jurisdiction to set rates for storage services, since they would in those circumstances be satisfactorily set by competition.

It is for consideration whether this expectation of rational behavior in regard to encouraging competition should be made explicit in the legislation establishing the Commission. It is for further consideration whether the responsibility for making the determination that a given activity may be satisfactorily regulated by competition should be the responsibility of another department of government, such as the future Anti-Monopolies Commission, that has been under policy discussion in China for some time now.

#### *3.14 Place of the Regulatory Commission within Government*

The gas regulatory commission would be an agency of government, located within the total organizational framework of the GOC. A senior minister (in the transition period, the “Change Champion” proposed in the Joint Report) would be the contact point for the commission at state council level. He would be knowledgeable about its activities, budget, and the like. He would publicly communicate general policy direction to the agency’s head, but he would not interfere in its decisionmaking in individual cases.

It is for those responsible in the GOC for the “machinery of government” to decide the precise location and reporting relationship of the commission agency and also its relationships for purposes of budgeting, accommodation, provision of staff, and other resources.

#### *3.15 Recommendations*

The analysis in this chapter gives rise to recommendations respecting duties and powers of the gas regulatory commission, delegation and jurisdiction, transparency and independence, and resourcing and staffing, as follows:

- The commission’s principal duties should be to grant (or deny) project authorization, rates (tariffs), terms of access, quality of service, codes of conduct, and rights to participate in industry activities, and to monitor and report on gas market development.
- The general powers should include information gathering, authority to hold inquiries, to receive applications, maintain confidentiality, make decisions on applications, give orders and approvals, condition those approvals, enforce orders, grant exemptions, assess penalties, and deal with appeals.
- The politically sensitive and administratively complex matter of delegation of authority should be the subject of further study.
- If delegation is decided upon, the regional, provincial, or municipal levels should be required to observe national standards for regulatory processes and national guidelines in such areas as return on investment, the design of tariffs and, eventually, access principles.
- The commission should not be permitted to delegate its powers without the approval of the policymaker.
- The jurisdiction of the commission should include construction and expansion approval; transmission, distribution, and storage rates; access terms and conditions; and, probably, gas marketing activities.

- If the courts are given the power to deal with appeals from commission decisions, such appeals should be limited to questions of law and jurisdiction.
- The authority of policymakers over y decisions relating to individual cases should not extend to changing those decisions.
- The commission's activities should be fully transparent, as described in section 3.10, Transparency.
- Measures, as described in section 3.11 Independence, should be taken to ensure that the commission is properly independent for purposes of fair and effective decisionmaking. Particularly in the interest of assuring this independence, the regulatory agency and its support staff should have pay and benefits comparable to those in the regulated entities.
- The decisionmaking regulatory agency(ies) should be appointed by the senior level of government and be selected from a list of qualified persons. The support staff of the decisionmaking regulatory agency should be selected on the basis of merit in open competition.
- The regulatory commissions should be granted adequate resources to perform their duties. In this connection, the regulated entities should pay for the regulatory agency's costs by way of levies on their activities or fees for regulatory services rendered, rather than being met by government out of general tax revenues.

## 4. PRINCIPLES FOR THE REGULATORY ACTIVITY

The purpose of this chapter is to discuss principles related to the economic regulation of transmission and distribution of natural gas that would guide this aspect of the work of the gas regulatory commission. Efficient and effective regulation of these elements of the gas chain will result in low-cost, yet profitable and innovative transportation systems, lower prices to consumers, and higher returns and therefore profits to gas producers.

The key elements discussed in this chapter include the following:

- Principles for delimiting regulatory jurisdictions over pipelines between central and local governments (section 4.1).
- Market structure of transmission and distribution, taking account of the arguments for and against granting exclusivities in the authorization of pipelines and criteria to be used in the authorization of pipelines (section 4.2).
- Principles for access to transmission and distribution service (section 4.3).
- Principles for setting transmission and distribution tariffs (section 4.4).
- Recommendations (section 4.5).

### *4.1 The Regulatory Jurisdiction over Transmission Pipelines*

Certain policy considerations, as well as pros and cons, on the delegation of regulatory commission authority to the regional level were dealt with in Chapter 3 based on analyses of international practices, concluding with a recommendation that the issue be studied further. In the following paragraphs, the question is addressed from a technical standpoint whether intra-provincial transmission pipelines should be regulated from the center or at the regional level.

The central government should regulate all transmission lines that cross provincial boundaries. Provincial regulation of those parts of inter-provincial or international pipelines that are within their territories would result in fragmented, potentially inconsistent, regulation. The result would be high costs and increased regulatory uncertainty for pipeline owners and users.

The question arises as to whether it makes sense for the regulation of intra-provincial transmission pipelines to be done at the provincial level. Although the idea is intuitively attractive, the experience in at least one country—Canada—is that it is not an efficient way of regulating.

The problem is that transmission lines rarely remain solely within the borders of a single province even though they may start out that way. In China, for example, a number of transmission lines that are relatively short may lie entirely within a province. However, it is highly likely that, as the gas industry develops, transmission lines will become increasingly interconnected, and there will be fewer and fewer unambiguously intra-provincial lines.

In those cases, segmented jurisdiction will almost certainly result in inefficient regulation. For example, in a number of cases in Canada where pipelines connect producing provinces, the owners have segmented the corporate structure, so that the small length of line that crosses the border is set up as a

separate company and is regulated by the federal authority. The other elements of the line are regulated separately by the individual provinces within which they are located. Three regulatory agencies are involved, clearly an inefficient process. In another case, two regulatory authorities are involved in the regulation of a major pipeline connecting a producing area to a large center of gas consumption.

The only way to avoid such regulatory inefficiency is to define the starting point of a transmission line to be the outlet of the purification plant and the end point to be where the pipeline connects with a UGD at a city gate, or with a large industrial user or power plant. All such transmission lines should be under the regulatory authority of the central government.

### *4.2 The Tasks of Economic Regulation: Gas Transportation and Regulatory Authorizations*

If transmission and distribution pipelines are to be regulated, the regulatory framework must specify the terms and conditions under which companies providing such services operate.

The government will wish to ensure that economies of scale are achieved, that there is no duplication of service that causes congestion, and that the industry structure is conducive to providing high-quality service at minimum cost—a characteristic referred to as *productive efficiency*. To a considerable extent, these objectives are inconsistent in reality. For example, economies of scale are most likely to be obtained if monopoly (exclusive) franchises are granted, but productive efficiency is more likely in an industry where a number of companies are competing.

Therefore, the principles governing economic regulation must seek to promote productive efficiency in an industry that is characterized by monopoly. They must also provide for the granting of exclusive franchises only when there are compelling reasons for doing so.

#### **Exclusivity**

Exclusivity in the provision of pipeline service is sometimes granted for *transmission* and almost always for *distribution*. Among European countries with relatively well-developed gas markets, exclusivity has existed in a number of them, but the practice is no longer permitted under the terms of the European Union (EU) Gas Directive.

#### ***Transmission***

Transmission pipelines in most newly developing gas industries do not receive an exclusive right to serve an area or route. Nor do they have a statutory obligation to provide service. Nonexclusive transmission authorizations are frequently granted upon application for an indefinite period.

Lack of an exclusivity provision in the authorization is most unlikely to result in a second pipeline being built over a given route, whereas an existing transmission company will have had substantial unexploited economies of scale. An incumbent transmission pipeline company, however, knowing that it had no exclusive right to serve, would have a greater incentive to provide efficient and effective service in the long run to prevent competition for the market by a potential new entrant(s).

Substantial practical difficulties also exist in enforcing a policy of exclusivity for transmission. As gas markets develop and the number of supply sources and use destinations increase, the potential exists for many routes to connect supply basins with users. Such routes need not always be “physical” because the potential for gas exchanges will arise as transmission networks develop. This may be especially relevant in China where there are multiple gas basins and many centers where gas is used. Thus, transmission pipeline interconnections are likely to exist, as well as more than one route from a given basin to a given industrial or municipal area. It is not clear that there is any useful meaning to exclusivity in this context.

It is important that the exclusivity issue be dealt with when the regulatory framework is established, so that the government is clear in its intent and that investors understand the nature of the regulatory commission regime within which they must operate.

In countries where the gas industry is relatively mature, pipeline-to-pipeline competition can emerge. This may occur for a number of reasons:

- The incumbent transmission service provider may be either unwilling or unable to provide additional capacity.
- Existing shippers (users of the pipeline system) may be unhappy with the incumbent's service or expansion proposals and prepared to contract for capacity from another pipeline.
- The transmission charges of the incumbent service provider may not reflect costs, such that bypass, by means of a direct line, becomes commercially viable.
- The regulatory commission takes the view that the dynamic benefits of pipeline-to-pipeline competition and the consequent reduction in regulation outweigh the risk of underutilized capacity.

Frequently, elements of all these factors may combine in a specific situation. In general, however it would be unusual for a regulatory commission to allow the construction of a competing pipeline unless there was evidence that the economies of scale of the existing pipeline system had been exhausted. This is particularly the case for a developing gas industry.

### ***Distribution***

In the case of *distribution*, exclusivity in the provision of transportation service makes sense because, in addition to ensuring that economies of scale and scope are achieved, it ensures that the congestion of pipeline networks is avoided that would result from a number of companies operating in the same geographical area.

Distribution utilities are, therefore, almost always granted an exclusive monopoly franchise for the provision of gas transportation service within a given geographical area, frequently a municipality. With the granting of exclusivity goes a statutory obligation to serve customers within the franchise area.

Productive efficiency can be encouraged in a number of ways, notwithstanding the exclusivity characteristic of distribution companies:

- A bidding process can be used to select the company to whom the concession is to be awarded. The regulatory commission prepares a bid containing the terms and conditions on which the franchise is to be operated and the winner selected based on its commitments.
- Distribution franchises are frequently granted for a fixed period—20–30 years—after which they are rebid. The incumbent may be permitted to participate in the rebidding. This provides an opportunity to the regulatory commission to replace an inefficient operator.
- In a large municipality, (..) the area may be divided into several franchises. Although franchisees would have local monopolies in their areas, the regulatory commission would have a basis for comparing performance across distributors, rewarding good performers, and penalizing bad performers.
- Contracts to construct extensions of the system may be awarded to companies other than the franchisee.
- The tariff-setting mechanism can contain incentive elements—allowing good performers to earn higher profits.

Distribution pipelines are also granted another form of exclusivity—that of the exclusive right to sell gas to some or all of their customers. As noted, in virtually all newly developing gas markets, distributors have the exclusive right to buy and sell gas to small consumers: households and small

commercial and industrial establishments. If these small consumers are allowed to purchase gas directly from producers or non-distribution pipeline operators, the costs for management would be high, and the marketing costs of independent gas suppliers as a third party would also be high. Facilities for managing gas sales by third parties are expensive, and the cost of providing them in a new gas service area is high. Further, as an aid to encourage investment in the distribution system and in facilitating the development of a new distribution network, distribution companies may be given the exclusive right to sell gas to all customers, large and small, for some initial period, such as five to ten years. Once this period has elapsed, large consumers, in particular, are often permitted to purchase gas from other suppliers to provide competition to the gas distribution company.

In the past, in North America, to curtail the market power conferred by exclusivity in the sale of gas in their area, the distribution companies were not permitted to profit from gas sales. Their charges to consumers for the gas commodity were overseen by the regulatory commission that authorized the amounts to be charged consumers. This practice continues in those areas where full retail competition (giving all consumers a choice of supplier) has not been implemented.

In Europe, traditionally, the profit on the bundled supply service has not been disaggregated into its pipeline service and commodity components. The progressive implementation of gas market liberalization has resulted in an increasing requirement for distribution companies to separate the costs of these components. Regulatory agencies have a number of techniques to curtail the costs of gas being passed through to consumers receiving bundled service. For example, the regulatory agency could impose an “economic purchase condition” on the company or specify a gas price index. If the company purchased gas at a price lower than that determined by the index, it could keep the difference as an increase in profit. This provides an incentive to seek out low-cost supplies of gas.

### **Methods of Operation: Contract vs. Common Carriage**

Pipelines operate on the basis either of *contract carriage* or *common carriage*.

In a *contract carriage* pipeline, users contract to purchase an amount of space for a specific period (“firm capacity”) and to pay for that space whether or not they use it. In return they are guaranteed access to the contracted space. If all the space in the pipeline is contracted, a new potential customer for firm capacity will have to wait in line either until an existing user gives up its space, until the pipeline expands, or until someone builds a new pipeline. Facilities constructed under contract carriage are built to order—construction occurs only when users (“shippers”) are willing to sign contracts obligating them to pay for the new capacity.

In a *common carriage* pipeline there are no contracts and shippers have *no* right to a constant, predetermined, amount of space. In contrast to transmission pipelines, distribution companies sell their transportation services on this basis. In addition to a variable charge, users of the system pay a fixed charge for transportation service that is related to the costs of providing the transportation. For example, large industrial users of urban distribution systems pay less, on a unit basis, than small residential users for whom much more extensive facilities are required. Pipelines offering common carriage—including UGDs—construct new capacity on the basis of anticipated demand for service. Indeed they frequently have a statutory obligation to operate in this way. In addition, it is often difficult to quantify the capacity that is used by a system user. This is a key element of any contract. For these reasons, common carriage is the most common approach for distribution systems.

UGDs should continue to operate on common carriage principles in China’s reformed gas industry, albeit with a much different and much more effective form of government oversight. Therefore, no further discussion of urban distribution is required in this section. The major issues relate to transmission pipelines.

### *Transmission*

North American transmission systems are the best examples of contract carriage. In Europe major systems are a hybrid of contract and common carriage, but are in a process of transition to a more contractually oriented regime. A system of contract carriage is desirable, especially in a country like China with a newly developing gas industry. It enhances the economic viability of new pipelines and reduces their risk because it increases the probability that its capacity will be used at a high rate. Therefore, it is useful to describe the main features of the North American system. However, the issues being confronted by some European countries as they move to a more contract-based system may be illustrative of those that China will face as it transits to a contractual, open-access regime. Hence the main features of each are described.

#### North America: Contract Carriage

In North America, when new transmission lines are constructed, they are backed by long-term contractual commitments—up to 15 years—on the part of shippers. As contracts expire, they may be renewed, frequently for a much shorter term than in the original contract, or the associated capacity will be released to the pipeline by the shipper. Released capacity will be resold by the pipeline, usually through an auction process called an open season. In an open season, the space is awarded based on the offered contract term—winning bids being those offering the longest terms.

Unutilized capacity could be sold in two ways:

- If all the contracted space is not used during a particular period, the pipeline can sell it on an “interruptible” basis. Capacity would be sold on an *interruptible* basis if it were idle on a short-term, day-to-day basis depending on shippers’ use profiles. It is called interruptible service because the buyer of this type of service will be interrupted when the holder of the firm capacity wants it back.
- When shippers know that they will not be using their contracted capacity for several months—or even years—say, because of seasonal fluctuations in use or because of a downturn in the economy, they, or the pipeline on their behalf, may agree to sell it in a secondary market on a firm basis. Such secondary markets have developed in North American gas transportation in recent years. They perform the extremely important function of providing information on the value of pipeline service to shippers and signal the need for and the economic feasibility of new pipeline capacity.

The split in rights and responsibilities between the transmission company and its customers is quite sharp:

- The transmission company operates the pipeline system and is entitled to the recovery of its costs for constructing, operating, and maintaining the facilities.
- The customer holds the rights to the capacity, under long-term financial obligations, and may use that capacity or sell it (temporarily or permanently) as it sees fit (as long as the capacity sale is consistent with pipeline operation).

Contract carriage with resale rights is therefore similar to renting commercial office space. Capacity (floor area) is purchased under a long-term contract (lease). The landlord sets the lease price at a level that will pay for the construction of the office space. The lease is a contract that gives the tenant specified rights over how to use or sell (sublet) that capacity.

Assigning capacity rights on a contract carriage regime, for the purpose of allowing customers themselves to use or sell these rights as they wish, allows the value that different customers place on that transmission capacity to be determined. In other words, it is possible to ensure that those customers who are willing to pay the most for property rights on the pipeline are the ones who receive them without the pipeline having to place a value on those rights. It is also easy to compare the cost of acquiring existing

capacity rights with the cost of constructing new capacity. This allows expansion projects to face a legitimate market-based test.

Finally, and perhaps most importantly, assigning tradable, long-term property rights on a transmission system forces holders of existing capacity to continuously face the marginal cost of holding these rights. Those customers who seek increased capacity have two major choices:

- Commit to long-term payments for newly constructed capacity.
- Purchase existing capacity rights from the holder of these rights.

Effective capacity trading requires many buyers and sellers and an electronic bulletin board or alternative posting mechanism to provide transparency. Otherwise, it is unlikely that this secondary market in capacity will attract favorable prices.

The ability to trade capacity rights is now effectively working in the United States and Canada. Capacity trading is not yet functioning effectively in the United Kingdom; the system of annual tariffs and an inadequate definition of capacity are hampering the emergence of this market. The Australian transmission companies are planning to eventually introduce capacity trading.

### Europe: Hybrid Common and Contract Carriage

Gas industries in most European countries were developed in a much more integrated fashion than in North America. Transmission companies provide a bundled transmission and gas supply service and are akin to common carriage utilities in that they build facilities in anticipation of demand and have a public service obligation (PSO) to serve.

In some countries, such as the United Kingdom, the transmission system has some of the characteristics of contract carriage in that there are short-term, annual contracts between the transmission company and shippers for the provision of service. The concept of contracted capacity, however, is not well defined—there is a looser connection between transmission investment and the demand for service than in North America. As a consequence, in the transition to a contract-based regime, some of the assets of transmission companies are likely to be found to be redundant—that is, not necessary for the effective operation of the business.

This raises the difficult issue of how to deal with the so-called stranded costs—the undepreciated value of the unnecessary equipment: whether and the extent to which they should be borne by the government, by the users of the transmission system, or by the shareholders of the transmission company.

### Implications for Reform in China

As noted, this report argues that a system of contract carriage would best facilitate the development of natural gas in China. It is the system used virtually everywhere among newly developing or reforming gas industries.

For existing pipeline companies, the system of contract carriage has both advantages and disadvantages. The main advantage is that a move to a contractual basis would improve the ability of pipeline companies to force shippers to pay their bills—rights and obligations of both pipeline and shippers would be more clearly defined. On the other hand, a shift to contract carriage would probably result in some assets of pipeline companies being declared redundant so that mechanisms would have to be found to deal with the associated stranded costs.

It is important to note, however, that stranded costs are a transitional problem, not a permanent one. The advantages of a move to contract carriage for gas transmission pipelines far outweigh any transitional difficulties that may occur.

### *4.3 The Tasks of Economic Regulation: Access to Service*

Access issues are discussed separately for transmission and distribution.

#### **Transmission**

As the gas industry grows, an increasing number of producers will be selling to an increasing number of consumers (including distributors, large industrial customers, and electric power generators) along the route of a transmission pipeline. Typically only one monopoly pipeline will connect a given basin to its market(s).

To attract investors to the upstream industry and to encourage development of gas markets downstream, it is critical that market participants enjoy open access to the pipeline on a nondiscriminatory basis. As in other commercial enterprises, access is conditional on shippers' willingness and ability to comply with standard terms and conditions of service, including formulation mechanism of tariffs, offered by the pipeline to all its customers on an equal, nondiscriminatory basis.

This means that transmission pipelines, as well as UGDs in their dealings with customers who buy their gas from sellers other than the distribution company, should conduct their businesses like any commercial transportation company, such as a railway or shipping company, selling transportation services to independent enterprises desiring to ship gas. Like other companies engaged in the provision of transport services, pipelines need not, and should not, have an interest in the goods being shipped. And, like other commercial enterprises, they should be expected to have a reasonable return on their investment and be financially viable in their own right.

The most effective way to ensure open access is to prohibit cross-ownership of pipelines and companies operating in other parts of the gas industry, usually gas producers or marketers. Without cross-ownership, no motive exists for discriminatory behavior in access.<sup>5</sup>

Frequently in a developing gas market, however, producers will want to have an ownership interest in transmission either because there are no other interested parties or because they wish to ensure reliable and efficient transmission to facilitate market development. In this event, cross-ownership may be permitted, either indefinitely or for a fixed period, while gas markets are developing.

If cross-ownership is allowed, the regulatory commission regime should require that the pipeline be managed and operated independently of other companies, upstream or downstream, in which the owner also has an interest. The pipeline's terms and conditions of service (such as the obligations of the pipeline to provide reliable service, the financial qualifications of shippers, measurement and quality of gas and the obligations of shippers to inform the pipeline of their shipping intentions) should be approved by the regulatory commission and should be the same for all shippers. They should also be publicly available. Such terms and conditions of service are contained in a Code of Operations.

Independent operation of transmission pipelines requires that the pipeline itself should not be permitted to buy or sell gas except for its own use as, for example, compression fuel.

The long-term vision of China's gas industry that underlies the recommendations of this report will be much easier to achieve if the marketing and transmission functions are separated from the start of the

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<sup>5</sup> There may still be a motive to discriminate among different users with respect to tariffs. Tariff issues are discussed in the subsection, Tariff-Setting Principles, below.

restructuring process. If the two are inadequately separated, their separation and the achievement of open access at a later date can be a difficult and controversial process, as was the case in North America in the 1980s.

In some gas markets, notably those of Europe, the transmission pipelines also act as merchants of gas. However, virtually all gas markets that are undergoing restructuring and many newly developing gas markets are instituting regulatory commission frameworks that prohibit pipelines from being gas marketers.

The relationship of the pipeline to other companies having the same ownership and the requirements of its independent operation and management are usually set out in a Code of Conduct, described in more detail in Chapter 5.

### **Distribution**

In newly developing markets, distributors are also frequently given the exclusive right to supply *all* customers, large and small, for some initial period as they develop their markets. Most of the time, however, large industrial customers are permitted to choose their own supplier after an initial period, which may be 5–15 years.

With this qualification, distributors also should be required to operate in an open, transparent way, independently of any affiliate companies in the energy industry. Like transmission companies, independent ownership is desirable, but, also like transmission, in the early stages of development, cross-ownership is frequently found. Thus, UGDs should also be subject to the Code of Conduct mentioned above. Further, they should be required to establish terms and conditions of service that are common to all users and that are subject to regulatory commission approval (the Code of Operations).

In conclusion, access services should be offered on an effectively unbundled basis to all consumers who are supplied directly from transmission pipelines. To increase the liquidity in the market for bulk supplies of gas, however, access services should also be offered to large volume consumers supplied from urban distribution networks at the earliest practicable stage in the restructuring process.

#### *4.4 The Tasks of Economic Regulation: Setting Tariffs*

As noted in section 1.5 above, regulation of transmission and distribution pipelines is necessary because, being monopolies, they have market power. Among other things, this means that, if unregulated, they could charge prices (tariffs) that would be higher than required to cover their capital and operating costs, including a normal rate of profit.<sup>6</sup> Because their tariffs, if unregulated, would be higher than costs, less pipeline space (and less gas) would be used than is economically efficient.

Society will be better off if tariffs are regulated so that they approximate the average cost (including an appropriate rate of profit) of providing pipeline services. More pipeline space would be used because, in that case, the price of gas at the burner tip will be lower and gas more competitive with alternative fuels. Thus, the basic principle for setting tariffs is that they be equal to the average cost of providing pipeline service.

In this section, the following topics are discussed in relation to tariff-setting:

- The objectives.
- The tariff structure.

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<sup>6</sup> In a competitive market, in which there are a number of sellers and buyers, the price would tend to be equal to the average cost (including a normal rate of profit) of the highest-cost supplier. The amount of the service produced would be higher and its price lower than in the case of a monopoly supplier.

- Tariff regulation options.
- Tariff-setting principles.
- Recommendations.

### Objectives

There are a number of objectives for tariff design:

1. *Productive efficiency* means that transportation service is produced at the lowest possible cost consistent with the desired quality of service. It is a critical objective in setting transportation tariffs. To achieve this objective, transmission tariffs should do the following:

- Ensure that the pipeline system is used to the greatest possible extent, because the cost associated with incremental use of the existing system is very low (most costs are sunk; they relate to capital equipment in place and must be paid whether or not the system is used).
- Provide incentives to the transmission service provider to operate and maintain the pipeline system at low cost consistent with the desired level of service.
- Provide incentives for the system to be expanded only when the incremental benefits of expansions exceed the costs of the expansions.

2. *Allocative efficiency* means that the tariff paid by a shipper should reflect the costs of providing the service. The tariff should be designed so that capacity will be allocated to the user who places the highest value on it. If the tariff is greater or lower than costs, transportation use will be discouraged or encouraged, and a smaller or larger amount of transportation will be used than is justified by the economics of providing it.

3. *Revenue sufficiency* is paramount for transportation service providers. They must be able to earn sufficient revenue to achieve their permitted rate of return. It is important to note that the achievement of the economic efficiency objectives will also ensure the achievement of this objective, but an emphasis on revenue sufficiency may lead to tariffs that are not economically efficient.

The objectives of productive and allocative efficiency are critically important. Tariffs designed to achieve such economic efficiency convey clear signals to all participants in the gas supply chain that, when acted upon, will allow them to maximize their profits and/or some other element of economic well-being.

### Tariff Structure

Transmission and distribution pipelines are capital-intensive, and the cost of transporting gas tends to be high relative to the cost of the commodity being transported. Because pipelines are so capital intensive, a very high proportion of their costs is fixed, and the bulk of the tariff consists of a contribution to fixed costs—called a “demand (or capacity) charge”; it is paid whether or not the shipper or user transports or takes gas in any period. The tariff will have a second part—called an “energy (or commodity) charge”—that is paid according to the amount of gas shipped or taken.

### Tariff Regulation Options

#### *Regulated Rate of Return*

For many years in North America, the principle of linking pipeline tariffs directly to costs, including a regulated rate of profit, was followed—the so-called regulated rate-of-return approach to tariff-setting. It is still used to some extent. Although this has an economic logic, it does not have the virtues of the dynamic price-setting process that exists in competitive markets.

In competitive markets, price will tend to be driven to equal the average cost, but, unlike companies that set tariffs according to the regulated rate-of-return method, individual companies in competitive industries do not have the ability to charge a price equal to their costs. They must accept whatever price prevails, and producers with relatively high costs will be unable to compete in the long run. Hence, producers have a strong incentive in competitive markets to be as efficient as possible: it increases their profit margin and, at a minimum, allows them to survive. The incentive to be productively efficient is much weaker in monopolistic sectors without competition, where revenues and profits are regulated through the rate-of-return method.

Further, using the method of setting tariffs involves the regulatory commission on a more or less continuous basis as an arbitrator. Tariffs are set and changed on the basis of applications to the regulatory commission. In turn, regulatory commission decisions are made after public hearings, which are frequently protracted and adversarial. Thus, neither productive efficiency in the pipelines nor efficiency in the regulatory commission process is achieved with the regulated rate-of-return method of setting tariffs.

### ***Performance-Based Regulation***

Dissatisfaction with a tariff mechanism that links prices directly to costs and with a costly and adversarial process for adjusting tariffs led to the development of methods of performance-based regulation. For example, a comprehensive performance-based system was introduced in the United Kingdom when a number of utilities, including the gas transmission and distribution system, were privatized in the 1980s.

In that system the regulatory commission, in consultation with the utility, determines a base tariff taking into account the need for expansion and replacement of capital equipment. The base tariff is indexed annually for a number of years, typically five. The annual index factor is an economywide price index (the retail (or consumer) price index—RPI) reduced by an amount—“ $x$ ”—which represents the regulatory commission’s assessment of the potential for efficiency—or productivity—gains by the utility in each year over the period. The mechanism is known by the shorthand term “RPI- $X$ .” At the end of each five-year period, the regulatory commission reassesses the base tariff and sets a new value for  $x$  that will apply for the subsequent multiyear period. The objective is to ensure that the tariff falls in real terms over time. The incentive for the utility is that if it reduces its costs by more than that projected by the regulatory commission, it retains the difference.

In actual application, the indexing formula tends to be more complicated than that described here. For example, a term may be added to allow the utility to recoup any tax increases through an increase in tariffs. Mechanisms of this kind have been very popular among countries that have recently corporatized their gas industries, for example, in Mexico, Argentina and, at the distribution level, in Brazil.

The concept of performance-based regulation is attractive and, in principle, is to be recommended. It promotes efficiency in both operating and capital expenditures and represents relatively efficient regulation, pushing the decisionmaking back on the regulated company where it should be.

### **Tariff-Setting Principles**

Whether cost of service or some method of performance-based regulation is used to determine the average level of the tariff, a number of principles should be used in designing the structure of tariffs, that is, the tariff charged to specific customers for specific services.

Transportation capacity will be most efficiently allocated among system users if tariffs incorporate the costs associated with providing particular services—if they are cost-based. As noted, costs are importantly affected by the size of pipeline capacity. Costs also rise with the distance over which gas is

transported. Thus, other things being equal, the tariff paid by a user of a pipeline will be higher the greater is the diameter of the pipeline (and the pressure rating) and the farther the gas is shipped.

The principle of cost-based tariffs implies that there should be no cross-subsidization of one group of shippers or users by another. That is, tariffs should be structured so that shippers or users bear all the costs associated with the provision of the service they are using.

Discrimination among shippers for the same transportation service with the same costs should not be permitted. This is frequently described as unjustifiable or undue discrimination. However, it is perfectly legitimate to discriminate among shippers on the basis of the costs they cause to be incurred.

Although these principles are generally accepted, some jurisdictions ignore the consequences of distance transported for tariffs either because policymakers wish to subsidize particular geographic areas or because they wish to encourage the use of gas.

This report argues first that subsidies, if desired, should be granted directly and not through the price system. Second, encouraging the uneconomic use of gas, which is what happens when costs are ignored in setting tariffs, is not in the public interest.

There are other contentious issues that must be dealt with in determining the tariff structure. They include the question of whether the costs associated with pipeline expansions should be “rolled in” to the existing tariff, thereby spreading the costs among all shippers, new and old, or whether those costs should be charged “incrementally” in a separate tariff to those shippers who benefit from the expansion. Issues of this kind are usually dealt with by the regulatory commission on a case-by-case basis.

### 4.5 Recommendations

The recommendations are summarized below:

*Jurisdiction:* Efficient regulation requires that all transmission pipelines—whether they operate solely within a province or cross provincial boundaries—should be regulated by an agency of the central government.

*Regulatory Authorizations:* The following are recommended to promote productive efficiency in the gas transportation industry:

- Transmission pipelines should be authorized on a nonexclusive basis.
- Distribution pipelines should be authorized to provide transportation service on an exclusive basis to avoid congestion.
- Measures should be taken to enhance productive efficiency among distribution franchises, such as granting franchises for fixed terms and granting several franchises for subdivided areas of large cities.
- Distribution companies should be given the exclusive right to supply the gas commodity to small users to avoid the necessity for the extensive investment needed to manage a diversity of supply to small users.

*Methods of Operation—Contract Carriage vs. Common Carriage:*

- Transmission: International experience shows that contract carriage is desirable. It is conducive to
  - attracting capital on favorable terms;
  - resulting in an efficient match of pipeline capacity to demand.
- For existing transmission pipelines, the introduction of contract carriage imposes financial discipline on shippers.
- For UGDs, common carriage is more appropriate.

- They have an exclusive transportation franchise.
- They have an obligation to build in anticipation of demand.

### *Access to Transportation Service:*

- If common ownership is permitted among companies in different parts of the gas production, marketing, and transportation chain, it is essential that regulation enforces independent management and operation of transportation affiliates. A Code of Conduct is required to state the requirements for independence.
- All customers of transmission and distribution companies must be accorded access to service on the same terms and conditions. A Code of Operations, which states the standard terms and conditions, including tariffs, is necessary.
- Customers for transportation service on UGDs should be restricted, for the foreseeable future, to large commercial and industrial users of gas.
- Existing pipelines will be expected to develop procedures for open access.

### *Tariffs:*

A major objective is to promote economic efficiency.

- Productive efficiency: The tariff-setting mechanism should be “performance-based regulation” and not “rate-of-return” regulation.
- Allocative efficiency: Tariffs for particular types of service and for different locations should be cost-based.

## 5. REGULATORY TECHNIQUES

Chapter 4 sets out the principles governing the performance of the principal downstream regulatory duties identified in Chapter 3. The regulatory techniques dealt with in Chapter 5 flow directly from these principles and the discussion of the application of these principles in the Chinese context. Section 5.1 sets out the regulatory techniques appropriate for long-distance transmission, whereas section 5.2 presents the techniques appropriate for urban distribution.

### *5.1 Transmission: Regulatory Techniques*

The regulatory techniques for transmission fall into three broad categories that correspond to the principles considered in the previous report:

- The establishment of the business rules and procedures that will govern the terms and conditions of access to the transmission system.
- The derivation and regulation of tariffs for the transmission system.
- The authorization of pipelines and pipeline expansions.

This section addresses these categories and discusses the regulatory techniques in each of them. Currently the transmission system in China comprises unconnected networks of pipeline segments. These networks vary from relatively complex ones in Sichuan and in the Northeast to single pipelines from basins to market centers. Each of these networks (from the single pipeline to the most complex) constitutes a separate transmission entity

### **Terms and Conditions of Access**

The principal initial focus of regulatory effort will be on the existing transmission networks *regardless of whether or not there is a demand for access by third parties*. Even on networks where there is no immediate potential for the customers gaining access to an alternative supplier of gas, the separation (or unbundling) of transmission and supply activities generates benefits by revealing the underlying cost drivers and the potential for increased efficiency. In addition, as the interconnection of the currently isolated networks occurs over time, the development of appropriate terms and conditions of access will expedite the application of the appropriate regulatory arrangements to the transmission system in China. This will confer more rapidly the benefits of increased competition in gas commodity markets through the increased access of network users to new sources of gas supply.

The establishment of appropriate terms and conditions of access requires the application of three sets of regulatory techniques. These comprise techniques to

- Ensure the separation of transmission and gas supply activities;
- Establish the business rules and procedures that govern the terms and conditions of access for individual network users; and
- Evaluate and, if acceptable, approve the transmission service offer

The first set of regulatory techniques relate to the application of the principle that requires an effective separation of transmission and gas supply activities.

Three options define a broad range of options that may be chosen to achieve varying degrees of separation:

- *Option 1:* Separation of accounts and management accompanied by a Code of Conduct to police this separation.
- *Option 2:* Separate business units for transmission and supply at different locations.
- *Option 3:* Divestment of either transmission or supply.

These three options vary from the minimum separation requirement (Option 1) to the radical option of divesting (or selling off) either the transmission or supply business. Option 2 may be viewed as a “half-way house,” but it is one of a number of variants that may be defined between the extremes defined by Option 1 and Option 3. These options successively broadly describe the experience of gas transmission businesses throughout the world as they attempt to adapt to the changes involved when they are required to provide access to their pipeline networks. Most transmission businesses initially resisted regulatory demands to separate their transmission and supply mainly to protect their share of the gas market (more common in Europe), but also to avoid the costs of restructuring their businesses and the development of new administrative arrangements (more common in North America). As a result, they were prepared to concede only a minimum degree of separation.

Over time regulatory commissions sought more effective separation, which was motivated, in many cases, by complaints from shippers that the transmission businesses were discriminating against them and in favor of their own associated (or affiliated) supply businesses. Eventually many transmission businesses saw a benefit in placing their supply activities in a completely separate company. This provided a better strategic and managerial focus for both companies and reduced the incidence of disputes with both the regulatory commission and gas shippers. This is true of gas transmission businesses in both North America and the United Kingdom. Movements in this direction are beginning to emerge in Australia and New Zealand, which began their gas industry reforms later than those in North America and the United Kingdom. Most gas transmission businesses in Western Europe (such as Gaz de France (France), Distrigaz (Belgium), Gasunie (the Netherlands), Gas Natural (Spain) and Ruhrgas (Germany)) are only beginning to address this issue of separation and, in most cases, are contemplating some variant of Option 1.

In the Chinese context, it makes sense to begin with Option 1 and, during the transitional phase, to assess its ability to satisfy regulatory commission and shipper requirements. The implementation of Option 1 is frequently (and most effectively) achieved by means of a Code of Conduct.

The purpose of this exercise is to provide the basis for the offer and regulation of an unbundled transmission service. For each transmission business, the regulatory commission will set out the issues that will need to be addressed in each document. It is envisaged that these documents and procedures will be developed by means of discussion and consultation between the transmission business and the eligible pipeline system users under the guidance and oversight of the regulatory commission.

### ***Code of Conduct***

The Code of Conduct is the document that describes the procedures put in place by a transmission business to implement and enforce the separation of its transmission and supply activities. Each transmission entity that is subject to regulation will be required to prepare such a code. It is envisaged that these codes will be prepared as part of a process of consultation between the regulatory commission and the regulated transmission entity with provision for the participation of other interested parties (for example, producers, eligible consumers, and UGDs) in the consultation process.

A typical Code of Conduct document will include the following elements:

*An Explanatory Note:* This will set out the requirement for the document with reference to the specific transmission entity.

*Definitions:* This will set out precise descriptions of the relevant parties and activities that will be referred to in the code.

*Objectives and Principles:* This section includes the transmission entity's commitment to provide *nondiscriminatory access* to all eligible and suitably qualified applicants. A key feature of this commitment will comprise the principles governing the *management of information flows* and the *access to information*. The transmission entity will receive commercially confidential information from applicants for a transmission-only service. The transmission activity has an incentive to pass this information on to its affiliated supply activity. For example, it will find out who, among its customers currently receiving a bundled service, is planning to contract for a gas supply from another supplier. This will allow its affiliated supply activity to target these customers and entice them to remain as customers. This would provide the affiliated supply activity with an unfair advantage relative to other suppliers.

### *Implementation of Code of Conduct*

This section addresses the implementation of the Code of Conduct and includes the following: The obligations of the transmission business. These obligations include the reorganization of procedures, policies, departmental structures, and job responsibilities to ensure compliance with the Code of Conduct. This section also includes commitments to establish employee communications and training programs to ensure that employees are informed and resourced to comply. A Complaints Procedure will also be established.

*The nature of the functional separation.* This subsection deals with the following:

- Sharing of facilities and resources.
- Keeping of books and records.
- Prohibitions on engaging in restricted activities.
- Provision of business support services.

*The conduct of business.* This subsection addresses the application of tariffs, charges, and discounts and the notification that will be required to ensure nondiscriminatory service.

*Procedure for dealing with system emergencies.* This subsection addresses the procedures for dealing with responses to system emergencies that violated the Code of Conduct.

*The maintenance of accounts and records.* This addresses accounting Code and statutory requirements.

*The role of the Compliance Officer.* This subsection presents the powers, duties, and responsibilities of the Compliance Officer who is responsible for monitoring and enforcing compliance with the Code of Operation, and outlines provisions for external audit.

A draft Code of Conduct is presented in Appendix 5.

## ***Code of Operations and Transmission Service Agreement***

### *Code of Operations*

The second and third sets of regulatory techniques that set out the “business rules” and the offer of transmission service may now be addressed. The code of operations sets out the duties and obligations

of the regulated transmission business (as the transmission service provider) and transmission system users. The TSA will be defined in terms of the code of operations and will detail the contract for transmission service between the transmission entity and an eligible network user.

A typical code of operations would comprise the following elements:

- Definitions and interpretation.
- Common network security Code and network planning.
- Transfer of custody and title.
- Specification, pressure and quality.
- Measurement and testing.
- Shrinkage.
- Entry (input or receipt) point requirements.
- Exit (off-take or delivery) requirements.
- Capacity available and offered.
- Nominations, renominations, and scheduling.
- Balancing and settlement of imbalances.
- Maintenance.
- Emergencies and throughput curtailments (force majeure).
- Billing and Payment.
- Taxes and duties.
- Dispute resolution.

Appendix 6 contains the General Terms and Conditions for a North American pipeline. This corresponds to a Code of Operations.

### *Transmission Service Agreement*

Generally a standard TSA is comprised of separate firm and interruptible services. A typical firm service offer will be defined in terms of the Code of Operations and will include specific contractual terms such as the following:

- Nature and definition of service.
- Receipt and delivery points.
- Charges for service.
- Financial assurances.
- Invoicing and payment.
- Allocation and assignment (release) of capacity.

The General Terms and Conditions presented in Appendix 6 contain the form of firm and interruptible TSAs as appendixes. Appendix 6 also contains Web site addresses for the Terms and Conditions of Access being offered by a selection of North American and European gas transmission companies.

The Articles in the General Terms and Conditions do not precisely match the key components of a Code of Operations as set out above. There are two reasons for this. First, the General Terms and Conditions relate to a specific pipeline and to a specific pipeline in North America. Second, and related to this, the components of the Code of Operations are intended to provide an overview of the issues that will need to be addressed in the Chinese context.

Six issues are worthy of further consideration in the Chinese context:

- The definition and allocation of transmission capacity.
- The nature of the right to capacity.
- Network planning and common network security standard.
- Gas quality.
- Balancing and settlement.
- Shrinkage.

The first three issues are closely related and may be discussed together.

### *Transmission capacity, capacity rights, and security*

In North America transmission pipelines have traditionally been “built to order.” This means that existing or new customers placed an order for capacity and backed up this request with a commitment to enter into a long-term contract for this capacity. When pipelines agreed, and were subsequently mandated, to offer an unbundled transmission service (separate from the supply of gas), in most cases it did not prove difficult to convert the maximum daily quantity (MDQ) in their contracts to a capacity reservation. This, in effect, created a long-term property right to transmission capacity. In addition, this property right could be reasonably accurately defined and priced, particularly on long-distance transmission pipelines, because transmission charges were primarily determined by the capacity reserved and the distance over which this capacity was reserved.

By way of contrast, it has proved more difficult to define and allocate capacity on the more complex European national transmission networks. With the exception of BG Transco in the United Kingdom and the major German transmission companies, most European transmission companies are either fully within state ownership or are gradually being listed. All European transmission companies established and developed their networks to comply with a PSO to construct sufficient gas supply infrastructure to ensure secure and reliable supplies of gas and to comply with public policy objectives regarding the penetration of natural gas.<sup>7</sup> As a result, European transmission companies constructed capacity in anticipation of demand and without any long-term contractual commitment by their customers to pay for this capacity.

The introduction of open access provides network users with the opportunity to place a value on the services provided by the network. And network users will invariably attempt to maximize their access to service at minimum cost. This has the potential to generate “stranded” or “above market” costs. Full cost recovery includes the investment recovery, investment return, and associated operating and maintenance costs of the existing transmission and storage facilities. If network users are unwilling to contract and pay for all the services of these facilities, actual revenue recovery will fall short of full revenue recovery. This shortfall is equivalent to “stranded” or “above market” costs. It may be the case in China that the transmission (and distribution) businesses will have to accept a write-down in the value of some of their assets before they are included in the asset base for the purposes of tariff design.

All these factors have contributed to the limited—indeed, almost negligible—progress in Europe toward the definition and allocation of transmission capacity and the offer of longer-term transmission contracts based on this definition. As a result, transmission contracts are typically offered for one year, usually in parallel to the gas contract year beginning on October 1. The relationship between the capacity reserved in these contracts and the capacity physically available on the network tends, at best, to be tenuous. The transmission tariffs are on an annual basis and may not be related in any meaningful way to the revenue recovery requirement of the transmission company.

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<sup>7</sup> In many instances, this PSO was not explicit, but it could be inferred from the legislation governing the establishment and operation of the transmission company.

The extent to which these factors affect China is not clear, but what is clear is that the Chinese transmission business has more in common with that in Europe than in North America. As discussed in Chapter 4, however, a strong case may be made for developing the TSA as a longer-term contract based on an objective definition and allocation of the physical transmission capacity.<sup>8</sup>

In China, as in Europe, the gas industry will move from a situation where capacity is provided in anticipation of demand without firm long-term contractual commitments to a situation where network users decide how much capacity they require to ship their gas. Invariably network users will tend to understate their capacity requirements so as to minimize their costs. The transmission company will have an equally strong incentive to ensure that network users reserve as fully as possible the capacity that is available so as to minimize the incidence of stranded costs. With some justification, the transmission company will be able to assert that it is entitled to recover the full costs of investments prudently made under the previous legislative and commercial arrangements. However, regulatory commissions are reluctant to allow the full recovery of investment costs when there is evidence that some of these costs are above market.

In most jurisdictions where the stranded cost issue has arisen, regulatory commissions have been compelled to arrive at a compromise. This compromise may take many forms, but it generally is composed of a number of common features.

The first feature is the establishment of a common standard of network security that is included in the Code of Operations and with which all network users are required to comply.<sup>9</sup> This will result in a requirement that network users reserve a higher level of capacity than they would if they had complete discretion as to their capacity reservations. On the other hand, the level of capacity reserved is usually less than the total available, so some stranded costs result.

The second feature relates to the recovery of these stranded costs. In general, regulatory commissions tend to allow recovery of a portion of these stranded costs, which may be achieved in a number of ways. For example, the transmission company may be required to write off a portion of the stranded investments either immediately or over a short period. The company may be allowed to continue to recover the cost of a further portion of investment in accordance with the established depreciation policy, but without recovering a return on this portion of the investment. Finally, the company may be allowed full recovery of a portion of the investment, but allowed to earn a reduced rate of return.

In China, this will require detailed analysis of the availability of, and demand for, transmission in each of the identified transmission entities. This task should be relatively straightforward for single pipelines and for new pipeline projects. It may prove more time and resource consuming for the more complex systems. The exercise is very important, however, because uncertainty about the level of cost recovery and the level of capacity available will diminish any possibility of developing contracts for capacity.

### *Gas Quality*

Although the gas transmission system in China currently consists of a number of separate pipelines and networks, it is vitally important that a common gas specification is defined and applied to all networks.

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<sup>8</sup> In the United Kingdom the failure to relate capacity reservations by network users to the physical capacity available at the entry points on the U.K. National Transmission System (NTS) resulted in overbooking by network users (shippers) and frequent curtailments of gas inputs. BG Transco has recently begun to auction entry capacity as the most effective means of allocating capacity to the network users who value it most highly. Consideration is also being given to a “contractualization” of system exit capacity.

<sup>9</sup> These Codes can vary quite considerably in terms of definition, but generally coincide in practice. In most cases, they attempt to identify the level of transmission capacity that is required to meet demand on a particularly cold day.

This is primarily a mandatory technical regulation, but it has major implications for the current operation and future development of transmission networks in China.

Maintaining a tight specification for all gas entering the networks—in effect, enforcing a standard of pipeline marketable gas—will reduce corrosion and maintain the integrity of the networks. It will also facilitate the interoperability of these networks when interconnects are constructed.

An example of a typical specification for pipeline marketable gas may be found in Appendix 6 (Article 2).

### *Balancing and Settlement*

Typically for long-distance pipelines in North America (as illustrated in Appendix 6), receipts and deliveries are balanced over a 30-day period with a cash-out settlement at the end of the period. Penalties are imposed to encourage network users to minimize imbalances. It makes economic sense to keep these lines as full of gas as possible. These pipelines therefore operate at a high load factor. The fluctuations in daily and seasonal demand are then dealt with by supply from storage facilities located close to delivery points and adjacent to demand centers. As a result, relatively little daily variation will be likely in throughput on transmission lines. This tends to be true internationally for long-distance pipelines both in and between countries whose population density may be relatively low by international standards or where areas of population density may be few and concentrated.

By way of contrast, transmission networks in countries with higher population densities (which is particularly true of Europe) tend to experience much greater daily and seasonal variation in throughput. In addition, this variation varies directly with the extent of market penetration. The higher the proportion of residential and commercial (R&C) demand, the greater will be the daily variation. And it varies inversely with the availability of storage services close to demand centers. The greater the availability of storage services to modulate supply, the less will be the daily variation in throughput on the transmission network. For example, daily balancing is required in the United Kingdom. Italy and Spain are considering a similar arrangement. Belgium, France, and the Netherlands are seeking to establish an hourly balancing regime.<sup>10</sup>

The period over which balancing should take place is a function of the technical and operational characteristics of the transmission network. It is also related to the costs of the information and control systems that would need to be put in place to support the nomination, scheduling, and settlement arrangements associated with a specific balancing period.

In the Chinese context, this is an issue that will require detailed study. It should be noted that in addition to monthly and daily balancing, considering weekly balancing is possible. The choice of balancing period will determine the procedures that will be required to ensure efficient nomination, scheduling, balancing, and settlement.

Imbalance penalties should be related to the costs incurred by the transmission entity to maintain network balance. Typically this involves the costs of either acquiring or disposing of gas at short notice. It is difficult to devise a regime that provides an effective incentive to minimize these costs, which are recovered from network users.

Increasingly in the United States, the availability of gas at short notice on spot markets is reducing the requirement for imbalance penalties. Transmission companies and network users are using these markets to deal with imbalances directly. Similarly, in the United Kingdom, an On-the-Day Commodity

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<sup>10</sup> This is widely viewed as unrealistic, and some commentators view it as a tactic to discourage applications for access to these networks.

Market (OCM) has been developed, which allows BG Transco and network users to buy and sell gas at short notice to maintain a daily balance.

This emphasizes an additional benefit of encouraging the emergence of a liquid and transparent gas commodity market.

### *Shrinkage*

Shrinkage is defined as the difference between the total inputs to a gas network and the total volume taken off. Typically it is comprised of unaccounted-for gas (UAG)—arising from leakage and measurement error—and Own Use gas used as compressor fuel, for heating where the drop in pressure drives gas temperature below the gas specification and for controlled venting. On most North American pipelines, the UAG volume tends to be negligible, and there is rarely any requirement for heating and controlled venting. As a result, shrinkage may be equated to the compressor fuel requirement. The transmission company estimates the compressor fuel requirement and determines the share of this for each network user who is then required to add this volume to his gas input.

In the United Kingdom shrinkage comprises approximately 1 percent of gas inputs. BG Transco purchases this gas directly and recovers the cost in its transmission tariffs. Because the U.K. National Transmission System (NTS) is a relatively complex network, it is difficult to assign shrinkage volumes to specific network users. In addition, shrinkage is estimated for the entire transmission and distribution system, and UAG comprises a higher share of shrinkage than would be the case for long-distance transmission lines.

Given the variety of the unconnected networks in China, it appears reasonable to suggest that each transmission entity should purchase shrinkage volumes directly (as in the United Kingdom) and recover the cost from networks users via transmission tariffs. A method to estimate the shrinkage volume should be developed and be approved by the regulatory commission. In addition, the purchase of gas for shrinkage should be subject to regulatory oversight.

### **Transmission Tariff Methodology**

Each transmission entity will need to develop transmission tariffs to recover its costs and the regulatory commission will need to assess each transmission entity's tariff proposals and make determinations to enforce an efficient level and structure of tariffs. In the Chinese context, it is envisaged that the transmission entities will conduct much of the initial analysis to derive transmission tariffs, whereas the regulatory commission is developing the competence and capability to perform its duties.

As a result, this section tackles tariff design from the perspective of the transmission entities. The subsection below, Regulation of Transmission Tariffs, discusses the principal approaches available to the regulatory commission to enforce an efficient level and structure of tariffs.

The primary goals of the transmission tariff methodology are the following:

- To reflect the cost structure of the service provided.
- To allow the transmission company to recover operating costs and earn an adequate and reliable return on the capital invested.

These goals are achieved in the process of deriving tariffs by focusing on the achievement of productive and allocative efficiency. Tariffs should encourage maximum use of the system throughout the year (productive efficiency), but be subject to the condition that those high-priority network users requiring capacity during peak periods are allocated their appropriate share (allocative efficiency).

It is generally accepted that the time-tested cost of service analysis provides an effective means of achieving the goals of tariff design. This basic approach provides a sound framework for analysis and is now used in nearly all mature third party access regimes throughout the world.<sup>11</sup> The prevalence of the cost of service approach is due to the need to establish a transmission cost base that is completely separate from any costs incurred in the supply and trading of gas. The approach is applied in a static framework and, as a result, requires development to generate an appropriate tariff profile over time.

The methodology is composed of five basic steps:

1. Calculate a total cost of service or “revenue requirement;”
2. Functionalize costs into the different unbundled services to which they relate;
3. Classify costs into fixed and variable components;
4. Allocate costs between groups of customers on the basis of causation; and
5. Design prices on the basis of the allocated costs.

These steps are discussed in more detail below.

### ***Step One—Cost Base or Revenue Requirement***

Tariff design is a five-step process beginning with the determination of the total costs of providing a transportation service—the “*cost base*.” The cost base determines the revenue requirements of the transmission company. As noted in the goals of the tariff methodology, the revenue requirements should reflect the cost structure of providing the service—the cost base.

The cost base is composed of only those costs associated with providing transportation and, where relevant, storage activities. A typical cost of service base contains four elements: *return on investment, depreciation, taxes, and operation and maintenance (O&M)*. In a company that is involved in more than one activity the precise nature of the cost base is often an area of considerable debate. The issues involved in deriving the revenue recovery requirement are considered in more detail in Appendix 4.

### ***Step Two—Determination of Cost Function—Functionalization***

Once we have completed the first step of tariff derivation and determined the cost of the elements that make up the cost base, we proceed to the second step of the tariff building block approach. The second step is to attribute costs to the functions of production, transmission, and storage.<sup>12</sup> The central concern of this process is to develop a basis for the equitable apportionment of costs based on use and benefits derived from the various types of facilities. This is generally accomplished by developing a separate cost of service for each function. For example, facilities and costs associated with the functions of transmission, storage, swing services, blending, and backup will be separated, such that each of these functions will have a distinctive cost of service.

### ***Step Three—Cost Classification***

The third step is cost classification. Functionalized costs are determined to be either fixed or variable. Fixed costs are defined as costs and expenses that remain constant regardless of volume or throughput. Fixed costs remain essentially constant over the relatively short term. These costs include labor expenses, overheads, and capital-related costs, such as plant investment, depreciation, accrual, return on investment, and associated income taxes. These latter three elements (depreciation, return, and

<sup>11</sup> Countries such as Belgium, France, and Germany that are attempting to develop a regime of negotiated access to their pipeline systems do not have a clear link between their proposed transmission tariffs and the actual cost of providing transmission service. In most other countries, the debate is focused on how an annual cost of service should be projected into the future and for how long.

<sup>12</sup> For the purposes of this study, a transmission networks begins at the outlet of the purification plant.

corporate taxes) make up the preponderance of fixed costs. These costs are typically referred to as “capacity related” costs because of their obvious direct relation with a transmission company’s capacity to provide service. Variable costs change essentially in direct proportion to facilities use or capacity utilization. These costs are basically related to compression or compressor station activity.

*Classification is the source of good tariff design.* Separating costs in the process of classification allows the design of tariffs that are both more economically efficient and safer financially than tariffs that contain no such distinction. Prices with more than one component—particularly with an “up-front” component—are common in competitive markets as a way of better matching the cost of providing certain services with the price. Classification is a formal way of doing the same thing with transmission tariffs—matching the *structure of prices* with the *structure of costs*.

#### **Step Four—Cost Allocation**

The fourth step involves the allocation of the following:

- Costs between categories of network users.
- Fixed and variable costs to the capacity and commodity charges.

Costs are allocated to categories of network users according to capacity utilization by such groups, based on economic and equity criteria. This is a critical step in the determination of the final tariff paid by high and low load factor network users. The proportion of fixed and variable costs that are allocated to the capacity and commodity charge is a function of the tariff design.

*Allocation* is the process whereby an attempt is made to match the characteristics of the use of the transportation and distribution systems with the types of costs that must be incurred to serve them. *Allocation directs costs to users who **should** pay them.* It is, in other words, the central core of the effort to present network users with the cost consequences of their usage decisions.

To achieve economic efficiency, it is generally accepted that fixed costs should be allocated to capacity as these costs are incurred, primarily to provide transmission services on the peak day (or peak hour). The remaining variable costs are typically allocated to commodity. Typically capacity costs are recovered in fixed annual reservation charges related to capacity requirements at peak demand (bookings or reservations) that do not vary with the volume of gas shipped—Currency Unit/Peak Day Cubic Meter. Commodity costs are recovered in volumetric charges—Currency Unit/Cubic Meter.

This approach enhances the certainty of revenue recovery by the pipeline business and loads the costs onto system users with low demand load factors. In most cases, these will be the distribution companies supplying low load factor R&C consumers. Quite understandably, this approach provokes controversy because these consumers are being required to pay for capacity that they will use for, perhaps, only five days each year. The approach may be defended if there is a mechanism to allow them to release this capacity in the off-peak period and generate revenue from this release of capacity to defray a portion of the capacity cost. It may take a considerable period, however, to develop such a release mechanism. In the interim it is common to see a compromise in cost allocation between efficiency and perceived equity.

#### **Step Five—Design of Tariffs**

The final step involves cost distribution to various services provided to customers including storage and transportation services. Costs are further distributed according to mileage or zone, season, load factor, and volume and/or long-run marginal costs. This is the final step of the tariff design process that develops the commodity and capacity costs based on system use. Experience in North America and the United Kingdom demonstrates that the most complete unbundling of tariffs provides the correct economic signals and encourages maximum capacity utilization.

A wide variety of possibilities of tariff design may be appropriate, depending on the configuration of the transmission system (for example, “long line” versus “spider web”), the methodological approach of the transmission company, and the stance of the regulatory commission. The most basic pricing concept would be to derive *postage stamp* prices such that customers pay the same price regardless of location or distance from the source of gas supply. The most sophisticated approach, although subjective and theoretical, is receipt to delivery point pricing (distance based) on the basis of long-run marginal costs.

An approach that lies between these two extremes derives distance-related charges based on an analysis of pipeline flows. This approach is capable of generating a range of charging units (or billing determinants) to derive separate components of the final transmission tariff. This may be described as Flow-Based Transmission Tariffs. In addition, this approach may be modified to deal with point-to-point transmission and with transmission from entry (or receipt) points to zones that group together a number of off-take (or delivery) points on the pipeline system.

### **Regulation of Transmission Tariffs**

Although the standard cost of service model is being overtaken by various tariff-generating mechanisms on an increasing number of pipelines in North America, it still provides a useful framework to develop transmission tariffs in markets where competition in supply and the provision of supply support services are at an early stage of development. The long-standing criticism that it generates “backward-looking” rather than “forward-looking” prices has proved susceptible to resolution. From a regulatory perspective, there is a growing consensus on the derivation of the base year transmission cost base, even though disputes continue on some matters. Achieving a measure of agreement on the derivation of the base year cost base is vital if any attempt is made to project the cost base into the future and to develop “forward-looking” tariffs.

There is an increasing emphasis (largely deriving from experience in the United Kingdom) on the control of the level of tariffs for a specified period into the future combined with an incentive mechanism to generate increased efficiency. This is commonly referred to as the “price cap” or “RPI-X” approach.

Regulation, however, involves a tradeoff between eliminating excess profits earned by the monopolist while simultaneously providing incentives to efficiency. There is a spectrum of regulatory approaches that reflects a different balancing of this tradeoff. At the two extremes are rate-of-return regulation and permanent price caps.

### ***The Spectrum of Regulatory Approaches***

***Rate-of-return regulation*** is the preferred approach of regulatory commissions in the United States. It aims to eliminate excess profits by equating revenue with actual costs. The regulated business is allowed to charge tariffs that will cover its operating costs and give it a reasonable rate of return on the value of the capital employed in the business. When tariffs move out of line with costs, the business (or customers, when costs fall) makes an application for a new set of tariffs. Rate-of-return regulation thus eliminates all prospects of excess profit. This has the advantage of keeping the cost of capital low, but it does not give the regulated business a strong incentive to reduce costs. Under certain conditions, rate-of-return regulation can also encourage unnecessary and inefficient investment, because the business is generally assured of being able to recover the costs of that investment and earn a given rate of return.

In an attempt to encourage efficiency, some regulatory commissions in the United States have now adopted the practice of *prudential reviews*. These reviews are designed to assess whether past investment was necessary. If the regulatory commission decides that such investment is not “used and useful,” it will not be added to the asset base. Although this approach looks attractive in principle, it

could result in a regulatory commission “micromanaging” the business by controlling individual investment and operating decisions.

*Permanent price caps* were the starting point of the development of so-called incentive regulation. Permanent price caps involve a one-time setting of tariffs, beyond which all efficiency gains are retained by the business. They mimic the desirable incentives for cost minimization found in competitive markets, where prices are generally set without reference to the costs of individual producers, but by reference, in principle, to conditions in the market as a whole. The regulated business has a strong incentive to reduce costs, but the regulatory commission must define comprehensive output standards (to counteract incentives to economize by cutting the quality of service) and may have to tolerate permanently higher-than-expected profits.

Permanent price cap regulation is not a credible or sustainable mechanism, since prices will sooner or later diverge from costs (in one direction or another). Demands for renegotiation of the cap—either from customers or the regulated businesses—will be impossible to resist.

Between these extremes is a range of regulatory approaches that combine incentives for efficiency with some form of profit control. They are all profit control regimes designed to reset prices periodically so that they are equal to costs. The various approaches are listed in Table 5.1. The rest of this section briefly describes each approach.

**Table 5.1: Alternative Regulatory Mechanisms**

Type of regulation	Form of control	Regulatory mechanism
Cost-Plus Regulation	Cost Controls	Rate-of-Return Regulation
Incentive Regulation	Profit Controls	Profit Sharing, for example: Banded rates of return Sliding scale regulation Price caps with periodic reviews
	Revenue Controls	Permanent price caps Total revenue caps

### Profit Controls—Banded Rates of Return<sup>13</sup>

In the United States, many regulatory commission schemes in the telecommunications sector are based on banded rates of return. Typically, profit-sharing rules are invoked if a business’ rate of return or its costs fall outside a set of specified limits, often referred to as a “dead band.”

For example, once costs move outside the dead band (upwards or downwards), the regulatory commission sets a marginal rate of claw-back, which determines the proportion of any cost saving (or increase) that is transferred to customers. If the marginal claw-back rate is not 100 percent for all variations in cost, the regulated business will experience a varying level of profit. Most telecommunications businesses and regulatory commissions are not willing to tolerate unlimited variation in profits because of factors outside their control. Most incentive regulation schemes, therefore, define the maximum loss of profit that the business must tolerate (floor), and often also the maximum additional profit (ceiling) that the business is allowed to earn. Outside these limits, the marginal

<sup>13</sup> Much of the following discussion is drawn from an excellent overview of the forms of regulatory mechanisms in “*Draft Principles for the Regulation of Distribution and Transmission Revenues: A Consultation Paper*,” Commission for Electricity Regulation, October 13, 1999. The Commission for Electricity Regulation’s (CER’s) site may be accessed at <[www.cer.ie](http://www.cer.ie)>.

claw-back rate is 100 percent. Floors and ceilings also ensure that the businesses do not profit from poor estimates by the regulatory commission of the potential for cost savings.

High marginal claw-back rates are a risky strategy, for the following reasons:

- Actual costs are difficult to measure. The combination of a 99 percent claw-back rate and a 1 percent overestimate of cost savings (due to an understatement of true costs) would eliminate any reward for reducing costs.
- Regulatory reviews prevent businesses from capturing long-term cost savings, so they need to capture a higher proportion in the short term.

Banded rate-of-return regulation is an improvement over straight rate-of-return regulation, since it provides businesses with some incentive to cut costs. However, although the problem is not as severe as in pure rate-of-return regulation, there is still an incentive to overinvest.

### Profit controls—Sliding-Scale Regulation

Sliding-scale regulation works by setting limits on the prices charged by the business, above which a mechanism is triggered that shares out with customers, in a specified proportion, the business' cost savings. The way in which the savings are measured depends on the particular scheme: examples are dividends ("dividend sharing") and profits ("price-related profits levy"). The key to the schemes is that there is some sharing of profits between the business and the customer, but that the business is free to determine the level of sharing by its choice of price behavior.

#### Dividend Sharing

Under dividend sharing, the regulatory commission allows a company's dividends to rise above a predetermined level as long as prices remain below a predetermined level. If prices rise above that level, the company is required to reduce its dividends. Companies can therefore affect their dividends through their choice of prices. The scheme effectively shares out between customers and shareholders the benefits (losses) from a reduction (increase) in costs. The regulatory commission's task is to determine the standard price, the standard dividend, and the rate of dividend share that is invoked at different price levels.

Dividend sharing offers incentives for businesses to reduce prices by reducing costs, and does not suffer from the inefficient allocation of resources associated with rate-of-return regulation. It requires, however, that all additional equity capital be raised through the auctioning of new shares to prevent dividends to shareholders effectively being made through discounts on the price of new shares. This restricts the company's options for financing.

The main problem for the regulatory commission is guarding against businesses trying to disguise dividend payments to shareholders by buying back shares or by making distributions to shareholders in other ways

#### Price-Related Profits Levy

Under a price-related profits levy, the regulatory commission sets a benchmark level of prices. If this benchmark price is exceeded, a proportion of the excess profits earned by the company is returned to the customer, for example, as an immediate rebate or as a tariff reduction for the following year. The regulatory commission's task is to set the benchmark price, the standard profit, and the rate of profit sharing at each price level.

Price-related profit levies provide strong incentives to efficiency and encourage regulated businesses to select an efficient combination of inputs. Businesses may, however, manipulate profits by changing accounting rules on noncash items (for example, depreciation and bad debts).

This puts a considerable burden on regulatory commission accounting procedures.

### Price Caps with Periodic Reviews

The approach to regulatory mechanisms adopted to date for the gas and electricity sectors in Argentina, Australia, Spain, and the United Kingdom is that of price caps with periodic reviews—or so-called CPI-X regulation (where CPI is the consumer price index). Price capping with periodic reviews is a form of incentive regulation with profit sharing.

Under this form of regulation, the regulated business is required to keep the increase in its prices to less than (or equal to) the increase in a specified general price index (for example, the CPI), less  $x$  percent. If  $x$  is positive, this means that prices will fall by  $x$  percent in real terms. The level of the cap on prices reflects the anticipated levels of future operating costs and investment that might be incurred by the business and are set to provide a reasonable rate of return on assets, consistent with efficient performance. The price cap is therefore set at a cost-reflective level.

The distinguishing feature of this form of regulation is that the price cap applies for a predetermined period. Hence, the regulated business keeps all the profits associated with unanticipated cost reductions in the period between regulatory reviews. Customers, however, benefit in the subsequent regulatory period when the regulatory commission reduces prices to capture those cost savings. The shorter the interval between reviews, the more there is a tendency for price cap regulation to approximate rate-of-return regulation, with frequent assessments of the asset base and the appropriate rate of return on investment.

The CPI-X mechanism provides incentives to efficiency on the part of the regulated business, while providing an assurance to customers that the benefits of efficiency gains will be reflected in lower prices in the longer term. This combination of qualities may explain why CPI-X regulation has become popular with governments and regulatory commissions, as well as with regulated businesses and their customers.

This forward-looking control of the level of transmission tariffs is combined with the exercise of a measure of discretion by the transmission business in determining the structure of tariffs. The regulatory commission, however, continues to monitor the structure of tariffs and is empowered to issue direction, where necessary.

This approach may be contrasted with the approach traditionally applied in North America where the regulatory commission exercised an equal degree of control over both the level and structure of tariffs.

### ***An Example of Performance-Based Regulation***

Dissatisfaction with a tariff mechanism that linked prices directly to costs and was associated with a costly adversarial process for adjusting tariffs led pipelines and their stakeholders in Canada to explore alternatives in *process* and *mechanism*:

- In *process*, pipelines began to negotiate tariff settlements of some five years in duration with their stakeholders, mainly shippers.
- In *mechanism*, the direct link between tariff and cost was broken, and tariffs were linked to factors, usually price indexes, exogenous to the pipeline companies.

Most large oil and gas pipelines in Canada now operate under such “negotiated settlements.” Though they are negotiated independently of the regulatory commission, all settlements must be submitted to the regulatory commission for approval. At the conclusion of the term of settlements, they are renegotiated in light of experience and again submitted for regulatory approval. It remains to be seen how durable the negotiation route will be. Many pipelines have expressed dissatisfaction with the rate of profit contained in their base tariffs.<sup>14</sup>

The essential elements of the *mechanism* are as follows—the details are different for different pipelines:

- The base level of tariffs is determined, usually the most recent tariff approved by the regulatory commission.
- For the duration of the settlement, operating expenditures are linked to some index, usually a price index that reflects the change in the average price level in the economy.
- Differences between the indexed expenditures and actual expenditures are shared between the pipeline and its shippers according to an agreed formula, which is a part of the settlement.
- At the end of the settlement term, it is renegotiated and resubmitted to the regulatory commission for approval.

The attraction of such a mechanism is that the pipeline has an incentive to improve its operating efficiency. Both the pipeline and its shippers benefit from the net revenue gains that result. The Canadian settlements represent a step in the direction of what is termed “performance-based” or “incentive” regulation. They are, however, incomplete in that the incentive applies to operating expenditures and not to capital expenditures.

Detailed aspects of the regulatory techniques applied to transmission tariffs are discussed in Appendix 4.

### ***Authorization of the Construction and Operation of Transmission Pipelines (and/or associated facilities)***

The authorization process contains economic and non-economic components. Information requirements, technical, health and safety, and environmental standards comprise the non-economic components of the process. The economic component of the process allows for the exercise of some regulatory discretion.

In general, a regulatory commission will seek to prevent uneconomic duplication of existing pipelines and to ensure that economies of scale are exploited. The regulatory commission will need an independent assessment of the viability of the project and a commitment to establish the procedures described in the previous section.

In a developing market context, it is reasonable to expect that a regulatory commission will seek to avoid unnecessary duplication of pipelines and to encourage the construction of interconnects between previously separate pipelines as means of fostering increased competition in supply.

### ***5.2 Distribution: Regulatory Techniques***

The discussion of distribution pricing in Chapter 7 on price deregulation suggests that much of the initial work in the area of natural gas distribution will have little regulatory input. The emphasis will be on raising prices to the level of economic costs and on improving the efficiency and commercial

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<sup>14</sup> The rate of profit included in base tariffs was set by the regulator—the National Energy Board of Canada—in 1995. A benchmark rate for all pipelines was established, as was the equity share of each pipeline’s capital. The benchmark rate is indexed to long-term government bond yields.

viability of the existing UGDs. Although it appears that the importance of these tasks has been recognized and that considerable progress has been made, the scale of these tasks is very large because it involves a major change in the culture and operating philosophy of the companies. Assessing the specific requirements is well beyond the scope of this report. It can only be reiterated how important it is to perform these tasks in a systematic and accelerated manner.

The recommendation to extend competitive access to large-volume consumers embedded in distribution systems, however, requires the application of specific regulatory techniques. In addition, there is potential to define specific franchise areas as a means of generating some “yardstick” competition for regulatory purposes. Finally, there will be a need to develop regulatory control of bundled and unbundled distribution services when the UGDs have achieved a measure of commercial and financial viability.

### **Development of Unbundled Distribution Service**

During the process of commercialization and corporatization of the UGDs, the regulatory commission will need to ensure that the costs of the distribution transportation service are separately accounted for. This typically involves the preparation and implementation of a detailed activity-based costing (ABC) program to separate the costs of distribution service, gas supply and marketing, and customer service (supply application, transfers and disconnections, metering, invoicing, and payment collection).

For those consumers within the distribution system who are deemed eligible to access competing suppliers, it will be necessary to develop similar procedures to those that it is proposed to develop for the transmission system. These comprise the following:

- Code of Conduct.
- Code of Operations.
- Distribution Service Agreement.
- Distribution Service Tariff Methodology.
- Authorization of Extensions, New Connections and Expansions.

These documents will address broadly the same issues as those for transmission. For tariff design, the first four steps of the cost of service model may be applied in an almost identical fashion to the application to transmission. The design of tariffs, however, involves consideration of some options that differ considerably from those applied to transmission. In general, on transmission systems it is possible to identify the capacity required by a system user and to specify this in a contract (the TSA) between the transmission business and the system user. It is frequently impossible to do this unambiguously on a distribution system. In addition, distribution systems tend to be operated and developed on a common carriage basis where expansion investment is made in response to anticipated demand rather than contractual commitments to pay for this additional capacity. As a result, there is a difference between the design of transmission and distribution tariffs.

### ***Design of Distribution Tariffs***

The design of unbundled distribution tariffs is a relatively recent phenomenon. Most distribution customers throughout the world receive a bundled supply and distribution service. Only in the United Kingdom is there a complete separation of the costs of distribution (use of pipeline system) from the costs of gas supply. This allows all gas consumers in the United Kingdom to choose their supplier—this is described as Full Retail Competition. In the United States and Canada full retail competition is being extended on a state-by-state or province-by-province basis.

In many states and provinces in North America, local distribution companies (LDCs) that provided a bundled service priced this on what was described as a “declining block” basis. This quite simply meant that, beyond an initial threshold volume, the customer’s unit price declined in steps corresponding to

predetermined consumption volumes or “blocks.” Different LDCs used different threshold and numbers of blocks, but the concept was common to all.

The rationale for this approach was quite simple. All distribution systems have a number of pressure tiers ranging from the intermediate pressure tier that is connected to the transmission system, through medium pressure down to low pressure. The range of pressures in these tiers varies among distribution systems, but this overall structure remains constant. Gas supplying smaller volume consumers tends to use more of the system from the medium- to low-pressure tier and the fixed costs per unit of volume of providing a service pipe and meter are quite high. Larger-volume consumers tend to be connected at a higher-pressure tier, and the unit cost of connection (service pipe and metering equipment) tends to fall as volume consumption increases.

LDCs have modified and replicated this approach in designing tariffs for the unbundled distribution service. The block tariff approach, however, may be inefficient in that it provides an incentive to consumers who are just below a threshold to increase their consumption to get a lower price.

In the United Kingdom, the principle underlying the distribution tariff methodology is similar to that in North America. BG Transco, however, has made a distinction between distribution costs and the costs of the service pipe and meter. Separate tariffs are levied to recover each of these categories of cost. For distribution, BG Transco has developed its tariff methodology on the basis that tariffs should reflect the typical use of the network made by consumers of a given size, rather than the actual use made by a particular consumer. The latter methodology is viewed as being too complex to be a practical basis of charging. Analysis conducted by BG Transco has shown that there is a good correlation between consumer size and off-take pressure tier. Large consumers are typically supplied from higher-pressure tiers and small consumers from lower-pressure tiers. Such an approach avoids the inconsistencies that may arise if neighboring sites of similar size are actually connected to different pressure tiers.

The methodology calculates the average cost for using each of the main pressure tiers of the distribution system. Combining this with the probability of a load using that pressure tier generates a charge for a load using that tier. The summation of these tier charges gives the total charge for a load to use the distribution system. The methodology uses average costs rather than marginal costs to reflect the total costs of using the system. Total costs are allocated 50 percent to capacity and 50 percent to commodity.

Gas consumers are divided into 12 consumption (or load) bands—from the smallest to the largest. Using the results from a survey of the pressure tier or subtier at which individual supply points are attached to the BG Transco pipeline system in conjunction with network analysis, it is possible to estimate the probability of a unit of gas supplied to a customer of given size having passed through the various pressure tiers or subtiers within the distribution network.

The application of the usage probabilities to the distribution peak day off-take volumes provides an estimate of the extent to which the different load bands make use of capacity across the pressure tiers. The capacity utilization figures for the main tiers have been calculated by applying the usage probabilities to the forecast peak demand for each load band.

The cost of providing capacity within each pressure tier or subtier per unit of capacity utilized on the peak day is calculated by the division of capacity related costs by the total volume of capacity utilized. The average cost, for customers in each load band, of utilizing a particular pressure tier or subtier, is calculated by multiplying the unit cost of utilizing the tier by the probability that the tier is utilized by customers in the load band.

To provide a workable basis for charging individual customers of different sizes, the average total costs of utilizing the distribution network are plotted. A function is fitted to the data points such that the error term is minimized. At present, this is in the form of a single log function with a straight-line element for

the residential (<7,500 cubic meters) load band. This function must then be scaled so that when applied to all supply points connected to the BG Transco network, it will generate the desired target revenue.

Although it is widely accepted in principle that this approach is an advance on the alternatives being used in other jurisdictions, it has been subject to criticism on a number of grounds. These criticisms asserted that the following existed:

- A lack of cost reflectivity.
- A failure to provide the correct economic signals for new connections to the system and for the use of gas.
- An inappropriate split between capacity and commodity charges.
- Creation of perverse incentives to bypass Transco's system.
- A lack of transparency.

A subsequent regulatory review resulted in agreement on a number of amendments (primarily to prevent inefficient bypass), but effectively confirmed the validity of the methodology. There would be value in conducting further study to determine the applicability and feasibility of this methodology in relation to gas distribution systems in China.

### **Regulation of Bundled Distribution Service**

Currently the UGDs provide a bundled distribution service. Once the UGDs have achieved a measure of commercial viability, it will be necessary to regulate formally the bundled price of gas. This will require a price control mechanism for the supply of gas to consumers who are not eligible to access competing suppliers and a price control mechanism for the pipeline services. The previous exercise in developing the regulation of an unbundled distribution service will provide the basis for developing the price control of the bundled service to consumers. In developing this price control, in addition to the price of the unbundled distribution service, a regulatory commission will need to address the costs of the following items:

- Gas purchase.
- Transmission and storage services.
- PSOs.
- Customer service costs.
- Profit.

In relation to gas purchase, it is envisaged that the regulatory commission would impose a requirement on the distribution company to purchase efficiently against some predetermined standard and, once this requirement was satisfied, allow a full pass-through of these costs to its customers.

It is also envisaged that transmission and storage services will be regulated. It is not clear to what extent distribution companies in China have an obligation to supply or to maintain supply, but this issue would require further study. The regulatory commission will need to take a view on what an efficient level of customer service costs would be and what return on turnover would be appropriate.

### *5.3 Recommendations*

The following conclusions and recommendations emerge from the discussion of regulatory techniques.

#### **Transmission**

- Unconnected parts of the transmission system in China constitute separate transmission networks and transmission entities for the purposes of regulation.

- To ensure effective access to these transmission networks, three documents establishing business rules and procedures are required:
  - Code of Conduct.
  - Code of Operations.
  - The TSA.
- The regulatory commission should provide guidelines for the preparation of these documents. The documents should be prepared in consultation with network users and under the supervision of the regulatory commission.
- When these documents are agreed, they should be submitted to the regulatory commission for final approval.
- The regulatory commission should provide guidance to transmission entities regarding the development of an appropriate transmission tariff design methodology, which each transmission entity should be obliged to prepare.
- The transmission entity should prepare its revenue recovery requirement for an initial year and derive tariffs. In addition, it should prepare capital and operating expenditure forecasts. All these data and information should be submitted to the regulatory commission.
- The regulatory commission will make a determination on all these matters and, for each transmission entity, determine the profile of tariffs for a specific number of years.
- In making this determination, the regulatory commission should make an estimate of the rate of technical progress in the gas transmission industry in China for the number of years over which tariffs are determined. This will generate a decline in real tariffs (benefiting network users), but provide the transmission entities with an incentive to improve the rate of efficiency improvements in advance of the regulatory commissions determination of the rate of technical progress, because this will increase their profits.

### **Distribution**

- A similar procedure may be applied to distribution, but there is an overriding prior requirement to enhance the commercialization of the UGDs.
- The design of tariffs for unbundled distribution service is considerably different to that for transmission, which constitutes a key difference in the procedure.
- In addition, it is envisaged that UGDs will continue to provide a bundled service to the smaller-volume consumers who are not eligible to receive unbundled service. As a result, the regulatory commission will need to regulate the additional costs and revenues of gas supply, which consist of the following:
  - Gas purchase.
  - Transmission and storage costs.
  - PSOs.
  - Customer service costs.
  - Profit

## **6. TRANSITIONAL CHANGES IN THE INTERIM REGULATION PERIOD**

In this chapter, definitions are provided for the terms in the chapter title in section 6.1, along with a comment in section 6.2 on the character of the changes anticipated to take place, and in section 6.3, on the concept of interim regulation. The discharge of the responsibilities of the interim regulatory agency in relation to other ministries and agencies is set out in section 6.4, and the concept is mentioned of the interim regulatory agency as a “buffer” between regulated entities and those ministries and agencies. The objectives for the gas industry in the transition derived from the Joint Report are described in section 6.5, and five steps are proposed for administrative tasks for achieving them. Two aspects of monitoring during the transition are discussed in section 6.6: monitoring for policy and regulation change and monitoring of competition. The requirements of the interim regulatory agency in terms of the principal required powers and processes, are defined in section 6.7, and suggestions are made on how the practical processes of regulation could work. Arrangements for the transition period are presented in 6.8, and recommendations in the chapter are finally given in section 6.9.

### *6.1 Definition of Terms*

“Transitional changes” derives from the concept, presented and elaborated in the Joint Report, of a flexible, pragmatic transition for both regulatory and market structure change in China’s oil and gas sector. Five years was suggested for the transition, corresponding with the term of the 10<sup>th</sup> Plan. The Joint Report recognizes the obstacles and challenges that will be faced in the transition, but equally emphasizes the importance of the permanent regulatory institutions being in place by its end.

“Interim Regulation Period” refers to the concept of creating within the GOC an interim regulatory structure headed by an “interim regulatory agency” that would initially coordinate the work of the agencies and ministries already exercising regulatory powers, while at the same time developing the permanent regulatory framework. The interim regulatory agency would later hand over responsibilities to the permanent gas regulatory commission. The interim structure would function for the duration of the transition period or until the coming into being of the permanent commission if that were earlier.

Clearly, it would be desirable for the permanent commission to be created and put in charge earlier rather than later in the transition. There are on the one hand, at least two reasons for this. First, it would maintain the momentum for change. Second, by signifying stability and permanence, the coming into being of the commission would increase investor confidence in the next couple of years where much investment is needed to achieve the GOC’s objectives in the sector. On the other hand, it is important that all of the studies and related consultation work associated with designing the permanent regime be carefully and thoroughly carried out to ensure a successful implementation.

The Interim Regulation Period may therefore be divisible into two. The first part would be prior to properly legislated powers becoming available to the interim commission, the second would be after those powers have become available, but prior to the handover to the permanent commission.

For purposes of this report only, “interim regulatory agency ” refers to that component of the “Chief Interim Regulator” function, which has to do with regulation of the downstream gas industry.

The “(Permanent) Regulatory Commission” similarly refers to that entity described in Chapter 3, which in turn is that component of the “(Downstream) Regulatory Commission” responsible after the end of the transition (or earlier if all necessary changes, including changes to laws, can be accomplished) for the implementation of the permanent downstream gas regulatory regime.

All these concepts—transition, interim regulation, chief interim regulator, and permanent regulatory scheme—are referred to and developed in the Joint Report.

“Changes” means changes in the scope and content of downstream gas regulation and in the organizational structures and organizational relationships that carry out the regulation.

### *6.2 Assumptions about Principles for the Regulatory Framework*

For purposes of discussing these changes, it is assumed that the following five principles for a new oil and gas regulatory framework for China recommended in the Joint Report will be adopted by the GOC and implemented during the transition period:

- Separation of regulation from policymaking.
- Independent regulatory decisionmaking.
- Removal of policy and regulatory responsibilities from SOEs.
- Transparent regulation.
- Creation of a sound legal framework.

Briefly, the character of the “changes” will be as follows:

- *Scope of regulation* will become broader, for example, applying to such entities as urban gas distribution systems, as well as to gas transmission.
- *Content of regulation* will change, to include the regulation of pipeline investment, pipeline rates, pipeline access, gas marketing activities by owners of monopoly pipelines and by third parties, gas storage, and the “qualification” or “certification” of entities to take part in downstream gas activities.
- *A new organization*, the interim regulatory agency, will be created to coordinate the administration of regulation, to progressively implement new style regulation, and to help develop the structure, procedures, regulatory policies, and techniques of the permanent regulatory commission.
- *Independence and transparency* will be progressively introduced as key principles in the administration of new regulation.
- There will be new, *close interagency relationships* created to ensure an interim regulation that would include all areas that need to be regulated.

### *6.3 Basic Concepts for Interim Regulation*

The following basic concepts, which define the key responsibilities of the interim regulatory agency, were discussed and agreed:

- The interim regulatory agency will ensure coordination, relative to new objectives, of existing regulation (for example, regulation of pipeline rates by SDPC Price Bureau).
- The interim regulatory agency will endeavor to fill in the gaps that existing in existing regulatory functions (for example, the regulation access to pipeline services by third parties).
- The interim regulatory agency will have principal responsibility to carry out the program of studies and make reports identified in the Joint Report and needed to prepare for permanent regulatory change (the Joint Report leaves open for decision the question whether this responsibility should go to the interim regulatory agency or be given to a separate organization that has no ongoing operational responsibilities).

- The interim regulatory agency will be principally responsible for overseeing, monitoring, and reporting on the process and progress of regulatory reform.
- The interim regulatory agency would bear principal responsibility for establishing the legal framework for the permanent regulatory regime.

To achieve a smooth transition for the present situation to the interim regulation, it is necessary to place emphasis on the following:

- The interim regulatory agency will coordinate, not direct, the activities of other ministries and agencies.
- The interim regulatory agency's action vis-à-vis other ministries and agencies will proceed gradually.
- The period of interim regulation will build up mutual confidence between the interim regulatory agency and other agencies and ministries, leading to a smooth transition to the permanent regulatory regime.

### *6.4 Responsibilities of the Interim Regulatory Agency in Relation to the Ministries*

#### *and Agencies*

#### **Definition of Terms**

The term "Responsibilities" means the exercise of certain powers over the regulated entities (long-distance gas transmission organizations, urban gas distribution systems, gas storage businesses, and gas marketing entities), the ability to delegate those powers, the controls on the use of these powers, the jurisdiction within which those powers apply, and the main elements of process in exercising powers.

"The Ministries and Agencies" means the institutions of government that presently exercise regulatory powers in the downstream gas sector.

#### **Maintaining Relationships**

The ministries and agencies referred to are those that have existing regulatory powers affecting the downstream gas industry. They include the following:

- The SDPC, with regard to balance and coordination of midterm and long-term development planning of the sector, approval of large construction projects, review and adjustment of projects budgetary estimates, acceptance of the completed projects, development of relevant pricing policies and pipeline rates, and control over their implementation.
- The SETC, with regard to formulation of the development plan and policies (such as technical and health policy) for the gas sector (urban gas distribution excluded), control over and regulation of economic operation in the sector, and supervision of industry restructuring and reform of state-owned enterprises.
- The Ministry of Land and Natural Resources, with regard to policy matters affecting pipeline rights of way.
- The Ministry of Construction, the authority in charge of urban gas distribution, with regard to development planning and policymaking, formulating relevant rules and regulations, as well as health, safety, and technical standards for the sector, and qualification management of participants.

The concept is that the interim regulatory agency would establish relationships with those ministries and agencies that had earlier been the subject of an implementation directive for regulatory and structural reform in downstream gas (see section 6.5).

The relationships would be maintained at a senior level, both on a bilateral basis, by the interim regulatory agency, and multilaterally, by means of an interdepartmental working group. The purpose of these relationships would be to ensure that implementation directive(s) are complied with by identifying and dealing with any problems that may arise and providing coordinated advice to the policy level about progress achieved and obstacles remaining.

The interim regulatory agency would be assisted in this task by a small “Core Team” of selected officials who had earlier received intensive training in new style regulation, partly overseas.

Ideally the relationships and the cooperative approach to regulatory reform would be voluntary. However, means need to be found to provide the interim regulatory agency with some degree of authority to compel cooperation of the ministries and agencies. The concept of State Council providing an implementation directive is raised in section 6.5. As well, the presence within the GOC of a senior level “Change Champion” and perhaps of a “Change Director,” too, both of which are proposed in the Joint Report, would be an encouragement to cooperation.

### **The Interim Regulatory Agency as a “Buffer”**

The interim regulatory agency would have a “buffer function” between regulated companies and those agencies, such as the SDPC, that have regulatory powers that are being coordinated by the interim regulatory agency.

This means that, in general, the interface in terms of contacts to provide information, make rulings, and receive representations would be provided by the interim regulatory agency. Previous direct contact with regulated enterprises by each relevant government agency would thus be replaced by the interim regulatory agency. Such an approach would be consistent with the principle of coordinating existing regulatory functions, and it would anticipate the provision by the future regulatory commission of a “single window” approach to the regulatory interface.

### *6.5 Recommended Measures for the Interim Regulatory Agency to Achieve the Objectives for the Transition*

By “objectives” is meant the GOC’s policy objectives for the downstream gas sector, as summarized in Chapter 1 and also dealt with comprehensively in the Joint Report.

By “objectives for the transition” is meant that set of tasks that the GOC considers appropriate for achievement in the transition. Again, the Joint Report contains appropriate recommendations on the main objectives and activities for the regulation of downstream gas during the transition, which may be visualized in terms of five major administrative stages:

#### *Stage One*

- Develop TOR for research on regulatory change (completed by the World Bank in respect of Downstream Gas, summer 2000).
- Study and make decisions on regulatory policy, principles, techniques, monitoring, and reporting (the Joint Report and Chapters 4 and 5 of the present report constitute an important element of this activity as it relates to downstream gas, second half 2000).
- State Council would send an implementation directive to those ministries and agencies that have powers over the downstream gas industry to inform them of the GOC’s policy objectives, and to

require them to use their powers to achieve the objectives to the fullest extent possible. Identify responsibility for regulatory implementation at the same time.

### *Stage Two*

- Create road map of existing regulatory processes (this report).
- Create and staff an interim regulatory organization (the present report is designed to assist in this). The interim regulatory agency would act toward other ministries and agencies that currently have regulatory functions, as described in section 6.4. The “buffer function” of the interim regulatory agency would be exercised in this context with the authority to implement regulatory change.

### *Stage Three*

- Interim regulatory agency identifies areas of regulation where existing authorities are lacking. In conjunction with appropriate agencies of the GOC, he would then attempt to devise means of filling these gaps prior to the required legislation being drafted and approved by State Council.

### *Stage Four*

- Under the supervision of the interim regulatory agency, draft the necessary laws and regulations for a permanent regulatory regime and a regulatory commission to implement it, and submit them to the NPC for its consideration and enactment.

### *Stage Five*

- Hand over staff and functions from the interim regulatory agency to the downstream gas group of the permanent commission.

The following tasks should be fulfilled to implement the above five-stage reform smoothly:

- Make regulatory decisions:
  - supporting gas marketing by PSC partners (2001-2002).
  - modernizing pipeline rates (effective 2002–03).
  - providing pipeline open access (2002–03).
- Initiate monitoring and reporting of regulatory changes and market behavior (2001–2002, having studied how to do this in 2000).
- Carry out those components of the formal reviews of the progress of regulatory change that relate to the downstream gas industry (in the first half of 2004).
- Concentrate all downstream gas regulatory functions and activity under the interim regulatory agency (in the first half of 2005).
- After enactment of the necessary laws and regulations, introduce the permanent regulatory system.

A comprehensive legal and administrative framework would then be in place for the achievement of the policy objectives for the regulatory reform in the gas sector.

If the studies, consultation, legal drafting and political decisionmaking required to establish the permanent regulatory commission can be completed more rapidly than presently envisaged, it would be possible to advance the dates for completing the above tasks. As already noted in section 6.1, there would be some advantages in so doing.

The assumption is made that other regulatory changes, broader in scope than downstream gas, are taking place in parallel with those itemized above. These include such important matters as the removal of regulatory and policy functions from the SOEs, the transfer of any relevant downstream gas economic regulatory functions to the interim regulatory agency and of policy functions from the SOEs to the GOC.

The “measures,” or administrative steps or tasks, to achieve these objectives would be implemented by the interim regulatory agency supported by his Core Team. The GOC’s ambitions directed toward achieving the objectives for the early part of the transition would have to be set realistically, taking account of the fact that initially there will likely be a vacuum in terms of proper authorities for change, especially open access to gas pipelines. This is consistent with the concept of pragmatism in transitional arrangements.

### *6.6 Monitoring Progress and Monitoring Competition*

The monitoring function is divisible in two parts.

#### **Monitoring and Reporting of Sector Restructuring and Policy and Regulation and Changes**

The first relates to monitoring the results of policy change and regulation in designated areas of market restructuring. These areas would include the direct marketing of PSC partners’ share of gas, the progress of price deregulation, the provision of pipeline access, and the modernization of pipeline tariffs design.

As with the discharge of other regulatory responsibilities, monitoring would first be carried out using the existing authorities of other ministries and agencies. In a later stage, it would be based on the legislative authorities approved by State Council. “ Authority” is an issue for monitoring because it might be necessary for the interim regulatory agency to have the power to compel the production of information and to hold inquiries.

Reporting the results of progress monitoring to the Chief Interim Regulator and, through that office, to the Change Director and to the Change Champion.

Progress reporting would relate to the facts of progress in market restructuring and modernized regulation and to measures to make policy adjustments that needed to correct any identified mistakes and deficiencies in the reform process.

Some elements of reporting would necessarily be confidential and would only be available to senior levels of government. Others would be circulated to all concerned departments and agencies. A third type of reporting would be provided to the interested public, such as gas producers, marketers, consumers, regulated entities, and industry associations.

On the latter point, the provision of information by governments and regulatory agencies has been an important factor in fostering the development of functioning markets, at least in the early stages of deregulation. For example, the provision of large amounts of monthly gas data and associated commentaries by the U.S. Energy Information Administration is regarded by all participants as a valuable contribution to the understanding of gas supply, demand, and market trends.

#### **Regulatory Monitoring of Competition**

A decision is first needed as to whether the interim regulatory agency is the correct locus within government for the discharge of this important function, which is mentioned as a potential duty in section 3.2 of the report. If that decision favors use of the interim regulatory agency, a number of options may be considered with regard to its role.

In many jurisdictions there is friction between the statutory body responsible for the implementation and enforcement of competition policy (the antimonopoly regulatory agency) and the specialist gas industry regulatory agency.

Various alternatives for delimitating the responsibilities between these two authorities exist. At one extreme is the mandate of the regulatory agency to exercise control over monopoly prices and the

quality of service, whereas all other matters that raise competition issues are to be dealt with by the competition authority. At the other extreme, the regulatory agency could be responsible for all regulatory and competition matters in the industry. Most jurisdictions fall somewhere between these two regimes. It is noted, however, that in New Zealand, there is no energy (or telecommunications) regulatory agency. Instead, the antimonopoly commission has sole responsibility to monitor and ensure that owners of monopoly facilities are not abusing their dominant market positions.

Divisions of responsibilities between industry regulatory agency and competition authorities may not be static. In the early stages of industry restructuring, when gas supply is being unbundled from transmission and supply support services are being separated from the previously integrated service offer, the regulatory agency frequently has the primary responsibility for the promotion of competition. Once self-sustaining competition emerges, responsibility may shift to the competition authority. In some instances, the regulatory agency may have concurrent responsibility for a particular activity, for example, the supply of gas to eligible consumers.

Another feature of this division of responsibility relates to the powers and duties of the regulatory agency. At one extreme, the regulatory agency may simply exercise a monitoring function and report any exercise of market power or anticompetitive practice to the competition authority. The power of the regulatory agency may be increased to allow binding arbitration in disputes brought before the regulatory agency for resolution. This power could be extended further to allow the regulatory agency to impose and enforce behavioral constraints on market participants who, in the view of the regulatory agency, are engaging in anticompetitive practices.

It is unusual, however, for the regulatory agency to be empowered to impose structural remedies on market participants. This might involve, for example, the requirement for a transmission business to divest its supply affiliate if, in the regulatory agency's view, it had persistently favored its affiliate to the detriment of competing suppliers. Typically such drastic action would require an inquiry by the competition authority or by a statutory appeals body (or a court).

In the Chinese context, where there is, as yet, no antimonopoly commission, it may make sense for a specialist industry regulatory agency to enforce the procedures outlined in the previous sections and to intervene in competition-related disputes on a complaints basis. If a requirement for a structural remedy arises, it would be dealt with by a higher authority in the policy side of government.

### **Monitoring of Regulatory and Market Change by a Third Party?**

The concept was discussed in the Working Group of using a third party, possibly a trade association of some kind, as an independent means of monitoring the progress of change, including corporate behaviors as part of that process.

There is no reason why trade associations should not comment on aspects of government and regulatory policies and their implementation. This might reasonably be a role for an industry association. In terms of international experience, however, it would be very unusual for a trade association to be given an official mandate in relation to monitoring regulatory change and the development of markets.

It is difficult to see the need to create a special trade association for monitoring purposes, given that the interim regulatory agency and, eventually, the permanent regulatory commissions, would have the staff capability, knowledge, and independent status to satisfactorily perform this role.

### *6.7 Authority of the Interim Regulatory Agency*

In each of the following areas, the GOC authorities should give consideration to the legal instruments and related authority that could be made available to the interim regulatory agency to carry out the

measures described, directed to achieving the government's objectives, and to monitor progress and results.

### **Powers of the Interim Regulatory Agency**

Desirable powers include information gathering, inquiring into matters within its jurisdiction, receiving applications, undertaking regulated activities, preserving confidentiality, making and enforcing regulatory decisions, assessing penalties, and dealing with appeals from regulatory decisions.

### **Power of Delegation**

Under the concept of interim regulation during the transition, the interim regulatory agency is more likely to have powers delegated to it by others, rather than having powers that it can delegate to others, for example, to provincial or municipal authorities. As well, whatever may be the merits of delegation by the permanent regulatory commission to provincial authorities (see section 3.3), it may be prudent during the transition to wholly retain the available regulatory powers with the interim regulatory agency. At the same time, it may also be prudent to provide for regular briefings and exchanges of information with provincial and municipal authorities as regulatory studies are carried out and decisions on principles and techniques are taken.

### **Scope of Regulation by the Interim Regulatory Agency**

The scope of the interim regulatory agency's activity is largely predetermined by the government's policy objectives and the measures to achieve them. Thus, the interim regulatory agency, directly or indirectly, should have authority related to gas transmission pipelines, gas distribution systems, and gas storage facilities in respect of the following matters:

- Construction and expansion.
- Rates (tariffs) charged for use of their services.
- Terms and conditions, other than price, for their use by others.
- Terms and conditions under which the owners of these facilities may enter and take part in activities involving the purchase and sale of natural gas.
- To receive, deal with, and resolve complaints from one or more parties, make binding arbitration decisions in respect of commercial disputes about gas pricing and other gas transaction issues where there is no control of prices, allocation, or other transactional matters by another agency of government.

The further comments on scope or jurisdiction of the regulatory commission that are set out in Chapter 3 will not be repeated. It will, however, be for discussion to what extent they are relevant to the interim regulatory agency, given the probably limited legal authorities available to him, at least during the first half of the transition.

### **Processes of the Interim Regulatory Agency**

*As to internal processes:* The interim regulatory agency and its Core Team should be operationally independent of whatever ministry acts as his "host" during the transition. This means having separate staffing, accommodation, communications, and budget allocation, and making physical and administrative arrangements to ensure the confidentiality of information flowing from regulated entities to the interim regulatory agency.

*As to interdepartmental processes:* The interim regulatory agency will develop, maintain, and enhance the ministerial and agency relationships referred to in the subsection above, Maintaining Relationships, by means of some interagency coordination group. This group would be chaired by the interim regulatory agency. Its purpose would be to ensure coordination of regulatory activities and to identify,

discuss, and resolve any difficulties that may arise between ministries and agencies. Its result would be to achieve coordinated implementation of regulation using existing and to-be-created powers.

*As to external processes:* The interim regulatory agency would probably establish a secretariat function as discussed in the subsection above in Chapter 3, Working-Level Procedures. The Secretariat would be responsible for tracking all regulatory issues, would provide a single point of access for regulated entities to the interim regulatory agency, would archive all incoming and outgoing documentation, ensure confidential handling, manage public affairs and external communications of the interim regulatory agency, and maintain his Web site.

### **Provisions for Transparency**

To the greatest extent possible, regulated entities, persons, and organizations having an interest in their services and activities should be able to find out what laws and regulations are being applied in the course of interim regulation (refer to section 3.10). Similarly, all non-confidential filings made with the interim regulatory agency by regulated entities or their customers should be available on the public record. If there are formal proceedings leading to approval (or disapproval) of these filings, they, too, should be public unless matters of commercial confidentiality are being dealt with. The interim regulatory agency should be required to take account of the evidence before him and to make public his reasons for decision in individual cases. Finally, he should report from time to time to the government and the interested public on his activities.

### **Independence in Decisionmaking**

Independence in decisionmaking is seen as a process that develops during the transition period (refer to section 3.11). Clearly, because the interim regulatory agency for a time will be dependent on regulation by others, he will have to respond to the overall guidance of the Change Champion (and the Change Director, if one is appointed) and will be involved with others in a cooperative effort of regulatory development. He, therefore, cannot be “independent” in the sense that the Permanent Commissions must be. In dealing with individual regulatory cases, however, it is important that decisionmaking by the interim regulatory agency, or the use of regulatory powers of those relevant agencies through its coordination, be taken on the basis of the facts of each case and independently of the policy side of government. Such an approach would be, in effect, a foreshadowing of the later independent decisionmaking by the regulatory commission.

### *6.8 Arrangements for the Transition Period*

The interim regulatory agency faces a formidable task in respect to the downstream gas industry in the transition period. Using the available authorities, initially those belonging to other ministries and agencies, the regulatory agency must implement the GOC’s policy objectives for the subsector (refer to section 2.2 for the listing of objectives).

The assumption is made that the Joint Report’s recommendations for the creation, staffing, resourcing, and training of the interim regulatory agency and his Core Team are broadly acceptable. The following activities will then need to be undertaken in sequence:

*a. Inventorying of enterprises.* First, an inventory is required of the entities—gas transmission, storage, distribution, and marketing enterprises—that will eventually be subject to the jurisdiction of the permanent regulatory commission. As new players enter the business, information about them will of course be added to the inventory. This inventory will eventually become a public register of regulated entities.

*b. Data Base.* Key factual information about these entities must then be obtained in relation to, for example, ownership; organization; financial, including capital structure; facilities; and operations.

Uniform standards, for example, of accounting, will have to be developed and applied for collecting, classifying, storing, and manipulating these data.

*c. Stakeholder Consultations.* In parallel with the establishment of the data base, parties having a demonstrable interest in the launch and implementation of interim regulation should be consulted. These parties include gas producers, transmission and distribution companies, gas users, relevant trade associations, and provincial and municipal governments. The consultations could be carried out through a variety of means: questionnaires, bilateral meetings, and workshops. It would be important to record, summarize, and collate the views obtained and to identify and act on those that are consistent with the principles of independent regulation of natural monopolies with the twin objective of protecting consumer interests and fostering gas market competition.

*c. Public filings.* The registered entities will be required to put on file with the interim regulatory agency prescribed information about regulated activities, particularly the rates charged by and the conditions of access to their facilities. No rates should be charged or services provided that are not filed with the regulatory agency.

*d. Regulatory implementation.* When these information sets have been obtained, which should be in the first year of the transition period, the stage will be set for implementation of new style regulation to the downstream gas sector, broadly according to the principles of Chapter 4, using the techniques of Chapter 5. Clearly, in an initial stage of interim regulation, major simplifications will likely be required. A stepwise process can be envisaged:

- *Voluntary implementation.* Regulated entities could be invited to review their public filings in the light of the GOC's stated policy objectives and voluntarily submit to the interim regulatory agency for approval changes that would bring those filings into conformity with the GOC objectives. In the case of gas transmission businesses, the voluntary filings could comprise the Code of Conduct, Code of Operations, and Offer of a Standard Transmission service referred to in section 5.1 of the previous chapter.
- *Complaints process.* Alternatively or additionally, parties affected by the practices that have been filed—gas producers, distributors (both in relation to pipelines), consumers (in relation to distributors), and provinces and industry associations (in relation to both)—could be invited to comment on the filings and propose changes, to the interim regulatory agency and to the regulated entities.
- *Active regulation.* The interim regulatory agency, assisted by the Core Team, could take active steps to analyze the filings, identify needed changes, always in relation to GOC policy objectives, and prioritize them by regulated entity. He could then seek to implement them in a logical sequence carefully related to policy objectives, to the market impact of regulatory changes, and to the authorities and resources available to the interim regulatory agency.

### 6.9 Recommendations

The analysis of transitional changes in the interim regulation period gives rise to the following recommendations and as well raises a number of issues for further discussion and decision:

- A suite of administrative measures should be taken to bring into being the interim regulatory organization, principally involving the following:
  - The issuance of a State Council directive that includes necessary authorization to this organization.
  - The creation, staffing, and resourcing of the office of the interim regulatory agency.
- The interim regulatory agency should then effect regulatory change, for example, in relation to pipeline rates and pipeline open access, using existing ministerial and agency powers.
- The interim regulatory agency and his Core Team further should do the following:

- Identify areas of regulation where existing authorities are lacking in the means to achieve regulatory objectives and attempt to find means to fill those gaps.
- Develop working procedures, along with rules and regulations, and establish a data base.
- Draft a gas law or supervise the law drafting based on relevant regulations enacted by the State Council, so as to pave the way for the introduction of the permanent regulatory regime.

The interim regulatory agency should contribute to the legislation of the sector. It should, to the greatest extent possible, discharge duties and have powers similar to those of the permanent regulatory commission, before that commission is established by the end of 2005.

## **7. A SCHEDULE FOR THE DEREGULATION OF NATURAL GAS PRICES**

The policy objective for a modern gas industry is to realize the benefits of a functioning market for the commodity natural gas while protecting consumers against the potential abuse of market power by owners of the natural monopoly transmission and distribution businesses over which the gas commodity is transacted. The institution, the principles, and the techniques to ensure proper regulation of transmission and distribution have been discussed in Chapters 3, 4, and 5, respectively. Attention now turns to the related question of the deregulation of the gas commodity price.

Section 7.1 identifies the scope and key elements in this chapter. Section 7.2 reviews the present method of controlling upstream gas prices. Section 7.3 then outlines the general principles by which such prices are determined in markets where there is much less government control than in China. Section 7.4 examines whether and when control is necessary. Based on international practices, the role of government in gas price formulation mechanism is discussed in section 7.5. Section 7.6 then briefly reviews the present structure of China's gas markets and argues that they could function without detriment to transacting parties if there were more flexibility for parties to negotiate prices, subject to regulatory commission oversight than at present. Section 7.7 considers what can be said, in principle, about the level of gas prices that would prevail in the absence of government control and section 7.8 outlines a recommended strategy for reduced control of upstream gas prices. Finally, all issues discussed in this chapter are concluded in section 7.9.

### *7.1 Introduction*

The Joint Report in section 2.5 reviewed in summary form the conditions for increased downstream gas market penetration. It noted that the allocation of about 25 percent of gas supplies at low “in-Plan” prices caused price signals to be distorted. This resulted in recommendations for the continued phasing out of these allocations and for the further strengthening of market orientation of market orientation so that “out-Plan” prices could be freely negotiated.

This chapter discusses how such strengthening of market orientation can be achieved. Specifically it deals with the price of gas at the outlet of the purification plant, a price that is referred to as the “upstream gas price.” This price, therefore, consists of the price at the wellhead plus the costs of gas gathering and purification.

It is important to recall that UGDs buy gas for resale to many of their customers. The price of gas to final users will in most—if not all—cases be an “all in” or bundled price, so that it includes the costs of the gas (the upstream price), as well as the costs of transportation.

Under the recommendations of this report, the bundled price of gas to final consumers will remain subject to regulation. This chapter does not discuss the nature of that oversight, which would be carried out by the gas regulatory commission. It is concerned solely with the question of whether the upstream gas price, as charged by producers to UGDs and other large gas buyers, such as industrial consumers and electric power plants, should be subject to government oversight as it now is in many cases and, if so, how that oversight is best achieved.

### 7.2 Present Control of Upstream Gas Prices

There are at present three tiers of gas prices:

- “*In-Plan*” prices: SDPC formulates the annual natural gas guidance supply plan, which requires natural gas producers to distribute at fixed wellhead prices a specified amount of natural gas to some customers, most of whom are fertilizer producers.
- “*Out-Plan*” prices: “For natural gas sold above the government-formulated gas supply plan, the SDPC publishes the median guidance wellhead price with permissible upward or downward adjustments of 10 percent by the natural gas producer.”<sup>15</sup> The “out-Plan” price is currently set at ¥ 900/1,000 m<sup>3</sup> (approximately \$3.15 per 1,000 cu. ft.). It is understood that this price has been in force since 1997 and was derived on the basis of a relationship with the heating value of crude oil.<sup>16</sup>
- “*Negotiated Prices*” : Upstream gas prices for a number of new projects are negotiated between buyer and seller outside the control framework. For example, the CNOOC negotiates upstream prices for its gas production with its customers, and prices in the Tu Ha Region are also negotiated.

The PetroChina Prospectus states (p. 82) that “in September 1999, the GOC proposed to set a pricing formula based on a reasonable ratio between the thermal value and the price of composite alternative energy.” Apparently such a formula is now under development in the SDPC, but no detailed information is available.

The present control of gas prices raises the issue that natural gas prices to some consumers, particularly fertilizer manufacturers, are lower than required to cover all the costs incurred in producing, transporting, and distributing the fuel. As a consequence, consumers are not confronted with the true costs of their gas use decisions. This, in turn, implies that investors somewhere in the chain of production, transmission, and distribution are receiving less than their costs of production. If the upstream price is lowered, gas supply will be reduced and supply will be used in ways that are not economically efficient. Alternatively, a failure to cover the full cost of transmission or distribution may raise the transmission or distribution cost to other users and discourage otherwise desirable expansions of service. In areas where coal prices are low and gas prices are not competitive, gas consumption is discouraged, which results in lower capacity utilization and leads to even higher transmission and distribution tariffs.

### 7.3 The Process of Gas Price Determination in Uncontrolled Gas Markets.

Fundamentally, two mechanisms exist for determining gas prices in market economies:

- A process of bilateral negotiation between individual suppliers on the one side, and UGDs or large industrial gas consumers on the other.
- An impersonal bidding process in which large numbers of buyers and sellers engage in an ongoing “auction,” in which they buy and sell gas for current and future delivery.

Bilateral negotiation occurs in much of continental Europe where a few companies dominate gas supply and a single company frequently provides bundled transmission and gas supply service to distributors. Gas producers and transmission-distribution companies negotiate the upstream gas price and other terms and conditions in contracts, which are frequently of long duration. Few market intermediaries—agents, brokers, marketers—specialize in the business of buying and selling gas, and most final consumers receive bundled gas service at the burner tip. They do not contract independently

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<sup>15</sup> PetroChina Prospectus, p. 82. It is stated in the Prospectus that “PetroChina negotiates the actual wellhead price with commercial natural gas users and municipal governments within the adjustment range.”

<sup>16</sup> Details of the process for deriving the gas price were not provided. It is understood that there is a legal basis for its derivation.

for the gas commodity, or for transmission and distribution services, respectively. The Chinese gas market situation may develop to approximate that now existing in continental Europe.

In North America, on the other hand, large numbers of gas producers and intermediaries specialize in the buying and selling of gas. Transmission and distribution functions are usually performed by different, independent companies. Finally, large gas users—and, increasingly, small household consumers—purchase gas directly from producers or marketers. Thus, the market has a large number of actors on both the supply and demand sides. Prices for delivery in the present (the “spot” price) and in the future are published and respond continuously to the forces of supply and demand. It is important to note that, in North America, gas markets reached their present state only after many years of development. Gas markets in continental Europe are much newer, but they show signs of evolving in the direction of the structure now prevailing in North America. The Chinese gas market is unlikely to develop in a foreseeable future to a condition comparable to that of the North American market at present.

In neither Europe nor North America is the upstream price of gas subject to government control.

### *7.4 When Is Government Control of the Gas Price Desirable?*

In general, there is a case for government intervention in the upstream gas market if there is some form of market power being exerted either by buyers or sellers of gas at the outlet of the purification plant. Market power would exist in the gas market if a single seller or buyer of gas could, by its actions in the marketplace, exert an influence on the upstream price of gas.

The most extreme form of market power exists if, say, a single seller of gas (a monopolist) were to confront many relatively small buyers. In that case, the single gas producer could set the upstream price so as to maximize its profits. The price would tend to be high relative to the prices of competing fuels—potential gas consumers would be dissuaded from using gas, and existing consumers would use less than if the price were lower. As a consequence, less gas would be produced than would be justified by the total, full-cycle costs of production (full-cycle costs include all the costs of finding, developing, and producing gas, including a reasonable profit). Similarly, if there were substantial concentration of power on the buying side of the market, gas prices would be kept relatively low and producers would have reduced incentive to expand gas production to meet the economic potential for gas use.

In general, we can say that there would be a case for government intervention in determining the upstream price of gas if there were a substantial imbalance of economic power between sellers (producers) and buyers (distribution companies and large industrial users) of gas.

### *7.5 Governments and Gas Pricing: International Examples*

In North America until the mid-1980s, gas prices were regulated. In those years, many fewer buyers and sellers were involved in the market: transmission companies engaged in, and dominated, the business of buying and selling gas, and it was difficult or impossible for final users to buy gas directly from producers at the other end of the pipeline. Gas prices were therefore regulated by the government. The experience of regulating upstream gas prices, however, was not a success. The problem was, and is, that it proved impossible for governments to change the price quickly enough so that producers and consumers could adapt to changing market conditions. The result was that the upstream price of gas was either too high or too low:

- Either the price was so high that consumption was discouraged, and E&D were encouraged, such that there were large volumes of “shut in” gas.
- or**
- The price was so low that the use of gas was encouraged, but E&D were discouraged, such that perceived “shortages” occurred.

These unhappy circumstances led governments in both countries to introduce a series of reforms in the mid-1980s to deregulate gas prices and allow access of all buyers and sellers to transmission pipelines. The result is today's competitive market where prices respond rapidly to changing circumstances.

In the present North American market structure, the upstream price of gas is determined in a competitive market. Because of the large numbers of buyers and sellers of gas operating in an impersonal market, except under special circumstances no elements for market power are being exercised either on the buying or selling side of the gas market, and normally no case exists for government intervention on prices.

In the European case, the market is much more concentrated. As discussed in Chapter 2, the structure of European markets prior to the implementation of the EU Gas Directive is not considered a desirable goal for China.<sup>17</sup> It is interesting to note, however, that, notwithstanding the concentrated market structure, little government control or regulation of upstream prices exists in Europe. This lack of control can be justified on the basis that, though there is not a competitive market for gas as there is in North America, there is a reasonable balance of negotiating power between buyers and sellers. Moreover, as explained in section 7.7 below, gas prices to consumers will be constrained by the prices of competing fuels.

In countries where former state petroleum or gas monopolies have been restructured and brought under modern regulation, upstream gas prices are typically not subject to regulation. This is the case, for example, in Argentina and Bolivia. It is recognized, however, that both countries have a degree of supplier competition in this market.

In Mexico, limited restructuring has occurred, and no supplier competition exists outside the areas bordering the United States, because the state monopoly Pemex continues to be the sole supplier. Gas prices, however, are set in relation to the opportunity value to Pemex of gas exports to or imports from the United States. This option is not, of course, available to China.

### *7.6 The Structure of Gas Markets in China: Is Government Control of Gas Prices*

#### *Needed?*

A small number of producer-sellers (PetroChina, SINOPEC, and the CNOOC) and a relatively small number of large gas buyers (municipal gas companies and industrial companies) now characterize the gas market in China. Little competition exists, however, between the producer-sellers because of the regionalization of their activities. In practice, PetroChina dominates almost all markets with its onshore gas supplies.

If the recommendations of the Joint Report are implemented, the gas market in China will gradually become more competitive. On the one hand, the Chinese onshore E&D companies may utilize their rights to explore throughout the country. On the other hand, the number of sellers will increase as PSC partners are allowed to sell their profit gas directly on the Chinese market, and the number of PSCs should grow as more contracts are entered into with foreign petroleum companies. Finally, the number of buyers will grow as the gas market develops. The Chinese gas market may therefore develop in the direction of that in continental Europe. If this happens, the need for oversight of the upstream price would gradually decline over time. Regulation will, of course, continue to be required of the gas buying and selling activities of UGDs.

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<sup>17</sup> Indeed, as noted, European markets are beginning to develop competition in wholesale gas markets.

Even in the present market structure, however, the existing control mechanisms cannot be justified:

- Bilateral price negotiation would normally result in a viable set of upstream gas prices. Presumably this was the rationale for allowing the CNOOC to negotiate with buyers. However, difficulties exist in most cases (Beijing was cited as an example) in enforcing prices on the distributor-buyers that are viable from the perspective of pipelines and producers. If the government wishes to continue to exercise some oversight over upstream gas prices in the medium term, however, the government can exercise such oversight in less intrusive ways than by directly controlling the upstream price.
- There is no sound economic basis for aligning upstream gas prices with crude oil prices, especially when the controlled price is left unchanged for extended periods. The relevant benchmark is some average of the prices of fuels that compete with gas, such as LPG, gasoil/diesel, fuel oil, and coal. And such a benchmark is widely used in bilaterally negotiated contracts. As noted, negotiated contracts would, at the present stage of development of the China gas market, be the way in which price would be determined.
- There is a band of upper and lower price levels within which the upstream gas price must fall, on average, over time in order to promote and preserve a viable gas industry as discussed in section 7.7. There is no reason, in principle, why negotiated prices would not result in a gas price that is within these bounds.
- It is important to remember that, as discussed in Chapter 4, if the principles of downstream regulatory reform are adopted by the GOC, there would be continuing oversight by the regulatory commission where it matters most, that is, with respect to the price charged by UGDs to their customers

### *7.7 What Are the Upper and Lower Sustainable Limits to Upstream Gas Prices?*

It is important to appreciate that there are natural limits within which upstream gas prices will be constrained over time:

- The gas price to final consumers cannot be maintained for extended periods appreciably above the prices—on a heat equivalent basis—of competing fuels.<sup>18</sup> If it could be, gas consumers would have an incentive to convert their facilities to be compatible with the alternative fuels. As a result, gas sales and the gas industry would decline. This maximum sustainable price is measured at the burner tip (that is, at the point where the gas is used). After deducting the costs of distribution and transmission, however, it implies that *there is also a maximum level of the upstream gas price* above which gas use will not be economic for final users.
- For short periods, prices to final consumers can exceed such a sustainable level, since peaks in gas use may exceed the production capacity of gas wells.<sup>19</sup> Such short-term price spikes are an efficient way of rationing gas use during periods of extreme demand caused by, for example, a period of very cold weather. Typically what happens at such times is that industrial users with dual firing ability will switch to alternative fuels when gas prices spike, thereby alleviating the short-term “shortage.” Similarly, there will be periods when the gas price is less than the maximum sustainable upstream price. This could be the case, for example, when new gas wells are connected to pipelines—gas supply may for a time exceed the demand, which would depress prices and cause the excess gas to be shut in.
- There is also a minimum sustainable level for the upstream gas price. The minimum sustainable price must, on average over time, be at least equal to or above the total, or “full cycle,” costs of gas production—including all costs from exploration through production of the gas and including a return on investment sufficient to attract a continuing flow of capital to the business. If the upstream

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<sup>18</sup> This “threshold” value for gas must take account of the capital costs of equipment required for energy users to convert to gas from competing fuels.

<sup>19</sup> Such short-term price variations may not be felt by all gas buyers. Whether they are or not depends on the nature of the contractual relationship between the gas supplier and the buyer.

price were to remain below this level for an extended period, producers would leave the industry, and the industry would decline. At any point in time, however, it will pay producers to continue to produce and sell gas at prices lower than the sustainable level as long as they recoup the “lifting cost,” that is, the cost incurred in getting the gas out of the ground and gathering it. This cost is typically very low, and any upstream price that returns more than this will allow producers to recover some portion of their capital invested.

An upstream price negotiated in a contract between large, knowledgeable buyers and producers would likely lie within the sustainable limits. Only if it were would the price be viable for an extended period.

Just where the price lies within these limits will affect how any “excess profits” in the gas industry are shared.<sup>20</sup> The closer it is to the upper limit, the more any “excess profits” accrue to producers, and the closer to the lower limit, the more they accrue to consumers of gas. There may, of course, be no “excess profits”—even at the upper sustainable limit. This could be the case, for example, if gas were expensive to find or develop, or if it were so far from markets that long, expensive pipelines were needed.

It is also important to note that any potential excess profits may be absorbed by transmission and distribution companies if they are inefficient and costs are higher than necessary. In this respect, it is critical that an effective regulatory system be established—to ensure that transmission and distribution are as efficient as possible. It is most unlikely that government control of the upstream gas price could do a better job than bilateral negotiation at finding a reasonable balance between the sustainable limits. Exactly where the upstream price would end up as a result of such negotiation is impossible to say.

### *7.8 Recommended Schedule for Decontrol of Upstream Gas Prices.*

As noted, there are now two classes of controlled upstream gas prices:

- “In-Plan” prices, which apply almost exclusively to fertilizer plants.
- “Out-Plan” prices, which apply to most other uses of gas.

This report has not addressed the issue of the future of “in-Plan” prices. It simply notes that the allocations are being phased down and that consideration should be given to replacing the low gas prices with direct government monetary subsidies.

It is recognized that raising prices to residential and fertilizers is politically sensitive. It is important, however, that any subsidization of gas users be done directly using public funds rather than indirectly through the use of tariffs that do not properly reflect the cost of producing, transporting, and distributing gas to such users. A number of methods can be used to ease the impact of higher prices to consumers, especially the poorest consumers for whom expenditure on fuel may absorb a substantial part of their disposable income. Specific social policy goals and the choice of measures to implement them are matters beyond the scope of this study.

With respect to “out-Plan” prices, it is recommended that the GOC move away from direct control of prices. The proposed change from a linkage of upstream prices with crude oil prices to a linkage with a basket of competing fuels is a step in the right direction. Continuing direct control of this kind would, however, in all probability, unduly and unnecessarily constrain the development of the gas industry in China.

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<sup>20</sup> We can say that consumers are receiving “excess profits” if the price of gas to them is lower than the price they would be willing to pay. At the producer end of the gas chain will be “excess profits” if the return on investment is greater than would be required to induce the producer to continue to invest in gas exploration and development over an extended period.

It is recommended, therefore, that the GOC cease setting “guidance prices” for out-Plan gas. Upstream gas prices would, as a consequence, be established by negotiation between producers (at present, PetroChina and SINOPEC, as well as the CNOOC) and gas buyers (mainly UGDs). This recommended change is not a dramatic change from the present. It would simply extend to all gas the practice of negotiating prices now used by PetroChina and in respect of gas supplied into pipelines in the Tu-Ha Region.

The GOC can continue to exercise oversight, but in a more efficient, less intrusive way than by setting prices. It is recommended that as the GOC’s role in setting prices is eliminated, the oversight responsibility be entrusted to the downstream gas regulatory commission. As the market develops and increasing numbers of gas producers begin to market their gas, the government should gradually reduce oversight over upstream gas prices. Eventually regulation would be confined to the gas-buying practices of UGDs.

The process could work as follows:

1. The regulatory commission would instruct gas buyers and sellers that all negotiated transactions should be set out in the form of gas purchase contracts, which would provide the terms and conditions of the deal (transitional provisions would have to be made to allow any existing contracts to be exempt from oversight until they were renegotiated).
2. To ensure that appropriate market principles are followed, the commission could issue guidelines setting out the broad parameters for contract terms and conditions.
3. The commission could require submission of all gas purchase contracts for monitoring purposes.
4. The commission may limit the pass-through of gas purchase costs by a particular UGD to its customers if the prices exceed those negotiated by other UGDs in similar circumstances (this is to address the problem of UGDs having little economic incentive to minimize their gas purchase prices because the purchase and resale of the commodity is typically a “flow-through” rather than a “profit-making” activity).

It is recommended that the scope of regulatory oversight of all upstream gas contracts and prices be reviewed after a period—say, five years.

### *7.9 Conclusions and Next Steps*

This chapter argues, as did the Joint Report, that control of upstream gas prices by the GOC, as currently practiced, is not efficient. As a result, it is recommended that the current control of wellhead prices be unwound in a systematic manner that recognizes specific features of China’s gas market.

In the present state of development of China’s gas market, there is a case for some regulatory oversight over all gas commodity transactions. Any such oversight, however, should not be prescriptive in the sense of having a predetermined idea of what upstream prices should be. That is why the preferred mechanism is for the regulatory commission to become involved only in cases of UGD transactions.

Appropriate oversight is best done by the downstream gas regulatory commission. This is consistent with the views on the distinction between “policy” and “regulation” described in Chapter 2. Individual cases of disagreement should be dealt with at “arm’s length” from the political process in the context of a framework of regulatory policy and process.

Finally the GOC should state clearly that such an oversight process for upstream gas prices is intended to be transitional for transactions with end users as parties become used to operating in a contractual, market environment. The government should also state that the continued necessity for regulatory oversight over all gas transactions will be reviewed at a specified future time.

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## **APPENDIX 1: TERMS OF REFERENCE: CHINA—REGULATORY FRAMEWORK FOR GAS DEVELOPMENT**

### **Introduction**

1. The Government of China (GOC) is in a process of reforming the state owned companies in the oil and gas sector with the objective of creating market-oriented, efficient, internationally competitive energy companies.

2. In 1998, the GOC restructured the sector and created five state-owned upstream oil and gas companies of which two, China National Petroleum Corporation (CNPC) and China Petrochemical Corporation (SINOPEC), are vertically integrated to strengthen the state companies' competitiveness. First, the state's upstream and midstream oil and gas assets and operations were separated North and South. Those assets were then allocated to CNPC and SINOPEC respectively. The restructuring has created the conditions for competition between Chinese companies operating in the sector and the companies compete on shore in China. On the other hand, competition in many segments of the industry is hindered by the demarcation between offshore and onshore, by the restrictions on import and exports of oil, by the duopoly of CNPC and SINOPEC in the wholesale market and by the monopoly of CNPC in the wholesale gas market.

The restructuring changed the role of the Government agencies. To further reform in the sector and to bring about a transformation to a socialist market economy several steps need to be taken, thus:

To further reform in the sector and to bring about a transformation to a socialist market economy several steps need to be taken, thus:

1. The role of the government should be limited to the definition of national oil and gas policy;
2. The autonomy of management in the sector corporations should be increased, giving boards of directors control over major decisions, subject to modern principles of corporate governance; and
3. A new approach to regulation is required.

3. The Government's incentive to encourage competition in the oil and gas sector and to create a modern regulatory framework, including independent regulatory commissions is driven by two factors: 1) A public listing (privatization) of three of the oil and gas companies is contemplated in 2000, thereby reducing the state's role in the companies and encouraging the move towards a more competitive market. PetroChina was successfully launched in an IPO listing 10 percent of CNPC's shares in core domestic assets; 2) Accession to the WTO requires a gradual opening of the downstream market and the government is keen to develop and put in place adequate policies and regulations to ensure a smooth transition to a competitive market. China has made wide-ranging commitments in market access, also in the petroleum sector.

## Scope of Work

4. The GOC requested the Bank for advice on the establishment of a new market-oriented, modern regulatory framework for the oil and gas sector. A joint report on Policy, Market Structure and Regulation has been prepared with a joint working group under the State Council Office for Restructuring the Economic System. It focuses on the structural and regulatory issues and details a roadmap for reform.

5. A separation of policy, regulation and operations has been recommended - preferably before the privatization begins. For example, the Chinese petroleum companies in the future should function as commercialized enterprises. The exploration effort needs to be enhanced to increase reserves additions by a more aggressive mineral right licensing policy and by allowing all Chinese companies to explore throughout China, including offshore. Private companies operating under production sharing contracts should be allowed to market their share of profit oil and gas directly to customers and to invest downstream. Import quotas for crude oil and crude oil allocations should be phased out gradually to put a competitive pressure on the Chinese companies.

6. The Government of China's policy is to increase the share of gas from 2% to 6% of national energy requirements by 2010. To achieve this it was recommended that the terms for producers under production sharing contracts should be reviewed; that consumer prices should be more market-oriented; that natural gas trade should be encouraged; and that private participation should be increased in gas transmission and distribution.

7. Three areas of regulatory activity should be part of the long-term regulatory framework:

- Mineral Resources and Fiscal: the administrative function of managing petroleum mineral resources, leasing rights to explore and produce them, collecting production royalties and similar revenues from their use for the state, and maintaining and providing appropriate access to the related data inventory.
- Technical: the administration of rules and regulations mainly dealing with engineering matters, the conservation of the nation's petroleum resources and the protection of health, safety and the environment, across all petroleum activities, upstream and downstream, onshore and offshore.
- Economic: the taking of decisions, often discretionary, about prices charged, services offered and investments to be made by businesses which are natural monopolies such as pipelines and gas distribution systems.

8. In respect of all three areas of regulation, the "qualification" of participants in oil and gas operations, to ensure their technical, financial and administrative fitness.

9. It was also recommended to identify a Ministerial and/or a Vice-Ministerial "Champion" for Market Structure and Regulatory Reform in the Oil and Gas Sector to have the overall policy responsibility for championing change in the sector and to identify a "Chief Interim Regulator" in charge of implementation. This person must be properly empowered to obtain the co-operation of ministries, commissions and agencies in the GOC that are involved in the transition, and receive staff support from a strong "core group" of officials.

## Public-Private Infrastructure Advisory Facility (PPIAF)

10. PPIAF has approved a study focusing on the implementation of the Regulatory framework for the downstream gas sector.<sup>21</sup> The study will focus on the downstream infrastructure segment of the gas sector, i.e., gas transmission and distribution and on the economic regulation of the sector (and will therefore be less concerned with engineering, safety, health and environmental regulation). It will take

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<sup>21</sup> By "downstream gas sector" is meant essentially gas transmission, distribution and storage activities downstream of the gas processing plant.

as a given, both the GOC's general objectives to introduce competitive market forces wherever possible in the oil and gas sector and its specific objectives for the gas industry. These include: the phasing-out of gas allocations and of remaining gas price controls; the freeing-up of gas trading and transportation; the provision of open-access to gas pipelines; the introduction of modern regulation of facilities having monopoly characteristics; and the monitoring of the working of markets in the sector.

- I. The study should identify responsibilities for the Interim Regulator in relation to the ministries and agencies selected to implement regulation in the transition period. The study should recommend measures for the Interim Regulator and his Core Team in respect of regulatory activities required to achieve the objectives set for the transition, including monitoring progress with and results of designated elements of market restructuring.
- II. The study should define the regulatory principles that would be valid for both the permanent Regulatory Commission, to be established in 2005, and the "Interim Regulator" who will have a key role to play in the transition to the permanent Commission. It should also assess and recommend among the alternative regulatory techniques for implementing the recommended principles.
- III. The study will assist the Chinese task force in drafting a Gas Law. This will include establishing the policy objectives for development, competition, and performance of the downstream gas sector, setting criteria for granting licenses, and defining the pricing methodologies and access terms for pipelines and distribution systems and the rights and obligations of the gas suppliers in the sector. The Gas Law should also include provisions to establish the regulatory agency.
- IV. The study should assist in design organization and staffing of both the temporary and the permanent Regulator and propose an organization structure and setting out business procedures for that position.

This study deals with I and II. The consultants should:

### **Priddle**

#### **Regulatory Commission and Transitional Arrangements**

11. Coordinate the Study on Implementation of the Regulatory Structure related to point I and II. These tasks involve organizing for and carrying out studies leading to recommendations and decisions that will put in place a modern oil and gas regulatory structure for China. The principal components are:

The inventorying, mapping and understanding of the *existing regulatory structure*, including its legal underpinnings.

- Identification of the *regulatory responsibilities* during the transitional period for implementation ministries and agencies, possible interim regulatory bodies and, ultimately, the Regulatory Commission, in order to achieve the GOC's objectives for the downstream gas industry and to monitor progress towards those objective.
- Identification of *transitional changes* and arrangements in the interim period through 2005.
- Definition of the *regulatory principles focusing on economic regulation*. For example, should regulation be essentially a mechanical process or should discretion be exercised and if so in what areas and to what purposes? Should pipeline rates be determined by a "price cap" methodology or by some kind of cost of service approach?
- Decision as to the basic *regulatory techniques* to be applied in each of the three areas. Corresponding with certain regulatory policy decisions, "how to?" decisions will be required. For example, if pipeline rates are to be determined by the cost of service approach, what data needs to be collected and in what form to provide the accounting basis for this kind of regulation?

**Specific assignments include:**

12. The agencies responsible for each task today have been identified in the Joint report and in Working Papers of the Joint Working Group.

- The findings and conclusions in these reports should be confirmed, and on this basis,
- The study should define, in appropriate detail the responsibilities and procedures of the permanent Regulatory Commission and arrangements for the transitional period.

13. For the permanent Regulatory Commission and for the transitional period the consultant should:

- carry out analysis and make recommendations as to the authority to be granted to the regulator including the powers required to exercise that authority,
- the scope of its regulation, the main elements of its processes including appeals from its decision;
- the provisions to be made for transparency in its activities; and
- the means to secure independence of its decision-taking.

14. In addition the consultant should supervise the work of consultants working in the following areas:

- Regulatory Policy Principles, recommend regulatory principles for:
  - Gas transmission; and
  - Gas distribution
- Regulatory Techniques, assessing the regulatory techniques appropriate for implementation of the principles for:
  - Project approval;
  - Terms of access;
  - Rates for transmission and distribution services;
  - Distributors' responsibilities;
  - Codes of conduct

### **Deliverables**

- Report on the responsibilities of the Regulatory Commission
- Report on transitional changes in the interim regulation period
- Quality assurance of the reports on regulatory principles and regulatory techniques.

### **Miles:**

#### **Regulatory Principles**

15. Analyze and give recommendations for the *regulatory principles* component *focusing on economic regulation*. The study should analyze and recommend regulatory principles, such as in which areas discretion should be exercised as opposed to mechanical procedures and for what purposes? Other issues include the regulation of pipeline rates: Analyses and recommendations for the selection of methodology (price cap, cost of service or other approaches?).

#### **Specific assignments include:**

- I. Recommend a schedule for deregulation of gas prices
- II. Recommend regulatory principles for:
  - Gas transmission; and
  - Gas distribution

in each case with special regard to:

- Project approval;
- Terms of access for gas owned by third parties;
- Rates (=prices) for transmission and distribution services, where and when these facilities are “open-access”;
- Rates for gas sales by transmission and distribution enterprises, where and when these facilities are not “open access” and provide instead a “bundled service” of sales gas delivered to buyers (this may be during a transition to “open access, unbundled service”);
- Regulation, to the extent necessary to prevent abuse of dominant positions, of other issues such as interconnections, interoperability, load balancing, storage, metering, billing, balancing of receipts and deliveries, imbalance charges, and intra-system trading;
- Responsibilities of the providers of distribution services with regard to such matters as security of supply to small consumers and the treatment of low-income customers; and
- Codes of conduct for gas transmission and distribution enterprises as buyers and sellers of gas, in the event that these activities are “unbundled”, taking account in all cases of existing regulation, by the central government and provincial governments and the future regulatory roles of provincial governments in regard to gas distribution.

### **Deliverables**

- Study on transmission and distribution fee principles.

### **Hunt:**

### **Regulatory Techniques**

16. Analyze and give recommendations for the *regulatory techniques* to be applied gas transmission and distribution. By “regulatory techniques” is meant the second level of detail in regulation. For example: it might be decided the regulatory policy component that gas transmission rates should be based on cost of service principles with some incentive features. Corresponding with certain regulatory policy decisions, “how to?” decisions will be required. For example, if pipeline rates are to be determined by the cost of service approach, what data needs to be collected and in what form to provide the accounting basis for this regulatory method?

### **Specific assignments include:**

17. Assess the regulatory techniques appropriate for implementation of the principles for:

- Project approval;
- Terms of access, including open-seasons at project initiation and when spare capacity later becomes available during the life of the project;
- Rates for transmission and distribution services;
- “Other issues” such as those listed for Miles above;
- Operation of gas networks, including the possible need for “network codes”;
- Criteria for granting distribution licenses
- Distributors’ responsibilities;
- Codes of conduct dealing with behaviors of regulated entities participating in unregulated markets for the gas commodity transacted over regulated network facilities;
- And make appropriate recommendations.

### **Deliverables**

- Recommendation on regulatory techniques and related regulations for gas distribution and transmission

## APPENDIX 2: LIST OF EXPERTS THAT PARTICIPATED IN THE WORK GROUP MEETINGS

Chen Kequan	Finance Department, PetroChina Company Limited
Chen Shihai	Department of Industry Planning, State Economic and Trade Commission, Deputy Director-General
Chi Guojing	China Gas Association, Managing Deputy Director-General
Dai Hua	Marketing Department, Shanghai Natural Gas Pipeline Network Company Ltd., Engineer
Ding Jianchun	Project Coordinator, Department of International Cooperation, China United Coal Bed Methane Corporation Ltd.
Du Ming	Department of International Cooperation, China United Coal Bed Methane Corporation Ltd., Director
Feng Yu	Industry Department, Hefei Planning Commission, Engineer
Gao Bingqi	Division of Special Minerals, Department of Geological Exploration, Ministry of Land and Resources, Deputy Director
Gao Yunhu	Department of Development Planning, State Development Planning Commission
Guan Kenan	Division of Urban Construction, Construction Department of Sichuan Province, Senior Engineer Commission
Guo Jingqi	Administrative Office, Beijing Gas Group company Ltd., Director
Hai Peng	Economic and Development Research Institute, SINOPEC, Vice President
He Jia	Department of Legal Affairs, PetroChina, Director
Hu Delong	Hefei Urban Gas Company, Deputy Chief-Engineer
Hu Weiping	West–East Pipeline Office, State Development Planning Commission, Deputy Director-General
Huang Yanhua	Department of Policy, Laws and Regulations, Shanghai Municipal Engineering Administration Bureau, Senior Economist
Huang Taihe	Deputy Director-General, Institute of Economic System and Management, SCORES
Jia Like	Department of Industry Planning, State Economic and Trade Commission, Deputy Division Chief
Jin Biao	Operation and Production Department, Beijing Gas Group Company Ltd., Deputy Manager
Jin Dongqi	Marketing Department, Shanghai Natural Gas Pipeline Network Company Ltd., Director
Kang Yan	Finance Department, Beijing Gas Group Company Ltd.
Li Jian	Department of Taxation, Ministry of Finance
Li Runsheng	Refinery and Marketing Branch, PetroChina, Deputy General Director
Liang Zhigang	Department of Comprehensive Planning, SINOPEC, Deputy Director
Liao Shaoguo	Division of Resource Saving and Comprehensive Utilization, Chongqing Municipal Economic Commission
Liu Bin	Department of Mineral Resources and Reserves, Ministry of Land and Resources, Deputy Director
Liu Heming	Department of Urban Construction, Ministry of Construction, Division Chief

Liu Mingke	Marketing Division, Southwest Oil and Gas Branch, PetroChina
Liu Shaoxin	Planning Department, Chengdu Gas Company, Director
Liu Zhenqiu	Prise Department, SDPC, Division Chief
Liu Zhuangzhi	Department of Policy and Legislation, Deputy Division Chief
Luo Fengying	Natural Gas and Pipeline Company, PetroChina, Division Chief
Mi Qinglai	Natural Gas and Pipeline Company, PetroChina, Deputy Division Chief
Niu Yubin	Price Department, State Development Planning Commission
Peng Junfu	Chengdu Gas Company, General Director
Qian Jianhua	Pipeline Storage and Transmission Branch Company, SINOPEC, Deputy Manager
Ren Jingdong	Department of Economic Operation, State Economic and Trade Commission,
Xi Decui	Shanghai Municipal Gas Administration Department, Chief Engineer
Wang Jing	West–East Pipeline Office, State Development Planning Commission, Engineer
Wang Ning	West–East Pipeline Project Office, PetroChina, Director
Wang Songqiu	Chongqing Municipal Gas Company, Deputy General Director
Wang Xiang	Commission of Legislative Affairs, Standing Committee of the National People’s Congress
Wei Shu	Shanghai Preparatory Office for Natural Gas Project, Senior Project Manager
Wu Chunjiang	Department of Planning and Development, Beijing Gas Group Company Ltd., Engineer
Wu Jiannian	Administrative Office, Chengdu Gas Company, Director
Wu Jianzhong	Energy Division, Sichuan Province Planning Commission, Deputy Director
Xiang Ze	Finance Department, PetroChina, Deputy General Director
Xu Dingming	West–East Pipeline Office, State Development Planning Commission, Director-General
Yang Keming	Gas Office, China Offshore Oil Corporation, Deputy Director
Ying Shisheng	Shanghai Municipal Gas Management Department, Senior Engineer
Zhang Jun	Natural Gas Office, Wuxi Gas Company, Director
Zhang Li	Department of Legal Affairs, PetroChina
Zhang Weiping	Department of Planning, CNOOC, Director
Zhang Yanqing	Department of Enterprise Management, China United Coal Bed Methane Corporation Ltd., Director
Zhang Yaopo	Department of Industry, Communication and Commerce, Office of Legislative Affairs of the State Council, Deputy Division Chief
Zhang Yong	West–East Pipeline Project Office, PetroChina
Zhang Yuqing	Department of Basic Industries, State Development Planning Commission, Deputy Division Chief
Zhang Zhongliang	Chongqing Gas Association, Deputy Chief Secretary
Zheng Qing	Finance Department, Beijing Gas Group Company, Ltd.
Zhu Dan	Southwest Oil and Gas Branch, PetroChina, Accountant
Zhu Ronggai	West–East Pipeline Office, State Development Planning Commission, Engineer
Zhu Weihua	Shanghai Gas Management Office, Division Chief

## APPENDIX 3: SUMMARY OF THE STRUCTURE, OPERATION, AND REGULATION OF GAS MARKETS

Canada, the United States, and a number of West European countries have relatively mature gas industries. Broadly speaking, we can discern three “market structures” from an assessment of international gas markets:

1. Bundled transmission and gas supply service provided by pipelines, for example, the United States and Canada before the mid-1980s.
2. Limited competition, for example, continental Europe.
3. Fully functioning markets, for example, contemporary Canada, the United States, and the United Kingdom.

It is important to note, however, that industry structures are not static. Gas industries typically evolve over time as they mature and as government policy changes. For example, gas markets in North America have changed enormously in the past 15 years. Although policy changes played a large part in this evolution, arguably the industry was “ready” for the changes in that the infrastructure and markets had been largely developed. Moreover, the market for crude oil had developed as a more competitive commodity market following the price shocks of the 1970s. Energy market participants had, therefore, become familiar with short-term trading arrangements similar to those developed in other commodity markets.

For many years, the North American gas industry was highly concentrated in that the main transmission pipelines were also merchants of gas—they sold a “bundled” transmission and gas supply service. They held contracts, mainly long-term, with producers for virtually all the gas they carried and sold to UGDs. Gas prices were contractually set (as in Canada<sup>22</sup>) or regulated (as in U.S. interstate trade) and in both cases were very rigid over time—little provision was made for price adjustment in response to changing market conditions. Thus, as noted in Report 5, *A Schedule for the Deregulation of Gas Prices*, gas markets tended to be characterized either by surpluses—there were large volumes of “shut in” gas—or perceived shortages—the amount of gas produced was insufficient to satisfy demand at the prevailing price.

In continental Europe the contemporary gas industry has some of the “old” (that is, pre-mid-1980s) North America characteristics. The industry tends to be dominated by a small number of gas producers and by a small number of “merchant” pipelines that buy and sell the gas they transport. Pipelines, however, no longer have an exclusive right to purchase and import gas. Their exclusive right was lifted in the early 1990s, but the continued negotiation of long-term take or pay contracts and lack of third party access to pipelines has tended to preserve the pipelines’ role as single buyers and sellers of gas. European gas markets are so highly concentrated both in terms of transmission and distribution and in terms of the number of producers supplying them. The situation is changing fast, however. On the one hand, to an increasing extent, large-volume gas buyers have access rights to transmission pipelines for gas that they buy directly from producers. On the other hand, the rapid development of infrastructures and markets has resulted in needs of intermediary gas marketers—companies that act as “brokers” specializing in the purchase and sale of gas. At the beginning, there was little need for such marketers,

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<sup>22</sup> Gas prices were regulated by governments in Canada between the mid-1970s and the mid-1980s.

but the situation is changing fast. There are now more than 40 gas and electricity traders operating in the energy market who are members of the European Federation of Energy Traders (EFET), and “limited competition” has been introduced into European gas markets.

Gas supply contracts in continental Europe tend to be long-term in nature. But price flexibility is provided for in that the bundled price to the final consumer is usually tied to the prices of competing fuels. The producer receives a “netback” price equal to the bundled price to the final consumer less the costs of distribution and transmission.<sup>23</sup>

Thus, recent developments in Europe indicate that in gas markets, there are tending to evolve in the direction of “fully functioning” markets, similar to those that now exist in North America. Such an evolution is being promoted by the Commission of the European Union, which promulgated Gas Directive 98/30/EC in June 1998. The directive is in force effective August 10, 2000. It provides for the following:

- Separation, in both accounting and management, of the businesses of supplying and of transporting gas.
- Publication of standard terms and conditions for pipeline transportation.
- Negotiated or regulated pipeline access to large industrial gas users (with annual gas use equal to or greater than 25 million m<sup>3</sup>).
- Authorization of pipelines, which are constructed and operated independently of the dominant national transmission service provider.
- Enforcement of open access by a regulatory commission or through “competition policy.”

The provisions of the directive are necessary conditions for the development of a competitive, fully functioning gas market and industry. Our recommendations are consistent with it.

In contrast to gas markets in continental Europe, the gas industry in the United Kingdom and in North America can now be characterized as one in which there are “fully functioning” markets for the gas commodity. There are many competing buyers and sellers of gas, there are many intermediary gas marketers, and there is a large variety of contracts in force. Gas prices for current and future purchase and sale are quoted on commodity markets. Prices, therefore, respond instantly to changes in gas supply and demand conditions (the latter being influenced by conditions in markets for competing fuels), and most contracts for the gas commodity contain price provisions in which the price tracks either the “spot” price in the gas commodity market or the prices of competing fuels.

It is also the case in North America that there are networks of pipelines. And increasingly more than one pipeline connects a given supply basin with markets. Thus, pipelines are becoming less monopolistic in both Canada and the United States. Further, the tariffs of both transmission and distribution companies are increasingly being set on an “incentive” basis. That is, tariffs are not linked continuously to the companies’ costs and companies, by operating more efficiently—thereby reducing costs—can increase their profits for a period.

Pipelines in fully functioning gas markets do not buy and sell gas; their business is the provision of transportation services. Although UGDs still offer a bundled service to consumers in many jurisdictions, they also are increasingly becoming open access, especially for large gas users. In a few jurisdictions, small retail customers have the option to buy their gas from marketers other than the distribution company.

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<sup>23</sup> Thus, under this “netback” pricing, the producer reaps the benefits when the prices of competing fuels are high, but suffers when those prices are low. Consumers, on the other hand, although they never have to pay more than the price of competing fuels, never have the opportunity to buy gas at a price lower than that of competing fuels.

## APPENDIX 4: DERIVING THE COST BASE FOR TRANSMISSION

This appendix expands on chapter 5 and discusses a number of detailed issues that have to be resolved to determine the initial transmission cost base (or revenue recovery requirement). These include the following:

- The appropriate approach to asset valuation.
- The estimation of a reasonable rate of return on those assets.
- The treatment of depreciation.
- The treatment of operating costs.

These techniques provide the basis for making a regulatory commission determination of the initial cost base. The discussion is extended to examine the following:

- How this cost base may be rolled forward into the future to determine an appropriate profile (or path) for transmission (or distribution) tariffs.
- How maximum allowable revenues are calculated.
- The form of the revenue control formula.

### Asset Valuation

Most regulated industries are characterized by long-lived and irreversible investments, with a limited number of potential uses. Consequently, the greatest single risk facing investors is that a past investment is rendered nugatory or becomes “stranded” by a regulatory commission decision.

Hence, investors will be prepared to invest only if there is a reasonable assurance that they will recover their investment, as well as earn a rate of return on it. The clarity and stability of the rules affecting the valuation of existing assets over time will dominate the assessment by the regulated businesses of the risks affecting future investment.

The asset base should include only those assets needed to provide the regulated services. Where assets are also used to provide unregulated services, an appropriate method of allocation will need to be agreed with the commission.

### *Asset Valuation Techniques*

Assets can be valued in a number of ways:

- *Historic cost.* This values assets at their original purchase price. It can be easily audited, because the data should be available from the published accounts of the regulated businesses, and it is objective, in that it relies on actual data rather than judgment. On the other hand, it will understate the value of assets in times of inflation and overstate it in times of technical progress. Given the length of life of assets in the transmission and distribution businesses, these disadvantages are considerable.
- *Replacement cost.* This methodology calculates the cost of replacing an asset with another asset that will provide the same services and capacity as the existing one. This has the advantage that assets are valued in terms of today’s prices. It also allows asset values to reflect technical change, since

modern equivalent replacements will cost less than existing assets for a given level of service or capacity. On the other hand, estimation of replacement cost involves judgment. The necessary data may also be more expensive to collect than historical cost data.

- *Optimized replacement cost.* This is a variant of the replacement cost method. Optimized replacement cost (ORC) can be thought of as what a new entrant (supplying the whole market) would have to pay to build the system on a green-field site, assuming an “optimal” system (that is, one that has no redundant assets). The use of ORC as a way of valuing assets allows an adjustment where, for example, the service capacity of existing assets is in excess of current requirements, perhaps reflecting over-investment in the past. The approach would require a greater degree of judgment on the part of the regulatory commission than the simple replacement cost approach.
- *Deprival value.* Deprival value (DV) is defined as the minimum loss the business would suffer if it were deprived of the asset. If the asset were to be replaced, its value would equal the replacement cost. If the asset would not be replaced, the DV would be the greater of the net present value (NPV) of expected cash flows from the continued use of the asset or the net realizable value of disposing of the asset. In other words, it is the minimum of an asset’s replacement cost or its economic value.
- *Optimized deprival value.* Optimized deprival value (ODV) is a variant of the deprival approach. It differs by taking into account the most efficient method of providing the asset’s services if the asset is to be replaced. ODV can be thought of as what a best new entrant would be prepared to pay for the remaining service potential of the existing system. Use of ODV as a way of valuing assets will tend to discourage inefficient investment because there is a risk that the regulatory commission will revalue inefficient assets down to their ORCs. Estimation of ODVs will require specialist engineering expertise. There is also an element of circularity with both the DV and ODV approaches. In the case where assets would not be replaced, both require estimation of future returns on the asset, which is what the regulatory commission effectively determines when setting a profile for the future level of transmission tariffs.
- *Market capitalization value.* When a company is listed, it is possible to derive an estimate of the market value of its net assets by valuing its shareholders’ investment using the share price and adding the net book value of debt. In most instances, this generates a value for the company’s net asset that differs from its book value. The ratio of these two valuations is called the market-to-asset ratio (MAR) or “market-to-book ratio.” It is rarely possible, however, to derive this ratio directly for the net assets of a transmission business because the transmission activity is frequently only one activity performed by a listed company. As a result, there is much discussion of whether the MAR for the overall business should be applied directly to the transmission net assets or whether some adjustment should be made to reflect variation in shareholders’ valuation of different parts of the business. This introduces an element of subjectivity that diminishes the attraction of this approach.

#### *Most Frequently Used Techniques*

The value of fixed assets is fundamental to the calculation of both the return on and recovery of a business’ investments. No consensus has emerged among regulatory commissions, however, regarding the most appropriate approach to value a transmission (or distribution) business’ net assets. Much depends on the accounting conventions employed (whether they are based on historic cost accounting (HCA) or current cost accounting (CCA)), the quality and quantity of data available to the regulatory commission, the guidance (if any) provided by legislation and precedent, and the intellectual stance adopted by the regulatory commission.

Traditionally in North America, the HCA convention holds sway, and regulatory commissions have based their valuation of a transmission company’s net assets on the book value of its assets. This approach is also being applied in those countries that are restructuring their gas industries and that typically use the HCA convention. The availability, objectivity, and ability to audit the data are viewed as considerable attractions by these regulatory commissions. These regulatory commissions tend to take the view that the impact of technical progress and inflation, if considered material, may be addressed in

the subsequent design of tariffs and that it does not justify arbitrary adjustments of the net asset value (NAV).

On the other hand, regulatory commissions in Australia, New Zealand, the United Kingdom, and, increasingly, Europe contend that accepting the published book value of net assets under the HCA convention does not provide an appropriate economic valuation for regulatory commission purposes. There is also increasing support for the concept of regulatory commission accounts used by a regulatory commission to provide the basis for the exercise of control over prices and the quality of service. These accounts would be separate from those prepared by the company for financial reporting, but with a clear audit trail between the two sets of accounts.

Considerable experience of the development and use of these separate regulatory commission accounts has been built up in the United Kingdom over the last 15 years. Following much analysis, debate and the use of trial and error a consensus is emerging that ORC adjusted to reflect the value placed on the business by the stock market is the appropriate means of valuing the net assets.

### **Rate of Return/Cost of Capital**

Most regulatory commissions are required to allow the businesses subject to regulation a “reasonable rate of return” on their assets. For natural gas, a reasonable rate of return can be defined as the risk-adjusted return that suppliers of funds to a business require the business to provide on those funds, given the risks imposed by both the inherent nature of the transmission and distribution sectors and the regulatory commission process itself. This allowed rate of return is more commonly called the *cost of capital*.

Generally speaking, the riskier the business, the higher the cost of capital, because suppliers of funds will require a higher return to compensate them for bearing greater risk. Maintaining an expected allowed return on capital in line with the cost of capital is the primary determinant of the business’ financial viability. The nature of the regulatory commission process, and regulatory commission risk in particular, is an important factor in determining the cost of capital.

#### *Methodology for Estimating the Cost of Capital*

Since most businesses are financed with a combination of debt and equity, the relevant measure of the cost of capital is the weighted average of the cost of debt and the cost of equity, where the weights reflect the business’ level of gearing.

#### ***The Cost of Debt***

The cost of debt to a regulated business can generally be thought of as the sum of the following:

The real pretax return required by investors in risk free investments, such as government bonds.

**plus**

A margin over the risk-free rate at which debt can be obtained by the business in question, which will reflect the credit rating of the business.

The main contentious issue here is the maturity of the risk-free asset. On one hand, it is possible to contend that the maturity should reflect the useful life of the assets in the business, which in transmission or distribution could be of the order of 40 years or more. It can be argued that it is appropriate to match the cost of investing in the asset with its productive life to determine an appropriate revenue stream that will service this cost in a manner consistent with the revenue generated by the asset.

On the other hand, it is equally possible to argue that it should be short (typically 3–5 years) so as to be consistent with the likely length of period between redeterminations of the price control.

### ***The Cost of Equity***

A number of alternative approaches to estimating the pretax cost of equity, more or less in order of increasing sophistication, can be used:

- *Comparative returns in “equal risk” industries*, nationally or internationally. One difficulty in using comparative returns is allowing for differences in the cost of capital as a result of different risk factors, such as regulatory commission environments. Longer-term trends in the returns to industry generally, at the national or international level, may be useful as an indication of the magnitude of the real cost of capital, even if the adjustment for the specific industry risk factors is more judgmental.
- *The Dividend Growth Model (DGM)*, which is based on expectations for future dividends. The method is popular among regulatory commissions in the United States, but it suffers from the lack of a dividend payment history in recently listed firms. It is also ruled out where subsidiaries of the parent company are also customers of the regulated business.
- *The Capital Asset Pricing Model (CAPM)*, which calculates the required rate of return, given the opportunity cost of investing in the equity market, the volatility of the market itself, and the systematic risk of holding equity in the particular company. This is the current “conventional wisdom” approach to estimating the cost of capital in Australia and the United Kingdom, where regulatory commissions have tended to favor the CAPM methodology, at least as a conceptual framework. Even if the methodology can be agreed in principle, however, approaches to estimating key parameters can be contentious. The relationship between past evidence and the future is debatable: the cost of capital is the expected return required to attract capital in future. Historic values of key parameters may not reflect future values if the nature of risks is changing. Aspects of risk, such as regulatory commission risk, can also be hard to incorporate in CAPM framework for the cost of capital, except in a tautological manner.

Although determining the cost of equity is quantitatively one of the most significant decisions affecting distribution and transmission tariffs in the longer term, it is also one of the most difficult areas for objective quantification.

### ***Taxation***

The post-tax weighted average cost of capital (WACC) is the return necessary for investors to have sufficient incentive to invest in the business. To finance the post-tax WACC and tax liabilities, a business must earn a pretax rate of return. The difference between the two is the *tax wedge*. The size of the tax wedge is a function of the rules governing the taxation of business profits and the specific tax position of each business. It is a relatively simple matter to estimate the tax wedge from a description of the tax system in the law (the statutory tax wedge). A business’ actual tax payments liabilities (the effective tax wedge), however, will reflect a number of other factors, such as the availability of capital allowances.

Regulatory commissions tend to favor an estimation of actual tax payments based on financial modeling of the expected cash flows of the business.

### ***Gearing***

The ratio of debt to equity will determine the weights attributed to the return on equity and the cost of debt when deriving the WACC. Regulatory commissions focus on the return to allow on the assets in the regulatory commission asset base, rather than the returns to individual stakeholders in that business. As a result, they have no role to play in deciding the allocation of the allowed return between equity holders and debt holders or the structure of the business’ balance sheet.

Nevertheless, regulatory commissions must aim to allow the regulated business only the *required* cost of finance. If the structure of financing is nonoptimal, so that the cost of capital is raised, the extra cost might be disregarded. Consequently, regulatory commissions seek to estimate the cost of capital on the assumption of an efficient or “optimal” level of gearing. Regulated businesses have an incentive to reduce the debt-to-equity ratio prior to the regulatory commission’s determination of the WACC. This gives them the opportunity to raise the ratio subsequently and increase the return to shareholders.

### **Depreciation**

An allowance for depreciation within allowable revenues recognizes the need on the part of the regulated business to recover the expenses incurred in the purchase of the asset over its economic life. Regulatory commissions view the rate of depreciation as important because the economic life of an asset is affected not only by its technical life, but also by the amount of technical change in the industry (which may lower the “best new entrant” cost) and by competition.

In a monopoly, the rate of depreciation does not affect the recoverability of the capital invested, only the rate at which the capital is recovered. Thus, the rate of depreciation does not affect the distribution of income between customers and the owners of the regulated businesses—only its distribution between present and future customers. Where there is a threat of competition, however, the value of assets and their depreciation become important in ensuring that owners of the businesses are able to recover their investment. The depreciation profiles used in setting allowable revenues should reflect the true “useful life” of the network in the face of future competition from other technologies.

Depreciation represents the change in the economic value of the assets over time. For many regulatory commissions, a primary objective of depreciation is that it be set to ensure that the assets are not stranded in the future. However, for regulatory commissions who employ a HCA-based valuation of net assets the initial tariffs for a new network, investment may be so high as to deter efficient use of the facility. Or in later years, when a considerable portion of the original cost has been written off, they may be so low that they might deter efficient investment by a new entrant. Consequently, regulatory commissions may alter the profile of depreciation to avoid these outcomes.

Among numerous available methods for profiling depreciation, probably the most effective and most soundly based is the method described as “economic depreciation.” This is consistent with the “NPV test,” which states that the sum of the future stream of return on an investment plus depreciation when discounted at the WACC should equal the original investment.

Despite the discretion that regulatory commissions may exercise in profiling depreciation, however, most regulatory commissions recognize that, in the interests of regulatory commission certainty, depreciation should not be varied *ex post*. This has the potential to undermine incentives, create uncertainty about the recoverability of future investments, and thereby increase the cost of capital and, ultimately, prices to final users.

### *Operating Costs*

An objective of any regulatory commission regime is to provide the regulated businesses with incentives to operate efficiently. In general, regulatory commissions need to examine the variances between the forecast and actual operating and maintenance expenditure for the regulated business, and develop rules on how these variances should be treated.

These variances could result from the following:

- Price effects, which may be caused by unanticipated movements in the price index used in forecasting investment or efficiency gains (that is, the business purchasing more cheaply than the price index would imply).
- Volume differences, to the extent that, say, demand has not grown as anticipated, such that investment has been higher or lower than forecast.
- Failure to meet agreed quality standards, which may invoke penalties. For example, actual investment may be lower than forecast, but at the expense of a deterioration in the quality of service.
- Efficiency gains, which may be rewarded, from a lower volume of investment to achieve the same quality and output as forecast.

The analysis of cost relationships, however, in particular the relationship between operating and maintenance expenditure and quality, is a difficult and relatively novel area of regulatory commission practice. Few regulatory commissions have attempted to distinguish between the different causes of variances of actual from forecast operating expenditure. Regulatory commissions have instead either set operating expenditure allowances at actual levels when making a determination (thereby eliminating the variances at a stroke), or they have phased out the whole variance over a period.

In deciding how far to pursue this analysis, most regulatory commissions tend to weigh up the possible benefits, and the probability that useful results will be gained, against the likely costs. One approach is to base the allowance for operating costs on a level of efficient costs, rather than on the businesses' actual or forecast level of costs (which may include inefficient expenditure). This raises the question of what level of operating costs could an efficient business achieve. There are at least two ways in which this could be resolved.

The first is to make comparisons with similar regulated businesses in similar countries and to set a target path for the business that envisages it moving toward that target at a demanding, but achievable, rate. Using benchmarking to set allowable revenues would give the business a powerful incentive to become efficient, but determining benchmarks of the type required for setting the operating cost element of transmission and distribution businesses is not without its problems. In many countries, there are a number of gas transmission and distribution entities against which to compare a particular operator. This may not be straightforward, however, because it will be difficult to make appropriate allowances in any such exercise for all the relevant factors (for example, population density, size of network, age of network, weather, nature of terrain, and differences in quality of service) affecting the level of the business' controllable operating costs.

An alternative to benchmarking that is considered by some regulatory commissions is to project future operating costs using objective and stable measures of efficiency trends, such as industry- or economywide measures of annual gains in labor and capital productivity, as a means of setting the future trend of the businesses' operating costs. This has the potential advantage of being less contentious than attempting to use suitably adjusted information on comparators' efficiency levels. It would be inappropriate, however, for businesses that are currently performing particularly badly, since the target path for operating costs would by definition include existing (large) inefficiencies.

### **Projecting the Cost Base (or Revenue Requirement)**

The task of projecting the cost base for a number of years requires an analysis of the regulated business' forecasts of capital and operating expenditure. The regulatory commission's objective is to set the projections in such a manner that the regulated business will not only achieve projected efficiency targets, but have an incentive to exceed these targets because this will increase its profits.

#### *Future Investment*

In addition to the valuation of the existing (or “opening”) asset base, the regulated businesses will want to know how *additions to that asset base* during the course of a period that tariffs will be determined will be treated by the regulatory commission. In general, regulatory commissions are reluctant to devote extensive resources to forecasting *future* capital expenditure for the following reasons:

- Errors in forecasting future investment can be taken into account at a subsequent determination of tariffs, when setting the next “closing” value of assets.
- There is genuine uncertainty over future levels of investment in most regulated businesses, since investment programs are rarely committed more than three years ahead.
- In the absence of certainty, there is bound to be disagreement between the regulatory commission and the regulated business. Such disputes must be resolved subjectively. Subjective decisionmaking should be minimized in the interests of long-term confidence in the regulatory commission regime.

Instead, regulatory commissions prefer to rely on the CPI-X framework to provide incentives for efficiency gains, rather than on second-guessing the regulated business on achievable cost savings. Regulatory commissions usually consider it inappropriate to lead the regulated businesses to believe that they will be allowed to keep the benefits of any cost savings, compared to forecast levels, whatever the cause. This would encourage the businesses to overstate their forecast capital expenditures in the knowledge that they would underspend. In practice, the regulatory commission would find it difficult to maintain its credibility while allowing the businesses to keep such large savings. Generally regulatory commissions attempt to avoid this problem by setting out in advance rules on how underspending on investment will be treated during the tariff determination.

#### *Future Operating Costs*

The regulatory commission will need to develop projections using the techniques developed when setting the initial efficient level of operating costs.

#### **The Calculation of Allowable Revenues**

At least three methods may be used to calculate the maximum revenues allowable over the period for which tariff will be determined:

1. The *accruals approach*, which calculates maximum allowable revenues over the tariff determination period as the sum of operating costs, including depreciation, plus the return on capital.
2. The *cash flow approach*, which calculates maximum allowable revenues over the tariff determination period as equal to the business’ cash spending on operating costs and investment, plus the change in the present value of its assets (using the WACC as the discount rate). The cash flow approach has become the standard approach for regulatory commissions, largely because it provides the most accurate measure of the amount of revenue required to allow the business to finance its activities.
3. The *multifinancial indicator approach*, which places less emphasis on asset valuation and depreciation and relies instead on a range of financial indicators to reach a judgment. This approach derives from concern about the uncertainties associated with the estimates of depreciation and asset values. It uses a range of indicators and yields a range of feasible revenues. The approach tests the financial position of the business under various pricing scenarios against financial benchmarks commonly used by investors, lenders, and rating agencies. These scenarios could include return on assets, return on equity, operating cash flow, interest cover, dividend cover, and gearing. The approach uses both cash flow- and accrual-based indicators. Underpinning the ratios are projections of the business’ accounts over the tariff determination period. The objective is to determine the range of price scenarios that would be consistent with the continuing commercial viability of the business in a competitive

market. Although this approach is eclectic in its use of indicators, it still requires decisions on what is an appropriate return and on the value of assets. The approach could, however, be used in conjunction with one of the other two more formal approaches as a cross-check on the acceptability of the results and is frequently used in this manner when initial tariff determinations by regulatory commissions are appealed by the regulated business.

The final step in setting the price cap is to determine the control formula that then governs what the regulated business can recover each year through its tariffs. It is this formula that is up-rated each year by the change in the CPI, less the  $x$  factor.

The twin purposes of the price control formula are as follows:

1. To maintain an acceptable relationship between revenues and total costs through the subsequent tariff determination period, so that pressures do not arise to reopen the determination prematurely, which would undermine incentives for cost efficiency.
2. To influence those incentives by relating prices to marginal costs, which determines efficiency in use of the networks and in consumption levels by different consumer classes.

### Example of Tariff Determination

To illustrate some of the techniques described in this appendix, some preliminary calculations are presented for the Shaanxi–Beijing Transmission Pipeline. It is important to note that these calculations are meant to illustrate some concepts and should not be viewed as a definitive analysis. Considerably more data and an intensive analysis would be required to generate robust tariff estimates.

Data on capital expenditure and capacity throughputs were provided by Working Group participants. To generate transmission tariff estimates, the following parameter assumptions were made (Table A4.1).

Total Capex	(RMB Billion)	5.2
Real pretax WACC		10.00%
General inflation rate		2.00%
Nominal pretax WACC		12.20%
Asset life	(years)	20
Pipeline Opex as % Capex		1.50%
Compressor Opex as % Capex		5.00%

Capex = capital expenditure.  
Opex = operating expenditure.

In Western Europe a consensus is forming that the real pretax WACC varies within a range of 6-8 percent. The assumption that some country risk that foreign investors may perceive a real pretax WACC of 10 percent is selected. The inflation assumption reflects the anticipated outcome for 2000. The asset life assumption of 20 years is short when related to the 30–40 years used by transmission companies in the developed market-based economies. It reflects the typical desire of foreign investors, however, to recover their investment as quickly as possible. The operating expenditures reflect international pipeline experience.

The first part of Table A4.2. presents the basic physical and financial data. All data are in billions of RMB unless otherwise stated. Capital expenditure for storage facilities is excluded. It should be noted that deriving tariffs for storage services will be necessary, but there was insufficient data to even begin this task. Using the data that provided an annual load factor is projected and used to derive estimates of the peak day requirement. This is followed by the calculation of a constant real tariff in the second part. This calculation is generally acceptable for a simplified economic evaluation, but it tends to generate

insufficient revenue in the early years of operation, which would deter the provision of financing. The third part is an estimate of the NAV, return on net assets (RONA) and depreciation using HCA. To provide an appropriate basis for comparison with alternative asset valuation techniques, the investments prior to 2000 are rolled forward to generate a HCA NAV for 2000. The next calculation rolls the NAV forward to 2000, using CCA, and generates the associated capital charge. Since the pipeline is newly built, there is no consideration of optimizing this investment. However, for older assets, any revaluation would have to take account of the investment required to bring their integrity and condition up to the standard of a modern equivalent asset. The final calculation in this section generates a constant real capital charge based on the CCA NAV. The NPV of each of these streams of capital charges discounted at the WACC is equal to the initial investment.

When the projected operating expenditure is added to the capital charge, these calculations generate three profiles for the transmission cost base (or the revenue recovery requirement). No attempt is made to classify these costs into fixed or variable costs, but it is assumed that 90 percent of the costs are recovered in a capacity (or reservation) charge. This generates three sets of capacity and commodity charges. For comparison purposes, the two components are combined in an average tariff.

Figure A4.1 illustrates the components of the revenue recovery requirement using a constant real capital charge. This is also described as “economic depreciation.” The total revenue recovery requirement (and the operating costs) increase with the general rate of inflation. Investment recovery via the depreciation charge is low in the early years and increases as the RONA falls.

Figure A4.2 illustrates the three average tariffs. The simplified economic real tariff is included for comparison purposes. The HCA tariff is the highest during the early years and falls rapidly until capacity throughput reaches its plateau. The CCA tariff begins at a lower level, and the constant real capital charge tariff is lower still. The HCA tariff falls toward the end of the period, whereas the CCA charge remains stable. The constant real capital charge tariff actually increases to compensate for its lower initial level. The constant real capital charge tariff appears to have certain advantages. It is lower than the other options in the early years to encourage gas market penetration and a more rapid build up of throughput volumes, but it also generates enough revenue to ensure financing.

The incentive-based regulatory commission techniques discussed in the previous sections may also be applied to these tariff estimates. For example, an estimate of the rate of technical progress (in percentage terms) may be deducted from the general inflation rate applied to the operating cost projections to generate projections that fall in real terms. Similarly, if new investments are made during the projection period, the rate of technical progress could be applied to determine the regulatory commission value of these investments.

This preliminary analysis suggests that the regulatory commission techniques described in this report may be applied quite readily to transmission networks in China.

**Table A4.2: Transmission Tariff Estimates**

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2010	2015	2020
<b>Basic financial and physical data</b>													
Annual throughput capacity (Bcm)		1.32	1.32	2.00	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30
Capex phasing	50%	50%		100%	100%								
Capex	1.645	1.645		0.128	0.507								
Cumulative Capex	1.645	3.290	3.290	3.418	3.925	3.925	3.925	3.925	3.925	3.925	3.925	3.925	3.925
Opex		0.049	0.049	0.056	0.081	0.083	0.084	0.086	0.088	0.090	0.099	0.109	0.120
Annual throughput (mcm)		180	380	680	1080	1464	1848	2232	2616	3000	3300	3300	3300
Capacity demand (mcmd)		1.55	3.28	5.87	8.66	10.26	11.51	12.51	13.32	14.00	15.07	15.07	15.07
Demand load factor		31.7%	31.7%	31.7%	34.2%	39.1%	44.0%	48.9%	53.8%	58.7%	60%	60%	60%
<b>Simplified tariff calculation</b>													
Capex + Opex	1.645	1.694	0.049	0.184	0.588	0.083	0.084	0.086	0.088	0.090	0.099	0.109	0.120
NPV of Capex + Opex @ 12.20%	4.131												
NPV of throughput @ 12.20%	17961												
Constant real tariff (RMB/m <sup>3</sup> )	0.230	0.235	0.239	0.244	0.249	0.254	0.259	0.264	0.269	0.275	0.303	0.335	0.370
<b>HCA calculation#1</b>													
Annual depreciation charge		0.082	0.165	0.165	0.171	0.196	0.196	0.196	0.196	0.196	0.196	0.196	0.025
Accumulated depreciation		0.082	0.247	0.411	0.582	0.778	0.975	1.171	1.367	1.563	2.545	3.526	3.925
Net asset value	1.645	3.208	3.043	3.007	3.343	3.146	2.950	2.754	2.558	2.361	1.380	0.399	0.000
Return on net asset value (RONA)		0.201	0.391	0.371	0.367	0.408	0.384	0.360	0.336	0.312	0.192	0.073	0.003
Total capital charge		0.283	0.556	0.536	0.538	0.604	0.580	0.556	0.532	0.508	0.389	0.269	0.028
Net investment cash flow		-1.645	-1.362	0.556	0.408	0.604	0.580	0.556	0.532	0.508	0.389	0.269	0.028
Internal rate of return	12.20%												
<b>HCA calculation#2</b>													
Annual depreciation charge						0.167	0.167	0.167	0.167	0.167	0.167	0.167	0.167
Net asset value					3.343	3.175	3.008	2.841	2.674	2.507	1.671	0.836	0.000
Return on net asset value (RONA)					0.408	0.387	0.367	0.347	0.326	0.224	0.122	0.020	
Total capital charge					0.575	0.555	0.534	0.514	0.493	0.391	0.289	0.188	
Net investment cash flow					-3.343	0.575	0.555	0.534	0.514	0.493	0.391	0.289	0.188
Internal rate of return in 2000	12.20%												

Table A4.2 (continued)

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2010	2015	2020
<b>CCA calculation</b>													
Gross asset value					3.075	3.136	3.199	3.263	3.328	3.395	3.748	4.138	4.569
Annual depreciation charge						0.157	0.160	0.163	0.166	0.170	0.187	0.207	0.228
Accumulated depreciation						0.157	0.320	0.489	0.666	0.849	1.874	3.104	4.569
Net asset value					3.075	2.979	2.879	2.773	2.663	2.546	1.874	1.035	0.000
Return on net asset value (RONA)						0.314	0.304	0.294	0.283	0.272	0.206	0.124	0.023
Total capital charge						0.470	0.464	0.457	0.449	0.441	0.394	0.331	0.251
Net investment cash flow					-3.075	0.470	0.464	0.457	0.449	0.441	0.394	0.331	0.251
Internal rate of return						12.20%							
<b>Constant real capital charge</b>													
Net asset value					3.075	3.081	3.082	3.074	3.058	3.033	2.705	1.843	0.000
Return on net asset value (RONA)						0.314	0.314	0.314	0.314	0.312	0.286	0.212	0.049
Annual depreciation charge						0.055	0.061	0.069	0.077	0.087	0.154	0.274	0.488
Total capital charge						0.368	0.376	0.383	0.391	0.399	0.440	0.486	0.537
Net investment cash flow					-3.075	0.368	0.376	0.383	0.391	0.399	0.440	0.486	0.537
Internal rate of return						12.20%							
<b>Revenue recovery requirement</b>													
HCA calculation#2						0.658	0.639	0.620	0.602	0.583	0.490	0.399	0.308
CCA calculation						0.553	0.548	0.543	0.537	0.531	0.492	0.440	0.372
Constant real capital charge						0.451	0.460	0.469	0.479	0.488	0.539	0.595	0.657
Capacity share of total costs						90%							
<b>Capacity costs</b>													
HCA calculation#2						0.592	0.575	0.558	0.541	0.525	0.441	0.359	0.277
CCA calculation						0.498	0.493	0.489	0.483	0.478	0.443	0.396	0.335
Constant real capital charge						0.406	0.414	0.422	0.431	0.439	0.485	0.536	0.591

Table A4.2 (continued)

		1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2010	2015	2020
<b>Capacity charge</b>														
HCA calculation#2	(RMB/Peak Day m <sup>3</sup> )						57.66	49.95	44.63	40.64	37.47	29.28	23.81	18.40
CCA calculation	(RMB/Peak Day m <sup>3</sup> )						48.50	42.86	39.06	36.28	34.13	29.41	26.29	22.21
Constant real capital charge	(RMB/Peak Day m <sup>3</sup> )						39.55	35.97	33.77	32.34	31.39	32.20	35.55	39.25
<b>Commodity charge</b>														
HCA calculation#2	(RMB/m <sup>3</sup> )						0.045	0.035	0.028	0.023	0.019	0.015	0.012	0.009
CCA calculation	(RMB/m <sup>3</sup> )						0.038	0.030	0.024	0.021	0.018	0.015	0.013	0.011
Constant real capital charge	(RMB/m <sup>3</sup> )						0.031	0.025	0.021	0.018	0.016	0.016	0.018	0.020
<b>Average charge</b>														
HCA calculation#2	(RMB/m <sup>3</sup> )						0.449	0.346	0.278	0.230	0.194	0.149	0.121	0.093
CCA calculation	(RMB/m <sup>3</sup> )						0.378	0.297	0.243	0.205	0.177	0.149	0.133	0.113
Constant real capital charge	(RMB/m <sup>3</sup> )						0.308	0.249	0.210	0.183	0.163	0.163	0.180	0.199

Figure A4.1: Constant Real Capital Charge

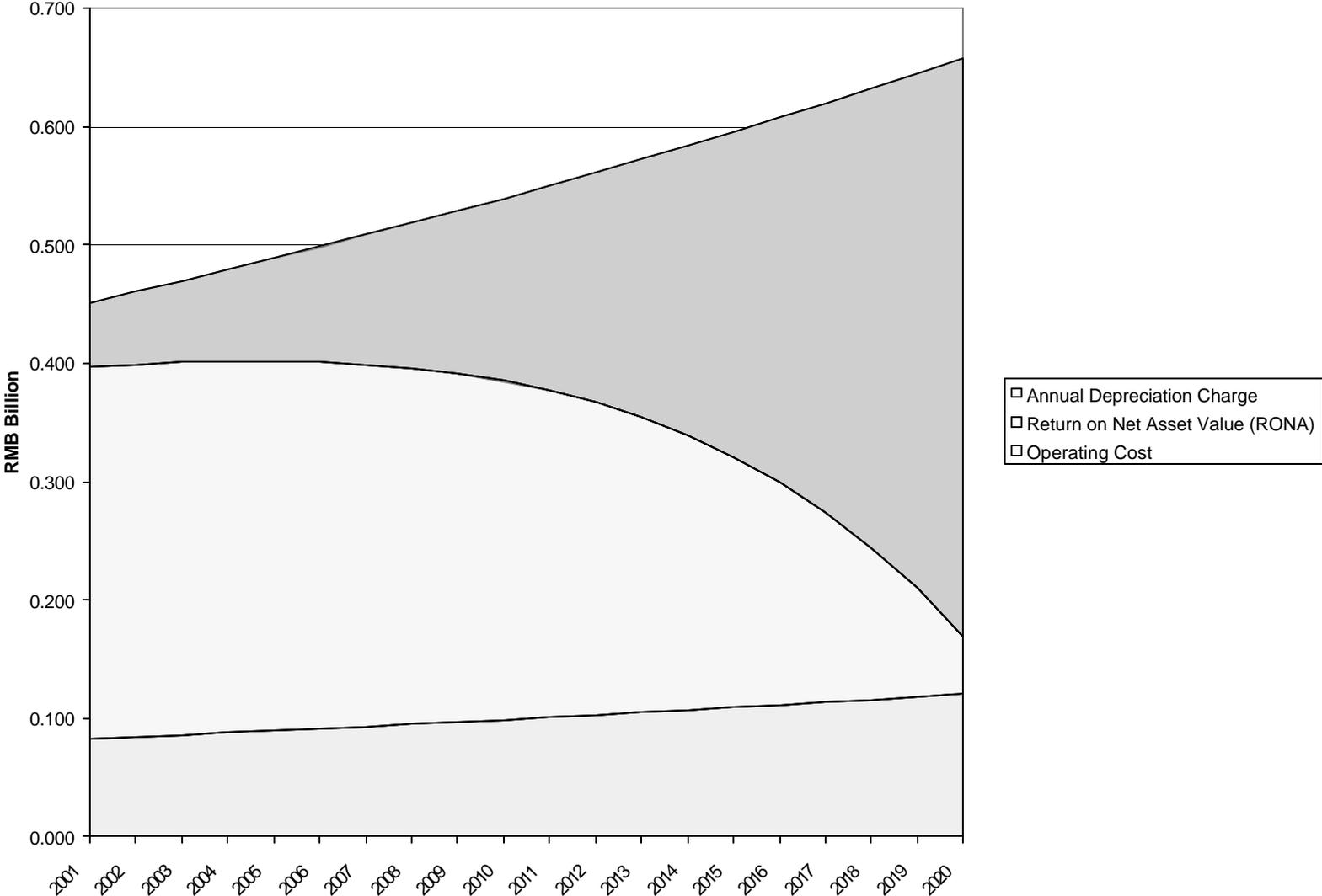
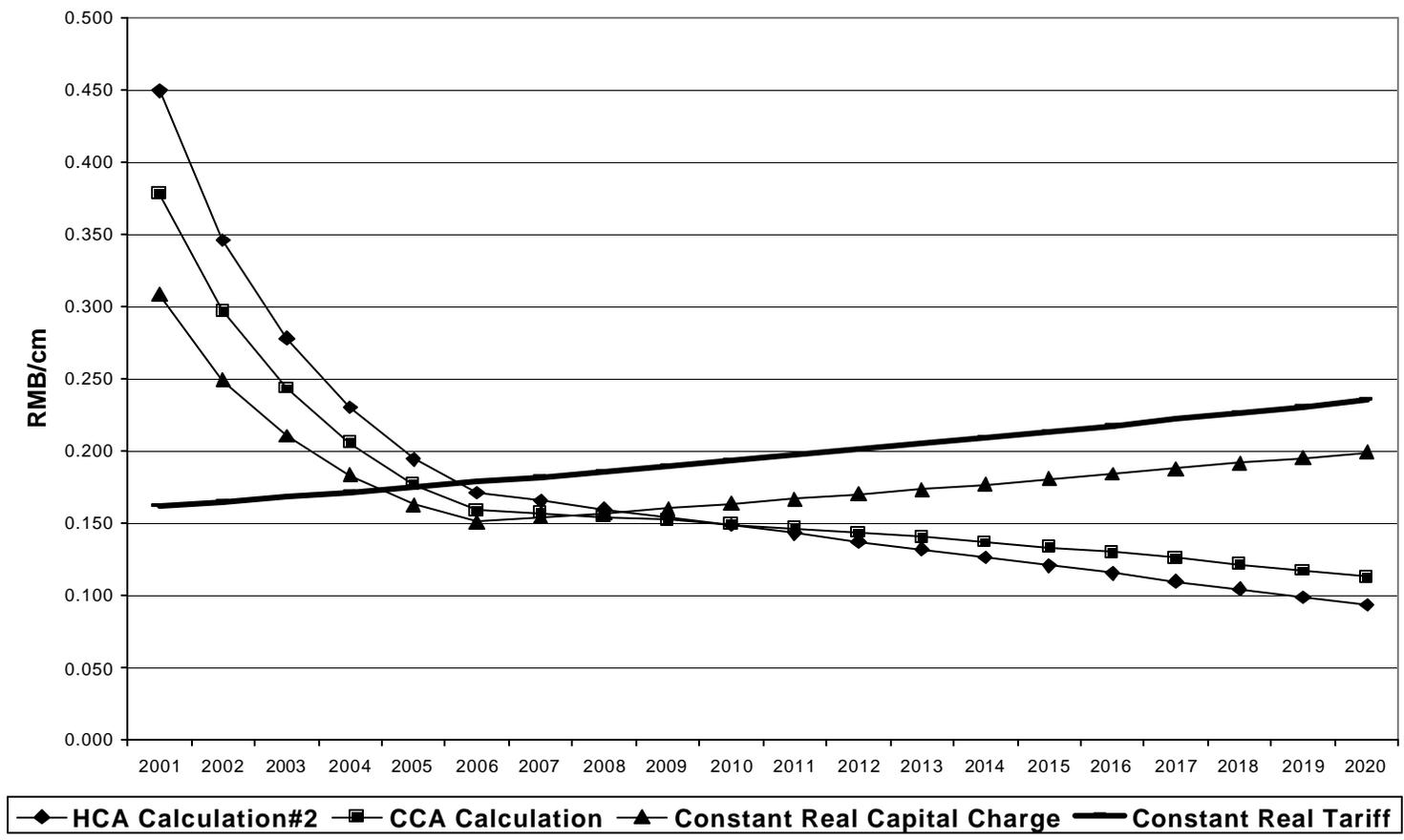


Figure A4.2. Shaanxi-Beijing Transmission Tariff Options



## APPENDIX 5: DRAFT CODE OF CONDUCT

This draft is drawn from a number of public domain sources and has been subject to some modification to reflect the circumstances in China.

### Definitions

The emboldened terms in this Code of Conduct Implementation Procedures have the following meanings:

**Affiliate** means a related undertaking of [Transmission Entity X].

**[Transmission Entity X]** means the business unit of Transmission Company Y that is the Transportation provider on Transmission System Z.

**Transmission System User** means a person with whom the Transportation Enterprise carries out business [or may carry out business] in its role of providing a transmission or distribution function. A Transmission System User is a person, who in dealing with [Transmission Enterprise X] in regard to those functions, might provide commercially sensitive information. A Transmission System User may also be described as a Shipper.

**Business Support Services (BSS)** means those Business Support Services, both technical and administrative, including, but not limited to, finance, accounting, human resources, and information systems whether provided by [Transmission Enterprise X] employees or third parties to one or more Business Units of [Transmission Enterprise X]/[to all business units], such as payroll, insurance, financial reporting, corporate accounting, corporate security, human resources (compensation, benefits, employment policies), employee records, pension management, and telecommunications and information systems.

**Business Units** means those divisions of [Transmission Company Y] that comprise Gas Supply and the Transportation Provider.

**Compliance Officer** means such person or persons as may be appointed by [Transmission Enterprise X] from time to time to fulfill the obligations of Compliance Officer as contemplated by the Code of Conduct.

**Corporate Support Services (CSS)** means those services provided to the Chief Executive Officer and the Board to facilitate the CEO and Board in carrying out their respective functions.

**Business Support Services Function** means those [Transmission Company Y] departments including but not limited to Finance, IT, Human Resources and Secretariat and third parties, providing BSS to [Transmission Enterprise X] or any Business Unit thereof].

**Gas Supply Customer** means a person with whom the Gas Supply Unit carries out business in the normal course of the provision of [a [bundled] gas supply].

**Gas Supply Unit** means the business unit of [Transmission Company Y] engaged in the business of the sale for resale (or direct sale to final customers), or purchase for resale, of gas on the wholesale market, or the generation or sale of electricity including for avoidance of doubt acting in its capacity as supplier of natural gas to customers/end users at any Off-take Point from the Transmission System.

**Transportation Provider** means [Transmission Enterprise X] acting in its capacity as an owner/operator of [Transmission System Z].

**Gas Supply** means the business as conducted by the Gas Supply Unit.

**Transportation Systems Operations** means the transmission of gas undertaken by the Transportation Provider.

**Transportation Information** means transmission construction plans, transmission abandonment plans, planned transmission system upgrades, downgrades, or modifications, planned transfer or sale of transmission facilities, transmission maintenance or outage plans or schedules, availability of transmission capacity, forecasted or scheduled new customer interconnection information, planned customer disconnection information, and customer emergency curtailment information.

**Supply Employee** means an employee of the [Transmission Company Y] or its Affiliates who works (solely or substantially) within Gas Supply.

**Transportation System Employee** means an employee of [Transmission Enterprise X] or its Affiliates who works (solely/substantially) within the Transportation Provider.

**Board** means the Board of [Transmission Company Y].

The **Chief Executive Officer** means the Chief Executive Officer of [Company Y].

The **Executive Management** means the Chief Executive Officer, the Heads of Business Units, The Chief Information Officer, The Head of Finance and the Company Secretary.

**Commercially Sensitive Information (CSI)** means any information compiled by [Transmission Company Y] or a Business Unit thereof on a customer in the normal course of providing, in the case of the Transportation Provider, gas transportation services, and in the case of Gas Supply a bundled gas supply and designated by a Transportation Customer or Gas Supply Customer respectively as Commercially Sensitive. Information relating to customers that is aggregated, redacted, or organized in such a way [for the purpose of proper business planning, forecasting, or otherwise and in a manner that does not reveal the identity of the customer to whom the information relates does not constitute Commercially Sensitive Information].

The **Regulatory Commission** means that person appointed by the State Council or such other person as may from time to time be designated with responsibility for regulatory commission matters within the gas industry.

The **Code of Operations** means the code of practice for the operation of the Transmission System Z.

**Code of Conduct** means the Code of Conduct as revised from time to time.

**Implementation Procedure** shall mean such procedures, policies, instructions or otherwise as may be prescribed by [Transmission Company Y] or any Business Unit thereof for the purpose of implementing the Code of Conduct.

## Objectives and Principles of Code of Conduct

This Code of Conduct relate to [Transmission Entity X] in its gas-related activities within the China. This Code of Conduct is adopted by [Transmission Company Y] for the purpose of

- establishing Code and conditions for interaction between the Business Units within [Transmission Company Y] and to ensure equality of treatment as between the Business Units within [Transmission Company Y] and third parties;
- ensuring there is non-discriminatory access to the regulated products and services of the Business Units within [Transmission Company Y];

- promoting nondiscriminatory access to information while protecting the confidentiality of proprietary Customer information and
- [preventing cross-subsidization of competitive activities as between the Business Units all in accordance with statutory and regulatory commission obligations of the Board].

## **Nondiscriminatory Access**

Unless otherwise authorized by the Code of Conduct, no Business Unit shall

1. Represent that as a result of the affiliation with [Transmission Enterprise X] or any other Business Unit thereof it will receive any different treatment from or by such other Business Unit than the treatment that Business Unit provides to unaffiliated entities or their customers in respect of regulated services; or
2. Provide other Business Units or their customers any preference (including but not limited to terms and conditions, pricing or timing) over unaffiliated entities or their customers in the provision or procurement of goods or services provided by that Business Unit.

If a Business Unit makes a service or product available to other Business Units or a customer thereof, the Business Unit shall contemporaneously make the same service or product available to all unaffiliated entities or their respective customers on a nondiscriminatory basis.

## **Nondiscrimination in Processing Requests**

The Transportation Provider and Gas Supply shall process all requests for the same or similar services or product provided by the Transportation Provider and Gas Supply respectively in the same manner and within the same period irrespective of whether the request is from another Business Unit or an unaffiliated enterprise.

## **Information Access**

The Transporter shall establish a Transportation Information request procedure, which shall be a procedure whereby all Transportation Information from the Transportation Provider. Requests for Transportation System Information shall be made to the Transporter and dealt with under the Transportation System Information Request Procedure.

[Transmission Enterprise X] will ensure that Gas Supply Employees and new Business Unit employees do not have access to, or obtain by any means, Transportation Information, except that which is available through the Transportation Systems Information Request Procedure. In the event that the Transporter receives any request for information the Transporter may seek the opinion of [The Compliance Officer/regulatory commission] with a view to ascertaining whether the provision thereof should or may constitute a breach of the Code of Conduct.

Gas Supply Employees shall not disclose confidential information to new Business Unit Employees and new Business Unit Employees shall not disclose confidential information to Gas Supply Employees.

[Transmission Entity X] will ensure that:

- Transportation System Employees do not disclose to Gas Supply Employees any Transportation Information, by any means other than as provided under a Transportation System Information Request.

- Transportation System Employees do not disclose to Gas Supply Employees any information about the transportation system(s) of others except as provided under a Transportation System Information Request.
- Transportation System Employees do not share any CSI related to nonaffiliated Transmission system Users or potential nonaffiliated Transmission system Users with any Gas Supply Employees [except as provided under Transportation System Information Requests].
- CSS Officers do not disclose to Trading Employees any information about [Transmission Enterprise X]’s Transportation System.
- CSS Officers do not disclose to Trading Employees any information about the transportation system(s) of others.
- CSS Officers do not share any CSI related to nonaffiliated Transmission system Users or potential nonaffiliated Transmission system Users with any Trading Employees except to the extent that such information is publicly available.

[Transmission Enterprise X] will ensure that CSI, insofar as possible, is not discussed at Executive Management Meetings. Members of the Executive not entitled to access to CSI will take no part in any deliberations of the Executive involving such matters.

To the extent that CSI is discussed at executive management meetings such executive management meetings shall be structured to ensure in so far as practicable that members of the executive not entitled to access to CSI shall not participate in discussions involving such CSI or that such CSI.

The Code of Conduct shall not be construed as limiting the entitlement of the CEO and or the Board or any others properly entitled thereto to CSI however, all persons to whom such information is properly released shall be obliged to comply with the Code of Conduct.

CSI required by the CEO and Board will be kept confidential by the CSS officers.

Where CSI is provided to the Board it shall be [labeled]/[identified] as such at the time of its provision. The Board undertakes not to disclose CSI.

[Transmission Entity X] will ensure

- (a.) that policies, procedures, organizational configuration, departmental structure and employee job responsibilities,
- (b.) physical and systemic restrictions, and
- (c.) communication, training and monitoring programs

shall be structured to ensure compliance with the Code of Conduct.

## Implementation of Code of Conduct

*Obligations of [Transmission Entity X]:*

**Communication:** [Transmission Enterprise X] will initiate and will maintain an employee communication program, consisting of a series of company-wide communications (print media) describing the ongoing changes within the gas utility industry and the resulting changes that have happened or will happen within [Transmission Enterprise X]. The focus of the communication program will include communication of the principals and objectives underlying the Code of Conduct and their impact on the manner in which [Transmission Enterprise X], the Business Units, Affiliates and employees conduct business.

**Training:** [Transmission Enterprise X] will design implement and maintain a program or programs to educate and train all [Transmission Enterprise X] employees in the requirements of the Code of Conduct. The training will be structured so that those employees in key areas (for example, employees engaged in

Transmission System operations and Gas Supply Division, and others whose day-to-day responsibilities will be directly affected will receive the most comprehensive training. Documentation will be maintained detailing the training provided, including a listing of employees attending, dates held, locations, and specific subject matter covered.

[Transmission Company Y] shall ensure (and to the extent necessary shall amend) its policies, procedures, organizational configuration, departmental structures and employee job responsibilities to enable [Transmission Enterprise X] and its constituent Business Units (and each of them) to conduct business in compliance with the Code of Conduct.

[Transmission Enterprise X] will establish a Complaints Procedure to address and resolve complaints made regarding alleged violations of the Code of Conduct such procedure to be established within [120 days] of the adoption of these Code of Conduct. The Complaints Procedure shall provide for inter alia

- That complaints shall be investigated and responses thereto made in writing within [\_\_\_\_\_] days of receipt of complaint or receipt of relevant information sought to enable [Transmission Enterprise X] to address a complaint.
- For advice to complainants that if they are not satisfied with the resolution of their complaint, they have the option of complaining directly to the regulatory commission if they so desire [a question arises as to whether the regulatory commission will have any power or entitlement to entertain such complaints].
- A log will be kept listing all complaints received and indicating whether they are resolved or still pending. The log will contain the following information:
  - (a) Date of complaint,
  - (b) Identity of complainant,
  - (c) Brief Description of the nature of the complaint including at a minimum the names of those involved and the facts and circumstances surrounding the allegation, forming the substance of the complaint.
  - (d) The names and titles of those who investigated the allegation.
  - (e) Status of complaint, whether pending or resolved,
  - (f) If resolved, a description of the resolution, and
  - (g) Any action taken by [Transmission Enterprise X] (other than the investigation itself) as a result of the complaint.

## **Enforcement Procedures**

[what internal Enforcement Procedures can be contemplated or established in the absence of an independent regulatory commission].

## **Functional Separation**

### *Sharing of Facilities and Resources*

Except as otherwise permitted [by the Code of Conduct] the Transportation Provider shall not share office space, office equipment services, computer or information systems with other Business Units. Business Units shall not share inter se office space, equipment, services, computer or information systems].

Where physical separation required is not accomplished by having office space in separate buildings, physical separation shall be accomplished by having office space and equipment in secure, controlled access areas within a building.

The Transportation Provider shall not allow its other Business Units to access its computer or information systems unless appropriate computer data management, data access protocols and contractual provisions regarding the breach of data access protocols have been put in place to ensure that such access will not result in access by a Business Unit to information in a manner contrary to or inconsistent with the Code of Conduct.

Nothing in the last sub-section above shall prohibit a (Business Unit) from having unrestricted access to any computer or information system that is available to the public.

Each Business Unit shall maintain books, accounts and records [in respect of its regulated products and services] separate from those of the other Business Units within [Transmission Company Y] such books, accounts and records shall be kept in accordance with generally accepted accounting principles and such guidelines or other system of accounts as may be prescribed from time to time, and shall be sufficient to allow for an audit of the transactions between the Business Units within [Transmission Enterprise X]

[Transmission Company Y] prohibits Transportation System Employees from being involved in any way with the Gas Supply Division and requires that its Transportation System Employees operate independently of [Transmission Company Y] employees, or employees, engaged in the Gas Supply Division. This is accomplished by:

- Restricted access, both physical and systemic, to Gas Supply information and facilities;
- Work procedure design and job responsibility assignment;
- Communication, training and monitoring programs as described above; and
- Such other methods as may be prescribed by the Board (or the compliance officer?) from time to time.

[Transmission Company Y] prohibits its Gas Supply employees, from engaging in Transportation System operations, and does not permit them access to the system control center or similar facilities used for transportation operations or reliability that differs in any way from the access available to other Transmission system Users. This is accomplished by:

- Restricted access, both physical and systemic, to Transportation System operations and system reliability information and facilities; Work procedure design and job responsibility assignment;
- Communication, training and monitoring programs as described above; and
- Such other methods as may be prescribed by the Board (or the compliance officer?) from time to time.

[Transmission Company Y] provides [and procures from third parties] Business Support Services (BSS). Business Support Services shall be priced, reported and conducted in accordance with the principles herein and with any applicable pricing and reporting requirements imposed from time to time by the [Compliance Officer/regulatory commission].

The provision of Business Support Services or Corporate Support Services shall not allow or provide a means for the transfer of information, including proprietary customer information in a manner contrary to or inconsistent with the Code of Conduct, create the opportunity for preferential treatment or/and confer competitive advantage, lead to customer confusion create significant opportunities for cross-subsidization or otherwise provide any means to circumvent the Code of Conduct.

[Implementation procedures shall be prepared by Business Support Services and Corporate Services within 120 days of the Code of Conduct and submitted to and approved by the [Compliance Officer/regulatory commission].

## Conduct of Business

The Transportation Provider shall strictly enforce all tariff provisions relating to the sale or purchase of regulated services or products and/or the utilization thereof that do not provide for the use of discretion. [Tariff provisions shall include and be deemed to include all financial charges or penalties that may apply together with cost of connection to the Transportation System].

In situations in which tariff provisions relating to the sale or purchase of regulated services or products or the utilization thereof do provide for the use of discretion. The Transportation Provider shall apply those tariffs in a fair and impartial way, and to treat all customers in a nondiscriminatory manner.

The Transportation Provider shall maintain a record of all instances in which discretion was used in applying tariff provisions.

Any discounts offered, relating to transportation service or ancillary services, be offered to all Transmission system Users eligible for such discounts on a nondiscriminatory basis.

[Transmission Company Y] shall:

- Design and implement policies, procedures, organizational configuration, departmental structure and employee job responsibilities;
- Design and implement physical and systemic restrictions; and
- Design and implement communication, training and monitoring programs

to ensure compliance with these Code of Conduct.

## System Emergencies

[Transmission Enterprise X] recognizes that during emergency situations [affecting system reliability], its employees, or those of an Affiliate, may take whatever steps are necessary to keep the system in operation.

[Transmission Enterprise X] will report to the regulatory commission within twenty-four hours any deviations from the Code of Conduct that result from necessary steps taken to address a [system] emergency. To meet this obligation [Transmission Enterprise X] has implemented the following procedures]:

- The [Transmission Enterprise X] Compliance Officer [has been assigned the responsibility for ensuring] [shall ensure] reports of any such deviations are notified and sent to the regulatory commission following an emergency.
- Each report will contain a description of the deviation, the name(s), title(s) and job function(s) of those involved, and the name and phone number of a contact person within [Transmission Enterprise X], should additional information be desired.
- To ensure that [system] emergencies are handled appropriately and to prevent, whenever possible, any deviations from the Code of Conduct that might occur as a result of having to contend with a [system] emergency, [Transmission Company Y] has established the following procedures that shall be implemented] by [Transmission Enterprise X];

[Transmission Enterprise X] shall procure;

- The system emergency assignments of Gas Supply Employees will be reviewed, and changed where possible, to areas of [Transmission Enterprise X] or its Affiliates where they should not be exposed to information that would likely result in a deviation from the Code of Conduct; and
- Communication, training and monitoring programs as described above.

## Accounts and Records

[Transmission Enterprise X] currently maintains its accounts and records as prescribed by Generally Accepted Accounting Code and Procedures.

[Transmission Enterprise X] shall modify (to the extent necessary) its accounting systems to comply with the requirements of [INSERT NAME OF COMPANY ACCOUNTS LEGISLATION OR STATUTORY REGULATORY BODY].

[Transmission Enterprise X] maintains a copy of its rules and allocations used in drawing up accounts as required by [INSERT NAME OF COMPANY ACCOUNTS LEGISLATION OR STATUTORY REGULATORY BODY]. These rules will be available for review by the regulatory commission.

## Compliance Officer

The Compliance Officer shall monitor, facilitate and review compliance with the Code of Conduct and any implementation programs in relation thereto.

The Compliance Officer shall make a quarterly [monthly?] report to the Company Secretary in relation to compliance with the Code of Conduct to include a review of the implementation of the Code of Conduct and identifying in particular any areas of compliance in respect of which in further Code or implementation procedures may be required. In addition the quarterly report may indicate areas in which changes to implementation procedures would, in the opinion of the Compliance Officer be beneficial.

The Compliance Officer shall liaise with members of the executive management to ensure that all employees, within the area of the relevant member of the executive management are aware of the Code of Conduct and implementation procedures in respect thereof.

The Compliance Officer shall also review with executive management, instances of employee misconduct or alleged employee misconduct.

Alleged violations of the Standard of Conduct will be immediately reported to the Compliance Officer and thereafter investigated by the Compliance Officer in consultation with the member of executive management charged with responsibility for the business unit in which the employee is engaged. The Compliance Officer will ensure that appropriate action according to [Transmission Enterprise X] disciplinary procedures is taken to:

- deal appropriately with employees found to have violated the Code of Conduct, and
- initiate whatever changes may be necessary to prevent a recurrence of any such violation.

If it is determined that an employee of [Transmission Enterprise X] or one of its Affiliates has violated the disclosure stipulations of the Code of Conduct, the Compliance Officer will ensure that the wrongful disclosure is promptly reported to the regulatory commission in accordance with the procedures outlined above.

The Compliance Officer and the Executive Management will receive training specifically designed to thoroughly familiarize them with the requirements of the Code of Conduct as defined herein. The requirements of the Code of Conduct will also be incorporated into [Transmission Company Y]'s (including Affiliates) Corporate Code of Conduct and ongoing Compliance Program activities. The Corporate Code of Conduct will be distributed to all Company and Affiliate employees.

## APPENDIX 6: GENERAL TERMS AND CONDITIONS

### Information Sources

Information on, or examples of, the Code of Operations (or General Terms and Conditions) may be found on numerous Web sites—some are listed below. The example of General Terms and Conditions presented in this Appendix is that the Alliance Pipeline Partnership in Canada (see Web site 3 below). It was chosen because it has just been issued, it contains the key requirements for a statement of General Terms and Conditions and it is presented in clear, concise language.

Web site 1: Canadian National Energy Board (federal regulatory commission): go to <[www.neb.gc.ca](http://www.neb.gc.ca)>; select “English”; check “Publications” for Annual Reports, Act, Regulations, Guidelines; go to “Energy Overview”; review “Natural Gas Market Assessments”; check “Other Government Agencies, Energy Associations and Related Organizations”—Canada, United States, Mexico, including links to FERC and Mexican CRE.

Web site 2: TransCanada PipeLines (large existing pipeline): go to <[www.transcanada.com](http://www.transcanada.com)>; open Transmission Web page from Home Page </Transmission/index.html>; go to “Transportation Tariffs”<[business/PDFTariffs/index.html](http://business/PDFTariffs/index.html)>; choose “Canadian Mainline”; go to “Informational Postings”; review menu items—“Queuing Procedure”; “Tariff Schedules” (there are nine, try “FT”); “General Terms and Conditions” “Pro Forma Contracts.”

Web site 3: Alliance Pipeline (large new Canada-U.S. system): go to <[www.alliance-pipeline.com](http://www.alliance-pipeline.com)>; review Home Page choices; check tariffs and tariff conditions, Canada </Shipper/Tariff/Canadian%20Tariff%202000.pdf> or United States: </Shipper/Tariff/US%20Tariff.pdf>

Web site 4: BG Transco (United Kingdom): go to <[www.transco.uk.com](http://www.transco.uk.com)> and select “Publications” from the home menu for a copy of a summary of Transco’s Network Code.

Web site 5: Gaz de France (France): go to <[www.gazdefrance.com](http://www.gazdefrance.com)>, switch to English and follow path to Press Releases.

Web site 6: Ruhrgas (Germany): go to <[www.ruhrgas.de](http://www.ruhrgas.de)> and proceed as for Web site 5.

Web site 7: Gasunie (Netherlands): go to <[www.gasunie.nl](http://www.gasunie.nl)> and select “Commodity/Service” from the home menu.

### Example of General Terms and Conditions

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SCHEDULE A

APPENDIX I  
Form of Transportation Service Agreement

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Form of Interruptible Transportation Service Agreement

## GENERAL TERMS AND CONDITIONS

## ARTICLE 1: DEFINITIONS AND INTERPRETATION

1.1 Except where expressly stated otherwise, the following terms, when used in these General Terms and Conditions shall have the following meaning:

**“103 m<sup>3</sup>”** means 1,000 cubic meters of Gas.

**“Accepted Volume”** has the meaning ascribed to it in Article 11 hereof.

**“Affiliate”**; when used to indicate a relationship with a specific Person, means another Person that directly, or indirectly through one or more intermediaries or otherwise, controls, or is controlled by, or is under common control with such specific Person. A corporation shall be deemed to be an Affiliate of another corporation if one of them is directly or indirectly controlled by the other or if each of them is directly or indirectly controlled by the same Person.

**“Authorized Overrun Service”** or **“AOS”** means the right of Firm Shippers to be allocated a pro rata share of capacity on the pipeline that is not, from time to time, contracted for as Transporter’s Contracted Capacity with any allocation to Firm Shippers to be made pursuant to Article 2.7 and Article 2.8 of the Tariff Schedule Firm Transportation Service and subsequent to such allocation means the Shipper’s share of such capacity.

**“Business Day”** or **“business day”** means any day on which Transporter’s main office in Calgary, Alberta, is customarily open for business.

**“Canadian Receipt Pool”** is a deemed location immediately downstream of the Receipt Points, maintained for each Shipper, forming itself a Receipt Point from which volumes may be scheduled for Transportation or nominated to or from for purposes of effecting Title Transfers, as defined in Article 11.1.

**“Canadian Delivery Pool”** is a deemed location immediately upstream of the Delivery Point, maintained for each Shipper, forming itself a Delivery Point from which volumes may be scheduled for Transportation or nominated to or from for purposes of effecting Title Transfers, as defined in Article 11.1.

**“Central Clock Time”** or **“CCT”** means Central Daylight time when Daylight Savings time is in effect and Central Standard time when Daylight Savings time is not in effect.

**“Commodity Charge”** means the Commodity Charge set out in “Schedule A” to the Tariff Schedule Firm Transportation Service.

**“Contracted Capacity”** means the daily volume of Gas contracted for by a Shipper and for which the Shipper has agreed to pay the Demand Charge in accordance with the terms of a Transportation Service Agreement.

**“Cubic Meter”** or **“m<sup>3</sup>”** means the volume of Gas occupying one cubic meter at a temperature of fifteen degrees Celsius (15°C), and at a pressure of 101.325 kilopascals absolute.

**“Daily Demand Charge”** means the quotient obtained by dividing the Demand Charge by the number of days in the relevant Month.

**“Daily Demand Charge Surcharge”** means the quotient obtained by dividing the Demand Charge Surcharge by the number of days in the relevant Month.

**“Day”** means a period of twenty-four (24) consecutive hours beginning and ending at 9:00 CCT or such other period of twenty-four (24) consecutive hours agreed to by Transporter and Shipper.

**“Delivery Point”** means the point of interconnection between Transporter’s pipeline system and the pipeline system of U.S. Pipeline.

**“Demand Charge”** means the Demand Charge set out in Schedule “A” to the Tariff Schedule Firm Transportation Service.

**“Demand Charge Credit”** means a Demand Charge Credit determined pursuant to Article 4 of the Tariff Schedule Firm Transportation Service.

**“Demand Charge Surcharge”** means the Demand Charge Surcharge set out in Schedule “A” to the Tariff Schedule Firm Transportation Service.

**“Demand Charge Surcharge Credit”** means a Demand Charge Surcharge Credit determined pursuant to Article 4 of the Tariff Schedule Firm Transportation Service

**“Firm Service”** means Transportation provided pursuant to Tariff Schedule Firm Transportation Service.

**“Firm Shipper”** means a shipper that enters into a Transportation Service Agreement and is eligible to receive Firm Service.

**“Force Majeure”** means any act of God, war, civil insurrection or disobedience, acts of public enemy, strikes, lockouts or other industrial disturbances, accidents, wars, blockades, insurrections, riots, epidemics, landslides, lightning, earthquakes, explosions, fires, storms, floods, washouts, arrests and restraints of governments and people, civil disturbances, breakage or accidents to machinery or lines of pipe, the necessity for making repairs to or alterations of machinery or lines of pipe, freezing of lines of pipe, inability to obtain materials, supplies, permits or labor, or other cause whether of the kind enumerated or otherwise, which is beyond the control of any applicable party and which by the exercise of due diligence such party is unable to prevent or overcome. The settlement of strikes, lockouts or other labor disputes shall be entirely within the discretion of the party having the difficulty. The following shall not be events of Force Majeure: (i) insufficiency of Shipper’s Gas supplies, (ii) inadequate or uneconomic markets for Shipper’s Gas, (iii) Shipper’s lack of funds, or (iv) curtailment or disruption of service, for any reason whatsoever, on facilities upstream of Receipt Points or downstream of the Delivery Point; for greater certainty, “upstream of Receipt Points” shall mean beyond the inlet side of Transporter’s measuring stations, and “downstream of the Delivery Point” shall mean beyond the outlet side of Transporter’s Delivery Point.

**“Fuel Requirement”** has the meaning ascribed to it in Article 14 hereof.

**“Gas”** or **“Natural Gas”** means methane, and such other hydrocarbon constituents, or a mixture of two or more of them which, in any case, meets the quality specifications of the Tariff.

**“Gross Heating Value”** means the total Joules expressed in megajoules per cubic meter (MJ/m<sup>3</sup>) produced by the complete combustion at constant pressure of one (1) cubic meter of Gas with air, with the Gas free of water vapor and the temperature of the Gas, air and products of combustion to be at standard temperature and all water formed by combustion reaction to be condensed to the liquid state.

**“Imbalance”** has the meaning ascribed to it in Article 13 hereof.

**“Interruptible Revenue Credit”** means an Interruptible Revenue Credit to be calculated and allocated to Firm Shippers in accordance with Article 21 hereto.

**“Interruptible Service”** means Transportation provided pursuant to Tariff Schedule Interruptible Transportation Service.

**“Interruptible Service Tariff”** means the toll set out in Schedule “ A” to the Toll Schedule Interruptible Transportation Service.

**“Interruptible Shipper”** means a Shipper that enters into an Interruptible Transportation Service Agreement and is eligible to receive Interruptible Service.

**“Interruptible Transportation Service Agreement”** or **“TISA”** means an agreement pursuant to which Transporter provides Interruptible Service to a Shipper.

**“ Joule”** or **“J”** shall mean the work done when the point of application of a force of one (1) Newton is displaced a distance of one (1) meter in the direction of the force.

**“ Maximum Daily Transportation Quantity”** means the maximum volume of Gas as specified in an Interruptible Transportation Service Agreement that Transporter agrees to receive from Shipper for Transportation under Toll Schedule Interruptible Transportation Service.

**“ Month”** means a period extending from 9:00 am CCT on the first Day in a calendar Month and ending at 9:00 am CCT on the first Day of the next succeeding calendar Month, or at such hour as Shipper and Transporter agree upon.

**“ Monthly Bill”** means the amount that Shipper is required to pay to Transporter for each Month in accordance with the terms of the applicable Toll Schedule.

**“ Person”** means an individual, partnership, limited partnership, joint venture, syndicate, sole proprietorship, company or corporation with or without share capital, unincorporated association, trust, trustee, executor, administrator or other legal personal representative, regulatory commission body or agency, government or governmental agency, authority or entity however designated or constituted.

**“ Primary Receipt Point”** means a Receipt Point that is designated by a Firm Shipper as a Primary Receipt Point as set out in Schedule “ A” to the Shipper’s Transportation Service Agreement.

**“ Primary Receipt Point Capacity”** has the meaning ascribed to it in Article 6.1 (a) of the Toll Schedule Firm Transportation Service and “Primary Receipt Point Capacities” means each of them.

**“ Prime Rate”** means, at any time, the per annum rate of interest then designated by the main branch of The Bank of Nova Scotia in Calgary, Alberta as its reference rate of interest for Canadian dollar commercial loans in Canada and which is announced by such Bank as its Prime Rate. A rate of interest payable pursuant hereto shall change automatically without notice to any party on each occasion upon which the Prime Rate is varied. Interest accruing due hereunder shall be calculated using the nominal rate method and shall be compounded monthly.

**“ Receipt Point”** means a point on Transporter’s pipeline system as set out in Schedule “ A” hereto at which a shipper may in accordance with a Service Agreement tender Gas for Transportation.

**“Secondary Receipt Point”** has the meaning ascribed to it in Article 2.9 of the Toll

Schedule Firm Transportation Service.

**“Service Agreement”** means, as the context requires, a Transportation Service Agreement or an Interruptible Transportation Service Agreement.

**“Shipper”** means any Person who enters into a Transmission Service Agreement (TSA) with Transporter, or, if the context so requires, a person who enters into an ITSA with Transporter.

**“Shipper’s Authorized Volume”** has the meaning ascribed to it in Article 11 hereof.

**“Shipper’s Contracted Capacities”** means the aggregate of the Contracted Capacities under all Transportation Service Agreements to which Shipper is a party.

**“Shipper’s Nomination”** has the meaning ascribed to it in Article 11 hereof.

**“Shipper’s Revised Nomination”** has the meaning ascribed to it in Article 11 hereof.

**“Tariff”** includes the Toll Schedule Firm Transportation Service, the Toll Schedule Interruptible Transportation Service, and the General Terms and Conditions, as amended and approved from time to time.

#### GENERAL TERMS AND CONDITIONS

**“Taylor-Aitken Creek Receipt Point”** or **“TAC Receipt Point”** means a Receipt Point designated as a Taylor-Aitken Creek Receipt Point on Schedule “A” hereto.

**“Transportation”** means the receipt of Gas for Shipper’s account at Receipt Points that are available to Shipper pursuant to Shipper’s Service Agreements and the transport and delivery of Gas for Shipper’s account at the Delivery Point.

**“Transportation Service Agreement”** or **“TSA”** means an agreement pursuant to which Transporter provides Firm Service to a Shipper.

**“Transporter”** means Alliance Pipeline Limited Partnership.

**“Transporter’s Contracted Capacities”** means the aggregate of the Contract Capacities under all Transportation Service Agreements to which Transporter is a party.

**“U.S. Pipeline”** means Alliance Pipeline L.P.

**“U.S. Fuel Requirement”** has the meaning ascribed to it in Article 14.

**“Year”** means a period of three hundred sixty-five (365) consecutive days except where the year contains the date 29 February, in which case it shall consist of three hundred sixty-six (366) consecutive days.

#### ARTICLE 2: QUALITY

2.1 Unless otherwise authorized by Transporter, Gas tendered to Transporter at Receipt Points shall, subject to Article 2.2, conform to the following specifications:

- shall have a Gross Heating Value of no less than thirty-six (36) MJ/m<sup>3</sup>;

- shall be commercially free at prevailing pressure and temperature in Transporter's pipeline from sand, dust, gums, hydrocarbons liquefiable at temperature in excess of minus ten degrees Celsius (-10°C) and at the prevailing operating pressure, impurities, other objectionable substances that may become separated from the Gas, and other solids or liquids that will render it unmerchantable or cause injury to or interference with proper operation of the lines, regulatory commissions, meters or other facilities through which it flows; and shall not contain any substance not normally contained in Gas, other than traces of those materials and chemicals necessary for the transportation and delivery of the Gas and which do not cause it to fail to meet any of the quality specifications herein set forth;
- shall contain no more than 23 milligrams of hydrogen sulphide per cubic meter, no more than 115 milligrams of total sulfur per cubic meter of Gas determined by standard methods and testing;
- shall contain no more than two percent (2%) by volume of carbon dioxide;
- shall contain no more than sixty-five (65) milligrams of water vapor per cubic meter of Gas;
- shall not exceed a temperature of fifty degrees Celsius (50°C);
- shall be as free of oxygen as practicable and shall in any event contain no more than four tenths of one percent (0.4%) by volume of oxygen; and
- shall in no event, contain any mix of components that will cause the presence of any liquids in the pipeline under normal operating conditions.

2.2 Gas tendered at Receipt Points designated as AB 05 Boundary Lake, AB 06 Boundary Lake—IOL, and AB 07 Boundary Lake South shall conform to the relevant specifications set out in the relevant tariff of Westcoast Energy Inc. as such tariff may be amended from time to time.

2.3 In the event gas tendered to Transporter by or on behalf of Shipper fails to meet the specifications in Article 2.1 or Article 2.2 as applicable, Transporter may refuse to receive the gas, in which case, Transporter will as soon as possible inform the Shipper to allow Shipper to promptly remedy any deficiency in quality.

2.4 Waiver: Transporter reserves the right to waive any or all such gas quality provisions, in a not unduly discriminatory manner, if it is determined by Transporter that such waiver can be granted without, in any way, jeopardizing the integrity of its system or violating any requirement of U.S. Pipeline.

2.5 In the event that Transporter determines that the projected Gross Heating Value of the commingled gas stream at any location on Transporter's system is approaching or is expected to approach the maximum acceptable level, based on the design of Transporter's system, Transporter will implement the energy capacity allocation procedure described in Article 2.6. For large diameter pipeline segments of Transporter's system, under normal operating conditions, the anticipated limit for the Gross Heating Value of the commingled gas stream is approximately 44.3 MJ/m<sup>3</sup>.

2.6 Transporter shall take the following steps to allocate energy capacity on Transporter's system when required pursuant to Article 2.5.

Transporter shall identify the affected part of its system, and specifically those Receipt Points for which these energy capacity allocation procedures are being invoked.

Transporter will first take all actions authorized under other portions of this Article 2, and specifically Article 2.4, to eliminate or avoid the identified problem.

If necessary, Transporter will determine the temporary maximum Gross Heating Value that will be acceptable for Gas nominated at Receipt Points to ensure that the commingled gas stream will not exceed the limit determined pursuant to Article 2.5.

Transporter will notify Shippers of the situation and the temporary maximum Gross Heating Value for Gas nominated at affected Receipt Points.

2.7 Nominations not in compliance with the temporary maximum Gross Heating Value will be rejected as not complying with the governing quality requirements. Transporter's actions will reflect Transporter's ability to reject Secondary Receipt Point nominations prior to rejecting, if necessary, Primary Receipt Point nominations for the affected Receipt Points, as a mechanism to alleviate the identified circumstance. Transporter will update the temporary maximum Gross Heating Value as required, with the objective of maximizing the flexibility afforded to Shippers.

#### ARTICLE 3: MEASUREMENT

3.1 A unit of volume for purposes of reporting shall be one thousand (1000) cubic meters (10<sup>3</sup>m<sup>3</sup>) of Gas.

3.2 The volume of the Gas received from Shipper shall be determined in accordance with the *Electricity and Gas Inspection Act (Canada)* and the Regulations thereunder.

3.3 The absolute atmospheric pressure used for volume calculations shall be assumed to be a specific pressure determined by calculations based on the actual elevation above sea level at the site of the meter, regardless of variations in actual barometric pressure. The formula used to calculate the atmospheric pressure shall be in accordance with the methodology prescribed pursuant to the *Electricity and Gas Inspection Act (Canada)* and the Regulations thereunder.

3.4 The determination of Gross Heating Value of Gas received or delivered shall be performed in a manner approved under the *Electricity and Gas Inspection Act (Canada)* and the Regulations thereunder or, if a manner for such determination is not set out in that Act, in accordance with industry accepted standards, and, in any event, in a manner to ensure that the Gross Heating Value so determined is representative of the Gas received or delivered at the Receipt or Delivery Point.

#### ARTICLE 4: MEASURING EQUIPMENT

4.1 All meters and measuring equipment for the determination of volume, Gross Heating Value or relative density shall be approved pursuant to, and installed and maintained in accordance with, the *Electricity and Gas Inspection Act (Canada)* and the Regulations thereunder. Notwithstanding the foregoing, all installation of equipment applying to or effecting deliveries of Gas shall be made in a manner permitting accurate determination of the quantity of Gas delivered and ready verification of the accuracy of measurement. Care shall be exercised by Transporter and by Shipper in the installation, maintenance and operation of pressure regulating equipment so as to prevent any inaccuracy in the determination of the volume of Gas delivered under the Service Agreement.

4.2 Transporter shall verify the accuracy of its measuring equipment once each month or at such longer intervals as agreed to by the parties. Transporter will verify the accuracy of measuring equipment whenever requested by Shipper, provided requests do not require verification more than once in any month. If upon a requested verification, the measuring equipment is found to be registering correctly (which shall include any inaccuracy of two percent (2%) or less as mentioned below), the cost of such requested verification shall be charged to and borne by the requesting party; otherwise the cost of all requested verifications shall be borne by Transporter. If, upon any test, measuring equipment is found to be inaccurate but not by more than two percent (2%), previous readings of the equipment shall be considered correct in computing deliveries, but the equipment shall be adjusted properly at once to record accurately. If, upon any tests, any measuring equipment is found to be inaccurate by an amount exceeding two percent (2%) then the previous readings of the equipment shall be corrected to zero error for any period that is known definitely or can be agreed upon, but if the period is not known definitely or

cannot be agreed upon, such corrections shall be for a period covering the last half of the time elapsed since the date of the last test.

4.3 Each party shall have the right to be present at the time of any installing, reading, cleaning, changing, repairing, inspecting, testing, calibrating or adjusting done in connection with the other's equipment used in measuring receipts and deliveries hereunder. The records from such measurement equipment shall remain the property of their owner, but, upon request, each will submit to the other its records and charts, together with calculations therefrom, for inspection and verification, subject to return within thirty (30) days after receipt thereof. Each party shall preserve for a period of at least two (2) years all test data, charts, and other similar records or such longer period as may be required by a responsible authority having jurisdiction.

#### ARTICLE 5: FORCE MAJEURE

5.1 If either Transporter or Shipper fails to perform any obligations under the Tariff or any Service Agreement due to an event of Force Majeure or any other event beyond its reasonable control then, subject to the provisions of the Tariff or such Service Agreement, such failure shall be deemed not to be a breach of such obligations. A party that fails to perform any obligation under the Tariff or Service Agreement where such failure is caused by such an event shall promptly remedy the cause thereof so far as it is reasonably able to do so, provided that the terms of the settlement of any strike, lockout or other industrial disturbance shall be wholly in the discretion of the party claiming suspension of its obligations hereunder by reason thereof.

5.2 Notwithstanding the provisions of Article 5.1, no event referred to therein shall: (i) relieve any party from any obligation or obligations pursuant to the Tariff or Service Agreement unless such party gives notice with reasonable promptness of such event to the other party, or (ii) relieve any party from any obligation or obligations pursuant to the Tariff or Service Agreement after the expiration of a reasonable period within which, by the use of due diligence, such party could have remedied or overcome the consequences of such event or (iii) except as expressly provided in Article 4 of the Toll Schedule Firm Transportation Service relieve any party from its obligations to make any Demand Charge, Demand Charge Surcharge or other payments to the other.

5.3 Where the failure by either party to perform any obligation under the Tariff or Service Agreement is, by virtue of the provisions of Article 5.1, deemed not to be a breach of such obligation, then the time for the performance of such obligation shall be extended by a number of days equal to the number of days during which the relevant event existed.

#### ARTICLE 6: RECEIPT AND DELIVERY PRESSURE

6.1 All gas tendered by or on behalf of Shipper to Transporter shall be tendered at a Receipt Point at the pressure requested by Transporter from time to time. Shipper shall not be required to tender gas at a receipt pressure in excess of that specified for the specific Receipt Point in Schedule "A".

6.2 All Gas delivered by Transporter to the facilities of U.S. Pipeline at the Delivery Point shall be delivered at the pressure agreed to by Transporter and U.S. Pipeline.

#### ARTICLE 7: BILLING AND PAYMENT

7.1 On or before the ninth (9th) day of each Month, Transporter shall deliver to Shipper by electronic or other means a statement of the amount payable by Shipper to Transporter for the preceding Month. Transporter will also deliver to Shipper by electronic or other means a statement of any charges calculated in accordance with Article 13. If actual quantities are unavailable in time to prepare the billing, such charges shall be based on estimated quantities and Transporter shall provide, in the

succeeding Month's billing, an adjustment based on any differences between actual quantities and estimated quantities. Any required invoice backup data will accompany the invoice.

7.2 At the reasonable request of Transporter, Shipper shall provide to Transporter in a timely manner any information or data required by Transporter to calculate and verify the volume, quality and Gross Heating Value of Shipper's actual deliveries to Transporter.

7.3 All payments under a Service Agreement or a Toll Schedule shall be made in Canadian funds to a depository designated by Transporter via electronic funds transfer on or before the later of the twenty-fifth (25th) day of the Month and the fifth (5th) Business Day following receipt by Shipper of the monthly statement. If the payment due date falls on a day that the designated depository is not open in the normal course of business to receive Shipper's payment, then Shipper's payment shall be made on the first day after the payment due date that such depository is open in the normal course of business. If Shipper fails to pay in accordance with this Article 7.3 all or any portion of the amount shown as payable by Shipper on a monthly statement, interest thereon shall accrue daily at a rate equal to the daily equivalent of the Prime Rate plus one percent (1%). If the failure to pay continues for ten (10) days after payment is due, Transporter, in addition to any other remedy it may have, may suspend further transport and delivery of Gas for Shipper without further notice. Such suspension of transport and delivery of gas shall not constitute a failure by Transporter to perform any of its obligations under this Tariff or any Service Agreement.

7.4 Provided that a claim is made within sixty (60) days of discovery of a billing error, and in any event within twenty-four (24) months from the date on the statement claimed to be in error, a billing error shall be adjusted within thirty (30) days from the date of receipt by the other party of a notice claiming discovery of the billing error, as follows:

Where Shipper has been overcharged and has paid the statement, the amount of the overpayment will be refunded to Shipper with interest at a rate equal to the sum of the Prime Rate and one percentage point (1%) from the date of the overpayment to the date of the refund. Where the refund is provided to Shipper by way of credit on another Transporter invoice, the overpayment will be deemed to have been refunded on the date the credited invoice is received by the Shipper.

Where Shipper has been undercharged by Transporter, Shipper will pay the amount of the undercharge without interest provided the undercharge is paid within thirty (30) days. Interest shall accrue daily on undercharge amounts not paid within thirty (30) days at a rate equal to the daily equivalent of the Prime Rate plus one percent (1%) from the date of the statement.

7.5 Transporter or Shipper shall have the right at reasonable times to examine the books, records and charts of the other party, to the extent necessary to verify the accuracy of any statement or any claim for underpayment or overpayment.

7.6 (a) Transporter shall not be entitled to suspend further delivery of Gas pursuant to Article 7.3 if Shipper in good faith:

- (i) disputes the amount of any such bill or part thereof;
- (ii) provides Transporter with a written notice including a full description of the reasons for the dispute, together with copies of supporting documents; and
- (iii) pays to Transporter such amounts as it concedes to be correct.

(b) Shipper shall not off-set any disputed amounts against the Demand Charge, or Demand Charge Surcharge portion of its bill.

(c) In the event of a good faith billing dispute, Transporter may demand, and Shipper, within ten (10) days of such demand, shall furnish a good and sufficient surety bond guaranteeing payment to

Transporter of all disputed amounts for any bills that are or will be affected by such dispute. If Shipper fails to provide a bond to Transporter guaranteeing payment, or if Shipper defaults in the conditions of such bond, then Transporter shall have the right to suspend or terminate Shipper's Service Agreement.

(d) Any good faith billing dispute shall be submitted to arbitration pursuant to the *Arbitration Act of Alberta* within sixty (60) days of Transporter's receipt of Shipper's written notice under Article 7.6 (a).

7.7 In the event that Shipper does not pay the full amount due Transporter in accordance with this Article 7, Transporter, without prejudice to any other rights or remedies it may have, shall have the right to withhold or set off payment or credit of any amounts of monies due or owing by Transporter to Shipper, whether in connection with Shipper's Service Agreement or otherwise, against any and all amounts of monies due or owing by Shipper to Transporter.

#### ARTICLE 8: PRIORITY OF SERVICE

8.1 (a) Transporter shall have the right to curtail or discontinue Transportation, in whole or in part, on all or a portion of its system at any time for reasons of Force Majeure or when, in Transporter's sole judgment, capacity or operating conditions so require, or it is desirable or necessary to make modifications, repairs or operating changes to its system. Transporter shall provide Shipper such notice of curtailment as is reasonable in the circumstances.

(b) Transporter shall have the unqualified right to interrupt Interruptible Service at any time to provide Firm Service to any Shipper.

(c) In the event of curtailment pursuant to Article 8.1 (a), Transportation shall be curtailed in the following order:

(i) Interruptible Service will be curtailed first, pro rata, based on the Interruptible Service scheduled in accordance with Article 12;

(ii) AOS will be curtailed next, pro rata, based on Shipper's relative rights to AOS as determined pursuant to Article 2.7 of the Toll Schedule Firm Transportation Service with nominations for AOS made after the time for nominations set out in Article 11 being curtailed fully before timely nominations; and

(iii) Firm Service other than AOS will be curtailed next, pro rata, based on the Firm Service scheduled for each Shipper in accordance with Article 12.

8.2 In the event of curtailment pursuant to Article 8.1(a) at a specific Receipt Point, or a localized subset of Receipt Points, Transportation at such Receipt Point(s) shall be curtailed in the following order:

(a) Interruptible Service at the Receipt Point(s) will be curtailed first and such Interruptible Service that is available at the Receipt Point(s) shall be allocated, pro rata, based on the ratio of the Interruptible Service scheduled for the Interruptible Shipper at the Receipt Point(s) in accordance with Article 12 to the aggregate Interruptible Service scheduled at the Receipt Point(s) in accordance with Article 12;

(b) Firm Service (including AOS quantities) to Firm Shippers for which the Receipt Point(s) is not a Primary Receipt Point and Firm Shippers nominating quantities greater than the Shipper's Primary Receipt Point Capacity at the Receipt Point(s) will be curtailed next. Such Firm Service that is available

to such Shippers at the Receipt Point(s) shall be allocated among such Shippers, pro rata, based on and up to each Shipper's scheduled quantity above Primary Receipt Point Capacity at each Receipt Point. If the Receipt Point(s) is a TAC Receipt Point, Firm Service (including AOS quantities) to Firm Shippers for which the TAC Receipt Point is not a Primary Receipt Point and Firm Shippers nominating volumes above their Primary Receipt Point Capacity at that TAC Receipt Point, to the extent that such Shipper's aggregate Primary Receipt Point nominations at all TAC Receipt Points are less than the Shipper's aggregate Primary Receipt Point Capacity at all TAC Receipt Points, shall be excluded from this curtailment;

(c) Firm Service (including AOS quantities) at TAC Receipt Points to Firm Shippers for which the TAC Receipt Point is not a Primary Receipt Point and Firm Shippers nominating volumes above their Primary Receipt Point Capacity at that TAC Receipt Point, to the extent that such Shipper's aggregate Primary Receipt Point nominations at all TAC Receipt Points are less than the Shipper's aggregate Primary Receipt Point Capacity at all TAC Receipt Points, will be curtailed next. Such Firm Service that is available shall be allocated among such Firm Shippers, pro rata, based on and up the volume of Gas scheduled for each shipper pursuant to Article 12.2(b) at the Receipt Point; and

(d) Firm Service (including AOS quantities) at all Receipt Points to Firm Shippers to the extent the Receipt Point(s) is a Primary Receipt Point will be curtailed last and such Firm Service that is available to such Shippers at the Receipt Point shall be allocated among such Shippers, pro rata, based on and up to the volume of Gas scheduled for each Shipper pursuant to Article 12.2(a) at the Receipt Point.

#### ARTICLE 9: NONWAIVER AND FUTURE DEFAULT

9.1 No waiver by either Transporter or Shipper of any one or more defaults by the other in the performance of any provisions of the Service Agreement shall operate or be construed as a waiver of any continuing or future default or defaults, whether of a like or different character.

#### ARTICLE 10: REQUESTS FOR TRANSPORTATION SERVICE

10.1 Valid requests for Transportation under Toll Schedule Firm Transportation Service and Toll Schedule Interruptible Transportation Service shall be made by providing the following information in writing to Transporter at the following address:

Alliance Pipeline Limited Partnership Suite 400  
605 5th Avenue S.W.  
Calgary, Alberta  
Canada T2P 3H5  
Attention: Manager, Tariff Administration

(a) Identification of Shipper:

(i) Shipper's legal name and principal place of business.

(ii) Shipper's business address for notices and billing.

(iii) Shipper's telephone number, including at least one telephone number at which an authorized employee or agent of Shipper can be contacted on a 24 hour, 7 day a week basis.

(b) Character of service requested (Firm or Interruptible).

(c) Requested Contracted Capacity for Firm Service or Maximum Daily Transportation Quantity for Interruptible Service, stated in 10 3 m 3 per day.

- (d) Requested date of commencement of service.
- (e) Requested term of service.
- (f) Requested Primary Receipt Point(s) from the Receipt Points listed in Schedule A to the General Terms and Conditions and requested Primary Receipt Point Capacities at each receipt point if request is pursuant to toll Schedule Firm Transportation Service.
- (g) Whether any party to the transaction is an Affiliate of Transporter, either as shipper, supplier, or as the person for whom service is provided and, if so, the extent of that affiliation.
- (h) If Shipper requests service on behalf of a third party, Shipper shall submit a copy of an executed agreement between Shipper and the third party that authorized Shipper to act on behalf of the third party to secure the Transportation requested. Shipper shall provide the name, address, telephone number and status (for example, Local Distribution Company and producer) of the third party.

#### ARTICLE 11: NOMINATIONS

- 11.1 (a) For service required on any day under each Service Agreement, Shipper shall provide Transporter with a nomination indicating the Receipt Points, Delivery Points, the applicable Toll Schedule, the volume of Gas, Gross Heating Value or total number of Joules (“Shipper Nomination”) that Shipper desires to be received, transported and delivered, and such other information as Transporter reasonably determines as necessary.
- (b) Nominations are to be provided to Transporter in writing or by electronic means agreed to between Transporter and the Shipper so as to be received by Transporter in accordance with the timelines established in conjunction with U.S. Pipeline, which reflect the Gas Industry Standards Board (“GISB”) standard nomination cycles.
- (c) In addition to the Receipt Points listed in Schedule “A”, Shippers may, as part of a Nomination, request transfers to and from the Canadian Receipt Pools of other Shippers. Shippers may also nominate for transfer to or from Shipper’s Canadian Delivery Pool to the Canadian Delivery Pool of other Shippers. Transfers to and from the Canadian Delivery Pools of other parties and transfers to and from the Canadian Receipt Pools of other parties are collectively referred to as “Title Transfers.”
- (d) If such Title Transfers are confirmed through matching and equal nominations by both parties, all remaining nominations, scheduling, and curtailment procedures will be implemented based on the parties aggregate Nominations net of such Title Transfers.
- 11.2 (a) If Transporter accepts Shipper’s Nominations, Shipper’s Nomination including Fuel Requirement and U.S. Fuel Requirement, shall be “Shipper’s Authorized Volume.”
- (b) If Transporter determines that it will not accept Shipper’s Nomination (for reasons of Force Majeure, failure of Shipper to comply with Shipper’s Service Agreements, or any reason whatsoever consistent with the Tariff) Transporter shall advise Shipper on the day immediately preceding the day for which service was requested of the reduced volume (if any) that Transporter is prepared to transport and deliver under Shipper’s Service Agreements (the “Accepted Volume”). Shipper shall provide a revised nomination (“Shipper’s Revised Nomination”) to Transporter Shipper’s Revised Nomination shall be no greater than the Accepted Volume.
- (c) If Shipper does not renominate, Shipper’s Nomination will be assumed to be the Accepted Volume and shall become Shipper’s Authorized Volume. If Shipper’s Revised Nomination is less than the

Accepted Volume, then the sum of (1) Shipper's Revised Nomination, (2) Fuel Requirement, and (3) U.S. Fuel Requirement shall become Shipper's Authorized Volume.

11.3 Transporter shall permit Shipper to revise Shipper's Nomination under Transporter's Toll Schedule Firm Transportation Service at any time prior to the end of a Day being scheduled, provided: (a) such revision may be implemented, in Transporter's reasonable judgment, by Transporter without detriment to Transporter's service to any other Firm Shipper; (b) such revision is not inconsistent with any term or condition of Transporter's Toll Schedule Firm Transportation Service or TSA; and (c) such revision can be confirmed in a timely manner with Shipper's upstream transportation operators and other operators of connecting facilities and U.S. Pipeline. Such change in nominated and scheduled deliveries shall be made prospectively only. Notwithstanding Article 11.2, if Transporter permits Shipper to revise Shipper's Nomination under this Article 11.3 then the sum of (1) such revised Shipper's Nomination, (2) Fuel Requirement, and (3) U.S. Fuel Requirement shall become Shipper's Authorized Volume.

11.4 Transporter may allow, but shall not be obligated to allow, Shipper to revise its nominations under Transporter's Toll Schedule Interruptible Transportation Service at any time prior to the end of the Day being scheduled, provided: (a) such revision may be implemented, in Transporter's reasonable judgment, by Transporter without detriment to Transporter's service to any other Firm or Interruptible Shipper; (b) such revision is not inconsistent with any term or condition of Transporter's Toll Schedule Interruptible Transportation Service and the ITSA; and (c) such revision can be confirmed in a timely manner with Shipper's upstream transportation operators and other operators of connecting facilities and U.S. Pipeline. Such change in nominated and scheduled deliveries shall be made prospectively only. Notwithstanding Article 11.2, if Transporter permits Shipper to revise Shipper's Nomination under this Article 11.4 then the sum of (1) such revised Shipper's Nomination, (2) Fuel Requirement, and (3) U.S. Fuel Requirement shall become Shipper's Authorized Volume.

11.5 All Nominations are subject to adjustment by Transporter in accordance with Article 13 hereof.

## ARTICLE 12: SCHEDULING

12.1 Transporter shall schedule all Firm Service for each Shipper prior to the scheduling of any Interruptible Service. Transportation shall be scheduled in accordance with the following order of declining priority:

- (a) Firm Service (excluding AOS) up to Shipper's Contracted Capacities under the Toll Schedule Firm Transportation Service, pro rata, based on each Shipper's Contracted Capacities.
- (b) AOS under Toll Schedule Firm Transportation Service, allocated in accordance with Article 2.7 of Toll Schedule Firm Transportation Service.
- (c) Interruptible Service under Toll Schedule Interruptible Transportation Service, pro rata, based on the nominations of all shippers seeking Interruptible Service.

12.2 Scheduling at specific Receipt Points shall be in accordance with the following order of declining priority:

- (a) Scheduling of Firm Service (including AOS quantities) at all Receipt Points will accord priority to Firm Shippers for which the Receipt Point is a Primary Receipt Point, to the extent of the Shipper's Primary Receipt Point Capacity for such Receipt Point;
- (b) Scheduling of Firm Service (including AOS quantities) at a TAC Receipt Point will afford priority to Firm Shippers for which the TAC Receipt Point is not a Primary Receipt Point and Firm Shippers nominating volumes above their Primary Receipt Point Capacity at that TAC Receipt Point, to the extent

that such Shipper's aggregate Primary Receipt Point nominations at all TAC Receipt Points are less than the Shipper's aggregate Primary Receipt Point Capacity at all TAC Receipt Points. Such Firm Service shall be allocated among such Firm Shippers, pro rata, based on and up to each Shipper's unnominated aggregate Primary Receipt Point Capacity for all TAC Receipt Points. Capacity at TAC Receipt Points that is not allocated in accordance with this Article 12.2(b) shall be allocated in accordance with Articles 12.2(c) and 12.2(d);

(c) Remaining Firm Service (including AOS quantities) at Receipt Points shall be allocated among Firm Shippers for which the Receipt Point is not a Primary Receipt Point and Firm Shippers nominating quantities greater than Shipper's Primary Receipt Point Capacity at the Receipt Point. Such Firm Service shall be allocated among such Firm Shippers, pro rata, based on and up to each such Shipper's Firm Service nomination above their Primary Receipt Point Capacity at that Receipt Point; and

(d) Interruptible Service shall be allocated among Interruptible Shippers, pro rata, based on the ratio of the volume of Interruptible Service nominated at the Receipt Point by the Interruptible Shipper to the aggregate volume of Interruptible Service nominated at the Receipt Point by all Interruptible Shippers.

12.3 Until Transporter has informed Shipper that Shipper's Nomination, whether monthly, daily or intraday, is accepted, such volumes will not be deemed scheduled.

#### ARTICLE 13: UNAUTHORIZED VOLUMES AND IMBALANCES

13.1 Shipper shall use reasonable efforts to minimize variances from scheduled quantities under each Toll Schedule. Notwithstanding such efforts, it is acknowledged that such variances are likely to occur. However, under certain circumstances, pursuant to the provisions of this Article, Shipper may be subject to penalties for failure to operate reasonably in this regard. Transporter shall, in good faith, assist Shipper in avoiding such penalties. Under no circumstances shall the payment of such penalties relieve Shipper from the obligation to take all required actions to resolve outstanding Imbalances.

13.2 Transporter shall use all reasonable efforts to tolerate Shipper variances because of temporary limitations of the physical capability of Transporter's system, giving due consideration to flexibility available to Transporter by fluctuating line pack levels and exploitation of permissible use of any operational balancing agreements with interconnecting facilities. Under no circumstance shall Transporter tolerate Shipper Imbalances that have a deleterious and discriminatory effect upon the capacity available to Firm Shippers.

13.3 Shipper shall use all reasonable efforts to at all times maintain balance, based on the best available information, between:

(a) volume of gas scheduled for receipt to Shipper's account from each Receipt Point and actual volume received to Shipper's account from each Receipt Point ("Volume Receipt Variance");

(b) total energy scheduled for receipt to Shipper's account from each Receipt Point and actual energy received to Shipper's account from each Receipt Point ("Energy Receipt Variance");

(c) aggregate volume received to Shipper's account and aggregate volume of gas delivered by Transporter from Shipper's account at the Delivery Point ("Volume Imbalance"); and

(d) aggregate energy received to Shipper's account and aggregate energy delivered by Transporter from Shipper's account at the Delivery Point ("Energy Imbalance").

13.4 All imbalances or variances defined in Article 13.3 (collectively “Imbalances”) shall be held in the Shipper’s account in the Shipper’s Receipt Pool. Transporter shall make available in advance of the time for timely nominations each Day the best available estimate of the various Imbalances to Shipper’s account.

13.5 Shipper shall not be subject to any penalty for prevailing Imbalances, provided at all times:

(a) Shipper’s account is within acceptable tolerance levels, as specified by Transporter from time to time, based on the best available information; and

(b) Shipper takes all reasonable actions to eliminate any Imbalances, as required by the provisions of this Article, including complying with all reasonable directions of Transporter to address prevailing Imbalances, with Transporter giving due consideration to avoiding potential impacts on other Shippers in identifying reasonable courses of action in specific circumstances.

13.6 Transporter shall communicate to all Shippers, as part of the nomination procedures, the current acceptable level of tolerance for Imbalances. Transporter shall use all reasonable efforts to operate its system so as to permit tolerance of periodic Imbalances by each Shipper, subject to compliance with the requirements of this Article 13, up to 4% of the volume authorized by Transporter. However, Transporter reserves the right to impose more stringent Imbalance tolerance levels, based on the need to maximize throughput or to protect the integrity of Transporter’s facilities.

13.7 Daily allocations by operators of interconnecting systems upstream of the Alliance Receipt Points (“Upstream Operators”) shall only give rise to Imbalance penalties, if Shipper fails to take immediate action to reduce any identified Imbalances within tolerance levels specified by Transporter at that time. In the event such actions are not taken, Transporter may adjust new or standing nominations so as to bring Shipper’s account within specified tolerance levels.

13.8 Any month-end allocation adjustments by Upstream Operators shall not give rise to Imbalance penalties, except to the extent the month-end allocations confirm Imbalances indicated by the corresponding daily allocations. For the purpose of establishing final Imbalances and imposing associated penalties, if any, differences between the month-end allocation and the aggregate of the individual daily allocations shall be prorated across each Day in the Month based upon the daily allocations confirmed by the Upstream Operators.

13.9 Any cumulative Imbalance confirmed by month-end allocation adjustments by Upstream Operators, if applicable, shall be eliminated by Shipper by immediately implementing one of the following courses of action:

(a) Effecting Title Transfer(s) to or from Shipper’s Receipt Pool sufficient to eliminate any such Imbalance (provided this does not create an Imbalance for the account of another Shipper); or

(b) Adjusting Shipper’s nomination over a period no greater than 25 Days, as agreed to by Transporter (accomplished by reductions of no less than one twenty-fifth of the original cumulative Imbalance on any Day), to eliminate any such Imbalance.

13.10 In the event Shipper does not take either of the actions in Article 13.9(a) and (b) in sufficient quantity, Transporter may decrease Shipper’s Receipt or delivery nomination to eliminate the outstanding Imbalance in a timely and an orderly fashion.

13.11 If, based on month-end allocations of Upstream Operators prorated across each Day in the Month in accordance with this Article 13 (where relevant), the Volume Imbalance exceeds the Imbalance tolerance level specified by Transporter on any Day, and such data confirms the best

available data available at the time the Imbalance was originally identified, and Shipper failed to take action, Shipper shall be subject to a charge (“ Volume Imbalance Penalty”). The Volume Imbalance Penalty shall be the product obtained by multiplying the absolute amount of the Imbalances in excess of the stated tolerance level on each Day in the Month, by ten times the Daily Demand Charge for the Month.

#### ARTICLE 14: FUEL

14.1 Shipper shall nominate for and tender or cause to be tendered to Transporter, in addition to the Gas that Shipper desires to be delivered for Shipper’s account at the Delivery Point, a volume of Gas determined on the basis of the applicable monthly fuel ratio established by Transporter, a volume of gas equal to Transporter’s reasonable determination of estimated line losses and UAG, and the required operational variance in linepack for the month, (collectively the “Fuel Requirement”). Transporter will advise Shipper of the applicable Fuel Requirement by no later than the twenty-fifth (25th) day of the Month for the following Month, or, in the absence of such notification, Shipper shall use the last monthly Fuel Requirement established by Transporter.

14.2 Shipper shall nominate for and tender or cause to be tendered to Transporter as part of the Gas that Shipper desires to be delivered for Shipper’s account at the Delivery Point a volume of Gas determined on the basis of the applicable monthly fuel ratio established by U.S. Pipeline, a volume of gas equal to U.S. Pipeline’s reasonable determination of estimated line losses and unaccounted for Gas, and the required operational variance in linepack (collectively the “ U.S. Fuel Requirement”). Shippers shall not be required to pay Transporter any toll for Transportation of the U.S. Fuel Requirement.

14.3 Transporter is not required to accept any nomination; (a) that does not include a nomination for the Fuel Requirement and the U.S. Fuel Requirement, or (b) if Transporter is not satisfied, in its sole discretion, that the Fuel Requirement and U.S. Fuel Requirement will actually be tendered to Transporter in accordance with the nomination. In the event Transporter refuses the nomination for the reasons set out in this Article 14.3, Transporter shall advise Shipper to revise its nomination for the Fuel Requirement and U.S. Fuel Requirement and Shipper shall revise its Fuel Requirement and U.S. Fuel Requirement nomination.

14.4 The Fuel Requirement and U.S. Fuel Requirement will be calculated on an energy basis and expressed in GJ per 10<sup>3</sup> m<sup>3</sup> of Gas to be transported.

#### ARTICLE 15: PRIORITY OF RECEIPTS

15.1 Gas shall be deemed to be transported from Shipper’s Canadian Receipt Pool on Shipper’s behalf in the following order:

- (i) Fuel Requirement;
- (ii) U.S. Fuel Requirement;
- (iii) Firm Service (excluding AOS) up to Shipper’s Contracted Capacities;
- (iv) AOS; and
- (v) Interruptible Service.

#### ARTICLE 16: RIGHT TO COMMINGLE

16.1 Transporter shall have the right at all times to commingle Shipper's Gas with other Gas in the pipeline. Gas delivered by Transporter at the Delivery Point shall have the quality that results from Gas having been transported and commingled in the pipeline.

#### ARTICLE 17: NOTICES OF CHANGES IN OPERATING CONDITIONS

17.1 Transporter and Shipper shall notify each other from time to time as necessary of expected changes in the rates of delivery or receipt of Gas, or in the pressures or other operating conditions, and the reason for such expected changes, to the end that the other party may be prepared to meet them when they occur.

#### ARTICLE 18: POSSESSION AND CONTROL OF GAS

18.1 Transporter shall be deemed to be in possession of, in control of and responsible for all Gas received by it until the Gas is delivered by it at the Delivery Point.

#### ARTICLE 19: SHIPPER WARRANTY AND INDEMNITY

19.1 Shipper warrants to Transporter that it will at the time of tendering have title to or right to tender all Gas tendered by it or on its behalf to Transporter for Transportation free and clear of liens and encumbrances and adverse claims of every kind, except that the option granted pursuant to Article 5 (Option to Extract and Purchase Liquids) of a TSA or Article 5 (Option to Extract and Purchase Liquids) of an ITSA shall not constitute an encumbrance or adverse claim hereunder.

19.2 Shipper represents and warrants to Transporter that it has and will maintain all authorizations for the removal of Gas from the province of production, export of Gas from Canada and import of Gas into the United States and any other authorization required to permit its Gas to be transported hereunder.

19.3 Transporter warrants that, subject to Article 5 of the TSA or Article 5 of the ITSA, as applicable, at the time of delivery of Gas for Shipper's account at the Delivery Point such Gas will be free and clear of all liens and encumbrances arising under or by virtue of Transporter.

19.4 Shipper shall indemnify Transporter and save it harmless against all claims, actions or damages arising from any adverse claims by third parties claiming ownership or an interest in the Gas tendered to Transporter for Transportation.

19.5 Transporter and Shipper shall each indemnify the other and save it harmless from all suits, actions, debts, accounts, damages, costs, losses, and expenses arising out of the adverse claim of any person or persons for any taxes, licenses, fees, royalties or charges that are applicable prior to the time of delivery of such Gas to such other party.

19.6 Shipper shall indemnify Transporter and save it harmless from all taxes and assessments levied and assessed upon the sale and delivery of such Gas prior to and upon delivery of such Gas to Transporter for Transportation.

#### ARTICLE 20: FINANCIAL ASSURANCES

20.1 Shipper shall at all times comply with one of the following creditworthiness requirements:

(i) Shipper (or an Affiliate that guarantees Shipper's obligations under the Transportation Service Agreement or Interruptible Transportation Service Agreement) has an investment grade rating for its long-term senior unsecured debt from a recognized rating agent.

The schedule below sets out the minimum acceptable rating from each of the indicated rating agencies:

Acceptable Credit Ratings \*  
(Long-term Senior Unsecured Debt)

Moody's	Baa 3 or better
Standard & Poor's	BBB or better
Dominion Bond Rating Service	BBB or better
Canadian Bond Rating Service	BBB or better
National Association of Insurance Commissioners	NAIC 1 or NAIC 2

\* Or other equivalent ratings from recognized rating agencies, as determined by Transporter.

A Shipper who qualifies under this category initially but is later downgraded below investment grade will be required to qualify under another category below.

(ii) A Shipper whose long-term senior unsecured debt does not have an acceptable rating as outlined in the schedule above will be accepted as creditworthy if Transporter and its lenders determine that, notwithstanding the absence of an acceptable rating, the financial position of the Shipper (or an Affiliate that guarantees the Shipper's obligations under the Transportation Service Agreement or Interruptible Transportation Service Agreement) is acceptable to Transporter and the lenders. Application for acceptance as creditworthy may be made at any time. Shipper will not be subject to having its acceptance under this category revoked unless there has been a material adverse change in the financial criteria relied on at the time of acceptance in the sole opinion of Transporter and its lenders.

(iii) A Shipper who, at the time of execution and delivery of its Transportation Service Agreement or Interruptible Transportation Service Agreement or at any time thereafter while it is bound thereby, is not eligible under (i) or (ii) above, must provide security for its obligation by either:

(a) posting a letter of credit or pledging a cash deposit, in an amount equal to the amount of the letter of credit, as set forth below; or (b) by providing other security acceptable to Transporter. A letter of credit or cash deposit under (a) above shall be in the following amounts: (i) with respect to a Shipper under a Transportation Service Agreement, an amount equal to 12 months of estimated Demand Charges and Demand Charge Surcharges if applicable, such security to be adjusted annually to reflect any change in the estimated Demand Charges and Demand Charge Surcharge if applicable, for the succeeding 12 months; (ii) with respect to a Shipper under an Interruptible Transportation Service Agreement, such security shall be equal to the product obtained by multiplying the Maximum Daily Transportation Quantity in Shipper's Interruptible Transportation Service Agreement by the Interruptible Service Toll and that product multiplied by thirty (30); and shall be adjusted from time to time to reflect any changes to Shipper's Maximum Daily Transportation Quantity and the Interruptible Service Toll.

(iv) Transporter reserves the right to require any Shipper who does not qualify under paragraph (i) above and who has not been accepted pursuant to paragraph (ii) above to provide the security required by paragraph (iii) above. Any Shipper who qualifies under paragraphs (i) or (ii) above by virtue of an Affiliate guaranteeing the obligations of the Shipper shall provide an unconditional and irrevocable guarantee from the Affiliate, in Transporter's usual form, and shall provide the guarantee concurrently with the execution of the Transportation Service Agreement or Interruptible Transportation Service Agreement.

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#### ARTICLE 21: CREDITING OF REVENUE FROM INTERRUPTIBLE TRANSPORTATION

21.1 For each Month Transporter shall calculate and credit to each Firm Shipper a share of an aggregate Interruptible Revenue Credit determined and allocated as follows:

(a) The aggregate Interruptible Revenue Credit shall be equal to the product obtained by multiplying (1) the total volume of Gas transported by Transporter under Interruptible Service for all Shippers in the preceding Month by (2) the Interruptible Service Toll.

(b) Each Firm Shipper shall be allocated, by way of deduction from the Monthly Bill otherwise payable by such Shipper for the Month following the Month for which the aggregate Interruptible Revenue Credit has been determined, a pro rata share of the aggregate Interruptible Revenue Credit determined based on Contracted Capacities as at the first day of the Month for which the aggregate Interruptible Revenue Credit has been determined.

#### ARTICLE 22: INCORPORATION IN TOLL SCHEDULES AND CONTRACTS

22.1 These General Terms and Conditions are incorporated in and are part of all Toll Schedules and Service Agreements.

22.2 These General Terms and Conditions, the Toll Schedules and all Service Agreements are subject to the provisions of all valid present and future laws, rules, regulations and orders of any legislative body or duly constituted authority now or hereafter having jurisdiction over the subject matter thereof.

#### ARTICLE 23: TRANSPORTATION SERVICE AGREEMENTS

23.1 Shipper shall enter into a Transportation Service Agreement or Interruptible Transportation Service Agreement with Transporter under Transporter's appropriate standard form of Transportation Service Agreement or Interruptible Transportation Service Agreement, as presented in Appendix I and Appendix II hereto respectively.

23.2 The term of an Interruptible Transportation Service Agreement shall be agreed upon between Shipper and Transporter at the time of the execution thereof.

#### ARTICLE 24: NOTICES

24.1 Except as otherwise provided, any request, demand, statement, or bill, or any notice (collectively "a notice") that either party desires to give to the other, must be in writing and shall be validly communicated by the delivery thereof to its addressee, either personally or by courier or by telecopier, and will be considered duly delivered to the party to whom it is sent at the time of its delivery if personally delivered or if sent by telecopier during normal business hours, or on the day following transmittal thereof if sent by courier (provided that in the event normal courier service, or telecopier service shall be interrupted by a cause beyond the control of the parties hereto, then the party sending the notice shall utilize any service that has not been so interrupted or shall personally deliver such notice) to the other party at the address set forth below. Each party shall provide notice to the other of any change of address for the purposes hereof.

(i) Operator: To be advised

(ii) Transporter:

Alliance Pipeline Limited Partnership

c/o Alliance Pipeline Ltd.  
Ste 400, 605-5 Avenue S.W.  
Calgary, AB, Canada T2P 3H5

Attention: Manager, Tariff Administration

Fax: (403) 266-4495

(iii) Shipper: At the address set out in a Service Agreement.

Routine communications, including monthly statements, will be considered duly delivered when mailed by either registered, certified, or ordinary mail.

#### ARTICLE 25: OPERATOR

25.1 Transporter shall have the right to designate any Person or Persons to function as “Operator” of its pipeline system with respect to, but not limited to, the management of facilities, receipt and disposition of nominations, scheduling of receipts and deliveries, administration of Service Agreements and accounting. If Transporter designates an Operator, references to Transporter in a Service Agreement, Toll Schedule or these General Terms and Conditions shall be read to include Operator acting on behalf of Transporter, to the extent applicable.

#### ARTICLE 26: LIABILITY AND INDEMNITY

26.1 In no event will either Transporter or Shipper be liable to the other for any indirect, special or consequential loss, damage, cost or expense whatsoever based on breach of contract, negligence, strict liability or otherwise including, without limitation, loss of profits or revenues, cost of capital, loss or damages for failure to deliver Gas, cost of lost, purchased or replacement Gas, cancellation of permits or certificates and the termination of contracts.

26.2 Except as set out in Article 4 of the Toll Schedule Firm Transportation Service, Transporter shall have no liability to Shipper, nor obligation to indemnify and save harmless Shipper, in respect of Transporter’s failure for any reason whatsoever to accept receipt of, or deliver Gas pursuant to any Service Agreement between Transporter and Shipper.

#### ARTICLE 27: MISCELLANEOUS

27.1 Transporter and Shipper each assume responsibility and liability for the installation, maintenance and operation of its respective properties and shall indemnify and save harmless the other party from all liability and expense on account of any and all losses, damages, claims or actions, including injury to or death of persons, arising from any act or accident resulting from the installation, presence, maintenance and operation of the property and equipment of the indemnifying party.

## APPENDIX I: FORM OF TRANSPORTATION SERVICE AGREEMENT

## ARTICLE 1: AVAILABILITY OF SERVICE

1.1 Any Shipper shall be eligible to receive service hereunder provided that Shipper:

(a) is a party to a subsisting Transportation Service Agreement;

(b) has arranged for firm transportation on U.S. Pipeline for a volume and term equal to that of all Shipper's TSAs, and has made arrangements, suitable to Transporter, for Transportation on upstream carriers if applicable; and

(c) has met the requirements of Article 20 (Financial Assurances) of the General Terms and Conditions.

## ARTICLE 2: NATURE OF SERVICE

2.1 Service under this Toll Schedule is available on any Day as provided herein, in Shipper's TSA and in the General Terms and Conditions. Nominations for service shall be made pursuant to Article 11 (Nominations) of the General Terms and Conditions. Service hereunder shall not be subject to curtailment or interruption except as provided herein or in the General Terms and Conditions.

2.2 Transporter is entitled to refuse service hereunder if, and for so long as, Shipper is in default hereunder, under any TSA or under the General Terms and Conditions.

2.3 Transporter will receive for Shipper's account for Transportation hereunder daily quantities of gas up to Shipper's Contracted Capacity, plus AOS allocated to Shipper, plus the Fuel Requirement and U.S. Fuel Requirement at Receipt Point(s) in accordance with nominations accepted under Article 11 (Nominations) of the General Terms and Conditions.

2.4 (a) Transporter will transport and deliver for Shipper's account at the Delivery Point a volume of Gas equal to the volume of Gas received by Transporter at Receipt Points from or on behalf of Shipper in accordance with Article 2.3 less the portion of such volume that contains the Fuel Requirement.

(b) Transporter will transport and deliver for Shipper's account at the Delivery Point Gas containing a number of Joules equivalent to the number of Joules contained in the Gas received by Transporter at Receipt Points from or on behalf of Shipper in accordance with Article 2.3 less the Fuel Requirement.

2.5 Transporter shall not be obligated to add any facilities or expand the capacity of its pipeline system in any manner in order to provide service hereunder to any Shipper.

2.6 Transporter shall determine and advise Firm Shippers on a periodic basis as to the anticipated amount of capacity available for AOS. Actual capacity available for AOS will vary daily depending upon Shipper nominations for Firm Service and the capability of Transporter's system to provide Transportation.

2.7 Firm Shippers may nominate for AOS in accordance with Article 11 (Nominations) of the General Terms and Conditions. AOS will be allocated daily as follows:

(a) Each Shipper will be allocated AOS, equal to the lesser of:

(i) a pro rata portion of AOS according to the ratio of Shipper's Contracted Capacities and Transporter's Contracted Capacities; and

(ii) the AOS nominated by the Shipper.

(b) Each Shipper not already being allocated under Article 2.7 (a) sufficient AOS to satisfy Shipper's AOS nomination will be additionally allocated a portion of any unallocated AOS equal to the lesser of:

(i) a pro rata share of unallocated AOS determined according to the ratio of Shipper's Contracted Capacities and the Contracted Capacities of all Shippers not already being allocated sufficient AOS to satisfy their AOS nominations; and

(ii) the deficiency between Shipper's AOS nomination and the AOS previously allocated to Shipper under Article 2.7 (a) above.

(c) In the event additional unallocated AOS remains following the allocation procedure described in Article 2.7 (b), the remaining unallocated AOS will be allocated among Shippers, if any, not already being allocated sufficient AOS to satisfy their AOS nominations, through a replication of the allocation procedure described in Article 2.7 (b). If all AOS nominations have been satisfied through the allocation process, remaining unallocated AOS will be made available as Interruptible Service.

2.8 Transporter will use its reasonable efforts to make available to Shippers AOS in accordance with nominations made after the time for nominations set out in Article 11 (Nominations) of the General Terms and Conditions provided that AOS allocated to Shippers making timely nominations under Article 11 (Nominations) of the General Terms and Conditions shall not be apportioned to accommodate such late nominations.

2.9 In addition to tendering Gas at its Primary Receipt Point(s) for Transportation up to Shipper's Primary Receipt Point Capacity, Shipper may tender Gas at such Receipt Point above Shipper's Primary Receipt Point Capacity, or at any other Receipt Point ("Secondary Receipt Point") for Transportation. Transporter may, but will not be obligated to, receive Gas at a Secondary Receipt Point for Transportation.

### ARTICLE 3: MONTHLY BILL

3.1 For each Month, Transporter shall charge and Shipper shall pay an amount equal to the sum of:

(a) the product obtained by multiplying (1) the Contracted Capacity by (2) the Demand Charge;

(b) the product obtained by multiplying (1) the sum of Primary Receipt Point Capacities designated by Shipper for TAC Receipt Points in accordance with Article 6 (as recorded in paragraph C of Schedule A to each of Shipper's TSAs) by (2) the Demand Charge Surcharge;

(c) the product obtained by multiplying (1) the Commodity Charge by (2) the volume of Gas received in the Month by Transporter from or on behalf of Shipper in accordance with Article 2.3 less the portion of such volume that contains the Fuel Requirement and the portion of such volume that contains the U.S. Fuel Requirement;

(d) any interest on late payments payable by Shipper in accordance with Article 7.3 of the General Terms and Conditions;

(e) any charges payable by Shipper in accordance with Article 13 in respect of any Imbalances; less

(f) (1) Shipper's allocated share of available Interruptible Revenue Credit, determined in accordance with Article 21 (Crediting of Revenue from Interruptible Transportation) of the General Terms and

Conditions; (2) any Demand Charge Credit to which Shipper is entitled in accordance with Article 4; and (3) any Demand Charge Surcharge Credit to which Shipper is entitled in accordance with Article 4.

3.2 Nothing in this Article 3 shall be construed as in any way relieving Shipper from its obligations to pay any adjustments, charges, interest or penalties calculated in accordance with the General Terms and Conditions.

#### ARTICLE 4: DEMAND CHARGE CREDITS AND DEMAND CHARGE SURCHARGE CREDITS

4.1 (a) If on any day (“the Under Receipt Day”) Transporter is unable, for any reason, including Force Majeure suffered by Transporter, that relates solely to the physical capability of Transporter’s system to provide Firm Service, to receive Gas from or on behalf of Shipper at Shipper’s Primary Receipt Points then, subject to Articles 4.1 (b), (c) and (d) and Article 4.3, Shipper shall be entitled to receive a credit (“Demand Charge Credit”) for the Under Receipt Day as set out in Article 4.2.

(b) Shipper shall only be entitled to receive a Demand Charge Credit as set out in Article 4.2 to the extent Transporter’s inability to provide Firm Service at Shipper’s Primary Receipt Points prevents Shipper from having aggregate volumes transported at least equal to the Shippers Contracted Capacity, on the Under Receipt Day.

(c) Shipper shall only be entitled to receive a Demand Charge Credit as set out in Article 4.2 in respect of a volume of Gas (“the Nominal Volume”) that, if it had been nominated, would have been (1) scheduled for the Under Receipt Day in accordance with Article 12 (Scheduling) of the General Terms and Conditions and (2) tendered at Shipper’s Primary Receipt Points for Transportation hereunder by or on behalf of Shipper, up to Shipper’s Contracted Capacity, in the absence of the reason making Transporter unable to receive Gas from or on behalf of Shipper as set out in Article 4.1 (a).

(d) Refusal by Transporter to receive gas failing to comply with the Gas Quality, Receipt Pressure, or account Imbalance Tolerance requirements of this Tariff, shall not give rise to any Demand Charge Credit or Demand Charge Surcharge Credit. Similarly, Shippers ineligible to receive service under a TSA, for whatever reason, are not eligible for a Demand Charge Credit or Demand Charge Surcharge Credit.

4.2 Notwithstanding that Transporter is unable to receive Gas from or on behalf of Shipper as set out in Article 4.1 (a), there shall be no reduction in respect thereof to Shipper’s Monthly Bill for the Month in which the Under Receipt Day occurs (“the Under Receipt Month”). Subject to Article 4.10(a), Shipper’s Monthly Bill for the subsequent Month shall be reduced by a Demand Charge Credit in an amount equal to the product obtained by multiplying (1) the Daily Demand Charge for the Under Receipt Month by (2) the difference (“the Under Received Volume”) between (a) the volume of Gas received by Transporter from or on behalf of Shipper on the Under Receipt Day, minus Fuel Requirement and U.S. Fuel Requirement, and (b) the lesser of: (i) Shipper’s Contracted Capacity; or (ii) the Nominal Volume.

4.3 If Transporter and Shipper agree, Transporter may either allow Shipper to:

(a) tender for Transportation make-up Gas in amounts not exceeding the Under Received Volume within a mutually acceptable time in which event Shipper shall not be entitled to receive a Demand Charge Credit in respect of any make-up Gas received for Transportation under this Article 4.3 (a); or

(b) tender for Transportation on the Under Receipt Day Gas in amounts not exceeding in the aggregate the Under Received Volume at one or more Secondary Receipt Points in which event Shipper shall not be entitled to receive a Demand Charge Credit in respect of any Gas received for Transportation under this Article 4.3 (b).

4.4 (a) If on any day (“the TAC Under Receipt Day”) Transporter is unable, for any reason, including Force Majeure suffered by Transporter, that relates solely to the physical capability of Transporter’s system to provide Firm Service, to receive Gas from or on behalf of Shipper at a TAC Receipt Point then, subject to Articles 4.4 (b), (c) and Article 4.1(d) and Article 4.6, Shipper shall be entitled to receive, in addition to any other Demand Charge Credit that Shipper may be entitled to receive, a credit (“Demand Charge Surcharge Credit”) for the TAC Under Receipt Day as set out in Article 4.5.

(b) Shipper shall only be entitled to receive a Demand Charge Surcharge Credit as set out in Article 4.5 in respect of volumes of Gas up to Shipper’s Primary Receipt Point Capacity for the TAC Receipt Point that Transporter is unable to receive at the TAC Receipt Point on the TAC Under Receipt Day.

(c) Shipper shall only be entitled to receive a Demand Charge Surcharge Credit as set out in Article 4.5 in respect of a volume of Gas (“the TAC Nominal Volume”) that, if it had been nominated, would have been (1) scheduled in accordance with Article 12 (Scheduling) of the General Terms and Conditions and (2) tendered at the TAC Receipt Point for Transportation hereunder by or on behalf of Shipper, up to Shipper’s Primary Receipt Point Capacity at the TAC Receipt Point, in the absence of the reason making Transporter unable to receive Gas from or on behalf of Shipper as set out in Article 4.4 (a).

4.5 Notwithstanding that Transporter is unable to receive Gas from or on behalf of Shipper as set out in Article 4.4 (a), there shall be no reduction in respect thereof to Shipper’s Monthly Bill for the Month in which the TAC Under Receipt Day occurs (“the TAC Under Receipt Month”). Subject to Article 4.10(b), Shipper’s Monthly Bill for the subsequent Month shall be reduced by a Demand Charge Surcharge Credit in an amount equal to the product obtained by multiplying (1) the Daily Demand Charge Surcharge for the TAC Under Receipt Month by (2) the difference (“the TAC Under Received Volume”) between (a) the volume of Gas received by Transporter from or on behalf of Shipper at the TAC Receipt Point on the TAC Under Receipt Day, minus associated the Fuel Requirement and associated U.S. Fuel Requirement, and (b) the lesser of: (i) Shipper’s Primary Receipt Point Capacity at the TAC Receipt Point; or (ii) the TAC Nominal Volume.

4.6 If Transporter and Shipper agree, Transporter may either allow Shipper to:

(a) tender for Transportation at the TAC Receipt Point make-up Gas in amounts not exceeding the TAC Under Received Volume within a mutually acceptable time in which event Shipper shall not be entitled to receive a Demand Charge Surcharge Credit in respect of any make-up Gas received for Transportation under this Article 4.6 (a); or

(b) tender for Transportation on the TAC Under Receipt Day Gas in amounts not exceeding in the aggregate the TAC Under Received Volume at one or more Receipt Points other than the TAC Receipt Point in which event Shipper shall not be entitled to receive a Demand Charge Surcharge Credit in respect of any Gas received for Transportation under this Article 4.6 (b).

4.7 If, on any day (“the Under Delivery Day”) Transporter is unable, for any reason, including Force Majeure suffered by Transporter, that relates solely to the physical capability of Transporter’s system to provide Firm Service, to transport and deliver for Shipper’s account at the Delivery Point the volume of Gas that Transporter is required to deliver in accordance with Article 2.4 (a) there shall be no reduction in respect thereof to Shipper’s Monthly Bill for the Month in which the Under Delivery Day occurs (“the Under Delivery Month”). Subject to Article 4.10(a), Shipper’s Monthly Bill for the subsequent Month shall be reduced by a Demand Charge Credit in an amount equal to the product obtained by multiplying (1) the Daily Demand Charge for the Under Delivery Month by (2) the difference (“the Under Delivered Volume”) between:

(a) the lesser of the volume of Gas that Transporter is required to transport and deliver in accordance with Article 2.4 (a) and the Shipper’s Contracted Capacity;

and

(b) the volume of Gas delivered by Transporter on the Under Delivery Day.

4.8 If Transporter and Shipper agree, Transporter may allow Shipper to tender make-up Gas in the amounts not exceeding the Under Delivered Volume for Transportation within an agreed-upon period, in which event Shipper shall not be entitled to receive a Demand Charge Credit or, notwithstanding Article 4.9, a Demand Charge Surcharge Credit in respect of any make-up gas transported and delivered by Transporter under this Article 4.8. The tendering of make-up Gas will in no way impact the availability of Firm Service.

4.9 If:

(a) Shipper is entitled to receive a Demand Charge Credit in accordance with Article 4.7; and

(b) Shipper's Monthly Bill for the Under Delivery Month includes an amount payable under Article 3.1(b);

then, subject to Article 4.10(b), in addition to being reduced by the amount of the Demand Charge Credit determined under Article 4.7, Shipper's Monthly Bill for the Month following the Under Delivery Month shall be reduced by a Demand Charge Credit in an amount equal to the product obtained by multiplying (1) a portion of the Daily Demand Charge Surcharge for the Under Delivery Month that is equivalent to the ratio of the Primary Receipt Point Capacity designated by Shipper at TAC Receipt Points to the total Primary Receipt Point Capacity designated by Shipper at all Receipt Points by (2) the Under Delivered Volume.

4.10 (a) In no event shall the reductions to Shipper's Monthly Bill resulting under Articles 4.2 or 4.7 exceed in aggregate the amount otherwise payable by Shipper for the relevant Month in accordance with Article 3.1(a).

(b) In no event shall the reductions to Shipper's Monthly Bill resulting under Articles 4.5 and 4.9 exceed in aggregate the amount otherwise payable by Shipper for the relevant Month in accordance with Article 3.1(b).

#### ARTICLE 5: CAPACITY ALLOCATION OR RELEASE

5.1 Shipper may allocate to third parties its transportation entitlement for its Contracted Capacity or portion thereof and its share of AOS, however, notwithstanding such allocation, Shipper will remain responsible for all of its obligations under the TSA and the Tariff.

#### ARTICLE 6: PRIMARY RECEIPT POINT DESIGNATION

6.1 (a) Shipper may, subject to Articles 6.1 (b) and (c), designate in its TSA one (or more) Receipt Point(s) as a Primary Receipt Point(s) and the capacity ("the Primary Receipt Point Capacity") that shipper wishes to designate for each such Primary Receipt Point.

(b) Shipper may designate Primary Receipt Point Capacities totaling, in the aggregate, no more than 125% of Shipper's Contracted Capacity.

(c) Shipper may designate a Primary Receipt Point under Article 6.1 only if Transporter determines that sufficient capacity exists at the Receipt Point to accommodate Shipper's designation and the similar designations made by other Firm Shippers.

(d) If Transporter determines in accordance with Article 6.1 (c) that a Primary Receipt Point designation cannot be accommodated then Transporter shall allocate the available capacity among all Shippers seeking to designate the Receipt Point as a Primary Receipt Point at that time, based on the relative valid requested capacity.

(e) Primary Receipt Point Capacity at new Receipt Points will be made available in a not unduly discriminatory manner, giving due consideration to the terms under which such new facilities are constructed and financed.

6.2 (a) Shipper may, by notice in writing to Transporter, request to add or delete a Primary Receipt Point or increase or reduce the Primary Receipt Point Capacity at a Primary Receipt Point and Transporter shall, subject to Article 6.2(c), use its reasonable efforts to accommodate the request provided that it shall be in the sole discretion of Transporter whether to grant the request.

(b) If two Shippers, by notice in writing to Transporter, simultaneously request the exchange of Primary Receipt Point Capacities between the two shippers, Transporter will make all reasonable efforts to give effect to such transfers.

(c) Transporter shall maintain a queue or queues of requests from Shippers wishing to either add Primary Receipt Points or increase the Shipper's designated Primary Receipt Point Capacity at a Receipt Point. Such queue or queues shall establish the priority in which Transporter will endeavor to accommodate requests in accordance with Article 6.2(a) in instances when Primary Receipt Point Capacity becomes available as a result of a Shipper reducing the Primary Receipt Point Capacity designated at that Receipt Point or an upstream Receipt Point.

(d) If Transporter agrees pursuant to Article 6.2 (a) to delete a TAC Receipt Point as a Primary Receipt Point, or reduce the Primary Receipt Point Capacity at a TAC Receipt Point, Shipper shall, notwithstanding that the Receipt Point has been deleted or the Primary Receipt Point Capacity has been reduced, remain obligated to pay the Demand Charge Surcharge in respect of the TAC Receipt Point for the Primary Receipt Point Capacity as though no such deletion or reduction had occurred. In such instances, the Shipper will be entitled to increase the Primary Receipt Point Capacity designated at that TAC Receipt Point up to the Primary Receipt Point Capacity for which Shipper is obligated to pay the Demand Charge Surcharge in respect of that TAC Receipt Point, unless Transporter has agreed to transfer such Primary Receipt Point Capacity to another TAC Receipt Point.

#### ARTICLE 7: MISCELLANEOUS

7.1 (a) The General Terms and Conditions, as amended from time to time, are applicable to and hereby incorporated in this Toll Schedule. In the event of conflict between the provisions of this Toll Schedule and the General Terms and Conditions, the provisions of this Toll Schedule shall prevail.

(b) The terms used herein shall have the same meanings as are ascribed to corresponding terms in the General Terms and Conditions unless otherwise defined herein.

## FIRM TRANSPORTATION SERVICE

## SCHEDULE A

## FIRM TRANSPORTATION SERVICE TOLLS

Demand	\$830.73/10 3 m 3/mo
Commodity	Nil
Demand Charge Surcharge	\$42.95/10 3 m 3/mo

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## INTERRUPTIBLE TRANSPORTATION SERVICE

### ARTICLE 1: AVAILABILITY OF SERVICE

1.1 Any Shipper shall be eligible to receive service hereunder provided that Shipper:

- (a) is a party to a subsisting Interruptible Transportation Service Agreement;
- (b) has met the requirements of Article 20 (Financial Assurances) of the General Terms and Conditions; and
- (c) has satisfied Transporter as to the service available from U.S. Pipeline.

### ARTICLE 2: NATURE OF SERVICE

2.1 Service under this Toll Schedule is available on any Day, and will be interruptible, as provided herein, in Shipper's ITSA or in the General Terms and Conditions.

2.2 Transporter is entitled to refuse service hereunder if, and for so long as, Shipper is in default hereunder or under any Service Agreement or under the General Terms and Conditions.

2.3 Service hereunder shall be subject to curtailment or interruption at any time that Transporter determines in its sole discretion that deliveries hereunder would in any way interfere with or restrict Transporter's ability to make deliveries of Gas under Firm Service, including AOS.

2.4 Transporter will receive for Shipper's account for Transportation hereunder daily quantities of gas up to Shipper's Maximum Daily Transportation Quantity plus the Fuel Requirement and U.S. Fuel Requirement, at Receipt Point(s) in accordance with nominations accepted under Article 11 (Nominations) of the General Terms and Conditions.

2.5 (a) Transporter will transport and deliver for Shipper's account at the Delivery Point a volume of Gas equal to the volume of Gas received by Transporter at Receipt Points from or on behalf of Shipper in accordance with Article 2.4 less the portion of such volume that contains the Fuel Requirement.

(b) Transporter will transport and deliver for Shipper's account at the Delivery Point Gas containing a number of Joules equivalent to the number of Joules contained in the Gas received by Transporter at Receipt Points from or on behalf of Shipper in accordance with Article 2.4 less the Fuel Requirement.

2.6 Transporter shall not be obligated to add any facilities or expand the capacity of its pipeline system in any manner to provide service hereunder to any Shipper.

### ARTICLE 3: MONTHLY BILL

3.1 For each Month, Transporter shall charge and Shipper shall pay an amount equal to the product obtained by multiplying (1) the Interruptible Service Toll by (2) the volume of Gas received in the Month from or on behalf of Shipper in accordance with Article 2.4 less the portion of such volume that contains the Fuel Requirement and the U.S. Fuel Requirement.

3.2 If on any day Shipper fails to tender or cause to be tendered Shipper's Authorized Volume for Transportation hereunder or tenders gas that Transporter refuses to receive pursuant to Article 2 (Quality) of the General Terms and Conditions, Shipper shall pay to Transporter, in addition to any other amount payable to Transporter under Article 3.1 or otherwise, an amount equal to twenty-five percent

(25%) of the difference between: (a) the product obtained by multiplying the Interruptible Service Toll by Shipper's Authorized Volume; and (b) the product obtained by multiplying the Interruptible Service Toll by the total volume of Gas tendered by Shipper or on Shipper's behalf for Transportation hereunder.

3.3 Nothing in this Article 3 shall be construed as in any way relieving Shipper from its obligations to pay any adjustments or penalties calculated in accordance with the General Terms and Conditions.

#### ARTICLE 4: NO ASSIGNMENT

4.1 Shipper may not assign its rights and obligations, or any part thereof, under an ITSA.

#### ARTICLE 5: NOMINATIONS

5.1 Shippers shall nominate for Interruptible Service, including the Fuel Requirement and U.S. Fuel Requirement, in accordance with Article 11 (Nominations) of the General Terms and Conditions.

5.2 If nominations exceed available Interruptible Service, the nominations shall be apportioned pro rata based on the ratio of the volume nominated by each Shipper seeking Interruptible Transportation to the total volume nominated by all Shippers seeking Interruptible Service.

5.3 If nominations exceed available Interruptible Service at a specific Receipt Point, the nominations at that Receipt Point shall be apportioned pro rata, based on the ratio of the volume nominated at the Receipt Point by each Shipper seeking Interruptible Transportation at the Receipt Point to the total volume nominated by all Shippers seeking Interruptible Service at the Receipt Point.

#### ARTICLE 6: MISCELLANEOUS

6.1 (a) The General Terms and Conditions, as amended from time to time, are applicable to and hereby incorporated in this Toll Schedule. In the event of conflict between the provisions of this Toll Schedule and the General Terms and Conditions, the provisions of this Toll Schedule shall prevail.

(b) The terms used herein shall have the same meanings as are ascribed to corresponding terms in the General Terms and Conditions unless otherwise defined herein.

INTERRUPTIBLE TRANSPORTATION SERVICE

SCHEDULE A

INTERRUPTIBLE SERVICE TOLL

Interruptible Service Toll      \$27.33/10 3 m 3

## APPENDIX 7: GLOSSARY

<b>Access</b>	The ability to buy transportation service conditional only on a willingness and ability to subscribe to standard terms and conditions of service.
<b>Allocative efficiency</b>	The act of setting the price for a commodity or service equal to its costs of production, including a normal rate of profit so that production occurs up to the point where the value of the commodity or service to the user is equal to the cost of producing it.
<b>Applicant</b>	A person who has applied for a transmission service.
<b>Back-to-back contract</b>	A contracting structure in which a marketer of gas purchases a supply of gas from a supplier under a supply contract that has a specified term, quantity, purchase obligation, delivery point, and price, and then resells that gas to a buyer under a gas sales contract that has a matching term, quantity, delivery obligation, and delivery point. The price of the two contracts may not necessarily be the same, but there may be a similar pricing structure, such as the use of the same pricing index.
<b>Bundled service</b>	The sale of a package consisting of transportation service and the natural gas commodity.
<b>Capacity</b>	Capacity is the ability of a pipeline to transport gas between two locations under a particular set of operating conditions. The term Capacity is also used to refer to the proportion of the pipeline system capacity that is reserved by an individual Network User. Capacity is expressed in terms of the quantity of gas, which can be transported from one location (Receipt Point) and delivered to another (Delivery Point) in a specified time period commonly a day.
<b>Capacity reservation tariff</b>	The Capacity Reservation Tariff is the price of Reserved Capacity. A different tariff may apply depending on where a Customer wishes to put gas into the Transmission Network (Receipt Point) and where a Customer wishes to take delivery of the gas following transportation (Delivery Point).
<b>Capital charge</b>	The return and depreciation on pipeline, compressor and station assets.
<b>Commodity tariff</b>	The Commodity Tariff is price per unit of gas throughput on the Transmission Network.
<b>Common carriage</b>	A process of selling transportation service in which users have no contractual obligation. New capacity is built on the basis of anticipated demand for the service.
<b>Contract carriage</b>	A process of selling transportation service in which users are contractually committed to buying a specified amount of capacity whether or not they use it. New capacity is built only when there is a demand for it, evidenced by new contracts.
<b>Daily quantity</b>	The actual energy value, in Gigajoules (GJ), of gas delivered on any day. <sup>24</sup>

<sup>24</sup> Natural gas may be measured in volume or energy terms. It is common to measure production gas (ex- field) in volume terms—cubic meters or cubic feet. However, once gas is treated/ or purified to meet

<b>Delivered quantity</b>	The quantity of gas delivered during a stated period, in Gigajoules (GJ).
<b>Delivery point</b>	The point on the Transmission Network where a Network User nominates to have gas delivered.
<b>Deprivation value (DV)</b>	The minimum loss the business would suffer if it were deprived of the asset.
<b>Distribution</b>	The act of moving gas from the city gate to the final user.
<b>Distribution system</b>	A gas transportation system, operated between a city gate and final users of gas.
<b>Downstream</b>	Those activities related to natural gas that involve transmission and distribution
<b>Economic value</b>	The value of an asset derived from a discounted cash flow analysis.
<b>Economies of scale</b>	Reduced costs of producing a commodity or a service (such as gas transportation) as a result of producing very large quantities within a single producing unit (such as a transmission or distribution system).
<b>Economies of scope</b>	Reduced costs of producing a commodity or a service as a result of combining a number of complementary activities (such as gas storage, meter reading and management) within a single production unit.
<b>EU Gas Directive</b>	The EU Gas Directive is the short name for Directive EC/98/30 Common Rules for the Completion of the Internal Energy Market in Natural Gas agreed by the 15 Member States of the European Union (EU) on 10 June 1998. This directive requires each Member State, by 10 August 2000, to establish legislative and regulatory commission arrangements to permit access to certain eligible gas consumers and to open a prescribed share of their national gas markets to competitive supply.
<b>Gathering</b>	The act of moving raw gas to the purification plant
<b>In-Plan gas prices</b>	Gas prices centrally determined for gas production set out annually and allocated to a specific industrial sector—primarily fertilizer production. In general, these prices are considerably lower than the market value of gas as either fuel or feedstock.
<b>Joint Report</b>	“Modernizing China’s Oil and Gas Sector: Structure Reform and Regulation,” March 2001, a Joint Report prepared by the Institute of Economic System and Management, SCORES and the International Bank for Reconstruction and Development (the World Bank).
<b>Market power</b>	The ability for one company to unilaterally influence the terms and conditions of service, including price, on which a product is bought or sold.
<b>Maximum daily quantity</b>	The maximum energy value, in Gigajoules (GJ), of gas delivered on any day of the year. Where “ reserved MDQ” appears in the text, it means the same as “ Reserved Capacity.”
<b>Natural monopoly</b>	An industry, such as natural gas transportation, which is characterized by unit costs that decline over a wide range of production so that, if there were a number of companies, unit costs would be higher than if there were only one.
<b>Network</b>	A network is defined as a distinct unconnected part of the current natural gas transmission system in China. In some instances, a network may be

a particular gas specification (see pipeline marketable gas), it is more usual to measure it in energy terms (Gigajoules, MMBtu, or KCal).

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	comprised of a single pipeline from a gas input point to a single large volume off-take point; in other instances, a network may consist of a large number of interconnected pipeline segments with more than one gas input point and a number of off-take points.
<b>Network user</b>	A person who is either seeking, or has gained, access to the network.
<b>Nondiscriminatory</b>	Means to act impartially and not to distinguish between Network User or to favor one Network User over another in the terms and conditions and price for services offered or provided.
<b>Nonspecification gas</b>	Natural gas that is not specification gas (or is not pipeline marketable quality).
<b>Open access</b>	Generally Open Access refers to a regime whereby a pipeline owner offers to transport gas for others, on a first come first served basis, under posted terms and conditions.
<b>Open season</b>	A period during which potential customers can bid for pipeline services, usually when the pipeline operator is able to anticipate that it will have uncontracted capacity available, for example, when new construction or an expansion is planned. During the open season, all customers are treated equally in regard to priority for access to capacity. After the open season, customers are generally treated on a “ first come, first served” basis.
<b>Optimized depreciated replacement cost (ODRC)</b>	The replacement cost of an optimized asset adjusted for depreciation.
<b>Optimized deprival value (ODV)</b>	This is the asset valuation methodology that has generally been adopted for the valuation of pipeline assets in the New Zealand gas industry but is rarely used elsewhere. The ODV of any asset is the lesser of its ODRC and its Economic Value (EV).
<b>Out-Plan gas prices</b>	“ Out-Plan” gas prices are applied to gas production not specifically allocated in annual plan. These prices are higher than “in-Plan” prices (see above) and there is scope to negotiate the final purchase price within a predetermined range.
<b>Overrun</b>	Overrun means the quantity of gas delivered on any day in excess of a Network User’s Reserved Capacity. To incur an Overrun means to use capacity in excess of Reserved Capacity.
<b>Performance-based regulation</b>	A method of setting the level of pipeline tariffs, which breaks the link between the tariff level and the cost of providing transportation service, allowing the rate of profit to vary with the productive efficiency of the pipeline.
<b>Pipeline marketable gas</b>	See <i>Specification gas</i> .
<b>Production</b>	The process of extracting natural gas from underground or undersea reservoirs.
<b>Productive efficiency</b>	The act of producing a commodity or service of specified quality at the lowest possible cost.
<b>Purification</b>	The process of extracting liquids, sulfur and impurities from raw gas
<b>Raw gas</b>	Natural gas in the state in which it exits the well at which point it contains liquids, sulfur and impurities
<b>Receipt point (RP)</b>	The point on the Transmission Network where a Network User nominates to present gas for transportation.
<b>Rate-of-return regulation</b>	A method for setting the level of pipeline tariffs by linking them directly and continuously to the cost of service, which includes an allowed rate

	of profit (rate of return).
<b>Reserved capacity</b>	Reserved Capacity is the amount of capacity a Network User anticipates requiring and reserves in advance.
<b>Retail competition</b>	A situation where all users of gas are able to buy gas directly from producers or marketers.
<b>Specification gas</b>	Specification gas is gas that satisfies the physical and chemical composition criteria for gas entering a transmission network. This is also known as pipeline marketable gas.
<b>Supply support services</b>	Services required to facilitate the progression of gas through the transportation system to final users, such as blending, back-up, gas storage, and meter reading, which may be unbundled from the transportation service and priced separately.
<b>Tariff</b>	The price charged by a transmission or distribution system for providing transportation services.
<b>Transition period</b>	The flexible pragmatic five-year transition to a socialist market economy for the oil and gas sector and to the new style regulation of that sector, coincident with the 10 <sup>th</sup> Plan, as proposed in the Joint Report.
<b>Transmission services agreement (TSA)</b>	The agreement signed by the transmission entity and a network user, setting out the respective rights and obligations in respect of the transportation of the network user's gas through the transmission entity's network.
<b>Transmission entity</b>	A transmission entity is defined as the operator of a transmission network in China.
<b>Transmission network</b>	A transmission network is defined as an unconnected part of the current transmission system (see <i>Network</i> ).
<b>Transmission system</b>	A system of high-pressure pipelines available for the transportation of Specification Gas (or Pipeline Marketable Gas) between the purification plant and the receipt point of a large volume consumers and a city gate.
<b>Unaccounted-for gas (UAG)</b>	The difference between gas metered entering a pipeline system and gas metered leaving that system in a given period, after allowing for any change in the amount of gas contained in the system.
<b>Unbundling</b>	The process of separating the function of transporting gas through a pipeline system from the function of purchasing, trading, marketing and selling gas. This process separates the commodity "gas" from the means of delivering this commodity to consumers.
<b>Upstream</b>	Those activities related to natural gas that involve exploration, development, production, gathering and purification.
<b>Wholesale competition</b>	A situation in which large volume users of natural gas purchase their supplies directly from gas producers or marketers, other than transportation companies. LDCs (or, in the case of China, UGDs) may participate in the wholesale market on behalf of their customers who do not have access to competing suppliers.