APPLYING PAST LESSONS TO FINANCING FUTURE GAS PROJECTS

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By:

Afsaneh Mashayekhi, The World Bank*
Dennis Amanda, Economatters

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The natural gas chain historically has included a number of distinct stages with widely varied financing characteristics. In addition, financing arrangements have been largely influenced by whether natural gas has been developed for local or export markets. Following a brief background, this paper examines the historical trends in financing gas projects and applies them to future financing possibilities. Further, it takes into account that natural gas is the fastest growing energy sector – one that is facing new dynamism and innovation. In this transition stage, the structure, management, and ownership of gas companies and consequently, financing of the gas sector are all changing rapidly. In addition, the relationship between the natural gas and power sectors is evolving; cogeneration projects and gas-based BOT power plants are the new flavor and each project requires unique financial innovations. This paper looks at the major historical factors and ends with a review of possible innovative financial tools that could be applied to the gas sector.

BACKGROUND

Energy policymakers and experts worldwide are more than ever optimistic about the gas sector. This optimism has been reinforced by the recent Middle East conflict and oil shock. A number of long-term factors have contributed to this optimism. First, proven world gas reserves are about 80 percent of proven oil reserves. There is reason to believe that potential gas reserves are significantly underestimated and higher than proven reserves. Second, technological developments have allowed a much higher efficiency factor for gas-based power generation as compared to coal-based power. Third, environmental concerns have benefitted natural gas which is the cleanest of the hydrocarbons. While natural gas is not a faultless 'Knight in Shining White Armor', the natural gas industry can argue that in an imperfect world, natural gas is, as of today, the only major fuel that addresses both local and global environment concerns. There is as yet much public concern about the safety aspects and waste management problems for nuclear energy. Renewable energy requires future technological developments for it to compete economically with most alternative fuels. There is much uncertainty about global environment problems and debates as to whether we are headed towards climatic inconvenience or cataclysm. However, with today's knowledge, substitution by natural gas is one of the few short-term remedies available.

This environment factor has an important impact on the economics of fuel use and its financing. Gas substitution for coal could halve carbon dioxide emissions. Direct use of gas in some uses as compared to electricity can also reduce primary energy consumption as losses are reduced. The relative pricing of fuels taking into account their environment costs and benefits could have a major influence on the economics of gas use. The gas industry seems to have a greater opportunity for promoting gas given this new potential environmental boost.
Major Factors Influencing Financing of the Gas Sector

A number of key factors influence the type of financing as well as availability of funds to the gas sector. These include the:

(i) Integrated long-term chain of the gas development plan for upstream and downstream businesses.

(ii) Relative cost of gas transport and economies of scale in gas projects.

(iii) Ownership of gas companies (public/private/mixed)

(iv) Gas markets: local and export.

(i) Integrated long-term chain of the natural gas business

Natural gas use requires integrated long-term planning and financing of the whole chain from exploration to end use. The strong interdependence results in the need for appropriate financing for each stage in order for any project to come into fruition. This is the famous 'chicken-and-egg' problem with gas development financing which is based on an interdependent process.

For the exploration stage, in addition to the normal risks in the other stages of the business, there is an inherent uncertainty in the search for hydrocarbons. An exploration and development company needs to ensure that if in the process of search gas is found, an adequate market providing a reasonable price and acceptable foreign exchange can be tapped. Consequently, companies often look for investment options which will give their shareholders an adequate return on their investment in excess of the cost to the company of borrowing funds as debt or equity. The cost of capital will differ by company, depending on their credit rating and past returns on investments. While exploration costs may be borne by internal capital generation, in the development stage the financial criteria of third parties become more important. Oil companies often seek project financing from banks or other third parties because of the large capital expenditures to develop a gas field. Obviously, the cost of borrowed funds is compared with the company's own cost of capital.

Financing of transmission lines is often done separately. Transmission and distribution companies require long-term gas sale and purchase agreements in order to secure appropriate financing. It normally requires long-term gas contracts from purchasers to provide assurance as to pipeline utilization and profitability of gas sales along those lines or take or pay contract will be necessary to attract private financing for the producer. To further ensure that the transmission system is financed and built, the producer may want to take an equity interest in the pipeline and perhaps even build and operate it. In the case of pipeline projects and LNG, third party financing could be provided by the banks as well as purchasers of gas. The end-user has to be sure of the long-term availability of gas before it converts its equipment to gas or acquires gas-based equipment. Financing of the connection, carcasating and equipment purchase and conversion is a critical part of the market development. While long-term economics may be adequate, the end-consumer may be unable to finance these lumpy investments in the short-term. Existence of long-term financing
mechanisms that smooth out these needs could be critical in gas marketing. Particularly in lower income countries, while major investments for the gas infrastructure may be forthcoming, smaller financing requirements to cover the consumer-related costs could be a major deterrent to gas use.

Another important factor is the need for long-term planning as natural gas projects normally have a life of about 15-20 years. Investments tend to be lumpy and most lifetime costs are often invested at the beginning. About 70-80 percent of total discounted lifetime costs of a typical project have to be invested upfront before the first cubic meters of gas can be delivered to a customer. With most costs occurring upfront, it becomes extremely important to the supplier to utilize the built in capacity. Financing packages should also be long-term to fit the gas project life.

(ii) Relative cost of gas transport and economies of scale

In many cases, gas transport costs, compared to oil, are higher by several fold. In some developing countries, gas costs are often relatively low and a World Bank study of ten developing countries indicates a range of $0.5 - 10.5/boe for gas transported to the citygate. However, in some instances, gas is found far from the markets and as a result, there are major transport costs (pipeline or LNG). The range of costs differs significantly depending on the sources and markets for gas. In cases where low cost gas is found close to large, high density markets, the cost of gas delivered to the city-gate could be as low as $0.5/MMBtu. In other cases, where gas is transported by LNG, it could be about $4/MMBtu before distribution. Obviously, the success in marketing of gas would entirely depend on its price competitiveness with alternative fuels.

In certain phases – in particular, in the transmission stage – there are major economies of scale that influence the investment costs and financing of gas projects. In many cases, it pays to develop the gas infrastructure at the largest scale possible. For example, doubling the pipeline size could, in some cases, reduce the marginal cost of transmission by close to 100%. Thus, potential savings would be realized only if the larger capacity is fully utilized. Rapid load buildup, therefore, is crucial to reap the benefits from the economies of scale and financing.

(iii) Ownership form, industry linkages and financing

The ownership of the gas company has major implications for the type of financing that is available. Different private and public sector bodies will have different risk-return expectations, ability to raise capital, access to capital markets and availability of own funds.

Generally, exploration and production is carried out by international oil and gas companies or national companies. Transmission and distribution can lie in the public or private domains. In addition, regional and local authorities with mixed public and private characteristics are often involved in the gas business.

The ownership of the gas company in any stage has major implications for the financing of projects. For example, a private sector international company would be concerned about political risk exposure while a public sector company would not be concerned with this
factor. Other lenders and potential investors can attach importance to the direct financial participation of the host government as a sign of the latter's commitment. The government could finance its share from its own resources, international financial institutions, mixed credits (exim packages) and commercial borrowings. The private sector has other sources and costs of financing.

Within the private sector, the situation would differ depending on whether they were major integrated companies and independents or those involved only in the upstream or downstream businesses. Energy companies, unlike institutional investors will generally be the likely foreign investors in gas projects, particularly in developing countries. The gas industry and, in particular, the LNG industry - with the latter's more precarious economics - has long recognized the phases linked by common threads of ownership.

This is not the place to enter into the debate on common carriage but we cannot ignore it altogether as it influences financing of gas projects. The common carriage debate is often about who should exercise the 'merchant function' and take the risk and reward. Protagonists in the debate see matters differently. Those in favor of common carriage argue for the freedom of markets strangled by pipeline monopoly. Its opponents deny any such monopoly. Under any system though a pipeline company finances investments in pipelines if it can foresee a reasonable return on its capital. The company may base its expectations on market forecasts, firm contracts for sale or transportation, or linked financial structures. Phase linking within projects in some cases offers a common sharing of the profits of the chain. It is, however, important to emphasize that generally, common carriage takes only one party, the pipeline, out of the fight, but still leaves any rents up for discussion among the other parties.

Phase linking could avoid this conflict in some circumstances, and encourages banks to lend. Phase linking could take the form of shareholding or linked contracts which spread the risk of price fluctuations, volume offtake, political risk, technical risk and of potential obsolescence.

(iv) **Gas markets: local and export**

For gas used domestically, if a producer is an international oil company, it will be exposed to foreign exchange fluctuations as well as currency convertibility and political risks. This is particularly true in developing countries. In import substitution cases, irrespective of whether project revenues from gas sales are denominated in a hard currency, foreign exchange shortages may prevent the buyer or borrower from making hard currency available to cover debt service requirements. Currency convertibility could also be subject to the imposition of exchange controls.

In situations where foreign exchange availabilities are serious constraints that impede investors from building the long-term gas infrastructure, the government could guarantee payment in foreign exchange particularly if the natural gas replaces energy imports. In countries with endemic debt problems, a large share of gas projects have been financed with the assistance of international financial institutions, bilateral aid donors, export-import credit agencies and similar institutions.
Another solution to attracting private investment is to have a quick payback period by shifting the profits from a project due to the private sector partner to the early phases of the project. The advantage of this approach is that for the private investor, capital is at risk for a shorter period, and the initial rate of return on the investment is raised.

Further, if natural gas is produced associated with oil or rich in condensates, the investors could export or sell these products for foreign exchange and finance the longer-term gas infrastructure.

With export projects or countries with a convertible currency, the financing of gas projects is more similar to any other project. In such a case, the fundamental questions for the sources of finance are: Are long-term contracts from creditworthy gas customers available and how secure are these contracts? Are the negotiated prices sufficient to guarantee an adequate rate of return? Is there sufficient gas available? Is there an adequate regulatory framework to protect all the market participants?

With large LNG and pipeline export projects, investments are normally several billion dollars, with high front-end capital costs accounting for about three-quarters of project costs. Close coordination between sellers and buyers often requires the creation of a special consortium to raise project financing. Because of their substantial capital requirements, they often rely on export credit financing. Each project has a unique ownership, management and financial structure. As a result of their highly capital intensive nature, project sponsors and lenders seek to minimize their risks. Long-term purchase and sales agreements are required before financing can be obtained. They will include either a take or pay clause or some other legally binding provision that states clearly minimum levels of purchase, as well as 'comfort' and common interests among the partners. Certified gas reserves would be needed to sustain deliveries throughout project life. LNG projects are often financed on an off-balance sheet basis, i.e., without recourse to the creditworthiness and guarantee of the project's sponsors.

The technical costs of LNG projects have been increasing. Opportunities, therefore, have been taken, such as the use of existing tankers by the Nigerian LNG project, fuller utilization and expansion of the Pacific projects, and revamping of the Algerian projects, to squeeze the benefits out of the existing infrastructure.

For the 1990s, the LNG picture has changed considerably. The experience of the past twenty years has shown the extreme technical reliability of LNG projects. Not only are the projects more reliable technically, but there is more spare capacity in the network to allow for interruptions in the individual units to be handled in a way that the other investors in the chain do not suffer.

Most markets are now supplied by more than one project. A certain standardization in ship size and interface configuration has been the major contributor on the hardware side, whilst a natural caution on the part of the designers in all the phases has resulted in spare capacity becoming available with minimal debottlenecking. The one exception to date is arguably the relationship between field and liquefaction plant, but even here, multiple field developments upstream and modular plant design downstream (so that a failure of one train does not affect production as whole) have meant that on the whole, the flexibility
found further downstream is reflected in the relationship between these phases, albeit to a lesser extent.

Not only have projects proved reliable and flexible, they have also proved durable. Because of the uncertainties, the economics of the initial ventures were all worked on a 15 or 20 years life. The evidence is before us. Kenal has passed the 20-year mark; Brunei will shortly do so. Little ARZEW I, the erstwhile CAMEL, the granddaddy of them all, is still functioning after close to thirty years. The Jules Verne and the Methane Princess, launched to go with it, are still sailing. This affects the financing of projects as these projects were justified only on a 20-year life.

Recent Developments in the Gas Business and Implications for Financing

The gas business worldwide is expanding at a rapid pace. At the same time, a number of major oil companies are assessing the potential of integrating into downstream pipeline operations in order to market their gas. Similarly, a number of national gas companies have become, in recent years, more international and also expanded into the upstream business. While these developments have been limited, they have changed the traditionally inflexible image of natural gas to a more desirable and flexible fuel. These changes have tended to expand the sources of capital for gas projects.

Further, in order to compete in an increasingly competitive world, oil and gas companies have restructured, and in some cases, privatized to improve internal management and operating practices. These changes have also altered the access of companies to sources of finance and at the same time, privatization has often provided new sources of cash.

Another recent development is the new relationship forged between the gas and power sectors. The large efficiency improvements due to combined cycle and cogeneration technologies have opened the door to a number of innovative gas-power projects. Some of these have been undertaken by oil companies or gas companies and others by special energy investor groups.

These cogeneration projects often require new financing techniques and more sophisticated financial advisory assistance. Financial institutions often play a major role in the negotiations between the contractor-operator and the developer, as well as structuring the terms for construction and procurement, debt financing and representing the companies in bank negotiations for debt placements. Some innovative deals have included arranging the financing without long-term gas prices in place.

Financing Future Gas Projects

Most energy experts and policymakers expect natural gas to be the fastest growing energy sector particularly in gas-rich countries. Further, at present natural gas trade accounts for about 14 percent of total world consumption, of which, about 10 percent is pipeline trade and the remainder LNG. Gas trade has, until recent years, involved only a limited number of participants. Most experts expect that gas trade will expand and more importantly, involve many more players. The natural gas sector, therefore, will become increasingly more flexible. This will have major implications for the financing of the sector.
In addition, a number of East European countries are planning a large expansion of their gas sector due to the higher efficiency and environmental benefits of gas. This will require substantial development of domestic production capabilities as well as import options. A number of import options that could further integrate Western and Eastern Europe are currently under assessment. These could increase the trading flexibility in Europe. However, given the financial situation of many East European countries, the financing of such projects will be quite complex.

At the same time, many developing countries are planning to use their local gas resources. In these countries, as well as in East European countries, there will be some reliance on international and regional financial institutions, such as the World Bank, the European Bank for Reconstruction and Development, Asian Development Bank, etc. In others, such as Asian countries (Korea, Malaysia, Thailand, Singapore, Taiwan), with a rapid economic growth rate and a lesser debt problem, financing of these projects may be more likely using the export credit agencies, Japanese and local banks, and the local capital markets of these countries.

The recent experience in the U.K. is being watched closely and the European countries are debating the issue of common carriage and its consequent financial implications. The gas sector in southern Europe is also expanding rapidly and countries such as Portugal have begun to expand the sector by inviting the private sector to participate.

Let me end by giving examples of the innovations that are either in use or planned:

- More international oil company joint ventures with national oil companies or gas companies;
- Financing leasing arrangements involving offshore companies, commercial banks and suppliers;
- Enclave financing arrangements for gas-based power generation in which the owner-operator sells power to a public grid or it to specific consumers;
- Sale of existing public sector facilities to the private sector;
- Conversion of some portion of country energy debt into equity;
- Direct private equity financing;
- Increased use of management contracts for operation and maintenance work.

Some countries are considering breaking up large national gas monopolies into regional or municipal or private groups. In some instances, governments are encouraging local and foreign private investors to come forward and manage and invest. Capital markets in the U.S. have been historically a source of long-term financing to the gas industry. Many countries planning an expansion of their gas sectors in Eastern Europe, and in the developing countries could rely on the local and foreign capital markets to finance the large and lumpy investments. The establishment of a local market in which shares or debt instruments could be issued and
traded will improve the liquidity and acceptability of private participation in the gas sector.

One of the major constraints on new approaches such as these, is the lack of an adequate regulatory system. There are undoubtedly numerous variations of regulatory and market structures that can be used to enhance the opportunities for innovative financing in the gas sector to assure all parties that their legitimate concerns can be adequately taken into account.

CONCLUSION

Let us conclude by noting a few major developments in the gas sector.

First, much larger financing will be needed in the future to meet the increasing demand.

Second, much of the demand will be in the countries that are only in the initial phases of gas development. They will, therefore, require larger amounts of funds to build a whole gas infrastructure which will require much larger funds than incremental additions to existing systems.

Third, the recent restructuring and privatization schemes, as well as the introduction of new regulatory systems and common carriage will have profound consequences for the financing of the gas sector.

Fourth, a number of energy companies are attempting innovative gas-power projects or more integrated upstream-downstream projects. This has meant that natural gas has attracted more innovative financing schemes. In particular, as the private sector has increased its role in the gas sector, these innovative financing deals have multiplied. This has been particularly true in the cogeneration sector and in gas trade projects.

Fifth, a large part of the expansion in the gas industry will be in gas-rich developing countries. Innovative financing will be needed to ensure that the large energy demand growth in these countries is met with an environmentally benign fuel.

There is no question that the future of natural gas is bright. Its growth will, however, need a greater readiness by all the partners, producers, transporters, distributors and consumers, to assume risks and share the large potential benefits from natural gas development.