

Operational Guidance for World Bank Group Staff

Public and Private Sector Roles in
the Supply of Gas Services in
Developing Countries



THE WORLD BANK
GROUP



The Energy and
Mining Sector Board

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The World Bank, Washington, DC



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ACRONYMS

CDM	Clean Development Mechanism
E & P	Exploration and Production
EI	Extractive Industries
GGFR	Global Gas Flaring Reduction
	Public Private Partnership
LNG	Liquefied Natural Gas
PSC	Production Sharing Contracts
PCF	Prototype Carbon Finance

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FOREWORD

Infrastructure services are critical to economic growth, poverty reduction and the achievement of the Bank's Millennium Development Goals (MDGs). The introduction of gas as an alternative source of energy in developing countries in the recent past is an important development since it often provides a cleaner and cheaper source of energy for industrial and domestic usage than alternative sources of fuels or technologies currently available. To fully benefit from the utilization of natural gas, developing countries will require private and public financing to develop infrastructure and to create domestic and regional gas markets. Developing countries will also require assistance to create efficient gas market structures and legal and regulatory frameworks that encourage private participation and the efficient utilization of gas.

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The private sector will have to account for a growing share of providing capital for upstream and downstream gas network development. At the same time, the public sector, public-private partnerships and international donor organizations, such as the World Bank Group, will continue to play an important investment role, mainly in those parts of the gas chain where international investors are less willing to provide capital, such as the development of downstream gas networks.

This Note provides guidance to World Bank Group staff on assessing the suitability of available options for public-private roles in the financing and provision of natural gas, the potential role of the Bank in the various parts of the gas chain and the main steps which staff should take to analyze these options. It also links to appropriate World Bank Group instruments, relating them to the different public-private models and parts of the gas chain.

As we accelerate the implementation of the Infrastructure Action Plan, the Note provides a framework within which staff can design operations in a way that will enable us to maintain the quality of our interventions.

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EXECUTIVE SUMMARY

1. The discovery of large natural gas reserves in many developing countries or the potential to import natural gas in the domestic market provide a unique opportunity to stimulate economic growth and improve the standard of living of millions of people in these countries and adjacent regions. To fully benefit from the utilization of natural gas a comprehensive upstream and downstream gas network is required. To date, most developing countries continue to lack relevant infrastructure, and this hinders the introduction of natural gas in the domestic market or the export of gas to neighboring countries and international markets.

2. To create and further develop domestic gas markets in developing countries and promote regional and international gas trade, substantial investment in infrastructure will be needed. The public sector will continue to play an important role in providing financing in all segments of the gas market. At the same time local and international investors will have to account for a growing share of total investment because the public sector, including state-owned energy companies in developing countries, often has difficulties raising sufficient funds and providing technical know-how. To attract local and international capital, developing countries will have to improve their investment climate. Gas market restructuring and legal and regulatory reform, aiming to allow and promote private participation in upstream and downstream gas markets by reducing investment and regulatory risk, are paramount to attract capital into the sector.

3. The World Bank Group announced in 2000 that it would conduct a comprehensive review of its activities in the extractive industries (EI) sector, including natural gas, in response to concerns expressed by a variety of stakeholders, primarily environmental and human rights organizations. The review was concluded in January 2004 and the WBG's final Management Response is provisionally expected around June, 2004. Of special relevance to natural gas are the recommendations of the reports that:

- IBRD and IDA should help countries remove subsidies from carbon-based fuels, taking into account of the potential impact on the poor;
- WBG lending should concentrate on aggressively promoting the transition to renewable energy and endorsing natural gas as a bridging fuel - building new pipelines and renovating leaking ones and funding fuel switching from coal to gas in power generation;

- The WBG should ensure that local communities benefit directly from EI projects (e.g. through supplying gas to communities in areas of production and transmission).

4. The reports also highlight the need for an **integrated strategy** for World Bank Group activities in extractive industries; increased **focus on governance** by the World Bank Group – both in the context of projects and in its dealings with resource rich countries generally; increased **disclosure and transparency** about revenues received by governments, about project outcomes and World Bank activities; **environmental issues** including concerns about particular processes and sensitive and biodiversity-rich areas; and **greater use of World Bank Group convening power** to advance the sustainability agenda in the extractive industries

5. The World Bank can play a key role in achieving these objectives. First, by providing technical assistance (TA) and supporting governments in developing countries to create efficient gas market structures, and legal and regulatory frameworks. Secondly, by utilizing World Bank Group financial instruments (such as loans, guarantees, equity and others) to encourage participation of domestic & international investors in the development of gas production and downstream transmission and distribution networks to create and develop domestic and regional gas markets.

6. The overall objective of this paper is to provide guidance to World Bank Group staff on the public and private sector roles in the supply of gas services in developing countries and the main issues these countries have to address in order to develop gas markets. This Note should also enable Bank staff to identify the technical and financial instruments available to assist governments in fashioning strategies to attract private participation in gas infrastructure. Bank staff should use the framework provided in the Note in conducting the dialogue with clients, and identifying and preparing new projects. Bank staff should be aware that given the variety and complexity of country circumstances, this Note cannot provide answers or detailed recommendations to each individual situation that Bank staff will face.

CONTEXT AND BACKGROUND

1. The natural gas chain comprises upstream and downstream activities. In this Note, upstream activities include exploration and production, Liquefied Natural Gas (LNG) and export-oriented gas pipelines. Downstream activities refer to transmission (including storage and regasification terminals) and distribution activities to domestic and industrial customers.¹

2. Compared to other infrastructure industries such as electricity, transport, water and telecommunication, natural gas markets in most developing countries have only recently evolved. The introduction of gas as an alternative source of energy in developing countries is desirable as it provides a cleaner and often cheaper source of energy for industrial and domestic usage, increases security of supply through energy diversification and gradually substitutes more environmental harmful and unhealthy sources of energy (such as coal, oil and biomass) and provides a new source of revenue for governments if exported to international markets. At the same time, many developing countries that have discovered economically viable gas reserves continue to lack the network and demand required to supply industrial and household customers in domestic markets or to export gas through export-oriented pipelines or LNG facilities. For example in Africa, Equatorial Guinea and Nigeria have very high reserve/production ratios that indicate limited development of gas markets and infrastructure. This hinders the creation of domestic and regional gas markets that could potentially benefit millions of customers located in gas rich regions - in particular in developing regions in the Middle East, South and Central Asia, and West Africa.

3. The creation and development of natural gas markets is capital intensive, and future upstream and downstream investment requirements to create and develop domestic and regional gas markets in developing countries and adjacent regions are enormous. The International Energy Agency (IEA) has estimated that investment requirements in gas exploration and production and LNG and downstream transmission (including storage) and distribution network in developing countries over the next 30 years will amount to 790 and 350 billion US dollars respectively.² Export-oriented gas

pipeline projects in North African and Nigeria over the next decade are estimated to require some 12 billion US dollars.³ Regional network projects are also planned in the Middle East, Asia and Central and South America that require substantial investment.

4. It is generally accepted that the public sector, including state-owned energy companies, in most developing countries and regions does not have the financial and technical capabilities to ensure exploration and production of economically viable gas reserves and construction of infrastructure either for gas export through LNG facilities and export-oriented pipelines or for domestic household and industrial consumption. International investors, both private and public, will have to account for a growing share of upstream and downstream investment in the gas sector. At the same time, the public sector in developing countries, public-private partnerships, and international donor organizations will continue to play an important investment role mainly in those parts of the gas chain where international public and private investors are less willing to provide capital, notably in the development of downstream transmission and distribution networks, including for gas imports.⁴

5. In principle, efficient private participation in the development of gas markets is preferable not only because it provides capital for upstream and downstream network development, but also because it increases efficiency and innovation which eventually benefits final consumers through lower tariffs and better services. However, financial constraints on the public and private sector in developing countries, monopolistic market structures and inadequate legal and regulatory regimes often prevent, hinder or discourage investment in upstream and downstream gas network. To attract private investors, governments in developing countries must demonstrate political commitment and a clear policy that allows for efficient private participation and a level playing field in all parts of the gas chain, create market structures that provide international companies access to the domestic market and develop an efficient legal and regulatory regime that reduces investment risks.

¹ Distribution includes both low-pressure network and supply activities to final customers.

² International Energy Agency, World Energy Investment Outlook, 2003 Insights

³ Planned-export-oriented gas pipelines in Africa include GME expansion (Algeria to Spain via Morocco), Medgaz (Algeria to Spain), Galsi (Algeria to Italy), Arab Mashreq (Egypt to Jordan), Green Stream (Libya to Italy), WAGP (Nigeria to Ghana) and Trans-Saharan (Nigeria to Algeria).

⁴ For a detailed analysis of private participation in upstream and downstream gas markets around the world refer to the *ESMAP Report on Global Energy Sector Reform in Developing Countries: A Scorecard, ESM219, July 1999* by Robert Bacon and Charles McPherson and *Private Participation in Infrastructure: Trends in Developing Countries in 1990-2001, World Bank, January 2003*

6. This Note sets out the important role the World Bank Group (WBG) can play in (a) assisting governments in developing countries to create and develop domestic gas markets, and fashion strategies that promote the creation of regional gas markets and international gas trade through LNG and export-oriented pipelines, and (b) applying WBG financial instruments (such as guarantees, loans, equity) that reduce investment risks in gas network projects and encourage international public and private investors to provide capital to developing countries. The range of possible WBG technical assistance (TA) and financial instruments to support upstream and downstream gas network development is summarized in the matrix attached to this Note.

MARKET STRUCTURE AND LEGAL AND REGULATORY FRAMEWORK

7. Developing domestic and regional gas markets and international gas trading facilities requires upstream and downstream network. Investments in gas networks are capital intensive, have very long economic lives and public and private investors look for assurance that they can make a reasonable rate of return on their investment over the life of the asset. The legal and regulatory framework that governs the industry and the gas market has profound impacts on the willingness of public and private investors to invest in upstream and downstream infrastructure.

Gas Exploration and Production, LNG and Export-Oriented Pipelines

8. Gas producers face substantial financial risks in the exploration and development of gas reserves and look to recover their investment costs by signing long-term take-or-pay contracts to sell natural gas in international markets (through export-pipelines or LNG facilities) and to anchor customers in domestic gas markets at prices that reflect economic costs. Long-term contracts will continue to play an important role in financing capital intensive gas projects for the foreseeable future. At the same time, with the introduction of new technologies, the cost of liquefaction and re-gasification has fallen drastically over the last few years. As a result LNG is increasingly competing with piped gas to supply markets in developing and industrialized markets. With the expansion of LNG, international gas markets have

become more competitive and gas buyers can increasingly chose from alternative sources of gas supply. This has major implications on traditional long-term take-or-pay contracts. One can already observe that gas producers offer more flexible take-or-pay contracts with shorter durations and less restrictive contract terms (for example gas buyers are allowed to on-sell unused contracted gas to other markets). This would also have an impact on less mature gas markets where gas buyers depend on a single source of gas given that LNG presents an alternative for expansion.

9. Contractual arrangements are crucial to mitigate investment risk, and governments in developing countries can play an important role in providing an investor-friendly environment, such as fiscal regimes that create financial incentives for international private and public investors to participate in upstream activities. Fiscal instruments include royalty payments, taxes, government share (as defined in Production Sharing Contracts) and duties. These and other payments are often referred to as 'total government take'.⁵ Reservoir and rights management, revenue management, access to LNG terminals, processing plant and export-oriented pipelines, and emerging investments, such as carbon credits for reducing flaring of associated gas under the Clean Development Mechanism (CDM) can further affect investment in gas networks.

10. There has been sufficient private and public-private funding available for upstream gas infrastructure projects in developing countries that directly serve industrialized markets in Europe and the United States. In contrast, many developing countries with relatively smaller gas reserves and domestic markets, and unfavorable investment conditions, struggle to raise sufficient capital to develop infrastructure due to political and economic risks. For example, the conflicts that have recently affected some export-oriented gas pipeline projects in South Asia and South America are of both a political and economic nature. Many conflicts are based on economic issues, ranging from failure to agree on the terms of transit, and on profit and rent sharing among companies and governments in countries where the state-owned national companies exercise several roles (see paragraph 25).

⁵ Many governments in developing countries have actively promoted gas development by providing larger fiscal incentives for gas compared to oil production. These countries include China, Indonesia, Malaysia, Nigeria, Peru and Vietnam.

11. Governments in some developing countries will need to play a more proactive role in promoting investment in certain high-risk, large-scale upstream gas projects such as export-oriented gas pipelines and LNG facilities. This is best exemplified by the challenges the West Africa Gas Pipeline (WAGP) project has faced over the last decade. Governments can also help to lower country risk by intensifying dialogue and developing relevant inter-governmental agreements to overcome overarching legal jurisdictions to regulate activities and contracts. In addition, a clear and transparent legal and regulatory framework for both upstream and downstream activities has to be established that provides a more stable investment climate and confidence to investors.

12. The World Bank is in a good position to provide technical assistance on best practice fiscal regimes, reservoir and right management, and access to LNG terminals, processing plants and export oriented pipelines, including transit terms and profit and rent sharing methods. In addition, the international investment community and donors increasingly look for prudent and transparent revenue management frameworks in developing countries when committing private capital in the upstream sector to avoid mismanaged revenues from oil (and gas) production. The Bank is actively involved in providing advice to some developing countries on setting up transparent and prudent revenue management regimes.⁶ Bank staff also have wide experience in establishing investor friendly regimes through legal and regulatory reform. The World Bank, as part of the Global Gas Flaring Reduction Public Private Partnership (GGFR), is currently advising developing countries on establishing an efficient regulatory framework that will encourage operators to utilize rather than flare and vent associated gas.⁷

Transmission (including Storage and Regasification Terminals) and Distribution

13. In many developing countries, the downstream gas sector tends to be dominated by vertically integrated, state-owned, oil and gas companies that focus on oil production, and that often lack the financial and technical capabilities to further develop domestic gas markets. International private and public participation in the creation and development of gas infrastructure often tends to be hindered by existing monopolistic market structures and institutional

practices, laws, and regulations, that prevent or discourage private investment.

14. To encourage efficient private and public participation in new and existing gas markets, governments in developing countries have to ensure that new entrant companies have access to downstream customers, unbundle vertically integrated monopolies, create fair competition and an efficient regulatory and legal framework. A political commitment by government for reform and restructuring, underlined by relevant laws and regulations, will have profound impacts on investors' perception of investment risk and their willingness to provide capital for downstream gas market development in developing countries and regions.

15. Investment risks in transmission and distribution network projects in developing countries are particularly large where the market being supplied is small and immature, future demand scenarios are low and uncertain, and where there are doubts about the creditworthiness of the major consumers – typically power stations and large industrial customers – on which the financial viability of projects often rely. Private investors are only willing to participate in downstream projects if the regulatory and legal environment offers tariffs that allow for cost recovery and access to 'anchor' customers such as power generators,

BOX 1

Experience from restructuring and liberalizing gas markets in transition economies in Eastern Europe, developing countries such as Argentina and China, and industrial gas markets in the US, Australia and the UK suggests that gas market reform did encourage long-term investment in gas infrastructure.

distributors and other large consumers. This is often lacking in developing countries and hence substantially decreases the willingness of private investors to participate and provide capital.

⁶ These countries include Nigeria, Chad, Equatorial Guinea, Palau, Timor-Leste and Sao Tome.

⁷ For further details refer to *Regulation of Associated Gas Flaring and Venting – A Global Overview and Lessons from International Experience, March 2004, A World Bank Report by Franz Gerner and Bent Svensson*

16. The development of gas storage facilities in developing (and transition) countries can play an important role to provide increased security of supply, especially for economies that rely on a single source for piped natural gas to supply the domestic market. Gas storage can also provide important operational functions allowing network operators to balance seasonal gas demand and supply (as well as imbalances over short time periods), to utilize trading and contractual opportunities and thereby optimize the utilization of the transportation system. The need for gas storage facilities has to be analyzed on a case-by-case basis, and the costs of storage⁸ has to be assessed in a wider context considering security of supply issues and availability of substitutes. For natural gas these include energy supply diversification in general and gas supply diversification (i.e. LNG) and fuel-switching capabilities for gas with fuel and gas oil, in particular in the power and industrial sectors. In addition, in some countries and regions the construction of storage facilities is not possible for geological reasons. Countries lacking reservoir potential or have a relatively small gas market could contract storage volume or facilities in a neighboring country, sometimes even operating the facility themselves. Bilateral agreements of this kind already exist between Slovakia and Austria, Poland and Ukraine and Switzerland and France.

17. Natural gas can always be replaced by other fuels, and alternative fuel prices put a ceiling on the long-term market price for gas. The availability of other sources of energy that are subsidized or cheaper, in particular petroleum products and coal for power generation often constrain the development of domestic and regional gas markets in developing countries.⁹ Competing prices should reflect 'economic' costs and these competing fuels are commonly less environmentally friendly and negative environmental externalities tend not to be reflected in inter-fuel pricing structures.¹⁰ These implicit or explicit subsidies distort fuel prices and encourage to consumption of less environmental friendly sources of energy. To encourage the development of gas markets, governments will have to address the issue of cross-subsidies among consumer categories and ensure that competing fuels are priced at market levels for downstream gas projects to succeed. At the same time, experience from transition economies highlights the importance of creating social safety nets to limit undue hardship on poorer customers using gas for space

heating in cold climates as more efficient gas market structures and pricing regimes are being implemented.

18. The risks and uncertainties associated with the creation and restructuring of gas markets point to a need for governments in developing countries to clearly define the future envisaged gas market structure in order to ensure that the new rules and emerging market structures do not impede or delay investments that are economically viable. The management of the transition to a more competitive market structure in developing countries is especially critical to industry perceptions of uncertainty, the cost of capital and willingness to invest. Establishing a long-term energy policy and introducing efficient and fair energy pricing would help to attract investment in gas supply infrastructure.

19. Pricing of gas services is fundamental to maximize the contribution of the sector to economic growth. A key element is to establish sound energy pricing policies and methods that send correct signals to producers (what, when and how much energy to produce), and consumers (what, when and how much energy to consume). Correct price signals are fundamental for investment and consumption choices and prevent misallocation of scarce resources that reduce overall economic efficiency. In principle, the price of gas and tariffs for transmission and distribution should promote an efficient allocation of resources, achieve cost recovery and avoid cross-subsidization.

BOX 2

Most transition economies in Eastern Europe and some Central Asian countries have established, or are in the process of establishing, independent regulatory frameworks. In contrast, only a few developing countries have passed relevant legislation for establishing an independent regulatory regime for downstream gas (including Argentina, Brazil, Pakistan, Indonesia and India).

20. The intrinsic economic conditions of natural gas networks, that are characterized by large economies of scale, make competition in gas network construction inefficient and undesirable. Consequently, natural monopolies such as downstream gas transmission and distribution are generally subject to economic regulation.

⁸ A study by the UN Economic Commission for Europe on Underground Gas Storage estimates that gas storage investment costs for depleted fields and salt caverns in Europe are 0.35-0.6 US\$/cm and 0.7-1US\$/cm respectively. Press Release, ECE/ENE/00/1, Geneva, 15 February 2000.

⁹ In some developing countries domestic sources of energy, most notably coal, can be produced and supplied much cheaper than natural gas.

¹⁰ In this context it is important to stress that the World Bank, in line with the Kyoto Protocol, does not consider global warming externalities in developing countries as economic costs that should be reflected in final prices.

21. Economic regulation is different than just setting technical and safety standards and guidelines for the gas industry. Economic regulation refers to ongoing price regulation of monopoly network businesses and aims to balance the interests of consumers, government and companies in gas markets. Gas markets initially are often based on long-term contractual relationships between upstream and downstream companies. To achieve balance between the various conflicting interests, an 'independent' regulatory framework has to be established that provides confidence to all parties. A key requirement for establishing such a framework is to clearly separate powers in the gas industry between agencies and institutions dealing with matters of policy and regulation and the industry players themselves. This requires that economic regulation must be carried out independently to ensure that political considerations do not influence the operation and financial viability of the industry in the long-term.

22. At the same time, an efficient regulatory system also protects the interests of consumers by preventing monopoly power abuses and excessive pricing, and ensuring quality of service and access to natural gas. In many developing countries vertically integrated state-owned entities and political institutions continue to carry out regulatory, policy and operational functions that affect private investment. Removal of all policy making and regulatory functions from these parties is crucial in terms of avoiding potential conflicts of interests and allowing a level playing field for international investors.

23. In establishing an efficient regulatory regime it is also important to bear in mind the convergence of gas and electricity markets. The main driver for network developments tend to be large 'anchor' customers, mainly combined-cycle gas power generators (CCGT) that are supplied from the transmission network. Once a transmission network has been build to supply anchor customers it may become economically viable to develop a distribution network to supply smaller customers in developing countries.

24. In most developing countries, policy, regulatory and institutional arrangements that govern the relationships between the power and gas sub-sectors are weak and underdeveloped. The absence of effective regulation, that covers both gas and electricity markets, potentially hinders the efficient expansion of the gas and power sectors. The convergence of gas and electricity markets and the costs associated with establishing an efficient

regulatory framework has encouraged many industrial and developing countries to set up a joint gas and electricity or multi sector regulator.

25. The Bank can play a lead role in facilitating the development of downstream transmission and distribution gas network in developing countries. Bank staff can provide technical assistance that supports governments in developing sound energy sector policies and pricing methodologies that allow for an efficient market structure to evolve. Bank staff have also wide experience in advising governments on reforming, corporatizing and unbundling state-owned energy companies. Developing an efficient legal and regulatory regime for downstream gas markets in developing countries requires political commitment and governments that endorse gas market reform, restructuring and private participation. If that commitment is communicated, Bank staff have access to a wide pool of resources to assist governments in building relevant regulatory capacity and institutions and create an investment climate and a legal environment that promotes private participation in both the upstream and downstream sector.

PUBLIC AND PRIVATE PARTICIPATION

Gas Exploration and Production, LNG and Export-Oriented Pipelines

26. Until 1990, private participation in the gas sector in developing countries was mostly limited to upstream gas exploration and production and Liquefied Natural Gas (LNG). Foreign direct investment by international oil and gas companies played an important role in these areas in the past and is likely to grow in importance, particularly for LNG facilities and export-oriented pipelines.

BOX 3

Export oriented pipelines included the Maghreb pipeline from Algeria to Morocco to Europe, the Bolivia-Brazil pipeline, section of the Yamal pipeline in Belarus and Poland, the Yadana pipeline from Myanmar to Thailand, Gasoducto Cruz del Sur from Argentina to Uruguay and Brazil, and four pipelines from Argentina to Chile (GasAndes, Gas Atacama, Gasoducto del Pacifico and NorAndino). The last four projects, which launched the development of natural gas business in Chile, were developed by fully private consortia on a competitive basis.

27. Exploration and development of gas fields in developing countries have traditionally been carried out by private or public-private partnerships where international oil and gas companies bring capital and know-how. Production Sharing Contracts (PSC), which enable the public sector to transfer exploration and production risk to the private sector, form the contractual basis for revenue sharing in many countries and have been successfully applied in Asia and elsewhere.

28. Public-private partnerships have also played a key role in the LNG sector, and have developed LNG facilities in Abu Dhabi, Brunei, Indonesia, Malaysia, Nigeria, Oman, Qatar and Trinidad and Tobago among others, mainly to supply industrial markets in the United States, Western Europe and Japan. Different players are involved in different parts of the LNG chain. In 2001, more than 60 percent of the equity in global LNG liquefaction capacity was owned by state companies, in some cases in a joint venture with a major oil and gas international company. Major international companies and utilities account for most of the rest of global LNG capacity. In many cases, a significant proportion of the capital has been raised from commercial banks and export credit agencies and international agencies. There are many projects for re-gasification plants in developing countries, and to date plants are already operational in India, the Dominican Republic and Turkey and are at an advanced planning stage in China. The involvement of export credit agencies and multilateral lending agencies will be essential to get more of those LNG facilities off the ground.

29. The private sector and public-private partnerships also played an important role in the construction of export-oriented pipelines.¹¹ Developing countries with gas reserves and lack of domestic gas network seek to export gas to industrial markets to earn revenue. Export-oriented gas pipelines from developing countries such as Algeria and transition economies such as Russia, to industrial countries in Western Europe were mainly financed by the public sector (that is government-owned utilities). Some of the transmission pipeline network between Mexico and the United States was financed by public-private partnerships.

30. International gas trade has grown rapidly in the past decade and will be a major source of revenue for many developing countries in the decades to come. Future private investments in LNG facilities will be crucial and it can be expected that this will be a major focus of investment for many international utilities. International electricity and gas companies are likely to increase investment in export-oriented projects from developing (and transition economies) to be able to meet their gas supply commitments with customers in industrialized countries.¹²

31. At the same time, there are countries and regions with significant gas reserves that are less attractive for international public and private investors due to high political and economic risk or remoteness from any markets (stranded gas)¹³. Some developing countries have a resource policy that requires a high gas reserves/production ratio that prevents them from earning export revenues and discourages new exploration activities by international investors. IDA and IBRD should provide technical assistance to transfer international experience on the upstream sector and IFC and MIGA may provide financial assistance to mitigate risk and attract private capital and public-private partnerships to kick-start gas production, LNG projects and the construction of export-oriented pipelines in these regions.

The Downstream Transmission and Distribution Network

32. The 1990s has seen a significant increase in private participation in the downstream gas network in developing countries. The increasing participation has resulted mainly from a growing demand for new gas transport facilities in domestic markets, public sector budget constraints, and coincides with a growing consensus in favor of private participation in infrastructure industries. However, private participation in downstream transmission networks, and in particular in distribution networks, in many developing countries remains relatively small and there is a potential for growth.

¹¹ *Cross-Border Oil and Gas Pipelines: Problems and Prospects*, UNDP/ESMAP, June 2003, Paul Stevens and Robert Bacon.

¹² Investment in new LNG facilities in Africa and the Middle East and export-oriented pipelines is expected to increase over the coming decades, mainly driven by cost reductions of liquefying and re-gasification plants, and increasing demand for gas in Europe and the United States.

¹³ The Africa Gas Initiative investigated options for utilizing stranded and flared gas, including for Gas-to-Power, LPG extraction and other industry usage and Gas-to-Liquids (GTL). *Africa Gas Initiative, Main Report, Volume 1, February 2001*, Mourad Belguedj and Henri Beausant.

33. The distribution of natural gas is in its infancy in many developing countries. In contrast, in many transition economies (most notably in Eastern Europe) the distribution sector is highly developed (mostly based on public funding). In both cases there are substantial obstacles to private sector participation as the main vehicle for investment.

34. Most infrastructure projects with private participation fit in one of the following four categories – divesture, greenfield projects, management and lease contracts, and concessions¹⁴. The type of private sector involvement varies with the characteristics and peculiarities of a country’s gas industry and network.

35. In a divesture (that is full or partial) a private investor buys an equity stake in a state-owned enterprise through an asset sale, public offering or mass privatization program. Under a greenfield project a private entity (or a public-private venture) builds and operates a new facility for the period specified in the project contract¹⁵. In case of management and lease contracts a private entity takes over the management of a state-owned enterprise or elements of it, such as exploration and production, for a given period. The facility remains in the ownership of the public sector, and investment decisions and financial responsibilities also remain with the public sector. Contracts, where a private entity takes over the management of a state-owned enterprise for a given period during which it also assumes significant investment risk, are often referred to as concessions.

BOX 4

Divesture takes different forms across regions. In Latin America (such as Argentina) and some countries in Eastern Europe and Central Asia (such as Hungary and Kazakhstan) divestures were usually structured as the sale of controlling stakes to strategic operators, which took control of the privatized companies. In other countries in Europe and Central Asia (such as the Czech Republic) divestures took the form of voucher privatizations, with control of the privatized companies remaining with the government. In East Asia and Pacific (China, the Republic of Korea, Malaysia, and Thailand) natural gas transport facilities were divested through public offerings of minority stakes on local and regional stock exchanges, with the government retaining control of the companies.

36. The vast majority of private participation in the downstream gas sector is in greenfield projects and divestures. Divestures dominate in countries with well-developed pipeline network. Private participation in greenfield projects occurs mainly in countries with little or no transportation network and often in combination with broader reforms aimed at liberalizing gas markets. Management and lease contracts and concessions are rare in the natural gas downstream sector.¹⁶

37. Private participation in the downstream transmission and distribution of natural gas has increased significantly over the last decade in developing countries, and international experience shows that the private sector can play a leading role in developing or expanding the natural gas industry.¹⁷ However, some developing countries are unable to attract enough private investment due to country risk, governance and payment issues. Governments in these countries must take policy actions to address these shortcomings, and in some cases public involvement will be necessary to mitigate these risks and provide reasonable rate of returns for investors. Public sector participation is particularly required for distribution. Capital costs for gas distribution construction are high and depend on a number of factors: household density in the city, geographical distribution of customers, and the mix of commercial/industrial and residential customers in the area (and their disposable income).

38. Demand plays an important role in the economics of gas distribution network. The consumption volumes for residential customers depends on the heat load during the winter months and other residential gas consumption such as water heating and cooking. The tropical and subtropical climate conditions of many developing countries do not require space heating of residential and commercial premises and restrict the potential usage of natural gas to cooking and water heating that tends to make the development of distribution network to residential customers uneconomic. In addition, customer connection charges tend to be high in many developing countries and this reduces access of natural gas to poorer income groups. Uncertain demand forecasts, long pay back and build-up periods, and payment risk from customers (both domestic and commercial) make private financing of distribution networks challenging. Gas pricing,

¹⁴ Boundaries among these four categories are not always clear, and some projects have features of more than one category.

¹⁵ When ownership is transferred to the Government at the end of the project period they are referred to as BOT or BOOT contracts.

¹⁶ Management contracts exist in the upstream gas sector where Mexico and Venezuela, whose constitution prohibits foreign ownership of oil and gas reserves, are currently developing contracts with international investors.

¹⁷ Bulgaria’s State Energy Regulation Commission (SERC) recently published a tender that will allow private investors to bid for a 35-year license to develop and run a gas distribution network in a region of Bulgaria.

the cost of metering and payment collection are also often a deterrent for private investors to enter the market.

39. A number of multilateral and regional institutions provide financial and technical assistance to downstream gas infrastructure projects, including the World Bank. Development agencies, as well as national and multilateral expert credit agencies, will continue to play an important role in backing transmission and distribution pipeline projects in the future and it is important that there is a close dialogue between the Bank and other donor organizations to ensure financing is provided for the most viable projects in a systematic manner with the overall objective to minimize competitive distortions and promote the efficient operation of the industry.

STRATEGIES FOR EFFECTIVE BANK PARTICIPATION

40. The World Bank Group's lending, investment and advisory services are designed to promote public and private gas infrastructure projects in developing countries by providing policy advice to help governments build credible, stable policy and legal and regulatory frameworks that support infrastructure projects generally and by offering different types of finance for specific projects, including loans, guarantees, equity investments, structural lending and political risk insurance.

41. The various organizations of the World Bank Group – IBRD, IDA, IFC and MIGA – increasingly work together in providing financial support to the same projects, combining their comparative advantage to catalyze private investment.

42. The World Bank Group announced in 2000 that it would conduct a comprehensive review of its activities in the extractive industries (EI) – oil, gas, and mining production – in response to concerns expressed by a variety of stakeholders, primarily environmental and human rights organizations. The review, which included an independent evaluation of WBG activities in EI (OED/OEG/OEU), a CAO report, and a separate independent stakeholder consultation process headed by Dr. Emil Salim, concluded in January 2004. The WBG's final Management Response is provisionally expected around June, 2004. Of special relevance to natural gas are the recommendations of the reports that:

- IBRD and IDA should help countries remove subsidies from carbon-based fuels, taking into account the potential impact on the poor;
- WBG lending should concentrate on aggressively promoting the transition to renewable energy and endorsing natural gas as a bridging fuel - building new pipelines and renovating leaking ones and funding fuel switching from coal to gas in power generation;
- The WBG should ensure that local communities benefit directly from EI projects (e.g. through supplying gas to communities situated close to production areas or transmission pipelines).

The reports also highlight the need for:

- an **integrated strategy** for World Bank Group activities in extractive industries¹⁸;
- increased **focus on governance** by the World Bank Group – both in the context of projects and in its dealings with resource rich countries generally;
- increased **disclosure and transparency** about revenues received by governments, about project outcomes and World Bank activities;
- **environmental issues** including concerns about particular processes and sensitive and biodiversity-rich areas; and
- **greater use of World Bank Group convening power to** advance the sustainability agenda in the extractive industries.

Upstream

43. In natural gas production and LNG facilities, the private sector or private-public partnerships have taken the lead role in most developing countries. Where the private sector is reluctant to invest in upstream gas facilities, the World Bank may have a role to facilitate investment, including addressing institutional, regulatory and policy shortcomings for upstream development. The current IBRD and IDA policy is not to get directly involved in financing exploration activities while MIGA and IFC provides financial products to encourage private participation in gas production and in LNG.

¹⁸ The internal evaluations recommended that such an integrated strategy should be designed to transform resource endowments into sustainable development. The strategies should incorporate governance issues, and the use of EI revenues to support development priorities. They will require closer cooperation between the WBG and other stakeholders.

44. The World Bank can provide technical assistance on international best practice fiscal regimes, international gas contracting, right management, access to LNG terminals and processing plants, rent sharing methods and transparent revenue management frameworks to facilitate private capital in the upstream sector.

45. Regional and international gas trade is rapidly growing. An increasing part of international gas trade takes place through LNG and many projects for exporting LNG from developing countries to Europe and in particular to North America are at a planning stage. In addition, re-gasification plants are planned in several developing countries, including China and India.

46. The WBG can play an important financing role in those markets to get projects off the ground. For export-oriented gas pipelines, public and private partnerships may be needed to bring political and legal stability to the venture. In this case there may be a role for a combination of Bank Group products, including IBRD/IDA and IFC/MIGA working in tandem. Export projects are typically very large, and the World Bank Group's role tends to ensure the overall quality of the investment as well as providing funding. In the case of export-oriented gas pipeline projects, where pipelines transit more than one border, Bank staff should seek to assist governments in developing relevant inter-governmental agreements to lower country risk. These would include agreements on principles for transit fees and how to overcome overarching legal jurisdictions in regards to taxes and other financial matter that would impact the economics of the projects, and how to regulate the activities. Bank staff should also ensure that the Bank's environmental and social policies, procedures and guidelines are applied to the project within the country that benefits directly from Bank support through direct lending or other means of credit support. For adjacent countries that include contiguous project infrastructure but where the Bank may not be providing direct financial support, Bank staff should ascertain that the procedures are reasonably equivalent to the Bank's own policies and procedures.

Downstream

47. The majority of investment in the downstream sector in developing countries is required for the construction of gas transmission pipelines to supply anchor customers such as power plants. Bank staff should provide advice in the areas of gas market structure and reform and development

an efficient legal and regulatory regime for downstream gas markets in client countries to attract private investments. Partial Credit Guarantees and Partial Risk Guarantees in combination with IFC and MIGA financial products should be considered for such projects. Direct Bank lending to state-owned transmission companies has had low priority in recent years. This may change in some countries with well performing state-owned companies, if the share of gas in the energy balance is to increase.

48. Creating or extending gas distribution networks in some developing countries with large demand (commercial and smaller industries or residential heating consumption in cold climates) may be economically feasible and the Bank has a major role in encouraging and supporting such initiatives.

49. The main issues in the sector are related to the creation of viable distribution networks, economic regulations that allow private investors to recover the cost of providing pipeline networks, and the treatment of connection costs and payment collection. Partial Credit Guarantees, MIGA and IFC support can be considered for private sector projects. The Bank can play an important role in developing financial schemes for connecting poorer customers to the network. Good performing public distribution companies should be considered for new Bank lending.

50. Transmission and distribution management contracts or leases are unlikely to be a suitable long-term solution and should be considered selectively, and only if continued public sector management and private sector investment in the short- and medium-term are both not possible.

51. Small scale and rural gas use is a newly emerging area of interest. The technology for small scale distribution is still evolving. Investments are typically small and spread over a wide area. Issues of management and ability to pay are important. Community, municipal and small and medium sized enterprises are the key players under this scheme and the public sector and international donors play a key part in providing financing. Small and medium sized enterprise credit lines offer one means of funding, as does the Bank Group's municipal lending program. IDA/IBRD provides support but due to the small scale of the interventions, potentially high transaction costs and the difficulty of centralized management by government there are only a few countries that have experienced some success with developing small scale local gas projects, most notably Mozambique.

Matrix of World Bank Group Gas Sector Interventions

SUB-SECTOR	KEY ISSUES	PRIVATE SECTOR INTEREST	GOVERNMENT APPROACH	WORLD BANK GROUP INSTRUMENTS
UPSTREAM				
Exploration and Production	<ul style="list-style-type: none"> • Design of contract terms in PSCs • Revenue management • Fiscal incentives • Reservoir and rights management • Access to processing plant • Carbon credits • Ownership of associated gas • Access to domestic and international gas markets • Associated gas flaring reduction • Transparent legal and regulatory framework 	<p>HIGH but. . . .</p> <p>Policy, contractual and fiscal environment has to be right</p> <p>Transparent, competitive bid processes for E & P rights seen as desirable by private sector</p> <p>Transparent revenue management processes increasingly important</p> <p>Direct access to downstream anchor customers increasingly important</p>	<p>HIGHLY RECEPTIVE</p> <p>Most governments aim for substantial private sector investment in E & P which is high risk capital</p> <p>By using PSCs governments can shift E & P risks to E & P companies</p> <p>Public investment role often in joint ventures private investors</p>	<p>Technical Assistance on key issues</p> <p>No financing of gas exploration activities by WBG</p> <p>IBRD guarantees</p> <p>IDA credits</p> <p>IFC loans, equity financing</p> <p>MIGA political risk insurance</p> <p>PCF for carbon credits</p>
Liquefied Natural Gas (LNG)	<ul style="list-style-type: none"> • Design of long term supply contracts • Fiscal incentives • Ownership of associated gas 	<p>HIGH but. . . .</p> <p>Policy, contractual, fiscal and regulatory environment has to be right</p>	<p>HIGHLY RECEPTIVE</p> <p>Most governments aim for substantial private sector investment in LNG facilities</p>	<p>Technical Assistance on key issues</p> <p>IFC loans, equity financing</p> <p>MIGA political risk insurance</p>

Matrix of World Bank Group Gas Sector Interventions

SUB-SECTOR	KEY ISSUES	PRIVATE SECTOR INTEREST	GOVERNMENT APPROACH	WORLD BANK GROUP INSTRUMENTS
Liquefied Natural Gas (LNG) (cont.)	<ul style="list-style-type: none"> Access to international markets 		Public investment role will tend to be in a joint venture with private parties	
Export-oriented Pipelines	<ul style="list-style-type: none"> Contract design Political risk Divergence of energy sector reform in various countries WB environmental and social policies Ownership and operation of pipeline Profit and rent sharing Inter-Governmental Agreements and political dialogue Transit fees Legal and regulatory framework that governs pipeline Third-Party Access 	<p>HIGH</p> <p>Private investment favors large regional export schemes, to solvent markets</p> <p>International gas and electricity utilities invest in export-oriented pipelines to supply customers in industrial countries</p> <p>LOW</p> <p>Many developing countries around the globe do not have geographic access to customers in industrial countries and only are able to export to neighboring or regional markets that are less liquid and developed</p>	<p>MODERATELY RECEPTIVE</p> <p>Most governments assume continued state ownership and operational role but increasingly open to private investment in export-oriented pipelines</p> <p>Most governments like the idea of interconnection, but absence of functioning internal or regional markets makes it difficult</p> <p>Projects are unlikely to produce expected benefits unless country-level reform is successful</p>	<p>Technical Assistance on key issues</p> <p>IBRD guarantees</p> <p>IDA credits</p> <p>IFC loans, equity financing</p> <p>MIGA political risk insurance</p>

Matrix of World Bank Group Gas Sector Interventions

SUB-SECTOR	KEY ISSUES	PRIVATE SECTOR INTEREST	GOVERNMENT APPROACH	WORLD BANK GROUP INSTRUMENTS
DOWNSTREAM				
Transmission (including Storage and Regasification terminals)	<ul style="list-style-type: none"> • Network expansion and rehabilitation • Capacity rights • Third-Party Access • Tariff methodology • Anchor customers • Long-term contracts • Unbundling of transportation activity from commodity • Economic regulation 	<p>MODERATE</p> <p>Fair, predictable, and transparent regulatory framework is critical for attraction of private investors</p> <p>Private investors seek long term contracts with solvent anchor customers to mitigate risk</p>	<p>MODERATELY RECEPTIVE</p> <p>Most governments assume continued state ownership and operational role but some developing countries are gradually receptive for private investment in new lines</p> <p>Political commitment required to allow for private participation</p> <p>Legal and regulatory changes crucial</p>	<p>Technical Assistance on key issues</p> <p>IBRD guarantees</p> <p>IDA credits</p> <p>IFC loans, equity financing</p> <p>MIGA political risk insurance</p>
Distribution	<ul style="list-style-type: none"> • Network investment • Economic regulation • Unbundling of distribution network business from supply activities • Cost-covering tariffs • Subsidies for poor customers • Social safety nets 	<p>LOW</p> <p>Fair, predictable, and transparent regulatory framework is critical for attraction of private sector participation</p> <p>Investment needs are high in particular in distribution to small customers, in new markets an immature business may have long cost-recovery times</p>	<p>MODERATELY RECEPTIVE</p> <p>Many governments recognize that private sector participation is highly desirable but many also are reluctant to push pricing reform too fast or cede control of a strategic sector</p> <p>Important to deal up-front with social, labor issues (such as subsidies)</p>	<p>Technical Assistance on key issues</p> <p>IBRD guarantees</p> <p>IDA credits</p> <p>IFC loans, equity financing</p> <p>MIGA political risk insurance</p>

Matrix of World Bank Group Gas Sector Interventions

SUB-SECTOR	KEY ISSUES	PRIVATE SECTOR INTEREST	GOVERNMENT APPROACH	WORLD BANK GROUP INSTRUMENTS
Distribution (cont.)	<ul style="list-style-type: none"> • Payment collection • Connection costs and policy • Metering requirements • Wholesale or retail competition • Rural and small scale gas use • Collection policy 	<p>Key challenge is how to package Government reform initiatives and Bank Group products to increase private sector interest</p> <p>Emerging local and regional players can play an important role as operators or minority partners</p>	<p>Avoiding tariff shock is key political concern</p> <p>Some governments show reluctance regarding regulatory independence</p> <p>Political economy of pricing puts regulatory agencies in difficult position</p> <p>Regulatory and policy linkages between power and gas are crucial</p>	IFC municipal funds for small scale gas



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