

Discussion FORUM

A Natural Gas Sector "Roadmap" for Developing Countries: Increased Utilization for Economic Development

Washington-area professionals gathered on January 22nd for the thirteenth IRG Discussion Forum. Panelists Dean Girdis, Director of PFC Energy's Gas and Power Group, and Audie Setters, Vice President of International Marketing and Business Development, Chevron/Texaco Global Gas, discussed the fact that development of oil resources has historically overshadowed natural gas potential in the developing world. Yet, there are opportunities to increase gas usage to meet the much-needed energy demand requirements in developing-country markets while at the same time monetizing gas and spurring economic development. PFC Energy has summarized the the issues on this topic and are calling for the development of a Natural Gas Road Map.



The focus on developing oil resources has historically overshadowed natural gas development, particularly in much of the developing world. Why? Oil is the most easily monetized energy commodity in the world: it can be more easily exported than other energy forms; it is fungible and can be readily traded in world markets; and the risks associated with its exploration and production in developing countries can be well managed. As a result, finding and/or increasing oil exports has

been the focus of both developing countries and national and international oil companies operating in these markets.

This perspective began to change over the past thirty years with the development of long-distance-piped gas and LNG exports from developing countries to markets in the US, Japan, and Europe. Gas is becoming the fuel of choice and the focus of investment activities, largely because of growing power sector demand and the increased use of gas within the sector.

Most recently, interest has grown in identifying, developing, and monetizing developing-country gas resources via increased exports to developed markets. With increased competition for oil resources and growing demand for gas, International Oil Companies (IOGCs) are seeking new investment targets in gas. This new focus is forcing them to look outside OECD in higher-risk areas such as Asia, West Africa Coast, Russia, and Latin America. Concurrently, governments and National Oil Companies (NOCs) in

these areas have renewed interest in both increasing gas exports to meet rising global gas demand and also in increasing domestic gas utilization to meet domestic energy needs.

Natural gas development is different than oil

Significant quantities of natural gas are available throughout the world—some 5,500 trillion cubic feet (roughly equivalent to total oil reserves). Yet, most gas is located far from major demand centers of USA, Europe, and Japan, with principal gas reserves located in Russia (30.5%); Iran (14.8%); countries of the Former Soviet Union (35.5%); and the remainder of the Middle East (21%). Given the location of the gas, long-distance pipelines and LNG exports have driven gas monetization. In particular, improved technology and falling costs have continued to increase the competitiveness of LNG with indigenous supplies and

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long-distance pipelines in major demand centers.

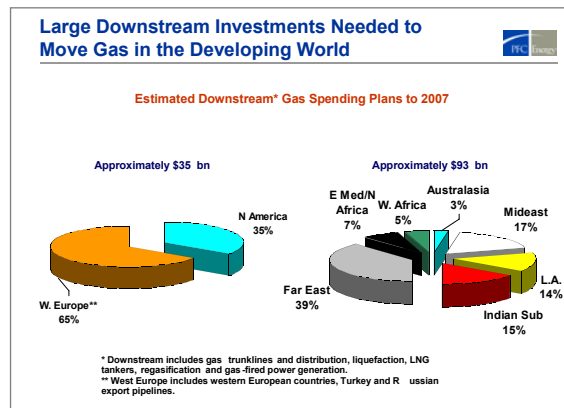
Second, given the location of vast gas reserves in the developing world, higher capital investment required for natural gas development, and the nascent stage of regulation and market development in many gas-exporting countries, risk management and mitigation measures play a far greater role in gas development as compared to oil.

Third, export-driven focus on gas development in developing-country markets has led to the exclusion of increasing gas utilization in domestic markets. Opportunities exist to increase gas use to meet strong energy demand in these markets while also monetizing gas and spurring economic development.

Significant downstream sector investment is needed

Meeting greater natural gas demands in developed and developing country markets and realizing the potential of natural gas in the developing world will require significant downstream sector investment. In developing countries, more than \$90 billion will be required—well beyond the financing capability of most governments and NOCs. Indigenous private sector capital, bilateral and multilateral assistance, and, most importantly, IOGC involvement will be required for such development to occur.

A key barrier to increasing domestic utilization has been a lack of investment in such downstream infrastructure. Hindering this investment has been an absence of gas development plans. Necessary sector reforms to promote increased investment flows to these markets will require detailed sector plans, market



reform, and sector transparency.

Despite the past focus on exports, many developing-country markets show both a growing and yet-untapped potential demand for gas. Domestic utilization is increasingly an attractive—if not ignored—option for countries with both large and even small (and stranded) gas reserves and those with limited and/or no indigenous gas supplies.

This has occurred for a number of reasons. First, export markets may not always be the most viable option to monetize gas. Piped gas exports are limited to those countries in close proximity to major demand centers, and the global LNG market is increasingly competitive with many large well-positioned IOGCs and NOCs. Thus, not all gas can be exported. Concurrently, over the past twenty years, gas has become more important for power generation:

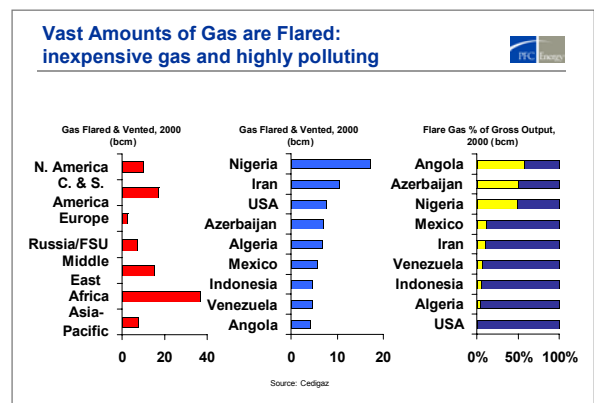
higher efficient combined cycle gas-fired turbines have made power generation from gas very competitive with both diesel and even coal. For commercial and residential consumption, gas often can easily displace growing LPG usage. Last, from a technical

perspective, many smaller gas reserves may be well suited to domestic utilization given reserve characteristics and proximity to localized demand centers.

One key driver of promoting increased gas use in these markets has a reduction in the vast

amounts of flared gas from developing countries. As presented in chart below, developing countries represent the largest portion of flared and vented gas in the world.

Much of the flared and/or vented gas is both inexpensive and highly polluting. Increasing either export opportunities or domestic gas utilization of this gas is the most effective way to remedy this growing environmental problem. It would also further the role of gas in promoting economic development.



Sector reform and access are key issues to gas development

Despite the great interest on the part of governments, NOCs, and IOGCs in further developing gas reserves, market and sector reform is essential if additional investment

in many developing countries is to continue.

Efforts to support market reform and sector transparency are key to stimulating and supporting gas sector development. Both China and Brazil provide instructive insight on the ongoing process of such market transformations. China has promulgated a natural gas law and accompanying regulations, with the assistance of the World Bank, to help establish a clear and transparent regulatory process to promote sector investment; IOGCs responded positively to these efforts. Brazil underwent a process of downstream gas and power sector privatization and some market reform initiatives; however, given the absence of full market reform of both the gas and power sectors, among other factors, investment and increased gas sector utilization have been stymied.

Reform, in the context of a clear government policy, increased transparency, and greater commercialization of NOCs will facilitate private sector investment and encourage both increased exports and domestic gas utilization. Ultimately, this will lead to increased government take from the energy sector and more robust economic development.

Companies and government are now more willing to confront traditional barriers that often discouraged greater gas sector development. These include:

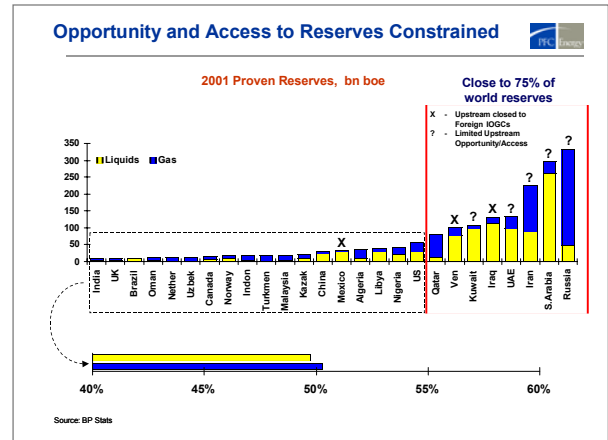
- ♦ Mitigation of country and market risk;
- ♦ Development of transparent regulatory, pricing framework, and institutional capacity; and

- ♦ Increasing financing appetite for developing country markets.

NOCs and governments need assistance on understanding the respective potential of their gas sectors, both domestically and as an export earner, and on initiating and facilitating the reform process to support such development.

Concurrent with these reform initiatives is the limited upstream access to oil and gas reserves in many parts of the world. As

presented in the following chart, upstream access to about 75% of world oil and gas reserves, located primarily in the Middle East, is either restricted to NOCs or limited access is granted to IOGCs.



About the Panelists

Dean Girdis, Director of PFC Energy's Gas and Power Group, is a specialist in energy policy, gas market development, power portfolio analysis, renewable energy, gas and power development in China, and corporate sustainability. Recent work has focused on energy policy in developing countries, assessment of power and gas development opportunities, and renewable energy policy and carbon trading. Prior to his tenure at PFC, Dean was CEO of a procurement and trading software company and worked independently with clients on energy policy, reform and privatization, and the development of competitive gas and power markets in Africa, Latin America, and China. Dean also consulted for Arthur D. Little and Environmental Resources Management, working on energy financing and economics, policy, corporate strategy, natural gas development and sustainable development. He holds an M.Sc. in Resource Economics and Policy from the University of London and a B.S. in Management from Babson College.

Audie Setters, Vice President of International Marketing and Business Development, ChevronTexaco Global Gas, manages ChevronTexaco's gas commercialization activities outside the US and Canada, including LNG project development; oversight of direct gas marketing regional offices in Singapore, Tokyo, London, Houston, San Ramon, Beijing and Seoul; and relationship building with key customers and government officials in target countries. Prior to joining ChevronTexaco in 2001, Audie held positions with Texaco, Inc. as Executive Director of Texaco Gas International Inc., Director of Business Development for Texaco Australia Pty.; and Director of New Business Development, Europe & Africa. While with Texaco Canada he worked in Exploration, Finance, Government and Public Affairs, International Contracts and Negotiations, and Natural Gas Marketing. Audie holds a BComm (Finance) from the University of Calgary.

A "Roadmap" for Gas Sector Development

A detailed roadmap for gas sector development in developing-country markets would assist in identifying target markets and in facilitating the necessary reforms to develop these markets. Such a "Roadmap" would promote sector reform, spur foreign investment, support increased domestic gas utilization, and stimulate economic development.

Issues that would need to be addressed with such a "Roadmap" would include:

- ♦ Evaluation of gas resources for domestic development and export;

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February 19	Water and Security
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April 15	Middle East Oil
May 20	Rule of Law
June 17	Knowledge Management

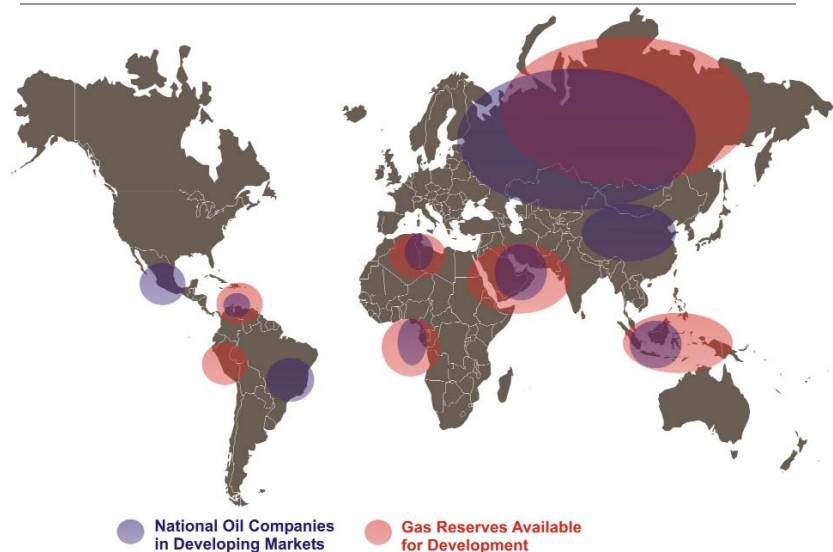
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- ♦ Analysis of government policies, specifically energy and gas related, and sector development plans;
- ♦ Identification of sectoral and institutional limiting factors;
- ♦ Definition of the role and responsibilities of NOC and influence of Government; and
- ♦ Review of reform and institutional requirements.

The focal areas of such a roadmap would need to be based upon gas reserves available for development, as well as the existence of a relatively well-functioning NOC within those markets. In most parts of the developing world, while these conditions co-exist, a further and more detailed examination of both reserves and the governance of the energy sector and the NOC/government involvement are required.

Primary NOCs in Developing Markets and Major Available Gas Reserves for Development



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