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The Geopolitics of Natural Gas

Natural gas is rapidly gaining in geopolitical importance. Gas has grown from a marginal fuel consumed in regionally disconnected markets to a fuel that is transported across great distances for consumption in many different economic sectors. Increasingly, natural gas is the fuel of choice for users seeking its relatively low environmental impact, especially for electric power generation. As a result, world gas consumption is projected to more than double over the next three decades, surpassing coal as the world's number two energy source and potentially overtaking oil's share in many large industrialized economies.

Currently, most natural gas is transported by pipeline. Elaborate pipeline networks in North America and Europe connect consumers to production areas and provide an important source of energy. In Asia, liquefied natural gas (LNG) is the primary means of connecting end-users to supply, most of which originates in remote locations and must be refrigerated into liquid form, allowing easier transport by vessels across oceans. International trade in LNG, though limited in application, has been occurring for more than 30 years and involves shipments from close to a dozen countries. In the 1990s, roughly 5 percent of world natural gas consumption moved as LNG, but this is expected to rise as mature producing basins in the industrialized West, particularly in North America, begin to decline. Currently, Japan is by far the largest importer of LNG, consuming close to two-thirds of all LNG traded worldwide. South Korea is the second-largest importer of LNG.

About three-quarters of the world's proven gas reserves are located in the former Soviet Union and the Middle East—far from the areas where demand for gas is expected to rise most rapidly. Indeed, construction of transportation infrastructure currently is the major barrier to increased world natural gas consumption. According to the International Energy Agency, cumulative investments in the global natural gas supply chain of $3.1 trillion, or $105 billion per year, will be needed to meet rising demand for gas between 2001 and 2030. Exploration and development of gas fields will represent over half of this required investment, with more than two-thirds of new capacity needed to replace declines in existing fields. Investment in LNG facilities is expected to double after 2020.

The Energy Forum of the James A. Baker III Institute for Public Policy and Stanford University's Program on Energy and Sustainable Development released in May 2004 a major study of the geopolitical impact of transitioning to a gas-fed world.

The two-year Baker Institute/Stanford University study includes seven historical case studies on the special challenges of investing in large-scale, long-distance gas production and transportation infrastructures. These studies concentrate on countries that do not have the long histories of cooperation and the stable legal and political environments that often are seen as essential to attracting private investors. The expansion of gas as a global fuel depends in large part on success in attracting investment within such risky political, institutional, and economic environments. The studies examine the factors that explain why some projects were built and why alternative viable projects stalled. Case studies cover competing projects in Algeria, Russia, Turkmenistan, Indonesia, Trinidad and Tobago, the southern cone of Latin America, and Qatar (see working paper, Hayes/Victor).

Simultaneous to the analyses of historical case studies, a group of scholars at Rice University developed a dynamic spatial general equilibrium economic model, known as the Baker Institute World Gas Trade Model (BIWGTM), to simulate the development of global gas markets between 2005 and 2040. The reference case model assumes resources are developed and transported to market based solely on commercial considerations. However, scenario analysis allows for examination of the impacts on the global market of various geopolitical, social, environmental, and other noneconomic impediments to infrastructure development. The Baker Institute World Gas Trade Model is based on geologic assessments of proved and potential natural gas resource, economic assessment of resource development costs, the cost of developing and utilizing pipeline and LNG infrastructure, end-use demand, and interfuel competition. The model honors longstanding economic principles for the optimal extraction of depletable resources, determining the least-cost schedule for the development of gas resources and transportation routes to satisfy consumer demands. Some of the experiments performed in the modeling study include examination of the impacts of restricting the development of pipeline infrastructure in northeast Asia, the potential for cartelization in natural gas, and the effects of accelerated demand in China (see working paper, Hartley/Medlock).

The study findings include four broad conclusions that apply to the assumed shift to greater reliance on natural gas:

1) An integrated global gas market will emerge in which events in any individual region or country will affect all regions.
2) The role of governments in natural gas market development will change dramatically in the coming decades.
3) The rising geopolitical importance of natural gas implies growing attention to supply security.
4) The rapid shift to a global gas market is not a certainty. It depends enormously on creating the context in which investors will have confidence to deploy vast sums of financial and intellectual capital; it requires finding solutions to the adverse social and political consequences of developing natural resources in countries where governance is weak; and it assumes a continued pull from the growing world electricity sector.

Emergence of an Integrated Global Gas Market

A major conclusion of the joint study is that a shift is taking place today from a world of regionally-isolated natural gas markets to an international, interdependent market. A series of developments—increasing demand, technological advances, cost reductions in producing and delivering LNG to markets, and market liberalization—is spurring this integration of natural gas markets. Such market interconnections will have major ramifications for both large gas consumers and producers.

Results from the study's economic modeling suggest that the shift to a global market will make each major consuming or producing region vulnerable to events in any region. Disruptions or discontinuities in supply or demand will ripple throughout a global market. Moreover, the timing of any major gas export project coming online will affect prices and project development in all regions. Policy-makers now focus on the macroeconomic effects of variable oil prices; similar concerns will arise with the transition to gas.

Major consuming countries will have to learn to consider the interdependencies of a global gas market. While large gas importing countries have in the past been focused on key supply relationships (see case studies, Victor/Victor; Hayes; and Mares), this point-to-point approach to project development is unlikely to prove as effective for the future where price and supply security in the gas market will become more like the commodity oil market of today.

According to base runs of the BIWGTM, in a world of fully integrated natural gas markets, gas users in Japan, for instance, will have a vested interest in the stability of South American gas reaching the U.S. West Coast; those in the United States will have concern about natural gas policy in Africa and Russia, and the European Union will be compelled to monitor the political situation in gas-producing regions as remote as the Russian Far-East and Venezuela.

Russia will play a pivotal role in price formation in this new, more flexible and integrated global natural gas market, the model suggests. It was one of the first major gas exporters to the European market and could use the nascent European pipeline network taking shape alongside the rising Russian exports (see case study, Victor/Victor). Russia benefits not only from its location and size of resources but also from its status as the key incumbent. Throughout the model period to 2040, Russia is expected to be a very large supplier to Europe via pipeline, exceeding 50 percent of total European demand post-2020. The model suggests that eastern Siberian gas will flow to northern China by the middle of the next decade. Strategically positioned to move large amounts of gas both east and west, low-cost Russian pipelines to Asia and Europe will link Asian and European gas prices. The model further suggests that Russia also eventually will enter the LNG trade in both the Atlantic and Pacific via the Barents Sea and Sakhalin, respectively, providing additional links between gas prices in North America, Europe, and Asia.

Other nations rich in natural gas resource, such as Qatar, Iran, and Saudi Arabia, also could become major players. However, they will be at a disadvantage because they must bear the fixed costs of market entry due to lack of existing infrastructure to carry their gas to the lucrative European and Asian markets. The model estimates that their entry is delayed until demand rises sufficiently to accommodate those incremental supplies. With the exception of Qatar, the countries of the Middle East are not expected to be major gas players in the next two decades, according to study predictions. Prolific Turkmen gas also may be slow to come to market due to political and economic barriers in moving that gas across rival Russia (see case study, Olcott).

The modeling work suggests that the United States market will remain a premium region as North American production fails to keep pace with demand and high prices pull gas supplies from around the world. Alaska is an important source of future supply, flowing to the lower 48 states by 2015 and replacing dwindling supplies from western Canada. While this new Alaskan resource is important for price stability, it does not collapse North American prices. Nor do Alaskan supplies eliminate the need for imported LNG, which today accounts for just 1.5 percent of U.S. gas supplies.

The international gas industry already is responding to this integration of supplies and major gas consuming regions. As liquidity in the market and the number of available supply alternatives have grown, the average distance between gas trading partners has declined, creating new opportunities for price arbitrage. In this new market context, there will be a reduced need for long-term bilateral contracts to hedge risks (see working paper, Hartley/Medlock; Hartley/Brito). Expectations about the future market evolution are influencing investment and trading decisions today, and this, in turn, is accelerating the change in market structure—a self-fulfilling prophecy.

Such a transformation already is taking place in the world gas market. More international oil companies are investing in major natural gas infrastructure projects without the security of fully finalized sales for total output volumes. Instead, companies are counting on their own ability to identify end-use markets at some future time, closer in line to the investment pattern that characterizes development of multibillion dollar oil fields. The expectation of a premium, liquid U.S. market is a key factor encouraging this change, as is liberalization of certain European markets, which allowed gas sellers to bypass European state gas monopolies and sell directly to large gas customers and power generators (see case study, Ball/Shepherd).

New Market Structures and the Changing Roles for Governments

Throughout most of the historical development of the gas industry, government has played the central role in creating markets for gas as well as in directing gas supply projects. Government-owned enterprises have built and operated the infrastructures that were essential to distributing the large volumes of gas that arrived with supply projects. Government-to-government agreements, usually backed with government-controlled financing, have been essential cement for the gas producer–consumer relationship.

However, as market liberalization takes hold in many key gas-consuming countries and global trading of natural gas expands, the role of government is changing from builder, operator, and financier of gas projects to a greater role as regulator and creator of the context for private investment. Historical case studies have allowed examination of how this market-oriented structure, which itself is part of a broader trend in the organization of modern states and economies, will affect the incentives to create new (greenfield) gas transportation networks that are essential if the world is to continue its rapid shift to gas.

In all the cases where gas has been supplied to a market that does not exist, case study findings suggest that governments have played a central role in “creating” demand for new import volumes of gas. Absent the state, very few, if any, of these projects would have been able to move ahead at the same speed or with the same volumes of deliveries.

Studies of the first-of-their-kind LNG export projects from Arun in Indonesia (1970s) and Qatar (late 1980s) to Japan show the importance of a government willing to orchestrate the investment—in these cases, the government of Japan and a small coalition of Japanese buyers. The first of these projects—Arun—rested on the willingness of the Japanese government—through the Ministry of International Trade and Industry (MITI) and Japan's export–import bank—to orchestrate the purchase of the gas and the timely construction of an infrastructure for using it. The Japanese government provided crucial financial support as Japanese trading companies launched the Arun venture. The government's interest was rooted in its high priority on energy security and a desire to diversify energy supplies away from coal and oil. In the context of Japan as an island nation, the government supported an infrastructure that was not a gas pipeline transmission grid (as seen in Europe) but, rather, a network of LNG receiving terminals, serving a cluster of relatively isolated local markets. Constraints on moving gas between those markets helped each local monopoly protect its position and thus invest with confidence in long-term returns. Lack of similar government backing for proposed sales of Arun gas to California meant contracts to that market languished in the face of Japanese insistence that it be given the right of first refusal on any increased gas exports from Arun (see case study, Lewis/von der Mehden).

Similarly, the role of the Japanese government and its buying coalition was important to Mobil Corporation's ability to get the Qatargas project off the ground in 1987. Although the strength of MITI and other crucial arms of the Japanese government had weakened considerably as part of a broader effort to expand the role for market forces in the Japanese economy, the role of a Japanese buying consortium, along with access to existing import infrastructure, was critical to the success of Qatargas in gaining financial backing and sufficient sales contracts. The timing of the project coincided with a reduction in Japanese concerns about the political stability of supplies from the Persian Gulf with a rising U.S. military presence in that region (see case study, Hashimoto/Elass).

In the same vein, much of the variation in the outcomes of the two proposed projects to pipe gas across the Mediterranean in the late 1970s also is due to the starkly different roles that the Italian and Spanish governments took toward the prospects of starting to import large volumes of gas. Like Japan, Italy was actively seeking gas imports and was willing to mobilize significant state resources to secure new energy supplies. Through its own export credit agencies, the government provided the bulk of financing for the Trans-Mediterranean (Transmed) pipeline project. State-owned Ente Nazionale Idrocarburi (ENI) was positioned at that time to orchestrate the Transmed project and the development of Italy's domestic gas transmission grid. State backing allowed ENI to invest with confidence and provided cover for international lending. Spain, on the other hand, did not have supporting policies in place and thus could not lead successful development of a major gas import project in the late 1970s and early 1980s (see case study, Hayes).

Importantly, other case studies show that the ready availability of large volumes of gas is not enough to create demand for gas in end-user markets. In markets where the state has avoided a central role in creating infrastructures, rapid gasification has not taken place. In the 1990s in Poland, for example, a large pipeline from Russia was constructed mainly to supply additional volumes of gas to the German market. Because it crossed Polish territory, large volumes also were available to Poland—yet that market has used very little of the available gas despite take-or-pay contracts for Polish delivery. The Polish gas market stalled in large part because no entity in the country was prepared to build the infrastructure needed to distribute gas, and coal was a plentiful fuel source. (See case study, Victor/Victor.)

Thus, case study findings sound caution about visions for rapid gasification in markets where gas delivery and domestic market infrastructure do not already exist and where the state is not prepared to back the creation of the gas delivery infrastructure. Indeed, the instance of most-rapid gasification that has been observed in any of the case studies is the one where the state played the most central role—the Soviet Union. A decision from the center to favor gas in the 1950s, orchestrated through central planning, catapulted gas from just 1 percent of total primary energy supply in 1955 to nearly one-third in 1980 (see case study, Victor/Victor). Of course, state intervention usually is neither the most economically efficient nor the only way to create a market, but these case studies suggest that state intervention accounts for much of the observed variation in first gas projects.

In looking at the role of the state in gas market development, it also is important to examine the role of government in market regulation. The case study of the Southern Cone provides two contrasting examples. The GasBol pipeline connecting Bolivia to Brazil was a favorite of both governments and multinational development banks looking to support market reform, transparency, and intraregional trade in the aftermath of a bilateral peace treaty. Under pressure from multinational organizations, market liberalizers, and domestic trade groups, the Brazilian government forced state-owned Petrobras to contract for the bulk of gas purchases from the pipeline and also encouraged the company to provide financial support for the investments in field development in Bolivia to be sure that the project went forward. But the lack of demand for gas in Brazil—in part due to the failure of the Brazilian government to create a regulatory context that would allow gas-fired power plants to sell their electricity—meant that GasBol could not survive financially. Petrobras was left on the hook for volumes of gas it could not sell (see case study, Mares).

The GasAndes pipeline from Argentina to Chile indicates the type of projects that seems likely to emerge in the absence of direct state support. The GasAndes project, a minor pipeline that connects gas fields in Argentina to a small number of power generators near Santiago, Chile, beat out its competitor, Transgas, because it was able to find private-sector buyers and environmentally driven government support for a limited, strictly commercially viable project. The liberalizing electric power market in Chile, along with the tighter air pollution regulations in badly polluted Santiago, created favorable conditions for the project.

In contrast, the Transgas project sought to build a much more elaborate gas distribution network in south central Chile, seeking to supply gas to new distribution companies that would serve industrial and residential gas consumers in addition to new gas-fired power generators. The rival project, GasAndes, sought to supply just large electricity plants in Santiago directly. The Transgas project was more costly, and payback would have occurred over a longer period and with greater uncertainty. Transgas sought a concession from the government to allow it to recover investments in the gas distribution grid; as political efforts to get that concession foundered, the GasAndes project moved quickly ahead (see case study, Mares).

On the supply side, the role of government has been equally important. Even where private firms actually have made the investments in developing gas fields and in building the transmission infrastructure, governments have been essential guarantors of long-term contracts that, historically, have underpinned most large scale gas infrastructure investment. In the past, investor risk has been mitigated by "take-or-pay" contracts. But new, more flexible contracting is being pressed on the industry as gas markets become more global and akin to a commodity. Gas-on-gas competition, new gas resale contract clauses, and joint investor/host country spot marketing strategies are creating uncertainties that are resulting in a new market structure for gas.

As the role of the state is weakening, the key anchoring role for gas projects is shifting to the private sector. In the old world, governments had deep pockets and a strategic vision that was organized around serving national markets and developing national resources. The development and implementation of this vision was often inseparable from the state-owned and supported enterprises whose charge it was to supply energy to the national market. In that world, gas projects were national ventures (see case studies, Hashimoto/Elass; Victor/Victor; Hayes).

In the new world, a handful of large energy companies with deep pockets and a similar strategic vision are taking over the role of creator and guarantor of the implementation process. These players are largely private, but they also include national energy companies that are now playing a larger role in the *international* marketplace—ENI, PetroChina, Petrobras, and others. This shift to large energy companies, however, is likely to mean that infrastructure development will increasingly be driven by commercial interests rather than national energy security objectives (see case study, Ball/Shepherd).

The advent of new, more commercially oriented players dominating the gas scene also will change the nature of how contracts are negotiated and enforced. In the regulated, state-controlled environment, it was relatively easy for governments and their bidders to tailor the terms of gas trade agreements for political ends. But as gas markets liberalize—especially in Europe, where countries are small and borders are plenty—directed gas trade is harder to sustain, especially as provisions, such as destination clauses, are undone. In the emerging commercially-driven environment, the role of courts as enforcers has grown—made possible, in part, by legal reforms that have accompanied the shift to markets and given courts and quasi-judicial bodies, such as regulators, greater authority. Although specialized industry media only now is focusing on the implications of this shift, case study investigation on this issue suggests that it has been under way for more than a decade (see case studies, Ball/Shepherd; Hayes).

Ironically, the importance of existing contracts may lie less in their enforceability but, rather, in their ability to tap a first-mover advantage. By facilitating the creation of sunk infrastructure costs, existing relationships act as a deterrent to others and a binding agent for the project investors. Once Italy had partnered with Algeria and had begun to lay pipe, huge incentives were created to continue cooperation (see case study, Hayes). Russia's contract with Poland partly deterred alternative (more costly) suppliers to that market. The ultimate discouragement to Norwegian supplies to Poland was the fact "on the ground" of Russia's pipeline (see case study, Victor/Victor).

The base run of the BIWGTM suggests that there are substantial advantages to first movers. For example, resource-rich players like Saudi Arabia and Iran must bear the fixed costs of market entry due to their lack of existing infrastructure. Too early an entry into a market already taken up by existing players will drive down prices, limiting the profitability of the opportunity. The modeling shows that the price impact is likely to discourage new greenfield investment by entrants like Saudi Arabia and Iran until market demand is strong enough to absorb those countries' incremental supplies. Demand is unlikely to be high enough to support significant new entries from Saudi Arabia and Iran until after 2020, according to modeling estimates.

Various case studies show that private commercial players have been better able to position themselves as first movers than were state gas concerns, with the exception of Russia. Owners of Trinidad LNG were able to push Algeria's Sonatrach from lucrative U.S. East Coast markets by creating lower costs (see case study, Ball/Shepherd). Nimble GasAndes beat out slow-paced Transgas, which had hoped to tap government support to create a market (see case study, Mares). A topic that remains to be explored is whether government-owned entities will be able to act as strategic players in the more competitive gas world or whether private commercial players will be able to organize competitive supplies to get to market more quickly and effectively, thereby leaving state monopolies to wait for long-term market growth to make space for them to enter without the pressure of innovation.

Global Gas and Security of Supply

The shift from the highly structured gas world of government-backed bilateral, fixed priced contracts to a new world of private, market-related contracts raises questions about national security of supply. Private sector participants have different interests than countries, driven as they are mainly by commercial considerations; they cannot be expected to consider automatically the energy security concerns of client nations.

One area of attention is the potential formation of a gas cartel similar to OPEC. Concern for maintaining a secure supply of reasonably priced natural gas, which until now has taken a back seat to oil, will increasingly be viewed as a vital national interest. In the past, gas consumers have feared interruption in vital gas supplies for a variety of reasons, such as contract disputes between Algeria and its customers (see case study, Hayes), political unrest in Indonesia (see case study, Lewis/von der Mehden), and transit country risks like those associated with transporting Russian gas to Europe through Ukraine and Belarus (see case study, Victor/Victor). In addition to fears of supply interruption, major gas-consuming countries and regions worry that a key exporter, such as Russia (to Europe), or group of exporters could exercise monopoly power to extract inflated rents for their product.

In May 2001, the Gas Exporting Countries Forum (GECF) held its first ministerial meeting in Tehran with the aim of enhancing coordination among gas producers. Although the GECF ministers announced that they did not intend to manage production or set quotas, certain individual members of the group have debated the merits of exercising some form of market influence or control. Such ideas have gained momentum since the group's first session. By its third session in Doha, Qatar, GECF had swelled to 14 members—Algeria, Brunei, Egypt, Indonesia, Iran, Libya, Malaysia, Nigeria, Oman, Qatar, Russia, Trinidad and Tobago, the United Arab Emirates, and Venezuela—and one observer nation—Norway.

The GECF already has tried, unsuccessfully, to exercise some collective influence in the European market. GECF helped to catalyze formation of a working group headed by Russia and Algeria, which sought to resist E.U. attempts to outlaw destination clauses that prevent buyers from reselling gas. (The option to resell gas is a pivotal mechanism for market arbitrage and efficiency, as it helps to prevent segregation of markets that allows gas sellers to exert monopoly power.) In another example, Egypt has sought a change in gas pricing systems that would end the link to crude oil prices with the aim of easing the penetration of gas into European markets. Both of these efforts, so far, have generated little practical change; a gas exporters' cartel remains at a theoretical stage (see working paper, Soligo/Jaffe).

The GECF has too many members with diverging interests to exert effective constraints on capacity expansion projects in the near term. It is likely to be a decade or more before they can assert sustained monopoly power in world gas markets, leaving consumer countries ample time and opportunity to adopt countermeasures. It will take many years to work off an abundance of supplies from within major consuming regions and small competitive fringe producers.

Gas suppliers might be able to extract short-term rents in particular markets by manipulating supplies into markets where alternative supplies are not available. Algeria used this position to force higher prices on the Italian and French markets in the 1970s, but Algeria quickly suffered when circumstances changed. Over the long term, Algeria has paid a high cost for its reputation as an unreliable supplier (see case study, Hayes). The same Algerian effort to lift prices also contributed to its loss of share in the U.S. market, which created an opening that new export projects from Trinidad eventually filled (see case study, Ball/Shepherd).

Over the long term, gas exports may concentrate in the hands of just a few major producers, which could make it more feasible for a group of gas producers to restrain capacity expansion to gain higher rents. The overall distribution of world natural gas reserves is more concentrated than the distribution of oil reserves. The two countries with the largest gas reserves, Russia and Iran, have roughly 45 percent of world natural gas reserves while the two countries with the largest oil reserves, Saudi Arabia and Iraq, have just 36 percent of world oil reserves. The five-country concentration ratio for both gas and oil is roughly the same at 62 percent. However, the regional concentration of gas resources is more diverse. Middle East countries hold only 36 percent of natural gas reserves as opposed to 65 percent of oil reserves. The former Soviet Union represents a second equally important region for gas production and exports. (See working paper, Soligo/Jaffe.)

Indeed, the reference case of the model estimates that Russia will become a very large supplier to Europe via pipeline, exceeding 50 percent of total European demand after 2020. This dominance could leave Russia in a position to curtail capacity additions and boost rents for its gas for a few years. However, model scenarios indicate the Russia's ability to exert monopoly power is limited by the abundance of alternative gas supplies that become competitive at just marginally higher prices and could be brought on line with new investments aimed to tap the higher prices.

Policy responses to the risk of cartelization are numerous. Among them is the privatization of gas reserves and the gas transport networks in producer countries. If all else is equal, it is probably easier for national, state-owned producers to participate in a cartel than for privately owned firms that might have different objectives from the state. If numerous private Russian gas producers emerge, for example, it will be more difficult to reconcile their conflicting corporate ambitions with those of a cartel—especially if effective regulation prevents pipeline operators from using their network for market manipulation.

As the case studies show, diversity of supply is an important protection from rent-seeking behavior of both gas exporters and transit countries. When Ukraine first interrupted Russian gas exports in 1995, European buyers who redoubled their efforts to diversify found many alternative suppliers, confirming the importance of market reforms that encourage multiple supply sources and gas-on-gas price competition. Moreover, the declining costs of LNG and pipeline trade mean that markets will be contested, promoting ever-distant trade arbitrage opportunities.

Over the longer term, as gas production capacity peaks in the various regions containing more limited gas production potential, direct competition between key LNG suppliers in the Middle East and Africa and Russian pipe gas may appear to key players as counterproductive, creating an opportunity for more strategic cooperation among Russia and other major gas exporters. However, the power to set gas prices also will be limited by the fact that gas consumers will have the option of shifting to other fuels, suggesting the need for policy-makers to promote diversity of fuel choice, including existing and new energy sources.

Risks to the Greater Gas Vision

For many analysts, the assumption that the world will shift to gas is rooted in current trend lines and economic modeling that, understandably, do not fully reflect the myriad of political and institutional factors that often play a large role in determining where gas investments occur. Thus, the bright gas future is by no means assured.

First, the vision for gas depends enormously on investor confidence and the supply of vast sums of financial and intellectual capital. Studies have confirmed that world gas resources are abundant, but many of those resources are not in countries that traditionally have been attractive for private investors. The capital-intensive nature of gas and the long payback periods typical of gas projects—15 to 20 years or longer for some of the most complex projects—make investors especially wary.

Second, developers of gas resources may run afoul of concerns about mismanagement of gas revenues, intrastate disputes over rents, harm to indigenous communities, and other afflictions that often get the label “resource curse.” The Arun case study concludes, for example, that nongovernmental organizations and social discontent had less impact on Arun development in the 1970s because critics had yet to organize themselves sufficiently on a political basis to provide significant impediments to the operation. By 1998, agitation in Aceh, where Arun was located, became so severe that operations were temporarily suspended and led finally to full-scale central government military action against local armed groups (see case study, Lewis/von der Mehden).

The case of Arun may be a telling sign of an era coming to an end—an era where developers of these resources faced much less external scrutiny of their operations and where states, themselves, directed many resource development projects. It is plausible to argue that neither of those two conditions will hold in the future. With the advent of revenue management schemes in Azerbaijan and on the Chad–Cameroon pipeline and other such arrangements emerging for oil resources, it is reasonable to expect that gas projects could some day face similar intervention.

In addition to more challenging local politics, visions for gasification also may run afoul of difficulties in siting major gas infrastructures, especially amid emerging worries about terrorism. LNG is the key to the shifting structure of the world gas market—toward a global market—and the U.S. market is a keystone to that development. Yet today, the developers of LNG projects are facing a string of failures and political difficulties in siting LNG regasification facilities in nearly every part of the U.S. market except the Gulf Coast.

Finally, the case studies also underscore that, since around 1990, much of the "dash to gas" has depended on expectations about electric power markets. The conventional wisdom that gas is favored for electricity has been shaped by the experiences in England and Wales, the United States, and several other markets. In many regions, gas has gained due to tightening environmental rules. It also has gained, however, because liberalization has created additional pressure to select the least-cost options. But close attention must be given to markets where gas-fired generation is not the current low marginal cost supplier or where electricity demand might be constrained by other factors.

In Poland, the dominance of incumbent coal-fired power plants, the vast oversupply of electric generating capacity, and the lack of strong government incentives for gas have made it difficult for Russian gas to enter the market (see case study, Victor/Victor). In Brazil, a darling for potential investors in the 1990s, the recent collapse of economic growth, combined with dominance of incumbent hydropower and an unfavorable regulatory setting, has impeded the entry of gas (see case study, Mares).

It is not yet clear whether gasification in other emerging markets—such as China and India—will follow the examples set in the United States and England, where electrification and liberalization favored gas for electricity, or Poland and Brazil, where governments failed to institute the incentives for a push to gas. We end, thus, with a note of caution, especially when projections such as the International Energy Agency's World Energy Outlook envision that two-thirds of the incremental demand for gas will come from electric power.

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