

## **The Golden Age of Gas?**

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Good morning, and thank you for inviting me to this distinguished gathering here in Santa Cruz.

I have been asked to speak today about the current state and future prospects of the natural gas industry. The events and trends in the global gas industry over the past fifteen years are familiar to all of us assembled here today. The isolated and fragmented markets of the 1980s are now connected beyond all expectation by flexible logistical infrastructure and commercial relationships. As the industrialized economies of Europe, Asia and North America have obsessed over whether we have reached “peak oil”, entrepreneurs and researchers have been finding new sources and forms of fuel compatible with existing transportation and power generation technologies.

The 2.5 billion citizens of China and India now see the means to improve their own lot in life and that of their children and grandchildren. They will need huge amounts of all forms of energy to realize those objectives.

But while the United States and Europe have balked at the competition from Asian energy companies for available global energy supplies, these new entrants have been busily developing their own energy resources while building the infrastructure and commercial relationships to supplement their domestic energy production with new supplies from newly developed resources around the world.

Western leaders continue to fear skyrocketing Asian energy demand, but global energy markets remain remarkably unperturbed and adept at meeting this challenge. The Russians, who viewed China as a long-term captive customer for their oil and gas, increasingly see competition from the Turkmenis, Qataris and even U.S. shale developers.

This is not the world many of us expected. Of course, it rarely is. Technological innovation has permitted our species to find more of what we think we need most, and find acceptable – often superior– substitutes that become commercial realities as perceived scarcity drives prices higher.

This price-driven technological innovation, massively assisted by financial innovations that provide access to deep pools of capital to those deemed trustworthy, is now changing world opinion and national strategies about the long-term role of natural gas.

World events have also conspired to push natural gas to center stage. The ascendancy in recent years of the “zero-carbon absolutists” in energy and environmental policy debates throughout the industrialized world has led to the design of national and regional energy strategies purporting to put the intended beneficiaries in a happy world of zero-carbon prosperity. Those of us who weren’t convinced that current-generation renewable power technology was up to the task of grid stability and reliability were given assurances that there was always carbon-free nuclear power. Nuclear power plants aren’t very good at chasing windmills up and down their highly volatile dispatch profile, but no matter.

Whatever the merits of this plan, it received quite a shock with the events at Fukushima, where reasonable nuclear safeguards met an unreasonable seismic event back in March. We all know what followed. As of late July, only 29% of Japan’s 49,000MW of nuclear generating capacity was on-line, and that figure will drop to 10% by the end of 2011. Germany and Italy, bending to their large and vocal Green constituencies, have announced plans to phase out nuclear power altogether, and every nation with nuclear

generating capacity is reexamining its assumptions regarding nuclear plant safety.

For those of us yet unconvinced by all-renewable power sector solutions using current technology, this gives the natural gas industry a tremendous opportunity to pick up the slack. As the least-offensive hydrocarbon in terms of carbon and air pollution emissions, and fueling power generation technologies most adept at tracking load variability, natural gas is the preferred solution to efficient and flexible power supply.

The resistance to dependence on natural gas for power generation has always been based on concerns about the availability of adequate long-term supplies at affordable prices. As a practical matter, these concerns have now been largely assuaged by the development of LNG production and marketing systems for even small stranded gas fields, onshore or offshore, creating new reasons to look for gas in remote places, as well as the Shale Gas Revolution we've been hearing so much about recently here in the Southern Cone and around the world.

I have to shake my head whenever I read a report describing how unconventional oil and gas has burst upon the scene, as I first learned about its energy supply potential some 50 years ago, sitting around the family dinner table. Technology and price were

the only barriers even back then, but with regulated U.S. gas prices capped at around 15¢/MMBtu back in the 1960s, no technology was up to the challenge.

Then came the uneven but undeniable upward trend in oil and gas prices over the past decade. Rising price expectations were premised on oil supply reliability fears, growing Asian demand and the anticipation of irrevocable declines in European and North American gas production capacity, placing new demands on global supplies. Climbing prices in turn provided the economic incentive to make use of new drilling and completion capabilities to improve oil and gas recovery from source rock shales. I don't need to tell this audience about what happened next.

The U.S. shale boom was well underway by 2006 but passive capital, in the form of proceeds from stock sales, asset sales and bank financing, really started pouring in for shale developers in 2007-2008, financing the burst of mineral rights acquisition and development drilling that occurred. All that money allowed for a lot of experimentation to improve drilling and completion techniques and reduce unit costs.

When oil and gas prices plummeted in late 2008, U.S. drilling rig counts fell as well, but it was too late for anyone hoping to put the shale genie back in its bottle. U.S. gas production is now at an historical high despite the shift in focus to oil-directed drilling, because productivity enhancements now let one horizontal drilling rig do the work of three as recently as 2008.

I don't want to steal another speaker's thunder by dwelling too long on shale gas, but I do want to make note of its impact on energy planners and forecasters around the world. The U.S. Energy Information Administration recently issued a widely-reported study on global shale resources, providing only a partial accounting of technically recoverable resources in identified shale deposits.

I'm sure you are familiar with it, so I'll only note in passing the large number and variety of geopolitical and gas market implications it presents to both corporate and government planners. I earlier mentioned China's new attitude toward Russian gas imports even as Chinese planners routinely raise their gas demand projections. Now the Poles and Ukrainians are talking about gas self-sufficiency. Here in the Southern Cone, of course, shale gas resources are also causing optimism and

dread, depending on whether you are currently an importing or exporting nation. We'll get back to this shortly.

Noting all the buzz on shale plus the political reaction to Fukushima, the International Energy Agency in April added a new scenario to its annual World Energy Outlook. The name says it all: The Golden Age of Gas

While I would never advise a client to rely on a single forecast for decision making, this IEA scenario provides a credible overview of an energy economy in which carbon emissions abatement remains an important policy goal, but not at the expense of economic and social development in emerging market economies. The key element of this workable compromise is the expanded use and production of natural gas.

Incorporating the latest estimate of global gas resource availability and cost, IEA's Golden Age scenario introduces three perfectly plausible modifications of its earlier work concerning gas demand. First, the revised projections acknowledge the expanded role of gas in the latest Chinese Five Year Plan, taking demand from the actual 85 billion cubic meters in 2008 to 250 Bcm by 2015 and to more than 600 Bcm by 2035, exceeding current gas demand for all of western and central Europe. This rate of growth alone absorbs essentially all spare liquefaction and transportation

capacity still lingering in global LNG markets by 2015. This development will significantly alter current world trade patterns. The IEA adds about 62 Bcm of incremental demand from early retirements of nuclear reactors, principally in Japan and Germany, and assumes there will be 70 million natural gas vehicles on the road, consuming 155 Bcma, by 2035.

What emerges in this scenario is not only a “golden era” for gas demand growth, but for gas production around the world. Only Europe registers any decrease in gas production by 2035. Putting supply and demand together the IEA scenario projects a doubling of international gas trade by 2035, to about one trillion cubic meters per year.

The biggest importing regions are Europe and Asia, with Chinese imports roughly equal to those of the balance of southern and eastern Asia. Russia, Central Asia, the Middle East and Africa remain the largest exporters. Those of us fortunate enough to live in the Western Hemisphere look to be roughly self-sufficient as a region, but this masks the growing competition for market share in the Southern Cone.

Some twenty years ago, when I was trying to get Gasoducto Transandino financed and built, the supply/demand facts were simple: Argentina and Bolivia held the supply, and everybody else



wanted it. As you all know, these circumstances have changes several times since then. Over the past five years, South America in general and the Southern Cone in particular have become far more integrated into the global gas industry as the overbuilt LNG industry sought out new markets and individual importing nations sought to expand their supply options. The massive offshore discoveries in Brazil and the development of the Camisea project in Peru added major new mid-term supply options for the entire region. Now initial shale evaluation work has begun in the region, establishing a major new longer-term regional supply option.

Today, therefore, the question is no longer who has the gas and who needs it. Today, the relevant question for potential importers is, **“Who is offering the best combination of availability, flexibility, reliability and price?”** The question for potential exporters is, **“How does my delivered cost structure compare with those of my competitors?”**

Why belabor all these points this morning?

- First, it is to express my newfound confidence that, if called upon, the natural gas industry has the resources, logistical infrastructure and capital access to perform a greatly expanded role in meeting the energy needs and fulfilling the

economic aspirations of human populations around the world.

- Second, it is to emphasize the essential role natural gas can play in our long-term transition to more environmentally benign fuels, from wood and animal dung to coal to oil to gas and renewables and beyond.
- Finally, it is to note that, while shale gas is an enormous resource, it does not necessarily pose the disruptive role in economically efficient gas markets that some traditional exporters fear on seeing the ever-increasing global shale resource estimates and the production boom in North America. In fact, the widespread nature of shale resources has already and will continue to facilitate new demand for gas as security fears subside.

The Chinese government is approaching domestic resource development with the same urgency exemplified by the rapid build-out of its high-speed train network and urban housing: short-term costs are not the primary focus. It is a daunting challenge. A critical mass of prevailing fear about energy security, plus high price expectations, plus political and regulatory toleration, plus available drilling and completion technology, oil field and technical services, logistical infrastructure, and financial capital, is needed to foster a shale boom. The Chinese can certainly provide the

appropriate levels of resource insecurity and political will, but will struggle – and no doubt eventually succeed - with putting together the equipment, knowledge and infrastructure needed to efficiently develop and produce oil and gas from shale. Until then, it will be a costly research project.

But neither the U.S. nor the Chinese model applies to Europe or the Southern Cone. Shale gas development here will not be driven by the objectives of a single autocratic government willing and able to lose large sums of money to achieve its political objective of minimal dependence on foreign imports. Conventional gas exporters to Europe and within the Southern Cone have it within their means to frustrate relatively high-cost shale development as well as LNG imports as global markets tighten and distressed cargo sales become rarity.

Those means, however, are not the old familiar ones, based on product scarcity, political relations and national boundaries. In this new world of widely dispersed resources, global gas market integration and mobile financial capital, gas-short nations have options, in terms of both import sources and domestic resource development. Their choices will be driven by price and perceived performance risk, not by physical necessity. For exporters, the opportunity for corporate or national enrichment is now defined by

cost structure plus the relative availability and cost of best technology, best practices and the human and financial capital for efficient resource development, production and transportation. “Beggar thy neighbor” strategies in international gas trade are no longer sustainable beyond the expiration date on a sales contract. Your customers have options, and they will exercise them if your price or performance risk is deemed unacceptable.

This is indeed the Golden Age of Gas. Global flows of capital and technology will follow opportunity, and the opportunity is vast. Logistical integration, via pipeline and LNG transport technologies, will continue apace, permitting price signals in one market to trigger a supply response in near and distant lands, thereby assuring greater economic efficiency in resource development and infrastructure investment. This offers us a pathway to greater shared prosperity and energy security. I’m sure many of you sitting in this hall will play an essential part in turning this firm expectation of mine into practical reality.

Thank you for your kind attention this morning, and for inviting me to this important event. The speakers and presentation topics that follow promise to be informative and stimulating. I look forward to meeting and speaking with many of you during the conference breaks and social events today and tomorrow.