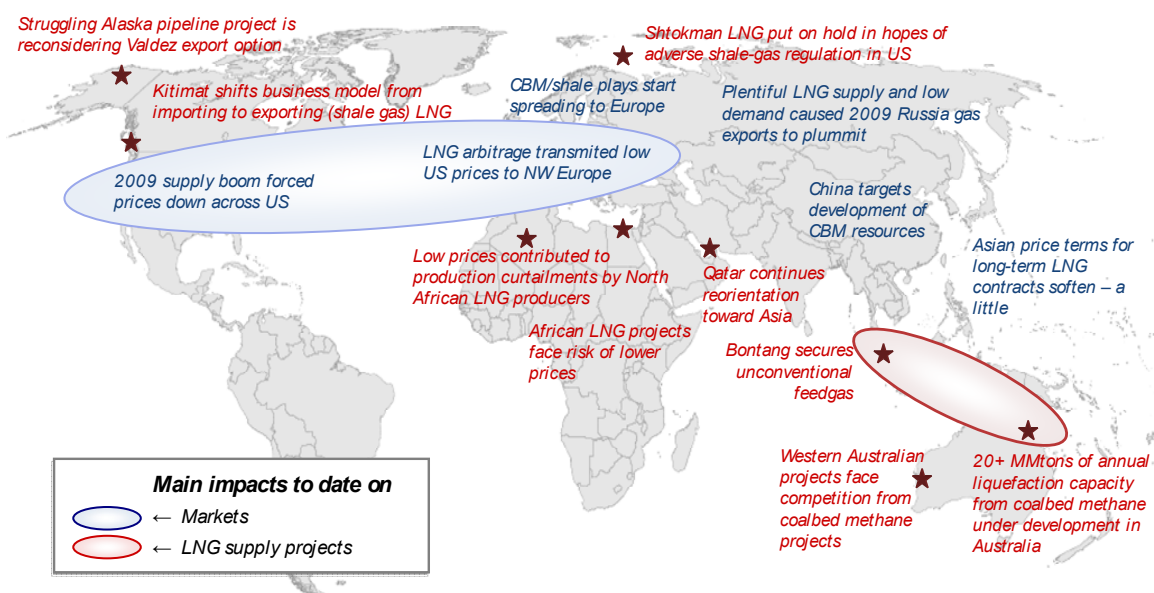


Mixed Impact For LNG From Shale Gas Revolution

It's no secret that the US gas industry is in the midst of a supply revolution triggered by the unprecedented rise in unconventional production – tight sands, coal bed methane and shale gas. Representing just 15% of US gas output in 1990, unconventional supplies accounted for over 50% of domestic production in 2008, with the absolute volume quadrupling from 75 Bcm/y to 300 Bcm/y. Washington's Energy Information Administration has increased its supply forecast for 2010 by 8%, or 40 Bcm, over the last four years, mostly due to growth in unconventional sources. Most of the unconventional gas production in the US now comes from tight sands, but shale gas is the big growth play. The EIA's latest estimate of the technically, although not necessarily economically, recoverable resource for shale gas alone is 9.8 Tcm. This is enough to satisfy current domestic consumption for 15 years. As the map below summarizes, the impact of this revolution has spread beyond the lower 48 states to the far reaches of the globe, with decidedly mixed consequences for LNG.

Anatomy of a Revolution



Source: Poten & Partners

In North America, the rise in unconventional supplies caused a complete change of direction for Canada's Kitimat project in British Columbia, which flip-flopped from being a terminal for the importation of LNG to a liquefaction venture targeting export markets in Asia. Its sponsors first saw Kitimat as a source of imported gas for use by producers of heavy crude oil in Alberta on the other side of the Rockies Mountains. Now it has become a liquefaction plant to be supplied by unconventional gas sent over the mountains. Farther north, the long-delayed Alaska Pipeline project is being prodded forward by state officials based on the assumption that it will be used to deliver North Slope gas to Alberta and potentially Chicago. Abundant shale gas near the delivery point and huge increases in pipeline costs have recently weakened that rationale. Project sponsors are now open to piping gas to Valdez in southern Alaska, where it would be liquefied and shipped, presumably also to buyers in Asia.

Plentiful supply, together with depressed demand stemming from the economic crisis, has pushed US gas prices down from double-digit highs in mid-2008. Louisiana's Henry Hub, the main US benchmark, averaged just \$3.96/MMBtu in 2009 after dipping briefly below \$2.00/MMBtu in September. Last year, Henry Hub averaged only 40% of West Texas Intermediate crude oil on an equivalent Btu basis, less than half its average relative value for the decade ending in 2008. Low US prices caused LNG to flood into Northwest Europe, driving prices at the UK's National Balancing Point and the Zeebrugge Hub in Belgium down to rough parity with Henry Hub. The combination of surging LNG imports, high oil-indexed contract prices and low demand led Russian pipeline exports to plummet as major European utilities undershot their minimum purchase requirements, accumulating billion of dollars in overhanging obligations as a result and wreaking havoc with Gazprom's finances.

Unconventional gas recently forced Gazprom to postpone plans for Shtokman LNG, a US-focused export project based on gas reserves from the giant Shtokman field in the Barents Sea. The Russians are now hoping US authorities will introduce environmental regulations on water contamination that will flatten the growth trajectory for



shale production from the Marcellus play, which runs from southwestern New York through much of western Pennsylvania and parts of West Virginia and Ohio. If such regulations are not forthcoming, Shtokman LNG – a hugely expensive and technically difficult project – could freeze-dry on the vine. Adding to Russia's problems, unconventional gas technology is spreading to Europe, which has some 34 Tcm of the resource about half of which is shale. A number of upstream projects, mostly at the nascent stages of development, are underway in Poland, Germany, Hungary, France, Switzerland and the UK. Novatek, Russia's second largest gas producer, has derided the idea that shale gas could compete with its conventional gas in Europe. However, development could indeed be feasible at gas prices linked to \$70 per barrel oil.

Supply projects have been affected in Africa, home to most of the Atlantic Basin's existing and proposed liquefaction capacity. Production from plants in Egypt and Algeria dropped 1.8 MMt and 1.0 MMt, respectively, in 2009. To be sure, rising domestic demand, mechanical problems and, in Algeria's case at least, a desire to maximize oil production, figured heavily in the shortfalls. But low prices in the US and Northwest Europe strengthened calls to siphon off feedgas for other uses. Lower gas prices throughout the North Atlantic also jeopardize the economics of a number of greenfield projects, including Nigeria's Brass LNG (see related story above). Investors in Nigeria already had plenty to worry about without this added complication, including violent civil unrest in the Niger Delta, tightening fiscal terms for both oil and gas and onerous domestic supply obligations for gas producers.

Middle Eastern producers, notably Qatar, have responded to weaker Atlantic Basin markets by diverting LNG to outlets in Asia, where spot prices are firmer and term contracts are linked to crude oil. Deals totaling 8 MMt/y are pending with two buyers in China as well as one in Thailand, on top of the 5 MMt/y already sold into China from the Qatargas mega trains. But producers in Qatar also insist they can compete with shale gas in the US, given the high liquids yield from gas produced from the country's giant North field. "Can shale gas compete with LNG is the real question," Hamad Rashid al-Mohannadi, the head of RasGas, was widely quoted as saying at this month Cera Week conference in Houston. China, meanwhile, is intent on developing its own prodigious reserves of

unconventional gas, which are mostly coal bed methane. Poten LNG Consulting estimates that by 2020 China's unconventional gas production could reach 20 Bcm/y, the equivalent of 14 MMt/y of LNG. The country's energy requirements are growing so rapidly, however, that it isn't clear if indigenous unconventional gas production will significantly blunt its appetite for more LNG.

In Oceania, unconventional gas is being developed to feed liquefaction plants. The first unconventional LNG supply will likely come from Indonesia, where the Vico joint venture grouping BP and Eni hopes to start directing coal bed methane to East Kalimantan's Bontang plant later this year (see LNGWM, Jan '10). However, the main focus of CBM-to-LNG is in Queensland in eastern Australia. There, producers face challenges that include issues with dewatering, low well flow rates and lean heating contents that aren't particularly appealing to buyers in traditional Asian markets like Japan. Nonetheless, the ventures are competing with more conventional LNG projects under development on the Western side of the continent, pushing up labor and construction costs in an already high-priced environment.