

Rays of hope

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The pipeline landscape is changing as old conventional deposits deplete and new sources emerge. Gordon Cope guides us through the latest in the North American pipeline industry.

A combination of new plays, new basins and growing demand is helping support a banner year for the US pipeline sector. “Overall, we foresee a bright future for natural gas and pipelines,” says Don Santa, President of the Interstate Natural Gas Association of America. “It is going to be a bigger part of the energy portfolio.”

Unconventional natural gas is leading the parade. El Paso recently completed its 680 mile, 42 in. Ruby pipeline to transport Rocky Mountain tight sand gas from Opal, Wyoming, to an interconnect in Oregon.

But it is shale gas that is generating most of the pipeline action. The dense black rock filling many of the basins around North America is full of natural gas, but low reservoir permeability has previously stymied attempts to produce it. Recent advances in horizontal drilling and hydraulic rock fracturing techniques, however, have allowed petroleum companies to tap into this vast resource. IHS CERA, a consultancy, now reckons that natural gas reserves and resources in North America exceed 3000 trillion ft³; of that, shale gas makes up 1200 trillion ft³ in the US and 500 trillion ft³ in Canada. In Texas, production from the Barnett Shale, which pioneered the play, has plateaued at approximately 5 billion ft³/d. Other shale plays are rapidly emerging; however, creating a need for new capacity.

➔ Almost 200 rigs are currently drilling the Eagle Ford shale play in south Texas. Enterprise Products Partners (EPP), which is currently constructing the

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300 mile, 600 million ft³/d south Texas gathering system, recently announced that it is adding a further 62 mile of 30 in. pipe and 300 million ft³/d capacity. The expanded system is expected to enter service in 2013.

- ➔ BENTEK, a consultancy, estimates that the Marcellus shale gas production in Pennsylvania and adjacent states could reach 8.5 billion ft³/d by 2013, generating a need for 5 billion ft³/d of new pipeline capacity in the northeastern US market. El Paso subsidiary Tennessee Gas Project recently completed the 300 Line Project expansion in the region, bringing total capacity to 1.5 billion ft³/d. Plans have been filed for further additions.
- ➔ Enbridge and Veresen announced plans for a 124 km line to connect up gas production associated with the Bakken shale oil play of North Dakota. The Tioga Lateral, expected to enter service in 2013, will move up to 120 million ft³/d of liquids rich gas to the Alliance mainline.

Mid-stream companies are also scrambling to transport a new, related resource to market. With gas prices remaining low for the foreseeable future, explorers have turned their attention to the liquids-rich portions of shale gas plays, discovering large quantities of natural gas liquids, or NGLs (composed of ethane, butane and propane). EPP has proposed an ethane pipeline system that would collect up to 125 000 bpd from Pennsylvania, West Virginia and Ohio and transport it to ethylene petrochemical plants in the Gulf Coast. Chesapeake Energy has already committed 75 000 bpd supply for the 1230 mile system, which will be a mix of existing lines, new build and reversals. EPP is also looking to build the Texas Express Pipeline (TEP), a new, 580 mile NGL line from Carson County, Texas, to storage facilities in Mont Belvieu, Texas. Producers in west and central Texas, the Rocky Mountain States, and Oklahoma are expressing interest; the line would have an initial capacity of 280 000 bpd, with the ability to expand to 400 000 bpd.

Oil lines

On the liquids side, the expansion of two unconventional crude sources is necessitating major new lines.

In a play similar to shale gas, explorers are using horizontal drilling and hydraulic fracturing to release light crude from liquids-rich shale. The USGS estimates that 3.6 billion bbls could be recovered from the Bakken formation beneath North Dakota, Saskatchewan and Manitoba. North Dakota's production of light, sweet crude has risen from 100 000 bpd in 2005 to over 400 000 bpd in late 2011, thanks to 160 rigs currently operating in the state. The North Dakota Department of Mineral Resources projects that production from the Bakken formation could reach 700 000 bpd in the next four to seven years. Plains All American Pipeline recently announced it will spend US\$ 200 million to build a new crude line to service the production; the 103 mile, 12 in. pipe will carry up to 75 000 bpd to a main line in Saskatchewan.

Other shale oil plays are not far behind. The Eagle Ford formation in south Texas also produces gas condensate and oil, and the play has grown to 125 000 bpd from virtually nothing at the beginning of 2010. Ultimate recovery is estimated at 2 billion to 9 billion bbls of oil and 40 trillion ft³ of gas, plus NGLs. Purvin & Gertz, a consultancy, conservatively predicts that unconventional oil production from the Bakken, Eagle Ford, and other shale formations is expected to approach 900 000 bpd in 2015 and exceed 1.3 million bpd by 2020.

The oilsands in northern Alberta is one of the largest crude reservoirs in the world, with almost 2 billion bbls of bitumen (over 170 billion bbls of recoverable) trapped in sand and carbonate rock. Oil companies have spent tens of billions of dollars to boost production into the 1.6 million bpd range. Peters & Co. a consultancy, predicts that Cdn\$ 30 billion will be spent between now and 2015 to add another 1 million bpd production, primarily through in-situ projects. Alberta's Energy Resources Conservation Board (ERCB) now expects that, by the end of the decade, bitumen production will surpass 3.2 million bpd.

In order to deliver increased oil production from the oilsands to the US Midwest market, Enbridge completed the Alberta Clipper in 2010, a 36 in. crude oil pipeline delivering 450 000 bpd from Alberta to Wisconsin. TransCanada Corp. also brought its Cdn\$ 5.2 billion Keystone pipeline on line in 2011. The 3500 km system carries up to 590 000 bpd from Alberta to the massive tanker hub in Cushing, Oklahoma.

Problems

However, the Cushing hub has now become glutted with oil, and production is facing discounts of over US\$ 20/bbl. In order to prevent future bottlenecks to oilsands production, TransCanada is proposing Keystone XL, a 1700 mile pipeline that will transport up to 800 000 bpd directly from Alberta to the Gulf Coast. Environmental critics are vehemently opposed to the project; however, citing that it would transport 'dirty oil'. Nebraska state officials are worried that the line might pollute the Ogallala aquifer, an important source of fresh water. Activists chained themselves to the White House fence, trying to convince President Obama to veto the plan. "Keystone XL is unique because it is an import pipeline, and is subject to Department of State approval, and has an elevated profile," says Santa. "Also, it has an enlarged symbolic importance in the minds of many environmental proponents that has eclipsed the debate in the eyes of some."

As a result of political and environmental pressure, a decision date on the Cdn\$ 7 billion Keystone XL pipeline has been delayed until 2013. "Whether it will help the president retain his job is unclear, but it will cost thousands of shovel-ready opportunities for American workers," said American Petroleum Institute President Jack Gerard, in a prepared response. "There is no real issue about the environment that requires further investigation, as the President's own State Department has recently concluded

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after extensive project reviews that go back more than three years.”

As an alternative outlet, Enbridge is promoting the Northern Gateway pipeline, which would transport 525 000 bpd of bitumen to a marine terminal in Kitimat, British Columbia, and on to markets in Asia Pacific. The line has also drawn the wrath of environmental and aboriginal groups concerned with oil spills on land and water, and its future may also be delayed.

In the meantime, operators are shipping new crude production by rail. Analysts note that crude-by-rail loading capacity in North Dakota’s Bakken Shale is expected to rise from 130 000 bpd to 500 000 bpd by late 2012. It costs approximately US\$ 12/bbl to ship from North Dakota to the Gulf Coast by train, but Canadian Pacific Railways (CPR) and other rail lines estimate that as many as 70 000 car loads per year (each tank car carries up to 1000 bbls) could move by rail until pipeline capacity catches up.

Persistent, low prices for natural gas are a major concern. Shale gas has glutted the market, forcing prices under US\$ 4 per mmBTU. The result has been to put the brakes on marginal projects far from consumers. Alaska, for instance, would like to monetise the 34 trillion ft³ of gas associated with the massive Prudhoe Bay field by shipping up to 4.5 billion ft³/d on a 2800 km line through Alaska and the Yukon to Alberta. ExxonMobil and TransCanada, which spearhead the state-approved plan, have no firm commitments. BP and ConocoPhillips have shelved their rival US\$ 35 billion Denali pipeline plan.

“Low natural gas prices are a double-edged situation,” says Santa. “On one hand, low prices make it easier to capture market share. In the early 2000s, we saw petrochemical industries curtailing or moving their operations offshore because of high gas prices. North America now has the lowest natural gas market, and it is creating petrochemical demand. Gas to power (GTP) is also surging ahead, as we are seeing

gas competing head to head with coal on a cost per BTU basis. On the other hand, you have to find a point of equilibrium where the price of gas provides incentive for the industry to explore and develop the resource.”

Rays of hope

On a more positive note, federal lawmakers of all stripes are co-operating to reauthorise legislation covering pipeline safety. In October, the Senate unanimously approved a bill, and two bills referred to the floor in Congress are moving toward a final version that can be submitted for White House approval. “There have been several common themes, including the expanded scope of integrity management, looking at maximum operating pressures of older pipes operating in high consequence areas, and state laws regarding limits on third party damage to pipelines,” says Santa.

More importantly, the reauthorisation is seeing support from industry, safety advocates and the administration. “In the current climate, Congress has not been particularly prolific in terms of getting bills all the way to the president’s desk,” says Santa. “We are optimistic that the reauthorisation may beat the odds, as there has been good

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Mergers and acquisitions

In 2011, M&A activity began to pick up due to a number of different drivers. Some companies were attracted by bargain prices, others dropped non-core assets. Several purchases were driven by the need to connect up new plays with consumer markets, and a desire to achieve economies of scale. Some of the larger transactions from 2011:

- ➔ In November, ConocoPhillips sold its interest in Seaway Crude Pipeline Co., a 150 000 bpd crude line running 500 miles from the Gulf Coast to Cushing, Oklahoma, to Enbridge for US\$ 1.3 billion. The latter will reverse the flow on the line by mid-2012, in order to relieve bottlenecks in the Cushing terminal region. Enbridge and partner EPP also have plans to boost capacity to 400 000 bpd by 2013.
- ➔ In October, Kinder Morgan acquired El Paso Corp. for US\$ 38 billion. The deal created the largest gas pipeline network in North America, with over 65 000 miles, as well as the largest mover of petroleum liquids (over 1.9 million bpd), and the largest CO₂ shipper. The acquisition also connects up new shale gas plays in Texas and Pennsylvania with major consumer markets. Kinder Morgan noted that it would save US\$ 450 million/yr due to economies of scale.
- ➔ In July, Energy Transfer Equity beat out Williams for the purchase of Southern Union Company with a US\$ 9.4 billion cash offer. The merger will create a natural gas pipeline giant worth US\$ 40 billion.
- ➔ In June, DCP Midstream agreed to acquire ConocoPhillips’ refined product lines so that they could convert the pipelines into a new, Southern Hills network to move ethylene and other NGLs from the Midcontinent region to Gulf Coast petrochemical plants. Target capacity is 150 000 bpd.

Attention is now focusing on other large industry players, including TransCanada and Enbridge. “The M&As are a recognition of the optimistic outlook in the US,” says Don Santa, President of the Interstate Natural Gas Association of America (INGAA).

bipartisan support. That is a recipe for the likelihood of seeing it passed.”

Pipelines have also had a relatively safe and clean year. After the San Bruno explosion in September 2010 (which killed five nearby residents and injured dozens), and the Line 6B rupture in July 2010 (that spilled almost 20 000 bbls into Michigan’s Kalamazoo River), the only major incident has been the loss of 1000 bbls of oil into Montana’s Yellowstone River after the failure of ExxonMobil’s Silvertip line in July 2011. The American Petroleum Institute, Association of Oil Pipe Lines, Interstate Natural Gas Association of America, and American Gas Association from the US, and the Canadian Gas Association and Canadian Energy Pipeline Association, recently announced that they are launching a study of other industries’ safety models in order to improve gas and liquids pipeline safety. The study is expected to be released in early 2012.

Transportation companies are also looking for ways to end the stalemate over Keystone XL. In a move that does not require Department of State approval, Enbridge purchased the Seaway Crude Pipeline Co., a 150 000 bpd crude line running 500 miles from the Gulf Coast to Cushing, Oklahoma. Enbridge and its partner EPP intend to reverse the flow on the line by mid-2012 in order to relieve bottlenecks in the Cushing terminal region. Enbridge and partner EPP also have plans to boost capacity to 400 000 bpd by 2013.

The future

Although new plays and sources of oil and gas promise a bright future for US pipelines, several major issues must be addressed. Environmentalists, politicians and residents adjacent to shale gas development are concerned about hydraulic fracturing. After drilling a horizontal well through the shale, operators inject millions of litres of water and chemicals under high pressure into order to fracture the rock and release the gas. Scientists have raised concerns that some of the chemicals could contaminate local drinking supplies. Some states have sought moratoriums on shale gas drilling until more is known; if bans become widespread, the shale gas phenomenon could quickly come to an end, as would natural gas pipeline expansion.

Government and industry are working to address concerns. The Obama administration announced the formation of the Secretary of Energy Advisory Board Subcommittee on Shale Gas Production (SEAB), to ensure that shale gas is produced in an environmentally safe manner. The American Petroleum Institute (API) is working with the Ground Water Protection Council (GWPC) and the Interstate Oil & Gas Compact Commission (IOGCC) to ensure that all chemicals used by operators are posted on FracFocus, the voluntary chemical disclosure registry. Since its formation in early 2011, 50 operators have posted information from more than 5500 wells. “This site does more than just serve as a repository for disclosure data,” API noted. “It also provides a wide array of reference materials from federal, state, and independent sources.”

The petroleum sector must also address concerns regarding oilsands production. Over the 150 years, greenhouse gases (GHGs) in the atmosphere have increased from 280 ppm to 382 ppm, primarily due to the approximately 28 billion tpy of CO₂ emitted by mankind. There is widespread concern that this will lead to global warming, triggering glacial melting, sea rises, species extinction and other dire calamities. Because oilsands production requires large amounts of energy to recover from the ground and upgrade to premium crude, it emits more GHGs than conventional oil production. As production grows, so do GHG emissions. Opposition to oilsands development has already successfully delayed the Keystone XL pipeline project, and other major projects can expect similar opposition.

In order to reduce emissions, producers are working with government to develop carbon capture and sequestration, or CCS. A CCS system captures carbon at an oilsands upgrader then transports it by pipeline to a geologically-appropriate basin where it can be permanently injected underground. Several programmes are under way to prove the commercial viability of CCS. The governments of Alberta and Canada recently contributed Cdn\$ 865 million to Shell’s Quest project. Starting in 2015, Quest will capture more than 1 million tpy of CO₂ from Shell’s Scotford upgrader near Edmonton. It will then be transported 65 km and injected underground into an oil reservoir as part of an Enhanced Oil Recovery (EOR) project.

If the Quest and other CCS projects prove viable, CO₂ transportation could result in a major new network in its own right. According to studies commissioned by INGAA, a nationwide system large enough to handle 1 billion tpy (about 50% of annual coal-fired plant emissions) would need up to 56 000 miles of pipe costing US\$ 65 billion. Transportation tolls would amount to approximately US\$ 5.3 billion/yr.

Indeed, the future of the pipeline sector looks rosy on several fronts. INGAA estimates that an average of over US\$ 8 billion in new-build and infrastructure investment will be needed to handle expansion of shale gas alone. “We are confident that industry can do that, as we have seen US\$ 8 billion invested per year for the last several years,” says Santa.

Note

Don Santa is president of the Interstate Natural Gas Association of America.

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