Unplugging Bottlenecks in Oil and Gas Deliveries

By DIANE CARDWELL

THE North American shale boom has brought with it many benefits, including new jobs, cheaper electricity and the potential for energy independence.

But as producers tap ever more oil and gas, they are also exposing major shortcomings in the country's transportation system and grappling with a problem of plenty: how to move all that product to market? "The problem is transport," said Ed Hirs, an energy economist at the University of Houston.

With the glut of oil, pipelines are congested and railroads are scrambling to pick up the slack, raising concerns about hazards like the recent explosion that killed dozens in Quebec. Similarly, highways are underdeveloped for this kind of traffic, while oceangoing tankers are burdened with regulatory constraints and there is a barge shortage.

With natural gas, the challenge is different. It generally moves through pipelines, but because its prices are low, the economics do not always support building infrastructure where it is needed.

The country has a well-developed pipeline network — more than 2.6 million miles of tubes moving a volume of fuel around the country that would overwhelm any other form of transport. Developed over decades, though, it is largely meant to bring fuel from the Gulf Coast to major markets like the Northeast or Pacific Northwest, rather than from newly established energy sources like the Bakken shale in North Dakota, the Eagle Ford development in South Texas or the Marcellus in the mid-Atlantic.

Adapting the system includes reversing the flow of some pipelines, building new routes and changing which fuel goes where, a time-consuming and expensive process that can require government approval. The Interstate Natural Gas Association of America, a pipeline trade group, says building the required infrastructure will take $251 billion over the next 25 years.

Pipeline capacity has been increasing, but it is still not enough for all that North America is producing, analysts say. Kinder Morgan, the giant pipeline owner, plans to spend $10.6 billion on acquisitions and expansions this year, and at least $14 billion developing projects the next five years.

The capacity shortage is so acute that oil producers are burning the natural gas that is a byproduct of hydraulic fracturing for oil, or fracking. Given the natural gas glut, and without an inexpensive way to get it to a buyer, it is more economical to burn it.

In addition, new pipelines are expensive undertakings that can be politically fractious. Although the southern part of the Keystone pipeline between Oklahoma and the gulf is set to start operating soon, the northern leg, meant to carry heavy crude out of the Canadian oil sands, has become a lightning rod in the battle over the future of energy.

Refiners in the gulf have been getting more light crude from the shale boom than they can process and not enough of the heavier oil for which most of the refining capacity is designed. As a result, they are still importing heavy crude from Mexico and Venezuela, and medium crude from the Middle East, said Rob Smith, an analyst at PFC Energy, a consulting firm.

Railroads are picking up the slack for congested pipelines.

At the same time, companies like Valero, which is based in Texas, have been altering their refineries to handle the lighter crude from shale fields, which the southern Keystone connection could make even more available.

And since oil prices have been stuck at more than $100 barrel, Canadian oil sands producers like TransCanada, the company seeking to build the Keystone pipeline, have a strong incentive to get their product to market now.

PAUL CHIASSON/THE CANADIAN PRESS, VIA ASSOCIATED PRESS

RAIL TRANSPORTATION Hazardous materials exploded in Quebec this summer.

As the company awaits a decision from the Obama administration on whether it can build, producers have been turning to rail. A recent report by RBC Dominion Securities said that shipping crude by rail could pick up the slack if Keystone was not approved, delaying but not stopping the development of the Canadian oil sands.

"Pipeline infrastructure will always lag behind new production, just because you have to have proved production before you can invest billions of dollars in a pipeline," Mr. Smith said, adding, "so rail steps in to fill the gap."

In the United States, rail shipments of crude increased to nearly 234,000 carloads in 2012 from 9,500 at the beginning of the boom in 2008, according to the Association of American Railroads. Warren E. Buffett has been a big beneficiary. This year, the railroad BNSF, which he bought in 2010, helped drive the stock price of his company Berkshire Hathaway to a record high.

But North American railroad companies have been scrambling to add new track and loading terminals, as fuel companies buy more cars specially designed to carry the flammable crude.

What about safety? Rail's record has been improving — 99.997 percent of all hazardous materials reach their destination without being released because of an accident, according to the industry association.

But an analysis of data from the Pipeline and Hazardous Materials Safety Administration by EnergyWire found that spills and other accidents from rail cars carrying crude was up sharply, reaching 88 in 2012 from one or two a year the decade before, though none caused injuries and just four were classified as serious.

United States officials have already ordered tougher standards for moving hazardous materials by rail as they and Canadian officials continue to investigate the cause of the deadly explosion in Quebec this summer.

There has also been a sharp increase in carrying crude oil by truck, taxing the supply of qualified drivers and the small, rural roads ill-prepared for fleets speeding from new fields.

Tankers and barges, which could alleviate congestion by carrying refined petroleum to markets, especially on the East Coast where demand is high, are squeezed too. Maritime law requires commercial vessels transporting goods between United States ports to be built, owned, operated and manned by American citizens and registered under the American flag.

Those requirements, part of the Jones Act of 1920, make the vessels much more expensive to build and operate than foreign ships, analysts say, which are also more readily available.

Tom Kloza, chief oil analyst at the Oil Price Information Service, said shipping could add 20 cents to the price of each gallon of gas, while the charge for using a pipeline would be less than 5 cents a gallon. But when the pipelines are full, it makes it more profitable to ship refined petroleum to foreign markets where the Jones Act restrictions do not apply.

That can help keep prices high at the pump for American consumers despite having more than enough domestic crude and refining capacity to meet demand, Mr. Hirs said. Oil prices are set globally, and suppliers can move product along well-worn waterways to maximize profits.

That means a refinery manager has a choice. "That manager can sell refined crude oil — that's diesel or gasoline or jet fuel or kerosene — to Japan, Latin America, Europe or to the corner gas station in Houston or New York City. And so if Japan bids more, that price becomes the price on the coast."

Natural gas could soon have a similar dynamic. The Obama administration has approved three projects to export liquefied natural gas and is considering more, amid worries that it could raise the price of the fuel for American utilities and industries. But it would allow producers to take advantage of higher prices for natural gas overseas, despite the billions it would cost for new or adapted installations to liquefy the gas. That is another political battle ahead.