

# INSIDE OUT

## New Spin on North America Oil and Gas Exports



By  
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**T**raditional oil and gas reserves accumulated when hydrocarbons migrated into a natural trap, such as an anticline. But with unconventional hydrocarbons, such accumulations are no longer essential to commercial production because permeability in some hydrocarbon-rich shale formations can be “manufactured” if the geologic conditions are appropriate.

North America has proven that it can be done and on an enormous scale. Along the way, these unconventional hydrocarbon resources have turned the economics of the industry inside out.

The surge in shale oil output in the U.S., together with oil sands from Canada, has caused overall oil production in these two countries to double in four years (Figure 1).

Since Canadian oil sands production is rising faster than export capacity, Canada continues to seek new markets for its oil. Meanwhile, the ban on crude oil exports from the U.S. has triggered a surge of fuel products into other markets, most notably Central and South America and Europe (Figure 2).

We have examined the effect of this unexpected production on deep-sea marine hydrocarbon exports from North America.

U.S. regulations ban the export of crude oil. But most other forms of oil and gas can be delivered to markets elsewhere in the world, provided it can be shipped on an economically viable basis. Since the emergence of these exports from North America has taken place quite recently, it is interesting to consider just how large they might turn out to be.

The results are surprising, to say the least. But first a bit more background.

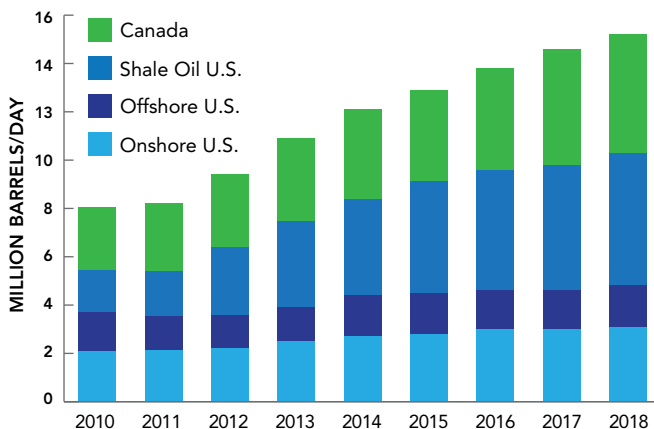
Output of both shale oil (U.S.) and oil sands (Canada) continues to increase. Canada is still considering how to monetize its vast reserves; some estimates suggest 750 billion barrels of extractable heavy oil exist within the Province of Alberta, which could equate to up exports of up to 3 million barrels per day of diluted bitumen. Meanwhile, since about 2010 U.S. refiners have benefited from access to ample supplies of light, low sulphur domestically produced oil from shale.

Figures 3 and 4 endeavor to place these changes in perspective. Beginning around 2008, shale gas production began to rise and shifted the U.S. energy balance very quickly:

- Many power generation plants in the U.S. began burning gas instead of coal due to the sharp drop in natural gas prices.

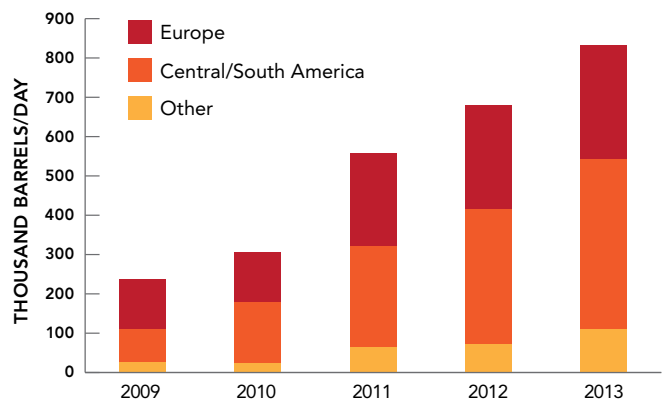
- Thus, U.S. coal producers adapted by

**FIG. 1: U.S., CANADIAN OIL PRODUCTION**



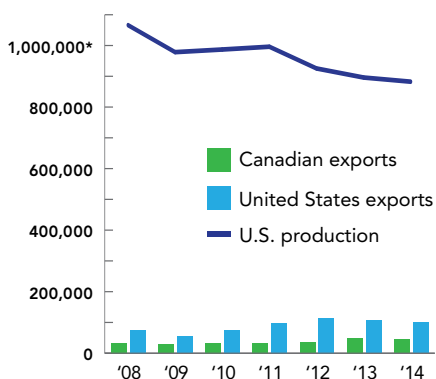
Source: Platts London Oil Forum, February 2014

**FIG. 2: DESTINATIONS OF U.S. DIESEL AND JET FUEL EXPORTS**



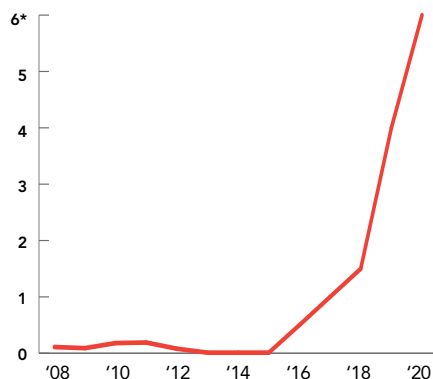
Source: Petroleum Argus and Platts London Oil Forum, February 2014

**FIG. 3: U.S., CANADIAN COAL EXPORTS AND U.S. PRODUCTION**



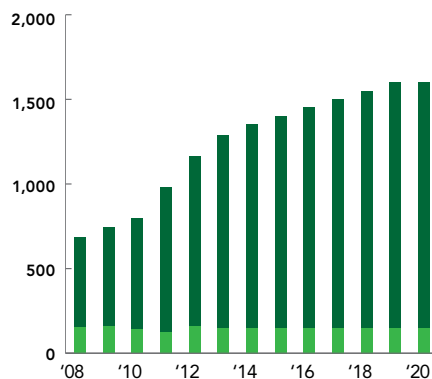
\*thousand metric tons  
Source: U.S. Energy Information Administration and The Coal Association of Canada

**FIG. 4: U.S., CANADIAN LNG EXPORTS**



\*million cubic feet/year  
Source: FERC (www.ferc.gov/industries/gas) and RBN Energy reports

**FIG. 5: U.S., CANADIAN DIESEL AND GASOIL EXPORTS**



\*thousand bbls/day  
Source: U.S. Energy Information Administration, and "Baby Can You Drive My Exports" (RBN Energy, March 27 2014)

increasing exports to other countries. This dampened the decline in U.S. coal output. As shown below, it has dropped by only about 20 percent since 2008 (Figure 3).

- Meanwhile the U.S. and Canada are producing more natural gas than can be absorbed by domestic markets. Gas prices elsewhere in the world, especially in Asia and Western Europe, are much higher than the U.S. It is expected that several liquefied natural gas export plants will be built over the next five to 10 years. RBN Energy of Houston has predicted that by 2020, 8 billion to 10 billion cubic feet per day of gas will be exported as LNG. We assumed the lower end of the range for this article (Figure 4).

The trends with fuel products (i.e. gasoline, diesel and jet fuel), however, are slightly more complicated. Figures 5 and 6 shows that most of the increased

export volume has been diesel and gas-oil; jet and gasoline are much smaller volumes. To a large extent this reflects destination markets being better able to accommodate large quantities of diesel, relative to gasoline.

It is also our conclusion that such dramatic increases in product supply will inevitably slow, due either to slower growth in shale oil output in the U.S. or relaxation of the ban on crude oil exports. Either way, CEG considers it sensible to assume a limit on fuel product exports. For diesel, we think this will be about 1.4 million barrels per day.

But not all of these fuel product volumes are delivered as seaborne exports; the U.S. ships about half by rail or pipeline. Thus it seems reasonable to assume that half of the total will depart as marine cargoes.

The net estimate is presented in Figure 6.

### Conclusions

Regardless of the scenario chosen, the North American unconventional oil and gas story will have a tremendous impact on the quantity of marine exports from Canada and the U.S.. CEG's analysis suggests that there will be about 1,500 additional, incremental cargoes of crude oil, LNG and fuel products shipped per year by 2020.

It is our further expectation that such a rapid increase will inevitably slow. Nonetheless a sustainable increase of at least 1,000 cargoes per year (or three per day) seems reasonable. **BB**

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**FIG. 6: U.S., CANADIAN NET HYDROCARBON EXPORTS**

TYPE OF HYDROCARBON	EXPORTS (MILLION TONNES / YEAR)		EXPORTS (CARGOES / YEAR)		INCREASED NUMBER OF CARGOES / YEAR
	2009	2020	2009	2020	
Coal	108	150	1,600	1,900	300
LNG	0.6 (1)	73	10	700 (2)	690
Diesel	30	60 (3)	375	750	375
Oil sands (4)	-	-	0	180 (4)	180
<b>TOTAL</b>					<b>1,545</b>

(1) LNG exports from Kenai Alaska.

(2) Assumes 60% of total US / Canadian gas exports are shipped by sea as LNG.

(3) Marine exports only; excludes rail and pipeline deliveries

(4) Assumes one oil sands pipeline is completed to Canada's west coast and marine exports are as crude, not refined products

Source: CEG Europe