

North American ENERGY



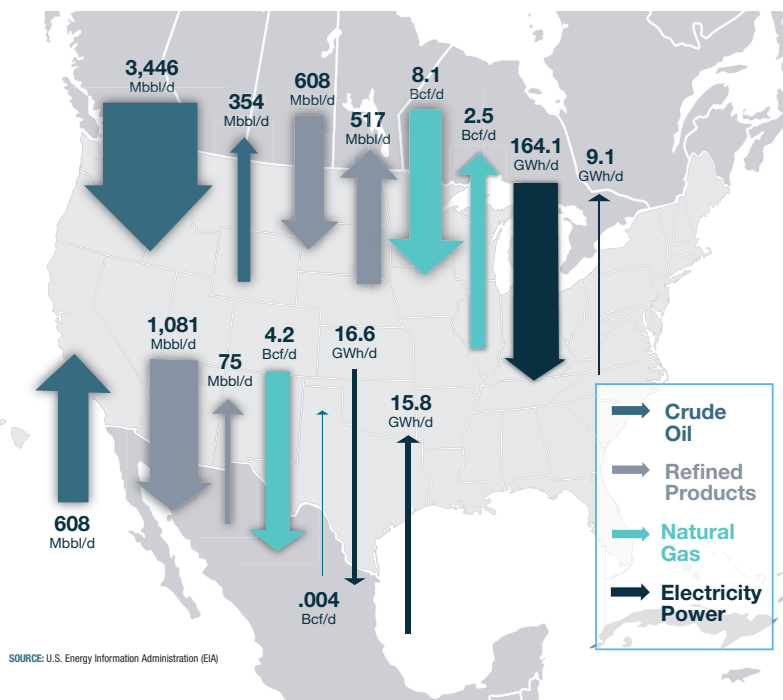
AMERICAN PETROLEUM INSTITUTE

Today's highly integrated and interdependent North American energy markets (oil, natural gas, electricity) benefit the United States by expanding the size of our energy markets which create economies of scale that attract private investment, lower capital costs, and reduce energy costs for consumers. Energy system integration enhances U.S. energy security by enabling North American energy self-sufficiency and by providing export markets for the U.S. as the world's largest producer of oil and natural gas.

NORTH AMERICAN ENERGY FLOWS

North American energy markets (oil, natural gas, electricity) are integrated and interdependent with energy infrastructure and trade crossing the borders of the U.S., Canada and Mexico. The trade in crude oil, natural gas, refined products such as gasoline and petrochemicals, and electricity between the U.S., Canada and Mexico is multi-directional, with *Figure 1* showing the flows in 2017.

FIGURE 1. NORTH AMERICA ENERGY FLOWS BY COMMODITY, 2017



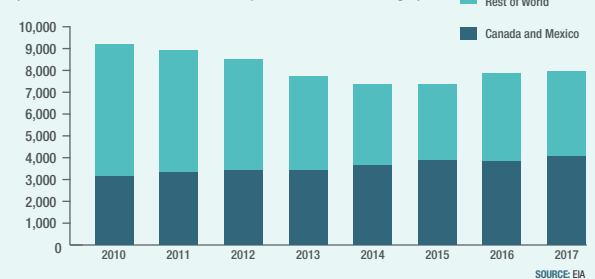
CRUDE OIL

Oil production from shale resources, made available by hydraulic fracturing and horizontal drilling, has led a U.S. revolution in crude oil production. As a result, **imports of crude oil by the U.S. decreased from 9,213 thousand barrels per day (kb/d) in 2010 to 7,969 kb/d in 2017**. At the same time, imported crude oil from Canada and Mexico now account for a larger percentage of total U.S. imports, growing from 33.9% in 2010 to 50.9% in 2017.

Canada is a major producer of heavy crude oil, which is suited for the complex refineries in the U.S. Midwest and Gulf regions. **Canada supplies virtually all of the heavy oil processed at Midwest refineries** and a large percentage of the heavy oil processed at Gulf Coast refineries. Mexico also produces heavier crude oil, which is well-suited for U.S. refineries.

FIGURE 2. U.S. CRUDE OIL IMPORTS, 2010–2017

(Thousand Barrels Per Day, Annual Average)



NATURAL GAS

The U.S. is a net importer of natural gas from Canada and the U.S. is a net exporter of natural gas to Mexico. The U.S. produces enough natural gas to meet its consumption. However, domestic natural gas pipeline constraints have made Canadian imports of **natural gas more cost effective for U.S. customers** in certain U.S. markets, especially in the Northern U.S. In addition to consumer benefits, the interconnectedness of the Canadian, U.S., and Mexican natural gas markets **enhances system flexibility and reliability**.

U.S. and Mexican natural gas markets are also becoming more interconnected: **U.S. pipeline capacity for natural gas exports to Mexico has rapidly expanded** in the past few years and pipeline exports total 4.2 billion cubic feet per day (Bcf/d) and are expected to increase 42% in the next five years. **Mexico is also a new market for U.S. liquefied natural gas (LNG)**, with 140 million cubic feet (MCF) of natural gas shipped from the U.S. in 2017. Mexico's energy reforms, strong growth in natural gas demand in the power sector, declining domestic production, and the lower prices of U.S. pipeline gas compared with more expensive LNG imports have all created an opportunity to **increase energy trade between the U.S. and Mexico**.

REFINED PRODUCTS

The U.S., Canada, and Mexico form a highly-integrated products market, which allows for greater efficiency in responding to local relative advantages (such as lower cost energy sources) and constraints – both natural and artificial. For instance, access to abundant natural gas for refining and processing operations provides an advantage for U.S. refineries in the Gulf Coast, which are increasing diesel production for export to Mexico and to other South American destinations. The EIA reports the U.S. is the source for most of Mexico's refined product imports, and at the same time the destination for most of Mexico's crude oil exports.

FIGURE 3. NORTH AMERICA REFINED PRODUCT FLOW, 2017

PRODUCT – 1,000 B/D	U.S. TO CANADA	U.S. FROM CANADA	U.S. TO MEXICO	U.S. FROM MEXICO
Finished Motor Gasoline	21	15	425	-
Motor Gasoline Blending Components	16	181	43	4
Distillate Fuel Oil	22	112	256	-
Kerosene-Type Jet Fuel	38	20	41	-
Petroleum Coke	21	2	68	-

SOURCE: <https://www.eia.gov/petroleum>

New England relies heavily on imported energy. Shipping products from the U.S. Gulf Coast requires Jones Act vessels, which generally make these products more costly than foreign imports. Canada's largest refinery, located 65 miles north of the border, sends over 80% of its production to the U.S, accounting for a large portion of U.S. gasoline imports. And most U.S. imports of distillate fuel are supplied into the East Coast from Canada.

ELECTRICITY & LINKAGES TO NATURAL GAS

The United States and Canada benefit from a relatively seamless border that allows electricity grid managers to optimize electricity generation assets on both sides of the border in order to improve electric reliability and efficiency. Currently, there are more than 50 active major transmission connections (69 kilovolts or greater) between the two countries.

Although the predominant flow of trade is from north to south, it is not entirely one-sided. Canada is an overall net exporter of energy to the United States, but the roles are reversed in certain regions, particularly where there are infrastructure constraints. The U.S. and Mexico trade a smaller amount of electricity currently along the border regions where Mexico imports some power from California and Texas. However, **Mexico's recent energy reforms present a huge opportunity for electricity and natural gas trade with the U.S.** Mexico's growth in its domestic electricity market has largely been met with generation from new natural gas-fired plants, driving the increase in U.S. natural gas exports to Mexico.

NORTH AMERICAN ENERGY SELF-SUFFICIENCY

North America is on the verge of achieving self-sufficiency with respect to liquid fuels, when measured by production of liquid fuels exceeding consumption of the same across the U.S., Canada and Mexico. According to the U.S. Energy Information Administration *2018 Annual Energy Outlook*, a benchmark publication of potential future energy needs, and other EIA data, the quantity of petroleum and other liquid energy sources produced by the U.S., Canada and Mexico will soon outpace the quantity of petroleum and other liquid energy sources that those countries will consume. In fact, according to the EIA, this will happen as soon as 2020.

TABLE 1. NORTH AMERICA LIQUIDS PRODUCTION VS. CONSUMPTION, 2015-2040 (Source: EIA, Annual Energy Outlook 2017, Table 21)

mb/d	Petroleum and Other Liquids Production					Petroleum and Other Liquids Consumption ¹			
	United States (50 states)	Canada	Mexico ²	USMCA Supply ³	USMCA Supply - USMCA Demand	United States (50 states)	Canada	Mexico	USMCA Demand
2016	14.83	4.59	2.49	21.91	-2.30	19.69	2.47	2.05	24.21
2017	15.65	4.96	2.26	22.87	-1.52	19.96	2.44	1.98	24.39
2020	17.87	5.28	2.24	25.39	0.57	20.25	2.36	2.20	24.81
2025	18.90	5.44	2.11	26.44	2.21	19.67	2.28	2.28	24.23
2030	19.37	5.54	2.14	27.05	3.23	19.23	2.24	2.34	23.82
2035	19.65	5.85	2.28	27.78	4.04	19.07	2.23	2.44	23.73
2040	19.75	6.21	2.59	28.54	4.50	19.24	2.24	2.56	24.05
2045	19.51	6.69	3.00	29.20	4.73	19.53	2.27	2.66	24.47
2050	19.27	7.16	3.42	29.85	4.72	20.05	2.31	2.76	25.12

SOURCES: Compiled by API's Steve Crookshank, Michael Flickinger, Bryan Just, Marcus Koblitz and Aaron Padilla

Figure 1: U.S. Energy Information Administration (EIA), Petroleum & Other Liquids Exports by Destination and U.S. Imports by Country of Origin; Refined Products Exports by Destination and U.S. Imports by Country of Origin; U.S. Natural Gas Exports and Re-Exports by Country and U.S. Natural Gas Imports by Country; Canada National Energy Board (NEB) for Canada-U.S. Electricity Flows; Mexico Centro Nacional de Control de Energía (CRE-CENACE) for Mexico-U.S. Electricity Flows.

Figure 2: Energy Information Administration, Petroleum & Other Liquids: U.S. Imports by Country of Origin.

Figure 3: U.S. Energy Information Administration (EIA) Refined Products Exports by Destination and U.S. Imports by Country of Origin.

Table 1:

¹ Estimated consumption.

² Mexico projections include Chile. Historically, Chile represents 0.5% or less of combined Chile-Mexico production and 15% or less of combined Chile-Mexico consumption.

³ USMCA projections include Chile. Historically, Chile represents less than 0.1% of USMCA production and less than 2% of USMCA consumption.

Sources: 2015-2017: EIA, International Energy Statistics Database, Accessed December 2018
2020-2050: EIA, Annual Energy Outlook 2018, Table 21