

» THE OUTLOOK FOR THE ETHANOL INDUSTRY IN « **Nebraska, the U.S., and Globally**



July 2019

Brian Williams, PhD
Economist, NPPD

Ken Lemke, PhD
Economist, NPPD



Nebraska Public Power District
Always there when you need us

Table of Contents

EXECUTIVE SUMMARY	1
THE ETHANOL INDUSTRY IN NEBRASKA	3
FORECASTED FUEL USAGE	4
GLOBAL ETHANOL PRODUCTION	10
GLOBAL BIOFUELS TRADE.....	13
REFERENCES	15

List of Charts

Chart 1	Nebraska Ethanol Production, 1985–2016.....	3
Chart 2	Light-Duty Vehicle Sales by Fuel Type	4
Chart 3	U.S. Light Duty Transportation Vehicle Stock	5
Chart 4	Transportation Sector Consumption by Fuel Type	6
Chart 5	U.S. Transportation Fuel Use for Motor Gasoline and Ethanol, 2016–2050.....	7
Chart 6	World Transportation Energy Consumption	8
Chart 7	Transportation Energy Consumption	9

List of Tables

Table 1	World Biofuel Projections	11
Table 2	Ethanol Production by Country for Top Ten Ethanol Producing Countries for 2017 and 2027	12
Table 3	Ethanol Consumption by Country for Top Ten Ethanol Consuming Countries for 2017 and 2027	13
Table 4	Ethanol Exports by Country for Top Ten Ethanol Exporting Countries for 2017 and 2027	14
Table 5	Ethanol Imports by Country for Top Ten Ethanol Importing Countries for 2017 and 2027	14

EXECUTIVE SUMMARY

Although global demand for ethanol for transportation fuel use is expected to continue to grow into the future. The outlook for the U.S. ethanol industry does not look to follow the same track. Many of our global competitors are expected to increase the production of ethanol to meet the growing global demand and partially displace the U.S. on the global export market. Meanwhile, U.S. domestic demand for ethanol for transportation fuel is projected to decline. While growth in demand for ethanol for transportation fuel may be somewhat limited, there may be promising opportunities for growth in other uses. Specifically, a rapidly growing demand for fuels in non-combustible and industrial uses. While generally similar, the outlook for Nebraska's ethanol industry may be slightly better than the national outlook.

There are several things that are driving both production as well as consumption of ethanol in the U.S. It is also important to remember that the U.S. does not operate in a vacuum. One of the biggest drivers for the demand for ethanol is for fuel to be used in the transportation industry. Sales of gasoline and flex-fuel vehicles are projected to decline over the next two decades while electric vehicle sales are expected to increase over the same time frame. Despite the decline in gasoline and flex-fuel vehicle sales, they are still expected to make up the vast majority of vehicles on the road in 2050 (Energy Information Administration (EIA) Annual Energy Outlook, 2018). Simultaneously, fuel efficiency is projected to continue to improve well into the future, and as a result gasoline and distillate fuel will see its share of transportation energy consumption reduce from 84 percent in 2017 to 70 percent in 2050 (EIA Annual Energy Outlook, 2018).

While U.S. energy consumption for transportation is expected to decline by the year 2050, global energy consumption is projected to increase, with the total increase coming from non-organization for economic cooperation and development (OECD) countries; particularly India and China. However, along with the increase in demand for transportation energy, we will also see an increase in global ethanol production, with Brazil, China, India, Thailand, and Argentina all seeing increases in ethanol production of more than ten percent between 2017 and 2027 (OECD-Food and Agriculture Organization (FAO), 2017). Each of those countries are projected to see growth in their ethanol consumption of at least nine percent. At the same time, the U.S. is expected to decrease ethanol production by one percent from 2017 to 2027. The increases in both the production and consumption of ethanol from these countries is also expected to change the dynamics of the ethanol export market. Brazil's 20 percent increase in ethanol production gives them the ability to increase exports by 36 percent, helping to displace the U.S. in the export market and causing a decrease of 21 percent in U.S. exports (OECD-FAO, 2017).

In summary, although global demand for ethanol for transportation fuel use is expected to continue to grow into the future, the outlook for the U.S. ethanol industry does not look to follow the same track. Many of our global competitors are expected to increase the production of ethanol to meet the growing global demand and partially displace the U.S. on the global export market. Meanwhile, U.S. domestic demand for ethanol for transportation fuel is projected to decline. Although growth in demand for ethanol for transportation fuel may be somewhat limited, British Petroleum's (BP) 2018 Energy Outlook report suggests that there may be promising opportunities for growth in other uses. Specifically, BP's projections indicate a rapidly growing demand for fuels in non-combustible and industrial uses. The industrial sector accounts for more than half of the increase in energy consumption between now and 2040, which could present an opportunity for new uses for ethanol in the future.

The outlook for Nebraska's ethanol industry may be slightly better than the national outlook. Nebraska ranks second in ethanol production with the primary market for Nebraska-produced ethanol being the West Coast and Californian market. California is aggressively pushing to reduce the state's greenhouse gas emissions, and as a result the state is expected to see a 20 percent reduction in fuel consumption by the year 2030. However, the push in California and globally to reduce greenhouse emissions does come with a silver lining for ethanol: there is a growing industry focused on the replacement of petroleum-based products with products made from renewable resources. Nebraska is currently on the forefront in terms of innovative alternative ethanol uses. In September 2018, Prairie Catalytic broke ground for a new facility in Columbus, Nebraska to manufacture ethyl-acetate from ethanol. This new facility will be the largest manufacturer of renewable ethyl-acetate in the world. At the same time, the University of Nebraska's Innovation Campus opened the Biotech Connector, a bio industry startup incubator with the hope of making Nebraska a hub for bio industry companies. This type of innovation could provide a much-needed boost in the demand for Nebraska-produced ethanol that could offset reductions in demand for ethanol for transportation fuel.

THE ETHANOL INDUSTRY IN NEBRASKA

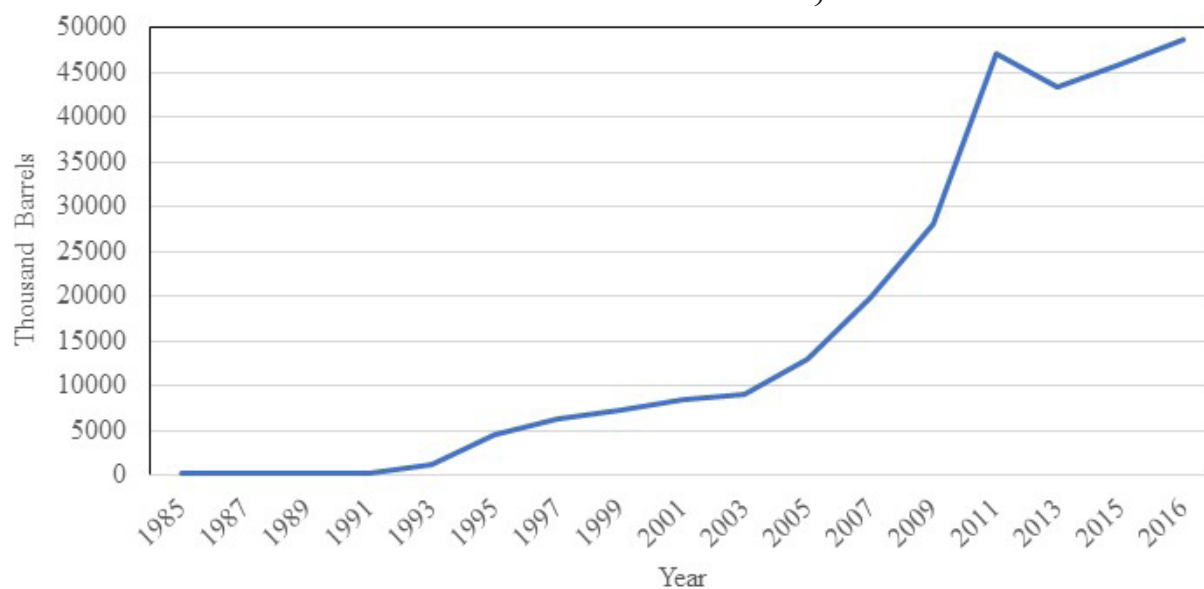
The positive outlook for Nebraska's ethanol industry is supported by growth in ethanol production capacity and employment. In 2017, Nebraska's twenty-four ethanol plants had a total production capacity of 2.558 billion gallons, an increase of 481 million gallons since 2014 primarily due to the expansion of existing plants. In addition, the Nebraska ethanol industry employs the equivalent of 1,453 full-time employees, an increase of 152 workers (full-time equivalent).

The majority of Nebraska's ethanol and related products are exported out of state from 2014–2017. A 2016 survey indicates that Nebraska producers exported 94 percent of ethanol produced, 44 percent of distiller's grain, and 57 percent of corn oil (University of Nebraska-Lincoln 2019).

In 2017, the total value of production for ethanol and its co-products was \$3.764 billion. The net returns on ethanol tend to fluctuate month to month due to the variability of prices on both input (corn) and output (ethanol). While the industry has little control over these factors, Nebraska ethanol plants have started to add diverse revenue sources to their co-product mix to mitigate the market risk. Though ethanol prices have dropped in recent years, Nebraska ethanol producers have successfully overcome this period of low prices by diversifying production, taking advantage of new market opportunities, and safeguarding against market movements.

Chart 1

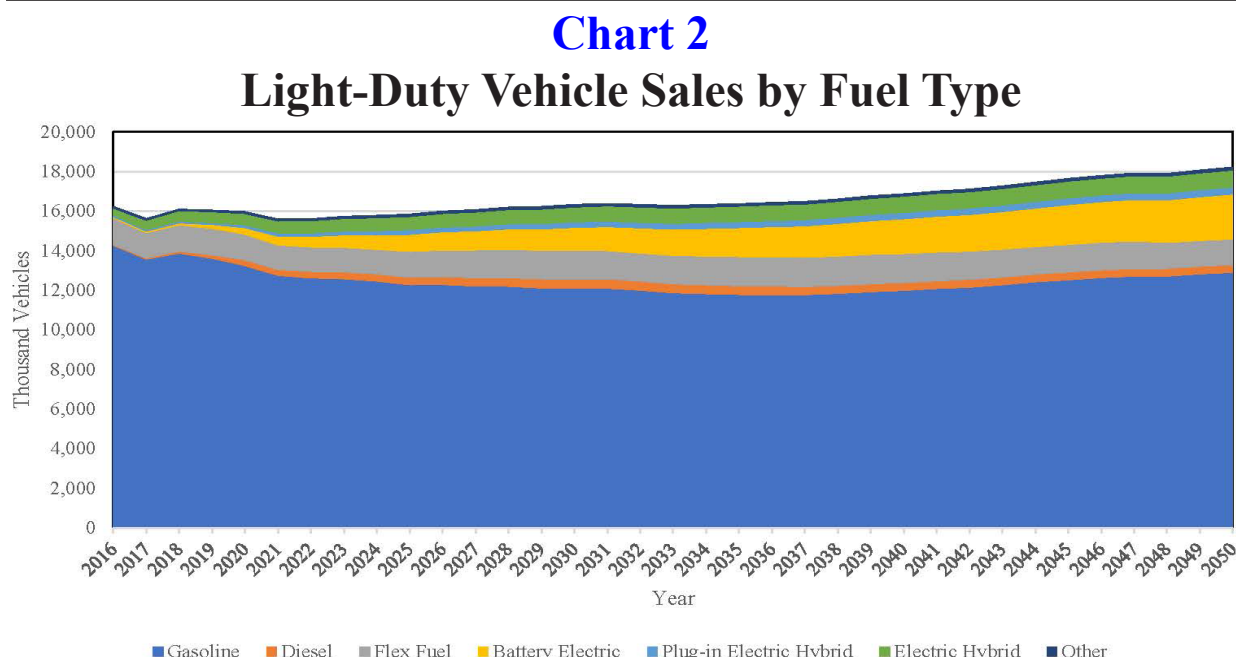
Nebraska Ethanol Production, 1985–2016



Source: U.S. Energy Information Administration, State Energy Data 2016: Production

FORECASTED FUEL USAGE

Currently, the single largest use by far for ethanol is for transportation use. Consequently, trends over time in the quantity of transportation fuel used as well as the types of fuel used for transportation will play a major role in driving future demand for ethanol. There are three primary factors driving the forecast for future transportation fuel usage: fuel type, miles driven, and fuel economy. The U.S. Energy Information Administration estimates the first of these factors in Chart 1 below with the forecasted U.S. vehicle sales by the type of fuel used.



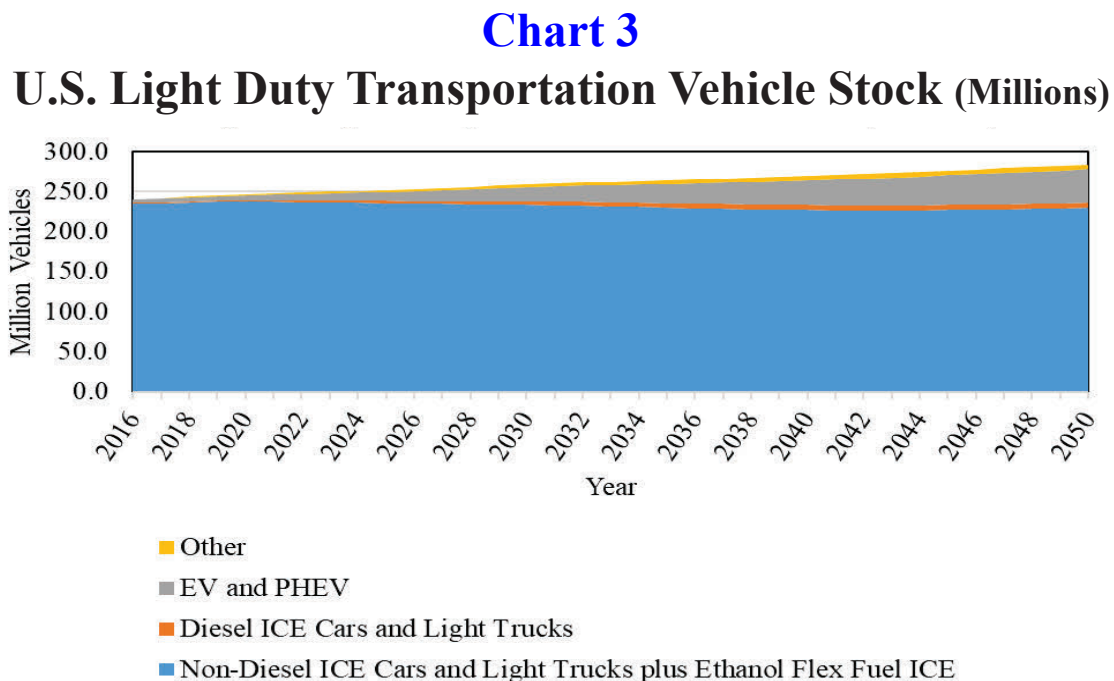
Source: U.S. Energy Information Administration, Annual Energy Outlook 2018.

Note: Motor Gasoline includes gasoline and E-85 ethanol vehicles.

Long term U.S. vehicle sales are projected to grow for most vehicle types, including electric, hybrid, and gasoline. Sales of electric and plug-in hybrid electric light-duty vehicles increase in the Energy Information Administration's (EIA) Reference, or best guess, case because of state policies, more models offering longer driving-range capabilities, and battery cost reductions. California's Zero-Emission Vehicle regulation, which has been adopted by nine additional states, requires a minimum percentage of vehicle sales of electric and plug-in hybrid vehicles, while new federal fuel economy standards go into full effect by the year 2025. However, the EPA has recently rolled back the federal standards and will freeze the standards after 2021, which could skew the numbers in EIA's report to slightly more favorably toward gasoline and flex fuel. In 2025, projected sales of Battery-Electric Vehicles (BEV) and Plug-in Hybrid Electric Vehicles (PHEV) reach 1.1 million, or about seven percent of projected total vehicle sales in the reference case. BEV sales increase from less than one percent of total U.S. vehicle sales in 2017 to 12 percent in 2050. PHEV sales increase from less than one percent to two percent over the same period. Sales of the longer-ranged 200- and 300-mile electric vehicles grow over the entire projection period, tempering sales of the shorter-range 100-mile electric vehicles and plug-in hybrid electric vehicles while combined sales of new electric, plug-in

hybrid electric, and hybrid vehicles grow in market share from 4 percent in 2017 to 19 percent in 2050 in the Reference case. The combined share of sales attributable to gasoline and flex-fuel vehicles (which use gasoline blended with up to 85 percent ethanol) declines from 95 percent in 2017 to 78 percent in 2050 because of the growth in the sales of electric vehicles.

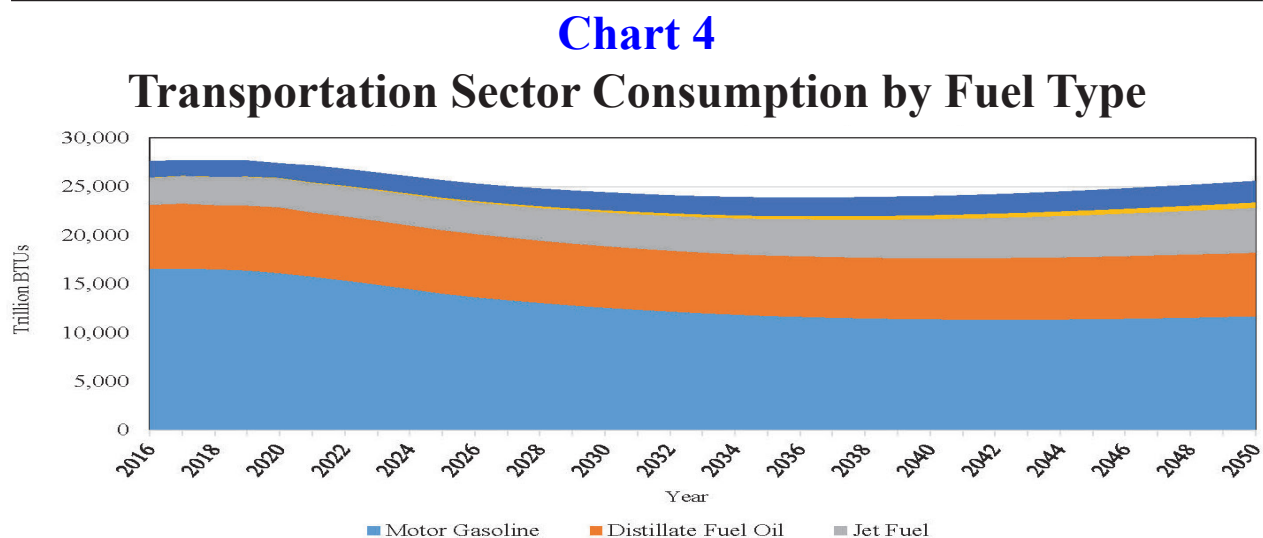
As new vehicles are purchased and older vehicles are retired, the trends in new vehicle purchases will begin to have an impact on the makeup of the total vehicle stock. Chart 3 below shows the forecasted vehicle stock, which accounts for vehicle sales, vehicles currently on the road, and vehicles that are retired after their useful lifespan.



Source: U.S. Energy Information Administration, Annual Energy Outlook 2018.

Non-diesel internal combustion engine (ICE) cars and light trucks (including ethanol flex-fuel vehicles) are expected to decrease slightly as the stock of EV and PHEVs grow and begin to replace some of the non diesel ICE cars and light trucks. As diesel technology and fuel economy continues to improve, the number of diesel ICE cars and light trucks is expected to grow substantially between now and 2050 but will still make up a small proportion of the vehicle stock.

The combination of the change in the types of vehicles in the U.S. vehicle stock as well as an improvement in fuel economy of newer vehicles is incorporated into the estimates of transportation fuel consumption as shown in Chart 4 below. In the U.S. Energy Information Administration's (EIA) 2018 Reference case projection, U.S. transportation energy consumption declines between 2019 and 2035 because increases in fuel economy more than offset growth in vehicle miles traveled.

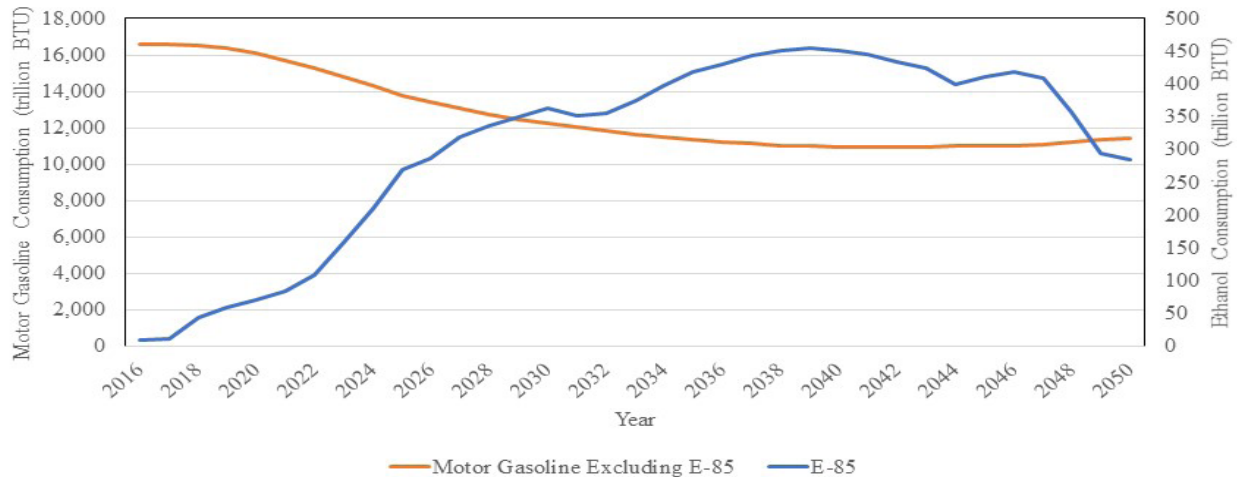


Source: U.S. Energy Information Administration, Annual Energy Outlook 2018.

Note: Motor Gasoline includes gasoline and E-85 ethanol vehicles.

Increases in fuel economy standards temper growth in motor gasoline, including ethanol consumption, which decreases by 31 percent between 2017 and 2050. Motor gasoline plus E-85's total U.S. transportation energy consumption decreases from 16.5 quadrillion BTUs in 2018 to 11.3 quadrillion BTUs in 2042 for a decline of 32 percent, while motor gasoline and distillate fuel oil's combined share of total transportation energy consumption decreases from 84 percent in 2017 to about 70 percent in 2050 as the use of alternative fuels increases. However, despite the decrease in motor gasoline plus E-85 consumption, as shown in Chart 5 (next page), the decline is driven by a decrease in motor gasoline while E-85 consumption actually increases during the same time period. Ethanol blends are projected to become more competitive with petroleum products in the future, which is expected to increase future demand for E-85.

Chart 5
U.S. Transportation Fuel Use for Motor Gasoline and Ethanol, 2016–2050



Source: U.S. Energy Information Administration, Annual Energy Outlook 2018.

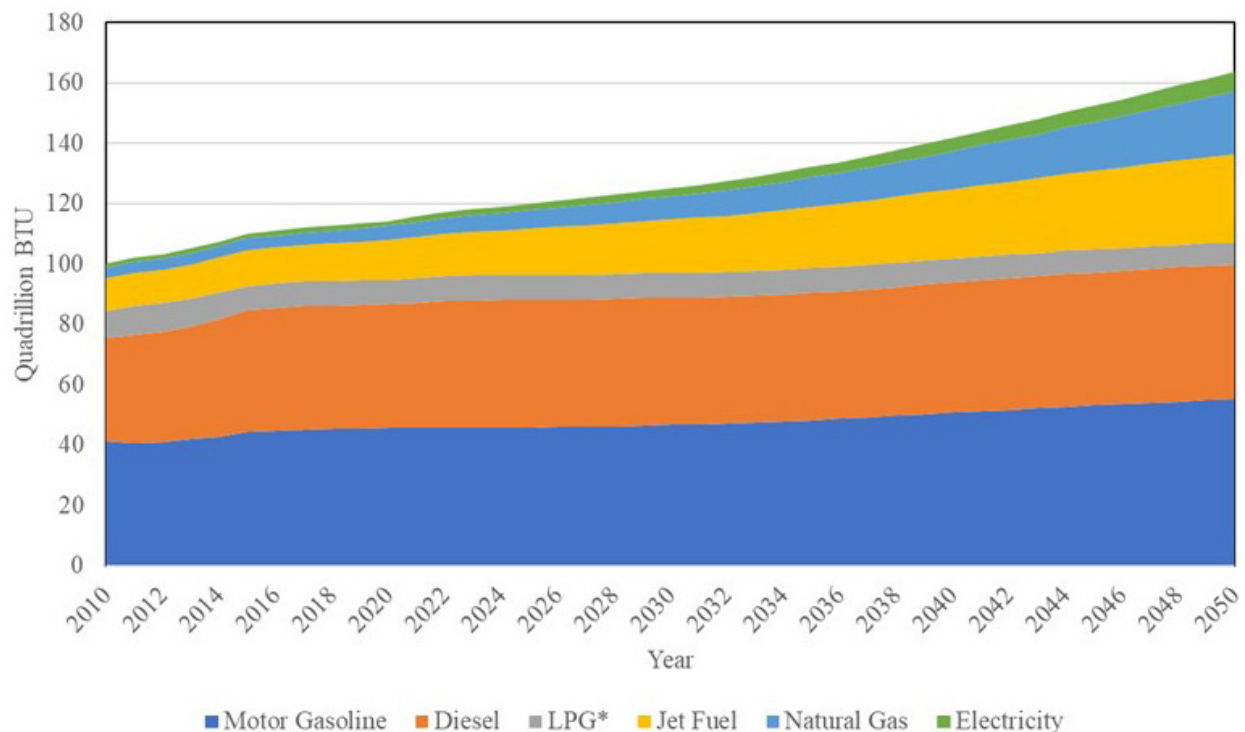
Increases in fuel economy standards result in heavy-duty vehicle energy consumption and related diesel use ending at approximately the same level in 2050 as in 2017, despite rising economic activity that increases the demand for freight truck travel. Excluding electricity and other transportation fuels, which are at comparatively low levels in 2017, jet fuel consumption grows more than any other transportation fuel over the projection period, rising 64 percent from 2017 to 2050, as growth in air transportation outpaces improvements in aircraft energy efficiency. Continued growth in on-road travel demand increases energy consumption later in the projection period because current fuel economy and greenhouse gas standards require no additional efficiency increases for new vehicles after 2025 for light-duty vehicles and after 2027 for heavy-duty vehicles.

In summary, when it comes to U.S. vehicle fuel consumption, light-duty vehicle fuel economy is forecast to improve as sales of more fuel-efficient cars grow and as electrified powertrains gain market share, but gasoline vehicles will remain the dominant vehicle type through 2050 in the EIA Reference case. The forecast also includes increasing market penetration of dedicated E-85 trucks in the medium-duty fleet, starting in 2021. Energy Commission staff forecasts of demand for E-85 ranges from 72 million to 74 million gasoline gallon equivalent (GGE) by 2030. The dedicated E-85 Cummins Ethos engine contributes to this growth in later years.

Nebraska's primary market for ethanol is California and the West Coast. As a result, fuel demand in those areas will at least partially drive the outlook for Nebraska's ethanol industry. When compared to the U.S., California is expected to see similar trends. The California Energy Commission's "Transportation Energy Demand Forecast, 2018–2030," projects gasoline demand in the state declining from roughly 15.8 billion gallons in 2017 to between 12.3 billion and 12.7 billion gallons in 2030, a 20 to 22 percent reduction. The declining trend in gasoline consumption is primarily due to increasing fuel economy (stemming from Federal Combined Automobile Fleet Emissions regulations) and gasoline displacement from the increasing market penetration of BEVs.

Despite a decline in U.S. transportation fuel usage between 2017 and 2035, global fuel consumption is expected to increase steadily through the year 2050 with nearly all fuel types seeing an increase in their usage. As shown in Chart 6 below, global energy consumption is projected to increase for gasoline, diesel, jet fuel, natural gas, and electricity. However, as shown in Chart 7 (next page), fuel use for OECD countries is expected to decline over the next 15 years. Those declines will be more than offset by an increase in fuel consumption by non-OECD countries. Increased fuel efficiency combined with slower population growth are the primary drivers behind the slight decline in transportation fuel consumption for OECD countries, while non-OECD countries in general are seeing a rapidly growing middle class as well as a faster growing population that is expected to more than offset any improvements in fuel efficiency over time.

Chart 6
World Transportation Energy Consumption



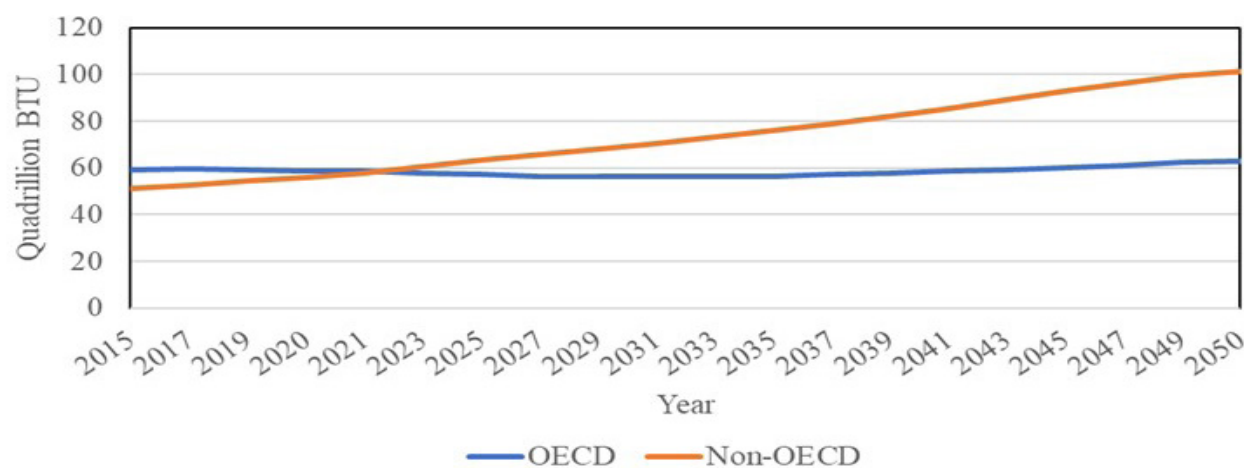
Source: U.S. Energy Information Administration, Annual Energy Outlook 2018.

* LPG - Liquefied Petroleum Gas

Note: Motor Gasoline includes gasoline and E-85 ethanol vehicles.

Chart 7

Transportation Energy Consumption



Source: U.S. Energy Information Administration, International Energy Outlook 2018.

In addition to transportation fuel usage, there are other factors that could drive demand for ethanol. In BP's Energy Outlook 2018 Edition, world gross domestic product (GDP) is forecasted to more than double by 2040, driven by increasing prosperity in fast-growing emerging economies. While rising prosperity drives an increase in global energy demand, a portion of this growth is offset by accelerating gains in energy efficiency. As a result, energy demand increases by only around one third over the next 25 years.

Demand for oil and other liquid fuels grows over much of the Outlook, but gradually slows and plateaus in the later years of BP's outlook. Renewable energy is the fastest-growing energy source, accounting for 40 percent of the increase in primary energy. The energy mix by 2040 is the most diversified the world has ever seen. The increase in liquids production is initially dominated by U.S. light oil, but is later driven by Organization of the Petroleum Exporting Countries (OPEC), as members adopt a strategy of increasing their market share. Meanwhile, all of the growth in energy consumption is in fast-growing developing economies: China and India account for half of the growth in global energy demand. BP's projections show growth of energy demand in industry and transport to slow through 2040 due to increases in energy efficiency, while buildings and non-combusted use grow in importance.

The industrial sector (including the non-combusted use of fuels) currently consumes approximately half of all global energy and feedstock fuels, with residential and commercial buildings (29 percent) and transport (20 percent) accounting for the remainder. In BP's forecast, the industrial sector also accounts for approximately half of the increase in energy consumption, although improving energy efficiency causes growth of industrial use outside of the non-combusted sector to slow. In contrast, the non-combusted use of fuels, particularly as a feedstock in petrochemicals, is projected to be the fastest growing source of demand. The non-combusted use of fuels, e.g. as feedstocks for petrochemicals, lubricants and bitumen, becomes an increasingly important component of overall industrial demand over the outlook. BP suggests that this stronger growth reflects the more limited scope for efficiency gains when oil, gas, and coal are used as a feedstock rather than as a source of energy, which could prove to be an area of opportunity for the ethanol industry moving forward.

GLOBAL ETHANOL PRODUCTION

As shown in Table 1 (next page), ethanol production is expected to grow by 8.8 percent worldwide from an average of 120.0 billion liters in 2017 to 130.5 billion liters by the year 2027. Global biodiesel production is also expected to grow by 8.8 percent over the next ten years from 36.1 billion liters in 2017 to 39.3 billion liters in 2027. The OECD projections expect biofuel production in developed countries to decline slightly over the next ten years while developing countries are expected to increase their biofuel production by 23.6 percent during the same time period.

Much of the increase in ethanol production is policy driven. The use of biofuels in the European Union is assumed to be governed by the 2009 Renewable Energy Data (RED) and Fuel Quality Directives and the 2015 Indirect Land Use Change (ILUC) Directive, as well as by national legislations. The proportion of total transportation energy accounted for biofuels, including double counting for waste- and residue-based biofuels, is expected to reach 6.4 percent by 2020 and to remain stable thereafter (OECD-FAO 2017). The remainder of the ten percent RED target should be met from other renewable energy sources. The Brazilian taxation system will remain favorable to hydrous ethanol rather than gasohol, which corresponds to the mandatory mix of 27 percent ethanol with gasoline. As shown in Table 2 (page 12), Brazilian ethanol demand is expected to expand by 6 billion liters over the outlook period. The Brazilian biodiesel mandate should reach 10 percent by the end of 2019, leading to an increase in production of more than 40 percent over the next ten years. In Argentina, it is assumed that the 12 percent blending mandate for biodiesel and ethanol will be fulfilled by 2020. Argentinean biodiesel production should also be driven by U.S. import demand to meet the latter's advanced mandate.

U.S. ethanol production is expected to decline over the next several years due to constraints on higher ethanol blend levels, increasing fuel efficiency in newer vehicles, and rising costs of fossil fuels (United States Department of Agriculture, Economic Research Service). Despite the decrease in production over the next ten years, the U.S. will continue to remain the largest ethanol producing country for the foreseeable future. Currently, the U.S. produces just over half of the world's ethanol supply and is projected to produce just over 46 percent of the world's ethanol in the year 2027.

Table 1
World Biofuel Projections (Billion Liters)

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
ETHANOL											
World											
Production	120.0	122.4	123.5	125.2	125.7	126.5	127.2	128.1	128.9	129.8	130.5
Consumption	118.8	123.3	124.1	125.6	126.2	127.0	127.8	128.6	129.4	130.3	131.1
Exports	10.0	9.2	9.3	9.4	9.4	9.4	9.5	9.6	9.5	9.5	9.4
Developed Countries											
Production	72.1	72.1	71.9	72.6	72.1	71.9	71.7	71.5	71.4	71.4	71.3
Consumption	70.0	72.2	71.8	72.2	72.0	71.9	71.8	71.7	71.6	71.5	71.3
Net Trade	1.5	0.4	0.4	0.4	0.3	0.1	0.0	-0.1	0.0	0.0	0.1
Developing Countries											
Production	47.9	50.3	51.6	52.6	53.6	54.5	55.6	56.6	57.5	58.4	59.2
Consumption	48.8	51.1	52.3	53.4	54.2	55.1	56.0	56.9	57.8	58.8	59.8
Net Trade	-1.8	-0.7	-0.6	-0.6	-0.6	-0.4	-0.3	-0.2	-0.2	-0.3	-0.4
OECD Countries											
Production	71.2	71.2	71.0	71.7	71.2	71.1	70.8	70.6	70.6	70.5	70.4
Consumption	70.1	72.2	71.9	72.3	72.1	72.0	71.9	71.8	71.7	71.6	71.4
Net Trade	0.6	-0.5	-0.6	-0.6	-0.6	-0.8	-0.9	-1.0	-1.0	-0.9	-0.8
BIODIESEL											
World											
Production	36.1	37.4	38.0	39.0	38.8	38.5	38.6	38.7	38.9	39.0	39.3
Consumption	36.6	37.4	38.1	38.9	38.7	38.6	38.7	38.8	38.9	39.1	39.4
Exports	10.0	9.2	9.3	9.4	9.4	9.4	9.5	9.6	9.5	9.5	9.4
Developed Countries											
Production	21.3	21.8	21.9	22.0	21.8	21.3	21.1	21.0	20.8	20.7	20.6
Consumption	24.4	24.6	24.4	23.9	23.6	23.2	23.0	22.8	22.6	22.5	22.4
Net Trade	-2.7	-2.9	-2.5	-2.1	-2.0	-2.0	-1.9	-1.9	-1.9	-1.8	-1.8
Developing Countries											
Production	14.7	15.6	16.1	17.0	17.0	17.2	17.5	17.7	18.1	18.3	18.7
Consumption	12.1	12.8	13.7	15.0	15.1	15.4	15.7	16.0	16.3	16.6	17.0
Net Trade	2.6	2.8	2.4	2.0	1.9	1.9	1.8	1.8	1.8	1.7	1.7
OECD Countries											
Production	22.0	22.5	22.6	22.7	22.5	22.0	21.8	21.6	21.5	21.3	21.2
Consumption	25.1	25.3	25.1	24.6	24.3	23.9	23.6	23.5	23.3	23.1	23.0
Net Trade	-2.7	-2.9	-2.5	-2.1	-2.0	-1.9	-1.9	-1.8	-1.8	-1.8	-1.8

Source: OECD-FAO 2018. "OECD-FAO Agricultural Outlook," OECD Agriculture Statistics (database).

Table 2
**Ethanol Production by Country for Top Ten Ethanol
Producing Countries for 2017 and 2027**

2017 Ethanol Production				2027 Projected Ethanol Production*		
Rank	Country	MM Liters	% World	Country	MM Liters	% World
1	United States	61,050.0	50.9	United States	60,434.9	46.3
2	Brazil	27,165.5	22.6	Brazil	32,721.7	25.1
3	China	10,000.0	8.3	China	11,054.5	8.5
4	India	2,037.5	1.7	Thailand	3,199.2	2.5
5	Thailand	1,883.2	1.6	India	2,946.1	2.3
6	Canada	1,810.0	1.5	Canada	1,795.6	1.4
7	Argentina	1,230.0	1.0	Argentina	1,668.6	1.3
8	Russian Federation	597.0	0.5	Philippines	815.0	0.6
9	Pakistan	497.2	0.4	Colombia	605.6	0.5
10	Colombia	445.2	0.4	Russian Federation	573.0	0.4
Total		106,715.7	88.9	Total	115,814.3	88.7

Source: OECD-FAO Agricultural Outlook, 2018

* Projected by OECD-FAO

GLOBAL BIOFUELS TRADE

As mentioned before, the U.S. is the largest ethanol producing country in the world. However, as shown in Table 3, U.S. ethanol production still outpaces consumption. As a result, the U.S. is also currently the largest ethanol exporter with 57.6 percent of all global exports coming from the United States. As shown in Table 4 (next page), Brazil is a distant second (see Table 4, next page), with their exports comprising 15.8 percent of the world's exports. Brazil is projected to see a 36.4 percent increase in exports in the next ten years, primarily due to increases in Brazilian ethanol production. The U.S. is expected to see a 21.1 percent decline in ethanol exports over the next ten years. The decline in U.S. ethanol exports is due to a combination of slightly lower ethanol production and an increase in ethanol consumption, meaning that more of the ethanol produced within the U.S. will be used domestically.

Table 3

Ethanol Consumption by Country for Top Ten Ethanol Consuming Countries for 2017 and 2027

2017 Ethanol Consumption				2027 Projected Ethanol Consumption*		
Rank	Country	MM Liters	% World	Country	MM Liters	% World
1	United States	55,925.7	47.1	United States	57,716.6	44.0
2	Brazil	26,475.1	22.3	Brazil	31,882.7	24.3
3	China	10,000.0	8.4	China	10,952.8	8.4
4	Canada	3,012.2	2.5	India	3,436.5	2.6
5	India	2,367.5	2.0	Thailand	3,157.8	2.4
6	Thailand	1,888.2	1.6	Canada	2,951.9	2.3
7	Japan	1,630.0	1.4	Argentina	1,652.0	1.3
8	Argentina	1,200.0	1.0	Japan	1,479.7	1.1
9	Philippines	809.7	0.7	Philippines	1,314.6	1.0
10	Colombia	620.0	0.5	Colombia	760.7	0.6
Total		103,928.4	87.5	Total	115,305.3	88.0

Source: OECD-FAO Agricultural Outlook, 2018.

*Projected by OECD-FAO

Note: U.S. Ethanol consumption will likely be higher than projected in 2027 due to recent policy changes allowing year-round blending of E-15.

Table 4

Ethanol Exports by Country for Top Ten Ethanol Exporting Countries for 2017 and 2027

2017 Ethanol Exports				2027 Projected Ethanol Exports*			
Rank	Country	MM Liters	% World	Country	MM Liters	% World	
1	United States	5,753.2	57.6	United States	4,537.1	48.3	
2	Brazil	1,572.6	15.8	Brazil	2,145.5	22.8	
3	Pakistan	463.4	4.6	Pakistan	484.9	5.2	
4	Republic of South Africa	228.6	2.3	Republic of South Africa	228.6	2.4	
5	China	150.0	1.5	China	149.2	1.6	
6	India	120.0	1.2	Russian Federation	119.5	1.3	
7	Russian Federation	120.0	1.2	Indonesia	99.1	1.1	
8	Indonesia	99.1	1.0	India	93.2	1.0	
9	Australia	90.0	0.9	Australia	87.9	0.9	
10	Canada	86.3	0.9	Canada	86.1	0.9	
Total		8,683.1	87.0	Total	8,031.1	85.5	

Source: OECD-FAO Agricultural Outlook, 2018

* Projected by OECD-FAO

Brazil is currently the world's largest importer of ethanol with 17.9 percent of all ethanol exports going to the country. However, with the rapid increase in ethanol production, Brazilian imports are projected to decrease by 34.2 percent by 2027. Conversely, the U.S. is expected to see imports increase by 56.0 percent by 2027, when the U.S. is expected to import 17.2 percent of the world's traded ethanol. The major driving factor behind the increase in U.S. ethanol imports is the increase in consumption of ethanol in the U.S., primarily from the transportation sector. The growing population and demand for ethanol in India is also expected to increase Indian ethanol imports by 29.7 percent over the next ten years.

Table 5

Ethanol Imports by Country for Top Ten Ethanol Importing Countries for 2017 and 2027

2017 Ethanol Imports				2027 Projected Ethanol Imports*			
Rank	Country	MM Liters	% World	Country	MM Liters	% World	
1	Brazil	1,840.9	17.9	United States	1,667.6	17.2	
2	Japan	1,580.0	15.4	Japan	1,405.3	14.5	
3	Canada	1,308.5	12.7	Canada	1,242.4	12.8	
4	United States	1,068.9	10.4	Brazil	1,210.4	12.5	
5	Philippines	500.0	4.9	India	583.5	6.0	
6	India	450.0	4.4	Philippines	500.0	5.2	
7	Korea	350.0	3.4	Korea	350.2	3.6	
8	Colombia	175.0	1.7	Colombia	155.3	1.6	
9	Nigeria	154.1	1.5	Nigeria	154.1	1.6	
10	Mexico	114.4	1.1	Mexico	131.5	1.4	
Total		7,541.7	73.5	Total	7,400.2	76.5	

Source: OECD-FAO Agricultural Outlook, 2018

* Projected by OECD-FAO

REFERENCES

British Petroleum. “BP Energy Outlook 2018 Edition.” Available at www.bp.com/energyoutlook. October 2018.

Hanson, Steven. U.S. Energy Information Administration. “E-85 projections.” Personal Communication. May 2019.

International Energy Agency. “Renewables 2018.” Available at www.iea.org/. October 2018.

Organization for Economic Co-operation and Development. “OECD-FAO Agricultural Outlook 2017-2026.” Available at www.oecd-ilibrary.org/agriculture-and-food/oecd-fao-agricultural-outlook-2017-2026_agr_outlook-2017-en. Accessed March 2019.

U.S. Energy Information Administration. “International Energy Outlook 2017.” Available at www.eia.gov/ieo. September 2017.

U.S. Energy Information Administration. “International Energy Outlook 2018.” Available at www.eia.gov/ieo. September 2018.

U.S. Energy Information Administration. “Annual Energy Outlook 2018.” Available at www.eia.gov/aeo. February 2018.



July 2019

Nebraska Public Power District (NPPD), Nebraska's largest electric utility, is proud of the areas it serves and has published this document in an effort to assist in the economic development of the NPPD service area. For more information on Nebraska as a business location, contact the Economic Development Department, Nebraska Public Power District, General Office, 1414 15th Street, P.O. Box 499, Columbus, Nebraska 68602, (877) 275-6773. Visit our web site at sites.nppd.com.



Nebraska Public Power District
Always there when you need us

D7F0899E