INTERNATIONAL TRADE ADMINISTRATION

2016 Top Markets Report
Renewable Fuels

A Market Assessment Tool for U.S. Exporters

November 2016

U.S. Department of Commerce | International Trade Administration | **Industry & Analysis (I&A)**

Industry & Analysis' (I&A) staff of industry, trade and economic analysts devise and implement international trade, investment, and export promotion strategies that strengthen the global competitiveness of U.S. industries. These initiatives unlock export, and investment opportunities for U.S. businesses by combining in-depth quantitative and qualitative analysis with ITA's industry relationships.

For more information, visit
www.trade.gov/industry

I&A is part of the International Trade Administration, whose mission is to create prosperity by strengthening the competitiveness of U.S. industry, promoting trade and investment, and ensuring fair trade and compliance with trade laws and agreements.

INTERNATIONAL
TRADE
ADMINISTRATION

Cora Dickson served as the lead author of this report. A note of thanks goes to **Janae Martin, Julia Price-Madison and Derek Schlickeisen** for their contributions and fact-finding. In addition, several insights were garnered from overseas **Commercial Service energy sector specialists** as well as colleagues at the U.S. Department of Agriculture's **Foreign Agricultural Service**. Country-level data and 2016-17 forecasts for ethanol production, consumption, imports, and exports were provided by **Platts,** a division of S&P Global, an analytical firm for the global capital and commodity markets. This report serves as an update to the 2015 report.

Table of Contents

This Page Intentionally Left Blank

Executive Summary

U.S. export performance for both fuel ethanol and wood pellets is currently very strong in terms of rising exports and market share. However, both industries are dependent on foreign markets for future growth, without which these industries may stagnate or decline. In addition to fluctuations in price, trade in these products is correlated with the existence of renewable energy policies that support the use of these renewable fuels.

In the case of ethanol – which is already blended in gasoline in low volumes as an oxygenate – the primary policy driver for larger volumes is usually a national-level blending mandate that increases blend targets over time for the gasoline pool. For wood pellets, renewable energy policies that aim to reduce carbon emissions are encouraging the partial or complete conversion of coal-fired heat and power plants to biomass. This has created demand for wood pellets, which have a higher energy density compared to other biomass feedstocks.

This *Top Markets Report* provides analysis on key trends, areas of opportunity and important challenges that exporters need to know in order to compete effectively in foreign markets. It offers projections on the potential for exports to 19 markets in the 2016-2017 time frame as well as eight country case studies with more in-depth information. By providing insight into global markets over the near term, ITA can help exporters compare international opportunities and develop export strategies.

In 2016-2017 and beyond, both industries will continue to grow their market share or expand to new markets. However, based on import demand and U.S. competitiveness, the *2016 Renewable Fuels Top Markets Report* developed rankings for each of the sectors. The countries near the top of the rankings are strong prospects. Those in the middle of the rankings are less predictable in the near term, but still expected to be significant buyers of U.S. fuel ethanol and biomass wood pellets. For the countries towards the bottom of the rankings, the 2016-2017 outlook for the U.S. share of imports is unlikely to improve due to significant obstacles such as protectionist policies or an unfavorable exchange rate.

Other key trends noted in the *2016 Renewable Fuels Top Markets Report*:

- The most noticeable pattern in both sectors was the emergence of Asian markets with growing import demand. However, while U.S. ethanol exporters have successfully shifted exports from Europe to Asia over the past several years, U.S. wood pellet exporters are struggling to compete against cheaper and lower quality pellets from elsewhere in the Asian region.

- While opportunities can be found in most markets, the destination of U.S. renewable fuel exports will continue to be highly concentrated. The top 10 destinations for U.S. fuel ethanol combined constitute 90 percent of all the exports, while 85 percent of all U.S. wood pellet exports go to the UK.

- Barriers to increasing the U.S. share of the world's import demand include the absence of supportive policies or incentives in certain markets; national sustainability criteria that require documentation from the U.S. forestry and agricultural supply chain, which is decentralized and fragmented; and preference for local production.

- Each market is at various stages of development and levels of openness to U.S. exports.
    - China, for example, developed a sudden and high-volume demand for ethanol imports over the past year that surprised many U.S. producers who had considered China's market difficult to penetrate.
    - Mexico, on the other hand, is much more promising in the long run for U.S. exporters given the closer trade ties and geographic proximity. However, recent policy decisions have prohibited ethanol blending in the three major metropolitan areas, which complicates the process of developing business relationships.

- Exports to India and Korea have steadily increased despite policies that seem to discourage the use of foreign ethanol for fuel purposes.

Although the nature of commodity trading tends to be subject to outside forces such as exchange rates and weather conditions, renewable fuels have one advantage: countries around the world are relying on them to address greenhouse gas (GHG) emissions. While the exact GHG reduction attributed to either fuel ethanol or biomass wood pellets is under rigorous debate, governments recognize that to a certain extent fossil fuel substitution is necessary. Therefore close monitoring of the policy developments in all markets is a key strategy for exporters.

U.S. Government resources, as summarized in the Addendum, are a valuable starting point. Exporters can utilize market intelligence, such as this report or the annual GAIN reports published online by the U.S. Department of Agriculture that analyze certain markets in-depth. Overseas trade missions also foster expansion of business opportunities, whether focused on exchanging views and best practices with foreign government policymakers to lay a stronger foundation, or whether designed solely for business-to-business matchmaking to enhance commercial relations. In addition, ITA's International Buyer Program can be utilized by trade show organizers to bring foreign delegations to U.S. based conferences and expos.

Overview and Key Findings

Introduction

U.S. export performance – in terms of rising exports and market share – for both fuel ethanol and wood pellets is currently very strong. However, both industries are dependent on foreign markets for future growth, without which these industries may stagnate or decline. In addition to fluctuations in price, trade in these products is correlated with the existence of renewable energy policies that support the use of these renewable fuels.

In the case of ethanol – which is already blended in gasoline in low volumes as an oxygenate – the primary policy driver for larger volumes is usually a national-level blending mandate that increases blend targets over time for the gasoline pool. For wood pellets, renewable energy policies that aim to reduce carbon emissions are encouraging the partial or complete conversion of coal-fired heat and power plants to biomass. This has created demand for wood pellets, which have a higher energy density compared to other biomass feedstocks.

Biodiesel, another liquid biofuel used in transportation, is also traded on the global market. It is blended with fossil diesel to lower greenhouse gas emissions, improve air quality in urban centers, and increase fuel lubricity thus extending engine life. However, biodiesel will not be covered in the 2015 report because, unlike ethanol, the biodiesel industry is not dependent on foreign markets for short-term growth. It does not face a perceived domestic blend wall, and U.S. diesel use is growing. The biodiesel industry's strategy is to grow domestic use through annual increases in the RFS2 and maintain tax support through the blender's credit.

In addition, unlike ethanol, U.S. biodiesel exporters face severe price competition from exporters from Indonesia, Malaysia and Argentina, who enjoy lower feedstock costs. In 2014, there were a limited number of export markets for U.S. biodiesel. Canada accounted for 85 percent of the biodiesel exports; the five largest destinations – Canada, Spain, Peru, Gibraltar and the Dominican Republic – together represented 99 percent of the exports.

This *Top Markets Report* provides analysis on key trends, areas of opportunity and important challenges that exporters need to know in order to compete effectively in foreign markets. It offers projections on the potential for exports in the 2016-2017 time frame as well as eight country case studies with more in-depth information. The 19 countries covered in this report are ranked as shown in Figure 1.

The overarching goal of this report is to provide useful context in which to view export opportunities in a changing world, while also offering commentary on how exporters can best leverage the trade policy and export promotion tools offered by the U.S. Government. By providing insight into global markets over the near term, ITA can help exporters compare international opportunities and develop export strategies. Companies should note that ITA's rankings are based on its current understanding of the market, which – given the pace of developments in the sector globally and sensitivity to the political environment – can be subject to unexpected changes.

Figure 1: Projected Top Markets for Renewable Fuel Exports (2016-2017)

Fuel Ethanol Exports		Biomass Wood Pellets	
1. Canada	7. Philippines	1. United Kingdom	7. Sweden
2. China	8. Netherlands	2. Belgium	8. Japan
3. India	9. Peru	3. France	9. Germany
4. Brazil	10. Jamaica	4. Denmark	10. Italy
5. South Korea	11. United Kingdom	5. Netherlands	11. South Korea
6. Mexico	12. Colombia	6. Canada	

Figure 2: Annual U.S. Ethanol Exports, 2005 - 2015

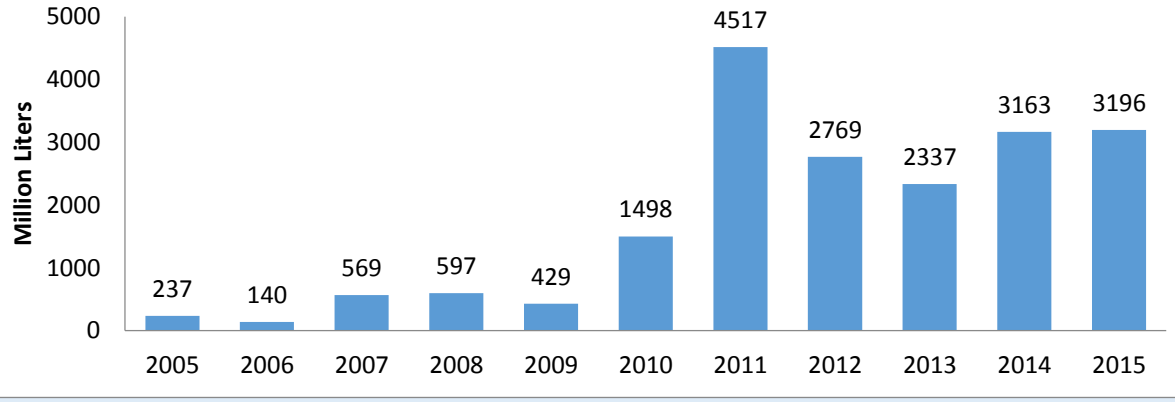
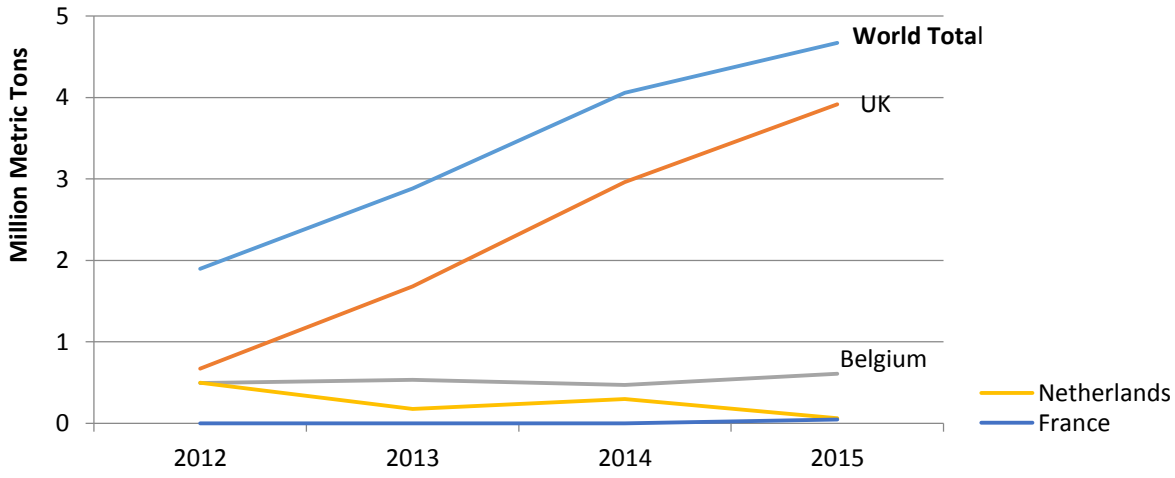


Figure 3: U.S. Pellet Exports to the EU 2012-2015

Vast Majority Shipped to UK



Key Findings: Top Markets and Methodology

Top Markets, 2016-2017

Through the data-driven approach described in more detail below, ITA found several key trends for fuel ethanol and biomass wood pellets that can suggest future directions for U.S. exporters.

As renewable fuels, both ethanol and biomass wood pellet exports from the United States have increased dramatically over the past five years.

The history of U.S. fuel ethanol exports is shown in Figure 2, with nominal amounts until exports began an upward trend in 2010 with approximately 1.5 billion liters.[1] They peaked in 2011 at 4.5 billion liters and have ranged from 2.8 billion liters to 3.2 billion liters in the years since. Although a nationwide drought was largely to blame for the decline in exports in 2012, the industry also was negatively affected in 2013 by the EU's imposition of anti-dumping duties on U.S. ethanol. However, exports rose again in 2014-2015 due to increased demand

from the two largest markets (Canada and Brazil) and additional exports to markets in Asia and the Middle East.[2]

Meanwhile, wood pellet exports from the United States increased 150 percent since 2012, reaching nearly 5 billion kg in 2015 (See Figure 3). In 2015, the United States far outstripped its closest competitor for exports, Canada, whose exports reached 1.6 billion kg.[3]

Trade in wood pellets has been tracked more closely since 2012 by a unique, 6-digit harmonized tariff code, which has indicated the global export market has grown from $1.7 billion per year to over $2.4 billion per year.[4] The total value of exports dipped in 2015 despite increased quantity, which indicates decreasing unit costs.

The most noticeable pattern in both sectors was the emergence of Asian markets with growing import demand. For fuel ethanol, examples include the Philippines and India. For pellets, both South Korea and Japan have increased their intake of foreign wood pellets in recent years, although the United States is capturing a small share of the import demand in both countries.

Undeniably, some trade partners – such as Canada and the UK – will remain our largest export markets for the foreseeable future. Canada, which in 2015 imported 43 percent of its needs, will likely continue to be the biggest customer of U.S. ethanol, although exports to China surpassed those to Canada in mid-2016. In the long term, the question is whether emerging policies at Canada's provincial or national levels favoring lower greenhouse gas (GHG) emission fuels might be leveraged to increase imports even more. The UK, which ironed out its sustainability criteria for wood pellets last year, is by far the largest importer of wood pellets in the world (in 2015, the UK's imports reached 6.5 billion kg, which was 93 percent of its consumption). The U.S. industry will continue to be the dominant supplier.

In both cases, U.S. producers have a large share of a large import market. However, there are also markets where the domestic consumption in the country is so large that even supplying a small percentage is a significant opportunity. Brazil, with its 27 percent blend requirement for gasoline and large flex-fuel fleet (giving consumers the ability to use up to 100 percent ethanol in their vehicles), has a high level of production and only needs to import two percent of its domestic consumption. Fortunately, U.S. ethanol exporters have captured the majority of that limited import market, which still accounted for approximately 500 million liters in 2015.

Small market shares in large markets are tenuous at best. For example, Korea initially took in a large volume of wood pellets from the United States in 2013 and 2014. However, U.S. pellets captured only 3 percent of the total import demand in 2014 while Vietnam and China dominated among the foreign suppliers. Starting in 2015, U.S. wood pellet exports to Korea dropped dramatically and there have been none reported in 2016. Meanwhile, Korea reported over 1 billion kg of imports from Vietnam in 2015.

The rankings for each sector are based on the total volumes expected to be shipped to the target markets in 2016 and 2017. However, when taking steps to further promote exports to these countries, the total import demand and the U.S. share of that import demand must be taken into consideration. For this report, ITA selected eight markets – Brazil, Canada, China, India, Mexico, the Philippines, the EU and South Korea – to develop case studies exploring the specific reasons for import demand and the challenges to expanding exports to these countries.

Methodology

The first step in compiling the ITA rankings was to narrow the field to the most promising export markets, based on two key factors for each country: 1) significant U.S. export patterns for 2012-2015; and 2) the existence of supportive policy that maintains or grows domestic use of the renewable liquid fuels for transport (ethanol) and biomass for stationary heat and power. Figure 4 shows a breakdown by sector of the countries that are included in this year's rankings, meeting both of the above criteria. One exception was made with regards to South Korea. Although initial discussions are taking place among Korean policymakers to gradually phase in a blend mandate, the steadily growing demand for U.S. ethanol seems to be driven by other needs such as industrial chemicals for bioplastics. Since the use in Korea is neither purely discretionary nor opportunistic, it was assumed that U.S. exports to Korea are reliable enough to include in the rankings in 2016-2017.

Figure 4: Countries Ranked in the Renewable Fuels Top Markets Report

	Ethanol	Pellets
Belgium		•
Brazil	•	
Canada	•	•
China	•	
Colombia	•	
Denmark		•
France		•
Germany		•
Italy		•
India	•	
Jamaica	•	
Japan		•
Korea	•	•
Mexico	•	
Netherlands	•	•
Peru	•	
Philippines	•	
Sweden		•
UK	•	•

Due to the lack of overlap in the export markets, each sector is ranked separately in this report, rather than combining the results of both sectors into one overall renewable fuels ranking. Ethanol export destinations represented a wide variety of regions, even within the top 20 markets where they are concentrated (although more than 100 countries have imported U.S. fuel ethanol in the past five years). Pellet exports, by contrast, were mostly to Europe.

For ethanol, several mid-level markets that ranked in the top 15 destinations for U.S. sales in 2015 (the UAE, Tunisia and Singapore) are excluded. As explained further in the sector snapshots, some of these "destinations" are regional hubs with no domestic use mandates. In other words, the ethanol was redistributed to other countries, in some cases solely for discretionary use (that is, based only on low cost of ethanol and its use as an oxygenate in gasoline). While the importance of these markets is undisputed when ethanol prices are low relative to gasoline, they do not meet the second criteria to be included in this report.

Ultimately, 12 markets were selected for ethanol and 11 markets selected for wood pellets. The countries near the top of the rankings have strong prospects for U.S. exporters. Those in the middle of the rankings are less easy to predict in the near term but still expected to be favorable to U.S. suppliers. For the countries towards the bottom of the rankings, potential opportunities can only be unlocked through addressing trade barriers. Please refer to the "Sector Snapshots" for ITA's rankings within these categories.

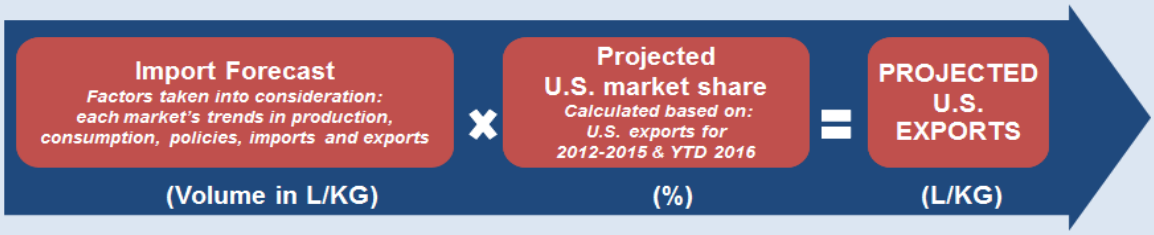
The rankings were determined using the methodology in Figure 5, based on volume. The unit cost to ship the ethanol or pellets to the export market, while available in trade data, was not part of the formula. While there may be variances in the unit prices, these reflect the logistical costs and therefore have no impact on the bottom line in a practical sense. The rankings for ethanol are determined by the combined number of liters predicted to be exported to the target market in 2016 and 2017 combined. The rankings for biomass wood pellets are determined by number of kilograms predicted to be exported to the target market in 2016 and 2017 combined. The rankings may thus be affected by a large increase or decrease in either year of the timeframe.

Import Demand: Market Size vs. Market Share

The first variable in the formula, import demand, is a forecast of the market's expected imports of the ethanol or pellets, regardless of the source. In the simplest case, a country's domestic production capacity could be falling short of policy goals and imports are welcomed as a solution. This is certainly true for ethanol in Canada, where local production satisfies slightly more than half of the total consumption.

However, in some cases, a country exports the product in addition to using it. In this case, exports could be viewed as a component of the import demand. For example, the Netherlands has a blend mandate, but due to Rotterdam's role as a fuel port to the rest of mainland Europe, it also exports

Figure 5: Methodology for Renewable Fuels Top Markets



ethanol. In fact, there is no question that U.S. ethanol is being redistributed. Figure 6 illustrates how in some years, the amount of exports exceeded domestic production in the Netherlands.

Regardless of whether the imported U.S. ethanol is consumed in the Netherlands or re-exported elsewhere, the import demand can be calculated. However, the Netherlands also imports from other sources. Therefore U.S. trade data for exports to the market contrasted with that market's total imports will produce a fairly accurate market share.

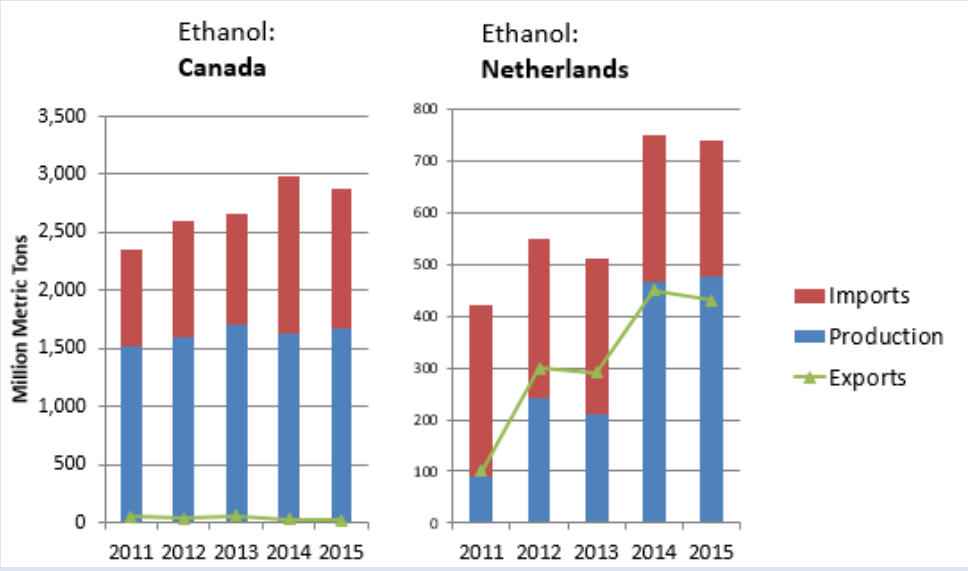
Estimates of 2016 and 2017 ethanol imports for each country in the *Top Markets Report* were provided by Platts S&P Global. Estimates of 2016 and 2017 wood pellet imports were provided based on directional trends of three years of data from the U.N. Food and Agriculture Organization (FAO), with adjustments made based on known policy impacts as appropriate.

For this report, a "large market" refers to the size of import demand (by volume) rather than consumption. The market share is the percentage of imports rather than percentage of consumption. This comparison is used because the U.S. product, whether ethanol or wood pellets, is essentially competing with imports from other markets. For example, Korea imports most of its wood pellets from Vietnam, while Japan imports mostly from Canada. The true challenge for U.S suppliers is two-fold: will the country increase its consumption and, therefore, increase the opportunities for importers (if domestic production remains the same)? And can the U.S. suppliers capture a larger share of the market as it grows?

A Few Caveats

Every year ITA improves the reports based on feedback from the previous years. However, even with its fourth iteration of analyzing fuel ethanol and biomass wood pellets, ITA cautions that these rankings are based on estimates and forecasts, as well as historical trade data as reported by exporters to U.S. Customs.

Figure 6: Exports of ethanol compared to production and imports
Data Source: Global Trade Atlas



Prior to 2012, the U.S. exporters only selected beverage or non-beverage purposes in the Harmonized System (HS) codes for ethanol. The 10-digit codes for "ethanol for fuel use" (denatured and undenatured) have been used since 2012 by the United States as an extension to the 6-digit HS codes 220710 and 220720. These are distinct from the corresponding 10-digit codes for ethanol for non-beverage industrial chemicals. There is a possibility that some U.S. exporters are over-reporting or underreporting their shipments if they do not select the correct code. Another issue is that fuel-grade ethanol may be exported, but it might be used as a non-beverage industrial chemical instead.

As a result of the differences in reporting systems between the United States and other countries, as well as difficulties in accurately identifying end use at the time of export, ITA has discovered some discrepancies between the trade data compiled by the U.S. Census Bureau and the import data reported by other countries. When undenatured ethanol that has been designated by U.S. exporters as "for fuel use" enters a country that does not have a separate system for identifying fuel use, it is impossible to verify whether it is used for its intended purpose without further investigation, which is beyond the resources available for this report. This issue and the countries where it is applicable will be addressed more fully in the Sector Snapshot.

In 2012, the wood pellet HS code was harmonized by the World Customs Organization at 440131 for all countries, so trade data discrepancy issues are not evident with the wood pellet trade data.

Industry Overview and Competitiveness

The low price of corn ethanol (compared to sugar cane ethanol as well as compared to gasoline) and the increased discretionary blending worldwide are key factors attributed to the dominance of U.S. ethanol in global trade. Although Brazil used to be the leading ethanol exporter in the world, the United States in recent years has surpassed or nearly matched Brazil's exports. This includes 2015, when crude oil prices reached extreme lows. The price gap between ethanol and gasoline narrowed, but consumption of gasoline rose, resulting in more blending of ethanol.

Domestic production of corn-based ethanol has approached the statutory levels of the Renewable Fuel Standard (RFS). As a result, U.S. producers either must reduce production or export the surplus. In addition, the Low Carbon Fuel Standard (LCFS) in California favors the sugar-cane based ethanol made in Brazil. Brazilian ethanol is being shipped to the West Coast while U.S. ethanol is exported to Brazil to meet the consumer demand for cheaper ethanol. The U.S. Energy Information Administration noted that 44 million gallons entered the United States on the West Coast in 2015, up from 13 million gallons in 2014. [5] Otherwise, conventional ethanol production is sufficient to meet domestic demand.

According to *Biomass Magazine*, in 2016 there were 184 pellet plants in the United States with an annual production capacity of 18.6 trillion tons per year combined.[6] The U.S. Energy Information Administration (EIA) predicts that electric power generation from wood and other biomass is expected to increase from 15.1 billion kWh in 2014 to 17.7 billion kWh in 2040, an annual growth rate of 4.3 percent.[7] The majority of the increase is expected to come from dedicated plants, but co-firing is predicted to decrease.

Some studies have also shown that the increased production of woody biomass in the United States has an economic benefit without devastating forests. The USDA notes that "forest owners will more effectively and intensively manage forests to increase their value and optimize biomass production and use over time."[8]

While opportunities can be found in most markets, the destination of U.S. renewable fuel exports will continue to be highly concentrated. The top 10 destinations for U.S. fuel ethanol combined constitute 90 percent of all the exports, while 85 percent of all U.S. wood pellet exports go to the UK.

Global Industry Landscape

The global demand for bioenergy is generally driven by the need for heat sources, but the growth in this sector is attributed to policies that incentivize cleaner emissions for electric power and cleaner-burning fuels for transportation. In 2015, the world generated 464 terawatt hours of electricity from biopower, which is mainly produced from solid biomass compared to other sources such as municipal solid waste or biogas.[9] The EU accounted

for approximately one-fourth of that total.[10] As for global ethanol production, the United States and Brazil together accounted for 86 percent in 2015. The next largest producers were China, Canada and Thailand.[11]

Challenges and Barriers

Despite the enormous success that U.S. ethanol and wood pellet exporters have experienced in recent years, many issues have emerged as obstacles to continued U.S. export growth.

Absence of blend mandate (Ethanol): The existence of a policy environment that requires petroleum companies to blend gasoline with ethanol is usually a prerequisite to U.S. ethanol exports. In the case of the regional hubs (UAE, Singapore, etc.) without blend mandates, the low cost ethanol is driving demand for discretionary blending. Ethanol is recognized as an octane booster; if the price is right, a company will voluntarily blend higher amounts with gasoline for better engine performance and lower the overall cost of the finished product. Larger amounts are needed to obtain significant environmental benefits. For a list of blend mandates in each of the 12 markets covered in this report, see Appendix.

Absence of co-firing incentives (Wood Pellets): Similarly, without government incentives for the substitution of wood pellets for coal, oil or gas in the heat and power sectors for environmental purposes, there is no export market for wood pellets. These incentives are usually based on policy goals for higher renewable energy content or carbon reduction. Countries wishing to fulfill these policies, but lacking the natural resources or production facilities to manufacture pellets, are more likely to import them. However, when these incentives are tied to sustainability criteria or local production requirements, U.S. and other foreign suppliers may be negatively affected. This is discussed in further detail below.

Sustainability criteria (Ethanol/Wood Pellets): Both grain-based ethanol and wood pellets face criticism from environmental NGOs and several in the academic community, despite their potential to reduce GHG emissions compared to fossil fuels as well as their ability to reduce air pollution. For instance, concerns have been raised that corn ethanol's GHG reductions are offset by the environmental impact of growing the crops for the feedstock. Based on life cycle analysis, waste-based fuels achieve generally higher reductions of GHG emissions than traditional grain-based ethanol.

For this reason, cellulosic ethanol, using waste residues from forest and agricultural industries, is given preference to satisfy environmental goals with the least amount of controversy both at home and abroad. However, due to higher production costs, cellulosic ethanol lags behind corn ethanol in terms of its commercial profitability. For pellets, the issue has been how to provide concrete evidence of sustainable forestry practices.

As detailed in the country case study, EU member states are developing sustainability certification regulations in a patchwork manner. Since the U.S. agricultural and forestry systems are structured differently than the EU, concerns have been raised as to whether such regulations will cut off trade in wood pellets completely. South Korea is also developing sustainability criteria, for which the impact is yet to be fully understood.[12]

Preference for local production (Ethanol/Wood Pellets): Many countries, such as India, the Philippines, China, and Mexico, state openly in their policies that locally produced ethanol is given a preference over imports. This is generally not an issue for pellets, because most countries that recognize their limitations with natural resources or production capacity tend to foster a relatively more open import regime.

Knowing the key players (Ethanol/Wood Pellets): U.S. ethanol producers now feel the constraint of how much ethanol can be absorbed in the U.S. market for fuel. At the same time, small and midsize U.S. ethanol producers are now finding their stock is in demand in countries where they have not met the buyers directly. Normally such producers rely on third party distributors to arrange trade logistics. From a long term strategic viewpoint, however, market intelligence and business relationships will build a steady trade flow. U.S. ethanol fuel associations are beginning to focus their efforts on assessing overseas demand potential, including a better understanding of the political context in various markets. The same is true for the pellet industry, which is working with U.S. Embassies in Japan and Germany to reach more customers

through educational sessions that highlight sustainable forestry practices in the United States.

Antidumping tariffs in the EU (Ethanol): In February 2013, the EC imposed antidumping duties broadly against U.S.-produced ethanol, leading to a sharp decrease in exports to EU Member States that year. Prior to 2013, the EU accounted for nearly one-third of the U.S. ethanol exports. However, that number has fallen to around 5 percent. The loss of market share resulting from the antidumping duties was particularly evident in the UK, which still imports over half of its ethanol needs; the U.S. share of that import market went from 58 percent in 2012 to less than 1 percent in 2014.

The antidumping duties were challenged in EU court by U.S. ethanol industry associations, who ultimately won their case in 2016. However, since the EC appealed the decision, the antidumping duties will remain in place for the near future and exports to the EU will continue to be severely limited during the 2016-2017 timeframe.

Opportunities

In 2016-2017 and beyond, both industries will continue to grow their market share or expand to new markets, while facing the challenges and barriers outlined earlier.

Although the nature of commodity trading tends to be subject to outside forces such as exchange rates and weather conditions, renewable fuels have one advantage: countries around the world are relying on them to address GHG emissions. While the exact GHG reduction attributed to either fuel ethanol or biomass wood pellets is under rigorous debate, governments recognize that to a certain extent fossil fuel substitution is necessary. Therefore close monitoring of the policy developments in all markets is a key strategy for exporters. U.S. Government resources such as this report as well as the annual GAIN reports on select markets by the U.S. Department of Agriculture (which can be downloaded online – see Addendum), are a valuable starting point.

Overseas trade missions also foster expansion of business opportunities, whether focused on exchanging views and best practices with the foreign government policymakers to lay a stronger foundation, or whether designed solely for business-to-business matchmaking to enhance commercial relations. In addition, ITA's International Buyer Program can be utilized by trade show organizers to bring foreign delegations to U.S. based conferences and expos (see Addendum for more information).

Sector Snapshots

This section contains sector snapshots that summarize U.S. renewable fuels export opportunities in each subsector. The snapshots provide export outlook and challenges for each subsector, along with an overview of current trade patterns.

This Page Intentionally Left Blank

Fuel Ethanol

As more countries mandate the blending of ethanol with gasoline to reduce greenhouse gas emissions in the transportation sector and enhance energy independence, new export opportunities are developing for U.S. fuel ethanol. In terms of total annual volume, the United States was the top exporter of fuel ethanol for four out of the past five years. Europe was the second largest market for U.S. fuel ethanol from 2010-12, but in the past three years, sales to Europe diminished sharply due to the imposition of anti-dumping duties. U.S. fuel ethanol exports have shifted to other markets, particularly Asian countries such as the Philippines and India. Canada, India and Brazil are expected to remain leading markets, and newly surging exports to China will also continue in the near term. Meanwhile, developments in Mexico are being closely monitored.

Nearly all ethanol is made through a traditional sugar fermentation process with a limited set of biomass- based raw materials (feedstocks), principally corn, other coarse grains (rye and barley), wheat, sugar cane or sugar beets. A small quantity of ethanol is made via "advanced" conversion technologies (primarily lignocellulosic biomass biochemically converted to alcohols) using wood and agricultural residues (waste streams), municipal solid waste or dedicated energy crops, like popular trees, switch grass, giant cane or energy sorghum.

Roughly 96 billion liters of fuel ethanol was produced annually in 2015.[13] Ethanol trade is growing throughout the world as countries build domestic use through mandates and taxation policy. These policies are motivated by desire to improve energy security by lowering dependence on imported fossil fuels, the need to reduce greenhouse gas emissions or air pollution, and support rural economies.

Overview of Global Export Market Opportunities

Most fuel ethanol in the world today is consumed within the same country that it is produced. However, many countries do not have the full production capacity to meet their needs. Despite this, sometimes governments prohibit or impose limitations on the use of foreign fuel ethanol in order to protect their domestic industry. Other times their blend mandates are adjusted according to the domestic capacity available every year. Some countries, such as India and Mexico, have a desire to increase the blending of ethanol with gasoline, but infrastructure or political problems prevent their local industry from growing.

Fuel ethanol use has become widespread, and the U.S. ethanol industry exports to every region of the world, including the European Union, where U.S. ethanol exports have faced antidumping duties since 2013. However, for purposes of this report, a handful of significant markets were not included in

Figure 1: Fuel Ethanol Exports 2016-17
Size of Import Market vs. U.S. Share

Rank		Country
Strong Prospects	1	**Canada** *Large Market, Large Share*
	2	**China** *Large Market, Large Share*
	3	**India** *Large Market, Large Share*
	4	**Brazil** *Small Market, Large Share*
	5	**South Korea** *Small Market, Large Share*
Less Certain Export Growth	6	**Mexico** *Small Market, Large Share*
	7	**Philippines** *Small Market, Large Share*
	8	**Netherlands** *Small Market, Large Share*
	9	**Peru** *Small Market, Large Share*
	10	**Jamaica** *Small Market, Large Share*
Significant Obstacles	11	**United Kingdom** *Small Market, Large Share*
	12	**Colombia** *Large Market, Small Share*

Figure 2: Ethanol Regional Hubs

Country	Region Served	2015 U.S. Fuel Ethanol Exports (L) – U.S. Census Data
Oman	Middle East	124,164,584
UAE	Middle East	108,171,311
Tunisia	Africa	87,848,339
Singapore	Asia/Oceania	37,198,107

the rankings because U.S. exports were not being driven by a domestic biofuels policy in the destination market, which is usually the most predictable driving factor. Nevertheless, those markets must be noted as additional opportunities.

Looking at the trade data for U.S. exports in 2012-2015, several markets stand out even though they do not have blend mandates (Figure 2). For these markets, to which we will refer as "regional hubs," it is assumed that the ethanol has a secondary destination. The reasons are varied. The U.S.–produced ethanol may be blended at a refinery and shipped out as a gasoline/ethanol blend to other markets in the region (e.g., the UAE).[14] It is also common to have "discretionary blending" for octane boosting.

The case of South Korea is still unclear and deserves continued monitoring. ITA decided to include South Korea in the 2016 Top Markets fuel ethanol ranking because of steadily increasing export activity. The records indicate that over 200 million liters (worth $109 million) of U.S.-produced fuel ethanol was delivered to South Korea in 2015, compared to 125 million liters the previous year. Exports to Korea were relatively low prior to 2014, with the previous peak of 29 million liters in 2012. This sudden surge has no simple explanation, given that South Korea has no blend mandate and the public opinion is against ethanol from food crops. According to most industry observers, South Korea is only importing ethanol as an industrial chemical. Although there is a separate trade code for ethanol for non-beverage use, it is estimated to be more economical to distill imported fuel grade ethanol into high-quality industrial ethanol.

Similarly, U.S. fuel grade ethanol imported into India (which, as of July 2016, had already reached 145 million liters, surpassing the 2015 total) is being used to fill a domestic demand for industrial ethanol rather than regional re-distribution. Thus, both India and Korea are included in the *Top Markets Report* rankings despite not being linked directly to blending mandates.

Meanwhile in the Netherlands, domestic consumption with a 5.5 percent blend mandate combined with redistribution within the EU has kept a steady flow of imported ethanol. U.S.-sourced ethanol decreased following the imposition of antidumping duties in 2013. However, the Netherlands imported 128 million liters from the United States in 2015 out of an estimated 265 million liters imported overall. The closure of an Abengoa facility in Rotterdam was expected to increase imports further, but the U.S. share of those imports is by no means guaranteed. Although the U.S. industry was successful in bringing a court case against the antidumping duties, the EU has filed an appeal, which prolongs the situation for another year or two. Fortunately, U.S. fuel ethanol exports have diversified over the past two years to markets in Asia and Latin America, lessening its dependence on the EU as an export market. (Figure 3)

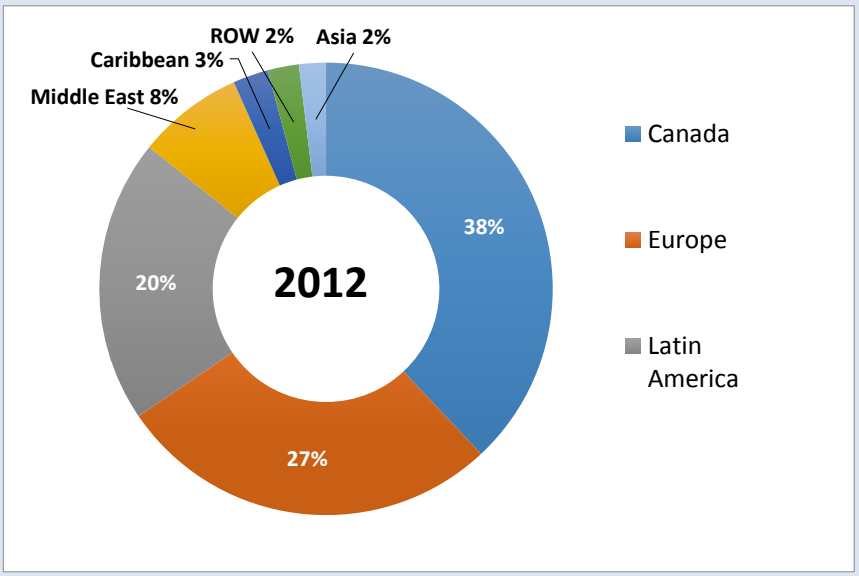
Despite several exclusions from the rankings and the downturn in U.S. exports to the EU, ITA identified 12 markets for this report. The countries near the top of the rankings are strong prospects. Those in the middle of the rankings are less predictable in the near term but still expected to be significant buyers of U.S. fuel ethanol. For the countries towards the bottom of the rankings (the UK and Colombia), no substantial increase in U.S. exports is anticipated, assuming protectionist policies in those markets might not be eased until the latter half of 2017.

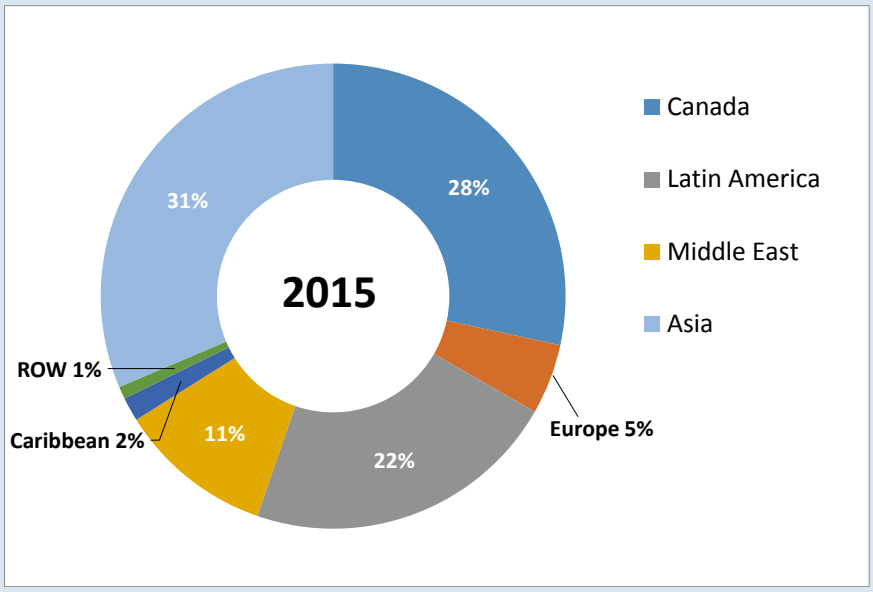
Export Opportunities in the Near Term

Background information about ethanol production, consumption, import/export and U.S. market share is detailed in the country case studies.

Each market is at various stages of development and levels of openness to U.S. exports. China, for example, developed a sudden and high-volume demand for imports over the past year that surprised many U.S. producers who had considered China's market difficult to penetrate. Mexico, on the other hand, is much more promising in the long run for U.S. exporters given the closer trade ties and geographic proximity. However, recent policy decisions have prohibited ethanol blending in the three major metropolitan areas, which complicates the process of developing business relationships. Meanwhile, U.S. exporters reaching out to Indian buyers must keep in mind that they are indirectly contributing to the domestic 5 percent mandate. Indian policy discourages the use of imports as fuel, but imports can backfill industrial use demand in order to free up more domestic supply for fuel use.

Figure 3: U.S. Fuel Ethanol Exports by Volume, Regional Comparison: Shift from Europe to Asia
Source: US Census Data





Some policymakers would like to see a 10 percent blend of ethanol. However, India's ethanol is produced from sugar cane, which can be subject to unpredictable fluctuations. More details about the ups and downs of India's biofuels policy environment are provided in the case study.

Market intelligence can thus play a key role in helping U.S. ethanol exporters differentiate the conditions faced by each potential business partner. Based partly on last year's *Renewable Fuels Top Markets Report*, in February 2016 the National Ethanol Conference (NEC) in New Orleans hosted five delegations (China, Brazil, the Philippines, India and Mexico) through ITA's International Buyer Program. During the NEC, the companies in these delegations held brief business-to-business meetings with U.S. companies who were interested in expanding their exports. Attending the NEC also gave the international buyers an opportunity to better understand trends and policy factors that affect U.S. production and therefore the availability of supply. The program will be implemented again at the NEC in 2017.

Planning for the Long Term

The unpredictability of factors that affect U.S. ethanol exports – such as weather, prices and exchange rates – should not deter long term strategic planning. Furthermore, even as commercial scale "second generation ethanol" production finally gains momentum in the United States, U.S. producers of "conventional ethanol" can continue to look abroad for opportunities. Imported corn-based ethanol will be an affordable option in countries whose level of economic development cannot support domestic production. Also, since the harvest season for sugar cane is not aligned with the harvest season for corn, imports from the United States can also supplement domestic supply.

Biomass Wood Pellets

Substitution of coal with biomass in several EU Member States, South Korea and Japan to meet carbon emission targets is driving demand for biomass pellets. This also has spurred U.S. and European investment in several new pellet mills in the Southeastern United States. Outside of the UK, which is still by far the largest customer of U.S. wood pellets, the strong dollar has had a negative impact on competitiveness in European markets over the past year. Asian markets remain largely untapped by U.S. exporters; however, producers continue to make efforts to lower costs and solve logistical issues.

Biomass power uses organic matter (wood, agricultural waste, etc.) or inorganic matter like municipal solid waste to create electricity or heat. Wood pellets and wood chips are the most commonly used fuel in biomass power plants. Pellets are usually created from forest thinning, scraps and other residues of low economic value in the timber industry. The compression of the wood creates a higher BTU than typical biomass sources.

Overview of Global Export Market Opportunities

Over the next two years, ITA expects biomass pellet consumption in the top 10 U.S. export markets to average 21 billion kg annually. The United Kingdom, which continues to ramp up its use of biomass power, will account for over one-fourth of the total consumption globally and will represent the largest pellet market for the United States.

South Korea will continue being the largest consumer in Asia (Figure 2) and will look to foreign suppliers (mainly Vietnam) for nearly all of its wood pellet needs. Japan's market is growing as well, with a 140 percent increase in year-on-year imports in 2015.[15]

Despite the large proportion of biomass wood pellet exports to the UK, ITA identified 11 markets for this report. The countries near the top of the rankings are strong prospects. Those in the middle of the rankings are less predictable and not high volume but still expected to be consistent buyers of U.S. wood pellets over the 2016-2017 time frame. For the countries towards the bottom of the rankings (including Korea and Italy, markets that had high expectations in last year's report), the near term outlook for the U.S. share of imports is unlikely to improve.

Figure 1: Biomass Wood Pellet Exports 2016-17

Size of Import Market vs. U.S. Share

Rank		Country
Strong Prospects	1	**United Kingdom** *Large market; large share*
	2	**Belgium** *Large market; large share*
	3	**France** *Small market; large share*
	4	**Denmark** *Small market; large share*
Less Certain Export Growth	5	**Netherlands** *Small market; large share*
	6	**Canada** *Large market; small share*
	7	**Sweden** *Large market; small share*
Significant Obstacles	8	**Japan** *Large market; small share*
	9	**Germany** *Large market; small share*
	10	**Italy** *Large market; small share*
	11	**South Korea** *Large market; small share*

Export Opportunities in the Near Term

The results showing mostly European countries as top prospects for U.S. wood pellet exports are in line with expectations. According to Global Trade Information Services, the United States was the leading exporter of wood pellets to the EU in 2015, capturing 59 percent of the EU's import market.[16] The top EU markets for U.S. pellet exporters were the UK (91 percent share of EU imports from the United States) and Belgium (14 percent. EU imports have steadily increased in the last three years, with imports of 4.5 million metric tons (MT) in 2012 and imports of 7.3 million MT in 2014. However, the diversity of EU markets for U.S. wood pellets was

considerably less in 2015, with significant loss of shares in Denmark, Netherlands and Italy. (See EU County Case Study for detailed analysis.) The increase in exports to the UK was enough to compensate for these decreases.

In terms of overall volume, the United States is firmly positioned as the largest exporter of wood pellets in the world. (Figure 3a) However, it is notable that in 2015, other exporters were rapidly gaining market share. This is particularly notable in Southeast Asian countries (Figure 3b), which have been responding to increased demand in South Korea and Japan. Although Vietnam's 2015 trade data is not included in this table, the wood pellet imports from Vietnam reported by Korea alone in 2015 exceeded 1 billion kg.

Shipments of U.S. wood pellets to the United States' North American Free Trade Agreement (NAFTA) partners are surprisingly low. However, neither Canada nor Mexico imports wood pellets in large volumes due

Figure 2: Global Import Statistics, 2015
Commodity: 440131 (Wood Pellets)

Reporting Country	Quantity Imported (kg)
United Kingdom	6,518,880,000
Denmark	2,076,428,000
Italy	1,640,239,000
South Korea	1,470,684,019
Belgium	988,652,000
Germany	434,672,000
Austria	367,843,000
Sweden	354,942,000
Japan	232,425,000
USA	207,171,527
Slovenia	160,359,000
Netherlands	140,171,000
France	136,793,000
Latvia	129,206,000
Switzerland	85,210,889

Source: Global Trade Atlas

Figure 3a: Top Exporters (kg) of Wood Pellets (Source: Global Trade Atlas)

	2013	2014	2015
USA	2,882,516,750	4,055,732,449	4,668,774,792
Canada	1,640,347,477	1,637,589,402	1,627,783,724
Latvia	1,055,929,000	1,290,447,000	1,620,448,000
Vietnam*	132,397,713	607,379,107	-
Russia	743,639,892	879,028,241	934,863,788
Estonia	623,175,000	640,838,000	883,293,000
Portugal	769,897,000	723,115,000	693,692,000
Germany	720,228,000	682,800,000	689,089,000
Austria	482,799,000	485,372,000	559,125,000
Romania	457,488,000	412,941,000	323,325,000

Figure 3b: Asian Wood Pellet Exporters (kg) (Source: GTA)

	2012	2013	2014	2015
Vietnam*	0	132,397,713	607,379,107	-
Malaysia	0	81,672,135	168,558,621	149,044,664
China	2,727,573	3,293,467	163,209,250	49,580,316
Thailand	631,435	18,158,929	110,826,307	25,428,807

* 2015 trade data not available [as of September 2016]; South Korea reported over 1 billion kg imported

to low consumption. Canada's use of wood pellets has yet to catch up with production, which is export-oriented. If Canada expands its use of biomass to replace coal as a fuel source in the near term, then the United States should be able to capitalize on its existing trade relationship. The United States would be well positioned to supply pellets to Mexico, but new biomass electricity capacity is not expected to come online in the near term.

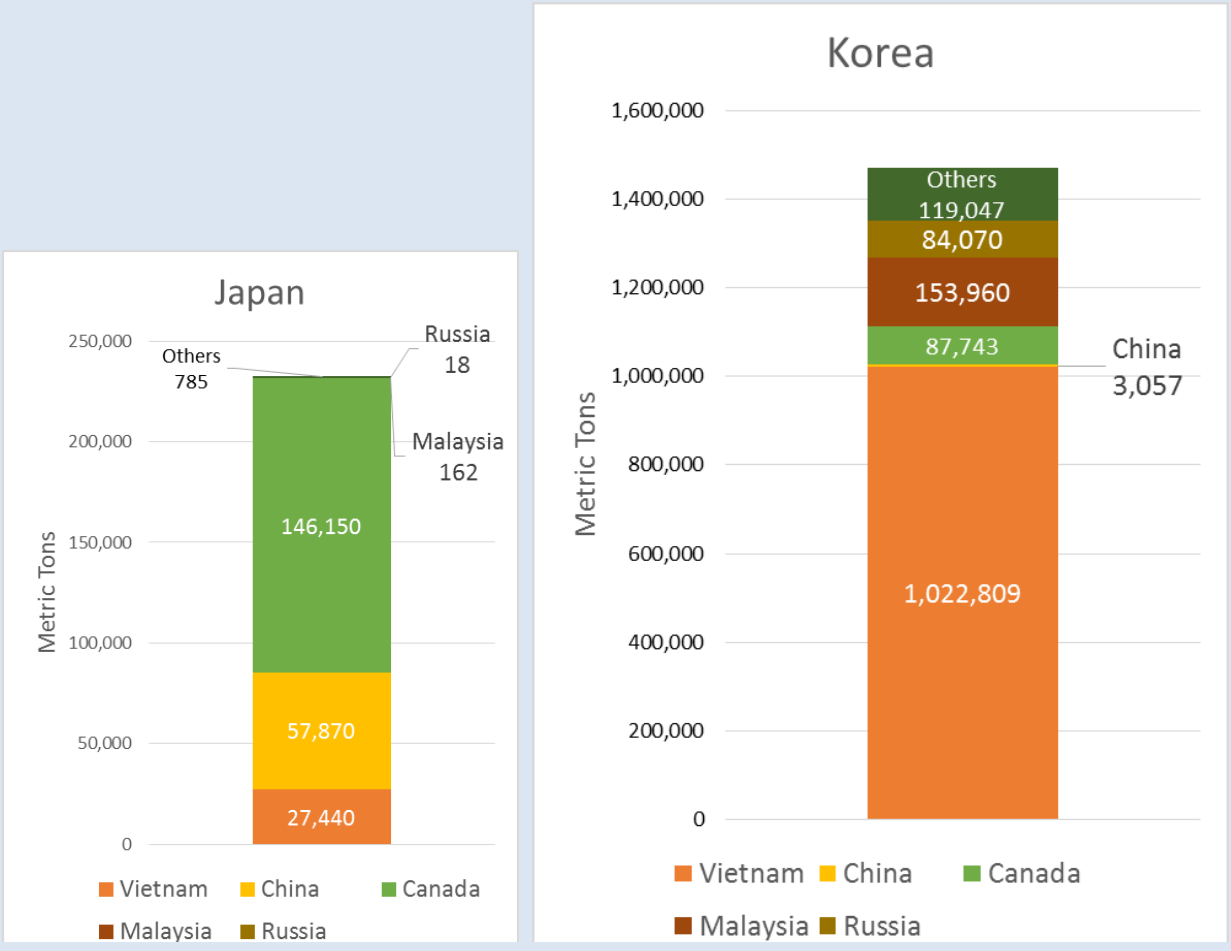
Planning for the Long Term

Beyond 2017, demand for wood pellets should continue to grow, particularly in markets where emissions policies encourage the use of co-firing. There is a possibility that the UK market will plateau after 2017. The European Commission stated that it will not adopt an EU-wide policy regarding sustainability certification for wood pellets until 2020.

Some EU member states, such as the Netherlands, have moved ahead with sustainability certification requirements. Despite significant evidence that forest growth in the United States exceeds the amount removed, voluntary U.S. private forestry initiatives may not be able to provide the detailed data for EU member states' requirements such as those in the Dutch regulations. The 2016 export data indicated that as of August, U.S. wood pellet exports to the Netherlands had only reached 34,000 kg, compared to 64 million kg total in the previous year and nearly 300 million kg in 2014.

The impact of EU sustainability certification regulations is only one challenge facing this industry. The United States will have to protect its market share in many of its top markets as Russia and its neighbors in the Baltic region increase production and as the strength of the dollar makes U.S. pellets more expensive. In many European countries, Russia was able to expand its market share by providing

Figure 4: Imported wood pellets by source for Japan and Korea, 2015 (Data Source: Global Trade Atlas)



cheap wood pellets in 2015.[17] According to trade data, the unit price for its exports averaged 11 cents/kg, compared to 14 cents the previous year and 17 cents in 2013. By comparison, U.S. wood pellet unit prices to Europe in 2015 ranged from 12 cents (Netherlands) to one dollar (Germany).

With the uncertainty surrounding opportunities in EU markets other than the UK, some U.S. producers are turning their attention to Asia. However, as Figure 4 indicates, Japan is importing mainly from Canada and China, while Korea is relying heavily on Vietnam for its imported supply. Possible reasons for the lack of U.S. market share include logistical costs (most U.S. exporters are in the Southeast), price of feedstock and the exchange rate. In the long term, even if the cost gap can be narrowed, U.S. producers need to increase awareness of the quality and sustainability of its product compared to Asian rivals.

Country Case Studies

The following pages include country case studies that summarize export opportunities for U.S. producers of renewable fuels technology in selected markets. The case studies outline ITA's analysis of the U.S. export potential in each market and offer recommendations to exporters that can improve their competitiveness. The markets represent a range of countries to illustrate a variety of points and not necessarily the top markets overall.

This Page Intentionally Left Blank

Brazil

The outlook for U.S. fuel ethanol exports to Brazil remains positive in the near term. In recent years, the symbiotic relationship between the two largest ethanol producers in the world has grown stronger, as evidenced by the steady trade in both directions. In recent years, Brazilian consumer demand for U.S. ethanol has been increasing, as U.S. exports have become more competitive in the Northeastern Brazilian market. The overall ranking for ethanol export potential this report has dropped due to the rapid expansion of opportunities in China and India. However, U.S. harvests and production are ample enough to support significant exports to Brazil.

Ethanol Rank	Wood Pellet Rank
4	N/A

The United States and Brazil, the top two ethanol producers and consumers in the world, have a robust trade in ethanol. The trade balance fluctuates depending mostly on weather conditions that affect the harvest of the feedstock. Thus, opportunity windows for price arbitrage between ethanol prices in the United States and Brazil shift the balance one way or the other throughout the year. The international sugar market is also part of the picture, given that the sugar-ethanol industry will divert more or less sugarcane to ethanol depending on sugar prices.

In 2015, the United States exported $238 million (426 million liters) in ethanol to Brazil, surpassing the imports from Brazil, valued at $149 million (323 million liters).[18] A record-breaking corn harvest created an abundant supply of ethanol in the United States and contributed to its cost competitiveness. Assuming normal weather conditions, the demand for U.S. corn-based ethanol in Brazil is expected to remain steady, largely due to ethanol needs in the Brazilian Northeast.

At the same time, Brazilian sugar-cane ethanol will retain a presence in the U.S. market because it qualifies as an "advanced biofuel" under EPA's Renewable Fuel Standard (RFS) regulations. In addition, California and Oregon have implemented their own state-level regulations to promote the use of low carbon intensity biofuels. However, despite the demand created by both federal and state level requirements, imports from Brazil in 2015 as well as the first half of 2016 remained lower than predicted. Brazilian ethanol imports have been declining since 2012 (Figure 1), but Brazil accounted for nearly 92 percent of total ethanol brought into the United States in 2015.[19]

Market Overview

Brazil is second only to the United States as the world's top producer of fuel ethanol. Brazil's ethanol is produced from sugarcane, rendering ethanol consumption highly dependent on fluctuations in sugar prices in addition to taxes on gasoline. Additionally, nearly half of the automotive fleet in Brazil is designed to run completely on a certain type of ethanol that can substitute for gasoline, leaving the drivers more likely to make their choice based on economic factors.[20]

Although Brazil is a major ethanol producer, it is also a significant market for American ethanol exporters.

Figure 1: Ethanol Imports from Brazil to the United States (Denatured and Undenatured Combined)

	2012	2013	2014	2015
Value	$ 1,285,829,833	$ 939,624,632	$ 158,459,638	$148,606,931
Volume (Liters)	1,736,875,737	1,318,061,827	230,395,535	323,457,185

Source: US Census Trade Data

The reasons are twofold: Brazilian consumption of ethanol is extremely high and consumers are price conscious because they can choose their blend at the pump. In particular, demand in Northeast Brazil for imported ethanol has been strong due to insufficient local production and the higher cost of transporting from Southern Brazil.

The Brazilian market for ethanol is still more complex, as ethanol comes in two forms: hydrous and anhydrous, meaning with water and without water, respectively. The type of ethanol that certain automobiles can operate on purely is hydrous ethanol, whereas anhydrous ethanol is blended with gasoline according to government blending requirements. Brazil's current blend rate is 27 percent.

Anhydrous and hydrous ethanols require different processing techniques, so the markets for the two products can diverge. Since hydrous ethanol is a substitute for gasoline, low gasoline prices undercut its competitiveness. However, in that environment, the blending requirements will push up demand for anhydrous ethanol, since it must comprise 27 percent of gasoline sold. Gasoline prices can effectively determine the future of the ethanol industry in Brazil, depending on whether Brazil's policies allow hydrous or anhydrous ethanol to retain a foothold in the market.

Government policy has been damaging to hydrous ethanol. In an effort to control inflation, the Brazilian government kept gasoline prices artificially low, preventing hydrous ethanol producers from having a level playing field and forcing a consolidation of the industry as producers broadly suffer losses.[21,22] In a market where drivers with flex-fuel cars have the option of filling up with ethanol beyond the 27 percent blend, when ethanol is expensive compared to gasoline, it is less desirable to consumers.

However, in 2015 the Government of Brazil increased taxes on gasoline and made no price adjustment in response to the collapse of international oil prices. This was greeted with relief and optimism by the Brazilian ethanol industry and led to a 36 percent increase in ethanol sales by February 2016.[23] However, a tax exemption for ethanol sales is anticipated to expire in December.[24] Such fluctuations in taxation policy complicate the demand/supply situation, making projections for production, use and trade somewhat difficult. Yet in June 2016, the new CEO of Brazil's state-owned oil producer, Petrobras, announced that government subsidies for gasoline would end, paving the way for an increase in ethanol demand as gas prices rise.[25]

In the long term, if economic conditions are favorable at a time when Brazilian ethanol production rebounds, it also is likely to make its way into California's low emissions fuel market to satisfy its Low Carbon Fuel Standard. Although it may displace U.S. ethanol, its import also may create a gap in Brazilian supply that U.S. ethanol suppliers can easily backfill. That said, there is no immediate evidence that imports of ethanol from Brazil to the United States – whether low or high -- are directly correlated to U.S. export opportunities to Brazil. By the same token, it is difficult to predict whether stimulated Brazilian ethanol production will be used for domestic demand or find its way to the United States.

Challenges and Barriers

After years of a public tug-of-war over tariffs, trade friction between the ethanol industries in the United States and Brazil is nearly nonexistent. The United States dropped its ethanol tariff for most favored nations at the end of 2011 and eliminated the controversial surcharge. According to a resolution by the Ministry of Development, Industry and Commerce (MDIC), Brazil's ethanol tariff will remain at zero until December 31, 2021. As a result, two-way trade in ethanol will continue without contentions over tariffs.

Instead, as trade becomes interdependent, the impact of policy issues on both sides of the trade relationship is growing more complex. Further dialogue, including both government and private sector stakeholders, is needed to ensure mutually beneficial trade for this sector.

Opportunities for U.S. Companies

U.S. export opportunities will clearly be affected in years that Brazilian production is bolstered by good sugarcane harvests. For example, sugar prices dropped to around 16 cents per pound in mid-2013, spurring ethanol production; as a result, nearly 60

percent of the country's harvest was converted into ethanol.[26] In contrast, a period of drought that drastically affects sugarcane harvests leads to high levels of imports from the United States, such as in 2011, when $1.2 billion worth of U.S. ethanol was shipped to Brazil. Sugar prices are currently at a four-year high, and sugarcane mills have shifted production from ethanol back to sugar as a result. This is expected to reduce Brazil's domestic ethanol supply in the coming season, creating an opportunity for U.S. exports.[27]

In October 2013, ITA organized a Market Development Cooperator Program in Recife where U.S. ethanol companies met with potential buyers. As a result of the event, U.S. participants strengthened their trade relationships and generated export successes worth reportedly $30 million. A sizeable Brazilian delegation also attended the National Ethanol Conference in 2016 through the International Buyer Program and is expected to participate again in 2017 (see Addendum).
Data for U.S. ethanol exports to Brazil in 2014 and 2015, as well as January-August 2016 data, were noticeably higher than the previous two years. This suggests that the strategy of making personal business connections, rather than relying on sporadic opportunities through distributors, has paid off for the U.S. ethanol industry. The true test that lies ahead will be whether these relationships endure whenever adverse economic or policy situations arise.

This Page Intentionally Left Blank

Canada

Canada will remain the largest market for U.S. ethanol during the 2016-2017 time frame. Federal and provincial mandates require more ethanol than the domestic refineries can produce, and the actual percentage of blending nationwide is slightly higher than the minimum 5 percent. With domestic production at maximum capacity and no increase foreseen, demand for U.S. ethanol should remain steady. In contrast to ethanol, Canada imports only a small amount of wood pellets, albeit U.S. producers have a considerable share. Canadian pellet suppliers also compete with U.S. pellet suppliers in Europe and Japan. Despite being a rival in the global wood pellet market, Canada is cooperative in dealing with trade barriers faced by the industry, recognizing common interests with U.S. wood pellet exporters.

Ethanol Rank 1

Wood Pellet Rank 6

Canada has traditionally been a reliable customer of U.S. ethanol. For nine out of the last 10 years, Canada has been the top market for U.S. ethanol exports. Trade with Canada is not restrained by tariffs, transportation or language barriers.

In 2013, there was a noticeable upsurge of U.S. exports to Canada, reaching over 50 percent of the total exports of U.S. fuel ethanol by the end of that year. This coincided with the dramatic reduction of ethanol exports to the EU market due to the EU's imposition of antidumping duties on U.S. ethanol and declining EU consumption. Since then, U.S. exports have become more diversified with rapid growth to smaller markets – in particular Korea, India and the Philippines – as well as regional hubs such as the Middle East. Still, Canada captured roughly 30 percent of U.S. ethanol exports in 2015.

Although it is still too early to tell, imports of U.S. ethanol to Canada may be surpassed by China, whose surge in the first five months of 2016 far exceeded the normal demand in Canada. However, year-to-date trade data as of August 2016 indicate that in terms of quantity, the two markets imported similar amounts. Regardless, Canada is seen as a steady customer whereas Chinese buyers are less predictable. Furthermore, the unit price of U.S. ethanol sent to China in 2016 has averaged 44 cents per liter compared to 70 cents per liter to Canada.

Two-way trade in wood pellets is a complicated story by comparison. While Canada does not rank highly compared to other markets in this report, it is worth examining how U.S. and Canadian exporters have competed for contracts in Europe, South Korea (prior to 2015) and Japan while also cooperating on sustainability certification issues.

Market Overview

Canada's blend mandates have led to success for U.S. exporters. The federal mandate of 5 percent renewable fuel content, together with higher provincial requirements such as Saskatchewan (7.5 percent) and Manitoba (8.5 percent), contribute to the estimated minimum of 2.7 billion liters of fuel grade ethanol consumption per year.[28] However, the annual production capacity is likely to remain around 1.7 billion liters, which is not enough to meet domestic demand.[29]

Furthermore, statistics suggest that due to discretionary blending, the actual blend rate exceeded the mandated level and peaked at about 6.4 percent of the gasoline pool in 2014. [30] This expansion came at a time when ethanol was a

significantly cheaper fuel than gasoline, thus encouraging discretionary blending. However, due to the precipitous decline in fuel prices and the closing of the price gap, blend rates in Canada have since begun dropping closer to the federal mandate of 5 percent.

By contrast, Canadian wood pellet consumption is relatively small, and Canada channels most of its production to overseas markets. Domestic consumption has been hovering around 200 million metric tons (MT) per year since 2013, but domestic production capacity continued to be added, reaching 3400 million MT per year.[31] Pellet mills only produce 53 percent of Canada's total capacity, however.

Currently, coal-fired power plants in Canada are not using wood pellets because they are more expensive than coal.[32] New regulations for commissioning of new coal power plants took effect July 1, 2015, new efficiency requirements for new coal plants came into effect.[33] However, natural gas is expected to replace most of the coal use.[34] These regulations are also seen as encouraging combined cycle turbines as well as carbon capture and storage.

In spite of the limited use of wood pellets in Canada, domestic production of wood pellets in Canada is projected to increase after 2015. According to the Canadian International Merchandise Trade Database, if Canadian production increased to 100 percent of its capacity, then an additional 1 billion kg of wood pellets could be produced each year. This would bring total production to 3 billion kg per year.[35]

According to the Wood Pellet Association of Canada, which is active in promoting Canadian wood pellet use both in Canada and abroad, demand can be expected to increase further if Canada makes additional efforts to reduce carbon emissions of power plants. Canada has committed to reducing its greenhouse gas emissions by 17 percent by 2020 compared to its 2005 levels. [36] Some Canadian power companies have been considering the option of converting some of the currently coal-powered plants into co-firing coal plants that use wood pellets.[37] It has been estimated that if Canadian utilities began co-firing with 10 percent wood pellets, then the domestic consumption could potentially rise to 6 billion kg per year.[38]

Until domestic demand within Canada is stimulated, global demand will determine how much production increases. Annual exports totaled about 1.6 billion kg in each of the past three years. In 2015, more than 1 billion kg of Canadian wood pellets were sent to the United Kingdom, and approximately 200 million kg were sent to the United States. (Figure 1) Meanwhile Canada also imported 10 million kg that same year, with 5.5 million kg coming from the United States and 5 million kg coming from Norway.

Figure 1: Canada's Wood Pellet Export Markets, 2015

Country	Volume Exported (kg)
United Kingdom	1,205,928,226
United States	205,743,232
Italy	85,513,095
Japan	80,203,440
South Korea	49,029,438
Singapore	583,688
Australia	266,316
Bahrain	203,200
Taiwan	172,515
Malaysia	65,743

Source: Global Trade Atlas

Challenges and Barriers

U.S. ethanol exports do not face any trade barriers in Canada. However, imports have no real potential for further growth unless ethanol blending targets are revised upward. With no changes in targets, use will slowly decline as the gasoline pool declines. The weak crude oil price and the strength of the U.S. Dollar against the Canadian Dollar have created challenges for U.S. suppliers. Despite this, ethanol prices have dropped, and U.S. suppliers have some leeway to lower their prices. As a result, Canada will remain the strongest proven prospect for fuel ethanol in this report.

By contrast, the lack of significant domestic consumption of wood pellets in Canada will hamper any efforts to increase the U.S. market share. At this

time, Canada's wood pellets industry is almost entirely focused on exports.

However, wood pellets from both the United States and Canada being shipped in large quantities to European markets are similarly affected by trade-restrictive sustainability certification issues (see the EU case study). As such, being in the "same boat" has led to close coordination between U.S. and Canadian exporters to ensure markets remain open to North American pellets.

Opportunities for U.S. Companies

Provincial policies, rather than increasing the federal mandate, could be the key to growing U.S. exports to Canada. Since environmental concerns have been the key driver of these policies and programs,[39] it may be possible to encourage higher blend rates in Ontario, British Columbia and Alberta. These are among the most densely populated provinces and thus the greatest consumers of gasoline and are also provinces very concerned with sustainability and environmental quality.

Also of interest, emerging carbon markets in Canada will create opportunity, especially for suppliers of biofuels with lower carbon intensities. British Columbia has established a low carbon fuels market. In Ontario, there is a sustainability component calculated for how the ethanol is created that gives the obligated party credits and lowers its obligation. The greener the feedstock and process, i.e., use of corn stover to heat plants that make ethanol, the better the score. U.S. exporters who can leverage this system have a better chance of supplying to the obligated party. Also, Ontario is developing a climate change action plan that prioritizes transport emissions. Actions like these will incentivize low carbon intensity fuels, and more provincial initiatives can be expected in coming years.

Although U.S. wood pellet exports to Canada are not anticipated to be significant in the near term, one area to monitor closely in the next two years is whether the new emission regulations create more import demand from power utilities for wood pellets. However, since Canadian wood pellet mills are operating at 50 percent capacity, this scenario would be unlikely.

This Page Intentionally Left Blank

China

The outlook for U.S. fuel ethanol exports to China in 2016-2017 is dramatically different than last year's report. At the same time that the Chinese Government has encouraged greater use of ethanol to address climate change concerns, feedstock prices have been artificially high. This has resulted in a sudden increase in imports, which -- even with high tariffs – are more affordable. Because ethanol importers are regulated by the Chinese Government and many are state owned enterprises, there is some concern that the phenomenon is only temporary and will also depend on whether China expands the blending and use of ethanol in gasoline in the future. In the short term at least, the expansion of fuel ethanol use in China will depend on imports.

Ethanol Rank	Wood Pellet Rank
2	N/A

Market Overview

Although China produced nearly 18 billion liters of ethanol in 2015, only about one-fifth of its domestic production is used for fuel purposes. China consumes an estimated 8.2 billion liters of non-beverage ethanol and industrial ethanol combined per year.[40] Out of this amount, China's demand for fuel ethanol in 2015 was 3.6 billion liters, which was met largely by production from the country's seven fuel ethanol plants.[41] The government sets both production amounts and prices, which are determined as a percentage of current gasoline prices.[42] Sinopec and PetroChina, China's state-owned petroleum companies, are the major blenders of gasoline and ethanol.[43]

The Chinese Government has been decreasing subsidies for domestic grain-based production steadily since 2009, with the goal of phasing them out completely by 2016.[44] Combined with a low price for ethanol, which is pegged to gasoline prices, domestic producers have suffered from falling revenue.

U.S. ethanol exports to China reached nearly 280 million liters in 2015, compared to only 11,451 liters in 2012.[45] China became the largest U.S. denatured ethanol export market in the first few months of 2016.[46]

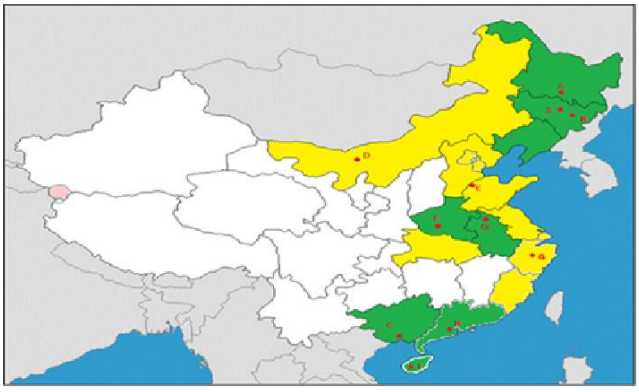


Figure 1: Green provinces have implemented E10, yellow provinces have limited implementation in certain cities. *[source: USDA Foreign Agricultural Service]*

The implementation of 10 percent blending (E10) in China has been geographically fragmented by province or city and tended to be seen as experimental. (See map in Figure 1) Some influential policy advisors have also advocated for E15 or E20. However, there are signs that E10 will eventually become a nationally accepted standard. In early 2016, the National Development and Reform Commission (NDRC) issued a "Notice of Fuel Quality Upgrade and Strengthening of Market Regulation," which elevated emission standards in the eastern region, with expansion nationwide by 2017. At present, the so-called "Chn V standard" gasoline is

only provided for consumption in 11 provinces and cities in the China eastern regions (Beijing, Tianjin, Hebei, Liaoning, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong and Hainan). Further, according to the NDRC notice, by 2017, only Chn V standard gasoline (including E10 gasoline) will be provided for consumption nationwide.

The regulation aims to curb the number of old vehicles on the road. Newer vehicles are designed to accommodate E10 blends and will have lower nitrogen oxide, carbon monoxide and hydrocarbon emissions. This may indicate that China is willing to adopt E10 gasoline standards in more provinces and prepare for a nationwide E10 coverage, but how long this process will take remains uncertain.

Challenges and Barriers

Despite the need to produce and use cleaner gasoline in order to address climate change issues, China's policy makers are hesitant to be more aggressive in stimulating domestic fuel ethanol production because of food security concerns. Yet they also fear becoming dependent on ethanol imports. The unclear nature of China's ethanol blending policy will continue to pose challenges to fuel ethanol exporters, as it is difficult to predict with certainty what the future demand will be.

U.S. denatured fuel ethanol exports to China are taxed at 5 percent import duty, and undenatured fuel ethanol is taxed at 40 percent import duty, while other countries, such as Pakistan, China's top exporter, enjoy duty-free access to the Chinese market through a bilateral arrangement. [47]

The high import duty for undenatured fuel ethanol means that U.S. exports must be denatured before being shipped to avoid high costs at customs. Fuel ethanol producers in China have commented that there are no clear guides to import regulations regarding the definition of a denatured product, leading to a relatively murky regulatory landscape for exporters to decipher.[48]

Only designated businesses are allowed to import ethanol, and the Chinese Government also tightly controls fuel distribution, including the use of ethanol in transportation. Given that the government has not taken a clear-cut policy to either encourage or prohibit the import of ethanol in 2015-2016, it is theorized that the activities are basically a trial to study the economics and feasibility of supplementing domestic supply.

Opportunities for U.S. Companies

The large size of the Chinese market offers significant potential for U.S. exporters. There is room to expand capacity in provinces that have municipal E10 pilot programs as well as other provinces.

Brazilian exporters have also enjoyed the recent surge in ethanol demand in China. However, as sugar prices rise in Brazil (see Brazil case study), the incentives to export decrease, resulting in opportunity for U.S.-based producers.

COFCO Biochemical and Sinopec – both of which are large state-owned enterprises – are the two most active Chinese importers of foreign ethanol in the past year's surge. U.S. producers are encouraged to develop direct relationships with companies such as these in order to position themselves for future business opportunities if the Chinese market continues to expand.

European Union

Ethanol exports to the European Union (EU), which used to account for one-third of all U.S. ethanol exports, have been chilled for three years as a result of antidumping duties. However, in 2016 the U.S. ethanol trade associations won their court case against the EU's imposition of antidumping duties on U.S. ethanol. In the short term, until the appeals process is completed, any gains in this market will be based solely on U.S. ethanol price competitiveness. The impact of "Brexit" on ethanol tariffs remains to be seen, although the UK will continue to depend heavily on ethanol imports. In the long run, EU policy makers are favoring advanced biofuels, which may also constrain EU-U.S. trade. Given the uncertainty in the ethanol market for U.S. exporters, this case study continues to focus its in-depth analysis on the individual wood pellet markets of the EU, where opportunity is stronger. Each has its own characteristics, although U.S. exports are mainly in demand for the public utility power sector rather than the home heating market. A patchwork of sustainability regulations has begun to develop, thus requiring closer examination of each market's regulatory process.

Consumption of ethanol in the EU is expected to remain roughly the same or decline slightly in the near term, but the U.S. share of imports remains stymied by antidumping duties imposed by the European Commission on U.S. ethanol. Furthermore, sustainability certification requirements under the EU's Renewable Energy Directive (RED) are difficult to meet for most suppliers of corn-based ethanol, as all biofuels used to meet renewable energy goals must provide evidence that they have reduced greenhouse gas emissions by at least 35 percent compared to fossil fuels. This threshold increases after 2017, requiring a verified reduction of at least 50 percent and at least 60 percent for new installations. Several EU member states have developed national voluntary systems, in addition to the 20 voluntary schemes adopted by the European Commission.

In 2015, the EC Parliament enacted legislation modifying the existing RED by imposing a 7 percent cap on total field crop biofuels by 2020. Given the double counting system in the RED that incentivizes waste-stream biofuels and the fact that diesel use is growing while gasoline use is shrinking, biodiesel use will likely increase further while little growth if any is expected for ethanol in the long term.

Although the current mandate calls for 10 percent of the transport fuel of every member state come from renewable sources such as biofuels by 2020, discussions are underway for the 2020-2030 plan ("RED II") to ultimately remove the specific subtarget for the transportation sector. Such uncertainty over how the EU will meet its own renewable energy goals is also a concern for European producers.

A few EU member states (mainly the Netherlands and the UK) have been importing U.S. ethanol in the first half of 2016. However, there is no anticipated upsurge during the 2016-2017 timeframe unless the EU chooses not to appeal the EU court's decision against the EU's imposition of antidumping duties on U.S. ethanol. And even if this were to happen, U.S. companies will have to weigh the costs of compliance with sustainability requirements and verification schemes compared to pursuing sales in other markets. Some of the recent imports from the United States have been attributed to the temporary discontinuation of production at certain facilities in Spain, the Netherlands and the UK. Thus, they do not represent stable opportunity.

U.S. ethanol exports to the UK were particularly strongly impacted by the imposition of the antidumping duties. While U.S. ethanol accounted for 58 percent of all UK imports of ethanol in 2012, the U.S. market share dropped to under 1 percent in 2015 despite the UK's continued dependence on imported ethanol to meet its blending requirements. The UK now gets most of its ethanol imports from the Netherlands and France. The impact of "Brexit" on ethanol trade (and whether the UK's biofuels policies will diverge from the EC) remains to be seen.

In contrast to fuel ethanol, the EU will remain by far the largest market for American wood pellets. Demand for wood pellets is increasing as its member states seek alternatives to coal for electricity and heat production. One of the driving factors for the use of wood pellets instead of natural gas is the EU-wide RED, under which renewable energy is to account for at least 20 percent of all energy consumed by 2020.

In 2015, the EU consumed 21 billion kilograms of wood pellets, which amounted to 75 percent of the global market.[49] That year the United States sent $683 million worth of wood pellets to the EU, capturing about 64 percent of the market share there.[50] The UK, the Netherlands and Belgium use the wood pellets predominantly for electricity production, and these countries have been the primary EU importers of American wood pellets, although imports to the Netherlands have dropped significantly.[51] Sweden and Denmark use wood pellets for large cogeneration plants and in heating appliances. However, both countries have recently imported most of their wood pellets from the Baltic Region and Russia.[52] The increase in wood pellet production in Germany, Italy, Austria and France is largely driven by increased demand for residential heating and industrial boilers.[53] As these countries are net exporters, this demand relies mostly on domestic production and other EU sources to meet their demand.[54]

The large volume of intra-European trade in wood pellets is another distinguishing feature of this market overall. As the table in Figure 1 shows, the U.S. and Canadian wood pellet exporters are competing primarily with exporters in Latvia, Russia, Estonia, Portugal and Germany. Among the largest pellet exporters in Asia (Malaysia, Vietnam and China), only Vietnam exports pellets at levels similar to those in Europe.

Figure 1: Global Export Statistics, 2015
Commodity Code: 440131 (Wood Pellets)

Reporting Country	Quantity Exported (kg)
United States	4,668,774,792
Canada	1,627,783,724
Latvia	1,617,260,000
Vietnam (estimate)	1,022,808,842
Russia	934,863,788
Estonia	883,293,000
Portugal	693,692,000
Germany	688,745,000
Austria	555,466,000
Romania	323,325,000
Lithuania	311,539,000
Sweden	244,585,000
Czech Republic	230,062,000
Poland	215,611,000
Croatia	200,415,000
France	198,703,000

Challenges and Barriers

With regards to ethanol, prospects for U.S. exports are poor in both the short term and the long term. As previously noted, there are antidumping duties that handicap U.S. ethanol; costs to meeting EU sustainability requirements and verification schemes and other less regulated markets that offer opportunity; current and evolving policies that incentivize the use of biodiesel at the expense of ethanol; and the possibility that biofuel use may decline after 2020. As a result, most U.S. ethanol producers will be looking at other markets, particularly Asia. The remainder of this case study will therefore focus on wood pellet exports.

The biggest challenge for American exporters of wood pellets will be regulation. The EC, the primary regulatory body in the EU, has stated that it is not

planning on instituting any Europe-wide regulations on sustainability criteria for biomass before 2020.[55] In anticipation of EU and member state legislation on sustainability requirements for wood pellets, the industry has created standards like ENplus (created by the European Pellet Council) and the Sustainable Biomass Partnership (SBP) to encourage sustainable practices along the supply chain. In 2015, 7.7 billion kg of wood pellets were ENplus certified.[56] In March 2015, the Netherlands announced plans to require all imported wood pellets to come from sustainable sources.[57] It remains to be seen if those sustainability requirements will exclude some American companies from exporting to the Netherlands and whether other EU member states will follow the Netherlands' lead. The UK's vote for "Brexit" may add additional regulatory implications for U.S. exporters, although not in the immediate future. Later in 2016 or perhaps in early 2017, the EU is expected to present its "RED II" proposal in conjunction with an initiative outlining a bioenergy sustainability policy for 2030.[58]

Another potential challenge for American exporters of wood pellets will be the relatively low price of oil (for heating) combined with the strength of the U.S. Dollar. The President of the European Pellet Association noted these factors when observing that sales of pellet stoves and boilers decreased in the EU during 2014 and noted that pellets from the United States were also approximately 33 dollars per metric ton more expensive in February 2015 than the previous year. These trends are anticipated to affect large wood pellet sales in the UK and Belgium.[59] The strong Dollar has also been attributed to adversely affecting exports to Italy, Denmark and Sweden.

Opportunities for U.S. Companies

Wood Pellet Market Overviews

The EU will be the largest market for American wood pellets over the next two years. The EU expects demand for wood pellets in heat and power production to be 22 billion kg in 2016 and 22.5 billion in 2017.[60] The United States can supply wood pellets to meet at least half of this demand. Below are brief snapshots of the markets within the EU that were ranked for potential U.S. exports in this report.

Wood Pellet Ranking 2

Belgium

Wood pellet consumption in Belgium is dominated by large scale power plants that are attempting to meet the EU's renewable energy goals. In 2015, Belgium imported 989 million kg of wood pellets of which 66 percent were from the United States. This made Belgium the second largest market for American pellets in 2015.[61]

Challenges and Barriers: From March to July 2014, the Flemish power sector temporarily stopped combustion of wood pellets because the Belgian wood sector argued that pellet production cannibalized its raw material. In August 2014, generation of electricity from wood pellets resumed, as a new Belgian decree requires the wood sector to prove the threat to its inputs prior to limiting its use for pellets. This event showed the uncertainty that still exists in the biomass industry around whether or not wood pellets are the most sustainable and business-friendly alternative to other fuels. In 2016, plans for a large new biomass facility in Ghent put on hold, raising doubts about continued demand and public support for wood pellets in the country.[62]

Opportunities for U.S. Companies: A stable market is foreseen for wood pellets in the 2016-2017 time frame. Current Belgian industrial use of biomass wood pellets is estimated at about 1 - 1.3 million MT per year.[63] Any increase in Belgian demand in 2018 and beyond could depend largely on financing for a new plant in Langerlo.[64]

Wood Pellet Ranking 4

Denmark

Denmark imported 2.1 billion kilograms of wood pellets in 2015. 28 million kilograms of those wood pellet imports were from the United States, down from 121 million kilograms in 2014.[6566] The wood pellet market is substantial in Denmark, but so far United States companies have not been able to capture a large share of it due to competition from Latvia, Estonia and Russia. U.S. exporters have also been challenged by the strong Dollar, which makes their imports more expensive than those coming from other countries.

Challenges and Barriers: Although biomass is more reliable for base load or backup power, it competes

in Denmark with wind power, which is increasing its share of electricity. Biomass power in Denmark is also highly dependent on government funding and the price of the pellets versus coal. In December 2014, the energy sector came to a voluntary agreement with the Danish Energy Agency that biomass will be sourced from fiber that is certified at the forest-level or that is certified under the industry's SBP standard. Voluntary agreements like this are very common in Denmark and are considered equal to legislation or law.

Opportunities for U.S. Companies: Large power plants using biomass are now supported by subsidies in the form of feed-in tariffs of about 22 dollars per megawatt hour (MWh) (this is approximately 104 dollars per metric ton of wood pellets).[67] The Danish Government has a goal of phasing out coal by 2030, and that could support a further increase in the use of wood pellets. In March 2015, Denmark announced it would convert a coal power plant to wood pellets, becoming the first plant in the nation to use 100 percent wood pellets over coal or gas. The plant is expected to be fully converted by autumn 2016.[68] This signaled Denmark's continued desire to pursue power production using wood pellets. Denmark will remain one of the EU's largest importers of wood pellets for the short to medium term.

Wood Pellet Ranking 3

France

France was one of the few EU member states, along with the UK and Belgium, to increase U.S. wood pellet imports in 2015, despite low oil prices and a strong dollar. It decreased its total imports to 156 million kg but increased its imports from the United States to 13 million kilograms, a 3800 percent rise.[69] The share of industry and of collective residential heating has increased since 2005, and it will keep increasing in the future as a result of national incentive policies.

Challenges and Barriers: In the long run, the potential for U.S. wood pellets in France is limited because local wood is favored in subsidized heat facilities. It is considered as more environmentally friendly than imported pellets. The potential for U.S. wood pellets in the future will largely depend on whether the French Government recognizes that ocean freight is substantially more carbon and energy efficient on a per ton basis than trucking. Imported wood used in subsidized heat facilities also must be certified (by the Programme for the Endorsement of Forest Certification or Forest Stewardship Council certifications).[70]

Opportunities for U.S. Companies: Electricity and heat production from biomass has grown fast in the last five years, and it is more and more difficult for energy companies to source local wood.[71] However, imported pellets are only seen as a temporary solution; in the long run, the objective is to use domestic wood. Thus, the market for wood pellets is expected to grow over the next few years but it could decline afterwards. A single contract for a district heating system in Paris led to a dramatic rise in imports from the U.S. starting in 2015.[72] However, the objective of the company that runs this system is to reduce the share of imported pellets in the future and to only use domestic pellets in the long run.

Wood Pellet Ranking 9

Germany

Germany is the third largest producer of wood pellets in the world after the United States and Canada. It has about 70 production facilities and an annual wood pellet production capacity of 3.5 billion kilograms.[73] It has a huge market for wood pellets, especially for wood pellet companies operating domestically.

Challenges and Barriers: Beginning in 2013, consumption of wood pellets stagnated in Germany. Two years later, imports from Russia and Poland increased and imports from the United States decreased to less than 2 million kg.[74] At the International Pellet Conference in February 2015, the decrease in oil price and a mild winter were cited as reasons for this decrease in demand.[75] The German Government also removed a tax deduction for energy renovations that makes it more expensive for businesses to convert to using wood pellets for heat.[76] These factors, along with Germany's domestic production capability, will make it difficult for U.S.-based companies to significantly increase their market share.

Opportunities for U.S. Companies: The market for wood pellets is expected to grow in Germany as it increases its use of renewable energy sources. The large amount of wood pellet consumption in

Germany will make it a viable option for American wood pellet exporters for at least the short term, even if market share does not increase.

Wood Pellet Ranking 10

Italy

Italy decreased its wood pellet imports to 1.6 billion kilograms in 2015. The United States exported 48 million kilograms of wood pellets to Italy in 2015, capturing about 3 percent of the market, down from 9 percent in 2014. About 15 percent of the total biomass installations use wood pellets in Italy, and the residential heating industry is the largest source of demand for the pellets,[77] estimated at 96 percent of total consumption.[78]

Challenges and Barriers: At the end of 2014, Italy increased the value added tax (VAT) on wood pellets from 10 percent to 22 percent. The change is not expected to decrease demand for pellets in the short term, though it may exacerbate the price difference between pellets made in the United States and pellets made elsewhere.[79] The Italian wood pellet market also is fragmented. Pellets are sold in many different types of stores and in different quantities. Italy also is increasing the proportion of ENplus certified pellets that it uses, indicating that sustainability of the supply chain will be important in the future.[80] U.S. imports have fallen significantly since 2013, due in part to a warm winter and the higher price of U.S. wood pellets over European competitors. Since the strong Dollar is expected to continue for the short term, Italy has been given a lower ranking in this year's report.

Opportunities for U.S. Companies: Italy has a very large market for wood pellets, and there has been a recent increase in purchases of pellet boilers. The government has tax deductions in place to encourage buying pellet stoves and a scheme to support small-scale efficiency improvements using ENplus certified biomass.[81] If U.S. pellets become cost competitive again, it is likely that exports to Italy will return to their previous levels.

Wood Pellet Ranking 5

Netherlands

In 2015, the Netherlands imported 131 million kg of wood pellets, which made it the ninth largest importer in the EU.[82] The United States exported 38 million kg of wood pellets to the Netherlands, down from 272 million in 2014, capturing approximately 29 percent of the market, compared to 60 percent of the market in 2014.[83]

Challenges and Barriers: *Challenges and Barriers*: In March 2015, the Dutch government announced plans to require all large (>500 hectares) wood pellet producers for the Netherlands to certify their pellets at the forest level. It plans to gradually require that 100 percent of the forest acreage from which Dutch wood pellets are sourced be sustainable, demonstrated by forest level certification. It remains to be seen if those sustainability requirements will exclude some American companies from exporting to the Netherlands, but long term contracts will be more difficult to secure and other countries in the EU may follow the Netherlands' lead. Currently, the Dutch Government is in the process of determining which certification programs are valid to demonstrate sustainability; in transition and as alternative, a Verification Protocol is being prepared.

Opportunities for U.S. Companies: Uncertainty about Dutch regulations has impeded U.S. exports, although they are expected to resume in mid-2017. Legislation requiring 100 percent sustainability of wood pellet sources will not be fully implemented until 2020, after which the prospect for U.S. exports is uncertain.

Wood Pellet Ranking 7

Sweden

Sweden is the second largest producer of wood pellets in the EU. However, production has stagnated since 2011 as competitive imports from the Baltic countries and Russia have increased.[84] U.S. companies had 0.01 percent of the market share of imports in Sweden in 2015, accounting for 49 thousand kg, falling off from 6 percent of the market share in 2014.[85]

Challenges and Barriers: American companies wishing to export to Sweden will have to compete with cheap wood pellets that are being imported from Russia and the Baltic states. Production in those areas is increasing, and the value of the dollar along with transportation costs will make it difficult for U.S.-based companies to compete.

Opportunities for U.S. Companies: Sweden is targeting 100 percent renewable energy use by 2020, so it is expected to continue to utilize large amounts of wood pellets for heat production.[86] Despite competition from Baltic countries and Russia, American companies have an opportunity to increase exports to this large wood pellet consumer market.

Wood Pellet Ranking

1

United Kingdom

The United Kingdom will continue to be the largest market for wood pellets within the EU for the foreseeable future. In 2015, the UK consumed 6.7 billion kilograms of wood pellets.[87] Nearly 4 billion kg of that consumption came from the United States. Consumption is expected to increase to 7.2 billion kilograms in 2016.

In the UK, the use of wood pellets in power plants is driven by the interaction of three policies:

- The Renewables Obligation (RO), which requires until 2027 that licensed UK electricity suppliers source a specified proportion, which is set at the beginning of each year and increased annually, of the electricity they provide to customers from eligible renewable sources;
- The EU's Industrial Emissions Directive, which created a legally binding standard for sulfur dioxide emissions, among other things, and is set to be implemented on January 1, 2016; and
- The Carbon Price Floor, which disincentivizes the use of coal in coal-fired power plants.

On August 22, 2013, the UK's Department of Energy and Climate Change (DECC) announced the release of its final guidelines, which stakeholders within the United States viewed as achievable based on current practices. The UK announced that the guidelines' sustainability criteria will be enforced starting in April 2015 and that it would not revise them until 2027 at the earliest. Drax, which provides electricity for 7 percent of the UK, is continuing its conversion to wood pellets. It has signed contracts with U.S. suppliers and is expanding its own pellet production in the United States.[88]

Challenges and Barriers: The UK's Renewables Obligation program states that utilities are required to assess the sustainability of the fuels that they use and publish an annual report.[89] Thus far, this obligation has not prevented American wood pellet producers from being able to supply in the UK market. The EU investigated Lynemouth Power Station, one of the UK's largest power producers, on whether or not UK subsidies for the conversion of the coal-fired power plant to biomass violated EU State Aid laws. This case was concluded in December 2015 and the facility was found to be in compliance.[90] However, shortly thereafter another case was opened against a Drax power plant converted to biomass.[91] A decision is expected by the end of 2016.

Opportunities for U.S. Companies: The largest consumer of wood pellets in the UK, Drax, has a coal plant that provides 7 percent of the UK's electricity. Drax has converted its third generating unit out of six at this facility into a biomass fueled unit and is looking to convert a fourth in the future. This project and similar ones across the UK will drive demand higher in the short term. The market share of wood pellets from companies based in the U.S. compared to all other foreign suppliers increased every year between 2011 and 2014 but decreased from 61 percent to 54 percent in 2015 despite an overall rise in imports.[92] The UK import market itself will continue to be more than six times as big as Belgium, the next biggest importer of U.S. wood pellets. It is clear that the UK is the most important market for American pellet exporters by a large margin. However, it is anticipated that the market could plateau in 2017.

India

The Government of India's ambitious E5 blending target set in 2009 has yet to be achieved. India's inadequate molasses supply associated with reoccurring drought place limits on ethanol production. However, the main reasons India has never achieved its fuel blending goals are the lack of sufficient incentives for India's sugar mills offered by the Oil Marketing Companies (OMCs) and barriers to interstate commerce due to its bureaucratic and patchwork regulatory environment. In spite of these challenges, India is still on a trajectory to be the third largest destination for U.S. ethanol in the next two years based on volume. Indian policy currently prohibits the use of ethanol imports as fuel, but does allow imports of undenatured fuel grade ethanol to be used as other industrial chemicals, freeing up more domestic supply for gasoline blending.

Ethanol Rank	Wood Pellet Rank
3	N/A

As U.S. ethanol producers turn to Asia as a developing export market, India has been in the spotlight for its ambitious blending goals. While on the surface the Government of India's support for ethanol has been persistent over the years, India also has struggled to balance the incentives for the producers and the blenders.

U.S. exporters will likely fill the gap between the supply and the demand, and appear to be doing so at least indirectly. However, the complexities of India's market may require a more nuanced approach than the approach for the higher ranked countries in this year's *Top Markets Report* (Canada and China).

Market Overview

India's sugar policy forces most of the country's sugarcane harvest into sugar production. Molasses, a by-product of sugar production, is the only feedstock permitted to produce ethanol for beverage, fuel and other industrial uses. Reoccurring and acute water shortages discourage farmers from expanding plantings. With these factors at play, recent ethanol production and consumption have remained relatively balanced in recent years, although a growing deficit is currently boosting imports. Given apparent limitations on feedstock supply and demographic trends boosting ethanol consumption, India's periodic ethanol trade deficit could become permanent and grow over time.

According to India's National Policy on Biofuels (2009), renewable fuels are encouraged for motor vehicles, targeting a 5 percent blending rate for ethanol. Under the Ethanol Blending Program (EBP), the benefits of ethanol are recognized – including environmental reasons and economic considerations such as cutting the deficit or reducing India's dependence on imported crude oil. Many structural limitations have prevented the EBP from reaching its 5 percent goal in the past. Yet the Government of India has repeatedly stated that it would like this rate to be increased to 10 percent.

The Government of India made various attempts to overcome these obstacles. In December 2014, a price fixing scheme for fuel ethanol procurement was introduced.[93] However, according to news reports, this backfired for suppliers that have high transportation charges.[94]

Furthermore, in February 2015, the Government approved the long-awaited export subsidy for raw sugar but with a condition attached—those mills that produce alcohol must offer at least 25 percent of their annual production to OMCs in order to receive the subsidy. This policy also may have unintended consequences for mills that do not make both products.

The United States and Brazil supply most of India's ethanol imports, but recently the United States has emerged as the largest supplier and will likely retain this position as the low-cost producer and supplier of ethanol. U.S. fuel ethanol exports to India were 151 million liters in 2014 and 140 million liters in 2015.[95] Furthermore, year-to-date exports as of August 2016 have already exceeded the 2015 total by about 60 million liters. The uptake has been attributed to a widening shortfall of industrial ethanol, as domestic production is diverted to gasoline blending.[96] There has been some speculation that, due to the shifting of imports to industrial ethanol, blending rates could potentially hit the government-mandated level of 5 percent in 2016.[97] Assuming that is the case, India continues to be ranked in the *Top Markets Report* because blend rates and insufficient domestic supply are indirectly driving the demand for U.S. fuel ethanol.

Challenges and Barriers

Under the EBP, the state-owned OMCs are subject to this requirement and domestically produced ethanol takes priority over foreign-produced ethanol. Thus it was unexpected development when U.S. fuel ethanol began to be exported to India in increasingly large volumes starting in 2013.

Currently, to use imported ethanol as fuel, government-owned OMCs must float an expression of interest/global tender and ethanol exporter bids are competitive with domestic prices. With such a cumbersome and time-consuming process, it is unsurprising that Indian importers find it easier to simply repurpose the imported undenatured fuel ethanol. However, the import ban will eventually place growth limits on the domestic market and foreign supplier sales because a significant expansion in domestic production is not expected as long as existing sugar policy is unchanged.

The biggest near term challenge for U.S. companies is exploring business relationships in a complex and fragmented market, despite India's top-down approach to biofuels policies. The extent to which India's ethanol production can be supplemented with imports remains to be seen. In years of surplus sugar production, India should have no problem meeting its goals.[98] However, other impediments at the state level need to be fully resolved in order to reach the ultimate 10 percent target. These policy mandates appear to be aspirational rather than firm, making it difficult to predict whether U.S. export growth can maintain its momentum.

Transportation is another area that needs improvement. State level procedures that treat inter-state movement of ethanol as "imports and exports" are widely viewed as impediments.[99] The Government of India's Transportation Minister has pushed for measures to address this.[100]

Opportunities for U.S. Companies

For now, the ban on fuel ethanol imports has little negative impact on foreign suppliers as long as India continues to divert domestically produced industrial chemical ethanol to the fuel market while permitting imports to backfill the resulting shortfall in the industrial chemicals market. A biofuels policy aimed at maintaining or expanding fuel ethanol blending has the potential to drive the largest expansion in ethanol consumption. Thus it is still worthwhile to encourage India to open its market directly to foreign suppliers of fuel ethanol.

Mexico

Although the Government of Mexico established the legal framework for the commercial use of biofuels in 2008, the state-run oil company, Petróleos Mexicanos (PEMEX), did not have a successful bid for domestically produced biofuels until March 2015. A relatively small but steady supply of undenatured U.S. fuel ethanol has been shipped to Mexico for the past several years. With recent energy reforms, PEMEX's competitors have been contemplating entering the fuels market or importing gasoline by 2017. However, Mexican regulations adopted in 2016 dealt a major setback for nationwide blending by banning ethanol use in the three most populated metropolitan areas. U.S. exporters should consider focusing in the short term on reaching customers in the areas that are allowed up to 5.8 percent blend.

Ethanol Rank	Wood Pellet Rank
6	N/A

Despite its proximity and the ease of trade with the United States as a NAFTA country, Mexico has not been a large market for U.S. ethanol because as of yet it has not implemented a nationwide fuel ethanol program. The situation is made more complex by sugar trade regulations between the two countries and the monopoly by state-run oil company PEMEX, which is required to favor domestic ethanol. However, it is only recently that PEMEX has taken any serious steps to implement ethanol blending.

Exporters were bullish on prospects for a massive increase in trade with Mexico after the government released a draft regulation that allows for the blending of up to 5.8 percent ethanol in fuel supply nationwide. However, the government sharply reversed course and banned blending ethanol in the metropolitan regions of Mexico City, Guadalajara and Monterrey, which combined account for approximately one-fourth to one-third of the total Mexican population.

U.S. producers who are interested in increasing their market share in Mexico can still provide an affordable option for either PEMEX or its competitors in the non-restricted areas. However, without the demand from the major cities it will take time for the upgrades in supply chain infrastructure to attract investment.

Market Overview

Mexico produces non-fuel ethanol as a sub-product of sugarcane milling. The few operational ethanol distilleries in Mexico have been supplying ethanol for alcoholic beverages and pharmaceutical industries. Sugarcane producers are aware that increasing the ethanol blend could help reduce the country's mounting sugar surplus.[101]

In an attempt to stimulate domestic production of fuel ethanol, the Government of Mexico launched a pilot program in December 2011 to introduce ethanol into the market. It set dates and minimum volumes for blending ethanol with gasoline, gradually increasing until 2016. However, these goals were very modest, with a maximum of only 230 million liters per year[102] in a market that annually uses 45 billion liters of gasoline per year.

In March 2015, PEMEX announced that it will begin selling E6 (5.8 percent) ethanol-blended gasoline in selected cities in the Mexican states of Tamaulipas, San Luis Potosi and Veracruz. It awarded four 10-year contracts to Mexican companies that will supply PEMEX with as much as 123 million liters of ethanol per year. PEMEX will invest about $58 million to build the necessary infrastructure. The pilot program is expected to begin in January 2017.

The energy reforms enacted in 2014 likely put pressure on PEMEX to finally implement its blending program, after many years of uncertainty and failed bids. Beginning in 2017, as part of these reforms, gasoline prices will be liberalized and companies that operate new stations not affiliated with PEMEX will likely import gasoline. This is also seen as an opportunity for ethanol imports, as the locally produced ethanol is being purchased by PEMEX.

In July 2016, the Government of Mexico released the draft Norma Oficial Mexicana (Official Mexican Standard) NOM-016-CRE-2016 regarding the specifications for oil quality including a proposed 5.8 percent nationwide ethanol blend. However, the final regulation passed by CRE prohibited ethanol blending and sales in the three largest major metropolitan areas (Mexico City, Guadalajara and Monterrey), which represent one-third of Mexico's population. The regulation, which took effect October 31, does not mandate ethanol blending in the rest of the country but will allow a maximum of 5.8 percent. The regulation is likely to be reviewed after one year.

Challenges and Barriers

National policies that have been unsuccessful in effectively building demand for fuel ethanol have hampered efforts to increase exports to Mexico. PEMEX was accused by domestic suppliers of setting the price of the bids too low for sugarcane based ethanol, which costs more to produce than corn-based ethanol.[103]

Energy sector reforms and renewed commitment to curb carbon emissions attracted new interest for ethanol. However, Mexico's continued use of MTBE for octane boosting, among the highest in the world, remains an obstacle. There appear to be entrenched interests in the MTBE industry that would benefit from the prohibition on blending ethanol in the major cities. This was a particularly disappointing outcome for the U.S. ethanol associations who proactively stepped up their educational outreach efforts to Mexican Government officials over the past year. Also, even before the Government's reversal of its stance on ethanol blending, the lack of tank storage infrastructure to handle ethanol imports was noted by industry experts. [104]

Opportunities for U.S. Companies

Based on U.S. Census Data that separately identifies non-beverage ethanol used as fuel beginning in 2012, fuel ethanol shipped to Mexico remained between 80 and 116 million liters (mostly undenatured) from 2012-15. Imports of undenatured ethanol from the U.S. increased 25 percent in 2015.[105] U.S. exporters captured 85 percent of Mexico's overall ethanol imports in 2015, totaling 134 million liters.

Industry observers continue to be cautiously optimistic that the launch of PEMEX's program, although ostensibly awarded to domestic suppliers, could create more opportunities for U.S. ethanol suppliers due the lack of economically efficient, large scale fuel ethanol processing in Mexico.[106] If the E6 gasoline target was implemented nationwide, demand for ethanol could rise to 790 million gallons (23 billion liters) of ethanol annually.[107] Regardless of government regulation, PEMEX may be setting a precedent that will be adopted nationwide eventually by all retailers of gasoline.

Even with the restrictions on the large metropolitan areas, U.S. corn ethanol suppliers are expected to remain highly price competitive with Brazilian, Peruvian and other suppliers of sugar cane ethanol and are thus well positioned to capture much – if not most – of any expansion in the Mexican fuel ethanol market. The next two years are critical for U.S. exporters to establish business relationships in Mexico.

Philippines

Imported ethanol is expected to satisfy at least one quarter of the domestic demand in the Philippines for the next several years even though domestic production capacity is catching up. As fuel consumption continues to increase overall due to economic expansion, it will be a challenge for the Philippine Government to spur enough investment to cover its ambitious policy goals for ethanol. Exporters should focus on strengthening their relationships with Philippine buyers. Building on their recent success, U.S. ethanol producers will be well positioned in the long term if the Philippine Government's blend mandate is increased as proposed.

Ethanol Rank	Wood Pellet Rank
7	N/A

Following the implementation of a 10 percent blending mandate in 2011, U.S. ethanol exports to the Philippines have skyrocketed from 12 million liters in 2012 to 276 million liters in 2015. Strategic export promotion activities within the next two years can help ensure that this temporary phenomenon becomes a steady flow of trade. However, the ranking has been revised downward in the face of reports that significant domestic capacity has finally reached production stage.

Although the Biofuels Act of 2007 gave priority to locally produced ethanol, the Philippines has had little choice but to rely on imports until domestic capacity catches up. Despite facing higher tariffs compared to regional competitors, U.S. ethanol comprised 95 percent of total denatured ethanol imports in 2015. Moreover, when Thailand increased its own blending mandate to 20 percent, fuel ethanol from Thailand was used for its domestic supply instead of being exported to the Philippines. This created an opening for U.S. producers at an opportune time, as they were adjusting to the decrease in exports to the EU due to antidumping duties.

The potential competition for market share with other regional ethanol producers remains, but economic and historic ties between the United States and the Philippines could help tip the balance. The affordable price of U.S. ethanol has also been an advantage, particularly given the 10 percent tariff rate plus a 1 percent duty imposed if ethanol is used for fuel-blending under the Philippine Fuel Ethanol Program. It should be noted that Philippine tariffs for ethanol were eliminated in 2016 for ASEAN partners through various trade agreements, and Most Favored Nation tariffs for WTO-member countries, including the United States, were also lowered to zero in 2016, down from 10 percent the previous year.

Market Overview

The Philippines was the first country in Southeast Asia to enact biofuels legislation. The blend mandate was gradually increased in accordance with the Biofuels Act of 2007, ending with a 10 percent ethanol requirement in August 2011, which remains the current mandate. However, meeting this target with domestically produced ethanol has been a challenge due to the inadequate capacity of existing sugarcane distilleries, low productivity and high production costs.

The fact that oil companies are still currently importing the bulk of their ethanol to comply with the Philippine Government's requirement has angered some who would like the Philippines to be less dependent on imported fuel.[108] With new facilities starting production in 2016 of around 100 million new liters of ethanol, total installed capacity is expected to reach 322 million liters, which is more than half of demand from the blending mandate.[109]

Fuel use is predicted to increase as the population and economy continue to expand.[110] As gasoline demand increases, the amount of ethanol required to meet the E10 blend mandate will also grow. The Philippines Department of Energy also has indicated

that it would like to increase the blend rate even further, to 20 percent by 2020. At least 15 additional plants with a 30 million liter capacity each would be needed to meet this requirement.[111] This proposed policy may also increase imports again, at least temporarily. However, without a feasible roadmap in place, a discussion of higher blends can only be viewed as aspirational.

Challenges and Barriers

While U.S. exporters have enjoyed undeniable success in the Philippines in 2013 through 2015, given the preference for domestic ethanol, there is no guarantee that exports will continue at the same high levels. The number of domestic producers is growing, and there is still competition from regional sources. Rather than taking advantage of ad-hoc opportunities, it is important for exporters to nurture long term relationships with buyers.

U.S. exporters should also keep in mind that congestion in Manila ports slows the movement of goods and adds extra costs. As long as U.S. ethanol remains competitively priced, this should not be a major issue.

Opportunities for U.S. Companies

In the short term, ITA expects a gradual decline in U.S. exports to the Philippines in 2016-2017. However, to prepare for the potential opportunities in the medium and long term -- if the Government of the Philippines follows through on its plan to increase the blend rate, it will have to accept the reality of imports – producers and exporters should continue to monitor the market and develop business relationships, positioning themselves to provide a steady, affordable supply.

South Korea

Despite what appeared to be promising signs for U.S. wood pellet exporters in 2013-2014, South Korea has dropped to the bottom of the rankings for 2016-2017. Opportunities in South Korea are now dominated by cheaper regional competitors in Vietnam and China, despite their questionable quality and attempts to impose certification requirements. Additionally, exporters must navigate a tendering process where wood pellets are purchased by biomass utilities that are wholly owned subsidiaries of Korea Electric Power Corporation (KEPCO), which is owned by the Government of South Korea. On the other hand, U.S. exports of "fuel ethanol" to South Korea have been steadily rising. This year's *Top Markets Report* includes a ranking for the fuel ethanol sector for the first time. However, the lack of a biofuels mandate in South Korea makes continuation of these exports less certain than other markets.

Ethanol Rank	Wood Pellet Rank
5	11

The market for wood pellets as biomass in power plants has expanded immensely over the past three years in South Korea, although it has a forest product self-sufficiency rate of only 6 percent.[112] As a result, imports from a variety of sources have increased at an unprecedented rate. From 2013 to 2014, imports quadrupled from 485 million kg to 1.85 billion kg. In 2015, the United States shipped 3.8 million kg of wood pellets to South Korea, but South Korea's top suppliers were Vietnam, Canada, Malaysia, Russia, Indonesia and Thailand (Figure 1).

In last year's *Renewable Fuels Top Markets Report*, South Korea was featured as a growing opportunity for U.S. wood pellet suppliers. Unfortunately, U.S. exports of wood pellets to South Korea peaked in 2014 and dropped sharply in 2015. In the first four months of 2016, no exports to Korea were recorded, and the future looked grim for wood pellets exports from North America generally. The South Korean market has clearly prioritized obtaining the lowest priced wood pellets possible.[113] This once-promising market dropped to the bottom of the rankings in this year's report for that sector.

By contrast, South Korea remained a solid market for U.S. ethanol despite the absence of a blending mandate. This year ITA ranks South Korea for fuel ethanol export potential for the first time. However, it should be noted that demand is less certain than countries with a national biofuels policy and that certain amounts are likely being re-exported into the region rather than blended in South Korea.

Market Overview

The increase in South Korean wood pellet use is closely correlated to recent policy changes. Through the Renewable Portfolio Standard (RPS), in effect since January 2012, the South Korean Government mandates that state-owned and independent power utilities with a capacity over 500 MW generate a certain percentage of their energy production from renewable sources annually or else face penalties.[114] The RPS quota increases gradually, from 2 percent in 2012 to 10 percent in 2024.[115]

In the first few years after the introduction of the RPS, many companies have decided to focus on wood pellets for heat and power production since the conversion from coal is relatively easy. However, imports have slowed down, as other renewable energy resources such as solar power or wind power have been deployed to meet the RPS requirements.

U.S. fuel ethanol exports to Korea started to grow strong and steady in 2014 and 2015. However, while Korea's Renewable Fuel Standard stipulates a 2.5 percent blend for biodiesel, it contains no similar mandate for ethanol. Any decision to include

ethanol in its requirements would not be implemented until 2020 at the earliest.

The cause for the increase in trade appears to be related to Korea's increased demand for industrial ethanol. Distillation infrastructure in Korea is being used to convert imported fuel grade ethanol to a solvent, with some of the imported product re-exported to countries in the region that do implement biofuels policies.[116]

Challenges and Barriers

The competition for the wood pellet market in South Korea is formidable. Between 2012 and 2015, Vietnam's share of the wood pellet market rose from 24 percent to nearly 70 percent. The U.S. pellet producers, who are very successful in Europe, have been facing a number of obstacles in South Korea, including offering a competitive price, coordinating logistics from the east coast of the United States, and difficulty navigating the procurement process. Since the power utilities in South Korea are government-owned, wood pellets are subject to a cumbersome and sporadic tendering process.[117]

Of the five thermal power generating companies, each company's Invitation to Bid (ITB) can have different quality specification requirements, accordingly to their specific demand and need at that time. If an importer or supplier meets the minimum quality specification for the specific ITB, one of the most important factors, if not the most important factor, taken under consideration is the 'competitive price' relative to the calorific value.[118] Long term off-take agreements are also not sought in the ITBs.

Korean utilities have attempted to impose requirements in February 2015 for Forest Stewardship Council (FSC) chain-of-custody certificates to accompany bids for wood pellet tenders. However, when the FSC certification provided by Vietnamese pellet producers proved to be fraudulent, the Korean Government implemented new requirements. The authentication process required government-issued documentation for all fiber sources in each wood pellet shipment, which was difficult for North American producers. They have since reversed this policy, putting the sourcing verification responsibility on the importer rather than the exporter. As it currently stands, Korea will not impose forest management requirements.

Figure 1: South Korea Wood Pellets: Import Sources, 2015

Country	Volume Imported (kg)
Vietnam	1,022,808,842
Malaysia	153,959,495
Canada	87,742,511
Russia	84,070,138
Thailand	59,976,653
Indonesia	35,118,213
United States	18,847,033
China	3,056,694
New Zealand	1,215,763
Netherlands	894,701

Source: Global Trade Atlas

The biggest challenge facing U.S. ethanol exporters interested in Korea is competition with Brazilian ethanol, which is closer to the industrial grade that the market is seeking. Another hurdle may be connecting with the appropriate customers as well as predicting demand in absence of a blending mandate.

Opportunities for U.S. Companies

Consumption of wood pellets is expected to continue to increase only gradually in South Korea during the next two years. Domestic production is not expected to increase during that same time period. The only factors that would support U.S. exports to Korea would be either the introduction of a certification system that would allow sustainably produced U.S. pellets to prove their quality compared to cheaper Asian pellets or a larger increase in co-firing that would necessitate higher quality pellets for technical reasons.

With regards to ethanol, U.S. exporters are more likely to succeed in Korea in correlation with higher Brazilian sugar prices, which divert sugar cane feedstock away from the ethanol industry and therefore reduce Brazilian ethanol exports. Even with the extra step of distilling the fuel ethanol into

a solvent, U.S. ethanol is seen as affordable and reliable. Despite the short term opportunity in such fluctuations, establishing business relationships could potentially be rewarded in the long term if Korea implements a blending policy.

This Page Intentionally Left Blank

Addendum: Resources for U.S. Exporters

The U.S. Government has numerous resources available to help U.S. exporters: from additional market research, to guides to export financing, to overseas trade missions, to staff around the country and the world. A few key resources are highlighted below. For additional information about services from the International Trade Administration (ITA), please visit www.export.gov.

Renewable Energy & Energy Efficiency (RE&EE) Exporter Portal
http://export.gov/reee/
This online portal provides a one-stop shop for RE&EE exporters – including renewable power, biofuels, T&D equipment, smart grid ICT and energy storage – to connect to news, events and market intelligence resources from U.S. Government agencies under the National Export Initiative. RE&EE exporters can also sign up to receive a quarterly e-newsletter. Additionally, the portal includes the latest information from the Department of Commerce's Renewable Energy and Energy Efficiency Advisory Committee, a Federal Advisory committee that advises the Secretary regarding the development and administration of programs and policies to expand the competitiveness of U.S. exports of RE&EE goods and services.

Country Commercial Guides
https://www.export.gov/ccg
Written by U.S. Embassy trade experts worldwide, the *Country Commercial Guides* provide an excellent starting point for what you need to know about exporting and doing business in a foreign market. The reports include sections addressing market overview, challenges, opportunities and entry strategies; political environment; selling U.S. products and services; trade regulations, customs and standards; and much more.

Basic Guide to Exporting
http://export.gov/basicguide/
A Basic Guide to Exporting addresses virtually every issue a company looking to export might face. Numerous sections, charts, lists and definitions throughout the book's 19 chapters provide in-depth information and solid advice about the key activities and issues relevant to any prospective exporter.

Trade Finance Guide: A Quick Reference for U.S. Exporters
https://www.export.gov/TradeFinanceGuide
Trade Finance Guide: A Quick Reference for U.S. Exporters is designed to help U.S. companies, especially
small and medium-sized enterprises, learn the basics of trade finance so that they can turn their export opportunities into actual sales and achieve the ultimate goal of getting paid on time for those sales. Concise, two-page chapters offer the basics of numerous financing techniques, from open accounts to forfaiting and government assisted foreign-buyer financing.

Trade Missions
http://www.export.gov/trademissions/
Department of Commerce trade missions are overseas programs for U.S. firms that wish to explore and pursue export opportunities by meeting directly with potential clients in local markets. Trade missions include, among other activities, one-on-one meetings with foreign industry executives and government officials that are pre-screened to match specific business objectives.

Certified Trade Fairs
http://export.gov/tradefairs
The Department of Commerce's trade fair certification program endorses overseas trade shows that are reliable venues and good markets for U.S. firms to sell their products and services abroad. These shows serve as vital access vehicles for U.S. firms to enter and expand into foreign markets. The certified show/U.S. pavilion ensures a high-quality, multi-faceted opportunity for American companies to successfully market overseas. Among other benefits, certified trade fairs provide U.S. exhibitors with help facilitating contacts, market information, counseling and other services to enhance their marketing efforts.

International Buyer Program
http://export.gov/ibp/
The International Buyer Program (IBP) brings thousands of international buyers to the United

States for business-to-business matchmaking with U.S. firms exhibiting at major industry trade shows. Every year, the International Buyer Program results in millions of dollars in new business for U.S. companies by bringing pre-screened international buyers, representatives and distributors to selected shows. U.S. country and industry experts are on site at IBP shows to provide hands-on export counseling, market analysis and matchmaking services. Each IBP show also has an International Business Center where U.S. companies can meet privately with prospective international buyers, prospective sales representatives and business partners and obtain assistance from experienced ITA staff.

Upcoming IBPs include:

- National Ethanol Conference; San Diego, CA *February 20-22, 2017*

The Advocacy Center
http://www.export.gov/advocacy/
The Advocacy Center coordinates U.S. Government interagency advocacy efforts on behalf of U.S. exporters that are bidding on public-sector contracts with overseas governments and government agencies. The Advocacy Center helps to ensure that sales of U.S. products and services have the best possible chance competing abroad. Advocacy assistance is wide and varied but often involves companies that want the U.S. Government to communicate a message to foreign governments or government-owned corporations on behalf of their commercial interest, typically in a competitive bid contest.

Global Energy Team
http://www.export.gov/industry/energy/index.asp
The Global Energy Team is a network of ITA's global energy specialists that draws on experiences across the U.S. Commercial Service, Foreign Commercial Services and Department of Commerce headquartered industry analysts. The team provides information to clients on upcoming events, trade leads and market research.

U.S. Commercial Service
http://www.export.gov/usoffices/index.asp
With offices throughout the United States and in U.S. Embassies and Consulates in nearly 80 countries, the U.S. Commercial Service utilizes its global network of trade professionals to connect U.S. companies with international buyers worldwide. Whether looking to make their first export sale or expand to additional international markets, companies will find the expertise they need to tap into lucrative opportunities and increase their bottom line. This includes trade counseling, actionable market intelligence, business matchmaking and commercial diplomacy.

Foreign Agricultural Service (USDA)
http://www.fas.usda.gov/regions
Through its market development programs, USDA's Foreign Agricultural Service (FAS) works in partnership with the U.S. food and agricultural industry to help exporters develop and maintain global markets for hundreds of products, including ethanol. Contact information for the FAS office in each market is also available for country-specific inquiries.

Global Agricultural Information Network
http://ain.fas.usda.gov/
USDA'S Global Agriculture Information Network (GAIN) provides timely information on the agricultural economy, products and issues in foreign countries since 1995 that are likely to have an impact on United States agricultural production and trade. U.S. Foreign Service officers working at posts overseas collect and submit information on the agricultural situation in more than 130 countries to USDA's Foreign Agricultural Service (FAS), which maintains the GAIN reports. The online database can be searched for biofuels reports, which are published on an annual basis for selected markets.

Appendix 1: Ethanol Blend Mandates for countries included in the Top Markets Report

Country	2016-2017 Blend Mandate (% of gasoline)	Notes
Brazil	27.5	
Canada	5	5% is the overall national requirement but actual blend rate is higher due to higher provincial mandates (Saskatchewan and Manitoba mandates - 7.5% and 8.5%, respectively) and discretionary blending
China	10	Mandate only applies to the following provinces: Jilin, Jeilongjiang, Liaoning, Henan, Anhui, Hebei, Hubei, Jiangsu, Shandong, Guangxi, Hainan
Colombia	8	Blending target for cities with population greater than 500,000
India	5	
Jamaica	10	
Korea	N/A	
Mexico	5.8	A maximum blend that only applies outside of the metropolitan areas of Monterrey, Guadalajara and Mexico City.
Netherlands	5.5	EU directive calls for renewables to account for 10% of energy use in transport for each Member State by 2020
Peru	7.8	
Philippines	10	Will increase to E20, effective 2020
UK	5	EU directive calls for renewables to account for 10% of energy use in transport for each Member State by 2020

Appendix 2: Citations

[1] Ethanol export data prior to 2012 includes small amounts of industrial (non-fuel) ethanol.
[2] US Census data
[3] Global Trade Information Services. (2015). *Global Trade Atlas.*
[4] Global Trade Information Services. (2015). *Global Trade Atlas.*
[5] Energy Information Administration. (2016). U.S. ethanol exports exceed 800 million gallons for the second year in a row. *Today in Energy*.
[6] Access from http://biomassmagazine.com/plants/listplants/pellet/US/
[7] Energy Information Administration. (2016). *Annual Energy Outlook 2016.*
[8] Johansson, Robert. (2015). Study finds increasing wood pellet demand boosts forest growth, reduces greenhouse gas emissions, creates jobs. Retrieved from http://blogs.usda.gov/2015/06/08/study-finds-increasing-wood-pellet-demand-boosts-forest-growth-reduces-greenhouse-gas-emissions-creates-jobs/. Johansson is the USDA Acting Chief Economist.
[9] Renewable Energy Policy Network for the 21st Century. (2016). *Renewables 2016 Global Status Report*, page 45.
[10] Ibid.
[11] Ibid, page 46.
[12] Fletcher, Katie. (2015). Situation South Korea. *Biomass Magazine*. Retrieved from http://biomassmagazine.com/articles/12543/situation-south-korea.
[13] Renewable Fuels Association, US Department of Energy Alternative Fuels Data Center. (2016). *Ethanol Industry Outlook 2016*, page 8. Retrieved from http://www.afdc.energy.gov/data/10331.
[14] Prentice, Chris. (2015). Louis Dreyfus ships big U.S. ethanol cargo to Middle East. *Reuters*.
[15] *Bloomberg New Energy Finance*. (2016, June 7). *H1 2016 Global Biomass Market Outlook*.
[16] Global Trade Information Services. (2015). *Global Trade Atlas.*
[17] Ibid.
[18] U.S. Census trade data.
[19] U.S. Census trade data.
[20] Pearson, Samantha. (2013). Brazil raises fuel prices holds off changes to subsidies. *Financial Times*.
[21] Ibid.
[22] *Bloomberg New Energy Finance*. (2014, January 13). The US to export ethanol to Brazil. *Biofuel Weekly*.
[23] *Bloomberg New Energy Finance.* (2016, February 29). Sugar-cane fuel wins in Brazil as cheap ethanol beats gasoline.
[24]Soto, Alonso and Teixeira, Marcelo. (2016). Exclusive: Brazil to let ethanol tax break expire in December. *Reuters*. Retrieved from: http://www.reuters.com/article/us-brazil-ethanol-tax-exclusive-idUSKCN1100PB.
[25]*Bloomberg New Energy Finance*. (2016, June 13). New CEO of Petrobas has good news for Brazil's ethanol markers.
[26]Terazono, Emily. (2013). Traders look to Brazilian motorist for sugar's salvation. *Financial Times.*
[27] Strickland, Ryan. (2016). Globalization of ethanol impacts US industry. *Ethanol Producer*.
[28] Foreign Agricultural Service. (2016). *Canada Biofuels Annual.* Retrieved from http://gain.fas.usda.gov/Recent%20GAIN%20Publications/Biofuels%20Annual_Ottawa_Canada_8-9-2016.pdf .
[29] Ibid.
[30] Ibid.
[31] Ibid.
[32] Murray, G. (2013, March 26). Pellet Awakening. *Canadian Biomass*. Retrieved from http://www.canadianbiomassmagazine.ca/news/pellet-awakening-4040 .
[33] Littlecott, Chris. (2015). E3g – Canada coal phase out G7 scorecard country profile. Retrieved from https://www.e3g.org/docs/Canada_country_profile_-_G7_coal_scorecard.pdf
[34] Sawyer, D., & Stiebert, S. (2012, April). *International Institute for Sustainable Development.* Retrieved from http://www.iisd.org/pdf/2012/regulating_carbon_canada_electricity.pdf
[35] Barchyn, D. (2015, February 3). *BiofuelNet Canada*. Retrieved from http://www.biofuelnet.ca/2015/02/03/potential-biomass-co-firing-energy-generation-canada .
[36] Murray, G. (2013, March 26). *Canadian Biomass*. Retrieved from http://www.canadianbiomassmagazine.ca/news/pellet-awakening-4040 .
[37] Cocchi, M. (2011, December). *IEA Bioenergy.* Retrieved from BioenergyTrade: http://www.bioenergytrade.org/downloads/t40-global-wood-pellet-market-study_final_R.pdf .
[38] Murray, G. (2010, August 23). Pellet Power. *CanadianBIOMASS*. Retrieved from: http://www.canadianbiomassmagazine.ca/pellets/pellets-for-canadian-power-1904
[39] Ibid.
[40] USDA Foreign Agricultural Service estimate.
[41] Platts. (2015, August 15). *Monthly Biofuels Editorial*.

[42] Ibid.
[43] Ibid.
[44] Ibid.
[45] U.S. Census trade data.
[46] Renewable Fuels Association. (2016, June 3). U.S. net ethanol exports hit 52-month high; China is top market for second straight month.
[47] Platts, 2015.
[48] Ibid.
[49] USDA Foreign Agricultural Service. (2016, June 29). *2016 GAIN Report*. Retrieved from http://gain.fas.usda.gov/Recent%20GAIN%20Publications/Biofuels%20Annual_The%20Hague_EU-28_6-29-2016.pdf
[50] Ibid.
[51] Ibid.
[52] Ibid.
[53] EurObserv'ER. (2015, January). *Solid Mass Barometer*. Retrieved from http://www.energies-renouvelables.org/observ-er/stat_baro/observ/baro225_en.pdf .
[54] USDA Foreign Agricultural Service. (2016, June 29). *2016 GAIN Report*.
[55] Ibid.
[56] Ibid.
[57] Ibid.
[58] Ibid.
[59] Fordaq. (2015, March 6). Current wood pellet market trends in Europe. Retrieved from http://www.ihb.de/wood/news/European_pellet_market_Christian_Rakos_40790.html
[60] USDA Foreign Agricultural Service. (2016, June 29). *EU Biofuels Annual Report 2016*. Retrieved from http://gain.fas.usda.gov/Recent%20GAIN%20Publications/Biofuels%20Annual_The%20Hague_EU-28_6-29-2016.pdf
[61] Global Trade Information Services. (2016). *Global Trade Atlas*
[62] EU Bioenergy (2016, June 7). Honeymoon is over for Biomass in Flanders. Retrieved from https://eubioenergy.com/2016/06/07/honeymoon-is-over-for-biomass-in-flanders/
[63] USDA Foreign Agricultural Service. (2016, June 29). *EU Biofuels Annual Report 2016*. Retrieved from http://gain.fas.usda.gov/Recent%20GAIN%20Publications/Biofuels%20Annual_The%20Hague_EU-28_6-29-2016.pdf
[64] Biomass Magazine (2016, November 11). USIPA wraps in Miami with a positive outlook to 2017. Retrieved from http://www.biomassmagazine.com/articles/13902/usipa-wraps-in-miami-with-a-positive-outlook-to-2017
[65] Global Trade Information Services. (2016). *Global Trade Atlas*.
[66] Ibid.
[67] USDA Foreign Agricultural Service. (2014, July 3). *EU Biofuels Annual Report 2014*. Retrieved from http://gain.fas.usda.gov/Recent%20GAIN%20Publications/Biofuels%20Annual_The%20Hague_EU-28_7-3-2014.pdf .
[68]CBTR. (2016, June 17). Denmark's Avedore power station gets closer to use wood pellets as fuel. *Clean Technology Business Review.* Retrieved from http://biopower.cleantechnology-business-review.com/news/denmarks-avedore-power-station-gets-closer-to-use-wood-pellets-as-fuel-170616-4926425 .
[69] Global Trade Information Services. (2016). *Global Trade Atlas*.
[70] USDA Foreign Agricultural Service. (2015). *Country Survey*.
[71] Ibid.
[72] Zilkha Biomass Selma. *Zilkha Biomass Energy*. Retrieved from http://zilkha.com/zbs .
[73] USDA Foreign Agricultural Service. (2016, June 29). EU Biofuels Annual Report 2016. Retrieved from http://gain.fas.usda.gov/Recent%20GAIN%20Publications/Biofuels%20Annual_The%20Hague_EU-28_6-29-2016.pdf
[74] Global Trade Information Services. (2015). *Global Trade Atlas*.
[75] Fordaq. (2015, March 13). Pellet market spotlights worldwide. Fordaq: The Timber Network. Retrieved from http://www.ihb.de/fordaq/news/Pellets_Konferenz_Wels_Marktbericht_40903.html
[76] Ibid.
[77] Paniz, A. (2014). Development of the Italian pellet market. Associazione Italiana Energie Agroforestali.
[78] USDA Foreign Agricultural Service. (2016, August 2). *The Italian Wood Pellet Market*. Retrieved from Global Agricultural Information Network.
[79] Fordaq. (2015, March 6). Current wood pellet market trends in Europe. Fordaq: The Timber Network. Retrieved from http://www.ihb.de/wood/news/European_pellet_market_Christian_Rakos_40790.html .
[80] Paniz, 2014.
[81] Ibid.
[82] USDA Foreign Agricultural Service. (2016, June 29). *EU Biofuels Annual Report 2016*.
[83] Global Trade Information Services. (2016). *Global Trade Atlas*.
[84] USDA Foreign Agricultural Service. (2016, June 29). *EU Biofuels Annual Report 2016*.
[85] Global Trade Information Services. (2016). *Global Trade Atlas*.

[86] Ukrainian Biofuel Portal. (2014, September 12). Sweden imported around 300 thousand tons of Russian wood pellets in 2013. Retrieved from http://pellets-wood.com/sweden-imported-around-300-thousand-tons-of-russia-o12492.html .
[87] USDA Foreign Agricultural Service. (2016, June 29). *EU Biofuels Annual Report 2016*. Retrieved from http://gain.fas.usda.gov/Recent%20GAIN%20Publications/Biofuels%20Annual_The%20Hague_EU-28_6-29-2016.pdf
[88] Simet, Anna. (2014, May 21). Drax plans another Mississippi pellet plant. *Biomass Magazine*. http://biomassmagazine.com/articles/10423/drax-plans-another-mississippi-pellet-plant .
[89] EUObserv'ER. (2015, January). *Solid Mass Barometer*. Retrieved from http://www.energies-renouvelables.org/observ-er/stat_baro/observ/baro225_en.pdf .
[90] European Commission. State aid: Commission authorises UK support to convert Lynemouth power station to biomass. European Union Press Release. Retrieved from http://europa.eu/rapid/press-release_IP-15-6214_en.htm
[91] European Commission. State aid: Commission opens in-depth investigation into UK public support for Drax power plant. European Union Press Release. Retrieved from http://europa.eu/rapid/press-release_IP-16-2_en.htm .
[92] Global Trade Information Services. (2016). *Global Trade Atlas*.
[93] Ibid.
[94] FE Bureau. (2015, March 20). Less than a third of ethanol blending target may be met. *Financial Express*. Retrieved from http://www.financialexpress.com/article/markets/commodities/less-than-a-third-of-ethanol-blending-target-may-be-met/55503/ .
[95] U.S. Census data for HS codes 2207200010 and 2207106010
[96] Zheng, Wei. (2016, July 15). Is India the next big thing in the Asian ethanol market?" *Platts Blog*.
[97] Jha, Dilip Kumar. (2016, April 20). After 3 years of trying, India to achieve 5% ethanol blending. *Business Standard*.
[98] USDA Foreign Agricultural Service. (2016, June 24). *India Biofuels Annual Report 2016*. Retrieved from http://gain.fas.usda.gov/Recent%20GAIN%20Publications/Biofuels%20Annual_New%20Delhi_India_6-24-2016.pdf
[99] Ibid.
[100]Dashl, Dipak K. (2015, January 31). Govt keen on resolving state-wise ethanol duty variation. *Times of India*. Retrieved from http://timesofindia.indiatimes.com/india/Govt-keen-on-resolving-state-wise-ethanol-duty-variation/articleshow/46073887.cms.
[101] Sapp, Meghan. (2013, August). Boosting ethanol production in Mexico would ease sugar surplus. *Biofuels Digest*. Retrieved from http://www.biofuelsdigest.com/bdigest/2013/08/05/boosting-ethanol-production-in-mexico-would-ease-sugar-surplus/
[102] Chavez, Luis. (2012, July 2). *Uncertainty on the Future of Mexican Biofuels*. *Biofuels Annual*. http://gain.fas.usda.gov/Recent%20GAIN%20Publications/Biofuels%20Annual_Mexico%20City_Mexico_7-11-2012.pdf .
[103] Ibid.
[104] Pedrick, Josh. (2016, August 4). Ethanol blend in Mexico to support domestic industry: Grains Council. *Platts News and Analysis*. Retrieved from https://www.platts.com/latest-news/agriculture/houston/ethanol-blend-in-mexico-to-support-domestic-industry-21173426 .
[105] Ibid.
[106] Ibid.
[107]Oil Price Information Service. (2016, October 27). Mexico Opens Its Doors to Ethanol, but Obstacles Remain. OPIS Biofuels Update.
[108] Ibid.
[109] Sapp, Meghan. (2015, December 29). Philippines ethanol production capacity to reach 80% of E10 in 2016. *Biofuels Digest*. http://www.biofuelsdigest.com/bdigest/2015/12/29/philippines-ethanol-production-capacity-to-reach-80-of-e10-in-2016/ .
[110] Foreign Agricultural Service. (2016, August 16). *Philippines Biofuels Annual.* Retrieved from http://gain.fas.usda.gov/Recent%20GAIN%20Publications/Biofuels%20Annual_Manila_Philippines_8-16-2016.pdf
[111] Ibid.
[112] U.S. Forest Service. (2012). *The Asian Wood Pellet Markets*. Retrieved from http://www.fs.fed.us/pnw/pubs/pnw_gtr861.pdf
[113] Portz, T. (2014, October 6). Context is critical in telling the biomass story. *U.S. Industrial Pellet Association*. Retrieved from http://usipa.tumblr.com/post/100667984994/context-is-critical-in-telling-the-biomass-story .
[114] CS Korea, citing Korea Energy Management Corporation (KEMCO) report.
[115] Ibid.
[116] Pedrick, Josh. (2016, July 31). More US ethanol could lead to Korea in shuffling of supply, demand. *Platts Snapshot*.
[117] Walker, Seth. *Pellet Market Stories* (RISI presentation, Pellet Fuels Institute conference, July 2015).
[118] Ibid.

Industry & Analysis' (I&A) staff of industry, trade and economic analysts devise and implement international trade, investment, and export promotion strategies that strengthen the global competitiveness of U.S. industries. These initiatives unlock export, and investment opportunities for U.S. businesses by combining in-depth quantitative and qualitative analysis with ITA's industry relationships.

For more information, visit
www.trade.gov/industry

I&A is part of the International Trade Administration, Whose mission is to create prosperity by strengthening the competitiveness of U.S. industry, promoting trade and investment, and ensuring fair trade and compliance with trade laws and agreements.

INTERNATIONAL
TRADE
ADMINISTRATION