

# **World Biofuels Study**

## **Scenario Analysis of Global Biofuel Markets**

**Thomas Alfstad**

**Prepared for  
U.S. Department of Energy**

***Energy Sciences and Technology Department***

*Brookhaven National Laboratory*

P.O. Box 5000  
Upton, NY 11973-5000  
[www.bnl.gov](http://www.bnl.gov)

Notice: This manuscript has been authored by employees of Brookhaven Science Associates, LLC under Contract No. DE-AC02-98CH10886 with the U.S. Department of Energy. The publisher by accepting the manuscript for publication acknowledges that the United States Government retains a non-exclusive, paid-up, irrevocable, world-wide license to publish or reproduce the published form of this manuscript, or allow others to do so, for United States Government purposes.

## **DISCLAIMER**

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, nor any of their contractors, subcontractors, or their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or any third party's use or the results of such use of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof or its contractors or subcontractors. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

## TABLE OF CONTENTS

<i>List of Figures</i> .....	<i>v</i>
<i>List of Tables</i> .....	<i>vi</i>
<i>Executive summary</i> .....	<i>vii</i>
<i>Background</i> .....	<i>1</i>
<i>Methodology</i> .....	<i>3</i>
<b>MARKAL and ETP</b> .....	<b>3</b>
<b>Feedstock supply curves</b> .....	<b>5</b>
<b>Technology Data</b> .....	<b>9</b>
<b>Capital equipment cost curves</b> .....	<b>9</b>
<b>Existing policies</b> .....	<b>9</b>
<b>Potential future policies</b> .....	<b>13</b>
<i>Scenario analysis</i> .....	<i>15</i>
<b>Reference scenario</b> .....	<b>15</b>
<b>Scenario list</b> .....	<b>15</b>
<b>Carbon prices</b> .....	<b>16</b>
<b>Oil prices</b> .....	<b>16</b>
<i>Results and findings</i> .....	<i>18</i>
<b>Note on results and findings</b> .....	<b>18</b>
<b>Results</b> .....	<b>18</b>
<b>Biofuel market dynamics</b> .....	<b>28</b>
<b>Sensitivity and uncertainty</b> .....	<b>35</b>
<b>Conclusions</b> .....	<b>37</b>
<b>Possible next steps</b> .....	<b>39</b>
<i>References</i> .....	<i>40</i>
<i>Appendix A: Results</i> .....	<i>1</i>



## LIST OF FIGURES

<i>Figure 1: World biofuels supply by type .....</i>	<i>viii</i>
<i>Figure 2: Reference Energy System.....</i>	<i>3</i>
<i>Figure 3: Projection of sugarcane availability in Brazil [8].....</i>	<i>6</i>
<i>Figure 4: Brazil sugar cane supply curve for 2017 [8] .....</i>	<i>7</i>
<i>Figure 5: RFS structure with 2022 mandated volumes (Billion gallons) .....</i>	<i>11</i>
<i>Figure 6: Oil price.....</i>	<i>17</i>
<i>Figure 7: World biofuels supply by type for reference technology cases .....</i>	<i>19</i>
<i>Figure 8: World biofuels supply by type for delayed technology cases .....</i>	<i>20</i>
<i>Figure 9: Brazil sugarcane supply curve 2030.....</i>	<i>22</i>
<i>Figure 10: World biofuel supply by producing region for the reference technology cases.....</i>	<i>23</i>
<i>Figure 11: World biofuel supply by producing region for the delayed technology cases .....</i>	<i>24</i>
<i>Figure 12: World biofuel demand by region for the reference technology cases .....</i>	<i>25</i>
<i>Figure 13: World biofuel demand by region for the delayed technology cases .....</i>	<i>26</i>
<i>Figure 14: US biofuel supply for the reference technology cases .....</i>	<i>27</i>
<i>Figure 15: US biofuel supply for the delayed technology cases .....</i>	<i>28</i>
<i>Figure 16: E85 sales in the reference case .....</i>	<i>30</i>
<i>Figure 17: Biofuels sales with E10 vs. E20 .....</i>	<i>32</i>
<i>Figure 18: Oil price impact on biofuel imports .....</i>	<i>33</i>

## LIST OF TABLES

<i>Table 1: Feedstock supply curves developed for this study [8] .....</i>	<i>7</i>
<i>Table 2: Summary of aggregate feedstock projections for countries studied [8] .....</i>	<i>8</i>
<i>Table 3: Renewable Fuel Standard in billions of gallons per year [3] .....</i>	<i>11</i>
<i>Table 4: Selected world biofuel policies .....</i>	<i>13</i>
<i>Table 5: List of scenarios .....</i>	<i>16</i>
<i>Table 6: Share of world (non-US) production of crop feedstocks represented by the assessed countries [8] .....</i>	<i>21</i>
<i>Table 7: Change in lifecycle GHG emissions per mile traveled by replacing gasoline or diesel with biofuels .....</i>	<i>36</i>

## EXECUTIVE SUMMARY

This report forms part of a project entitled “World Biofuels Study.” The objective is to study world biofuel markets and to examine the possible contribution that biofuel imports could make to help meet the Renewable Fuel Standard (RFS) of the Energy Independence and Security Act of 2007 (EISA).

The study was sponsored by the Biomass Program of the Assistant Secretary for Energy Efficiency and Renewable Energy (EERE), U.S. Department of Energy. It is a collaborative effort among the Office of Policy and International Affairs (PI), Department of Energy and Oak Ridge National Laboratory (ORNL), National Renewable Energy Laboratory (NREL) and Brookhaven National Laboratory (BNL).

The project consisted of three main components:

- Assessment of the resource potential for biofuel feedstocks such as sugarcane, grains, soybean, palm oil and lignocellulosic crops and development of supply curves (ORNL).
- Assessment of the cost and performance of biofuel production technologies (NREL).
- Scenario-based analysis of world biofuel markets using the ETP global energy model with data developed in the first parts of the study (BNL).

This report covers the modeling and analysis part of the project conducted by BNL in cooperation with PI.

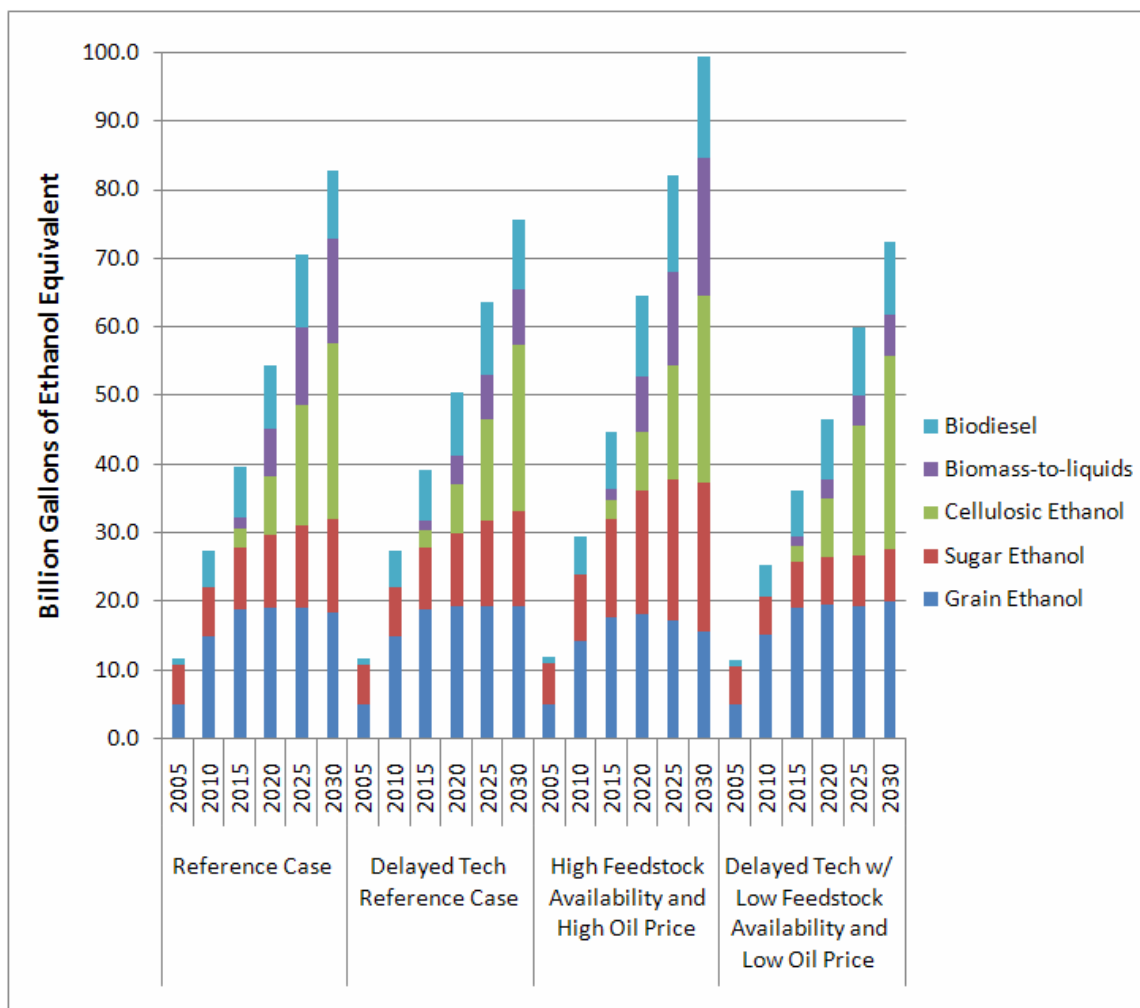
The Energy Technology Perspectives (ETP) energy system model was used as the analytical tool for this study. ETP is a 15 region global model designed using the MARKAL framework. MARKAL-based models are partial equilibrium models that incorporate a description of the physical energy system and provide a bottom-up approach to study the entire energy system. ETP was updated for this study with biomass resource data and biofuel production technology cost and performance data developed by ORNL and NREL under Tasks 1 and 2 of this project.

Many countries around the world are embarking on ambitious biofuel policies through renewable fuel standards and economic incentives. As a result, the global biofuel demand is expected to grow very rapidly over the next two decades, provided policymakers stay the course with their policy goals.

This project relied on a scenario-based analysis to study global biofuel markets. Scenarios were designed to evaluate the impact of different policy proposals and market conditions. World biofuel supply for selected scenarios is shown in Figure 1. The reference case total biofuel production increases from 12 billion gallons of ethanol equivalent in 2005 to 54 billion gallons in 2020 and 83 billion gallons in 2030. The scenarios analyzed show volumes ranging from 46 to 64 billion gallons in 2020, and from

## World Biofuels Study

about 72 to about 100 billion gallons in 2030. The highest production worldwide occurs in the scenario with high feedstock availability combined with high oil prices and more rapid improvements in cellulosic biofuel conversion technologies. The lowest global production is found in the scenario with low feedstock availability, low oil prices and slower technology progress.



**Figure 1: World biofuels supply by type**

Initially, the majority of biofuels are produced from food crops. In the longer run growth rates for grain and sugar ethanol slow down. This is mainly due to limits of feedstock availability, but also because the U.S. RFS does not mandate higher volumes of these fuels. Cellulosic biofuels quickly gain significant market share after they are introduced on a commercial scale in 2012. In the reference case cellulosic biofuels have a market share of 28% in 2020 and this grows to almost 50% by 2030.

The Renewable Fuel Standard in EISA is an ambitious policy that aims to raise biofuels supply in the U.S. to 36 billion gallons, with sub-targets for various types of biofuels. The challenge to the industry is vast and the scenarios presented here indicate that it may be



difficult to reach the mandated biofuels volumes according to the schedule set out in the bill. The shortfall ranges from 0 to 5 billion gallons in 2020 depending on the scenario.

The law creates a market place where ethanol is no longer a single commodity, but can be separated into several subsets, whose value is dependent on the feedstock from which it was produced. The ethanol itself will probably trade at one price, but the associated credits will achieve different prices in the market place and thus change the total value of the ethanol to the producers.

Developing the cellulosic resource base, building biofuel production facilities and constructing the ethanol distribution infrastructure quickly enough to meet the goals of the legislation is the main obstacle to fulfilling the RFS, rather than the underlying economics of biofuels production. The overall volume requirement of the fuel standard makes it impossible to meet by blending 10% ethanol by volume into gasoline alone. In order to distribute and sell the necessary volumes of biofuels suppliers will have to market E85, biomass-to-liquids (BTL) fuels and biodiesel as well.

Because the main constraint to cellulosic biofuel production is infrastructure development rather than the underlying economics, additional incentives such as growers' payments or an extension of the ethanol blenders' tax credit does little to increase overall biofuels supply. The blenders' tax credit would be paid to marketers for volumes already mandated by law, and as policy tool would be inefficient to encourage biofuel supply. If increasing biofuel supply is the main policy goal, a targeted subsidy or "learning investment" for cellulosic biofuels would have a larger impact and also be less expensive to implement.

In markets without biofuel mandates, the price of biofuels is determined by the price premium it can achieve over gasoline or diesel due to the subsidy regimes. Higher oil prices will therefore lead to a stronger price signal for biofuel production and consequently the high oil price scenarios show higher worldwide demand for biofuels. In markets with mandates however, demand volumes are fixed through policy and changes in price signals do not do much to raise or lower demand.

These observations are true for the U.S. The U.S. biofuel demand is not very responsive to changes in the oil price, because the buy-out from the cellulosic biofuels mandate adjusts to oil price and there are no relief-valve mechanisms for the other mandated volumes. This means that higher oil prices tend to lead to domestic production substituting for imports, because the oil price hike raises biofuel demand and thereby stronger competition in international markets.

A carbon price has a similar effect to that of a higher oil price. The carbon price can in fact be seen as a price premium on fossil fuels. A carbon policy will thus promote the production and use of biofuels worldwide. However, while higher oil prices are neutral as far as feedstock and conversion technologies are concerned, a carbon price will favor cellulosic and sugar-based biofuels production over grain-based production, because the

## World Biofuels Study

latter leads to higher carbon emission per gallon. A carbon policy will thus tend to increase the share of cellulosic and sugar ethanol at the expense of grain-derived ethanol.

## 1. BACKGROUND

In his state of the union address, President George W. Bush introduced the 20-in-10 initiative, which aims to reduce the consumption of gasoline by 20 percent over the next ten years [1]. Following this introduction, the administration sent the following two legislative proposals to Congress [2]:

- **“Increasing The Supply Of Renewable And Other Alternative Fuels By Setting A Mandatory Fuels Standard To Require The Equivalent Of 35 Billion Gallons Of Renewable And Other Alternative Fuels In 2017 – Nearly Five Times The 2012 Target Now In Law.** In 2017, this will displace 15 percent of projected annual gasoline use.”
- **“Reforming and Modernizing Corporate Average Fuel Economy (CAFE) Standards for Cars and Extending the Current Light Truck Rule.** In 2017, this will reduce projected annual gasoline use by up to 8.5 billion gallons, a further 5 percent reduction that, in combination with increasing the supply of renewable and other alternative fuels, will bring the total reduction in projected annual gasoline use to 20 percent.”

These proposals were the precursors to the “Energy Independence and Security Act of 2007” [3], signed into law on December 19<sup>th</sup> 2007. The bill differs from the 20-in-10 initiative in several aspects. The timing and targets have been changed, and the requirement is now 36 billion gallons by 2022 and there are also sub targets for advanced renewable fuels, cellulosic biofuels and biodiesel.

This report forms part of a project sponsored by the U.S Department of Energy (DOE) entitled: “World biofuels study”. The objective is to study world biofuel markets and examine the possible contribution that imported biofuels could make to help meet the new renewable fuel standard.

The project is a collaborative effort between the Biomass Program and the Office of Policy and International Affairs (PI) at the Department of Energy and Oak Ridge National Laboratory (ORNL), National Renewable Energy Laboratory (NREL) and Brookhaven National Laboratory (BNL).

The project consisted of three main components:

- Assessment of the resource potential for biofuel feedstocks such as sugarcane, grains, soybean, palm oil and lignocellulosic crops and development of supply curves (ORNL).
- Assessment of the cost and performance of biofuel production technologies (NREL)
- Scenario-based analysis of world biofuel markets using the ETP global energy model with data developed in the first parts of the study (BNL).

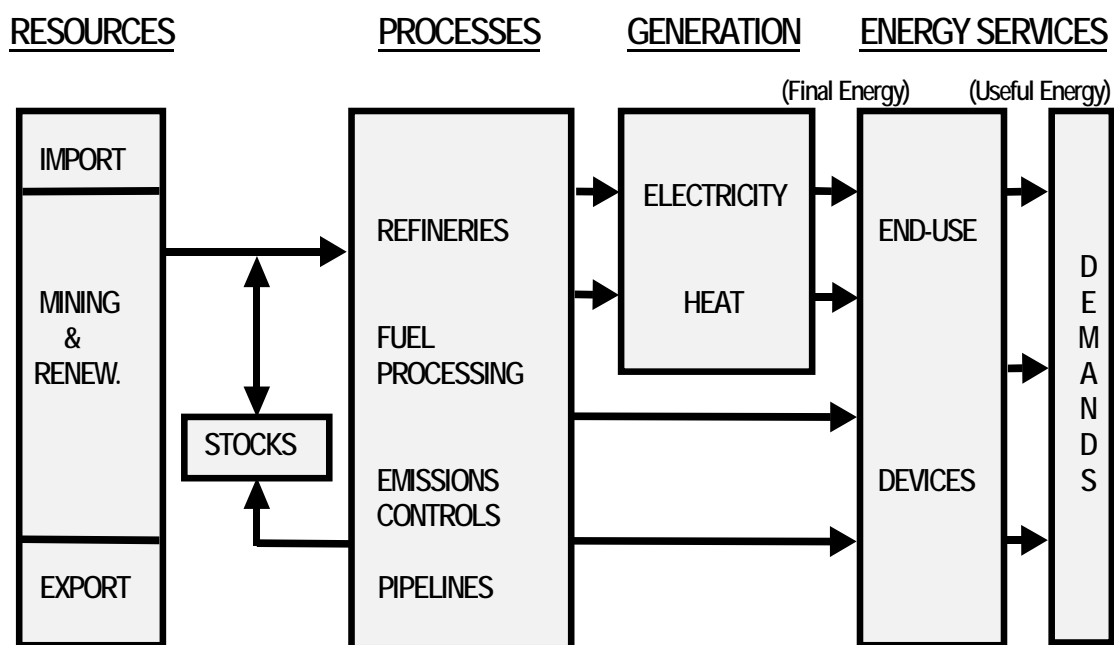
## World Biofuels Study

This report covers the modeling and analysis part of the project conducted by BNL in cooperation with PI.

## 2. METHODOLOGY

### 2.1 MARKAL and ETP

The Energy Technology Perspectives (ETP) model is the analytic tool employed for this exercise. ETP is a 15 region global model designed using the MARKet ALlocation (MARKAL) framework. MARKAL-based models are partial equilibrium models that incorporate a description of the physical energy system [4, 5]. The components of the energy system are linked together in a flow network where the technologies form the nodes which are interlinked by energy carriers. This is illustrated in Figure 2. By representing individual technologies, MARKAL provides a bottom-up approach to study the energy system. The whole energy system, from resource extraction to service demand, is included, which allows for full “well-to-wheel” comparison of technology options.



**Figure 2: Reference Energy System**

MARKAL models are generally solved as a cost minimization problem where future states of the energy system are determined by identifying the most cost-effective pattern of resource use and technology deployment over time. The MARKAL objective is thus to minimize the total cost of the system, discounted over the planning horizon. Each year, the total cost includes the following elements:

## World Biofuels Study

- *Annualized investments* in technologies;
- Fixed and variable annual *Operation and Maintenance (O&M)* costs of technologies;
- Cost of exogenous energy and material *imports* and domestic resource *production* (e.g., mining);
- Revenue from exogenous energy and material *exports*;
- Fuel and material *delivery* costs;
- *Welfare loss* resulting from reduced end-use demands.
- *Taxes* and *subsidies* associated with energy sources, technologies, and emissions.

MARKAL models are demand driven, which means that, for any feasible solution, exogenously specified energy service demands are met. The model then determines the least cost configuration of capital stock and utilization rates that will meet these demands over the full projection period. This is done while obeying a set of user-defined constraints, such as natural resource availability, technology and capital availability, environmental limitations and other constraints.

The model is dynamic, meaning that the capital stock in any period is equal to the capital stock in the preceding period plus/minus any additions or retirements. The model thus keeps track of capital stock, and the solution in one period is directly linked to the solution for other periods. Optimization is inter-temporal, which means that the optimization is performed for all periods concurrently, implicitly giving decision-makers foresight.

ETP was originally developed at the International Energy Agency for their Energy Technology Perspectives 2006 publication [6]. It consists of 15 separate regions:

- Africa
- Australia and New Zealand
- Canada
- Central and South America
- China
- Eastern Europe
- Former Soviet Union
- India
- Japan
- Mexico
- Middle East
- Other Asia
- South Korea
- United States
- Western Europe

Each of the regions listed above has a unique set of demands for all major energy services as well as energy-intensive materials such as metals, ammonia, cement, pulp and paper,

etc. Demands can be met either through internal production or through trade with other regions.

The ETP database contains representations of hundreds of different technologies covering all stages of the energy system from extraction of primary energy to end use devices. This includes information on capital stock already in place, as well as new technologies available now, or thought to be at a future date. The general approach is that all technologies can be deployed in all world regions. However to reflect “real-world” limitations, some the following additional characterizations have been made:

- Region and sector-specific constraints;
- Region and sector-specific discount rates;
- Region-specific investment costs, fixed and variable costs;
- Region-specific supply curves for fossil fuels and renewables
- Region-specific length of seasons;
- Region-specific starting years.

The ETP model resource and technology representation was expanded in key areas for this project. A new set of biomass supply curves were added for selected feedstocks and countries (see section “2.2 *Feedstock Supply Curves*” below) in place of the existing representation. Because a number of the most important potential biofuel-producing countries are located in Central and South America, new biomass supply curves were developed for individual countries in this region. These curves replace the aggregated regional representation that was used previously. This added level of resolution allows more detailed study of biofuel supply in the region and the option to study trade zones.

Technology descriptions were updated and expanded based on the analysis performed by NREL for this study [7], as described in section “2.3 *Technology Data*” below. The model representation of international trade was also updated to reflect the new biofuel infrastructure description and tariff considerations.

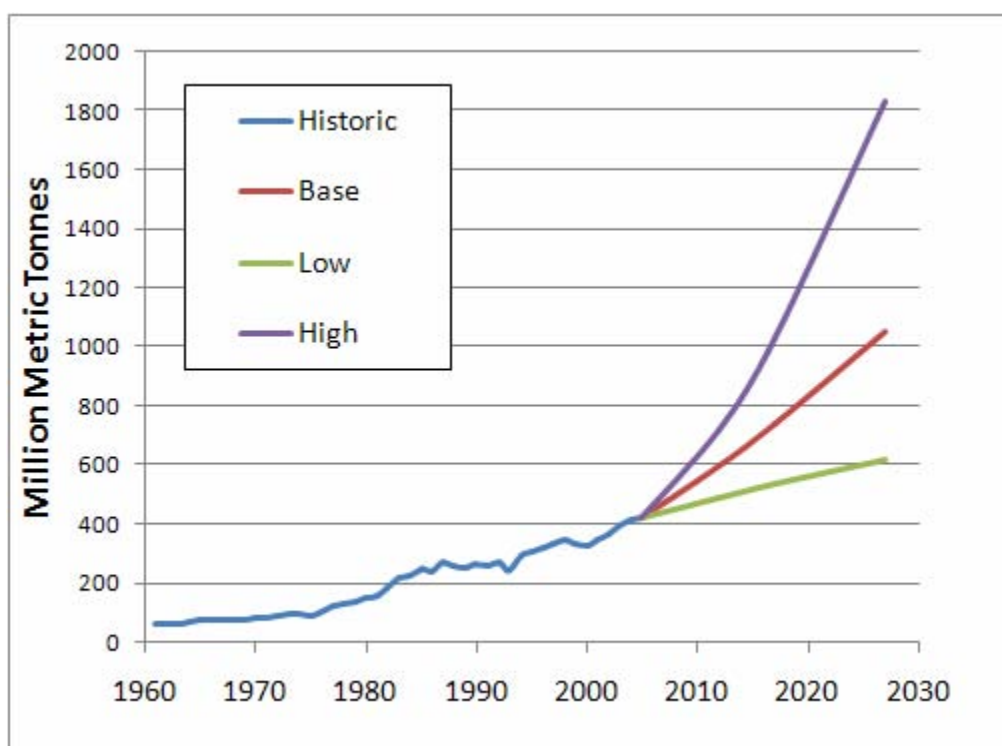
## 2.2 Feedstock Supply Curves

Supply curves describe the relationship between the price and the supplied quantity of a good or service. Through interaction with the rest of the energy system they can be used to predict the volume of feedstock that will be available for conversion to biofuels at a given price. Both volumes and prices therefore are determined endogenously in the model.

Feedstock supply curves were developed by Oak Ridge National Laboratory [8] for selected countries. A set of screening criteria were used to identify the countries that had the greatest potential to supply world markets with biofuels. As a result of the screening process, seven countries and one region were selected as areas for study.

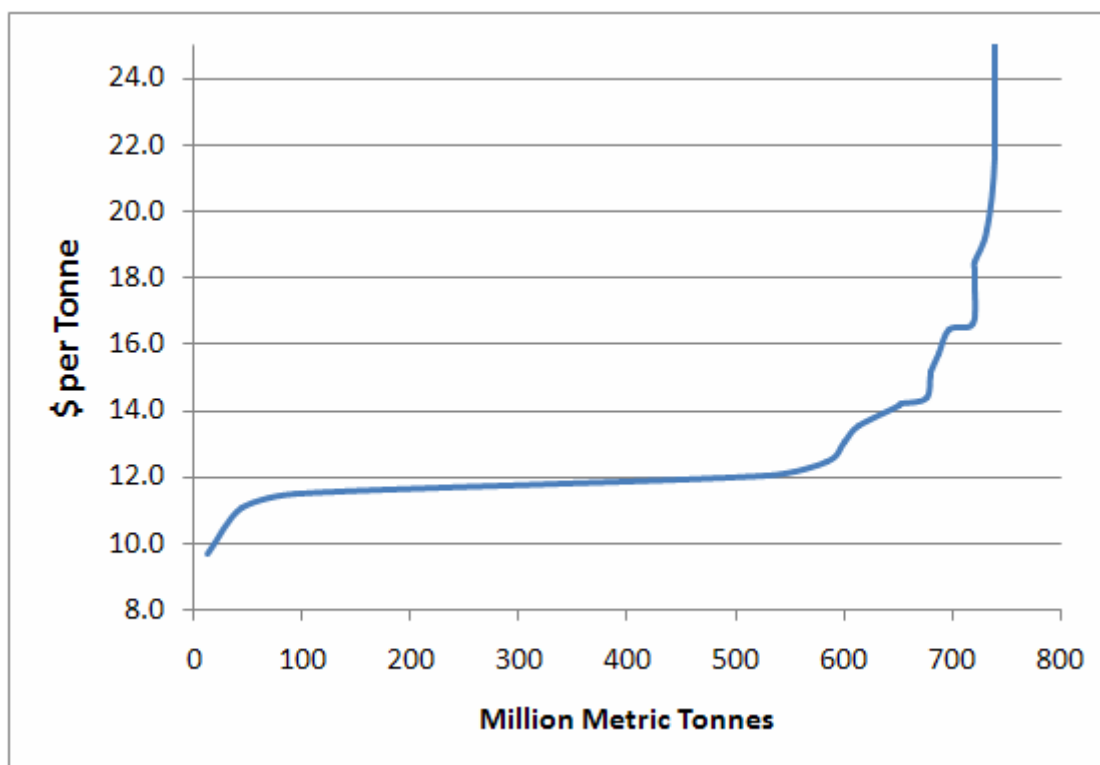
The ORNL study analyzed current trends in feedstock production and cost at the state (or province) level in each of the selected countries. Future supply potential was projected based on historical growth rates in yield and area harvested by state over the past seven years. The methodology assumes that recent growth trends for yield and harvested area at a state level will continue into the future within a set of defined parameters. In addition to reference case projections, which are derived from past growth rates, the ORNL report also includes high and low feedstock availability curves based on historical variance in year-on-year growth. This allowed sensitivity analysis of feedstock availability.

Figure 3 shows the projection of total potential sugarcane production in Brazil. The portion of that potential utilized in a given scenario depends on the market clearing price of the feedstock as illustrated by the supply curve shown in Figure 4.



**Figure 3: Projection of sugarcane availability in Brazil [8]**





**Figure 4: Brazil sugar cane supply curve for 2017 [8]**

Similar curves were developed for each of the study countries and each of the applicable feedstocks. Table 1 shows the crops and countries covered in the ORNL analysis.

**Table 1: Feedstock supply curves developed for this study [8]**

Priority Countries	Feedstocks for full supply curves 2012, 2017, 2027					Feedstocks for estimates 2017-2027		
	sugar cane	palm oil	soybean	corn	wheat	bagasse	ag residues	Other
Brazil	X		X	X		X	X	X
CBI (Caribbean Basin/C.America)	X	X				X		X
Colombia	X	X				X		X
Canada				X	X		X	X
Mexico	X			X		X	X	X
Argentina	X		X	X	X		X	X
India	X					X		X
China	X		X	X	X	X	X	X

Neither the ORNL study nor the ETP model directly incorporated the interaction with food markets in the analysis. Food demands were projected online and subtracted from the overall feedstock curves based on historical allocation and expert judgment. A summary of total world feedstock availability for the study countries as well as the percent available for export and biofuel production is shown in Table 2.

**Table 2: Summary of aggregate feedstock projections for countries studied [8]**

Feedstock/Year	Baseline		Low		High	
	Total supply	% availabl	Total supply mmt	% available	Total supply mmt	% available
<b>Feedstock Crop Supply</b>						
<b>Sugarcane</b>						
2012	1,225	47%	1,003	42%	1,508	57%
2017	1,457	48%	1,066	40%	2,030	63%
2027	1,932	51%	1,174	38%	3,353	72%
<b>Corn</b>						
2012	280	7%	241	2%	328	20%
2017	325	7%	257	2%	428	29%
2027	427	7%	290	1%	692	42%
<b>Soybeans</b>						
2012	155	65%	130	62%	188	71%
2017	202	66%	147	58%	288	76%
2027	314	67%	178	49%	652	84%
<b>Wheat</b>						
2012	153	18%	136	17%	183	32%
2017	160	19%	136	16%	208	38%
2027	176	19%	137	15%	268	47%
<b>Palm Oil</b>						
2012	2	41%	2	18%	3	53%
2017	3	41%	2	9%	5	59%
2027	7	40%	2	0%	12	66%
<b>Total Crops</b>						
2017	2,144		1,606		2,955	
2027	2,850		1,778		4,965	
<b>Cellulosic Supply</b>						
<b>Crop Residues<sup>1</sup></b>						
2017	246		182		344	
2027	326		201		569	
<b>Other Residues<sup>2</sup></b>						
2017	242		242		242	
2027	294		294		294	
<b>Total Cellulosic</b>						
2017	488		424		586	
2027	621		495		863	

<sup>1</sup> Recoverable crop residues are derived from the crop feedstock production projected in each case and country for crops listed above. Crop residues include a percentage of bagasse (the most prominent crop residue available), corn stover, wheat straw and palm oil processing wastes. See Methodology in Annex 3.

<sup>2</sup> Other residues include estimates based on forestry residues, fuelwood supplies and perennial harvests.

## 2.3 Technology Data

Technology data for biomass conversion technologies was provided by NREL in their contribution to this study [7] and used as input for ETP. Country-specific cost data was developed for a range of biofuel technologies. Data was incorporated for corn and wheat dry mills, sugar cane mills and cellulosic ethanol bio-chemical conversion plants for different plant sizes. Soy and palm oil diesel conversion technologies were also included.

The assumption for this study is that technology progress will transfer among regions, so that technology developed in one region will be available to others. However, in a report published by the UN [9], it was noted that advanced biofuel technologies tend to be developed for industrialized country applications and will be capital-intensive, labor-minimizing and designed for large scale production facilities to achieve better economics of scale. For developing countries to make best use of these technologies they will have to adapt them to local crops and to their competitive advantages. This might involve substituting abundant and cheap labor for scarce capital. Differences in climate and soil conditions might also require the adaptation of technology to local crops and conditions. For this study it has been assumed that these issues are resolved and that all regions can effectively deploy these technologies.

## 2.4 Capital Equipment Cost Curves

Another addition to the ETP model is that cost curves for capital equipment have been introduced. If the capital stock of a given technology is to expand faster than a predefined “normal” rate, a price premium has to be paid for that capital stock. This represents the added cost of outbidding competitors for labor, materials and contractors. A given technology will thus take market share from competing technologies more rapidly if it has a greater cost advantage.

These cost curves have been introduced for the various biofuel production technologies and are particularly important for the market penetration of cellulosic ethanol.

## 2.5 Existing Policies

The central policies covered in this study are the provisions enacted under the Energy Independence and Security Act (EISA) of 2007 [3]. EISA is designed to improve energy efficiency and increase the supply of renewable energy. The main provisions enacted into law can be summarized as follows:

- **Renewable Fuel Standard (RFS):** EISA mandates the use of additional renewable fuels by modifying the existing fuel standard. The standard now requires the sale of 36 billion gallons of renewable fuels per year by 2022.

- **Corporate Average Fuel Economy (CAFE):** The law sets a fuel efficiency target of 35 miles per gallon for the combined light duty vehicle fleet by the 2020 model year.
- **Appliance Energy Efficiency Standards:** The bill sets energy efficiency standards for a range of commercial and household appliances, including refrigerators, freezers and lighting.
- **Repeal of Oil and Gas Tax Incentives:** EISA repeals two tax subsidies. The revenues from these taxes are intended to cover the cost of implementing the CAFE standards.

While the CAFE provisions have been included in the analysis, the focus in this study is on the RFS and biofuel supply and demand. All scenarios are therefore designed to address this subject.

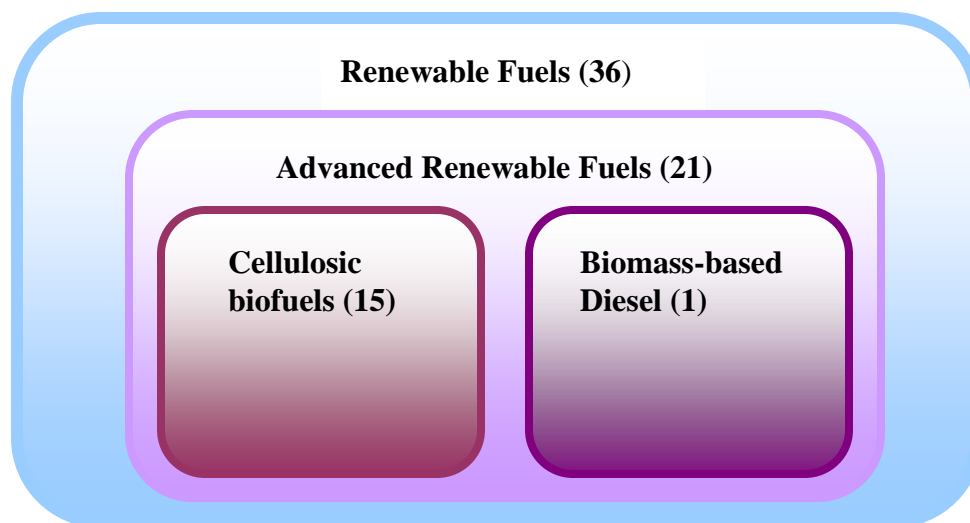
Under the RFS provision in EISA the existing standard under the Clean Air Act is revised and expanded. The main revision is the introduction of four different categories of renewable fuel. They are as follows:

- **Renewable Fuels:** fuel that is produced from renewable biomass<sup>3</sup>. Any qualifying new production plant would also have to demonstrate lifecycle greenhouse gas emissions that are at least 20% lower than the baseline lifecycle greenhouse gas emissions for gasoline.
- **Advanced Renewable Fuels:** renewable fuels other than fuels derived from corn and other starch that has lifecycle greenhouse gas emissions that are at least 50% lower than the baseline lifecycle greenhouse gas emissions for gasoline.
- **Cellulosic Biofuels:** renewable fuels derived from any cellulose, hemi-cellulose, or lignin that is derived from renewable biomass and that has lifecycle greenhouse gas emissions that are at least 60 percent less than the baseline lifecycle greenhouse gas emissions for gasoline.
- **Biomass-based Diesel:** renewable fuel that is biodiesel as defined in the Energy Policy Act of 1992 and that has lifecycle greenhouse gas emissions that are at least 50 percent less than the baseline lifecycle greenhouse gas emissions for gasoline.

The “renewable fuels” classification encompasses all fuels mandated under the law (*e.g.* all biomass-based diesel also qualifies as renewable fuel). All other categories are thus subsets of this classification. Furthermore, cellulosic biofuels and biomass-based diesel are both subsets of the advanced renewable fuels classification. This is illustrated in Figure 5, which shows the RFS structure and the mandated volumes for 2022.

---

<sup>3</sup> Renewable biomass is crops and crop residue harvested from agricultural land cleared or cultivated at any time prior to the enactment of the law. It also includes animal wastes, mill wastes, recycled cooking oil and algae.



**Figure 5: RFS structure with 2022 mandated volumes (Billion gallons)**

The standard includes individual mandated volumes for all of the different categories. These volumes increase over time and follow the schedules shown in Table 3. From 2015 onwards all increases in the overall mandated volumes are from advanced renewable fuels. The maximum volume of grain ethanol for which distributors can receive credits is thus 15 billion gallons annually. The law does not actually prevent production of corn ethanol above this volume, but the economic incentives to produce are significantly reduced if no additional credits are available.

**Table 3: Renewable Fuel Standard in billions of gallons per year [3]**

Year	Renewable Fuel	Advanced Renewable Fuel	Cellulosic Biofuels	Biomass Based Diesel
<b>2008</b>	9.00			
<b>2009</b>	11.10	0.60		0.50
<b>2010</b>	12.95	0.95	0.10	0.65
<b>2011</b>	13.95	1.35	0.25	0.80
<b>2012</b>	15.20	2.00	0.50	1.00
<b>2013</b>	16.55	2.75	1.00	1.00
<b>2014</b>	18.15	3.75	1.75	1.00
<b>2015</b>	20.50	5.50	3.00	1.00
<b>2016</b>	22.25	7.25	4.25	1.00
<b>2017</b>	24.00	9.00	5.50	1.00
<b>2018</b>	26.00	11.00	7.00	1.00
<b>2019</b>	28.00	13.00	8.50	1.00
<b>2020</b>	30.00	15.00	10.50	1.00
<b>2021</b>	33.00	18.00	13.50	1.00
<b>2022</b>	36.00	21.00	16.00	1.00

In general, compliance is required from “refineries, blenders, distributors, and importers” for each of the volumes. The final design of the regulation is the responsibility of the Environmental Protection Agency (EPA) and the exact details of implementation and enforcement are unclear pending the rulemaking due at the end of 2008. Furthermore, the EPA can issue waivers under certain circumstances, and may also sell waivers for the cellulosic biofuel mandate. The waiver price adjusts to gasoline prices and will be the maximum of \$0.25 or \$3.00 less the wholesale price of gasoline (*i.e.* if the gasoline price is \$2.50 the waiver price will be \$0.50, but if the price of gasoline is higher than \$2.75 the waiver price remains at \$0.25). Until the EPA has completed its rulemaking it remains unclear how the sale of these waivers will be conducted and under what circumstances they will be allowed. For this study we have assumed that these waivers will be available for sale in the case of a shortfall of biofuels. This then acts as a “relief valve”, which limits the potential cost of the mandate in a changing economic environment. The waiver price thus represents the price premium that cellulosic biofuels can achieve over gasoline (or diesel in the case of BTL distillates) and is thus the price signal for biofuels suppliers.

It is also worth noting that, as defined in EISA, distillates produced from a Fischer-Tropsch biomass-to-liquids process would qualify as cellulosic biofuels, not as biomass-based diesel. Only fatty acid methyl esters (FAME) would be considered biomass-based diesel.

Two existing policies that were addressed in this study are the 51 cents per gallon tax credit that currently is given for blending ethanol into gasoline and the 54 cents per gallon import tariff that is charged to producers outside the NAFTA trade zone. These two policies are considered in tandem as the main purpose of the tariff is to “cancel out” the subsidy going to foreign producers. The policies are currently due to expire in 2009 and 2010 respectively. This study examines scenarios with alternative expiration dates for these policies<sup>4</sup>.

Also, there is currently a \$1 per gallon tax credit for producers of biodiesel. This study assumes that this policy is extended.

Since this is a study of global biofuel markets, policies that are in place in other countries are also of great importance. These policies are often in the form of tariffs and exemption from fuel taxes. A list of policies considered in this study is given in Table 4.

---

<sup>4</sup> A new farm bill is currently being debated in Congress and one of the issues involved is the extension of these two policies, although the blenders’ tax credit might be reduced to 46 cents per gallon.

**Table 4: Selected world biofuel policies**

<b>Country/ region</b>	<b>Gasoline tax [\$/gal]</b>	<b>2010 Biofuel Tax exemption</b>	<b>Ethanol tariffs</b>	<b>Other modeled</b>	<b>Other not- modeled in current study</b>
Australia	1.40	100%	90 c/gal		
Canada	0.25	100%	20 c/gal		5% market share by 2010
China	0.15	100%	0		15% Market share 2015
Central and South America	0.70	50%	27 c/gal	Subsidy for hydrous ethanol and flex-fuel vehicles. Brazil blending requirement of 20-25%	
Europe	2.80	90%	90 c/gal	5.5 % market share in 2010, 10% market share in 2020	
India	1.90	0%	200%		5% market share by 2015
Japan	1.85	90%	17%	500 mill liter gasoline equivalent by 2010	
South Korea	3.02	90%	0		
USA	0.42	51 c/gal	54 c/gal	36 billion gallons of alternative fuels by 2022	

## 2.6 Potential Future Policies

A potential additional subsidy for cellulosic biofuel production was also considered because cellulosic ethanol has three important advantages over ethanol derived from grains. First, feedstocks for this form of production do not have an alternative use as food or feed. Increased production would therefore not impact food markets directly, although competition for land, labor and capital could yield indirect impacts. Second, the resource base is potentially enormous; and third, lower water and fertilizer requirements and an overall reduction in carbon emissions means that it is seen as more environmentally friendly. During the initial commercialization phase however, this technology option will most likely need additional subsidies. The technology data developed by NREL is for an “nth of a kind” plant. To bring the cellulosic biofuels technologies to the level of commercialization implied by these numbers, some form of learning investment is most likely required. Investment could come from both public and private sources. The subsidy could be in the form of production tax credits, co-funding or other support or subsidy scheme that improves the economics of cellulosic biofuel production for the investor. A production tax credit for cellulosic biofuels is being considered as part of the farm bill [10] although it is set to expire 2012. The policy considered here could be an extension of this tax credit or a different subsidy of similar magnitude.

## World Biofuels Study

Since ethanol distribution infrastructure limitations and the ability to deliver sufficient volumes of ethanol to consumers is one of the main obstacles to reaching the RFS mandate, a policy scenario where E20 (gasoline blended with 20% ethanol by volume) is certified was considered. This would alleviate some of the infrastructure concerns, but the viability of this policy is dependent on resolving issues related to the impact higher blends of ethanol will have on engines and fuel systems. Currently most car manufacturers' will only warrantee their gasoline engines if they are fuelled with ethanol blends of 10% or less.

Another potential subsidy considered in this study is a growers' payment for U.S. farmers cultivating renewable cellulosic biomass. A \$20 per dry tonne payment would be offered to farmers starting in 2010 and expires in 2022. It is not adjusted for inflation.



### **3. SCENARIO ANALYSIS**

#### **3.1 Reference Scenario**

The reference scenario forms the base against which other scenarios are compared. It is calibrated to the 2007 WEO [11] with the addition of EISA provisions and the updated reference case supply curves as developed by ORNL [8]. In this case the blenders' tax credit and ethanol import tariffs both expire in 2010.

#### **3.2 Scenario List**

A list of scenarios is given in Table 5. Each of the scenarios was run with two sets of technology assumptions. First, with the assumption corresponding to the learning investment described in the policy section above and then with technology assumptions that correspond to a scenario where there is no learning investment. There are 14 scenarios in the list, bringing the total number of cases to 28.

For the remainder of this report the reference case with learning investment will serve as the primary comparison for other scenarios and will be referred to as "reference case" for simplicity. Likewise the reference case without learning investment will be called "delayed technology reference". Scenarios building on these will follow the same naming convention (*e.g.* "Delayed technology with high oil price").

**Table 5: List of scenarios**

Scenario	Ethanol blenders' tax credit	Ethanol import tariff	Feedstock availability	Oil price	Other
Reference case	-	-	Reference	Reference	
Credit and Tariff Extension	Extended	Extended	Reference	Reference	
Credit Extension	Extended	-	Reference	Reference	
E20	-	-	Reference	Reference	E20 certified
\$20 per Tonne Growers Payment	-	-	Reference	Reference	\$20 per dry tonne of biomass feedstock
\$50 per tonne of carbon dioxide	-	-	Reference	Reference	Price of \$ 50 per tonne of CO <sub>2</sub>
70/30 fuel /food split					70% of sugarcane in Brazil avail. for biofuels
High Oil Price	-	-	Reference	High	
Low Oil Price		-	Reference	Low	
Extra High Oil Price	-	-	Reference	Extra High	
High Feedstock Availability	-	-	High	Reference	
Low Feedstock Availability	-	-	Low	Reference	
High Feedstock Availability and High Oil Price	-	-	High	High	
Low Feedstock Availability and Low Oil Price	-	-	Low	Low	

### 3.3 Carbon Prices

In the carbon scenarios, a carbon price of \$50 per metric tonne of CO<sub>2</sub> is gradually phased in. It starts at \$12.5 per tonne in 2015 and is increased by \$2.5 per tonne annually until it reaches \$50 per tonne in 2030. The carbon price applies to all sectors of the economy and to all regions. It is adjusted for inflation.

### 3.4 Oil Prices

Oil prices are determined endogenously in the model and are thus an outcome for a given model run and not an input assumption. Many factors influence the oil price including supply curves, demand, end-use efficiency and fuel switching. Another important

variable is OPEC rent-seeking, which can be manipulated in the model. This study used this rent-seeking as the market driver for oil prices. A high oil price scenario is thus a case where OPEC follows a more aggressive policy and restricts supply to world markets by demanding higher economic rent on each barrel it produces. Low oil prices conversely occur when OPEC reduces their rent-seeking and produces more crude oil for world markets.

In this study high oil prices indicate an additional \$18 per barrel economic rent sought by OPEC producers, while in the low price case it is \$18 per barrel lower. It is worth noting that this does not mean that oil prices will be exactly \$18 per barrel higher and lower respectively for these two scenarios, since non-OPEC producers will respond to price changes. There is also an extra high oil price case where OPEC rent-seeking is raised by \$43 per barrel. Oil price outcomes are shown in Figure 6.

The oil prices referred to in Figure 6 and in the rest of this report are the average U.S. imported prices of crude oil, also referred to as refiner's acquisition costs. Average import prices are generally significantly lower than the oil prices reported in the press. Reported oil prices are usually spot or future prices (*i.e.* WTI Cushing spot or NYMEX future price). These refer to reference crudes (light sweet crude oil), which are of higher quality than the average traded crude and thus receive a higher price. The latest estimates of imported contract prices available from the EIA at the time of writing (4/25/08) reports contract crude prices at \$109 per barrel [12]. This is \$10 below the WTI Cushing spot price for the same day. In its 2008 Annual Energy Outlook (AEO 2008) the EIA projects this gap to range between \$8 and \$12 per barrel over the next 20 years [13].

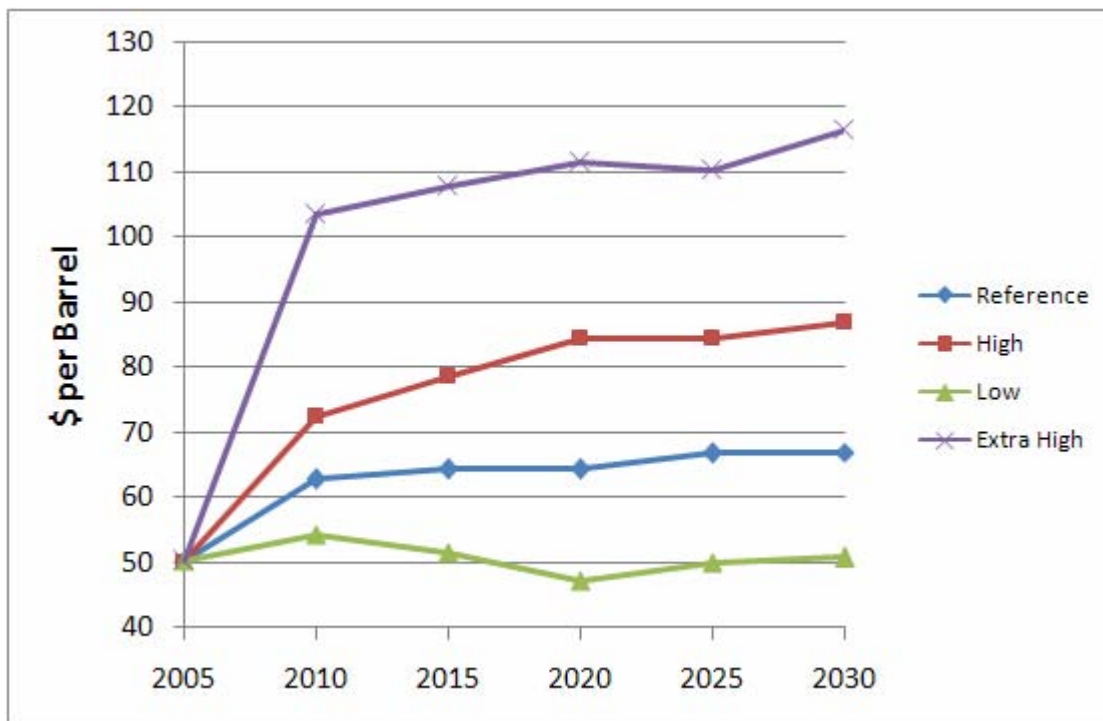


Figure 6: Oil price

## **4. RESULTS AND FINDINGS**

### **4.1 Note On Results And Findings**

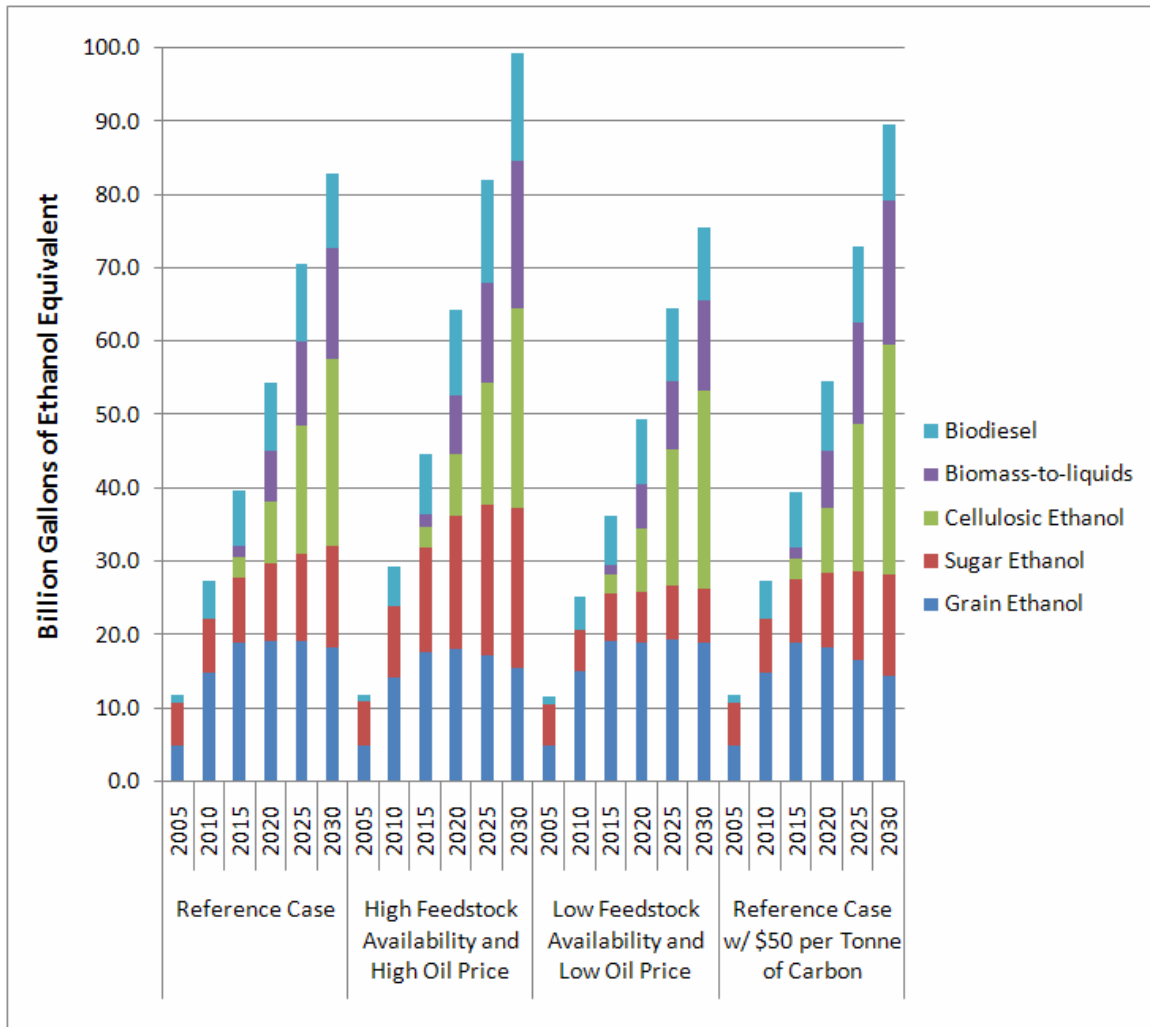
Results from this study should not be read as forecasts. There are too many uncertainties and unknowns to make accurate predictions about future production and traded volumes of biofuels. This has been an exploratory scenario analysis that is meant to inform the biofuels policy debate. It is thus intended to address the dynamics of the biofuel markets and the relative impact of policies and market uncertainties rather than forecast future biofuel supply. Numbers should not be viewed in isolation, but in the context of the study and underlying assumptions. For instance, an adjustment of supply curves would change produced volumes, but the overall dynamics of the markets and the relative impact of the various policies should not change. In this section the focus is therefore mainly on these issues rather than on absolute numbers. That said; every effort has been made to ensure that the reported volumes are as reasonable as possible. Furthermore, the overall spread of outcomes from the analysis probably gives a fair estimate of the range of import volumes that are feasible in the medium term. This caveat is meant to emphasize the inherent uncertainty in this type of forward-looking exercise and encourage the reader not to attach too great importance to individual values, but rather view them in context of the overall range of results.

### **4.2 Results**

This section covers the results of the scenario analysis. A total of 28 scenarios were analyzed. To limit the page count and ensure readability, only selected data have been included here. Data tables for each of the scenarios can be found in Appendix A for readers who wish to access the full results.

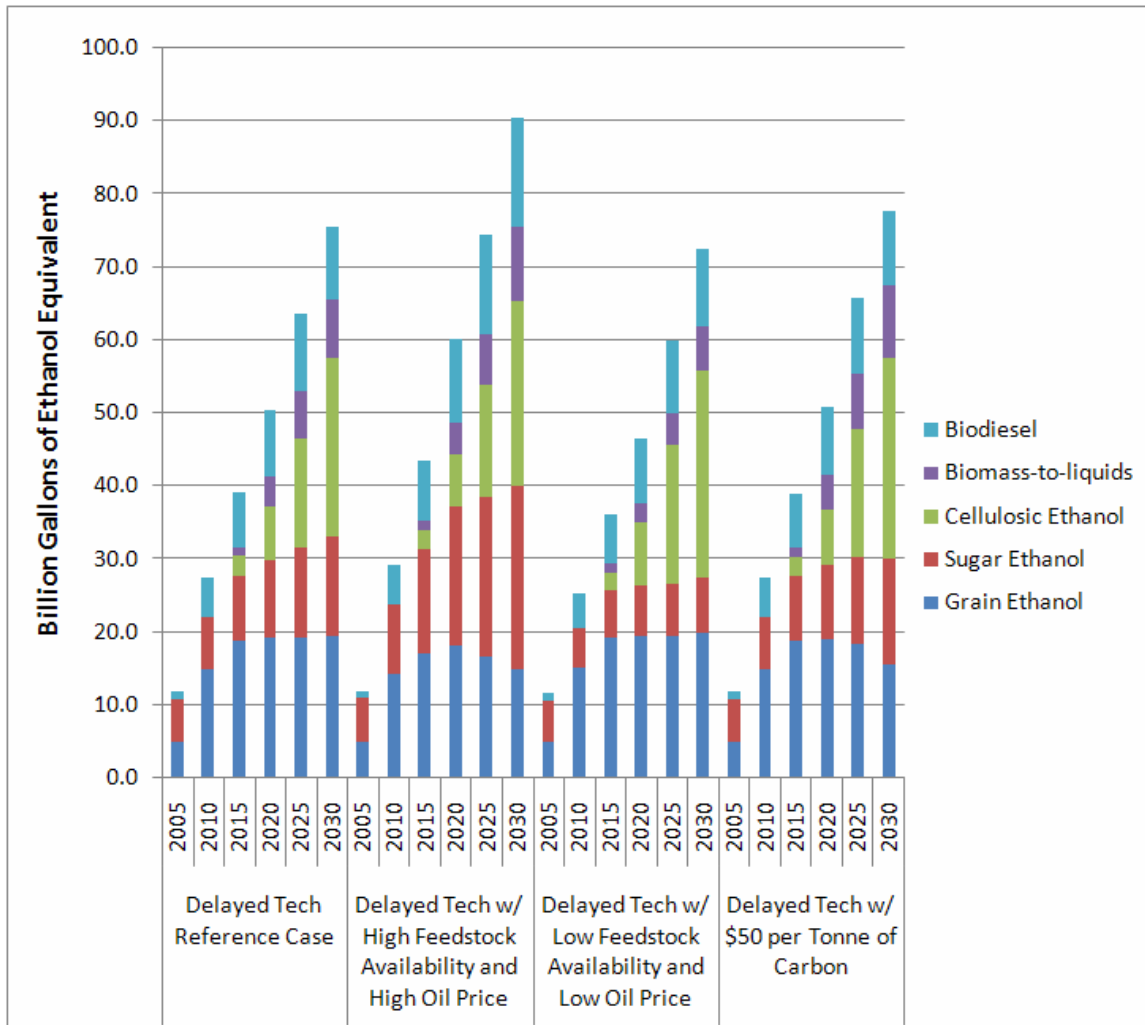
World biofuel supply for selected scenarios is shown in Figure 7 and Figure 8. The reference case total biofuel production increases from 12 billion gallons of ethanol equivalent in 2005 to 54 billion gallons 2020 and 83 billion gallons in 2030. The scenarios analyzed showed volumes ranging from 46 to 64 billion gallons in 2020 and from about 72 to about 100 billion gallons in 2030. The highest production worldwide occurs in the scenario with high feedstock availability combined with high oil prices and more rapid improvements in cellulosic biofuel conversion technologies. The lowest global production is found in the scenario with low feedstock availability, low oil prices and slower technology progress.

## World Biofuels Study



**Figure 7: World biofuels supply by type for reference technology cases**

Initially, the majority of biofuels are produced from food crops. In the longer run, growth rates for grain and sugar ethanol slow down. This is mainly due to limits on feedstock availability, but also because the U.S. RFS does not mandate higher volumes for these fuels. Cellulosic biofuels quickly gain significant market share after they are introduced on a commercial scale in 2012. In the reference case cellulosic biofuels have a market share of 28% in 2020 and this grows to almost 50% by 2030.



**Figure 8: World biofuels supply by type for delayed technology cases**

The feedstock availability mainly impacts sugar ethanol and biodiesel production, as can be seen by comparing the high and low feedstock cases to the reference case. This is because grain ethanol is not competitive outside the U.S. and cellulosic expansion is not constrained by the overall resource availability under any scenario.<sup>5</sup> Again it is worth noting that the scenarios exploring sensitivity to feedstock availability only adjust the supply curves for the countries covered in the feedstock assessment part of this study. Worldwide sugar ethanol production in the reference case is about 11 billion gallons in 2020, while in the high feedstock growth case this rises to 18 billion gallons and in the low growth case it is as low as 7 billion gallons. The majority of sugar cane ethanol is produced in Brazil, which maintains a market share of more than 80% in all years for all scenarios. There is some feedback to grain ethanol production, as it is displaced when more cheap sugar ethanol is supplied to world markets.

<sup>5</sup> Here feedstock availability refers to the physical presence of biomass resources in the region. Availability at conversion plants depends on the ability to harvest, collect and transport the feedstocks and this is treated as an infrastructure constraint in this study.

Cellulosic biofuel production is more dependent on technology cost and limits to infrastructure roll-out than feedstock availability, as can be seen by comparing Figure 7 and Figure 8. Cellulosic ethanol production remains virtually unchanged by the shifts to high and low feedstock availability. It is in fact slightly higher for the low feedstock cases because of reduced competition from sugar ethanol. However, by comparing with the corresponding cases for delayed technology assumptions instead, a clear change can be seen. World biofuel production is more than 35% higher with reference case technology assumptions as compared to the delayed technology case. This is an indication that feedstock availability is not the constraining factor for cellulosic ethanol production, but rather infrastructure constraints and competition from cheaper sources of biofuel.

Another reason for the lack of response to changes in feedstock supply is the fact that a large share of the overall cellulosic biofuel potential is in countries not covered by the feedstock analysis part of this study. Thus, the cumulative global shift in supply curves is smaller between scenarios for cellulosic feedstocks than for sugar cane or oil seeds, where a much larger share of total supply is from the studied countries (see Table 6). This is partly because cellulosic feedstocks are more evenly distributed geographically and because the country screening process mainly focused on potential for first generation biofuels (see Section 2.2 *Feedstock Supply Curves*).

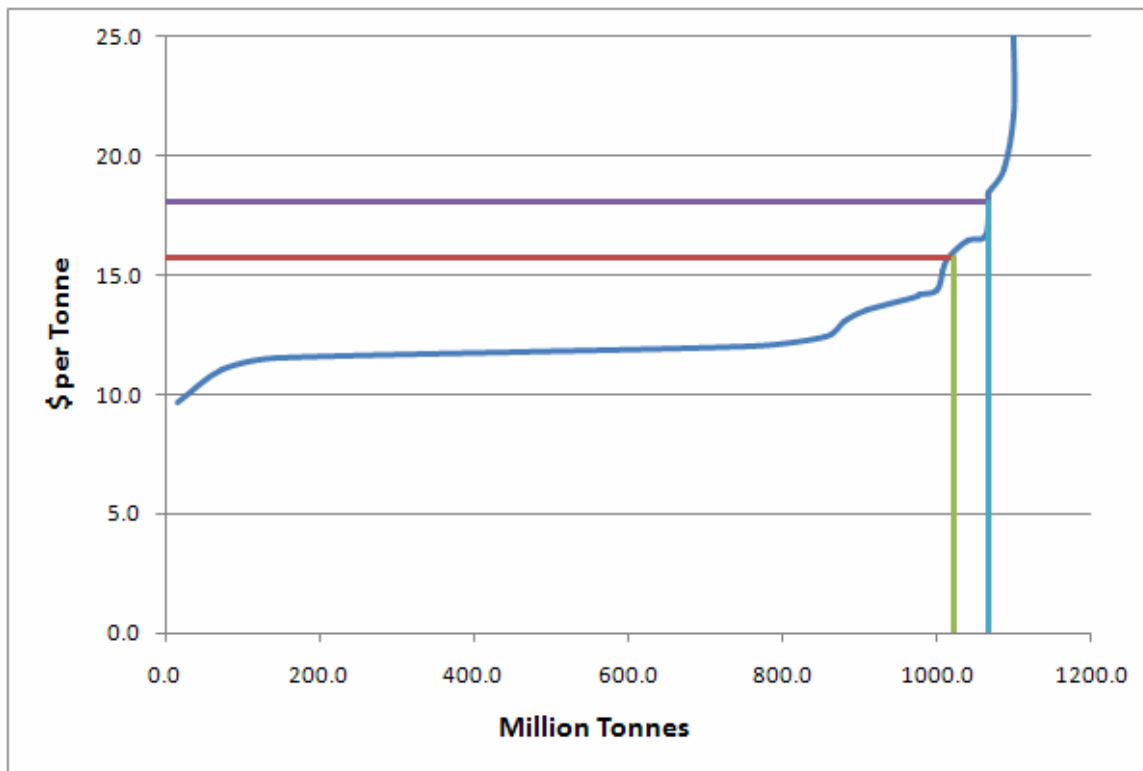
**Table 6: Share of world (non-U.S.) production of crop feedstocks represented by the assessed countries [8]**

Feedstock	Countries Assessed in Present Study	2006 Output (mmt)	Share*
Sugarcane	Argentina, Brazil, China, Colombia, India, Mexico, CBI	999	73%
Soybeans	Argentina, Brazil, China	108	81%
Corn	Argentina, Brazil, China, Canada Mexico	234	55%
Wheat	Argentina, Canada, China	146	27%
Palm Oil	Colombia, CBI	1.3	3%

The introduction of carbon prices raises overall biofuel production. Total biofuel supply is 7 billion gallons higher in 2030 after the introduction of a carbon price for the reference technology set. The increase in cellulosic biofuel supply is higher at 11 billion gallons, while grain ethanol production drops about 4 billion gallons. There is also a small increase in sugar ethanol production.

This result is perhaps counterintuitive since the resulting price signal from a carbon value is about the same for sugar ethanol and cellulosic biofuels, and because grain ethanol should still receive a positive price signal. The reason for the low response in sugar ethanol production has to do with the shape of the supply curves. Sugar is the cheapest source of ethanol and supply is mainly constrained by feedstock availability.

Figure 9 shows the sugar cane supply curve for Brazil in 2030 in million metric tonnes produced at a given price per tonne. The carbon price results in a significant increase in the feedstock market price from \$15.7 to \$18.1 per tonne for the reference case. However, since most of the ethanol is economic at prices below \$15.7 we are at the inelastic part of the supply curve where response to price signals is relatively small. As a result the increase in production is quite limited from 1,020 to 1,067 million tonnes. The same argument explains why other price signals, such as higher oil prices, also have a limited impact on sugar ethanol production and why an outward shift in the supply curve (the high feedstock growth case) has a much larger impact.



**Figure 9: Effect of carbon price on Brazilian sugarcane supply in 2030**

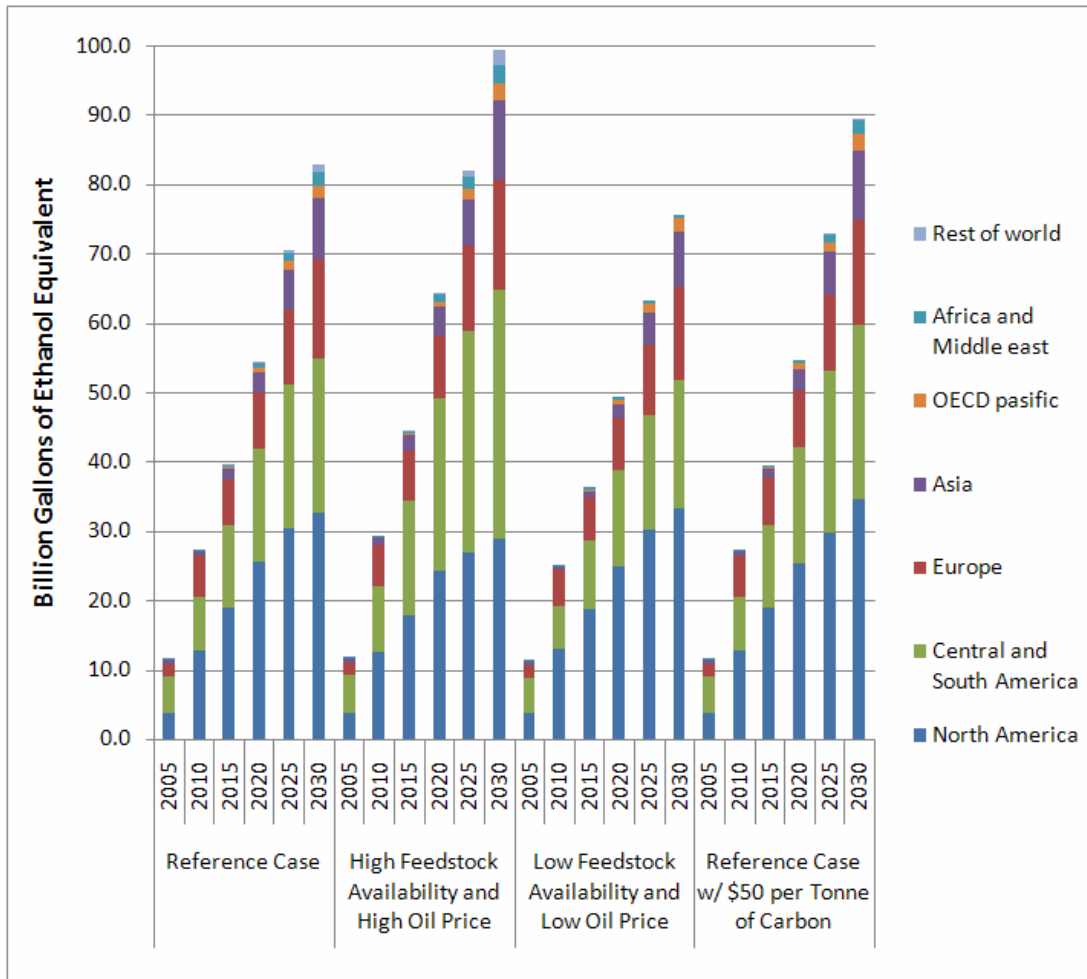
The reason why grain ethanol production is going down in spite of stronger price signals has to do with the limits on overall ethanol sales. U.S. and Europe, the biggest markets, are driven by mandates. The carbon price is not sufficient to encourage demand beyond the mandated levels and there is thus competition in a market of a fixed size. Since the economics of cellulosic biofuels relative to grain ethanol improves, the former takes market share from the latter.

In the no learning investment cases overall biofuel production is lower. For the reference case assumptions it is down 4 billion gallons in 2020 and more than 7 billion gallons in 2030 compared to the scenario with learning investment. The drop is entirely in cellulosic biofuels, and is partially offset by a small increase in production of other biofuels.



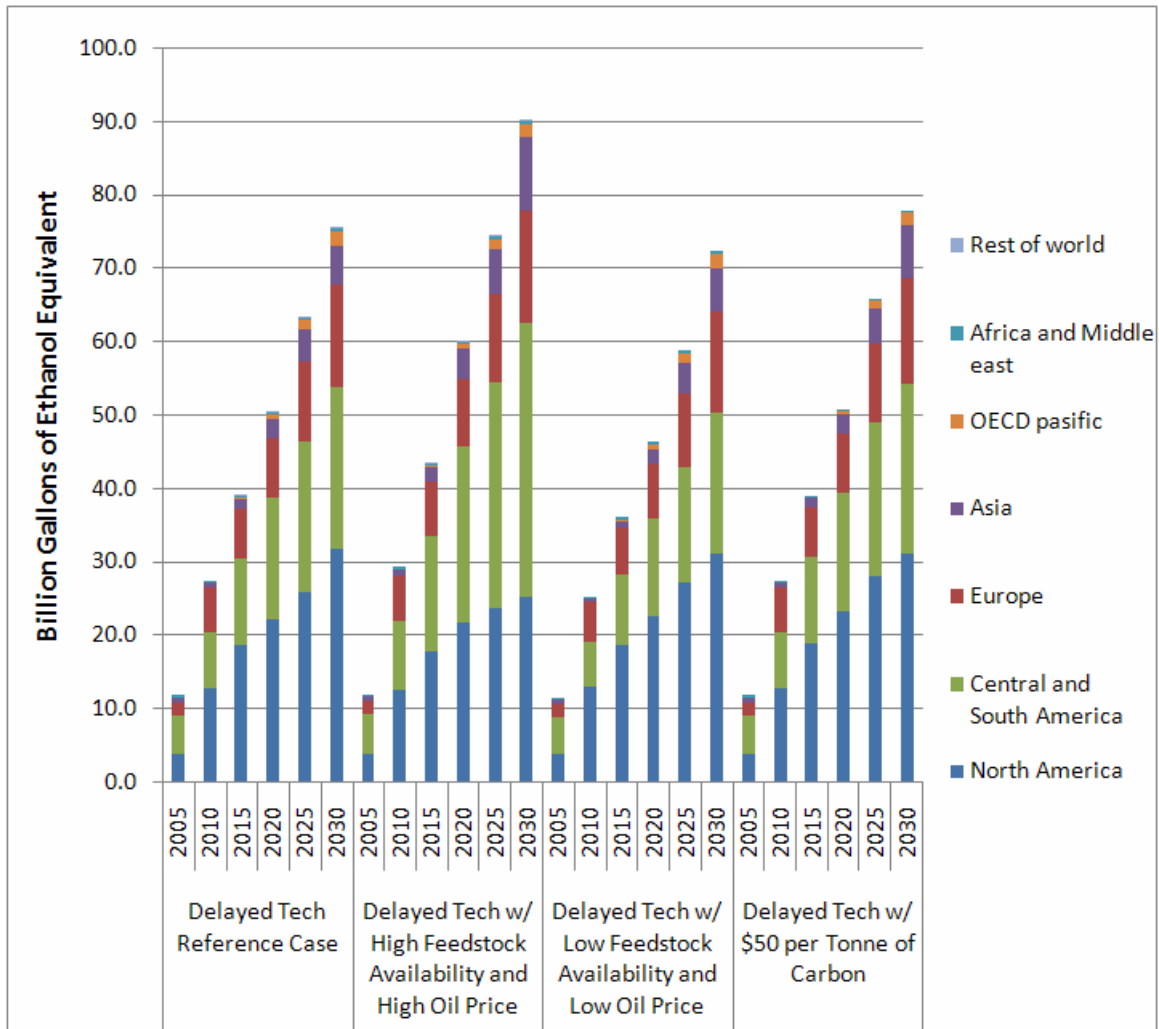
## World Biofuels Study

World biofuels production is dominated by North (primarily U.S.) and South (primarily Brazil) America, with significant contribution from Europe and Asia, as can be seen in Figure 10 and Figure 11. In the reference case, the U.S. share of total biofuel production grows to over 45% in 2015, but then drops gradually to about 35% in 2030. In the high feedstock case the share drops to 25% in the same year. Delayed technology development does not significantly alter the market shares for the different regions.

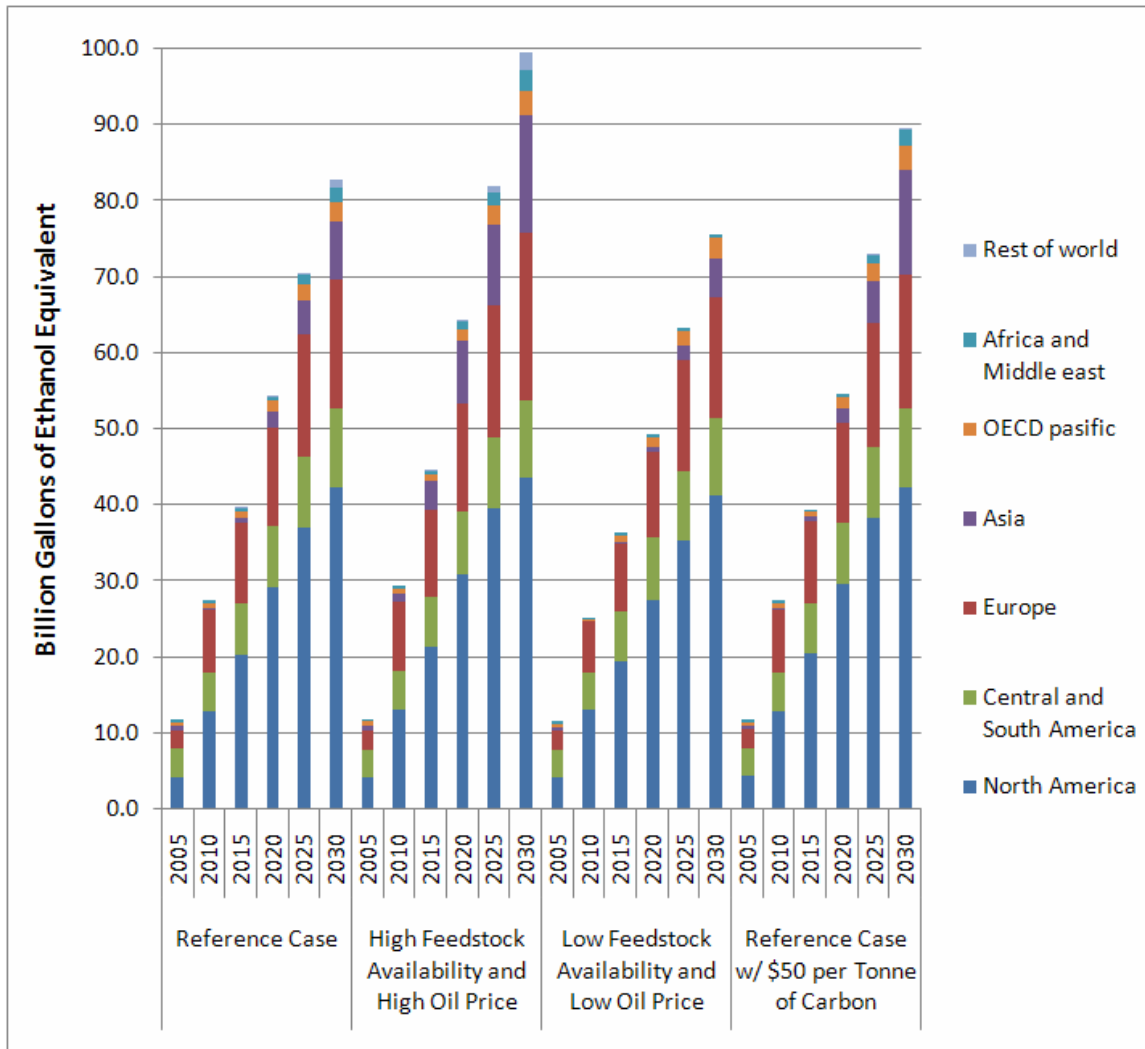


**Figure 10: World biofuel supply by producing region for the reference technology cases**

## World Biofuels Study



**Figure 11: World biofuel supply by producing region for the delayed technology cases**

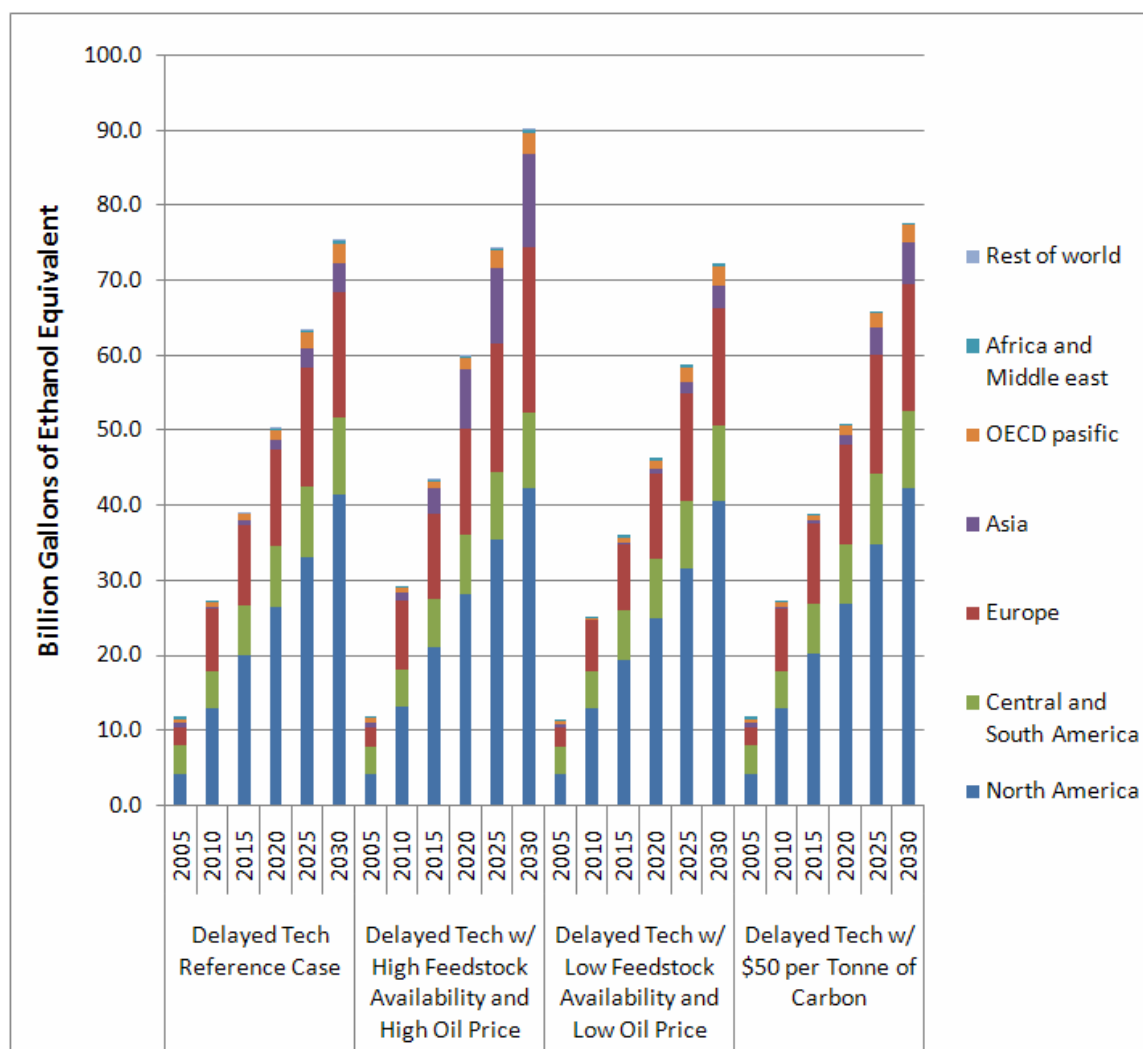


**Figure 12: World biofuel demand by region for the reference technology cases**

Figure 13 show biofuel demand by region. The U.S. is the biggest market for biofuels and it attracts around 50% of total supply for all years in the reference case. Europe and Brazil also attract large quantities of biofuels to satisfy their fuel standards. These three markets all have biofuel mandates, so overall demand changes little between scenarios, although there are some differences in U.S. demand since waivers can be purchased. The majority of the variation between scenarios is thus occurring in regions that have incentives, but not mandates, such as Asia and Central and South America (other than Brazil).

By comparing the supply side charts (Figure 10 and Figure 11) with the demand side it is possible to develop a view of trade flows. A total of 10 billion gallons of biofuels is traded among regions in 2020 and this grows to 15 billion gallons by 2030. For the high feedstock growth case, these trade flows are significantly higher at 15 and 26 billion gallons, respectively.

Most of the traded ethanol originates in Central and South America, which exports 8 billion gallons of biofuels in 2020 and 12 billion gallons in 2030. The U.S. and Europe are the major importers.



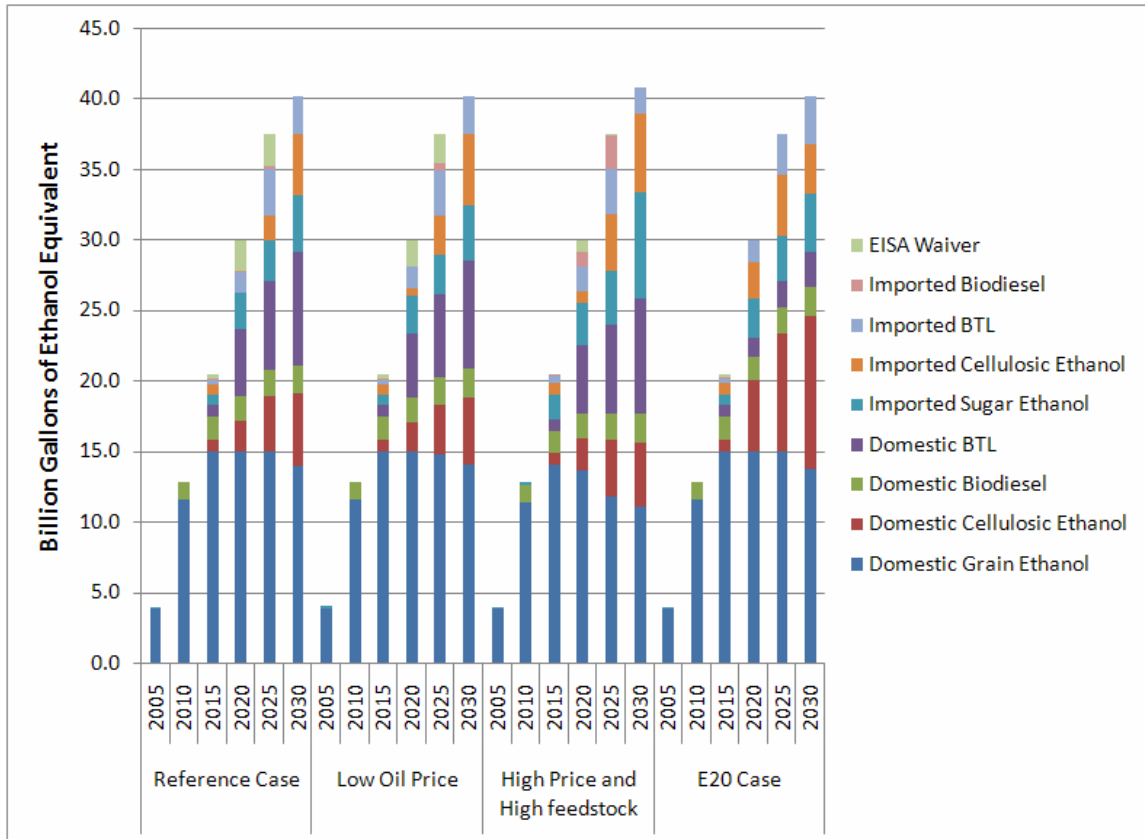
**Figure 13: World biofuel demand by region for the delayed technology cases**

The delayed technology assumptions do not have a major impact on global trade flows because the exporting nations tend to drop domestic consumption in order to keep regions with mandates supplied. Since fuel supply is scarcer, prices go up, lowering demand in regions without mandates, while demand in regions with mandates stay roughly the same.

Figure 14 and Figure 15 show biofuel supply to the U.S. This supply is not sufficient to meet the cellulosic biofuel mandates in the early years of the RFS. As a result waivers are purchased to cover the shortfall. Total biofuel supply in the reference case is 27.8 billion gallons in 2020 of ethanol equivalent of which about 4.3 billion gallons are imported. A little less than 20 billion gallons of this is ethanol, while the remainder is BTL fuels

## World Biofuels Study

(6.1 billion gallons) and biodiesel (1.9 billion gallons). Since the total RFS requirement for this year is 30 Billion gallons the waiver requirement is 2.2 billion gallons.



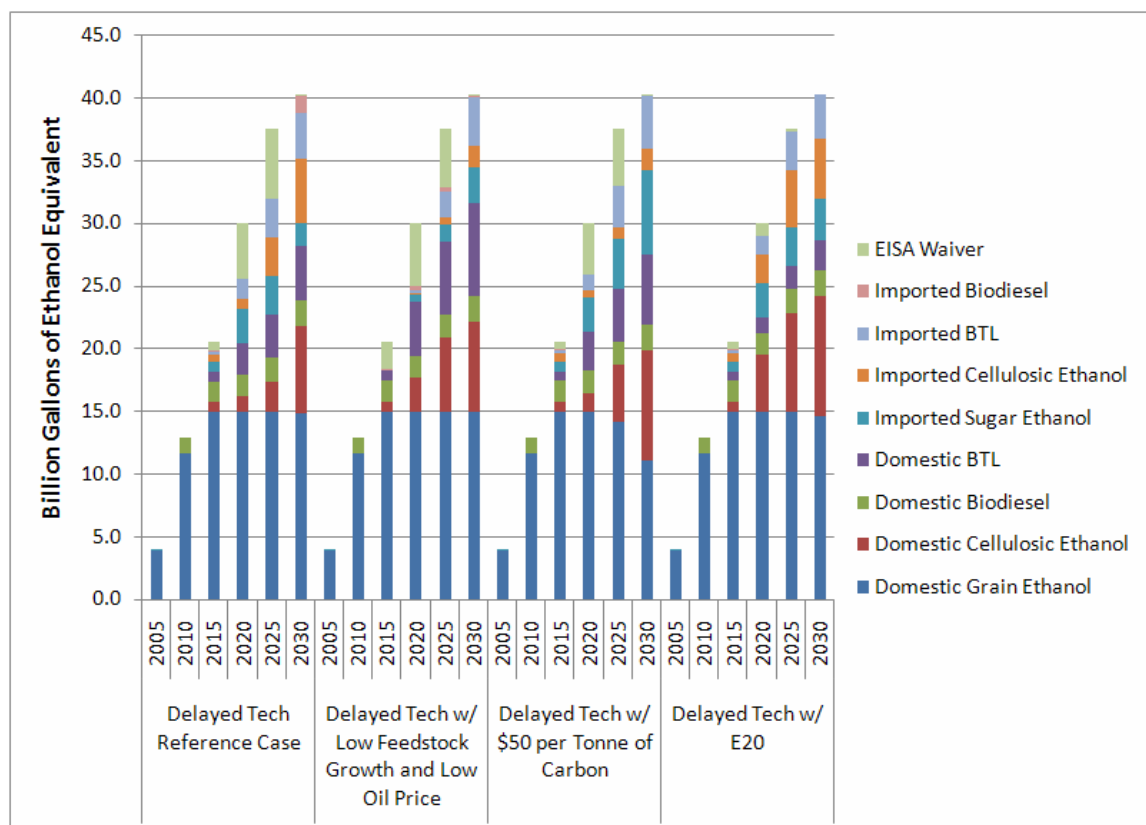
**Figure 14: US biofuel supply for the reference technology cases**

Allowing E20 greatly increases the share of ethanol and displaces BTL. In the reference case ethanol distribution is restricted by infrastructure constraints and the inability to deliver sufficient volumes of ethanol as E85. This brings BTL into the market to fill the RFS gap. Distributing and selling ethanol as E20 alleviates these restrictions allowing more ethanol to penetrate the market. In fact, the E20 case is the only scenario where the mandate is met in 2020 and as a consequence some BTL is displaced. This is discussed further in the “biofuel market dynamics” section below.

In scenarios where there is abundant sugar ethanol available in the world market, significant volumes of U.S. domestic grain ethanol production are displaced. In these cases the advanced renewable fuels mandate is exceeded and the additional sugar ethanol demand is not driven by the RFS but by price. Extension of the ethanol blenders’ tax credit or other domestic subsidy would protect domestic producers from this foreign competition, but come at a significant cost to the treasury.

The biodiesel requirement of the RFS is met in all scenarios in all time periods and supply also increases beyond the mandated volumes to help meet the overall advanced

biofuels target. This happens in scenarios where sugar ethanol is in short supply and higher prices justify larger imports of biodiesel.



**Figure 15: US biofuel supply for the delayed technology cases**

The delayed technology cases show a significant reduction in cellulosic biofuel supply, with the majority of the drop in domestic BTL production. In the reference case local production of BTL fuels drop from 4.7 to 2.5 billion gallons, while imports drop only marginally. Additional waivers are needed to cover the reduction in overall supply and the requirement under the delayed tech reference is 4.4 billion gallons.

### 4.3 Biofuel Market Dynamics

The market adoption of biofuels worldwide is driven by a combination of mandates and economic incentives. If a mandate is in place the price will rise until supply is sufficient to meet it. Assuming that the targets set are achievable, there is no volumetric risk in this case, but there can be considerable risks associated with the cost of compliance. This cost risk can be mitigated through some form of relief-valve mechanism, but this would reintroduce volume risk. In a market where biofuels demand is driven by economic incentives (e.g., tax breaks, direct subsidies) the price of these fuels are determined by the price premium they can realize over gasoline or diesel due to the subsidy regimes. The cost risks are therefore reduced, but there is significant volume risk. Another way of

describing this would be to say that under a mandate regime, prices adjust to volumes, while under a subsidy regime, volumes adjust to prices. In a region where both types of incentives are present the volumes will be determined by the mandates, while the main impact of subsidies will be to reduce prices for the consumer or increase profits for producers.

In a global market place, where some regions have mandates while others only have subsidies, these dynamics affect how biofuels are allocated among markets. Regions with mandates are willing to take the price risks and therefore tend to carve out a fixed share for themselves, regardless of what happens elsewhere<sup>6</sup>. These markets would therefore tend to be served “first”. The regions that rely purely on policy induced price incentives will compete for whatever is available after all mandates have been met. Producers will sell their product in the market where they realize the highest net-back. The ethanol will thus tend to flow to the markets where price signals are the strongest, net of transport costs and tariffs. As long as there are unmet mandates this will limit the amount of ethanol going to countries without these fixed volumetric targets.

The EISA RFS creates a market place where ethanol is no longer a single commodity, but can be separated into several subsets whose value is dependent on the feedstock from which it was produced. The ethanol itself will probably trade at one price, but the associated credits will achieve different prices in the market place and thus change the total value of the ethanol. There are essentially four different types of ethanol under this regulation; ethanol that qualifies as renewable fuel (e.g., grain ethanol), ethanol that qualifies as advanced renewable fuel (e.g., sugar ethanol), ethanol that qualifies as cellulosic biofuels (e.g., cellulosic ethanol) and ethanol that doesn’t qualify for any of the credits. It is thus perfectly possible, and in fact highly probable, that the market value (price plus credit value) for each of the types of ethanol will be different. Credit prices are generally determined by the market and will reach the level required to ensure sufficient supply, but for cellulosic ethanol (and other qualifying cellulosic biofuels) the credit value is equal to the waiver price as long as the mandate remains unmet.

The general dynamics of the biofuel markets as represented in this modeling exercise can best be understood by separating it into two stages; before the U.S. mandate is met, and after the mandate is met. Before the mandate is met all production is complementary in the sense that increased production in one part of the world does not come at the expense of production in another. There is little competition among ethanol producers, and ethanol prices are set by the price premium it can realize over gasoline due to the subsidy regimes. Any producer able to deliver ethanol to the market at this price will therefore do so.

After the mandate in the U.S. has been met however, biofuel markets become a lot more competitive and prices fall. At this stage (sometime between 2020 and 2030 in most scenarios), most of the subsidies in the rest of the world has been phased out. Producers

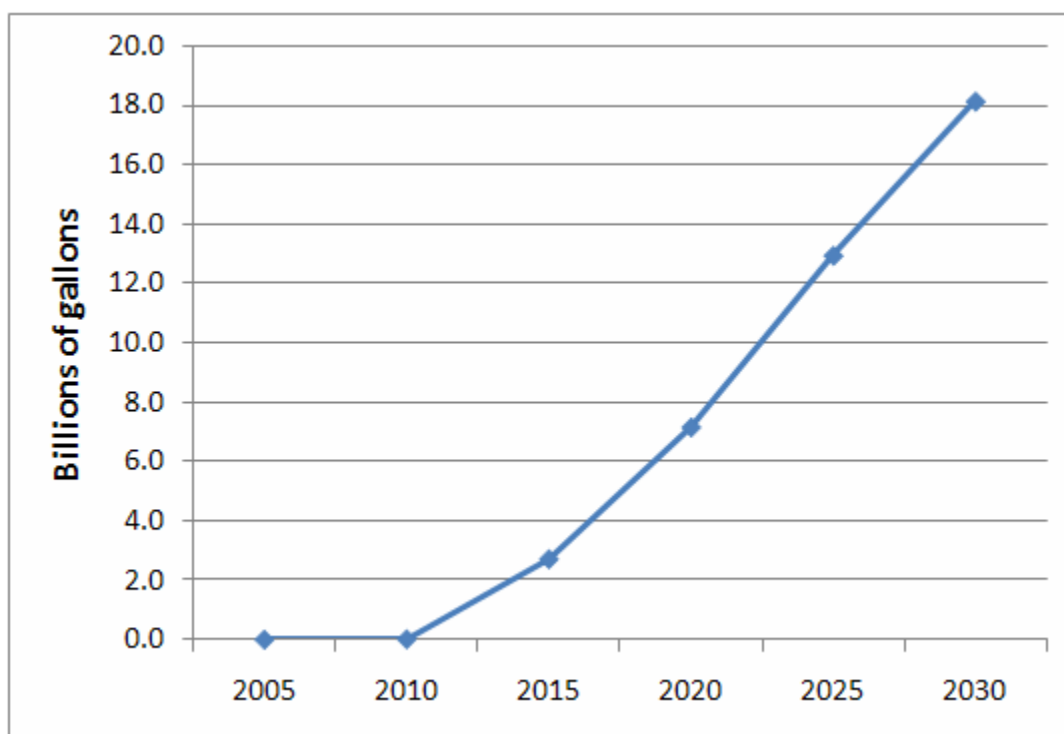
---

<sup>6</sup> This is how the ETP model behaves; strictly enforcing mandates. In the real world lawmakers and regulators would likely issue waiver, adjust the regulations or otherwise accommodate markets if the mandates are deemed to have unacceptable adverse impacts.

are in more direct competition, and increased production in one region leads to decreased production elsewhere. This can for instance be seen by comparing the high feedstock case to the reference case and see how domestic production changes little in the early years, but significant amounts are displaced by cheap imports in 2025 and 2030.

Another way to view this situation is to see the early years as a “sellers market” with high prices, where importers, unable to meet domestic biofuel targets, are competing for the fuel available on the open market. In the latter years the market is more balanced, prices fall and producers have to compete for market share.

Meeting the biofuel targets not only requires the production of sufficient volumes of fuel, but also that the infrastructure to bring this fuel to customers is in place, and that these consumers actually purchase it. The biofuels mandate in 2022 is 36 billion gallons of ethanol, roughly equivalent to 24 billion gallons of gasoline. In 2022 our projected gasoline demand is 139 billion gallons, so it is not feasible to meet the mandate by selling E10 alone. To sell more ethanol, retailers will be forced to market it as E85 (E85 sales in the reference case are shown in Figure 16). However, sale of E85 requires a dedicated infrastructure.



**Figure 16: E85 sales in the reference case**

Since the responsibility for meeting the mandate under the legislation lies with the “refineries, blenders, distributors, and importers,” it falls on these entities to ensure that consumers actually purchase the fuel. This poses both infrastructure and marketing challenges. In order to sell the fuel to customers, there needs to be an underlying infrastructure to deliver it to them at fuelling stations. Not only is an expansion of the

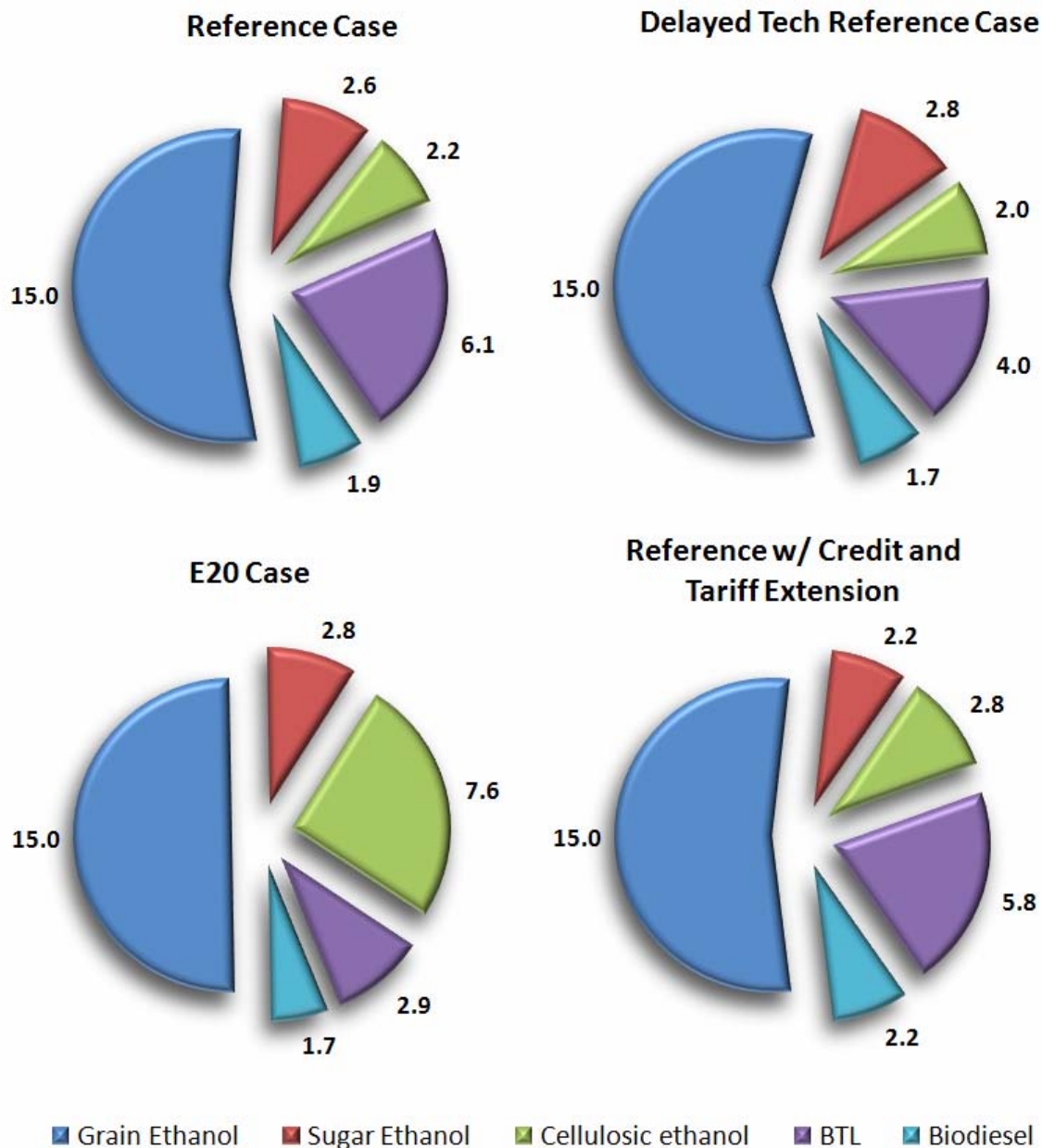


distribution and fuelling station infrastructure needed to deliver sufficient volumes of E85 to customers, but there also must be enough flex-fuel vehicles on the road to use it. Approximately 1200 out of almost 170,000 fuelling stations in the U.S. sell E85 currently [14]. There are about 6.5 million flex-fuel vehicles on the road [15], but few of these actually run on E85.

Another point is that consumers not only have to drive a flex-fuel vehicle and be filling up at a station where E85 is available; they also need to be willing to buy the fuel. E85 currently trades at a premium to gasoline when adjusted for the loss in fuel efficiency due to the lower energy content for a given volume of fuel. Assuming that the bulk of consumers will buy the fuel that lets them travel at the lowest cost, this means that some form of additional incentive needs to be in place to encourage the adoption of E85. This is likely to require a cross subsidy. The ETP model optimizes across the value chain and thus assumes that the constraint (RFS) placed upon the distributors is efficiently translated into prices at the pump. The problems associated with how to structure the incentives has thus been assumed away.

Instead of supplying E85, marketers can meet the mandates by distributing Fischer-Tropsch liquids derived from renewable biomass. These BTL fuels can be distributed in together with petroleum-based fuels in the existing infrastructure and can be used by the current fleet of light duty vehicles and trucks. Consequently, BTL fuels do not suffer from the same infrastructure constraints as E85. Based on the technology assumptions used for this study, cellulosic ethanol production is cheaper per unit of energy than Fischer-Tropsch diesel for a given feedstock price. The suppliers (as represented in the model) will therefore prefer to meet the mandates with ethanol supply as long as it can be distributed at reasonably low costs. As the sales of E85 increase, the cost of distribution goes up as the ability to expand the infrastructure and sell E85 is limited. Above a certain volume of ethanol sales, the production cost advantage is negated by the distribution cost escalation, and additional biofuel supply will then tend to be in the form of BTL distillates.

This effect can be seen by comparing the reference case, the delayed technology case and the credit extension case to the E20 case (see Figure 17). There is little variation in overall ethanol sales in the three cases with E10 as the maximum blend. Additional incentives, in the form of more rapid technology development or blenders' tax credit, have little impact. Since there are no substitutes for grain and sugar ethanol for the renewable and advanced renewable biofuel targets, the ethanol distribution constraints function as a cap on the amount of cellulosic ethanol that can be sold. Additional incentives for cellulosic biofuels will thus tend to lead to increased BTL supply. By allowing E20 to be sold to consumers, the infrastructure constraints are significantly reduced and more ethanol can be supplied to markets. This not only leads to an increase in cellulosic ethanol, but also a decrease in BTL fuels.

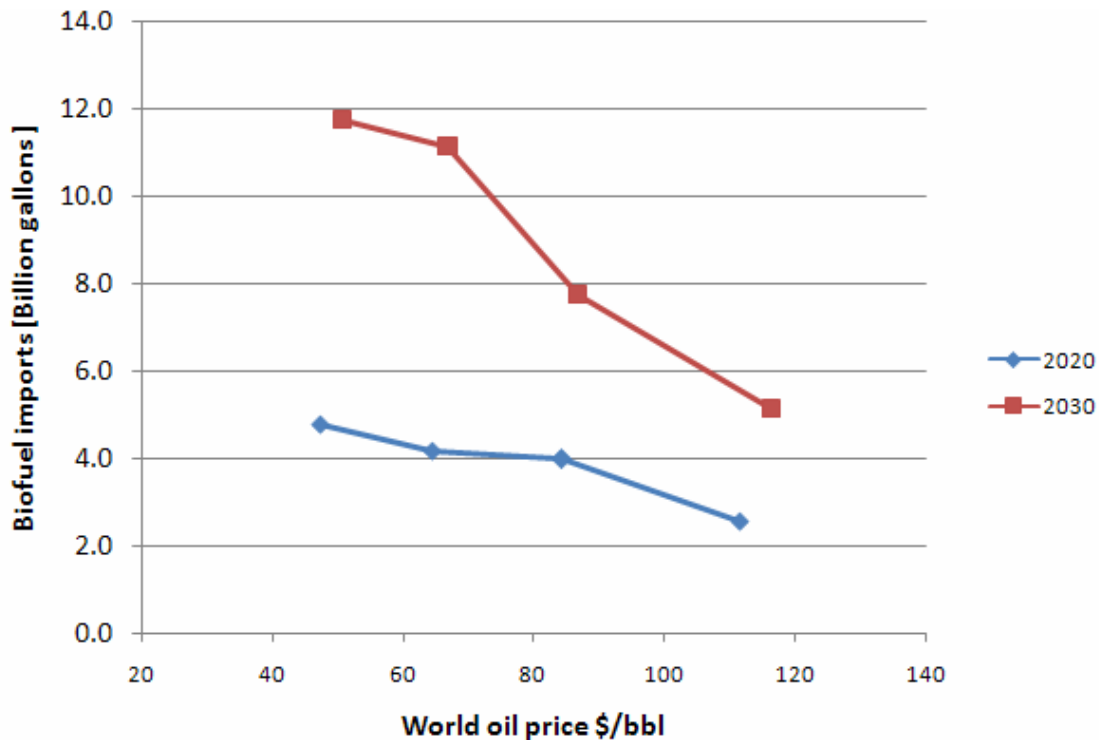


**Figure 17: Biofuels sales with E10 vs. E20**

Because the buy-out from the cellulosic biofuels mandate adjusts to oil price and there are no relief-valve mechanisms for the other mandated volumes, U.S. biofuel demand is not very responsive changes in the oil price. The law removes the risk of falling oil prices to suppliers since the credit price will adjust to keep price incentives at levels that are thought to be sufficient to ensure supply. Conversely, credit prices are reduced in the event of rising oil prices to make sure that the industry is not taxed needlessly in an environment where price incentives for biofuel supply are already adequate. The impact of this is that price signal for US renewable fuel suppliers does not change much from the baseline to the high and low oil price scenarios.

While biofuel demand in the U.S. is relatively independent of oil prices, this is not the case in countries that use price incentives rather than mandates. In these regions biofuel prices are determined by premium the subsidy regime allows them to achieve over petroleum fuels. Lower oil prices therefore mean lower biofuel prices, which leads to reduced incentives to supply these markets. With lower prices and less biofuel going to international markets the cost of importing biofuels into the U.S. drops and volumes go up. Conversely, higher oil prices mean higher demand internationally, more competition for supply and therefore higher prices and lower volumes imported into the U.S. This dynamic has two significant impacts. The first is the perhaps counterintuitive outcome that increasing oil prices lead to reduced biofuel demand in the U.S. This effect is marginal, but might have been more pronounced if it wasn't for the constraints on ethanol sales described earlier. The second is that it changes the balance of imports and domestic production.

Figure 18 shows that higher oil prices lead to reduced imports and thereby higher domestic production. The reverse would be true for falling oil prices. This relationship is consistent with the price impacts described above. This pattern changes if wholesale gasoline prices rise above \$2.75, at which point the credit price decouples from the gasoline price and is held constant at \$0.25. Oil prices above this level will increase biofuel demand in the US.



**Figure 18: Oil price impact on biofuel imports**

Critical to these outcomes is the assumption that producers believe that U.S. lawmakers will stick to this arrangement even if oil prices stay low for an extended period of time. The growth rates in biofuel production seen in these scenarios require strong confidence among investors that biofuel markets will expand and remain strong. Any doubt in the willingness of the U.S. and other governments to stay the course with their biofuel policies will likely lead to under-investment.

The RFS in itself is such a strong policy that additional incentives such as growers' payments or an extension of the ethanol blenders' tax credit does little to increase overall biofuels supply. The ability to develop the cellulosic resource base, build cellulosic biofuel production facilities, and construction of ethanol distribution infrastructure fast enough is the main constraint rather than the underlying economics. The exact limitation on how quickly the infrastructure can be rolled out is uncertain, and this is an issue that needs attention. The main impact of the credit extension is thus to bring in more domestic production at the expense of imports. Towards the end of the period, when growth rates are lower and infrastructure rollout is less of a concern, it also tends to bring in more cellulosic ethanol in place of BTL fuels. Furthermore, as more subsidies are introduced in the same scenario diminishing returns to the cost of the policy will be seen.

The relative strength of the carbon value policy as a price signal compared to other policies change over time. The blenders' tax credit and growers payment are both nominal values (*i.e.* they stay at a given dollar price and are not adjusted for inflation) and therefore decrease in real terms over time. However, the carbon price increases over time and is also assumed to be in real dollars (*i.e.*, inflation adjusted). This means that this policy strengthens over time.

Countries in the NAFTA trade-zone such as Mexico and the Caribbean nations currently have preferential access to U.S. markets through import waivers. Producers in these countries can realize higher net-backs to the U.S. than other exporting regions do for a given domestic ethanol price. The favored market for ethanol from these countries is therefore the U.S. and they tend to be the "first" exporters serving U.S. importers. An interesting consequence of this is that extending the current tariff and blenders' tax credit policies will lead to an increase in U.S. imports from these countries. This is because the blenders' tax credit will serve as an additional incentive to producers, while the tariff normally intended to cancel out the benefits of the tax credit to foreign producers does not apply to imports from NAFTA member countries.

India and China are both potentially huge markets for biofuels, but neither import much in most of the scenarios presented here. In the case of India this is mainly due to the very high import tariffs charged for imports of fuel ethanol into the country. Currently they are importing ethanol as a chemical feedstock, but we have assumed that this can be supplied by local producers when the internal infrastructure expands, which it will have to do if current ethanol blending targets are to be met. India thus produces significant amounts of ethanol for domestic consumption, but does not import any. China does not currently have any strong economic incentives for ethanol imports. Fuel tax exemptions do not provide strong encouragement because the taxes themselves are so low. Like India, China

relies mainly on domestic production in these scenarios. Any change in policy to help meet their ambitious targets might alter this.

## **4.4 Sensitivity and Uncertainty**

The model results are relatively sensitive to some of the key assumptions. One of the most important ones is the cost at which ethanol can be produced from cellulosic feedstocks. At the conversion costs reported in the NREL study [7], cellulosic ethanol is highly competitive and penetrates the market very rapidly. If this low production cost cannot be achieved, or if it can only be achieved at a later point in time, this will have dramatic effects on overall biofuel production. This uncertainty is captured in the delayed technology scenarios. There is also great uncertainty in the rate at which cellulosic ethanol can gain market share even if these low production costs are achieved. The available historical data is insufficient to determine appropriate market penetration rates for this technology at different ethanol prices.

Assumptions regarding the biofuels policies in Europe are also important, especially in early years. Europe attracts a large share of imports in early years, because of high subsidies. The assumption here is that when the E.U. goal under current policy (10% by 2020) is met, the subsidy is no longer available and any additional ethanol is available for the rest of the world. This assumes that Europeans are willing to pay these subsidies even if a large share of their supply comes from abroad. It also assumes that infrastructure to accommodate these imports is put in place as well as clear customs regulation. If these conditions are not met, considerable amounts of additional biofuels (1 to 2 billion gallons) could be available to U.S. markets.

Another note on the European subsidy regimes is that they are generally in the form of tax exemptions. If biofuels achieve substantial market shares (which they do in all scenarios) this leads to a considerable loss of revenue. To make up for this loss, the tax exemptions either need to be phased out as they are currently in the model (although not necessarily at the same rate), or European governments will have to find an alternative source of revenue to pay for roads. There is a lot of uncertainty regarding these subsidy provisions as they generally expire after a few years and there is no great clarity as to what will replace them. A faster phase-out than what has been assumed here is a distinct possibility which could significantly impact trade flows.

Another issue regarding the representation of Western Europe in the model is that it is modeled as a single region. While the region has a range of various fuel taxes and exemption levels it is represented as a single market with one average fuel tax and one tax exemption level in the ETP model. This means that the model exhibits some “knife-edge” behavior, in which U.S. importers are either competitive against the all European importers or not. In reality they could be competitive against some of the European markets, but not others.

Carbon emissions related to biofuel feedstock production is also a contentious issue. Emissions from land use changes and from diesel combustion in farm equipment, water pumping and production of fertilizer all erode the carbon benefits of biofuels. Different methodologies for estimating life cycle emissions produce different results. Most appear to arrive at estimates that show modest to significant emission benefits [16-18]. The net carbon loss of land conversion needs to be considered and is one of the greatest sources of debate and uncertainty. Soils and plant biomass are the two largest biologically active stores of terrestrial carbon and hold about 2.7 times more carbon than the atmosphere. If land is cleared to allow for cultivation of food or energy crops, the carbon contained in the standing biomass and some of the carbon stored in the soil will be released to the atmosphere. A “carbon debt” is thus incurred when native ecosystems are converted to cropland. This carbon debt is the difference between the amount of carbon stored in standing biomass and soil before land clearing and that of the crop grown in its place. The actual carbon debt is thus highly dependent on the type of ecosystem that is being cleared and the crop that replaces it.

One study [19] produced estimates for this pay-back. The actual pay-back will vary between scenarios, but even under their most optimistic assumptions it was over 30 years for corn, and under their base assumptions it was well over 100 years.

Another study on the issue [20] points out that the pay-back is highly dependent on what type of land is being converted and the type of crop is grown in its place. Their results indicate that clearing tropical or peatland rainforest to grow palm oil or soybean incur large carbon debts with paybacks of several hundred years, while using abandoned or marginal cropland to grow prairie grasses incurs little to no carbon debt.

While EISA and European legislators have tried to address these issues by requiring that only previously cultivated lands qualify for the fuel mandates, this will only deal with direct impacts. Under EISA the producer has to demonstrate that the feedstock comes from land that was cleared or under cultivation before the enactment of the law, but this does not necessarily cover secondary impacts. If pastureland is converted to sugarcane or energy cropland these crops might qualify as “renewable biomass” under the act even if this leads to conversion of forestland to pasture to accommodate the displaced livestock. How secondary impacts will be captured depends on the final rulemaking by the EPA. The emission factors used for this study, from widely referenced studies, are shown in Table 7.

**Table 7: Change in lifecycle GHG emissions per mile traveled by replacing gasoline or diesel with biofuels**

<b>Feedstock</b>	<b>Change from gasoline or diesel</b>
Sugar	-81% [18]
Maize	-25% [21]
Cellulose	-73% [21]
Wheat	-47% [16]
Soy bean	-78% [22]

Reducing or removing tariffs and other barriers to international trade of biofuels would yield several benefits. Most importantly, it will allow the most cost-effective producers to expand production and more easily market their products abroad. This should reduce the overall cost of supplying biofuels to markets. It should also limit the political pressure to maintain subsidies provided these also benefit imported biofuels. A well established international trade network would also lessen the impact of bad harvests. If supply falls short in one year, countries with mandates can shop for biofuels in international markets. Risks are thus shared among a larger number of participants.

### **4.5 Conclusions**

Many countries around the world are embarking on ambitious biofuel policies through renewable fuel standards and economic incentives. As a result, the global biofuel demand is expected to grow very rapidly over the next two decades, provided policymakers stay the course with their policy goals. In the reference case presented here, total biofuel production increases more than fivefold from 11 billion gallons in 2005 to 58 billion gallons in 2030. The infrastructure challenges are daunting, will require considerable investment, and will test the innovation systems in countries with nascent biofuel industries. The ability to transfer technology and trade in biofuels is essential to meeting the future demands.

Sugar-based ethanol is the cheapest source of biofuels and its production is mainly constrained by the availability of feedstock, which can be seen by the significant increases in production for scenarios where feedstock availability is high. Grain-based ethanol is hampered by high feedstock prices and competition with food markets, which leads to declining volumes in the long term. Cellulosic biofuels hold great promise if the necessary technology advances are made and these fuels can be produced at competitive prices. The potential for global cellulosic biomass production is sufficient to ensure that the resource base is not a constraining factor in the medium term, although the ability to bring the biomass to markets might limit the access to these resources.

The results from the ETP global model show biofuel production dominated by the U.S., Brazil and Europe. Combined they supply more than 90% of all biofuels in early years, although this decreases over time to about 80% in 2030. The majority of biofuel production is in the form of ethanol throughout the period. Sugar-based ethanol slowly loses market share as resource limitation prevents growth at the average rate of the industry.

Biofuel demand is dominated by the same regions, but the South American countries are surplus producers, and supply most of the internationally traded biofuels. In the reference case, the region exports 8 billion gallons of biofuels in 2020 and 12 billion gallons in 2030. The bulk of these volumes are sold to the U.S. and Europe, who are the largest importers.

The ESIA RFS is an ambitious policy that will raise biofuels supply in the U.S. to 36 billion gallons. The challenge to the industry is vast and the scenarios presented here indicate that it may be difficult to reach the goal according to the schedule set out in the bill. Developing the cellulosic resource base, building cellulosic biofuel production facilities and constructing the ethanol distribution infrastructure fast enough is the main obstacle to meeting the RFS. In the scenarios presented here, the shortfalls range from 0 to 5 billion gallons in 2020.

The law creates a marketplace where ethanol is no longer a single commodity, but can be separated into several subsets, whose value is dependent on the feedstock from which it was produced. The ethanol itself will probably trade at one price, but the associated credits will achieve different prices in the market place and thus change the total value of the ethanol to the producer.

Because the main constraint to cellulosic biofuel production is infrastructure development rather than the underlying economics, additional incentives such as growers' payments or an extension of the ethanol blenders' tax credit does little to increase overall biofuels supply. The blenders' tax credit would be paid to marketers for volumes already mandated by law and as policy tool would be inefficient to encourage biofuel supply. If increasing biofuel supply is the main policy goal, a targeted subsidy or "learning investment" for cellulosic biofuels would have a larger impact and also be cheaper to implement.

In markets without biofuel mandates, the price of biofuels is determined by the price premium it can achieve over gasoline or diesel due to the subsidy regimes. Higher oil prices will therefore lead to a stronger price signal for biofuel production and consequently the high oil price scenarios show higher worldwide demand for biofuels. In markets with mandates however, demand volumes are fixed through policy and changes in price signals do not do much to raise or lower demand.

This is also true in the U.S. The U.S. biofuel demand is not very responsive to changes in the oil price, because the buy-out from the cellulosic biofuels mandate adjusts to oil price and there are no relief-valve mechanisms for the other mandated volumes. This means that higher oil prices tend to lead to domestic production substituting for imports, because the oil price hike raises biofuel demand and thereby stronger competition in international markets.

A carbon price has a similar effect to that of a higher oil price. The carbon price can in fact be seen as a price premium on fossil fuels. A carbon policy will thus promote the production and use of biofuels worldwide. However, while higher oil prices are neutral as far as feedstock and conversion technologies are concerned, a carbon price will favor cellulosic and sugar-based biofuels production over grain-based production, which has higher carbon emission per gallon. A carbon policy will thus tend to increase the share of cellulosic and sugar ethanol at the expense of grain-derived ethanol.



## 4.6 Possible Next Steps

There are several ways in which the current study can be expanded and enhanced in subsequent work. The competition between food and fuel markets for the crops was not fully integrated into the analysis, since neither the feedstock assessment nor the ETP energy model directly incorporate competing uses. Presently food demand is not explicitly modeled and the share of product used for food has been subtracted from the supply curves based on historical trends and expert judgment. The remainder, which is currently being exported or already going to biofuels, is considered available for biofuel production. See [8] for more details on this methodology. An approach that better captures market feedbacks and the food vs. fuel tradeoff would augment the analysis

Competition for agricultural land has only been addressed indirectly through the data input development. If it was fully integrated into the analysis the ETP model would better capture the market impacts of shifts in agricultural production from one crop to another. These dynamics could be incorporated either through a more elaborate methodology for developing the input data or by including a land use model in ETP. Both of these would both be major undertakings and most likely very time consuming and resource intensive. Availability of good underlying data would probably be a major obstacle to both approaches as well.

Detailed feedstock assessments could be developed for more countries and regions. Currently there is a lack of interaction with potential biofuel producers, and this probably leads to an underestimate of the potential for global production and international trade of biofuels.

Greenhouse gas emissions and climate policy are becoming increasingly important issues and there is a vocal debate over the real GHG emissions impact of biofuel use. Emissions related to land use changes will vary greatly between regions and crops. For this study, standardized average emission factors for feedstock production based on the available literature were used, and these regional differences were therefore not reflected. More detailed region-specific emission factors, developed under a consistent methodology, can be incorporated into the ETP model and used for future analysis of carbon policies.

Currently the link between oil prices and the cost of feedstock is not directly captured. A rise in oil prices will increase the cost of crop production. By separating the fuel requirements and related cost from other production costs the oil price feedback can be integrated into the ETP model.

With more time and resources it would also be possible to more closely examine infrastructure constraints, as well as political, institutional and regulatory barriers to the production, transport, import and export of biofuels.

## 5. REFERENCES

1. President George W. Bush, *State of the Union Address*. 2007: Washington DC.
2. White House, T. *Twenty In Ten: Strengthening America's Energy Security*. 2007 <http://www.whitehouse.gov/stateoftheunion/2007/initiatives/energy.html>.
3. US Congress, *Energy Security and Independence Act of 2007*, P.L. 110-140, H.R. 6, 2007.
4. Fishbone L, A.H.E.R., *A linear programming model for energy systems analysis: technical description of the BNL version*. Energy Res 1981. **5**: p. 369–79
5. Hamilton LD, G.G., Lee JC, Manne AS, Marcuse W, Morris SC, Wene C-O, *MARKAL-MACRO: An overview*. 1992, Brookhaven National Laboratory: Upton, NY, USA.
6. IEA, *Energy Technology Perspectives*. 2006, IEA: Paris, France.
7. NREL, *World Biofuels Assessment, Worldwide Biomass Potential: Technology Characterizations*. 2007, NREL: Golden, Colorado.
8. ORNL, *Biofuel feedstock assessment for selected countries*. 2007, Oak Ridge National Laboratory.
9. Larson, E.D., *Biofuel production technologies: status, prospects and implications for trade and development*. 2008, United Nations Conference on Trade and Development.
10. US Congress, *Food and Energy Security Act of 2007*, H.R. 2419, 2007.
11. IEA, *2007 World Energy Outlook*. 2007, International Energy Agency: Paris, France.
12. EIA. *This week in Petroleum*. 2008 [cited 6 May 2008].
13. EIA, *Annual Energy Outlook 2008*. 2008, Energy Information Administration: Washington DC.
14. National Ethanol Vehicle Coalition. *E85 Fuel stations*. 2008 [cited 8 May 2008]; Available from: <http://e85vehicles.com/e85-stations.htm>.
15. EIA, *Annual Energy Outlook 2007*. 2007, Energy Information Administration: Washington DC. p. 136.
16. Armstrong, A.P., J. Baro, J. Dartoy, A.P. Groves, J. Nikkonen, D.J. Rickeard, N.D. Thompson, J-F Larivé, *Energy and Greenhouse Gas Balance of Biofuels for Europe—An Update*. 2002, CONCAWE: Brussels.
17. Wang, M., C. Saricks, D. Santini, *Effects of Fuel Ethanol Use on Fuel-Cycle Energy and Greenhouse Gas Emissions*. 1999, Center for Transportation Research, Argonne National Laboratory.
18. Macedo, I.d.C., Manoel Regis Lima Verde Lea, and João Eduardo Azevedo Ramos da Silva, *Assessment of Greenhouse Gas Emissions in the Production and Use of Fuel Ethanol in Brazil*. 2004.
19. Searchinger, T., Ralph Heimlich, R. A. Houghton, Fengxia Dong, Amani Elobeid, Jacinto Fabiosa, Simla Tokgoz, Dermot Hayes, Tun-Hsiang Yu, *Use of U.S. Croplands for Biofuels Increases Greenhouse Gases Through Emissions from Land Use Change*. Science, 2008.
20. Fargione, J., Jason Hill, David Tilman, Stephen Polasky, Peter Hawthorne, *Land Clearing and the Biofuel Carbon Debt*. Science, 2008.

## World Biofuels Study

21. Wang, M., *GREET model (v1.5a) (calculations made by IEA for reference case using the downloadable model, in consultation with Author)*. 2001.
22. Sheehan, J., Camobreco, Vince, James Duffield, Michael Graboski, Housein Shapouri, *An Overview of Biodiesel and Petroleum Diesel Life Cycles*. 1998, National Renewable Energy Laboratory: Golden, Colorado.

## Appendix A: Results

A-1	Reference Case .....	2
A-2	Reference Case with Credit and Tariff Extension .....	12
A-3	Reference Case with Credit Extension .....	22
A-4	Reference Case with 70/30 Fuel/Feedstock Split .....	32
A-5	Reference Case with High Feedstock Availability .....	42
A-6	Reference Case with Low Feedstock Availability .....	52
A-7	Reference Case with High Oil Price .....	62
A-8	Reference Case with Low Oil Price .....	72
A-9	Reference Case with High Oil Price and High Feedstock Availability .....	82
A-10	Reference Case with Low Oil Price and Low Feedstock Availability .....	92
A-11	Reference Case with E20 .....	102
A-12	Reference Case with \$50 per Tonne CO <sub>2</sub> .....	112
A-13	Reference Case with \$20 per Tonne Growers' Payment .....	122
A-14	Delayed Technology Reference Case .....	132
A-15	Delayed Technology Reference Case with Credit and Tariff Extension .....	142
A-16	Delayed Technology Reference Case with Credit Extension .....	152
A-17	Delayed Technology Reference Case with 70/30 Fuel/Food split .....	162
A-18	Delayed Technology Reference Case with High Feedstock Availability .....	172
A-19	Delayed Technology Reference Case with Low Feedstock Availability .....	182
A-20	Delayed Technology Reference Case with High Oil Price .....	192
A-21	Delayed Technology Reference Case with Low Oil Price .....	202
A-22	Delayed Technology Reference Case with High Oil Price and High Feedstock Availability .....	212
A-23	Delayed Technology Reference Case with Low Oil Price and Low Feedstock Availability .....	222
A-24	Delayed Technology Reference Case with E20 .....	232
A-25	Delayed Technology Reference Case with \$50 per Tonne CO <sub>2</sub> .....	242
A-26	Delayed Technology Reference Case with \$20 per Tonne Growers' Payment ..	252

**A-1 Reference Case****Table A-1: Reference case ethanol production [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	455	502
Argentina	0	178	810	910	940	952
Australia	0	0	71	267	709	1,174
Brazil	4,866	5,977	7,624	9,752	11,934	13,669
Canada	0	0	259	779	1,115	1,115
Caribbean basin	210	328	573	683	707	707
China	344	384	634	1,041	1,612	2,917
Colombia	196	215	411	782	1,501	2,195
Eastern Europe	110	226	434	780	1,037	1,149
Former Soviet Union	0	0	39	119	364	1,109
India	313	279	541	992	1,893	2,771
Japan	0	0	95	369	612	647
Middle East	0	0	0	0	0	0
Mexico	0	0	199	601	1,408	1,546
Other Asia	0	0	0	0	0	0
South Korea	0	0	36	36	36	36
United States	3,850	11,612	15,802	17,202	18,915	19,073
Western Europe	600	2,568	2,755	3,398	5,291	8,013
<b>Total</b>	<b>10,789</b>	<b>22,097</b>	<b>30,647</b>	<b>38,111</b>	<b>48,529</b>	<b>57,574</b>

# World Biofuels Study

**Table A-2: Reference case ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	455	502
Australia	0	0	71	267	709	1,174
Canada	145	0	233	984	1,004	1,020
China	297	0	0	667	1,612	3,289
Central and South America	3,788	4,853	6,156	7,153	7,959	8,855
Eastern Europe	699	226	872	953	1,037	1,149
Former Soviet Union	0	0	39	119	364	1,109
India	313	279	541	992	1,893	2,399
Japan	263	288	373	719	1,008	1,100
Middle East	0	0	0	0	0	0
Mexico	0	0	30	396	865	1,053
Other Asia	0	0	0	0	0	0
South Korea	264	335	400	414	413	413
United States	3,984	11,612	17,287	19,797	23,562	27,500
Western Europe	736	4,174	4,281	5,249	7,650	8,013
<b>Total</b>	<b>10,789</b>	<b>22,097</b>	<b>30,647</b>	<b>38,111</b>	<b>48,529</b>	<b>57,574</b>

**Table A-3: Reference case ethanol net trade [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	-145	0	26	-205	112	96
China	47	384	634	373	0	-372
Central and South America	1,484	1,845	3,261	4,974	7,124	8,668
Eastern Europe	-589	0	-438	-173	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	372
Japan	-263	-288	-278	-350	-395	-453
Middle East	0	0	0	0	0	0
Mexico	0	0	170	205	543	493
Other Asia	0	0	0	0	0	0
South Korea	-264	-335	-364	-378	-377	-377
United States	-134	0	-1,485	-2,594	-4,647	-8,427
Western Europe	-136	-1,607	-1,526	-1,851	-2,359	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

# World Biofuels Study

**Table A-4: Reference case grain ethanol production [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Argentina	0	178	604	604	604	604
Australia	0	0	0	0	0	0
Brazil	0	0	0	0	0	0
Canada	0	0	0	0	0	0
Caribbean basin	0	0	0	0	0	0
China	344	344	344	325	0	0
Colombia	0	0	0	0	0	0
Eastern Europe	110	226	348	477	367	251
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	3,850	11,612	15,000	15,000	15,000	13,910
Western Europe	600	2,568	2,589	2,705	3,178	3,604
<b>Total</b>	<b>4,904</b>	<b>14,928</b>	<b>18,885</b>	<b>19,112</b>	<b>19,149</b>	<b>18,370</b>

**Table A-5: Reference case sugar ethanol production [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	444	490
Argentina	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Brazil	4,866	5,977	7,329	8,862	10,057	11,793
Canada	0	0	0	0	0	0
Caribbean basin	210	328	573	683	707	707
China	0	40	48	48	48	48
Colombia	196	215	241	270	302	302
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	313	279	327	347	381	348
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	0	0	0	0
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>5,884</b>	<b>7,169</b>	<b>8,882</b>	<b>10,612</b>	<b>11,940</b>	<b>13,688</b>

**Table A-6: Reference case cellulosic ethanol production [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	11	11
Argentina	0	0	206	306	335	347
Australia	0	0	71	267	709	1,174
Brazil	0	0	296	890	1,877	1,877
Canada	0	0	259	779	1,115	1,115
Caribbean basin	0	0	0	0	0	0
China	0	0	243	667	1,564	2,869
Colombia	0	0	170	512	1,199	1,893
Eastern Europe	0	0	85	303	670	897
Former Soviet Union	0	0	39	119	364	1,109
India	0	0	214	645	1,512	2,424
Japan	0	0	95	369	612	647
Middle East	0	0	0	0	0	0
Mexico	0	0	199	601	1,408	1,546
Other Asia	0	0	0	0	0	0
South Korea	0	0	36	36	36	36
United States	0	0	802	2,202	3,915	5,162
Western Europe	0	0	166	693	2,113	4,410
<b>Total</b>	<b>0</b>	<b>0</b>	<b>2,880</b>	<b>8,388</b>	<b>17,440</b>	<b>25,517</b>

**Table A-7: Reference case grain ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	297	0	0	325	0	0
Central and South America	0	36	122	118	98	100
Eastern Europe	110	226	348	477	367	251
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	192	230	350	284	357
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	47	295	122	5	222	148
United States	3,850	11,612	15,000	15,000	15,000	13,910
Western Europe	600	2,568	3,064	2,836	3,178	3,604
<b>Total</b>	<b>4,904</b>	<b>14,928</b>	<b>18,885</b>	<b>19,112</b>	<b>19,149</b>	<b>18,370</b>



# World Biofuels Study

**Table A-8: Reference case sugar ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	444	490
Australia	0	0	0	0	0	0
Canada	145	0	0	0	0	0
China	0	0	0	48	48	48
Central and South America	3,788	4,818	6,035	7,014	7,860	8,728
Eastern Europe	589	0	412	173	0	0
Former Soviet Union	0	0	0	0	0	0
India	313	279	327	347	381	348
Japan	263	96	48	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	217	40	0	0	0	0
United States	134	0	788	2,594	2,920	4,074
Western Europe	136	1,607	908	33	287	0
<b>Total</b>	<b>5,884</b>	<b>7,169</b>	<b>8,882</b>	<b>10,612</b>	<b>11,940</b>	<b>13,688</b>

**Table A-9: Reference case cellulosic ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	11	11
Australia	0	0	71	267	709	1,174
Canada	0	0	233	984	1,004	1,020
China	0	0	0	294	1,564	3,241
Central and South America	0	0	0	21	0	27
Eastern Europe	0	0	111	303	670	897
Former Soviet Union	0	0	39	119	364	1,109
India	0	0	214	645	1,512	2,051
Japan	0	0	95	369	724	743
Middle East	0	0	0	0	0	0
Mexico	0	0	30	396	865	1,053
Other Asia	0	0	0	0	0	0
South Korea	0	0	279	409	191	265
United States	0	0	1,500	2,202	5,642	9,516
Western Europe	0	0	309	2,379	4,185	4,410
<b>Total</b>	<b>0</b>	<b>0</b>	<b>2,880</b>	<b>8,388</b>	<b>17,440</b>	<b>25,517</b>

# World Biofuels Study

**Table A-10: Reference case grain ethanol net trade [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	47	344	344	0	0	0
Central and South America	0	143	483	486	506	505
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	-192	-230	-350	-284	-357
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	-47	-295	-122	-5	-222	-148
United States	0	0	0	0	0	0
Western Europe	0	0	-476	-131	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-11: Reference case sugar ethanol net trade [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	-145	0	0	0	0	0
China	0	40	48	0	0	0
Central and South America	1,484	1,702	2,108	2,801	3,207	4,074
Eastern Europe	-589	0	-412	-173	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	-263	-96	-48	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	-217	-40	0	0	0	0
United States	-134	0	-788	-2,594	-2,920	-4,074
Western Europe	-136	-1,607	-908	-33	-287	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-12: Reference case cellulosic ethanol net trade [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	26	-205	112	96
China	0	0	243	373	0	-372
Central and South America	0	0	671	1,687	3,411	4,090
Eastern Europe	0	0	-26	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	372
Japan	0	0	0	0	-112	-96
Middle East	0	0	0	0	0	0
Mexico	0	0	170	205	543	493
Other Asia	0	0	0	0	0	0
South Korea	0	0	-243	-373	-155	-229
United States	0	0	-698	0	-1,727	-4,353
Western Europe	0	0	-143	-1,687	-2,072	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-13: Reference case biomass-to-liquids production [Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	68	263	653	1,177
Argentina	0	0	74	110	121	125
Australia	0	0	0	0	0	0
Brazil	0	0	106	320	675	675
Canada	0	0	93	280	401	401
Caribbean basin	0	0	0	0	0	0
China	0	0	57	240	563	563
Colombia	0	0	61	184	431	681
Eastern Europe	0	0	0	0	93	274
Former Soviet Union	0	0	0	0	0	0
India	0	0	77	232	544	544
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	125
Mexico	0	0	72	216	506	556
Other Asia	0	0	89	448	1,090	1,942
South Korea	0	0	37	77	77	77
United States	0	0	822	4,698	6,246	8,019
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>1,556</b>	<b>7,069</b>	<b>11,400</b>	<b>15,158</b>

**Table A-14: Reference case biomass-to-liquids consumption [Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	68	263	653	1,177
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	0	0	0	0	0
Eastern Europe	0	0	0	0	93	274
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	125
Mexico	0	0	0	0	0	0
Other Asia	0	0	89	449	1,090	1,942
South Korea	0	0	0	0	0	0
United States	0	0	1,111	6,132	9,564	10,720
Western Europe	0	0	289	226	0	920
<b>Total</b>	<b>0</b>	<b>0</b>	<b>1,556</b>	<b>7,069</b>	<b>11,400</b>	<b>15,158</b>

**Table A-15: Reference case biomass-to-liquids net trade [Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	93	280	401	401
China	0	0	57	240	563	563
Central and South America	0	0	241	614	1,227	1,481
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	77	232	544	544
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	72	216	506	556
Other Asia	0	0	0	0	0	0
South Korea	0	0	37	77	77	77
United States	0	0	-289	-1,434	-3,318	-2,701
Western Europe	0	0	-289	-226	0	-920
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-16: Reference case biodiesel production [Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Argentina	0	333	776	819	827	239
Australia	0	0	0	0	0	0
Brazil	0	333	877	1,642	1,966	1,355
Canada	0	0	0	0	0	0
Caribbean basin	0	95	310	675	802	898
China	0	0	0	0	0	0
Colombia	0	119	298	474	650	782
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	1,238	1,640	1,747	1,907	2,016
Western Europe	998	3,178	3,578	3,930	4,468	4,788
<b>Total</b>	<b>998</b>	<b>5,294</b>	<b>7,479</b>	<b>9,287</b>	<b>10,621</b>	<b>10,077</b>

**Table A-17: Reference case biodiesel consumption  
[Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	158	472	984	1,306	1,490
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	1,238	1,713	1,885	2,080	2,016
Western Europe	998	3,898	5,294	6,419	7,235	6,572
<b>Total</b>	<b>998</b>	<b>5,294</b>	<b>7,479</b>	<b>9,287</b>	<b>10,621</b>	<b>10,077</b>

**Table A-18: Reference case biodiesel net trade [Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	720	1,788	2,626	2,940	1,784
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	-73	-138	-173	0
Western Europe	0	-720	-1,716	-2,488	-2,767	-1,784
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**A-2 Reference Case with Credit and Tariff Extension****Table A-19: Reference case with credit and tariff extension ethanol production  
[Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	455	502
Argentina	0	178	745	841	904	347
Australia	0	0	71	267	709	1,174
Brazil	4,866	5,977	7,534	9,597	11,603	13,338
Canada	0	0	259	779	1,022	1,022
Caribbean basin	210	328	735	735	779	890
China	344	384	634	1,041	1,612	2,917
Colombia	196	215	401	750	1,469	2,163
Eastern Europe	110	226	434	780	1,037	1,149
Former Soviet Union	0	0	39	119	364	1,109
India	313	279	541	992	1,893	2,771
Japan	0	0	95	369	612	647
Middle East	0	0	0	0	0	0
Mexico	0	0	224	601	1,408	1,546
Other Asia	0	0	0	0	0	0
South Korea	0	0	35	35	35	35
United States	3,850	11,668	15,932	17,513	20,235	24,804
Western Europe	600	2,568	2,755	3,398	5,291	8,013
<b>Total</b>	<b>10,789</b>	<b>22,154</b>	<b>30,798</b>	<b>38,216</b>	<b>49,427</b>	<b>62,426</b>

# World Biofuels Study

**Table A-20: Reference case with credit and tariff extension ethanol consumption**  
[Million gallons]

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	455	502
Australia	0	0	71	267	709	1,174
Canada	145	0	233	779	1,004	1,020
China	121	0	0	959	2,896	5,063
Central and South America	3,788	4,853	6,065	7,339	7,954	8,799
Eastern Europe	699	226	872	953	1,037	1,149
Former Soviet Union	0	0	39	119	364	1,109
India	313	279	541	992	1,893	2,399
Japan	263	288	410	719	1,008	1,100
Middle East	0	0	0	0	0	0
Mexico	0	0	34	78	183	201
Other Asia	0	0	0	0	0	1,654
South Korea	264	335	400	414	413	413
United States	4,161	11,668	17,461	19,947	23,862	28,775
Western Europe	736	4,174	4,307	5,249	7,649	9,071
<b>Total</b>	<b>10,789</b>	<b>22,154</b>	<b>30,798</b>	<b>38,216</b>	<b>49,427</b>	<b>62,426</b>

**Table A-21: Reference case with credit and tariff extension ethanol net trade**  
[Million gallons]

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	-145	0	26	0	18	2
China	224	384	634	82	-1,284	-2,146
Central and South America	1,484	1,845	3,350	4,583	6,801	7,939
Eastern Europe	-589	0	-438	-173	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	372
Japan	-263	-288	-315	-350	-395	-453
Middle East	0	0	0	0	0	0
Mexico	0	0	190	523	1,225	1,345
Other Asia	0	0	0	0	0	-1,654
South Korea	-264	-335	-365	-379	-378	-378
United States	-311	0	-1,529	-2,433	-3,628	-3,970
Western Europe	-136	-1,607	-1,552	-1,851	-2,358	-1,058
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>



**Table A-22: Reference case with credit and tariff extension grain ethanol production [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Argentina	0	178	569	569	569	0
Australia	0	0	0	0	0	0
Brazil	0	0	0	0	0	0
Canada	0	0	0	0	0	0
Caribbean basin	0	0	0	0	0	0
China	344	344	344	325	0	0
Colombia	0	0	0	0	0	0
Eastern Europe	110	226	348	477	367	251
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	3,850	11,668	15,000	15,000	15,000	15,000
Western Europe	600	2,568	2,589	2,705	3,178	3,604
<b>Total</b>	<b>4,904</b>	<b>14,984</b>	<b>18,850</b>	<b>19,077</b>	<b>19,114</b>	<b>18,855</b>

**Table A-23: Reference case with credit and tariff extension sugar ethanol production [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	444	490
Argentina	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Brazil	4,866	5,977	7,233	8,862	10,057	11,793
Canada	0	0	0	0	0	0
Caribbean basin	210	328	735	735	779	890
China	0	40	48	48	48	48
Colombia	196	215	241	270	270	270
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	313	279	327	347	381	348
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	0	0	0	0
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>5,884</b>	<b>7,169</b>	<b>8,948</b>	<b>10,663</b>	<b>11,980</b>	<b>13,838</b>

**Table A-24: Reference case with credit and tariff extension cellulosic ethanol production [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	11	11
Argentina	0	0	176	272	335	347
Australia	0	0	71	267	709	1,174
Brazil	0	0	302	735	1,546	1,546
Canada	0	0	259	779	1,022	1,022
Caribbean basin	0	0	0	0	0	0
China	0	0	243	667	1,564	2,869
Colombia	0	0	160	480	1,199	1,893
Eastern Europe	0	0	85	303	670	897
Former Soviet Union	0	0	39	119	364	1,109
India	0	0	214	645	1,512	2,424
Japan	0	0	95	369	612	647
Middle East	0	0	0	0	0	0
Mexico	0	0	224	601	1,408	1,546
Other Asia	0	0	0	0	0	0
South Korea	0	0	35	35	35	35
United States	0	0	932	2,513	5,235	9,804
Western Europe	0	0	166	693	2,113	4,410
<b>Total</b>	<b>0</b>	<b>0</b>	<b>3,000</b>	<b>8,477</b>	<b>18,334</b>	<b>29,733</b>

**Table A-25: Reference case with credit and tariff extension grain ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	121	0	0	325	79	0
Central and South America	0	36	116	114	95	0
Eastern Europe	110	226	348	477	367	251
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	192	267	350	395	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	224	295	123	105	0	0
United States	3,850	11,668	15,000	15,000	15,000	15,000
Western Europe	600	2,568	2,995	2,705	3,178	3,604
<b>Total</b>	<b>4,904</b>	<b>14,984</b>	<b>18,850</b>	<b>19,077</b>	<b>19,114</b>	<b>18,855</b>

**Table A-26: Reference case with credit and tariff extension sugar ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	444	490
Australia	0	0	0	0	0	0
Canada	145	0	0	0	0	0
China	0	0	0	48	1,236	1,819
Central and South America	3,788	4,818	5,949	7,017	7,516	8,033
Eastern Europe	589	0	412	173	0	0
Former Soviet Union	0	0	0	0	0	0
India	313	279	327	347	381	348
Japan	263	96	48	0	0	453
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	41	40	0	0	0	70
United States	311	0	788	2,320	2,403	2,626
Western Europe	136	1,607	1,060	357	0	0
<b>Total</b>	<b>5,884</b>	<b>7,169</b>	<b>8,948</b>	<b>10,663</b>	<b>11,980</b>	<b>13,838</b>

**Table A-27: Reference case with credit and tariff extension cellulosic ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	11	11
Australia	0	0	71	267	709	1,174
Canada	0	0	233	779	1,004	1,020
China	0	0	0	586	1,582	3,244
Central and South America	0	0	0	209	343	766
Eastern Europe	0	0	111	303	670	897
Former Soviet Union	0	0	39	119	364	1,109
India	0	0	214	645	1,512	2,051
Japan	0	0	95	369	612	647
Middle East	0	0	0	0	0	0
Mexico	0	0	34	78	183	201
Other Asia	0	0	0	0	0	1,654
South Korea	0	0	277	309	413	343
United States	0	0	1,674	2,627	6,459	11,149
Western Europe	0	0	252	2,187	4,472	5,467
<b>Total</b>	<b>0</b>	<b>0</b>	<b>3,000</b>	<b>8,477</b>	<b>18,334</b>	<b>29,733</b>

**Table A-28: Reference case with credit and tariff extension grain ethanol net trade**  
[Million gallons]

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	224	344	344	0	-79	0
Central and South America	0	143	453	455	474	0
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	-192	-267	-350	-395	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	-224	-295	-123	-105	0	0
United States	0	0	0	0	0	0
Western Europe	0	0	-407	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-29: Reference case with credit and tariff extension sugar ethanol net trade**  
[Million gallons]

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	-145	0	0	0	0	0
China	0	40	48	0	-1,188	-1,771
Central and South America	1,484	1,702	2,260	2,850	3,591	4,920
Eastern Europe	-589	0	-412	-173	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	-263	-96	-48	0	0	-453
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	-41	-40	0	0	0	-70
United States	-311	0	-788	-2,320	-2,403	-2,626
Western Europe	-136	-1,607	-1,060	-357	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-30: Reference case with credit and tariff extension cellulosic ethanol net trade [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	26	0	18	2
China	0	0	243	82	-18	-374
Central and South America	0	0	637	1,278	2,737	3,020
Eastern Europe	0	0	-26	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	372
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	190	523	1,225	1,345
Other Asia	0	0	0	0	0	-1,654
South Korea	0	0	-243	-275	-378	-308
United States	0	0	-742	-114	-1,225	-1,345
Western Europe	0	0	-86	-1,494	-2,358	-1,058
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-31: Reference case with credit and tariff extension biomass-to-liquids production [Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	68	263	653	1,177
Argentina	0	0	74	110	121	125
Australia	0	0	0	0	0	0
Brazil	0	0	106	320	556	556
Canada	0	0	93	280	368	368
Caribbean basin	0	0	0	0	0	0
China	0	0	57	240	563	563
Colombia	0	0	61	184	431	681
Eastern Europe	0	0	0	0	93	274
Former Soviet Union	0	0	0	0	0	0
India	0	0	77	232	544	544
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	125
Mexico	0	0	45	216	506	556
Other Asia	0	0	89	448	1,090	1,942
South Korea	0	0	36	74	74	74
United States	0	0	792	4,683	6,280	5,980
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>1,498</b>	<b>7,050</b>	<b>11,277</b>	<b>12,963</b>

**Table A-32: Reference case with credit and tariff extension biomass-to-liquids consumption [Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	68	263	653	1,177
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	0	0	0	0	0
Eastern Europe	0	0	0	0	93	274
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	125
Mexico	0	0	0	0	0	0
Other Asia	0	0	89	449	1,090	1,942
South Korea	0	0	0	0	0	0
United States	0	0	1,067	5,796	9,442	9,445
Western Europe	0	0	275	542	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>1,498</b>	<b>7,050</b>	<b>11,277</b>	<b>12,963</b>

**Table A-33: Reference case with credit and tariff extension biomass-to-liquids net trade [Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	93	280	368	368
China	0	0	57	240	563	563
Central and South America	0	0	241	614	1,108	1,362
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	77	232	544	544
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	45	216	506	556
Other Asia	0	0	0	0	0	0
South Korea	0	0	36	74	74	74
United States	0	0	-275	-1,114	-3,162	-3,466
Western Europe	0	0	-275	-542	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

# World Biofuels Study

**Table A-34: Reference case with credit and tariff extension biodiesel production**  
[Million gallons ethanol equivalent]

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Argentina	0	333	776	819	827	94
Australia	0	0	0	0	0	0
Brazil	0	333	835	1,600	2,449	1,362
Canada	0	0	0	0	0	0
Caribbean basin	0	95	310	675	802	898
China	0	0	0	0	0	0
Colombia	0	119	298	474	650	782
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	1,182	1,640	1,747	1,907	2,016
Western Europe	998	3,178	3,578	3,930	4,468	4,788
<b>Total</b>	<b>998</b>	<b>5,238</b>	<b>7,437</b>	<b>9,245</b>	<b>11,103</b>	<b>9,940</b>

**Table A-35: Reference case with credit and tariff extension biodiesel consumption**  
[Million gallons ethanol equivalent]

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	158	472	984	1,306	1,490
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	1,182	1,713	2,159	2,562	2,016
Western Europe	998	3,898	5,252	6,102	7,235	6,434
<b>Total</b>	<b>998</b>	<b>5,238</b>	<b>7,437</b>	<b>9,245</b>	<b>11,103</b>	<b>9,940</b>

**Table A-36: Reference case with credit and tariff extension biodiesel net trade**  
**[Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	720	1,746	2,584	3,422	1,646
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	-73	-412	-655	0
Western Europe	0	-720	-1,674	-2,172	-2,767	-1,646
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>



**A-3 Reference Case with Credit Extension****Table A-37: Reference case with credit extension ethanol production [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	455	502
Argentina	0	178	810	910	940	822
Australia	0	0	71	267	709	1,174
Brazil	4,866	5,977	7,624	9,752	11,934	13,669
Canada	0	0	259	779	1,115	1,115
Caribbean basin	210	328	671	683	775	775
China	344	384	634	1,041	1,612	2,917
Colombia	196	215	411	782	1,501	2,195
Eastern Europe	110	226	434	780	1,037	1,149
Former Soviet Union	0	0	39	119	364	1,109
India	313	279	541	992	1,893	2,771
Japan	0	0	95	369	612	647
Middle East	0	0	0	0	0	0
Mexico	0	0	199	601	1,408	1,546
Other Asia	0	0	0	0	0	0
South Korea	0	0	35	35	35	35
United States	3,850	11,668	15,822	17,443	19,318	20,552
Western Europe	600	2,568	2,755	3,398	5,291	8,013
<b>Total</b>	<b>10,789</b>	<b>22,154</b>	<b>30,765</b>	<b>38,350</b>	<b>48,998</b>	<b>58,990</b>

**Table A-38: Reference case with credit extension ethanol consumption**  
[Million gallons]

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	455	502
Australia	0	0	71	267	709	1,174
Canada	145	0	233	808	1,004	1,020
China	121	0	0	528	1,612	3,289
Central and South America	3,788	4,853	6,163	7,153	7,962	8,845
Eastern Europe	699	226	872	953	1,037	1,149
Former Soviet Union	0	0	39	119	364	1,109
India	313	279	541	992	1,893	2,399
Japan	263	288	373	719	1,008	1,100
Middle East	0	0	0	0	0	0
Mexico	0	0	30	249	1,031	1,053
Other Asia	0	0	0	0	0	0
South Korea	264	335	400	414	413	413
United States	4,161	11,668	17,383	19,985	23,897	28,924
Western Europe	736	4,174	4,276	5,249	7,649	8,013
<b>Total</b>	<b>10,789</b>	<b>22,154</b>	<b>30,744</b>	<b>37,838</b>	<b>49,033</b>	<b>61,020</b>

**Table A-39: Reference case with credit extension ethanol net trade [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	-145	0	26	-29	112	96
China	224	384	634	512	0	-372
Central and South America	1,484	1,845	3,354	4,974	7,187	8,615
Eastern Europe	-589	0	-438	-173	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	372
Japan	-263	-288	-278	-350	-395	-453
Middle East	0	0	0	0	0	0
Mexico	0	0	170	351	377	493
Other Asia	0	0	0	0	0	0
South Korea	-264	-335	-365	-379	-378	-378
United States	-311	0	-1,581	-3,054	-4,544	-8,373
Western Europe	-136	-1,607	-1,521	-1,851	-2,358	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

# World Biofuels Study

**Table A-40: Reference case with credit extension grain ethanol production**  
[Million gallons]

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Argentina	0	178	604	604	604	475
Australia	0	0	0	0	0	0
Brazil	0	0	0	0	0	0
Canada	0	0	0	0	0	0
Caribbean basin	0	0	0	0	0	0
China	344	344	344	325	0	0
Colombia	0	0	0	0	0	0
Eastern Europe	110	226	348	477	367	251
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	3,850	11,668	15,000	15,000	15,000	13,716
Western Europe	600	2,568	2,589	2,705	3,178	3,604
<b>Total</b>	<b>4,904</b>	<b>14,984</b>	<b>18,886</b>	<b>19,112</b>	<b>19,149</b>	<b>18,046</b>

**Table A-41: Reference case with credit extension sugar ethanol production**  
[Million gallons]

	2005	2010	2015	2020	2025	2030
Africa	300	330	364	402	444	490
Argentina	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Brazil	4,866	5,977	7,329	8,862	10,057	11,793
Canada	0	0	0	0	0	0
Caribbean basin	210	328	671	683	775	775
China	0	40	48	48	48	48
Colombia	196	215	241	270	302	302
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	313	279	327	347	381	348
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	0	0	0	0
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>5,884</b>	<b>7,169</b>	<b>8,980</b>	<b>10,612</b>	<b>12,007</b>	<b>13,755</b>

**Table A-42: Reference case with credit extension cellulosic ethanol production**  
[Million gallons]

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	11	11
Argentina	0	0	206	306	335	347
Australia	0	0	71	267	709	1,174
Brazil	0	0	296	890	1,877	1,876
Canada	0	0	259	779	1,115	1,115
Caribbean basin	0	0	0	0	0	0
China	0	0	243	667	1,564	2,869
Colombia	0	0	170	512	1,199	1,893
Eastern Europe	0	0	85	303	670	897
Former Soviet Union	0	0	39	119	364	1,109
India	0	0	214	645	1,512	2,424
Japan	0	0	95	369	612	647
Middle East	0	0	0	0	0	0
Mexico	0	0	199	601	1,408	1,546
Other Asia	0	0	0	0	0	0
South Korea	0	0	35	35	35	35
United States	0	0	802	1,893	4,318	6,835
Western Europe	0	0	166	693	2,113	4,410
<b>Total</b>	<b>0</b>	<b>0</b>	<b>2,879</b>	<b>8,077</b>	<b>17,842</b>	<b>27,188</b>

**Table A-43: Reference case with credit extension grain ethanol consumption**  
[Million gallons]

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	121	0	0	325	0	0
Central and South America	0	36	122	118	98	87
Eastern Europe	110	226	348	477	367	251
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	192	230	0	284	357
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	224	295	123	217	222	31
United States	3,850	11,668	15,000	15,000	15,000	13,716
Western Europe	600	2,568	3,063	2,974	3,178	3,604
<b>Total</b>	<b>4,904</b>	<b>14,984</b>	<b>18,886</b>	<b>19,112</b>	<b>19,149</b>	<b>18,046</b>

**Table A-44: Reference case with credit extension sugar ethanol consumption**  
[Million gallons]

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	444	490
Australia	0	0	0	0	0	0
Canada	145	0	0	0	0	0
China	0	0	0	48	48	48
Central and South America	3,788	4,818	6,041	6,910	7,864	8,602
Eastern Europe	589	0	412	173	0	0
Former Soviet Union	0	0	0	0	0	0
India	313	279	327	347	381	348
Japan	263	96	48	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	41	40	0	0	0	0
United States	311	0	788	2,732	2,920	4,268
Western Europe	136	1,607	1,000	0	350	0
<b>Total</b>	<b>5,884</b>	<b>7,169</b>	<b>8,980</b>	<b>10,612</b>	<b>12,007</b>	<b>13,755</b>

**Table A-45: Reference case with credit extension cellulosic ethanol consumption**  
[Million gallons]

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	11	11
Australia	0	0	71	267	709	1,174
Canada	0	0	233	808	1,004	1,020
China	0	0	0	155	1,564	3,241
Central and South America	0	0	0	125	0	157
Eastern Europe	0	0	111	303	670	897
Former Soviet Union	0	0	39	119	364	1,109
India	0	0	214	645	1,512	2,051
Japan	0	0	95	719	724	743
Middle East	0	0	0	0	0	0
Mexico	0	0	30	249	1,031	1,053
Other Asia	0	0	0	0	0	0
South Korea	0	0	277	197	191	382
United States	0	0	1,595	2,215	5,942	10,940
Western Europe	0	0	213	2,275	4,121	4,410
<b>Total</b>	<b>0</b>	<b>0</b>	<b>2,879</b>	<b>8,077</b>	<b>17,842</b>	<b>27,188</b>

# World Biofuels Study

**Table A-46: Reference case with credit extension grain ethanol net trade [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	224	344	344	0	0	0
Central and South America	0	143	483	486	506	388
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	-192	-230	0	-284	-357
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	-224	-295	-123	-217	-222	-31
United States	0	0	0	0	0	0
Western Europe	0	0	-474	-269	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-47: Reference case with credit extension sugar ethanol net trade [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	-145	0	0	0	0	0
China	0	40	48	0	0	0
Central and South America	1,484	1,702	2,200	2,905	3,270	4,268
Eastern Europe	-589	0	-412	-173	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	-263	-96	-48	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	-41	-40	0	0	0	0
United States	-311	0	-788	-2,732	-2,920	-4,268
Western Europe	-136	-1,607	-1,000	0	-350	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-48: Reference case with credit extension cellulosic ethanol net trade**  
**[Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	26	-29	112	96
China	0	0	243	512	0	-372
Central and South America	0	0	671	1,583	3,411	3,959
Eastern Europe	0	0	-26	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	372
Japan	0	0	0	-350	-112	-96
Middle East	0	0	0	0	0	0
Mexico	0	0	170	351	377	493
Other Asia	0	0	0	0	0	0
South Korea	0	0	-243	-162	-156	-347
United States	0	0	-793	-322	-1,624	-4,105
Western Europe	0	0	-47	-1,583	-2,008	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-49: Reference case with credit extension biomass-to-liquids production**  
**[Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	68	263	653	1,177
Argentina	0	0	74	110	121	125
Australia	0	0	0	0	0	0
Brazil	0	0	106	320	675	675
Canada	0	0	93	280	401	401
Caribbean basin	0	0	0	0	0	0
China	0	0	57	240	563	563
Colombia	0	0	61	184	431	681
Eastern Europe	0	0	0	0	93	274
Former Soviet Union	0	0	0	0	0	0
India	0	0	77	232	544	544
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	125
Mexico	0	0	72	216	506	556
Other Asia	0	0	89	448	1,090	1,942
South Korea	0	0	36	74	74	74
United States	0	0	822	4,038	5,403	6,735
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>1,555</b>	<b>6,405</b>	<b>10,554</b>	<b>13,871</b>

**Table A-50: Reference case with credit extension biomass-to-liquids consumption**  
**[Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	68	263	653	1,177
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	0	0	0	0	0
Eastern Europe	0	0	0	0	93	274
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	125
Mexico	0	0	0	0	0	0
Other Asia	0	0	89	449	1,090	1,942
South Korea	0	0	0	0	0	0
United States	0	0	1,100	5,606	8,718	9,295
Western Europe	0	0	298	88	0	1,058
<b>Total</b>	<b>0</b>	<b>0</b>	<b>1,555</b>	<b>6,405</b>	<b>10,553</b>	<b>13,871</b>

**Table A-51: Reference case with credit extension biomass-to-liquids net trade**  
**[Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	93	280	401	401
China	0	0	57	240	563	563
Central and South America	0	0	241	614	1,227	1,481
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	77	232	544	544
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	72	216	506	556
Other Asia	0	0	0	0	0	0
South Korea	0	0	36	74	74	74
United States	0	0	-278	-1,568	-3,315	-2,560
Western Europe	0	0	-298	-88	0	-1,058
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>



# World Biofuels Study

**Table A-52: Reference case with credit extension biodiesel production**  
[Million gallons ethanol equivalent]

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Argentina	0	333	776	819	827	94
Australia	0	0	0	0	0	0
Brazil	0	333	877	1,642	1,966	1,362
Canada	0	0	0	0	0	0
Caribbean basin	0	95	310	675	802	898
China	0	0	0	0	0	0
Colombia	0	119	298	474	650	782
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	1,182	1,640	1,747	1,907	2,016
Western Europe	998	3,178	3,578	3,930	4,468	4,788
<b>Total</b>	<b>998</b>	<b>5,238</b>	<b>7,479</b>	<b>9,287</b>	<b>10,621</b>	<b>9,940</b>

**Table A-53: Reference case with credit extension biodiesel consumption**  
[Million gallons ethanol equivalent]

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	158	472	984	1,306	1,490
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	1,182	1,713	1,747	2,080	2,016
Western Europe	998	3,898	5,294	6,556	7,235	6,434
<b>Total</b>	<b>998</b>	<b>5,238</b>	<b>7,479</b>	<b>9,287</b>	<b>10,621</b>	<b>9,940</b>

**Table A-54: Reference case with credit extension biodiesel net trade**  
**[Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	720	1,788	2,626	2,940	1,646
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	-73	0	-173	0
Western Europe	0	-720	-1,716	-2,626	-2,767	-1,646
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**A-4 Reference Case with 70/30 Fuel/Feedstock Split****Table A-55: Reference Case with 70/30 Fuel/Feedstock split ethanol production  
[Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	455	502
Argentina	0	178	727	875	904	916
Australia	0	0	71	267	709	1,174
Brazil	5,225	6,956	8,845	10,655	12,619	14,462
Canada	0	0	259	779	1,115	1,115
Caribbean basin	180	299	573	597	597	676
China	344	384	634	1,041	1,612	2,917
Colombia	196	215	411	782	1,501	2,195
Eastern Europe	110	226	434	780	1,037	1,149
Former Soviet Union	0	0	39	119	364	1,109
India	313	279	541	992	1,893	2,771
Japan	0	0	95	369	612	647
Middle East	0	0	0	0	0	0
Mexico	0	0	199	601	1,408	1,546
Other Asia	0	0	0	0	0	0
South Korea	0	0	35	35	35	35
United States	3,850	11,423	14,849	17,174	18,714	18,445
Western Europe	600	2,465	2,755	3,398	5,291	8,013
<b>Total</b>	<b>11,118</b>	<b>22,756</b>	<b>30,831</b>	<b>38,862</b>	<b>48,866</b>	<b>57,671</b>

**Table A-56: Reference Case with 70/30 Fuel/Feedstock split ethanol consumption**  
[Million gallons]

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	455	502
Australia	0	0	71	267	709	1,174
Canada	119	0	233	984	1,004	1,020
China	442	0	0	1,041	1,612	3,289
Central and South America	3,785	4,851	6,144	7,144	7,948	8,848
Eastern Europe	699	783	872	953	1,037	1,149
Former Soviet Union	0	0	39	119	364	1,109
India	313	279	541	992	1,893	2,399
Japan	300	325	410	751	1,039	1,100
Middle East	0	0	0	0	0	0
Mexico	0	0	30	601	1,031	1,053
Other Asia	0	0	0	0	0	0
South Korea	264	335	400	414	413	413
United States	4,161	11,612	17,383	19,947	23,712	27,468
Western Europe	736	4,241	4,344	5,249	7,650	8,149
<b>Total</b>	<b>11,118</b>	<b>22,756</b>	<b>30,831</b>	<b>38,862</b>	<b>48,866</b>	<b>57,671</b>

**Table A-57: Reference Case with 70/30 Fuel/Feedstock split ethanol net trade**  
[Million gallons]

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	-119	0	26	-205	112	96
China	-98	384	634	0	0	-372
Central and South America	1,816	2,797	4,412	5,763	7,673	9,401
Eastern Europe	-589	-557	-438	-173	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	372
Japan	-300	-325	-315	-382	-427	-453
Middle East	0	0	0	0	0	0
Mexico	0	0	170	0	377	493
Other Asia	0	0	0	0	0	0
South Korea	-264	-335	-365	-379	-378	-378
United States	-311	-189	-2,534	-2,773	-4,999	-9,023
Western Europe	-136	-1,776	-1,589	-1,851	-2,359	-135
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-58: Reference Case with 70/30 Fuel/Feedstock split grain ethanol production [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Argentina	0	178	569	569	569	569
Australia	0	0	0	0	0	0
Brazil	0	0	0	0	0	0
Canada	0	0	0	0	0	0
Caribbean basin	0	0	0	0	0	0
China	344	344	344	325	0	0
Colombia	0	0	0	0	0	0
Eastern Europe	110	226	348	477	367	251
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	3,850	11,423	14,047	15,000	14,815	13,281
Western Europe	600	2,465	2,589	2,705	3,178	3,604
<b>Total</b>	<b>4,904</b>	<b>14,636</b>	<b>17,897</b>	<b>19,077</b>	<b>18,929</b>	<b>17,705</b>

**Table A-59: Reference Case with 70/30 Fuel/Feedstock split sugar ethanol production [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	444	490
Argentina	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Brazil	5,225	6,956	8,550	9,765	10,745	12,588
Canada	0	0	0	0	0	0
Caribbean basin	180	299	573	597	597	676
China	0	40	48	48	48	48
Colombia	196	215	241	270	302	302
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	313	279	327	347	381	348
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	0	0	0	0
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>6,214</b>	<b>8,119</b>	<b>10,103</b>	<b>11,428</b>	<b>12,517</b>	<b>14,451</b>

**Table A-60: Reference Case with 70/30 Fuel/Feedstock split cellulosic ethanol production [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	11	11
Argentina	0	0	158	306	335	347
Australia	0	0	71	267	709	1,174
Brazil	0	0	296	890	1,875	1,875
Canada	0	0	259	779	1,115	1,115
Caribbean basin	0	0	0	0	0	0
China	0	0	243	667	1,564	2,869
Colombia	0	0	170	512	1,199	1,893
Eastern Europe	0	0	85	303	670	897
Former Soviet Union	0	0	39	119	364	1,109
India	0	0	214	645	1,512	2,424
Japan	0	0	95	369	612	647
Middle East	0	0	0	0	0	0
Mexico	0	0	199	601	1,408	1,546
Other Asia	0	0	0	0	0	0
South Korea	0	0	35	35	35	35
United States	0	0	802	2,174	3,899	5,164
Western Europe	0	0	166	693	2,113	4,410
<b>Total</b>	<b>0</b>	<b>0</b>	<b>2,832</b>	<b>8,358</b>	<b>17,420</b>	<b>25,515</b>

**Table A-61: Reference Case with 70/30 Fuel/Feedstock split grain ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	344	0	0	325	0	0
Central and South America	0	36	109	114	93	95
Eastern Europe	110	226	348	477	367	251
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	192	267	382	315	357
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	295	123	74	160	117
United States	3,850	11,423	14,047	15,000	14,815	13,281
Western Europe	600	2,465	3,002	2,705	3,178	3,604
<b>Total</b>	<b>4,904</b>	<b>14,636</b>	<b>17,897</b>	<b>19,077</b>	<b>18,929</b>	<b>17,705</b>

**Table A-62: Reference Case with 70/30 Fuel/Feedstock split sugar ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	444	490
Australia	0	0	0	0	0	0
Canada	119	0	0	205	0	0
China	98	0	0	48	48	48
Central and South America	3,785	4,815	6,035	7,010	7,855	8,727
Eastern Europe	589	557	412	173	0	0
Former Soviet Union	0	0	0	0	0	0
India	313	279	327	347	381	348
Japan	300	133	48	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	264	40	0	0	0	0
United States	311	189	1,741	2,753	3,105	4,704
Western Europe	136	1,776	1,175	490	684	135
<b>Total</b>	<b>6,214</b>	<b>8,119</b>	<b>10,103</b>	<b>11,428</b>	<b>12,517</b>	<b>14,451</b>

**Table A-63: Reference Case with 70/30 Fuel/Feedstock split cellulosic ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	11	11
Australia	0	0	71	267	709	1,174
Canada	0	0	233	779	1,004	1,020
China	0	0	0	667	1,564	3,241
Central and South America	0	0	0	21	0	27
Eastern Europe	0	0	111	303	670	897
Former Soviet Union	0	0	39	119	364	1,109
India	0	0	214	645	1,512	2,051
Japan	0	0	95	369	724	743
Middle East	0	0	0	0	0	0
Mexico	0	0	30	601	1,031	1,053
Other Asia	0	0	0	0	0	0
South Korea	0	0	277	341	253	296
United States	0	0	1,595	2,194	5,792	9,483
Western Europe	0	0	166	2,053	3,788	4,410
<b>Total</b>	<b>0</b>	<b>0</b>	<b>2,832</b>	<b>8,358</b>	<b>17,420</b>	<b>25,515</b>

**Table A-64: Reference Case with 70/30 Fuel/Feedstock split grain ethanol net trade**  
[Million gallons]

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	344	344	0	0	0
Central and South America	0	143	460	455	476	474
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	-192	-267	-382	-315	-357
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	-295	-123	-74	-160	-117
United States	0	0	0	0	0	0
Western Europe	0	0	-414	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-65: Reference Case with 70/30 Fuel/Feedstock split sugar ethanol net trade**  
[Million gallons]

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	-119	0	0	-205	0	0
China	-98	40	48	0	0	0
Central and South America	1,816	2,655	3,329	3,622	3,789	4,839
Eastern Europe	-589	-557	-412	-173	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	-300	-133	-48	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	-264	-40	0	0	0	0
United States	-311	-189	-1,741	-2,753	-3,105	-4,704
Western Europe	-136	-1,776	-1,175	-490	-684	-135
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>



**Table A-66: Reference Case with 70/30 Fuel/Feedstock split cellulosic ethanol net trade [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	26	0	112	96
China	0	0	243	0	0	-372
Central and South America	0	0	624	1,687	3,409	4,088
Eastern Europe	0	0	-26	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	372
Japan	0	0	0	0	-112	-96
Middle East	0	0	0	0	0	0
Mexico	0	0	170	0	377	493
Other Asia	0	0	0	0	0	0
South Korea	0	0	-243	-306	-218	-261
United States	0	0	-793	-20	-1,893	-4,319
Western Europe	0	0	0	-1,361	-1,675	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-67: Reference Case with 70/30 Fuel/Feedstock split biomass-to-liquids production [Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	68	263	653	1,177
Argentina	0	0	57	110	121	125
Australia	0	0	0	0	0	0
Brazil	0	0	106	320	674	674
Canada	0	0	93	280	401	401
Caribbean basin	0	0	0	0	0	0
China	0	0	57	240	563	563
Colombia	0	0	61	184	431	681
Eastern Europe	0	0	0	0	93	274
Former Soviet Union	0	0	0	0	0	0
India	0	0	77	232	544	544
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	125
Mexico	0	0	72	216	506	556
Other Asia	0	0	89	448	1,090	1,942
South Korea	0	0	36	74	74	74
United States	0	0	822	4,637	6,169	7,919
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>1,538</b>	<b>7,005</b>	<b>11,318</b>	<b>15,055</b>

**Table A-68: Reference Case with 70/30 Fuel/Feedstock split biomass-to-liquids consumption [Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	68	263	653	1,177
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	0	0	0	0	0
Eastern Europe	0	0	0	0	93	274
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	125
Mexico	0	0	0	0	0	0
Other Asia	0	0	89	449	1,090	1,942
South Korea	0	0	0	0	0	0
United States	0	0	1,167	6,164	9,483	10,752
Western Europe	0	0	214	130	0	785
<b>Total</b>	<b>0</b>	<b>0</b>	<b>1,538</b>	<b>7,005</b>	<b>11,318</b>	<b>15,055</b>

**Table A-69: Reference Case with 70/30 Fuel/Feedstock split biomass-to-liquids net trade [Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	93	280	401	401
China	0	0	57	240	563	563
Central and South America	0	0	224	614	1,226	1,480
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	77	232	544	544
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	72	216	506	556
Other Asia	0	0	0	0	0	0
South Korea	0	0	36	74	74	74
United States	0	0	-345	-1,526	-3,314	-2,833
Western Europe	0	0	-214	-130	0	-785
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

# World Biofuels Study

**Table A-70: Reference Case with 70/30 Fuel/Feedstock split biodiesel production**  
[Million gallons ethanol equivalent]

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Argentina	0	333	776	819	827	239
Australia	0	0	0	0	0	0
Brazil	0	333	835	1,600	1,966	1,355
Canada	0	0	0	0	0	0
Caribbean basin	0	95	310	675	802	898
China	0	0	0	0	0	0
Colombia	0	119	298	474	650	782
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	1,238	1,640	1,747	1,907	2,016
Western Europe	998	3,178	3,578	3,930	4,468	4,788
<b>Total</b>	<b>998</b>	<b>5,294</b>	<b>7,437</b>	<b>9,245</b>	<b>10,621</b>	<b>10,077</b>

**Table A-71: Reference Case with 70/30 Fuel/Feedstock split biodiesel consumption**  
[Million gallons ethanol equivalent]

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	158	472	984	1,306	1,490
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	1,238	1,713	1,747	2,080	2,016
Western Europe	998	3,898	5,252	6,514	7,235	6,572
<b>Total</b>	<b>998</b>	<b>5,294</b>	<b>7,437</b>	<b>9,245</b>	<b>10,621</b>	<b>10,077</b>

**Table A-72: Reference Case with 70/30 Fuel/Feedstock split biodiesel net trade**  
**[Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	720	1,746	2,584	2,940	1,784
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	-73	0	-173	0
Western Europe	0	-720	-1,674	-2,584	-2,767	-1,784
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**A-5 Reference Case with High Feedstock Availability****Table A-73: Reference Case with high feedstock availability ethanol production  
[Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	455	502
Argentina	0	170	703	1,512	2,041	1,941
Australia	0	0	71	267	709	1,174
Brazil	4,866	7,863	11,399	16,323	20,461	22,213
Canada	0	0	259	779	1,139	1,139
Caribbean basin	210	280	682	682	682	682
China	344	0	222	993	1,564	3,969
Colombia	196	0	170	512	887	887
Eastern Europe	110	226	428	774	1,037	1,149
Former Soviet Union	0	0	39	119	364	1,109
India	313	833	1,300	1,728	2,200	2,822
Japan	0	0	95	369	612	647
Middle East	0	0	0	0	0	0
Mexico	0	0	199	601	1,053	1,053
Other Asia	0	0	0	0	0	0
South Korea	0	0	31	31	31	31
United States	3,850	11,413	14,840	15,598	15,574	13,655
Western Europe	600	2,465	2,755	3,235	5,205	7,923
<b>Total</b>	<b>10,789</b>	<b>23,580</b>	<b>33,557</b>	<b>43,924</b>	<b>54,014</b>	<b>60,394</b>

**Table A-74: Reference Case with high feedstock availability ethanol consumption**  
[Million gallons]

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	455	502
Australia	0	0	71	267	709	1,174
Canada	145	259	898	984	1,025	1,054
China	297	0	1,296	3,397	4,131	5,062
Central and South America	3,788	4,805	6,111	7,191	7,974	9,509
Eastern Europe	699	783	872	953	1,037	1,149
Former Soviet Union	0	0	39	119	364	1,109
India	313	833	1,300	1,642	1,980	2,399
Japan	263	325	448	757	1,045	1,138
Middle East	0	0	0	0	0	0
Mexico	0	0	30	601	601	1,053
Other Asia	0	0	0	2,166	3,005	3,472
South Korea	264	335	400	414	413	413
United States	3,984	11,668	17,377	19,947	23,712	24,438
Western Europe	736	4,241	4,350	5,086	7,563	7,923
<b>Total</b>	<b>10,789</b>	<b>23,580</b>	<b>33,557</b>	<b>43,924</b>	<b>54,014</b>	<b>60,394</b>

**Table A-75: Reference Case with high feedstock availability ethanol net trade**  
[Million gallons]

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	-145	-259	-640	-205	114	85
China	47	0	-1,075	-2,404	-2,567	-1,093
Central and South America	1,484	3,508	6,843	11,838	16,097	15,712
Eastern Europe	-589	-557	-444	-179	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	86	220	423
Japan	-263	-325	-353	-388	-433	-490
Middle East	0	0	0	0	0	0
Mexico	0	0	170	0	452	0
Other Asia	0	0	0	-2,166	-3,005	-3,472
South Korea	-264	-335	-369	-383	-382	-382
United States	-134	-256	-2,538	-4,349	-8,138	-10,783
Western Europe	-136	-1,776	-1,595	-1,851	-2,358	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-76: Reference Case with high feedstock availability grain ethanol production [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Argentina	0	170	525	1,074	1,495	1,395
Australia	0	0	0	0	0	0
Brazil	0	0	0	0	0	0
Canada	0	0	0	0	0	0
Caribbean basin	0	0	0	0	0	0
China	344	0	0	325	0	0
Colombia	0	0	0	0	0	0
Eastern Europe	110	226	348	477	367	251
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	3,850	11,413	14,038	13,613	11,781	9,863
Western Europe	600	2,465	2,589	2,542	3,178	3,604
<b>Total</b>	<b>4,904</b>	<b>14,273</b>	<b>17,500</b>	<b>18,031</b>	<b>16,821</b>	<b>15,112</b>

**Table A-77: Reference Case with high feedstock availability sugar ethanol production [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	444	490
Argentina	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Brazil	4,866	7,863	11,103	15,434	18,376	18,507
Canada	0	0	0	0	0	0
Caribbean basin	210	280	682	682	682	682
China	0	0	0	0	0	0
Colombia	196	0	0	0	0	0
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	313	833	1,086	1,083	688	78
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	0	0	0	0
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>5,884</b>	<b>9,306</b>	<b>13,236</b>	<b>17,601</b>	<b>20,190</b>	<b>19,757</b>

# World Biofuels Study

**Table A-78: Reference Case with high feedstock availability cellulosic ethanol production [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	11	11
Argentina	0	0	178	438	547	547
Australia	0	0	71	267	709	1,174
Brazil	0	0	296	890	2,085	3,706
Canada	0	0	259	779	1,139	1,139
Caribbean basin	0	0	0	0	0	0
China	0	0	222	667	1,564	3,969
Colombia	0	0	170	512	887	887
Eastern Europe	0	0	80	297	670	897
Former Soviet Union	0	0	39	119	364	1,109
India	0	0	214	645	1,512	2,744
Japan	0	0	95	369	612	647
Middle East	0	0	0	0	0	0
Mexico	0	0	199	601	1,053	1,053
Other Asia	0	0	0	0	0	0
South Korea	0	0	31	31	31	31
United States	0	0	802	1,986	3,793	3,793
Western Europe	0	0	166	693	2,027	4,320
<b>Total</b>	<b>0</b>	<b>0</b>	<b>2,821</b>	<b>8,292</b>	<b>17,003</b>	<b>26,026</b>

**Table A-79: Reference Case with high feedstock availability grain ethanol consumption [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	344	0	51	325	0	0
Central and South America	0	34	106	142	208	0
Eastern Europe	110	226	348	477	367	251
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	932	905	0
South Korea	0	136	369	0	382	0
United States	3,850	11,413	14,038	13,613	11,781	9,863
Western Europe	600	2,465	2,589	2,542	3,178	3,604
<b>Total</b>	<b>4,904</b>	<b>14,273</b>	<b>17,500</b>	<b>18,031</b>	<b>16,821</b>	<b>13,718</b>



**Table A-80: Reference Case with high feedstock availability sugar ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	444	490
Australia	0	0	0	0	0	0
Canada	145	259	640	205	0	0
China	0	0	1,024	2,318	2,233	585
Central and South America	3,788	4,771	5,980	6,917	7,634	8,425
Eastern Europe	589	557	444	179	0	0
Former Soviet Union	0	0	0	0	0	0
India	313	833	1,086	1,083	688	78
Japan	263	325	353	388	433	490
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	464	0
Other Asia	0	0	0	1,234	2,100	3,472
South Korea	217	199	0	0	0	359
United States	134	256	1,750	3,137	3,837	5,858
Western Europe	136	1,776	1,595	1,738	2,358	0
<b>Total</b>	<b>5,884</b>	<b>9,306</b>	<b>13,236</b>	<b>17,601</b>	<b>20,190</b>	<b>19,757</b>

**Table A-81: Reference Case with high feedstock availability cellulosic ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	11	11
Australia	0	0	71	267	709	1,174
Canada	0	0	259	779	1,025	1,054
China	0	0	222	754	1,898	4,477
Central and South America	0	0	26	132	133	191
Eastern Europe	0	0	80	297	670	897
Former Soviet Union	0	0	39	119	364	1,109
India	0	0	214	559	1,292	2,321
Japan	0	0	95	369	612	647
Middle East	0	0	0	0	0	0
Mexico	0	0	30	601	137	1,053
Other Asia	0	0	0	0	0	0
South Korea	0	0	31	414	31	54
United States	0	0	1,590	3,197	8,094	8,717
Western Europe	0	0	166	806	2,027	4,320
<b>Total</b>	<b>0</b>	<b>0</b>	<b>2,821</b>	<b>8,292</b>	<b>17,003</b>	<b>26,026</b>

# World Biofuels Study

**Table A-82: Reference Case with high feedstock availability grain ethanol net trade**  
[Million gallons]

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	-51	0	0	0
Central and South America	0	136	420	932	1,287	0
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	-932	-905	0
South Korea	0	-136	-369	0	-382	0
United States	0	0	0	0	0	0
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-83: Reference Case with high feedstock availability sugar ethanol net trade**  
[Million gallons]

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	-145	-259	-640	-205	0	0
China	0	0	-1,024	-2,318	-2,233	-585
Central and South America	1,484	3,372	5,806	9,199	11,424	10,764
Eastern Europe	-589	-557	-444	-179	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	-263	-325	-353	-388	-433	-490
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	-464	0
Other Asia	0	0	0	-1,234	-2,100	-3,472
South Korea	-217	-199	0	0	0	-359
United States	-134	-256	-1,750	-3,137	-3,837	-5,858
Western Europe	-136	-1,776	-1,595	-1,738	-2,358	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-84: Reference Case with high feedstock availability cellulosic ethanol net trade [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	114	85
China	0	0	0	-86	-334	-509
Central and South America	0	0	618	1,708	3,386	4,948
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	86	220	423
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	170	0	916	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	-383	0	-23
United States	0	0	-788	-1,212	-4,301	-4,925
Western Europe	0	0	0	-113	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-85: Reference Case with high feedstock availability biomass-to-liquids production [Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	68	263	653	1,177
Argentina	0	0	64	158	197	197
Australia	0	0	0	0	0	0
Brazil	0	0	106	320	750	1,333
Canada	0	0	93	280	410	410
Caribbean basin	0	0	0	0	0	0
China	0	0	80	240	563	563
Colombia	0	0	61	184	319	319
Eastern Europe	0	0	0	0	85	262
Former Soviet Union	0	0	0	0	0	0
India	0	0	77	232	544	987
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	125
Mexico	0	0	72	216	379	379
Other Asia	0	0	89	448	1,090	1,942
South Korea	0	0	36	66	66	66
United States	0	0	822	4,236	5,656	7,265
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>1,567</b>	<b>6,643</b>	<b>10,710</b>	<b>15,024</b>

**Table A-86: Reference Case with high feedstock availability biomass-to-liquids consumption [Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	68	263	653	1,177
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	0	0	0	0	0
Eastern Europe	0	0	0	0	85	262
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	125
Mexico	0	0	0	0	0	0
Other Asia	0	0	89	449	1,090	1,942
South Korea	0	0	0	0	0	0
United States	0	0	1,410	5,932	8,883	11,518
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>1,567</b>	<b>6,643</b>	<b>10,710</b>	<b>15,024</b>

**Table A-87: Reference Case with high feedstock availability biomass-to-liquids net trade [Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	93	280	410	410
China	0	0	80	240	563	563
Central and South America	0	0	232	662	1,266	1,849
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	77	232	544	987
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	72	216	379	379
Other Asia	0	0	0	0	0	0
South Korea	0	0	36	66	66	66
United States	0	0	-589	-1,696	-3,227	-4,253
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

# World Biofuels Study

**Table A-88: Reference Case with high feedstock availability biodiesel production**  
[Million gallons ethanol equivalent]

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Argentina	0	333	877	1,706	1,853	0
Australia	0	0	0	0	0	0
Brazil	0	333	877	1,579	1,579	1,115
Canada	0	0	0	0	0	0
Caribbean basin	0	95	310	742	1,611	3,359
China	0	0	0	0	0	0
Colombia	0	119	358	838	1,648	2,074
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	1,182	1,640	1,747	1,850	2,016
Western Europe	998	3,178	3,578	3,930	4,468	4,788
<b>Total</b>	<b>998</b>	<b>5,238</b>	<b>7,639</b>	<b>10,542</b>	<b>13,009</b>	<b>13,351</b>

**Table A-89: Reference Case with high feedstock availability biodiesel consumption**  
[Million gallons ethanol equivalent]

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	158	472	984	1,306	1,490
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	1,182	1,713	2,751	4,382	4,279
Western Europe	998	3,898	5,454	6,807	7,321	7,582
<b>Total</b>	<b>998</b>	<b>5,238</b>	<b>7,639</b>	<b>10,542</b>	<b>13,009</b>	<b>13,351</b>

**Table A-90: Reference Case with high feedstock availability biodiesel net trade**  
**[Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	720	1,948	3,881	5,385	5,057
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	-73	-1,004	-2,532	-2,263
Western Europe	0	-720	-1,876	-2,877	-2,853	-2,794
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**A-6 Reference Case with Low Feedstock Availability****Table A-91: Reference case with low feedstock availability ethanol production  
[Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	455	502
Argentina	0	178	865	1,634	1,640	1,640
Australia	0	0	71	267	709	1,174
Brazil	4,866	4,894	6,282	7,362	8,942	11,721
Canada	0	143	401	921	1,136	1,136
Caribbean basin	162	80	34	0	0	0
China	344	366	608	723	1,564	3,969
Colombia	0	196	366	512	539	539
Eastern Europe	110	226	434	798	1,037	1,149
Former Soviet Union	0	0	37	114	347	1,059
India	313	0	214	645	1,512	2,816
Japan	0	0	95	369	612	647
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	42	42	42	42
United States	3,850	11,612	15,802	17,967	21,334	22,930
Western Europe	600	2,570	2,755	3,398	5,291	8,013
<b>Total</b>	<b>10,544</b>	<b>20,594</b>	<b>28,371</b>	<b>35,152</b>	<b>45,160</b>	<b>57,335</b>

**Table A-92: Reference case with low feedstock availability ethanol consumption**  
[Million gallons]

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	455	502
Australia	0	0	71	267	709	1,174
Canada	101	128	361	829	1,022	1,022
China	126	0	0	0	797	4,345
Central and South America	3,764	4,831	6,124	7,172	7,850	8,641
Eastern Europe	699	226	434	927	1,037	1,149
Former Soviet Union	0	0	37	114	347	1,059
India	313	0	214	613	1,361	2,399
Japan	257	132	345	719	1,008	1,100
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	264	0	400	414	413	413
United States	3,984	11,612	15,802	18,446	22,512	27,519
Western Europe	736	3,335	4,218	5,249	7,650	8,013
<b>Total</b>	<b>10,544</b>	<b>20,594</b>	<b>28,371</b>	<b>35,152</b>	<b>45,160</b>	<b>57,335</b>

**Table A-93: Reference case with low feedstock availability ethanol net trade**  
[Million gallons]

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	-101	14	40	92	114	114
China	218	366	608	723	767	-376
Central and South America	1,264	517	1,423	2,335	3,271	5,259
Eastern Europe	-589	0	0	-129	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	32	151	417
Japan	-257	-132	-250	-350	-395	-453
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	-264	0	-358	-372	-371	-371
United States	-134	0	0	-479	-1,178	-4,589
Western Europe	-136	-765	-1,463	-1,851	-2,359	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>



**Table A-94: Reference case with low feedstock availability grain ethanol production**  
[Million gallons]

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Argentina	0	178	640	833	839	839
Australia	0	0	0	0	0	0
Brazil	0	0	0	0	0	0
Canada	0	143	143	143	0	0
Caribbean basin	0	0	0	0	0	0
China	344	366	366	55	0	0
Colombia	0	0	0	0	0	0
Eastern Europe	110	226	348	477	367	251
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	3,850	11,612	15,000	15,000	15,000	15,000
Western Europe	600	2,570	2,589	2,705	3,178	3,604
<b>Total</b>	<b>4,904</b>	<b>15,094</b>	<b>19,085</b>	<b>19,213</b>	<b>19,384</b>	<b>19,694</b>

**Table A-95: Reference case with low feedstock availability sugar ethanol production**  
[Million gallons]

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	444	490
Argentina	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Brazil	4,866	4,894	5,978	6,473	6,857	6,970
Canada	0	0	0	0	0	0
Caribbean basin	162	80	34	0	0	0
China	0	0	0	0	0	0
Colombia	0	196	196	0	0	0
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	313	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	0	0	0	0
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>5,640</b>	<b>5,500</b>	<b>6,572</b>	<b>6,875</b>	<b>7,301</b>	<b>7,460</b>

# World Biofuels Study

**Table A-96: Reference case with low feedstock availability cellulosic ethanol production [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	11	11
Argentina	0	0	225	801	801	801
Australia	0	0	71	267	709	1,174
Brazil	0	0	304	890	2,085	4,751
Canada	0	0	259	779	1,136	1,136
Caribbean basin	0	0	0	0	0	0
China	0	0	243	667	1,564	3,969
Colombia	0	0	170	512	539	539
Eastern Europe	0	0	85	320	670	897
Former Soviet Union	0	0	37	114	347	1,059
India	0	0	214	645	1,512	2,816
Japan	0	0	95	369	612	647
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	42	42	42	42
United States	0	0	802	2,967	6,334	7,930
Western Europe	0	0	166	693	2,113	4,410
<b>Total</b>	<b>0</b>	<b>0</b>	<b>2,713</b>	<b>9,064</b>	<b>18,476</b>	<b>30,181</b>

**Table A-97: Reference case with low feedstock availability grain ethanol consumption [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	128	143	143	0	0
China	126	0	0	0	0	0
Central and South America	0	36	130	212	169	169
Eastern Europe	110	226	348	515	367	251
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	132	250	55	0	299
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	218	0	116	0	0	371
United States	3,850	11,612	15,000	15,000	15,000	15,000
Western Europe	600	2,960	3,099	3,288	3,848	3,604
<b>Total</b>	<b>4,904</b>	<b>15,094</b>	<b>19,085</b>	<b>19,213</b>	<b>19,384</b>	<b>19,694</b>

**Table A-98: Reference case with low feedstock availability sugar ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	444	490
Australia	0	0	0	0	0	0
Canada	101	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	3,764	4,795	5,995	5,993	5,679	4,074
Eastern Europe	589	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	313	0	0	0	0	0
Japan	257	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	46	0	0	0	0	0
United States	134	0	0	479	1,178	2,896
Western Europe	136	375	213	0	0	0
<b>Total</b>	<b>5,640</b>	<b>5,500</b>	<b>6,572</b>	<b>6,875</b>	<b>7,301</b>	<b>7,460</b>

**Table A-99: Reference case with low feedstock availability cellulosic ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	11	11
Australia	0	0	71	267	709	1,174
Canada	0	0	219	687	1,022	1,022
China	0	0	0	0	797	4,345
Central and South America	0	0	0	967	2,002	4,398
Eastern Europe	0	0	85	413	670	897
Former Soviet Union	0	0	37	114	347	1,059
India	0	0	214	613	1,361	2,399
Japan	0	0	95	664	1,008	801
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	284	414	413	42
United States	0	0	802	2,967	6,334	9,623
Western Europe	0	0	906	1,961	3,802	4,410
<b>Total</b>	<b>0</b>	<b>0</b>	<b>2,713</b>	<b>9,064</b>	<b>18,476</b>	<b>30,181</b>

**Table A-100: Reference case with low feedstock availability grain ethanol net trade**  
[Million gallons]

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	14	0	0	0	0
China	218	366	366	55	0	0
Central and South America	0	143	510	620	670	670
Eastern Europe	0	0	0	-37	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	-132	-250	-55	0	-299
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	-218	0	-116	0	0	-371
United States	0	0	0	0	0	0
Western Europe	0	-390	-510	-583	-670	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-81: Reference case with low feedstock availability sugar ethanol net trade**  
[Million gallons]

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	-101	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	1,264	375	213	479	1,178	2,896
Eastern Europe	-589	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	-257	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	-46	0	0	0	0	0
United States	-134	0	0	-479	-1,178	-2,896
Western Europe	-136	-375	-213	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-92: Reference case with low feedstock availability cellulosic ethanol net trade [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	40	92	114	114
China	0	0	243	667	767	-376
Central and South America	0	0	699	1,236	1,424	1,694
Eastern Europe	0	0	0	-92	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	32	151	417
Japan	0	0	0	-295	-395	-154
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	-243	-372	-371	0
United States	0	0	0	0	0	-1,694
Western Europe	0	0	-740	-1,268	-1,689	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-103: Reference case with low feedstock availability biomass-to-liquids production [Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	68	263	653	1,177
Argentina	0	0	81	288	288	288
Australia	0	0	0	0	0	0
Brazil	0	0	97	320	750	1,333
Canada	0	0	93	280	409	409
Caribbean basin	0	0	0	0	0	0
China	0	0	57	240	563	563
Colombia	0	0	61	184	194	194
Eastern Europe	0	0	0	0	116	311
Former Soviet Union	0	0	0	0	0	0
India	0	0	77	232	544	1,001
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	125
Mexico	0	0	0	0	0	0
Other Asia	0	0	89	448	1,090	1,942
South Korea	0	0	43	89	89	89
United States	0	0	822	3,911	5,242	6,736
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>1,488</b>	<b>6,255</b>	<b>9,936</b>	<b>14,167</b>

**Table A-104: Reference case with low feedstock availability biomass-to-liquids consumption [Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	68	263	653	1,177
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	0	0	0	0	0
Eastern Europe	0	0	0	0	116	311
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	125
Mexico	0	0	0	0	0	0
Other Asia	0	0	89	449	1,090	1,942
South Korea	0	0	0	0	0	0
United States	0	0	895	4,215	7,259	10,612
Western Europe	0	0	436	1,329	819	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>1,488</b>	<b>6,255</b>	<b>9,936</b>	<b>14,167</b>

**Table A-105: Reference case with low feedstock availability biomass-to-liquids net trade [Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	93	280	409	409
China	0	0	57	240	563	563
Central and South America	0	0	239	792	1,232	1,815
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	77	232	544	1,001
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	43	89	89	89
United States	0	0	-73	-304	-2,017	-3,876
Western Europe	0	0	-436	-1,329	-819	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

# World Biofuels Study

**Table A-106: Reference case with low feedstock availability biodiesel production**  
[Million gallons ethanol equivalent]

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Argentina	0	333	877	1,491	1,472	1,155
Australia	0	0	0	0	0	0
Brazil	0	333	835	1,473	1,627	1,330
Canada	0	0	0	0	0	0
Caribbean basin	0	95	310	742	1,145	1,220
China	0	0	0	0	0	0
Colombia	0	0	0	0	0	0
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	1,238	1,640	1,803	1,907	2,072
Western Europe	998	2,910	3,578	3,930	4,468	4,788
<b>Total</b>	<b>998</b>	<b>4,908</b>	<b>7,239</b>	<b>9,440</b>	<b>10,619</b>	<b>10,564</b>

**Table A-107: Reference case with low feedstock availability biodiesel consumption**  
[Million gallons ethanol equivalent]

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	126	438	936	1,262	1,448
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	1,238	2,494	4,000	3,787	2,104
Western Europe	998	3,544	4,307	4,504	5,570	7,012
<b>Total</b>	<b>998</b>	<b>4,908</b>	<b>7,239</b>	<b>9,440</b>	<b>10,619</b>	<b>10,564</b>

**Table A-108: Reference case with low feedstock availability biodiesel net trade**  
**[Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	634	1,583	2,770	2,982	2,256
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	-854	-2,197	-1,881	-32
Western Europe	0	-634	-729	-574	-1,101	-2,224
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>



**A-7 Reference Case with High Oil Price****Table A-109: Reference case with high oil price ethanol production [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	455	502
Argentina	0	178	810	1,914	1,915	1,915
Australia	0	0	71	246	583	1,172
Brazil	4,866	5,977	7,624	9,752	12,299	13,686
Canada	0	0	259	779	1,053	1,057
Caribbean basin	210	360	573	683	779	890
China	344	384	687	1,171	2,371	3,561
Colombia	196	215	411	782	1,501	2,231
Eastern Europe	110	226	428	712	1,037	1,055
Former Soviet Union	0	0	39	120	367	1,120
India	313	279	541	992	1,893	2,822
Japan	0	0	95	369	609	727
Middle East	0	0	0	0	0	0
Mexico	0	0	199	601	1,408	1,546
Other Asia	0	0	0	0	0	0
South Korea	0	0	42	42	42	42
United States	3,850	11,612	15,802	17,258	20,065	22,205
Western Europe	600	2,570	2,755	3,235	5,291	8,013
<b>Total</b>	<b>10,789</b>	<b>22,131</b>	<b>30,701</b>	<b>39,057</b>	<b>51,670</b>	<b>62,541</b>

**Table A-110: Reference case with high oil price ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	455	502
Australia	0	0	71	246	583	1,172
Canada	145	0	259	895	948	951
China	265	0	0	1,511	4,132	5,063
Central and South America	3,788	4,856	6,156	7,284	8,060	8,966
Eastern Europe	699	226	872	953	1,037	1,055
Former Soviet Union	0	0	39	120	367	1,120
India	313	279	541	992	1,893	2,399
Japan	295	320	424	757	1,042	1,194
Middle East	0	0	0	0	0	0
Mexico	0	0	30	601	1,030	1,052
Other Asia	0	0	0	0	497	3,472
South Korea	264	335	400	414	413	413
United States	3,984	11,612	17,268	19,797	23,562	27,170
Western Europe	736	4,173	4,276	5,086	7,650	8,013
<b>Total</b>	<b>10,789</b>	<b>22,131</b>	<b>30,701</b>	<b>39,057</b>	<b>51,670</b>	<b>62,541</b>

**Table A-111: Reference case with high oil price ethanol net trade [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	-145	0	0	-116	105	106
China	80	384	687	-340	-1,761	-1,502
Central and South America	1,484	1,874	3,262	5,847	8,434	9,755
Eastern Europe	-589	0	-444	-241	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	423
Japan	-295	-320	-329	-388	-433	-467
Middle East	0	0	0	0	0	0
Mexico	0	0	170	0	378	493
Other Asia	0	0	0	0	-497	-3,472
South Korea	-264	-335	-358	-372	-371	-371
United States	-134	0	-1,466	-2,538	-3,497	-4,965
Western Europe	-136	-1,604	-1,521	-1,851	-2,359	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

# World Biofuels Study

**Table A-112: Reference case with high oil price grain ethanol production**  
[Million gallons]

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Argentina	0	178	604	1,153	1,153	1,153
Australia	0	0	0	0	0	0
Brazil	0	0	0	0	0	0
Canada	0	0	0	0	0	0
Caribbean basin	0	0	0	0	0	0
China	344	344	344	344	344	223
Colombia	0	0	0	0	0	0
Eastern Europe	110	226	348	477	567	451
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	3,850	11,612	15,000	15,000	15,000	15,000
Western Europe	600	2,570	2,589	2,542	3,178	3,604
<b>Total</b>	<b>4,904</b>	<b>14,930</b>	<b>18,886</b>	<b>19,517</b>	<b>20,242</b>	<b>20,431</b>

**Table A-113: Reference case with high oil price sugar ethanol production**  
[Million gallons]

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	444	490
Argentina	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Brazil	4,866	5,977	7,329	8,862	10,406	11,793
Canada	0	0	0	0	0	0
Caribbean basin	210	360	573	683	779	890
China	0	40	48	53	58	64
Colombia	196	215	241	270	302	338
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	313	279	327	347	381	348
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	0	0	0	0
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>5,884</b>	<b>7,201</b>	<b>8,882</b>	<b>10,616</b>	<b>12,371</b>	<b>13,923</b>

# World Biofuels Study

**Table A-114: Reference case with high oil price cellulosic ethanol production**  
[Million gallons]

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	11	11
Argentina	0	0	206	762	762	762
Australia	0	0	71	246	583	1,172
Brazil	0	0	296	890	1,893	1,893
Canada	0	0	259	779	1,053	1,057
Caribbean basin	0	0	0	0	0	0
China	0	0	296	774	1,970	3,275
Colombia	0	0	170	512	1,199	1,893
Eastern Europe	0	0	80	235	470	604
Former Soviet Union	0	0	39	120	367	1,120
India	0	0	214	645	1,512	2,475
Japan	0	0	95	369	609	727
Middle East	0	0	0	0	0	0
Mexico	0	0	199	601	1,408	1,546
Other Asia	0	0	0	0	0	0
South Korea	0	0	42	42	42	42
United States	0	0	802	2,258	5,065	7,205
Western Europe	0	0	166	693	2,113	4,410
<b>Total</b>	<b>0</b>	<b>0</b>	<b>2,934</b>	<b>8,924</b>	<b>19,056</b>	<b>28,188</b>

**Table A-115: Reference case with high oil price grain ethanol consumption**  
[Million gallons]

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	265	0	0	488	868	223
Central and South America	0	36	122	249	196	196
Eastern Europe	110	226	348	477	567	451
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	192	281	388	433	467
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	491
South Korea	80	295	63	372	0	0
United States	3,850	11,612	15,000	15,000	15,000	15,000
Western Europe	600	2,570	3,072	2,542	3,178	3,604
<b>Total</b>	<b>4,904</b>	<b>14,930</b>	<b>18,886</b>	<b>19,517</b>	<b>20,242</b>	<b>20,431</b>

**Table A-116: Reference case with high oil price sugar ethanol consumption**  
[Million gallons]

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	444	490
Australia	0	0	0	0	0	0
Canada	145	0	0	116	0	0
China	0	0	0	53	799	1,037
Central and South America	3,788	4,820	6,035	7,008	7,653	8,770
Eastern Europe	589	0	444	153	0	0
Former Soviet Union	0	0	0	0	0	0
India	313	279	327	347	381	348
Japan	295	128	48	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	346
South Korea	185	40	0	0	0	4
United States	134	0	788	2,538	3,094	2,928
Western Europe	136	1,604	876	0	0	0
<b>Total</b>	<b>5,884</b>	<b>7,201</b>	<b>8,882</b>	<b>10,616</b>	<b>12,371</b>	<b>13,923</b>

**Table A-117: Reference case with high oil price cellulosic ethanol consumption**  
[Million gallons]

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	11	11
Australia	0	0	71	246	583	1,172
Canada	0	0	259	779	948	951
China	0	0	0	971	2,465	3,804
Central and South America	0	0	0	27	211	0
Eastern Europe	0	0	80	323	470	604
Former Soviet Union	0	0	39	120	367	1,120
India	0	0	214	645	1,512	2,051
Japan	0	0	95	369	609	727
Middle East	0	0	0	0	0	0
Mexico	0	0	30	601	1,030	1,052
Other Asia	0	0	0	0	497	2,636
South Korea	0	0	337	42	413	409
United States	0	0	1,480	2,258	5,469	9,242
Western Europe	0	0	328	2,544	4,472	4,410
<b>Total</b>	<b>0</b>	<b>0</b>	<b>2,934</b>	<b>8,924</b>	<b>19,056</b>	<b>28,188</b>

# World Biofuels Study

**Table A-118: Reference case with high oil price grain ethanol net trade**  
[Million gallons]

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	80	344	344	-144	-524	0
Central and South America	0	143	483	904	957	957
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	-192	-281	-388	-433	-467
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	-491
South Korea	-80	-295	-63	-372	0	0
United States	0	0	0	0	0	0
Western Europe	0	0	-483	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-119: Reference case with high oil price sugar ethanol net trade**  
[Million gallons]

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	-145	0	0	-116	0	0
China	0	40	48	0	-741	-973
Central and South America	1,484	1,732	2,108	2,807	3,835	4,251
Eastern Europe	-589	0	-444	-153	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	-295	-128	-48	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	-346
South Korea	-185	-40	0	0	0	-4
United States	-134	0	-788	-2,538	-3,094	-2,928
Western Europe	-136	-1,604	-876	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-120: Reference case with high oil price cellulosic ethanol net trade**  
[Million gallons]

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	105	106
China	0	0	296	-197	-495	-529
Central and South America	0	0	671	2,136	3,643	4,547
Eastern Europe	0	0	0	-89	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	423
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	170	0	378	493
Other Asia	0	0	0	0	-497	-2,636
South Korea	0	0	-296	0	-371	-367
United States	0	0	-678	0	-403	-2,037
Western Europe	0	0	-162	-1,851	-2,359	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-121: Reference case with high oil price biomass-to-liquids production**  
[Million gallons ethanol equivalent]

	2005	2010	2015	2020	2025	2030
Africa	0	0	82	415	921	1,584
Argentina	0	0	74	274	274	274
Australia	0	0	0	46	217	474
Brazil	0	0	106	320	681	681
Canada	0	0	93	280	379	379
Caribbean basin	0	0	0	0	0	0
China	0	0	0	125	125	125
Colombia	0	0	61	184	431	681
Eastern Europe	0	0	0	125	376	731
Former Soviet Union	0	0	44	213	553	1,016
India	0	0	77	232	544	890
Japan	0	0	0	0	0	0
Middle East	0	0	0	111	348	685
Mexico	0	0	72	216	506	556
Other Asia	0	0	96	554	1,511	2,682
South Korea	0	0	43	89	89	89
United States	0	0	822	4,818	6,399	8,213
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>1,569</b>	<b>8,001</b>	<b>13,353</b>	<b>19,060</b>

**Table A-122: Reference case with high oil price biomass-to-liquids consumption**  
**[Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	82	415	921	1,585
Australia	0	0	0	46	217	474
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	0	0	0	0	0
Eastern Europe	0	0	0	125	377	731
Former Soviet Union	0	0	44	213	554	1,016
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	111	348	685
Mexico	0	0	0	0	0	0
Other Asia	0	0	96	554	1,511	2,683
South Korea	0	0	0	0	0	0
United States	0	0	1,069	6,058	9,428	10,993
Western Europe	0	0	279	480	0	894
<b>Total</b>	<b>0</b>	<b>0</b>	<b>1,569</b>	<b>8,001</b>	<b>13,354</b>	<b>19,061</b>

**Table A-123: Reference case with high oil price biomass-to-liquids net trade**  
**[Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	93	280	379	379
China	0	0	0	125	125	125
Central and South America	0	0	241	778	1,386	1,635
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	77	232	544	890
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	72	216	506	556
Other Asia	0	0	0	0	0	0
South Korea	0	0	43	89	89	89
United States	0	0	-247	-1,240	-3,029	-2,780
Western Europe	0	0	-279	-480	0	-894
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>-1</b>



# World Biofuels Study

**Table A-124: Reference case with high oil price biodiesel production**  
[Million gallons ethanol equivalent]

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Argentina	0	333	776	819	827	239
Australia	0	0	0	0	0	0
Brazil	0	333	877	1,579	1,768	1,351
Canada	0	0	0	0	0	0
Caribbean basin	0	95	310	675	802	898
China	0	0	0	0	0	0
Colombia	0	119	298	474	650	782
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	1,238	1,640	1,747	1,907	2,072
Western Europe	998	3,445	4,172	5,110	5,532	5,997
<b>Total</b>	<b>998</b>	<b>5,561</b>	<b>8,072</b>	<b>10,403</b>	<b>11,485</b>	<b>11,339</b>

**Table A-125: Reference case with high oil price biodiesel consumption**  
[Million gallons ethanol equivalent]

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	158	458	969	1,300	1,486
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	1,238	1,713	1,941	1,907	2,072
Western Europe	998	4,165	5,902	7,494	8,278	7,781
<b>Total</b>	<b>998</b>	<b>5,561</b>	<b>8,072</b>	<b>10,403</b>	<b>11,485</b>	<b>11,339</b>

**Table A-126: Reference case with high oil price biodiesel net trade**  
**[Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	720	1,803	2,577	2,747	1,784
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	-73	-194	0	0
Western Europe	0	-720	-1,730	-2,384	-2,747	-1,784
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**A-8 Reference Case with Low Oil Price****Table A-127: Reference case with low oil price ethanol production [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	455	490
Argentina	0	178	810	910	940	532
Australia	0	0	66	247	616	1,172
Brazil	4,866	5,977	7,624	9,539	11,603	13,338
Canada	0	0	259	779	1,069	1,069
Caribbean basin	210	328	573	597	597	597
China	344	384	634	993	1,564	1,564
Colombia	196	215	411	782	1,469	2,163
Eastern Europe	110	226	434	780	1,037	1,149
Former Soviet Union	0	0	0	0	0	0
India	313	275	534	974	1,850	2,527
Japan	0	0	95	348	612	644
Middle East	0	0	0	0	0	0
Mexico	0	0	199	601	1,408	1,546
Other Asia	0	0	0	0	0	0
South Korea	0	0	35	35	25	35
United States	3,850	11,612	15,802	17,094	18,336	18,836
Western Europe	600	2,549	2,755	3,398	5,291	8,013
<b>Total</b>	<b>10,788</b>	<b>22,074</b>	<b>30,595</b>	<b>37,477</b>	<b>46,871</b>	<b>53,673</b>

**Table A-128: Reference case with low oil price ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	455	490
Australia	0	0	66	247	616	1,172
Canada	145	0	233	701	1,069	1,061
China	263	0	0	263	780	771
Central and South America	3,788	4,853	6,156	7,149	7,948	8,803
Eastern Europe	699	226	872	953	1,037	1,149
Former Soviet Union	0	0	0	0	0	0
India	313	275	534	974	1,850	2,399
Japan	263	250	364	698	1,008	1,060
Middle East	0	0	0	0	0	0
Mexico	0	0	30	78	183	201
Other Asia	0	0	0	0	0	0
South Korea	264	335	400	414	413	413
United States	4,018	11,612	17,232	20,349	23,862	27,880
Western Europe	736	4,193	4,344	5,249	7,649	8,276
<b>Total</b>	<b>10,788</b>	<b>22,074</b>	<b>30,595</b>	<b>37,477</b>	<b>46,871</b>	<b>53,673</b>

**Table A-129: Reference case with low oil price ethanol net trade [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	-145	0	26	78	0	8
China	81	384	634	730	784	794
Central and South America	1,484	1,845	3,262	4,678	6,660	7,827
Eastern Europe	-589	0	-438	-173	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	128
Japan	-263	-250	-269	-350	-395	-415
Middle East	0	0	0	0	0	0
Mexico	0	0	170	523	1,225	1,345
Other Asia	0	0	0	0	0	0
South Korea	-264	-335	-365	-379	-388	-378
United States	-168	0	-1,430	-3,255	-5,526	-9,045
Western Europe	-136	-1,644	-1,589	-1,851	-2,358	-263
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-130: Reference case with low oil price grain ethanol production**  
[Million gallons]

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Argentina	0	178	604	604	604	185
Australia	0	0	0	0	0	0
Brazil	0	0	0	0	0	0
Canada	0	0	0	0	0	0
Caribbean basin	0	0	0	0	0	0
China	344	344	344	325	0	0
Colombia	0	0	0	0	0	0
Eastern Europe	110	226	348	477	367	251
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	3,850	11,612	15,000	15,000	14,815	14,015
Western Europe	600	2,549	2,589	2,705	3,178	3,604
<b>Total</b>	<b>4,904</b>	<b>14,909</b>	<b>18,886</b>	<b>19,112</b>	<b>18,964</b>	<b>18,055</b>

**Table A-131: Reference case with low oil price sugar ethanol production**  
[Million gallons]

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	444	490
Argentina	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Brazil	4,866	5,977	7,329	8,649	10,057	11,793
Canada	0	0	0	0	0	0
Caribbean basin	210	328	573	597	597	597
China	0	40	48	0	0	0
Colombia	196	215	241	270	270	270
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	313	275	320	329	338	332
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	0	0	0	0
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>5,884</b>	<b>7,165</b>	<b>8,874</b>	<b>10,246</b>	<b>11,706</b>	<b>13,481</b>

# World Biofuels Study

**Table A-132: Reference case with low oil price cellulosic ethanol production**  
[Million gallons]

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	11	0
Argentina	0	0	206	306	335	347
Australia	0	0	66	247	616	1,172
Brazil	0	0	296	890	1,546	1,546
Canada	0	0	259	779	1,069	1,069
Caribbean basin	0	0	0	0	0	0
China	0	0	243	667	1,564	1,564
Colombia	0	0	170	512	1,199	1,893
Eastern Europe	0	0	85	303	670	897
Former Soviet Union	0	0	0	0	0	0
India	0	0	214	645	1,512	2,196
Japan	0	0	95	348	612	644
Middle East	0	0	0	0	0	0
Mexico	0	0	199	601	1,408	1,546
Other Asia	0	0	0	0	0	0
South Korea	0	0	35	35	25	35
United States	0	0	802	2,094	3,521	4,820
Western Europe	0	0	166	693	2,113	4,410
<b>Total</b>	<b>0</b>	<b>0</b>	<b>2,835</b>	<b>8,118</b>	<b>16,201</b>	<b>22,137</b>

**Table A-133: Reference case with low oil price grain ethanol consumption**  
[Million gallons]

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	263	0	0	263	0	0
Central and South America	0	36	122	118	98	58
Eastern Europe	110	226	348	477	367	251
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	192	221	62	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	81	295	123	0	0	0
United States	3,850	11,612	15,000	15,000	14,815	14,015
Western Europe	600	2,549	3,072	3,191	3,684	3,731
<b>Total</b>	<b>4,904</b>	<b>14,909</b>	<b>18,886</b>	<b>19,112</b>	<b>18,964</b>	<b>18,055</b>

**Table A-134: Reference case with low oil price sugar ethanol consumption**  
[Million gallons]

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	444	490
Australia	0	0	0	0	0	0
Canada	145	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	3,788	4,818	6,035	6,631	7,850	8,690
Eastern Europe	589	0	412	96	0	0
Former Soviet Union	0	0	0	0	0	0
India	313	275	320	329	338	332
Japan	263	58	48	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	183	40	0	0	0	0
United States	168	0	788	2,732	2,756	3,969
Western Europe	136	1,644	908	57	318	0
<b>Total</b>	<b>5,884</b>	<b>7,165</b>	<b>8,874</b>	<b>10,246</b>	<b>11,706</b>	<b>13,481</b>

**Table A-135: Reference case with low oil price cellulosic ethanol consumption**  
[Million gallons]

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	11	0
Australia	0	0	66	247	616	1,172
Canada	0	0	233	701	1,069	1,061
China	0	0	0	0	780	771
Central and South America	0	0	0	400	0	55
Eastern Europe	0	0	111	380	670	897
Former Soviet Union	0	0	0	0	0	0
India	0	0	214	645	1,512	2,067
Japan	0	0	95	636	1,008	1,060
Middle East	0	0	0	0	0	0
Mexico	0	0	30	78	183	201
Other Asia	0	0	0	0	0	0
South Korea	0	0	277	414	413	413
United States	0	0	1,444	2,617	6,291	9,896
Western Europe	0	0	365	2,000	3,648	4,546
<b>Total</b>	<b>0</b>	<b>0</b>	<b>2,835</b>	<b>8,118</b>	<b>16,201</b>	<b>22,137</b>

# World Biofuels Study

**Table A-136: Reference case with low oil price grain ethanol net trade**  
[Million gallons]

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	81	344	344	62	0	0
Central and South America	0	143	483	486	506	127
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	-192	-221	-62	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	-81	-295	-123	0	0	0
United States	0	0	0	0	0	0
Western Europe	0	0	-483	-486	-506	-127
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-137: Reference case with low oil price sugar ethanol net trade**  
[Million gallons]

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	-145	0	0	0	0	0
China	0	40	48	0	0	0
Central and South America	1,484	1,702	2,108	2,885	3,074	3,969
Eastern Europe	-589	0	-412	-96	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	-263	-58	-48	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	-183	-40	0	0	0	0
United States	-168	0	-788	-2,732	-2,756	-3,969
Western Europe	-136	-1,644	-908	-57	-318	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>



**Table A-138: Reference case with low oil price cellulosic ethanol net trade**  
**[Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	26	78	0	8
China	0	0	243	667	784	794
Central and South America	0	0	671	1,308	3,080	3,731
Eastern Europe	0	0	-26	-78	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	128
Japan	0	0	0	-288	-395	-415
Middle East	0	0	0	0	0	0
Mexico	0	0	170	523	1,225	1,345
Other Asia	0	0	0	0	0	0
South Korea	0	0	-243	-379	-388	-378
United States	0	0	-642	-523	-2,770	-5,076
Western Europe	0	0	-199	-1,308	-1,535	-136
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-139: Reference case with low oil price biomass-to-liquids production**  
**[Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Argentina	0	0	74	110	121	125
Australia	0	0	0	0	0	0
Brazil	0	0	106	320	556	556
Canada	0	0	93	280	384	384
Caribbean basin	0	0	0	0	0	0
China	0	0	57	240	563	563
Colombia	0	0	61	184	431	681
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	77	232	544	790
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	72	216	506	556
Other Asia	0	0	0	188	565	1,097
South Korea	0	0	36	74	74	74
United States	0	0	822	4,468	5,952	7,643
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>1,398</b>	<b>6,312</b>	<b>9,696</b>	<b>12,468</b>

**Table A-140: Reference case with low oil price biomass-to-liquids consumption**  
**[Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	0	0	0	0	0
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	188	565	1,097
South Korea	0	0	0	0	0	0
United States	0	0	1,172	5,987	9,131	10,340
Western Europe	0	0	226	138	0	1,032
<b>Total</b>	<b>0</b>	<b>0</b>	<b>1,398</b>	<b>6,312</b>	<b>9,696</b>	<b>12,468</b>

**Table A-141: Reference case with low oil price biomass-to-liquids net trade**  
**[Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	93	280	384	384
China	0	0	57	240	563	563
Central and South America	0	0	241	614	1,108	1,362
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	77	232	544	790
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	72	216	506	556
Other Asia	0	0	0	0	0	0
South Korea	0	0	36	74	74	74
United States	0	0	-350	-1,519	-3,179	-2,697
Western Europe	0	0	-226	-138	0	-1,032
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

# World Biofuels Study

**Table A-142: Reference case with low oil price biodiesel production**  
[Million gallons ethanol equivalent]

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Argentina	0	333	776	819	827	239
Australia	0	0	0	0	0	0
Brazil	0	333	835	1,600	2,469	1,359
Canada	0	0	0	0	0	0
Caribbean basin	0	95	310	675	802	898
China	0	0	0	0	0	0
Colombia	0	119	298	474	650	782
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	1,238	1,640	1,747	1,907	2,016
Western Europe	998	2,643	3,281	3,307	3,760	4,114
<b>Total</b>	<b>998</b>	<b>4,760</b>	<b>7,140</b>	<b>8,622</b>	<b>10,415</b>	<b>9,408</b>

**Table A-143: Reference case with low oil price biodiesel consumption**  
[Million gallons ethanol equivalent]

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	158	477	985	1,309	1,494
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	1,238	1,713	1,747	2,429	2,016
Western Europe	998	3,364	4,951	5,890	6,677	5,898
<b>Total</b>	<b>998</b>	<b>4,760</b>	<b>7,140</b>	<b>8,622</b>	<b>10,415</b>	<b>9,408</b>

**Table A-144: Reference case with low oil price biodiesel net trade**  
**[Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	720	1,742	2,583	3,440	1,784
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	-73	0	-523	0
Western Europe	0	-720	-1,670	-2,583	-2,917	-1,784
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

## A-9 Reference Case with High Oil Price and High Feedstock Availability

**Table A-145: Reference case with high oil price and high feedstock availability ethanol production [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	455	502
Argentina	0	178	788	1,591	2,010	781
Australia	0	0	71	246	583	1,172
Brazil	5,225	8,034	12,103	16,323	20,293	24,835
Canada	0	0	259	779	1,054	1,067
Caribbean basin	164	282	687	795	795	795
China	344	119	587	1,350	1,922	3,937
Colombia	0	0	170	512	887	960
Eastern Europe	110	226	399	632	1,037	1,055
Former Soviet Union	0	0	39	120	367	1,120
India	313	842	1,300	1,728	2,200	2,822
Japan	0	0	95	369	609	727
Middle East	0	0	0	0	0	0
Mexico	0	0	199	601	1,088	1,088
Other Asia	0	0	0	0	0	0
South Korea	0	0	35	35	35	35
United States	3,850	11,413	14,840	15,918	15,775	15,653
Western Europe	600	2,465	2,755	3,235	5,205	7,923
<b>Total</b>	<b>10,905</b>	<b>23,889</b>	<b>34,690</b>	<b>44,636</b>	<b>54,316</b>	<b>64,471</b>

**Table A-146: Reference case with high oil price and high feedstock availability  
ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	455	502
Australia	0	0	71	333	803	1,174
Canada	103	261	851	895	949	960
China	442	297	2,465	3,397	4,132	5,063
Central and South America	3,764	4,807	6,124	7,207	7,977	8,656
Eastern Europe	699	783	872	953	1,037	1,055
Former Soviet Union	0	0	39	120	367	1,120
India	313	842	1,300	1,642	1,980	2,399
Japan	300	325	448	757	1,042	1,217
Middle East	0	0	0	0	0	0
Mexico	0	0	30	998	1,030	1,052
Other Asia	0	0	0	2,637	3,005	3,472
South Korea	264	335	400	414	413	413
United States	3,984	11,668	17,383	19,797	23,562	28,684
Western Europe	736	4,241	4,343	5,086	7,563	8,703
<b>Total</b>	<b>10,905</b>	<b>23,889</b>	<b>34,690</b>	<b>44,636</b>	<b>54,316</b>	<b>64,471</b>

**Table A-147: Reference case with high oil price and high feedstock availability  
ethanol net trade [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	-86	-220	-3
Canada	-103	-261	-592	-116	105	107
China	-98	-178	-1,879	-2,046	-2,211	-1,126
Central and South America	1,624	3,688	7,624	12,014	16,008	18,715
Eastern Europe	-589	-557	-473	-321	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	86	220	423
Japan	-300	-325	-353	-388	-433	-490
Middle East	0	0	0	0	0	0
Mexico	0	0	170	-398	59	36
Other Asia	0	0	0	-2,637	-3,005	-3,472
South Korea	-264	-335	-365	-379	-378	-378
United States	-134	-256	-2,543	-3,879	-7,788	-13,032
Western Europe	-136	-1,776	-1,589	-1,851	-2,358	-780
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-148: Reference case with high oil price and high feedstock availability grain ethanol production [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Argentina	0	178	604	1,153	1,495	234
Australia	0	0	0	0	0	0
Brazil	0	0	0	0	0	0
Canada	0	0	0	0	0	0
Caribbean basin	0	0	0	0	0	0
China	344	0	0	325	0	0
Colombia	0	0	0	0	0	0
Eastern Europe	110	226	348	477	716	600
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	3,850	11,413	14,038	13,660	11,828	11,111
Western Europe	600	2,465	2,589	2,542	3,178	3,604
<b>Total</b>	<b>4,904</b>	<b>14,282</b>	<b>17,579</b>	<b>18,157</b>	<b>17,217</b>	<b>15,549</b>

**Table A-149: Reference case with high oil price and high feedstock availability sugar ethanol production [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	444	490
Argentina	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Brazil	5,225	8,034	11,807	15,433	18,208	20,112
Canada	0	0	0	0	0	0
Caribbean basin	164	282	687	795	795	795
China	0	119	358	358	358	358
Colombia	0	0	0	0	0	0
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	313	842	1,086	1,083	688	40
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	0	0	0	0
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>6,001</b>	<b>9,608</b>	<b>14,302</b>	<b>18,072</b>	<b>20,493</b>	<b>21,795</b>

# World Biofuels Study

**Table A-150: Reference case with high oil price and high feedstock availability  
cellulosic ethanol production [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	11	11
Argentina	0	0	184	438	516	547
Australia	0	0	71	246	583	1,172
Brazil	0	0	296	890	2,085	4,723
Canada	0	0	259	779	1,054	1,067
Caribbean basin	0	0	0	0	0	0
China	0	0	229	667	1,564	3,580
Colombia	0	0	170	512	887	960
Eastern Europe	0	0	51	155	321	455
Former Soviet Union	0	0	39	120	367	1,120
India	0	0	214	645	1,512	2,782
Japan	0	0	95	369	609	727
Middle East	0	0	0	0	0	0
Mexico	0	0	199	601	1,088	1,088
Other Asia	0	0	0	0	0	0
South Korea	0	0	35	35	35	35
United States	0	0	802	2,258	3,946	4,541
Western Europe	0	0	166	693	2,027	4,320
<b>Total</b>	<b>0</b>	<b>0</b>	<b>2,809</b>	<b>8,407</b>	<b>16,606</b>	<b>27,127</b>

**Table A-151: Reference case with high oil price and high feedstock availability grain  
ethanol consumption [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	344	0	121	325	0	0
Central and South America	0	36	118	148	205	82
Eastern Europe	110	226	348	477	716	600
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	153
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	1,005	912	0
South Korea	0	143	365	0	378	0
United States	3,850	11,413	14,038	13,660	11,828	11,111
Western Europe	600	2,465	2,589	2,542	3,178	3,604
<b>Total</b>	<b>4,904</b>	<b>14,282</b>	<b>17,579</b>	<b>18,157</b>	<b>17,217</b>	<b>15,549</b>



**Table A-152: Reference case with high oil price and high feedstock availability  
sugar ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	444	490
Australia	0	0	0	0	0	3
Canada	103	261	592	116	0	0
China	98	297	2,115	2,404	2,463	788
Central and South America	3,764	4,771	5,980	6,923	7,639	8,430
Eastern Europe	589	557	473	321	0	0
Former Soviet Union	0	0	0	0	0	0
India	313	842	1,086	1,083	688	37
Japan	300	325	353	388	433	338
Middle East	0	0	0	0	0	0
Mexico	0	0	0	398	570	0
Other Asia	0	0	0	1,632	2,093	3,472
South Korea	264	193	0	0	0	0
United States	134	256	1,750	3,068	3,805	7,456
Western Europe	136	1,776	1,589	1,337	2,358	780
<b>Total</b>	<b>6,001</b>	<b>9,608</b>	<b>14,302</b>	<b>18,072</b>	<b>20,493</b>	<b>21,795</b>

**Table A-153: Reference case with high oil price and high feedstock availability  
cellulosic ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	11	11
Australia	0	0	71	333	803	1,172
Canada	0	0	259	779	949	960
China	0	0	229	667	1,669	4,276
Central and South America	0	0	26	136	133	144
Eastern Europe	0	0	51	155	321	455
Former Soviet Union	0	0	39	120	367	1,120
India	0	0	214	559	1,292	2,362
Japan	0	0	95	369	609	727
Middle East	0	0	0	0	0	0
Mexico	0	0	30	601	460	1,052
Other Asia	0	0	0	0	0	0
South Korea	0	0	35	414	35	413
United States	0	0	1,595	3,069	7,929	10,117
Western Europe	0	0	166	1,207	2,027	4,320
<b>Total</b>	<b>0</b>	<b>0</b>	<b>2,809</b>	<b>8,407</b>	<b>16,606</b>	<b>27,127</b>

**Table A-154: Reference case with high oil price and high feedstock availability grain ethanol net trade [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	-121	0	0	0
Central and South America	0	143	486	1,005	1,290	153
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	-153
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	-1,005	-912	0
South Korea	0	-143	-365	0	-378	0
United States	0	0	0	0	0	0
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-155: Reference case with high oil price and high feedstock availability sugar ethanol net trade [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	-3
Canada	-103	-261	-592	-116	0	0
China	-98	-178	-1,758	-2,046	-2,105	-430
Central and South America	1,624	3,545	6,514	9,306	11,364	12,476
Eastern Europe	-589	-557	-473	-321	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	3
Japan	-300	-325	-353	-388	-433	-338
Middle East	0	0	0	0	0	0
Mexico	0	0	0	-398	-570	0
Other Asia	0	0	0	-1,632	-2,093	-3,472
South Korea	-264	-193	0	0	0	0
United States	-134	-256	-1,750	-3,068	-3,805	-7,456
Western Europe	-136	-1,776	-1,589	-1,337	-2,358	-780
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-156: Reference case with high oil price and high feedstock availability  
cellulosic ethanol net trade [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	-86	-220	0
Canada	0	0	0	0	105	107
China	0	0	0	0	-105	-696
Central and South America	0	0	624	1,704	3,355	6,086
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	86	220	421
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	170	0	628	36
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	-379	0	-378
United States	0	0	-793	-811	-3,983	-5,576
Western Europe	0	0	0	-514	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-157: Reference case with high oil price and high feedstock availability  
biomass-to-liquids production [Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	82	415	921	1,584
Argentina	0	0	66	158	186	197
Australia	0	0	0	46	217	474
Brazil	0	0	106	320	750	1,363
Canada	0	0	93	280	379	379
Caribbean basin	0	0	0	0	0	0
China	0	0	72	240	563	982
Colombia	0	0	61	184	319	346
Eastern Europe	0	0	38	204	536	988
Former Soviet Union	0	0	44	213	553	1,016
India	0	0	77	232	544	1,001
Japan	0	0	0	0	0	0
Middle East	0	0	0	111	348	685
Mexico	0	0	72	216	391	391
Other Asia	0	0	96	554	1,511	2,519
South Korea	0	0	36	74	74	74
United States	0	0	822	4,818	6,399	8,213
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>1,664</b>	<b>8,064</b>	<b>13,689</b>	<b>20,213</b>

**Table A-158: Reference case with high oil price and high feedstock availability  
biomass-to-liquids consumption [Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	82	415	921	1,585
Australia	0	0	0	46	217	474
Canada	0	0	0	0	0	379
China	0	0	0	0	0	982
Central and South America	0	0	0	0	0	0
Eastern Europe	0	0	38	204	536	988
Former Soviet Union	0	0	44	213	554	1,016
India	0	0	0	0	0	1,001
Japan	0	0	0	0	0	0
Middle East	0	0	0	111	348	685
Mexico	0	0	0	0	0	392
Other Asia	0	0	96	554	1,511	2,519
South Korea	0	0	0	0	0	74
United States	0	0	1,405	6,522	9,604	10,118
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>1,664</b>	<b>8,065</b>	<b>13,689</b>	<b>20,213</b>

**Table A-159: Reference case with high oil price and high feedstock availability  
biomass-to-liquids net trade [Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	93	280	379	0
China	0	0	72	240	563	0
Central and South America	0	0	234	662	1,255	1,905
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	77	232	544	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	72	216	391	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	36	74	74	0
United States	0	0	-583	-1,704	-3,205	-1,905
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-160: Reference case with high oil price and high feedstock availability  
biodiesel production [Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Argentina	0	333	877	1,706	1,815	198
Australia	0	0	0	0	0	0
Brazil	0	333	877	1,579	1,579	1,103
Canada	0	0	0	0	0	0
Caribbean basin	0	95	310	742	1,611	3,359
China	0	0	0	0	0	0
Colombia	0	119	358	838	1,648	2,074
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	1,182	1,640	1,747	1,850	2,016
Western Europe	998	3,445	4,172	5,110	5,532	5,997
<b>Total</b>	<b>998</b>	<b>5,505</b>	<b>8,232</b>	<b>11,722</b>	<b>14,034</b>	<b>14,746</b>

**Table A-161: Reference case with high oil price and high feedstock availability  
biodiesel consumption [Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	158	464	975	1,303	1,488
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	1,182	1,713	2,772	4,367	2,016
Western Europe	998	4,165	6,056	7,974	8,365	11,242
<b>Total</b>	<b>998</b>	<b>5,505</b>	<b>8,232</b>	<b>11,722</b>	<b>14,034</b>	<b>14,746</b>

**Table A-162: Reference case with high oil price and high feedstock availability  
biodiesel net trade [Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	720	1,956	3,889	5,350	5,245
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	-73	-1,025	-2,517	0
Western Europe	0	-720	-1,884	-2,864	-2,833	-5,245
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

## A-10 Reference Case with Low Oil Price and Low Feedstock Availability

**Table A-163: Reference case with low oil price and low feedstock availability  
ethanol production [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	455	490
Argentina	0	178	865	1,634	1,634	895
Australia	0	0	66	247	616	1,172
Brazil	4,866	4,894	6,286	7,371	8,942	11,721
Canada	0	143	401	779	1,199	1,199
Caribbean basin	162	80	34	0	0	0
China	344	366	608	667	1,564	2,532
Colombia	0	196	375	512	512	512
Eastern Europe	110	226	434	780	1,037	1,149
Former Soviet Union	0	0	0	0	0	0
India	313	0	214	645	1,512	2,816
Japan	0	0	95	348	612	644
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	35	35	35	19
United States	3,850	11,612	15,802	17,643	20,834	22,159
Western Europe	600	2,570	2,755	3,398	5,291	8,013
<b>Total</b>	<b>10,544</b>	<b>20,594</b>	<b>28,335</b>	<b>34,460</b>	<b>44,243</b>	<b>53,320</b>

**Table A-164: Reference case with low oil price and low feedstock availability  
ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	455	490
Australia	0	0	66	247	616	1,172
Canada	101	128	361	701	1,079	1,079
China	126	0	0	0	0	1,685
Central and South America	3,764	4,831	6,126	7,172	7,845	8,562
Eastern Europe	699	226	434	780	1,037	1,149
Former Soviet Union	0	0	0	0	0	0
India	313	0	214	613	1,361	2,399
Japan	257	132	335	636	1,008	1,097
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	264	0	400	414	413	413
United States	3,984	11,612	15,802	18,246	22,779	26,725
Western Europe	736	3,335	4,233	5,249	7,649	8,550
<b>Total</b>	<b>10,544</b>	<b>20,594</b>	<b>28,335</b>	<b>34,460</b>	<b>44,243</b>	<b>53,320</b>

**Table A-165: Reference case with low oil price and low feedstock availability  
ethanol net trade [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	-101	14	40	78	120	120
China	218	366	608	667	1,564	847
Central and South America	1,264	517	1,435	2,344	3,242	4,566
Eastern Europe	-589	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	32	151	417
Japan	-257	-132	-240	-288	-395	-453
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	-264	0	-365	-379	-378	-394
United States	-134	0	0	-603	-1,945	-4,566
Western Europe	-136	-765	-1,478	-1,851	-2,358	-537
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>



**Table A-166: Reference case with low oil price and low feedstock availability grain ethanol production [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Argentina	0	178	640	833	833	95
Australia	0	0	0	0	0	0
Brazil	0	0	0	0	0	0
Canada	0	143	143	0	0	0
Caribbean basin	0	0	0	0	0	0
China	344	366	366	0	0	0
Colombia	0	0	0	0	0	0
Eastern Europe	110	226	348	477	367	251
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	3,850	11,612	15,000	15,000	15,000	15,000
Western Europe	600	2,570	2,589	2,705	3,178	3,604
<b>Total</b>	<b>4,904</b>	<b>15,094</b>	<b>19,085</b>	<b>19,015</b>	<b>19,378</b>	<b>18,950</b>

**Table A-167: Reference case with low oil price and low feedstock availability sugar ethanol production [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	444	490
Argentina	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Brazil	4,866	4,894	5,978	6,473	6,857	6,970
Canada	0	0	0	0	0	0
Caribbean basin	162	80	34	0	0	0
China	0	0	0	0	0	0
Colombia	0	196	196	0	0	0
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	313	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	0	0	0	0
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>5,640</b>	<b>5,500</b>	<b>6,572</b>	<b>6,875</b>	<b>7,301</b>	<b>7,460</b>

**Table A-168: Reference case with low oil price and low feedstock availability  
cellulosic ethanol production [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	11	0
Argentina	0	0	225	801	801	801
Australia	0	0	66	247	616	1,172
Brazil	0	0	308	899	2,085	4,751
Canada	0	0	259	779	1,199	1,199
Caribbean basin	0	0	0	0	0	0
China	0	0	243	667	1,564	2,532
Colombia	0	0	179	512	512	512
Eastern Europe	0	0	85	303	670	897
Former Soviet Union	0	0	0	0	0	0
India	0	0	214	645	1,512	2,816
Japan	0	0	95	348	612	644
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	35	35	35	19
United States	0	0	802	2,643	5,834	7,159
Western Europe	0	0	166	693	2,113	4,410
<b>Total</b>	<b>0</b>	<b>0</b>	<b>2,678</b>	<b>8,570</b>	<b>17,565</b>	<b>26,911</b>

**Table A-169: Reference case with low oil price and low feedstock availability grain  
ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	128	143	0	0	0
China	126	0	0	0	0	0
Central and South America	0	36	130	212	168	95
Eastern Europe	110	226	348	477	367	251
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	132	240	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	218	0	126	0	0	0
United States	3,850	11,612	15,000	15,000	15,000	15,000
Western Europe	600	2,960	3,099	3,325	3,842	3,604
<b>Total</b>	<b>4,904</b>	<b>15,094</b>	<b>19,085</b>	<b>19,015</b>	<b>19,378</b>	<b>18,950</b>

**Table A-170: Reference case with low oil price and low feedstock availability sugar ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	444	490
Australia	0	0	0	0	0	0
Canada	101	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	3,764	4,795	5,996	5,985	5,514	4,196
Eastern Europe	589	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	313	0	0	0	0	0
Japan	257	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	46	0	0	0	0	0
United States	134	0	0	488	1,342	2,774
Western Europe	136	375	212	0	0	0
<b>Total</b>	<b>5,640</b>	<b>5,500</b>	<b>6,572</b>	<b>6,875</b>	<b>7,301</b>	<b>7,460</b>

**Table A-171: Reference case with low oil price and low feedstock availability cellulosic ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	11	0
Australia	0	0	66	247	616	1,172
Canada	0	0	219	701	1,079	1,079
China	0	0	0	0	0	1,685
Central and South America	0	0	0	975	2,162	4,272
Eastern Europe	0	0	85	303	670	897
Former Soviet Union	0	0	0	0	0	0
India	0	0	214	613	1,361	2,399
Japan	0	0	95	636	1,008	1,097
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	274	414	413	413
United States	0	0	802	2,758	6,437	8,951
Western Europe	0	0	922	1,923	3,807	4,946
<b>Total</b>	<b>0</b>	<b>0</b>	<b>2,678</b>	<b>8,570</b>	<b>17,565</b>	<b>26,911</b>

**Table A-172: Reference case with low oil price and low feedstock availability grain ethanol net trade [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	14	0	0	0	0
China	218	366	366	0	0	0
Central and South America	0	143	510	620	664	0
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	-132	-240	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	-218	0	-126	0	0	0
United States	0	0	0	0	0	0
Western Europe	0	-390	-510	-620	-664	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-173: Reference case with low oil price and low feedstock availability sugar ethanol net trade [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	-101	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	1,264	375	212	488	1,342	2,774
Eastern Europe	-589	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	-257	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	-46	0	0	0	0	0
United States	-134	0	0	-488	-1,342	-2,774
Western Europe	-136	-375	-212	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-174: Reference case with low oil price and low feedstock availability  
cellulosic ethanol net trade [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	40	78	120	120
China	0	0	243	667	1,564	847
Central and South America	0	0	713	1,236	1,236	1,792
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	32	151	417
Japan	0	0	0	-288	-395	-453
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	-240	-379	-378	-394
United States	0	0	0	-115	-603	-1,792
Western Europe	0	0	-756	-1,231	-1,694	-537
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-175: Reference case with low oil price and low feedstock availability  
biomass-to-liquids production [Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Argentina	0	0	81	288	288	288
Australia	0	0	0	0	0	0
Brazil	0	0	92	311	750	1,333
Canada	0	0	93	280	431	431
Caribbean basin	0	0	0	0	0	0
China	0	0	57	240	563	563
Colombia	0	0	51	184	184	184
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	77	232	544	1,001
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	184	558	1,086
South Korea	0	0	36	74	74	74
United States	0	0	822	4,325	5,770	7,411
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>1,309</b>	<b>6,118</b>	<b>9,162</b>	<b>12,370</b>

**Table A-176: Reference case with low oil price and low feedstock availability  
biomass-to-liquids consumption [Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	0	0	0	0	0
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	184	558	1,086
South Korea	0	0	0	0	0	0
United States	0	0	874	4,612	7,854	11,285
Western Europe	0	0	435	1,322	750	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>1,309</b>	<b>6,118</b>	<b>9,162</b>	<b>12,370</b>

**Table A-177: Reference case with low oil price and low feedstock availability  
biomass-to-liquids net trade [Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	93	280	431	431
China	0	0	57	240	563	563
Central and South America	0	0	225	783	1,222	1,805
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	77	232	544	1,001
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	36	74	74	74
United States	0	0	-52	-287	-2,084	-3,874
Western Europe	0	0	-435	-1,322	-750	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-178: Reference case with low oil price and low feedstock availability  
biodiesel production [Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Argentina	0	333	877	1,491	1,472	1,155
Australia	0	0	0	0	0	0
Brazil	0	333	835	1,537	1,769	1,334
Canada	0	0	0	0	0	0
Caribbean basin	0	95	310	742	1,145	1,220
China	0	0	0	0	0	0
Colombia	0	0	0	0	0	0
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	1,238	1,640	1,803	1,907	2,072
Western Europe	998	2,643	2,984	3,240	3,684	4,114
<b>Total</b>	<b>998</b>	<b>4,641</b>	<b>6,646</b>	<b>8,813</b>	<b>9,976</b>	<b>9,895</b>

**Table A-179: Reference case with low oil price and low feedstock availability  
biodiesel consumption [Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	126	443	937	1,265	1,453
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	1,238	2,494	3,991	3,623	2,226
Western Europe	998	3,277	3,709	3,885	5,089	6,216
<b>Total</b>	<b>998</b>	<b>4,641</b>	<b>6,646</b>	<b>8,813</b>	<b>9,976</b>	<b>9,895</b>

**Table A-180: Reference case with low oil price and low feedstock availability  
biodiesel net trade [Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	634	1,579	2,833	3,122	2,256
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	-854	-2,188	-1,716	-154
Western Europe	0	-634	-725	-645	-1,405	-2,102
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>



## A-11 Reference Case with E20

**Table A-181: Reference case with E20 ethanol production [Million gallons]**

### **BIOREF20**

#### **Ethanol production [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	455	502
Argentina	0	178	846	2,074	2,074	1,002
Australia	0	0	71	267	709	1,174
Brazil	4,866	5,977	7,624	9,926	12,283	13,669
Canada	0	0	259	779	1,115	1,115
Caribbean basin	210	328	719	779	779	779
China	344	384	634	1,041	1,911	3,216
Colombia	196	215	411	782	1,501	2,195
Eastern Europe	110	226	434	798	1,037	1,149
Former Soviet Union	0	0	39	119	364	1,109
India	313	279	541	992	1,893	2,771
Japan	0	0	95	369	612	647
Middle East	0	0	0	0	0	0
Mexico	0	0	199	601	1,408	1,546
Other Asia	0	0	0	0	0	0
South Korea	0	0	35	35	35	35
United States	3,850	11,612	15,802	20,007	23,359	24,618
Western Europe	600	2,568	2,755	3,357	5,291	8,013
<b>Total</b>	<b>10,789</b>	<b>22,097</b>	<b>30,828</b>	<b>42,326</b>	<b>54,825</b>	<b>63,540</b>

# World Biofuels Study

**Table A-182: Reference case with E20 ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	455	502
Australia	0	0	71	267	709	1,174
Canada	145	0	233	701	1,004	1,020
China	297	0	0	0	1,137	3,588
Central and South America	3,788	4,853	6,171	7,309	8,076	8,864
Eastern Europe	699	226	872	798	1,037	1,149
Former Soviet Union	0	0	39	119	364	1,109
India	313	279	541	942	1,893	2,399
Japan	263	288	373	719	1,008	1,100
Middle East	0	0	0	0	0	0
Mexico	0	0	30	78	183	1,053
Other Asia	0	0	0	0	0	0
South Korea	264	335	400	414	413	413
United States	3,984	11,612	17,430	25,368	30,898	32,237
Western Europe	736	4,174	4,304	5,208	7,649	8,933
<b>Total</b>	<b>10,789</b>	<b>22,097</b>	<b>30,828</b>	<b>42,326</b>	<b>54,825</b>	<b>63,540</b>

**Table A-183: Reference case with E20 ethanol net trade [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	-145	0	26	78	112	96
China	47	384	634	1,041	774	-372
Central and South America	1,484	1,845	3,429	6,251	8,561	8,782
Eastern Europe	-589	0	-438	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	50	0	372
Japan	-263	-288	-278	-350	-395	-453
Middle East	0	0	0	0	0	0
Mexico	0	0	170	523	1,225	493
Other Asia	0	0	0	0	0	0
South Korea	-264	-335	-365	-379	-378	-378
United States	-134	0	-1,628	-5,361	-7,539	-7,620
Western Europe	-136	-1,607	-1,549	-1,851	-2,358	-920
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

# World Biofuels Study

**Table A-184: Reference case with E20 grain ethanol production [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Argentina	0	178	640	1,260	1,260	188
Australia	0	0	0	0	0	0
Brazil	0	0	0	0	0	0
Canada	0	0	0	0	0	0
Caribbean basin	0	0	0	0	0	0
China	344	344	344	325	0	0
Colombia	0	0	0	0	0	0
Eastern Europe	110	226	348	477	367	251
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	3,850	11,612	15,000	15,000	15,000	13,786
Western Europe	600	2,568	2,589	2,665	3,178	3,604
<b>Total</b>	<b>4,904</b>	<b>14,928</b>	<b>18,921</b>	<b>19,727</b>	<b>19,805</b>	<b>17,829</b>

**Table A-185: Reference case with E20 sugar ethanol production [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	444	490
Argentina	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Brazil	4,866	5,977	7,329	9,036	10,406	11,793
Canada	0	0	0	0	0	0
Caribbean basin	210	328	719	779	779	779
China	0	40	48	48	48	48
Colombia	196	215	241	270	302	302
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	313	279	327	347	381	348
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	0	0	0	0
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>5,884</b>	<b>7,169</b>	<b>9,028</b>	<b>10,882</b>	<b>12,361</b>	<b>13,760</b>

# World Biofuels Study

**Table A-186: Reference case with E20 cellulosic ethanol production [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	11	11
Argentina	0	0	206	814	814	814
Australia	0	0	71	267	709	1,174
Brazil	0	0	296	890	1,877	1,877
Canada	0	0	259	779	1,115	1,115
Caribbean basin	0	0	0	0	0	0
China	0	0	243	668	1,863	3,168
Colombia	0	0	170	512	1,199	1,893
Eastern Europe	0	0	85	320	670	897
Former Soviet Union	0	0	39	119	364	1,109
India	0	0	214	645	1,512	2,424
Japan	0	0	95	369	612	647
Middle East	0	0	0	0	0	0
Mexico	0	0	199	601	1,408	1,546
Other Asia	0	0	0	0	0	0
South Korea	0	0	35	35	35	35
United States	0	0	802	5,007	8,359	10,832
Western Europe	0	0	166	693	2,113	4,410
<b>Total</b>	<b>0</b>	<b>0</b>	<b>2,879</b>	<b>11,718</b>	<b>22,660</b>	<b>31,951</b>

**Table A-187: Reference case with E20 grain ethanol consumption [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	297	0	0	0	0	0
Central and South America	0	36	127	270	212	105
Eastern Europe	110	226	348	477	367	251
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	192	230	303	0	83
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	47	295	123	23	0	0
United States	3,850	11,612	15,000	15,000	15,000	13,786
Western Europe	600	2,568	3,093	3,655	4,226	3,604
<b>Total</b>	<b>4,904</b>	<b>14,928</b>	<b>18,921</b>	<b>19,727</b>	<b>19,805</b>	<b>17,829</b>

# World Biofuels Study

**Table A-188: Reference case with E20 sugar ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	444	490
Australia	0	0	0	0	0	0
Canada	145	0	0	0	0	0
China	0	0	0	0	48	48
Central and South America	3,788	4,818	6,044	7,040	7,864	8,732
Eastern Europe	589	0	412	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	313	279	327	347	381	348
Japan	263	96	48	48	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	217	40	0	0	0	0
United States	134	0	788	2,753	3,150	4,143
Western Europe	136	1,607	1,045	293	474	0
<b>Total</b>	<b>5,884</b>	<b>7,169</b>	<b>9,028</b>	<b>10,882</b>	<b>12,361</b>	<b>13,760</b>

**Table A-189: Reference case with E20 cellulosic ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	11	11
Australia	0	0	71	267	709	1,174
Canada	0	0	233	701	1,004	1,020
China	0	0	0	0	1,089	3,540
Central and South America	0	0	0	0	0	27
Eastern Europe	0	0	111	320	670	897
Former Soviet Union	0	0	39	119	364	1,109
India	0	0	214	596	1,512	2,051
Japan	0	0	95	369	1,008	1,016
Middle East	0	0	0	0	0	0
Mexico	0	0	30	78	183	1,053
Other Asia	0	0	0	0	0	0
South Korea	0	0	277	392	413	413
United States	0	0	1,643	7,615	12,748	14,309
Western Europe	0	0	166	1,261	2,949	5,330
<b>Total</b>	<b>0</b>	<b>0</b>	<b>2,879</b>	<b>11,718</b>	<b>22,660</b>	<b>31,951</b>

**Table A-190: Reference case with E20 grain ethanol net trade [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	47	344	344	325	0	0
Central and South America	0	143	513	990	1,048	83
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	-192	-230	-303	0	-83
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	-47	-295	-123	-23	0	0
United States	0	0	0	0	0	0
Western Europe	0	0	-504	-990	-1,048	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-191: Reference case with E20 sugar ethanol net trade [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	-145	0	0	0	0	0
China	0	40	48	48	0	0
Central and South America	1,484	1,702	2,245	3,045	3,624	4,143
Eastern Europe	-589	0	-412	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	-263	-96	-48	-48	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	-217	-40	0	0	0	0
United States	-134	0	-788	-2,753	-3,150	-4,143
Western Europe	-136	-1,607	-1,045	-293	-474	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-192: Reference case with E20 cellulosic ethanol net trade [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	26	78	112	96
China	0	0	243	668	774	-372
Central and South America	0	0	671	2,216	3,890	4,556
Eastern Europe	0	0	-26	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	50	0	372
Japan	0	0	0	0	-395	-370
Middle East	0	0	0	0	0	0
Mexico	0	0	170	523	1,225	493
Other Asia	0	0	0	0	0	0
South Korea	0	0	-243	-357	-378	-378
United States	0	0	-841	-2,608	-4,389	-3,477
Western Europe	0	0	0	-568	-836	-920
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-193: Reference case with E20 biomass-to-liquids production [Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	68	263	653	1,177
Argentina	0	0	74	274	274	274
Australia	0	0	0	0	0	0
Brazil	0	0	106	320	675	675
Canada	0	0	93	280	401	401
Caribbean basin	0	0	0	0	0	0
China	0	0	57	240	240	240
Colombia	0	0	61	184	431	681
Eastern Europe	0	0	0	0	116	311
Former Soviet Union	0	0	0	0	0	0
India	0	0	77	232	544	544
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	125
Mexico	0	0	72	216	506	556
Other Asia	0	0	89	448	1,090	1,942
South Korea	0	0	36	74	74	74
United States	0	0	822	1,299	1,908	2,481
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>1,555</b>	<b>3,830</b>	<b>6,912</b>	<b>9,481</b>

**Table A-194: Reference case with E20 biomass-to-liquids consumption**  
**[Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	68	263	653	1,177
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	0	0	0	0	0
Eastern Europe	0	0	0	0	116	311
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	125
Mexico	0	0	0	0	0	0
Other Asia	0	0	89	449	1,090	1,942
South Korea	0	0	0	0	0	0
United States	0	0	1,110	2,885	4,785	5,926
Western Europe	0	0	288	235	268	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>1,555</b>	<b>3,830</b>	<b>6,911</b>	<b>9,481</b>

**Table A-195: Reference case with E20 biomass-to-liquids net trade**  
**[Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	93	280	401	401
China	0	0	57	240	240	240
Central and South America	0	0	241	778	1,380	1,630
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	77	232	544	544
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	72	216	506	556
Other Asia	0	0	0	0	0	0
South Korea	0	0	36	74	74	74
United States	0	0	-288	-1,586	-2,878	-3,445
Western Europe	0	0	-288	-235	-268	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>



# World Biofuels Study

**Table A-196: Reference case with E20 biodiesel production**  
[Million gallons ethanol equivalent]

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Argentina	0	333	776	819	827	239
Australia	0	0	0	0	0	0
Brazil	0	333	835	1,537	1,525	1,355
Canada	0	0	0	0	0	0
Caribbean basin	0	95	310	675	802	898
China	0	0	0	0	0	0
Colombia	0	119	298	474	650	782
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	1,238	1,640	1,747	1,850	2,072
Western Europe	998	3,178	3,578	3,930	4,468	4,788
<b>Total</b>	<b>998</b>	<b>5,294</b>	<b>7,437</b>	<b>9,181</b>	<b>10,123</b>	<b>10,134</b>

**Table A-197: Reference case with E20 biodiesel consumption**  
[Million gallons ethanol equivalent]

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	158	472	984	1,306	1,490
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	1,238	1,713	1,747	1,850	2,072
Western Europe	998	3,898	5,252	6,451	6,967	6,572
<b>Total</b>	<b>998</b>	<b>5,294</b>	<b>7,437</b>	<b>9,181</b>	<b>10,123</b>	<b>10,134</b>

**Table A-198: Reference case with E20 biodiesel net trade**  
**[Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	720	1,746	2,520	2,499	1,784
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	-73	0	0	0
Western Europe	0	-720	-1,674	-2,520	-2,499	-1,784
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**A-12 Reference Case with \$50 per Tonne CO<sub>2</sub>****Table A-199: Reference case with \$50 per tonne CO<sub>2</sub> ethanol production  
[Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	73	81	89	98
Argentina	0	178	810	1,366	2,481	2,481
Australia	0	0	71	246	583	1,172
Brazil	4,866	5,977	7,624	9,752	12,491	14,318
Canada	0	0	259	779	1,043	1,043
Caribbean basin	210	328	683	683	779	890
China	344	384	634	1,045	1,622	2,933
Colombia	196	215	411	782	1,501	2,231
Eastern Europe	110	226	434	751	1,037	1,149
Former Soviet Union	0	0	0	0	0	0
India	313	279	541	992	1,893	2,822
Japan	0	0	95	369	580	676
Middle East	0	0	0	0	0	0
Mexico	0	0	199	601	1,408	2,543
Other Asia	0	0	0	0	0	0
South Korea	0	0	30	30	30	30
United States	3,850	11,612	15,802	16,630	17,984	19,077
Western Europe	600	2,570	2,755	3,235	5,298	8,190
<b>Total</b>	<b>10,789</b>	<b>22,099</b>	<b>30,422</b>	<b>37,340</b>	<b>48,820</b>	<b>59,652</b>

**Table A-200: Reference case with \$50 per tonne CO<sub>2</sub> ethanol consumption**  
**[Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	73	81	89	98
Australia	0	0	71	246	583	1,172
Canada	145	0	233	779	938	938
China	118	0	0	274	1,726	5,063
Central and South America	3,788	4,853	6,163	7,212	8,116	9,022
Eastern Europe	699	226	872	953	1,037	1,149
Former Soviet Union	0	0	0	0	0	0
India	313	279	541	992	1,893	2,399
Japan	265	290	373	757	1,013	1,129
Middle East	0	0	0	0	0	0
Mexico	0	0	30	601	1,031	1,053
Other Asia	0	0	0	0	461	3,472
South Korea	264	335	400	414	413	413
United States	4,161	11,612	17,361	19,947	23,862	25,555
Western Europe	736	4,173	4,305	5,086	7,657	8,190
<b>Total</b>	<b>10,789</b>	<b>22,099</b>	<b>30,422</b>	<b>37,340</b>	<b>48,820</b>	<b>59,652</b>

**Table A-201: Reference case with \$50 per tonne CO<sub>2</sub> ethanol net trade**  
**[Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	-145	0	26	0	104	104
China	226	384	634	772	-104	-2,130
Central and South America	1,484	1,845	3,365	5,370	9,137	10,898
Eastern Europe	-589	0	-438	-202	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	423
Japan	-265	-290	-278	-388	-433	-453
Middle East	0	0	0	0	0	0
Mexico	0	0	170	0	377	1,490
Other Asia	0	0	0	0	-461	-3,472
South Korea	-264	-335	-370	-384	-383	-383
United States	-311	0	-1,559	-3,317	-5,878	-6,478
Western Europe	-136	-1,604	-1,551	-1,851	-2,359	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

# World Biofuels Study

**Table A-202: Reference case with \$50 per tonne CO<sub>2</sub> grain ethanol production**  
[Million gallons]

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Argentina	0	178	604	604	604	604
Australia	0	0	0	0	0	0
Brazil	0	0	0	0	0	0
Canada	0	0	0	0	0	0
Caribbean basin	0	0	0	0	0	0
China	344	344	344	325	0	0
Colombia	0	0	0	0	0	0
Eastern Europe	110	226	348	477	367	251
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	3,850	11,612	15,000	14,278	12,447	9,863
Western Europe	600	2,570	2,589	2,542	3,178	3,604
<b>Total</b>	<b>4,904</b>	<b>14,930</b>	<b>18,886</b>	<b>18,227</b>	<b>16,596</b>	<b>14,322</b>

**Table A-203: Reference case with \$50 per tonne CO<sub>2</sub> sugar ethanol production**  
[Million gallons]

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	73	81	89	98
Argentina	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Brazil	4,866	5,977	7,329	8,862	10,406	12,233
Canada	0	0	0	0	0	0
Caribbean basin	210	328	683	683	779	890
China	0	40	48	53	58	64
Colombia	196	215	241	270	302	339
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	313	279	327	347	381	348
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	0	0	0	0
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>5,884</b>	<b>7,170</b>	<b>8,701</b>	<b>10,295</b>	<b>12,016</b>	<b>13,971</b>

# World Biofuels Study

**Table A-204: Reference case with \$50 per tonne CO<sub>2</sub> cellulosic ethanol production**  
[Million gallons]

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Argentina	0	0	206	762	1,877	1,877
Australia	0	0	71	246	583	1,172
Brazil	0	0	296	890	2,085	2,085
Canada	0	0	259	779	1,043	1,043
Caribbean basin	0	0	0	0	0	0
China	0	0	243	667	1,564	2,869
Colombia	0	0	170	512	1,199	1,893
Eastern Europe	0	0	85	274	670	897
Former Soviet Union	0	0	0	0	0	0
India	0	0	214	645	1,512	2,475
Japan	0	0	95	369	580	676
Middle East	0	0	0	0	0	0
Mexico	0	0	199	601	1,408	2,543
Other Asia	0	0	0	0	0	0
South Korea	0	0	30	30	30	30
United States	0	0	802	2,352	5,538	9,215
Western Europe	0	0	166	693	2,120	4,586
<b>Total</b>	<b>0</b>	<b>0</b>	<b>2,836</b>	<b>8,819</b>	<b>20,209</b>	<b>31,360</b>

**Table A-205: Reference case with \$50 per tonne CO<sub>2</sub> grain ethanol consumption**  
[Million gallons]

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	118	0	0	0	0	152
Central and South America	0	36	122	178	222	0
Eastern Europe	110	226	348	477	367	251
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	226	290	230	325	0	453
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	196	127	0	383	0
United States	3,850	11,612	15,000	14,278	12,447	9,863
Western Europe	600	2,570	3,059	2,969	3,178	3,604
<b>Total</b>	<b>4,904</b>	<b>14,930</b>	<b>18,886</b>	<b>18,227</b>	<b>16,596</b>	<b>14,322</b>

# World Biofuels Study

**Table A-206: Reference case with \$50 per tonne CO<sub>2</sub> sugar ethanol consumption**  
[Million gallons]

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	73	81	89	98
Australia	0	0	0	0	0	0
Canada	145	0	0	0	0	0
China	0	0	0	0	58	411
Central and South America	3,788	4,818	5,980	6,345	5,574	8,435
Eastern Europe	589	0	412	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	313	279	327	347	381	0
Japan	39	0	48	53	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	1,741
South Korea	264	139	0	0	0	339
United States	311	0	788	3,317	5,612	2,946
Western Europe	136	1,604	1,073	153	302	0
<b>Total</b>	<b>5,884</b>	<b>7,170</b>	<b>8,701</b>	<b>10,295</b>	<b>12,016</b>	<b>13,971</b>

**Table A-207: Reference case with \$50 per tonne CO<sub>2</sub> cellulosic ethanol consumption**  
[Million gallons]

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	71	246	583	1,172
Canada	0	0	233	779	938	938
China	0	0	0	274	1,668	4,501
Central and South America	0	0	62	689	2,321	587
Eastern Europe	0	0	111	476	670	897
Former Soviet Union	0	0	0	0	0	0
India	0	0	214	645	1,512	2,399
Japan	0	0	95	379	1,013	676
Middle East	0	0	0	0	0	0
Mexico	0	0	30	601	1,031	1,053
Other Asia	0	0	0	0	461	1,731
South Korea	0	0	273	414	30	74
United States	0	0	1,573	2,352	5,804	12,746
Western Europe	0	0	174	1,965	4,177	4,586
<b>Total</b>	<b>0</b>	<b>0</b>	<b>2,836</b>	<b>8,819</b>	<b>20,209</b>	<b>31,360</b>

# World Biofuels Study

**Table A-208: Reference case with \$50 per tonne CO<sub>2</sub> grain ethanol net trade**  
[Million gallons]

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	226	344	344	325	0	-152
Central and South America	0	143	483	427	383	604
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	-226	-290	-230	-325	0	-453
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	-196	-127	0	-383	0
United States	0	0	0	0	0	0
Western Europe	0	0	-470	-427	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-209: Reference case with \$50 per tonne CO<sub>2</sub> sugar ethanol net trade**  
[Million gallons]

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	-145	0	0	0	0	0
China	0	40	48	53	0	-348
Central and South America	1,484	1,702	2,273	3,470	5,914	5,026
Eastern Europe	-589	0	-412	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	348
Japan	-39	0	-48	-53	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	-1,741
South Korea	-264	-139	0	0	0	-339
United States	-311	0	-788	-3,317	-5,612	-2,946
Western Europe	-136	-1,604	-1,073	-153	-302	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>



# World Biofuels Study

**Table A-210: Reference case with \$50 per tonne CO<sub>2</sub> cellulosic ethanol net trade**  
[Million gallons]

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	26	0	104	104
China	0	0	243	394	-104	-1,631
Central and South America	0	0	610	1,474	2,840	5,268
Eastern Europe	0	0	-26	-202	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	76
Japan	0	0	0	-10	-433	0
Middle East	0	0	0	0	0	0
Mexico	0	0	170	0	377	1,490
Other Asia	0	0	0	0	-461	-1,731
South Korea	0	0	-243	-384	0	-44
United States	0	0	-771	0	-266	-3,531
Western Europe	0	0	-8	-1,272	-2,057	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-211: Reference case with \$50 per tonne CO<sub>2</sub> biomass-to-liquids production**  
[Million gallons ethanol equivalent]

	2005	2010	2015	2020	2025	2030
Africa	0	0	68	313	880	1,403
Argentina	0	0	74	274	675	675
Australia	0	0	0	46	217	474
Brazil	0	0	106	320	750	750
Canada	0	0	93	280	375	375
Caribbean basin	0	0	0	0	0	0
China	0	0	57	240	563	563
Colombia	0	0	61	184	431	681
Eastern Europe	0	0	0	36	198	569
Former Soviet Union	0	0	0	0	23	163
India	0	0	77	232	544	890
Japan	0	0	0	0	0	0
Middle East	0	0	0	102	330	656
Mexico	0	0	72	216	506	915
Other Asia	0	0	96	554	1,489	2,773
South Korea	0	0	31	44	44	44
United States	0	0	822	5,018	6,654	8,742
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>1,557</b>	<b>7,859</b>	<b>13,679</b>	<b>19,673</b>

**Table A-212: Reference case with \$50 per tonne CO<sub>2</sub> biomass-to-liquids consumption**  
**[Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	68	313	880	1,403
Australia	0	0	0	46	217	474
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	0	0	0	0	0
Eastern Europe	0	0	0	36	198	569
Former Soviet Union	0	0	0	0	23	163
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	102	330	656
Mexico	0	0	0	0	0	0
Other Asia	0	0	96	554	1,489	2,773
South Korea	0	0	0	0	0	0
United States	0	0	1,108	6,314	10,542	12,664
Western Europe	0	0	286	494	0	970
<b>Total</b>	<b>0</b>	<b>0</b>	<b>1,557</b>	<b>7,859</b>	<b>13,679</b>	<b>19,673</b>

**Table A-213: Reference case with \$50 per tonne CO<sub>2</sub> biomass-to-liquids net trade**  
**[Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	93	280	375	375
China	0	0	57	240	563	563
Central and South America	0	0	241	778	1,857	2,106
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	77	232	544	890
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	72	216	506	915
Other Asia	0	0	0	0	0	0
South Korea	0	0	31	44	44	44
United States	0	0	-286	-1,296	-3,888	-3,922
Western Europe	0	0	-286	-494	0	-970
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

# World Biofuels Study

**Table A-214: Reference case with \$50 per tonne CO<sub>2</sub> biodiesel production**  
[Million gallons ethanol equivalent]

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Argentina	0	333	776	819	827	0
Australia	0	0	0	0	0	0
Brazil	0	333	835	1,537	1,785	1,367
Canada	0	0	0	0	0	0
Caribbean basin	0	95	310	675	802	898
China	0	0	0	0	0	0
Colombia	0	119	298	474	650	782
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	1,238	1,640	1,747	1,907	2,016
Western Europe	998	3,178	3,578	4,175	4,566	5,191
<b>Total</b>	<b>998</b>	<b>5,294</b>	<b>7,437</b>	<b>9,426</b>	<b>10,537</b>	<b>10,253</b>

**Table A-215: Reference case with \$50 per tonne CO<sub>2</sub> biodiesel consumption**  
[Million gallons ethanol equivalent]

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	158	472	984	1,306	1,490
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	1,238	1,713	1,884	1,907	2,016
Western Europe	998	3,898	5,252	6,558	7,324	6,748
<b>Total</b>	<b>998</b>	<b>5,294</b>	<b>7,437</b>	<b>9,426</b>	<b>10,537</b>	<b>10,253</b>

**Table A-216: Reference case with \$50 per tonne CO<sub>2</sub> biodiesel net trade**  
**[Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	720	1,746	2,520	2,759	1,557
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	-73	-137	0	0
Western Europe	0	-720	-1,674	-2,383	-2,759	-1,557
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**A-13 Reference Case with \$20 per Tonne Growers' Payment****Table A-217: Reference case with \$20 per tonne growers' payment ethanol production  
[Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	455	502
Argentina	0	178	810	910	940	820
Australia	0	0	71	267	709	1,174
Brazil	4,866	5,977	7,624	9,752	11,934	13,669
Canada	0	0	259	779	1,115	1,115
Caribbean basin	210	328	573	683	707	707
China	344	384	634	1,041	1,612	2,917
Colombia	196	215	411	782	1,501	2,195
Eastern Europe	110	226	434	780	1,037	1,149
Former Soviet Union	0	0	39	119	364	1,109
India	313	279	541	992	1,893	2,771
Japan	0	0	95	369	612	647
Middle East	0	0	0	0	0	0
Mexico	0	0	199	601	1,408	1,546
Other Asia	0	0	0	0	0	0
South Korea	0	0	36	36	36	36
United States	3,850	11,612	15,802	17,258	18,946	19,034
Western Europe	600	2,568	2,755	3,398	5,291	8,013
<b>Total</b>	<b>10,789</b>	<b>22,097</b>	<b>30,647</b>	<b>38,167</b>	<b>48,560</b>	<b>57,404</b>

# World Biofuels Study

**Table A-218: Reference case with \$20 per tonne growers' payment ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	455	502
Australia	0	0	71	267	709	1,174
Canada	145	0	233	984	1,004	1,020
China	297	0	0	723	1,612	3,289
Central and South America	3,788	4,853	6,156	7,153	7,959	8,842
Eastern Europe	699	226	872	953	1,037	1,149
Former Soviet Union	0	0	39	119	364	1,109
India	313	279	541	992	1,893	2,399
Japan	263	288	373	719	1,008	1,100
Middle East	0	0	0	0	0	0
Mexico	0	0	30	396	896	1,053
Other Asia	0	0	0	0	0	0
South Korea	264	335	400	414	413	413
United States	3,984	11,612	17,287	19,797	23,562	27,343
Western Europe	736	4,174	4,281	5,249	7,650	8,013
<b>Total</b>	<b>10,789</b>	<b>22,097</b>	<b>30,647</b>	<b>38,167</b>	<b>48,560</b>	<b>57,404</b>

**Table A-219: Reference case with \$20 per tonne growers' payment ethanol net trade [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	-145	0	26	-205	112	96
China	47	384	634	318	0	-372
Central and South America	1,484	1,845	3,261	4,974	7,124	8,550
Eastern Europe	-589	0	-438	-173	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	372
Japan	-263	-288	-278	-350	-395	-453
Middle East	0	0	0	0	0	0
Mexico	0	0	170	205	512	493
Other Asia	0	0	0	0	0	0
South Korea	-264	-335	-364	-378	-377	-377
United States	-134	0	-1,485	-2,538	-4,616	-8,309
Western Europe	-136	-1,607	-1,526	-1,851	-2,359	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

# World Biofuels Study

**Table A-220: Reference case with \$20 per tonne growers' payment grain ethanol production [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Argentina	0	178	604	604	604	473
Australia	0	0	0	0	0	0
Brazil	0	0	0	0	0	0
Canada	0	0	0	0	0	0
Caribbean basin	0	0	0	0	0	0
China	344	344	344	325	0	0
Colombia	0	0	0	0	0	0
Eastern Europe	110	226	348	477	367	251
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	3,850	11,612	15,000	15,000	15,000	13,874
Western Europe	600	2,568	2,589	2,705	3,178	3,604
<b>Total</b>	<b>4,904</b>	<b>14,928</b>	<b>18,885</b>	<b>19,112</b>	<b>19,149</b>	<b>18,202</b>

**Table A-221: Reference case with \$20 per tonne growers' payment sugar ethanol production [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	300	330	364	402	444	490
Argentina	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Brazil	4,866	5,977	7,329	8,862	10,057	11,793
Canada	0	0	0	0	0	0
Caribbean basin	210	328	573	683	707	707
China	0	40	48	48	48	48
Colombia	196	215	241	270	302	302
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	313	279	327	347	381	348
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	0	0	0	0
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>5,884</b>	<b>7,169</b>	<b>8,882</b>	<b>10,612</b>	<b>11,940</b>	<b>13,688</b>

# World Biofuels Study

**Table A-222: Reference case with \$20 per tonne growers' payment cellulosic ethanol production [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	11	11
Argentina	0	0	206	306	335	347
Australia	0	0	71	267	709	1,174
Brazil	0	0	296	890	1,877	1,876
Canada	0	0	259	779	1,115	1,115
Caribbean basin	0	0	0	0	0	0
China	0	0	243	668	1,564	2,869
Colombia	0	0	170	512	1,199	1,893
Eastern Europe	0	0	85	303	670	897
Former Soviet Union	0	0	39	119	364	1,109
India	0	0	214	645	1,512	2,424
Japan	0	0	95	369	612	647
Middle East	0	0	0	0	0	0
Mexico	0	0	199	601	1,408	1,546
Other Asia	0	0	0	0	0	0
South Korea	0	0	36	36	36	36
United States	0	0	802	2,258	3,946	5,160
Western Europe	0	0	166	693	2,113	4,410
<b>Total</b>	<b>0</b>	<b>0</b>	<b>2,880</b>	<b>8,444</b>	<b>17,471</b>	<b>25,514</b>

**Table A-223: Reference case with \$20 per tonne growers' payment grain ethanol consumption [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	297	0	0	325	0	0
Central and South America	0	36	122	118	98	86
Eastern Europe	110	226	348	477	367	251
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	192	230	350	284	357
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	47	295	122	61	222	30
United States	3,850	11,612	15,000	15,000	15,000	13,874
Western Europe	600	2,568	3,064	2,780	3,178	3,604
<b>Total</b>	<b>4,904</b>	<b>14,928</b>	<b>18,885</b>	<b>19,112</b>	<b>19,149</b>	<b>18,202</b>



# World Biofuels Study

**Table A-224: Reference case with \$20 per tonne growers' payment sugar ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	444	490
Australia	0	0	0	0	0	0
Canada	145	0	0	0	0	0
China	0	0	0	48	48	48
Central and South America	3,788	4,818	6,035	7,014	7,860	8,692
Eastern Europe	589	0	412	173	0	0
Former Soviet Union	0	0	0	0	0	0
India	313	279	327	347	381	348
Japan	263	96	48	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	217	40	0	0	0	0
United States	134	0	788	2,538	2,920	4,110
Western Europe	136	1,607	908	89	287	0
<b>Total</b>	<b>5,884</b>	<b>7,169</b>	<b>8,882</b>	<b>10,612</b>	<b>11,940</b>	<b>13,688</b>

**Table A-225: Reference case with \$20 per tonne growers' payment cellulosic ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	11	11
Australia	0	0	71	267	709	1,174
Canada	0	0	233	984	1,004	1,020
China	0	0	0	350	1,564	3,241
Central and South America	0	0	0	21	0	63
Eastern Europe	0	0	111	303	670	897
Former Soviet Union	0	0	39	119	364	1,109
India	0	0	214	645	1,512	2,051
Japan	0	0	95	369	724	743
Middle East	0	0	0	0	0	0
Mexico	0	0	30	396	896	1,053
Other Asia	0	0	0	0	0	0
South Korea	0	0	279	354	191	383
United States	0	0	1,500	2,258	5,642	9,359
Western Europe	0	0	309	2,379	4,185	4,410
<b>Total</b>	<b>0</b>	<b>0</b>	<b>2,880</b>	<b>8,444</b>	<b>17,471</b>	<b>25,514</b>

# World Biofuels Study

**Table A-226: Reference case with \$20 per tonne growers' payment grain ethanol net trade [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	47	344	344	0	0	0
Central and South America	0	143	483	486	506	387
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	-192	-230	-350	-284	-357
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	-47	-295	-122	-61	-222	-30
United States	0	0	0	0	0	0
Western Europe	0	0	-476	-75	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-227: Reference case with \$20 per tonne growers' payment sugar ethanol net trade [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	-145	0	0	0	0	0
China	0	40	48	0	0	0
Central and South America	1,484	1,702	2,108	2,801	3,207	4,110
Eastern Europe	-589	0	-412	-173	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	-263	-96	-48	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	-217	-40	0	0	0	0
United States	-134	0	-788	-2,538	-2,920	-4,110
Western Europe	-136	-1,607	-908	-89	-287	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-228: Reference case with \$20 per tonne growers' payment cellulosic ethanol net trade [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	26	-205	112	96
China	0	0	243	318	0	-372
Central and South America	0	0	671	1,687	3,411	4,054
Eastern Europe	0	0	-26	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	372
Japan	0	0	0	0	-112	-96
Middle East	0	0	0	0	0	0
Mexico	0	0	170	205	512	493
Other Asia	0	0	0	0	0	0
South Korea	0	0	-243	-318	-155	-347
United States	0	0	-698	0	-1,696	-4,199
Western Europe	0	0	-143	-1,687	-2,072	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-229: Reference case with \$20 per tonne growers' payment biomass-to-liquids production [Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	68	263	653	1,177
Argentina	0	0	74	110	121	125
Australia	0	0	0	0	0	0
Brazil	0	0	106	320	675	675
Canada	0	0	93	280	401	401
Caribbean basin	0	0	0	0	0	0
China	0	0	57	240	563	563
Colombia	0	0	61	184	431	681
Eastern Europe	0	0	0	0	93	274
Former Soviet Union	0	0	0	0	0	0
India	0	0	77	232	544	544
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	125
Mexico	0	0	72	216	506	556
Other Asia	0	0	89	448	1,090	1,942
South Korea	0	0	37	77	77	77
United States	0	0	822	4,818	6,399	8,213
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>1,556</b>	<b>7,188</b>	<b>11,552</b>	<b>15,352</b>

**Table A-230: Reference case with \$20 per tonne growers' payment biomass-to-liquids consumption [Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	68	263	653	1,177
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	0	0	0	0	0
Eastern Europe	0	0	0	0	93	274
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	125
Mexico	0	0	0	0	0	0
Other Asia	0	0	89	449	1,090	1,942
South Korea	0	0	0	0	0	0
United States	0	0	1,111	6,195	9,717	10,877
Western Europe	0	0	289	282	0	957
<b>Total</b>	<b>0</b>	<b>0</b>	<b>1,556</b>	<b>7,188</b>	<b>11,552</b>	<b>15,352</b>

**Table A-231: Reference case with \$20 per tonne growers' payment biomass-to-liquids net trade [Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	93	280	401	401
China	0	0	57	240	563	563
Central and South America	0	0	241	614	1,227	1,481
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	77	232	544	544
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	72	216	506	556
Other Asia	0	0	0	0	0	0
South Korea	0	0	37	77	77	77
United States	0	0	-289	-1,378	-3,318	-2,664
Western Europe	0	0	-289	-282	0	-957
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

# World Biofuels Study

**Table A-232: Reference case with \$20 per tonne growers' payment biodiesel production [Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Argentina	0	333	776	819	827	200
Australia	0	0	0	0	0	0
Brazil	0	333	877	1,642	1,966	1,357
Canada	0	0	0	0	0	0
Caribbean basin	0	95	310	675	802	898
China	0	0	0	0	0	0
Colombia	0	119	298	474	650	782
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	1,238	1,640	1,747	1,907	2,016
Western Europe	998	3,178	3,578	3,930	4,468	4,788
<b>Total</b>	<b>998</b>	<b>5,294</b>	<b>7,479</b>	<b>9,287</b>	<b>10,621</b>	<b>10,040</b>

**Table A-233: Reference case with \$20 per tonne growers' payment biodiesel consumption [Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	158	472	984	1,306	1,490
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	1,238	1,713	1,941	2,080	2,016
Western Europe	998	3,898	5,294	6,363	7,235	6,535
<b>Total</b>	<b>998</b>	<b>5,294</b>	<b>7,479</b>	<b>9,287</b>	<b>10,621</b>	<b>10,040</b>

**Table A-234: Reference case with \$20 per tonne growers' payment biodiesel net trade [Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	720	1,788	2,626	2,940	1,747
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	-73	-194	-173	0
Western Europe	0	-720	-1,716	-2,432	-2,767	-1,747
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**A-14 Delayed Technology Reference Case****Table A-235: Delayed technology reference case ethanol production [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	455	502
Argentina	0	178	664	1,047	1,077	1,088
Australia	0	0	66	247	625	1,172
Brazil	4,866	5,977	7,624	9,801	11,947	13,338
Canada	0	0	259	779	1,004	1,004
Caribbean basin	210	328	573	683	775	775
China	344	384	614	1,041	1,485	1,485
Colombia	196	215	411	782	1,501	2,227
Eastern Europe	110	226	434	780	1,037	1,149
Former Soviet Union	0	0	6	19	57	174
India	313	279	541	992	1,893	2,543
Japan	0	0	95	348	612	647
Middle East	0	0	0	0	0	0
Mexico	0	0	199	601	1,408	1,546
Other Asia	0	0	0	0	0	0
South Korea	0	0	35	35	35	35
United States	3,850	11,612	15,732	16,156	17,368	21,748
Western Europe	600	2,568	2,755	3,398	5,291	8,013
<b>Total</b>	<b>10,789</b>	<b>22,097</b>	<b>30,371</b>	<b>37,109</b>	<b>46,570</b>	<b>57,444</b>

# World Biofuels Study

**Table A-236: Delayed technology reference case ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	455	502
Australia	0	0	66	247	625	1,172
Canada	145	0	233	779	1,004	1,020
China	297	0	0	311	712	1,485
Central and South America	3,788	4,853	6,134	7,171	7,971	8,872
Eastern Europe	699	226	872	953	1,037	1,149
Former Soviet Union	0	0	6	19	57	174
India	313	279	541	992	1,893	2,399
Japan	263	288	373	698	1,008	1,100
Middle East	0	0	0	0	0	0
Mexico	0	0	30	78	183	201
Other Asia	0	0	0	0	0	0
South Korea	264	335	400	414	413	413
United States	3,984	11,612	17,062	19,797	23,562	28,684
Western Europe	736	4,174	4,289	5,249	7,650	10,274
<b>Total</b>	<b>10,789</b>	<b>22,097</b>	<b>30,371</b>	<b>37,109</b>	<b>46,570</b>	<b>57,444</b>

**Table A-237: Delayed technology reference case ethanol net trade [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	-145	0	26	0	0	-16
China	47	384	614	730	774	0
Central and South America	1,484	1,845	3,137	5,142	7,328	8,556
Eastern Europe	-589	0	-438	-173	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	144
Japan	-263	-288	-278	-350	-395	-453
Middle East	0	0	0	0	0	0
Mexico	0	0	170	523	1,225	1,345
Other Asia	0	0	0	0	0	0
South Korea	-264	-335	-365	-379	-378	-378
United States	-134	0	-1,330	-3,641	-6,194	-6,937
Western Europe	-136	-1,607	-1,535	-1,851	-2,359	-2,261
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>



**Table A-238: Delayed technology reference case grain ethanol production**  
**[Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Argentina	0	178	604	741	741	741
Australia	0	0	0	0	0	0
Brazil	0	0	0	0	0	0
Canada	0	0	0	0	0	0
Caribbean basin	0	0	0	0	0	0
China	344	344	344	325	0	0
Colombia	0	0	0	0	0	0
Eastern Europe	110	226	348	477	367	251
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	3,850	11,612	15,000	15,000	15,000	14,780
Western Europe	600	2,568	2,589	2,705	3,178	3,604
<b>Total</b>	<b>4,904</b>	<b>14,928</b>	<b>18,885</b>	<b>19,249</b>	<b>19,286</b>	<b>19,377</b>

**Table A-239: Delayed technology reference case sugar ethanol production**  
**[Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	444	490
Argentina	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Brazil	4,866	5,977	7,329	8,911	10,406	11,793
Canada	0	0	0	0	0	0
Caribbean basin	210	328	573	683	775	775
China	0	40	48	48	48	48
Colombia	196	215	241	270	302	334
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	313	279	327	347	381	348
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	0	0	0	0
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>5,884</b>	<b>7,169</b>	<b>8,882</b>	<b>10,661</b>	<b>12,356</b>	<b>13,787</b>

**Table A-240: Delayed technology reference case cellulosic ethanol production**  
[Million gallons]

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	11	11
Argentina	0	0	59	306	335	347
Australia	0	0	66	247	625	1,172
Brazil	0	0	296	890	1,541	1,546
Canada	0	0	259	779	1,004	1,004
Caribbean basin	0	0	0	0	0	0
China	0	0	222	667	1,438	1,438
Colombia	0	0	170	512	1,199	1,893
Eastern Europe	0	0	85	303	670	897
Former Soviet Union	0	0	6	19	57	174
India	0	0	214	645	1,512	2,196
Japan	0	0	95	348	612	647
Middle East	0	0	0	0	0	0
Mexico	0	0	199	601	1,408	1,546
Other Asia	0	0	0	0	0	0
South Korea	0	0	35	35	35	35
United States	0	0	732	1,156	2,368	6,967
Western Europe	0	0	166	693	2,113	4,410
<b>Total</b>	<b>0</b>	<b>0</b>	<b>2,604</b>	<b>7,199</b>	<b>14,928</b>	<b>24,281</b>

**Table A-241: Delayed technology reference case grain ethanol consumption**  
[Million gallons]

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	297	0	0	263	0	0
Central and South America	0	36	100	136	108	109
Eastern Europe	110	226	348	477	367	251
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	192	230	62	0	254
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	47	295	144	0	0	378
United States	3,850	11,612	15,000	15,000	15,000	14,780
Western Europe	600	2,568	3,064	3,310	3,811	3,604
<b>Total</b>	<b>4,904</b>	<b>14,928</b>	<b>18,885</b>	<b>19,249</b>	<b>19,286</b>	<b>19,377</b>

**Table A-242: Delayed technology reference case sugar ethanol consumption**  
[Million gallons]

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	444	490
Australia	0	0	0	0	0	0
Canada	145	0	0	0	0	16
China	0	0	0	48	48	48
Central and South America	3,788	4,818	6,035	6,938	7,864	8,763
Eastern Europe	589	0	412	173	0	0
Former Soviet Union	0	0	0	0	0	0
India	313	279	327	347	381	348
Japan	263	96	48	0	0	54
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	217	40	0	0	0	0
United States	134	0	788	2,753	3,093	1,807
Western Europe	136	1,607	908	0	526	2,261
<b>Total</b>	<b>5,884</b>	<b>7,169</b>	<b>8,882</b>	<b>10,661</b>	<b>12,356</b>	<b>13,787</b>

**Table A-243: Delayed technology reference case cellulosic ethanol consumption**  
[Million gallons]

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	11	11
Australia	0	0	66	247	625	1,172
Canada	0	0	233	779	1,004	1,004
China	0	0	0	0	664	1,438
Central and South America	0	0	0	96	0	0
Eastern Europe	0	0	111	303	670	897
Former Soviet Union	0	0	6	19	57	174
India	0	0	214	645	1,512	2,051
Japan	0	0	95	636	1,008	791
Middle East	0	0	0	0	0	0
Mexico	0	0	30	78	183	201
Other Asia	0	0	0	0	0	0
South Korea	0	0	256	414	413	35
United States	0	0	1,274	2,044	5,469	12,098
Western Europe	0	0	318	1,939	3,312	4,410
<b>Total</b>	<b>0</b>	<b>0</b>	<b>2,604</b>	<b>7,199</b>	<b>14,928</b>	<b>24,281</b>

# World Biofuels Study

**Table A-244: Delayed technology reference case grain ethanol net trade**  
[Million gallons]

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	47	344	344	62	0	0
Central and South America	0	143	505	605	634	632
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	-192	-230	-62	0	-254
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	-47	-295	-144	0	0	-378
United States	0	0	0	0	0	0
Western Europe	0	0	-475	-605	-634	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-245: Delayed technology reference case sugar ethanol net trade**  
[Million gallons]

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	-145	0	0	0	0	-16
China	0	40	48	0	0	0
Central and South America	1,484	1,702	2,108	2,926	3,619	4,138
Eastern Europe	-589	0	-412	-173	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	-263	-96	-48	0	0	-54
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	-217	-40	0	0	0	0
United States	-134	0	-788	-2,753	-3,093	-1,807
Western Europe	-136	-1,607	-908	0	-526	-2,261
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-246: Delayed technology reference case cellulosic ethanol net trade**  
[Million gallons]

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	26	0	0	0
China	0	0	222	667	774	0
Central and South America	0	0	525	1,611	3,076	3,786
Eastern Europe	0	0	-26	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	144
Japan	0	0	0	-288	-395	-144
Middle East	0	0	0	0	0	0
Mexico	0	0	170	523	1,225	1,345
Other Asia	0	0	0	0	0	0
South Korea	0	0	-222	-379	-378	0
United States	0	0	-543	-888	-3,101	-5,130
Western Europe	0	0	-152	-1,246	-1,199	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-247: Delayed technology reference case biomass-to-liquids production**  
[Million gallons]

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Argentina	0	0	21	110	121	125
Australia	0	0	0	0	0	0
Brazil	0	0	106	320	554	556
Canada	0	0	93	280	361	361
Caribbean basin	0	0	0	0	0	0
China	0	0	80	240	517	517
Colombia	0	0	61	184	431	681
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	77	232	544	790
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	72	216	506	556
Other Asia	0	0	0	0	0	0
South Korea	0	0	36	56	56	56
United States	0	0	750	2,467	3,398	4,383
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>1,296</b>	<b>4,105</b>	<b>6,488</b>	<b>8,024</b>

**Table A-248: Delayed technology reference case biomass-to-liquids consumption**  
[Million gallons]

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	0	0	0	0	0
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	1,023	4,016	6,488	8,024
Western Europe	0	0	273	88	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>1,296</b>	<b>4,105</b>	<b>6,488</b>	<b>8,024</b>

**Table A-249: Delayed technology reference case biomass-to-liquids net trade**  
[Million gallons]

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	93	280	361	361
China	0	0	80	240	517	517
Central and South America	0	0	189	614	1,106	1,362
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	77	232	544	790
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	72	216	506	556
Other Asia	0	0	0	0	0	0
South Korea	0	0	36	56	56	56
United States	0	0	-273	-1,550	-3,090	-3,641
Western Europe	0	0	-273	-88	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

# World Biofuels Study

**Table A-250: Delayed technology reference case biodiesel production**  
[Million gallons]

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Argentina	0	333	776	819	827	239
Australia	0	0	0	0	0	0
Brazil	0	333	877	1,642	1,793	1,355
Canada	0	0	0	0	0	0
Caribbean basin	0	95	310	675	802	898
China	0	0	0	0	0	0
Colombia	0	119	298	474	650	782
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	1,238	1,640	1,747	1,907	2,072
Western Europe	998	3,178	3,578	3,930	4,468	4,788
<b>Total</b>	<b>998</b>	<b>5,294</b>	<b>7,479</b>	<b>9,287</b>	<b>10,448</b>	<b>10,134</b>

**Table A-251: Delayed technology reference case biodiesel consumption**  
[Million gallons]

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	158	472	984	1,306	1,490
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	1,238	1,713	1,747	1,907	3,413
Western Europe	998	3,898	5,294	6,556	7,235	5,231
<b>Total</b>	<b>998</b>	<b>5,294</b>	<b>7,479</b>	<b>9,287</b>	<b>10,448</b>	<b>10,134</b>

**Table A-252: Delayed technology reference case biodiesel net trade**  
**[Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	720	1,788	2,626	2,767	1,784
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	-73	0	0	-1,341
Western Europe	0	-720	-1,716	-2,626	-2,767	-443
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>



## A-15 Delayed Technology Reference Case with Credit and Tariff Extension

**Table A-253: Delayed technology reference case with credit and tariff extension  
ethanol production [Million gallons]**

### BIOREFDC

### Ethanol production [Million gallons]

	2005	2010	2015	2020	2025	2030
Africa	300	330	364	402	455	502
Argentina	0	178	628	875	904	478
Australia	0	0	66	247	622	1,172
Brazil	4,866	5,977	7,624	9,475	11,246	13,338
Canada	0	0	259	779	1,004	1,004
Caribbean basin	210	328	735	735	779	792
China	344	384	614	1,041	1,319	1,319
Colombia	196	215	411	782	1,388	1,542
Eastern Europe	110	226	428	738	1,037	1,149
Former Soviet Union	0	0	6	17	52	157
India	313	279	541	992	1,893	2,543
Japan	0	0	95	348	612	647
Middle East	0	0	0	0	0	0
Mexico	0	0	199	601	1,408	1,546
Other Asia	0	0	0	0	0	0
South Korea	0	0	35	35	35	35
United States	3,850	11,668	15,767	16,736	19,667	24,124
Western Europe	600	2,568	2,755	3,398	5,291	8,013
<b>Total</b>	<b>10,789</b>	<b>22,154</b>	<b>30,527</b>	<b>37,198</b>	<b>47,711</b>	<b>58,359</b>

**Table A-254: Delayed technology reference case with credit and tariff extension  
ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	455	502
Australia	0	0	66	247	622	1,172
Canada	145	0	233	779	1,004	1,004
China	121	0	0	1,041	1,103	1,463
Central and South America	3,788	4,853	6,139	6,863	8,250	8,709
Eastern Europe	699	226	872	953	1,037	1,149
Former Soviet Union	0	0	6	17	52	157
India	313	279	541	992	1,893	2,399
Japan	263	288	410	730	1,039	1,100
Middle East	0	0	0	0	0	0
Mexico	0	0	30	78	183	201
Other Asia	0	0	0	0	0	0
South Korea	264	335	400	414	413	413
United States	4,161	11,668	17,153	19,947	24,012	30,075
Western Europe	736	4,174	4,312	4,737	7,649	10,017
<b>Total</b>	<b>10,789</b>	<b>22,154</b>	<b>30,527</b>	<b>37,198</b>	<b>47,711</b>	<b>58,359</b>

**Table A-255: Delayed technology reference case with credit and tariff extension  
ethanol net trade [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	-145	0	26	0	0	0
China	224	384	614	0	216	-144
Central and South America	1,484	1,845	3,259	5,003	6,068	7,441
Eastern Europe	-589	0	-444	-215	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	144
Japan	-263	-288	-315	-382	-427	-453
Middle East	0	0	0	0	0	0
Mexico	0	0	170	523	1,225	1,345
Other Asia	0	0	0	0	0	0
South Korea	-264	-335	-365	-379	-378	-378
United States	-311	0	-1,386	-3,211	-4,345	-5,951
Western Europe	-136	-1,607	-1,557	-1,339	-2,358	-2,003
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-256: Delayed technology reference case with credit and tariff extension  
grain ethanol production [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Argentina	0	178	569	569	569	142
Australia	0	0	0	0	0	0
Brazil	0	0	0	0	0	0
Canada	0	0	0	0	0	0
Caribbean basin	0	0	0	0	0	0
China	344	344	344	325	0	0
Colombia	0	0	0	0	0	0
Eastern Europe	110	226	348	477	367	251
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	3,850	11,668	15,000	15,000	15,000	15,000
Western Europe	600	2,568	2,589	2,705	3,178	3,604
<b>Total</b>	<b>4,904</b>	<b>14,984</b>	<b>18,850</b>	<b>19,077</b>	<b>19,114</b>	<b>18,997</b>

**Table A-257: Delayed technology reference case with credit and tariff extension  
sugar ethanol production [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	444	490
Argentina	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Brazil	4,866	5,977	7,329	8,585	9,855	11,793
Canada	0	0	0	0	0	0
Caribbean basin	210	328	735	735	779	792
China	0	40	48	48	48	48
Colombia	196	215	241	270	270	270
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	313	279	327	347	381	348
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	0	0	0	0
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>5,884</b>	<b>7,169</b>	<b>9,044</b>	<b>10,387</b>	<b>11,778</b>	<b>13,741</b>

# World Biofuels Study

**Table A-258: Delayed technology reference case with credit and tariff extension  
cellulosic ethanol production [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	11	11
Argentina	0	0	59	306	335	335
Australia	0	0	66	247	622	1,172
Brazil	0	0	296	890	1,391	1,546
Canada	0	0	259	779	1,004	1,004
Caribbean basin	0	0	0	0	0	0
China	0	0	222	667	1,271	1,271
Colombia	0	0	170	512	1,118	1,272
Eastern Europe	0	0	80	261	670	897
Former Soviet Union	0	0	6	17	52	157
India	0	0	214	645	1,512	2,196
Japan	0	0	95	348	612	647
Middle East	0	0	0	0	0	0
Mexico	0	0	199	601	1,408	1,546
Other Asia	0	0	0	0	0	0
South Korea	0	0	35	35	35	35
United States	0	0	767	1,736	4,667	9,124
Western Europe	0	0	166	693	2,113	4,410
<b>Total</b>	<b>0</b>	<b>0</b>	<b>2,633</b>	<b>7,735</b>	<b>16,820</b>	<b>25,622</b>

**Table A-259: Delayed technology reference case with credit and tariff extension  
grain ethanol consumption [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	121	0	0	325	387	0
Central and South America	0	36	94	114	90	48
Eastern Europe	110	226	348	477	367	251
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	192	267	382	91	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	224	295	144	74	0	94
United States	3,850	11,668	15,000	15,000	15,000	15,000
Western Europe	600	2,568	2,996	2,705	3,178	3,604
<b>Total</b>	<b>4,904</b>	<b>14,984</b>	<b>18,850</b>	<b>19,077</b>	<b>19,114</b>	<b>18,997</b>

**Table A-260: Delayed technology reference case with credit and tariff extension  
sugar ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	444	490
Australia	0	0	0	0	0	0
Canada	145	0	0	0	0	0
China	0	0	0	48	48	48
Central and South America	3,788	4,818	6,045	6,749	8,156	8,662
Eastern Europe	589	0	418	153	0	0
Former Soviet Union	0	0	0	0	0	0
India	313	279	327	347	381	348
Japan	263	96	48	0	0	453
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	41	40	0	0	0	284
United States	311	0	788	2,689	2,749	1,454
Western Europe	136	1,607	1,054	0	0	2,003
<b>Total</b>	<b>5,884</b>	<b>7,169</b>	<b>9,044</b>	<b>10,387</b>	<b>11,778</b>	<b>13,741</b>

**Table A-261: Delayed technology reference case with credit and tariff extension  
cellulosic ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	11	11
Australia	0	0	66	247	622	1,172
Canada	0	0	233	779	1,004	1,004
China	0	0	0	667	667	1,415
Central and South America	0	0	0	0	4	0
Eastern Europe	0	0	106	323	670	897
Former Soviet Union	0	0	6	17	52	157
India	0	0	214	645	1,512	2,051
Japan	0	0	95	348	948	647
Middle East	0	0	0	0	0	0
Mexico	0	0	30	78	183	201
Other Asia	0	0	0	0	0	0
South Korea	0	0	256	341	413	35
United States	0	0	1,365	2,258	6,264	13,622
Western Europe	0	0	262	2,032	4,472	4,410
<b>Total</b>	<b>0</b>	<b>0</b>	<b>2,633</b>	<b>7,735</b>	<b>16,820</b>	<b>25,622</b>

**Table A-262: Delayed technology reference case with credit and tariff extension  
grain ethanol net trade [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	224	344	344	0	-387	0
Central and South America	0	143	475	455	479	94
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	-192	-267	-382	-91	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	-224	-295	-144	-74	0	-94
United States	0	0	0	0	0	0
Western Europe	0	0	-408	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-263: Delayed technology reference case with credit and tariff extension  
sugar ethanol net trade [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	-145	0	0	0	0	0
China	0	40	48	0	0	0
Central and South America	1,484	1,702	2,260	2,841	2,749	4,193
Eastern Europe	-589	0	-418	-153	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	-263	-96	-48	0	0	-453
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	-41	-40	0	0	0	-284
United States	-311	0	-788	-2,689	-2,749	-1,454
Western Europe	-136	-1,607	-1,054	0	0	-2,003
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-264: Delayed technology reference case with credit and tariff extension  
cellulosic ethanol net trade [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	26	0	0	0
China	0	0	222	0	603	-144
Central and South America	0	0	525	1,707	2,841	3,153
Eastern Europe	0	0	-26	-62	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	144
Japan	0	0	0	0	-335	0
Middle East	0	0	0	0	0	0
Mexico	0	0	170	523	1,225	1,345
Other Asia	0	0	0	0	0	0
South Korea	0	0	-222	-306	-378	0
United States	0	0	-599	-523	-1,597	-4,498
Western Europe	0	0	-96	-1,339	-2,358	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-265: Delayed technology reference case with credit and tariff extension  
biomass-to-liquids production [Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Argentina	0	0	21	110	121	121
Australia	0	0	0	0	0	0
Brazil	0	0	106	320	554	556
Canada	0	0	93	280	361	361
Caribbean basin	0	0	0	0	0	0
China	0	0	80	240	457	457
Colombia	0	0	61	184	431	458
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	77	232	544	790
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	72	216	506	556
Other Asia	0	0	0	0	0	0
South Korea	0	0	36	52	52	52
United States	0	0	786	3,253	3,349	3,264
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>1,332</b>	<b>4,887</b>	<b>6,375</b>	<b>6,614</b>

**Table A-266: Delayed technology reference case with credit and tariff extension  
biomass-to-liquids consumption [Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	0	0	0	0	0
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	1,059	3,913	6,375	6,614
Western Europe	0	0	273	974	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>1,332</b>	<b>4,887</b>	<b>6,375</b>	<b>6,614</b>

**Table A-267: Delayed technology reference case with credit and tariff extension  
biomass-to-liquids net trade [Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	93	280	361	361
China	0	0	80	240	457	457
Central and South America	0	0	189	614	1,106	1,134
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	77	232	544	790
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	72	216	506	556
Other Asia	0	0	0	0	0	0
South Korea	0	0	36	52	52	52
United States	0	0	-273	-660	-3,026	-3,350
Western Europe	0	0	-273	-974	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>



**Table A-268: Delayed technology reference case with credit and tariff extension  
biodiesel production [Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Argentina	0	333	776	819	827	651
Australia	0	0	0	0	0	0
Brazil	0	333	835	1,600	2,103	1,334
Canada	0	0	0	0	0	0
Caribbean basin	0	95	310	675	802	898
China	0	0	0	0	0	0
Colombia	0	119	298	474	650	782
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	1,182	1,640	1,747	1,907	2,072
Western Europe	998	3,178	3,578	3,930	4,468	4,788
<b>Total</b>	<b>998</b>	<b>5,238</b>	<b>7,437</b>	<b>9,245</b>	<b>10,757</b>	<b>10,525</b>

**Table A-269: Delayed technology reference case with credit and tariff extension  
biodiesel consumption [Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	158	472	984	1,306	1,490
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	1,182	1,713	1,791	2,216	3,546
Western Europe	998	3,898	5,252	6,471	7,235	5,489
<b>Total</b>	<b>998</b>	<b>5,238</b>	<b>7,437</b>	<b>9,245</b>	<b>10,757</b>	<b>10,525</b>

**Table A-270: Delayed technology reference case with credit and tariff extension  
biodiesel net trade [Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	720	1,746	2,584	3,076	2,175
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	-73	-43	-310	-1,474
Western Europe	0	-720	-1,674	-2,541	-2,767	-701
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**A-16 Delayed Technology Reference Case with Credit Extension****Table A-271: Delayed technology reference case with credit extension ethanol production [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	455	502
Argentina	0	178	699	946	975	987
Australia	0	0	66	247	622	1,172
Brazil	4,866	5,977	7,624	9,452	11,347	13,363
Canada	0	0	259	779	1,004	1,004
Caribbean basin	210	328	683	683	775	775
China	344	384	614	1,041	1,549	1,549
Colombia	196	215	411	782	1,501	2,231
Eastern Europe	110	226	434	780	1,037	1,149
Former Soviet Union	0	0	6	17	52	157
India	313	279	541	992	1,893	2,543
Japan	0	0	95	348	612	646
Middle East	0	0	0	0	0	0
Mexico	0	0	199	601	1,408	1,546
Other Asia	0	0	0	0	0	0
South Korea	0	0	35	35	35	35
United States	3,850	11,668	15,767	16,736	19,559	23,155
Western Europe	600	2,568	2,755	3,698	5,291	8,013
<b>Total</b>	<b>10,789</b>	<b>22,154</b>	<b>30,551</b>	<b>37,536</b>	<b>48,113</b>	<b>58,826</b>

# World Biofuels Study

**Table A-272: Delayed technology reference case with credit extension ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	455	502
Australia	0	0	66	247	622	1,172
Canada	145	0	233	779	1,004	1,020
China	121	0	0	903	1,100	1,374
Central and South America	3,788	4,853	6,147	6,858	8,237	8,863
Eastern Europe	699	226	872	953	1,037	1,149
Former Soviet Union	0	0	6	17	52	157
India	313	279	541	992	1,893	2,399
Japan	263	288	368	698	1,007	1,099
Middle East	0	0	0	0	0	0
Mexico	0	0	30	78	183	201
Other Asia	0	0	0	0	0	0
South Korea	264	335	400	414	413	413
United States	4,161	11,668	17,249	19,947	24,487	31,676
Western Europe	736	4,174	4,276	5,249	7,624	8,803
<b>Total</b>	<b>10,789</b>	<b>22,154</b>	<b>30,551</b>	<b>37,536</b>	<b>48,113</b>	<b>58,826</b>

**Table A-273: Delayed technology reference case with credit extension ethanol net trade [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	-145	0	26	0	0	-16
China	224	384	614	138	449	175
Central and South America	1,484	1,845	3,271	5,005	6,361	8,493
Eastern Europe	-589	0	-438	-173	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	144
Japan	-263	-288	-273	-350	-395	-453
Middle East	0	0	0	0	0	0
Mexico	0	0	170	523	1,225	1,345
Other Asia	0	0	0	0	0	0
South Korea	-264	-335	-365	-379	-378	-378
United States	-311	0	-1,482	-3,211	-4,928	-8,521
Western Europe	-136	-1,607	-1,521	-1,551	-2,333	-790
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-274: Delayed technology reference case with credit extension grain ethanol production [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Argentina	0	178	640	640	640	640
Australia	0	0	0	0	0	0
Brazil	0	0	0	0	0	0
Canada	0	0	0	0	0	0
Caribbean basin	0	0	0	0	0	0
China	344	344	344	325	0	0
Colombia	0	0	0	0	0	0
Eastern Europe	110	226	348	477	367	251
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	3,850	11,668	15,000	15,000	15,000	14,868
Western Europe	600	2,568	2,589	3,005	3,178	3,604
<b>Total</b>	<b>4,904</b>	<b>14,984</b>	<b>18,921</b>	<b>19,448</b>	<b>19,185</b>	<b>19,363</b>

**Table A-275: Delayed technology reference case with credit extension sugar ethanol production [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	444	490
Argentina	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Brazil	4,866	5,977	7,329	8,562	9,806	11,818
Canada	0	0	0	0	0	0
Caribbean basin	210	328	683	683	775	775
China	0	40	48	48	48	48
Colombia	196	215	241	270	302	338
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	313	279	327	347	381	348
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	0	0	0	0
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>5,884</b>	<b>7,169</b>	<b>8,992</b>	<b>10,312</b>	<b>11,756</b>	<b>13,816</b>

# World Biofuels Study

**Table A-276: Delayed technology reference case with credit extension cellulosic ethanol production [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	11	11
Argentina	0	0	59	306	335	347
Australia	0	0	66	247	622	1,172
Brazil	0	0	296	890	1,541	1,546
Canada	0	0	259	779	1,004	1,004
Caribbean basin	0	0	0	0	0	0
China	0	0	222	667	1,501	1,501
Colombia	0	0	170	512	1,199	1,893
Eastern Europe	0	0	85	303	670	897
Former Soviet Union	0	0	6	17	52	157
India	0	0	214	645	1,512	2,196
Japan	0	0	95	348	612	646
Middle East	0	0	0	0	0	0
Mexico	0	0	199	601	1,408	1,546
Other Asia	0	0	0	0	0	0
South Korea	0	0	35	35	35	35
United States	0	0	767	1,736	4,559	8,288
Western Europe	0	0	166	693	2,113	4,410
<b>Total</b>	<b>0</b>	<b>0</b>	<b>2,638</b>	<b>7,777</b>	<b>17,172</b>	<b>25,647</b>

**Table A-277: Delayed technology reference case with credit extension grain ethanol consumption [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	121	0	0	263	0	0
Central and South America	0	36	105	123	98	99
Eastern Europe	110	226	348	477	367	251
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	192	225	62	0	163
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	224	295	144	0	0	378
United States	3,850	11,668	15,000	15,000	15,000	14,868
Western Europe	600	2,568	3,099	3,522	3,720	3,604
<b>Total</b>	<b>4,904</b>	<b>14,984</b>	<b>18,921</b>	<b>19,448</b>	<b>19,185</b>	<b>19,363</b>

**Table A-278: Delayed technology reference case with credit extension sugar ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	444	490
Australia	0	0	0	0	0	0
Canada	145	0	0	0	0	16
China	0	0	0	48	48	48
Central and South America	3,788	4,818	6,042	6,589	7,790	8,764
Eastern Europe	589	0	412	173	0	0
Former Soviet Union	0	0	0	0	0	0
India	313	279	327	347	381	348
Japan	263	96	48	0	0	146
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	41	40	0	0	0	0
United States	311	0	788	2,753	3,093	3,091
Western Europe	136	1,607	1,011	0	0	915
<b>Total</b>	<b>5,884</b>	<b>7,169</b>	<b>8,992</b>	<b>10,312</b>	<b>11,756</b>	<b>13,816</b>

**Table A-279: Delayed technology reference case with credit extension cellulosic ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	11	11
Australia	0	0	66	247	622	1,172
Canada	0	0	233	779	1,004	1,004
China	0	0	0	592	1,052	1,326
Central and South America	0	0	0	146	350	0
Eastern Europe	0	0	111	303	670	897
Former Soviet Union	0	0	6	17	52	157
India	0	0	214	645	1,512	2,051
Japan	0	0	95	636	1,007	790
Middle East	0	0	0	0	0	0
Mexico	0	0	30	78	183	201
Other Asia	0	0	0	0	0	0
South Korea	0	0	256	414	413	35
United States	0	0	1,461	2,194	6,394	13,718
Western Europe	0	0	166	1,727	3,903	4,285
<b>Total</b>	<b>0</b>	<b>0</b>	<b>2,638</b>	<b>7,777</b>	<b>17,172</b>	<b>25,647</b>

# World Biofuels Study

**Table A-280: Delayed technology reference case with credit extension grain ethanol net trade [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	224	344	344	62	0	0
Central and South America	0	143	535	517	542	541
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	-192	-225	-62	0	-163
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	-224	-295	-144	0	0	-378
United States	0	0	0	0	0	0
Western Europe	0	0	-510	-517	-542	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-281: Delayed technology reference case with credit extension sugar ethanol net trade [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	-145	0	0	0	0	-16
China	0	40	48	0	0	0
Central and South America	1,484	1,702	2,211	2,926	3,093	4,167
Eastern Europe	-589	0	-412	-173	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	-263	-96	-48	0	0	-146
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	-41	-40	0	0	0	0
United States	-311	0	-788	-2,753	-3,093	-3,091
Western Europe	-136	-1,607	-1,011	0	0	-915
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>



**Table A-282: Delayed technology reference case with credit extension cellulosic ethanol net trade [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	26	0	0	0
China	0	0	222	75	449	175
Central and South America	0	0	525	1,561	2,726	3,786
Eastern Europe	0	0	-26	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	144
Japan	0	0	0	-288	-395	-144
Middle East	0	0	0	0	0	0
Mexico	0	0	170	523	1,225	1,345
Other Asia	0	0	0	0	0	0
South Korea	0	0	-222	-379	-378	0
United States	0	0	-694	-458	-1,835	-5,430
Western Europe	0	0	0	-1,034	-1,790	125
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-283: Delayed technology reference case with credit extension biomass-to-liquids production [Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Argentina	0	0	21	110	121	125
Australia	0	0	0	0	0	0
Brazil	0	0	106	320	554	556
Canada	0	0	93	280	361	361
Caribbean basin	0	0	0	0	0	0
China	0	0	80	240	477	477
Colombia	0	0	61	184	431	681
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	77	232	544	790
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	72	216	506	556
Other Asia	0	0	0	0	0	0
South Korea	0	0	36	52	52	52
United States	0	0	786	2,532	3,407	5,031
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>1,332</b>	<b>4,166</b>	<b>6,453</b>	<b>8,628</b>

**Table A-284: Delayed technology reference case with credit extension biomass-to-liquids consumption [Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	0	0	0	0	0
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	1,034	4,078	6,453	6,517
Western Europe	0	0	298	88	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>1,332</b>	<b>4,166</b>	<b>6,453</b>	<b>6,517</b>

**Table A-285: Delayed technology reference case with credit extension biomass-to-liquids net trade [Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	93	280	361	361
China	0	0	80	240	477	477
Central and South America	0	0	189	614	1,106	1,362
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	77	232	544	790
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	72	216	506	556
Other Asia	0	0	0	0	0	0
South Korea	0	0	36	52	52	52
United States	0	0	-248	-1,546	-3,046	-3,597
Western Europe	0	0	-298	-88	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

# World Biofuels Study

**Table A-286: Delayed technology reference case with credit extension biodiesel production [Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Argentina	0	333	776	819	827	239
Australia	0	0	0	0	0	0
Brazil	0	333	877	1,642	1,793	1,355
Canada	0	0	0	0	0	0
Caribbean basin	0	95	310	675	802	898
China	0	0	0	0	0	0
Colombia	0	119	298	474	650	782
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	1,182	1,640	1,747	1,907	2,072
Western Europe	998	3,178	3,578	3,930	4,468	4,788
<b>Total</b>	<b>998</b>	<b>5,238</b>	<b>7,479</b>	<b>9,287</b>	<b>10,448</b>	<b>10,134</b>

**Table A-287: Delayed technology reference case with credit extension biodiesel consumption [Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	158	472	984	1,306	1,490
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	1,182	1,713	1,747	1,907	2,042
Western Europe	998	3,898	5,294	6,556	7,235	6,602
<b>Total</b>	<b>998</b>	<b>5,238</b>	<b>7,479</b>	<b>9,287</b>	<b>10,448</b>	<b>10,134</b>

**Table A-288: Delayed technology reference case with credit extension biodiesel net trade [Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	720	1,788	2,626	2,767	1,784
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	-73	0	0	31
Western Europe	0	-720	-1,716	-2,626	-2,767	-1,815
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

## A-17 Delayed Technology Reference Case with 70/30 Fuel/Food split

**Table A-289: Delayed technology reference case with 70/30 food/fuel split ethanol production [Million gallons]**

### **BIORF70D**

#### **Ethanol production [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	455	502
Argentina	0	178	628	875	904	916
Australia	0	0	66	247	624	1,172
Brazil	5,225	6,956	8,845	10,906	13,274	14,133
Canada	0	0	259	779	1,004	1,004
Caribbean basin	180	299	573	683	775	775
China	344	384	614	1,041	1,485	1,485
Colombia	196	215	411	782	1,501	2,227
Eastern Europe	110	226	428	738	1,037	1,149
Former Soviet Union	0	0	6	19	57	174
India	313	279	541	992	1,893	2,543
Japan	0	0	95	348	612	647
Middle East	0	0	0	0	0	0
Mexico	0	0	199	601	1,408	1,546
Other Asia	0	0	0	0	0	0
South Korea	0	0	35	35	35	35
United States	3,850	11,423	14,790	16,127	16,196	21,110
Western Europe	600	2,465	2,755	3,398	5,291	8,013
<b>Total</b>	<b>11,118</b>	<b>22,756</b>	<b>30,609</b>	<b>37,971</b>	<b>46,551</b>	<b>57,428</b>

**Table A-290: Delayed technology reference case with 70/30 food/fuel split ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	455	502
Australia	0	0	66	247	624	1,172
Canada	119	0	233	933	1,004	1,020
China	442	0	0	1,041	712	1,485
Central and South America	3,785	4,851	6,129	7,148	7,954	8,855
Eastern Europe	699	783	872	953	1,037	1,149
Former Soviet Union	0	0	6	19	57	174
India	313	279	541	992	1,893	2,399
Japan	300	325	410	698	1,007	1,100
Middle East	0	0	0	0	0	0
Mexico	0	0	30	78	183	201
Other Asia	0	0	0	0	0	0
South Korea	264	335	400	414	413	413
United States	4,161	11,612	17,213	19,797	23,562	28,685
Western Europe	736	4,241	4,344	5,249	7,649	10,276
<b>Total</b>	<b>11,118</b>	<b>22,756</b>	<b>30,609</b>	<b>37,971</b>	<b>46,551</b>	<b>57,428</b>

**Table A-291: Delayed technology reference case with 70/30 food/fuel split ethanol net trade [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	-119	0	26	-154	0	-16
China	-98	384	614	0	774	0
Central and South America	1,816	2,797	4,328	6,097	8,500	9,195
Eastern Europe	-589	-557	-444	-215	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	144
Japan	-300	-325	-315	-350	-395	-453
Middle East	0	0	0	0	0	0
Mexico	0	0	170	523	1,225	1,345
Other Asia	0	0	0	0	0	0
South Korea	-264	-335	-365	-379	-378	-378
United States	-311	-189	-2,424	-3,669	-7,366	-7,575
Western Europe	-136	-1,776	-1,589	-1,851	-2,358	-2,263
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-292: Delayed technology reference case with 70/30 food/fuel split grain ethanol production [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Argentina	0	178	569	569	569	569
Australia	0	0	0	0	0	0
Brazil	0	0	0	0	0	0
Canada	0	0	0	0	0	0
Caribbean basin	0	0	0	0	0	0
China	344	344	344	325	0	0
Colombia	0	0	0	0	0	0
Eastern Europe	110	226	348	477	367	251
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	3,850	11,423	14,058	15,000	15,000	14,141
Western Europe	600	2,465	2,589	2,705	3,178	3,604
<b>Total</b>	<b>4,904</b>	<b>14,636</b>	<b>17,908</b>	<b>19,077</b>	<b>19,114</b>	<b>18,565</b>

**Table A-293: Delayed technology reference case with 70/30 food/fuel split sugar ethanol production [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	444	490
Argentina	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Brazil	5,225	6,956	8,550	10,016	11,733	12,588
Canada	0	0	0	0	0	0
Caribbean basin	180	299	573	683	775	775
China	0	40	48	48	48	48
Colombia	196	215	241	270	302	334
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	313	279	327	347	381	348
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	0	0	0	0
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>6,214</b>	<b>8,119</b>	<b>10,103</b>	<b>11,766</b>	<b>13,683</b>	<b>14,582</b>

# World Biofuels Study

**Table A-294: Delayed technology reference case with 70/30 food/fuel split cellulosic ethanol production [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	11	11
Argentina	0	0	59	306	335	347
Australia	0	0	66	247	624	1,172
Brazil	0	0	296	890	1,541	1,546
Canada	0	0	259	779	1,004	1,004
Caribbean basin	0	0	0	0	0	0
China	0	0	222	667	1,438	1,438
Colombia	0	0	170	512	1,199	1,893
Eastern Europe	0	0	80	261	670	897
Former Soviet Union	0	0	6	19	57	174
India	0	0	214	645	1,512	2,196
Japan	0	0	95	348	612	647
Middle East	0	0	0	0	0	0
Mexico	0	0	199	601	1,408	1,546
Other Asia	0	0	0	0	0	0
South Korea	0	0	35	35	35	35
United States	0	0	732	1,127	1,196	6,969
Western Europe	0	0	166	693	2,113	4,410
<b>Total</b>	<b>0</b>	<b>0</b>	<b>2,598</b>	<b>7,128</b>	<b>13,755</b>	<b>24,282</b>

**Table A-295: Delayed technology reference case with 70/30 food/fuel split grain ethanol consumption [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	344	0	0	325	0	0
Central and South America	0	36	94	114	90	92
Eastern Europe	110	226	348	477	367	251
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	192	267	350	0	99
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	295	144	105	0	378
United States	3,850	11,423	14,058	15,000	15,000	14,141
Western Europe	600	2,465	2,996	2,705	3,656	3,604
<b>Total</b>	<b>4,904</b>	<b>14,636</b>	<b>17,908</b>	<b>19,077</b>	<b>19,114</b>	<b>18,565</b>



**Table A-296: Delayed technology reference case with 70/30 food/fuel split sugar ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	444	490
Australia	0	0	0	0	0	0
Canada	119	0	0	0	0	16
China	98	0	0	48	48	48
Central and South America	3,785	4,815	6,035	7,004	7,864	8,763
Eastern Europe	589	557	418	184	0	0
Former Soviet Union	0	0	0	0	0	0
India	313	279	327	347	381	348
Japan	300	133	48	0	0	210
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	264	40	0	0	0	0
United States	311	189	1,729	2,753	3,093	2,445
Western Europe	136	1,776	1,181	1,029	1,853	2,263
<b>Total</b>	<b>6,214</b>	<b>8,119</b>	<b>10,103</b>	<b>11,766</b>	<b>13,683</b>	<b>14,582</b>

**Table A-297: Delayed technology reference case with 70/30 food/fuel split cellulosic ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	11	11
Australia	0	0	66	247	624	1,172
Canada	0	0	233	933	1,004	1,004
China	0	0	0	667	664	1,438
Central and South America	0	0	0	31	0	0
Eastern Europe	0	0	106	292	670	897
Former Soviet Union	0	0	6	19	57	174
India	0	0	214	645	1,512	2,051
Japan	0	0	95	348	1,007	791
Middle East	0	0	0	0	0	0
Mexico	0	0	30	78	183	201
Other Asia	0	0	0	0	0	0
South Korea	0	0	256	309	413	35
United States	0	0	1,426	2,044	5,469	12,099
Western Europe	0	0	166	1,515	2,140	4,410
<b>Total</b>	<b>0</b>	<b>0</b>	<b>2,598</b>	<b>7,128</b>	<b>13,755</b>	<b>24,282</b>

**Table A-298: Delayed technology reference case with 70/30 food/fuel split grain ethanol net trade [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	344	344	0	0	0
Central and South America	0	143	475	455	478	477
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	-192	-267	-350	0	-99
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	-295	-144	-105	0	-378
United States	0	0	0	0	0	0
Western Europe	0	0	-408	0	-478	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-299: Delayed technology reference case with 70/30 food/fuel split sugar ethanol net trade [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	-119	0	0	0	0	-16
China	-98	40	48	0	0	0
Central and South America	1,816	2,655	3,329	3,966	4,946	4,933
Eastern Europe	-589	-557	-418	-184	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	-300	-133	-48	0	0	-210
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	-264	-40	0	0	0	0
United States	-311	-189	-1,729	-2,753	-3,093	-2,445
Western Europe	-136	-1,776	-1,181	-1,029	-1,853	-2,263
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-300: Delayed technology reference case with 70/30 food/fuel split cellulosic ethanol net trade [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	26	-154	0	0
China	0	0	222	0	774	0
Central and South America	0	0	525	1,676	3,075	3,786
Eastern Europe	0	0	-26	-31	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	144
Japan	0	0	0	0	-395	-144
Middle East	0	0	0	0	0	0
Mexico	0	0	170	523	1,225	1,345
Other Asia	0	0	0	0	0	0
South Korea	0	0	-222	-275	-378	0
United States	0	0	-694	-917	-4,273	-5,130
Western Europe	0	0	0	-822	-27	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-301: Delayed technology reference case with 70/30 food/fuel split biomass-to-liquids production [Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Argentina	0	0	21	110	121	125
Australia	0	0	0	0	0	0
Brazil	0	0	106	320	554	556
Canada	0	0	93	280	361	361
Caribbean basin	0	0	0	0	0	0
China	0	0	80	240	517	517
Colombia	0	0	61	184	431	681
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	77	232	544	790
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	72	216	506	556
Other Asia	0	0	0	0	0	0
South Korea	0	0	36	56	56	56
United States	0	0	750	2,405	3,319	4,283
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>1,296</b>	<b>4,043</b>	<b>6,410</b>	<b>7,924</b>

**Table A-302: Delayed technology reference case with 70/30 food/fuel split biomass-to-liquids consumption [Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	0	0	0	0	0
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	1,082	3,913	6,409	7,924
Western Europe	0	0	214	130	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>1,296</b>	<b>4,043</b>	<b>6,409</b>	<b>7,924</b>

**Table A-303: Delayed technology reference case with 70/30 food/fuel split biomass-to-liquids net trade [Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	93	280	361	361
China	0	0	80	240	517	517
Central and South America	0	0	189	614	1,106	1,362
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	77	232	544	790
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	72	216	506	556
Other Asia	0	0	0	0	0	0
South Korea	0	0	36	56	56	56
United States	0	0	-332	-1,508	-3,090	-3,641
Western Europe	0	0	-214	-130	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

# World Biofuels Study

**Table A-304: Delayed technology reference case with 70/30 food/fuel split biodiesel production [Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Argentina	0	333	776	819	827	239
Australia	0	0	0	0	0	0
Brazil	0	333	835	1,600	1,793	1,355
Canada	0	0	0	0	0	0
Caribbean basin	0	95	310	675	802	898
China	0	0	0	0	0	0
Colombia	0	119	298	474	650	782
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	1,238	1,640	1,747	1,907	2,072
Western Europe	998	3,178	3,578	3,930	4,468	4,788
<b>Total</b>	<b>998</b>	<b>5,294</b>	<b>7,437</b>	<b>9,245</b>	<b>10,448</b>	<b>10,134</b>

**Table A-305: Delayed technology reference case with 70/30 food/fuel split biodiesel consumption [Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	158	472	984	1,306	1,490
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	1,238	1,713	1,747	1,907	3,415
Western Europe	998	3,898	5,252	6,514	7,235	5,229
<b>Total</b>	<b>998</b>	<b>5,294</b>	<b>7,437</b>	<b>9,245</b>	<b>10,448</b>	<b>10,134</b>

**Table A-306: Delayed technology reference case with 70/30 food/fuel split biodiesel net trade [Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	720	1,746	2,584	2,767	1,784
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	-73	0	0	-1,343
Western Europe	0	-720	-1,674	-2,584	-2,767	-442
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

## A-18 Delayed Technology Reference Case with High Feedstock Availability

**Table A-307: Delayed technology reference case with high feedstock availability ethanol production [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	455	502
Argentina	0	0	70	449	573	607
Australia	0	0	66	247	627	1,172
Brazil	4,866	7,998	11,399	16,323	20,592	23,010
Canada	0	0	259	779	1,004	1,020
Caribbean basin	210	280	682	682	682	683
China	344	0	222	993	1,564	3,251
Colombia	196	0	170	512	887	887
Eastern Europe	110	226	428	738	1,037	1,149
Former Soviet Union	0	0	6	19	57	173
India	313	833	1,300	1,728	2,200	2,822
Japan	0	0	95	348	612	647
Middle East	0	0	0	0	0	0
Mexico	0	0	199	561	635	665
Other Asia	0	0	0	0	0	0
South Korea	0	0	25	25	25	25
United States	3,850	11,413	14,769	14,344	15,501	16,640
Western Europe	600	2,465	2,755	3,235	5,205	7,923
<b>Total</b>	<b>10,789</b>	<b>23,546</b>	<b>32,809</b>	<b>41,385</b>	<b>51,656</b>	<b>61,173</b>

**Table A-308: Delayed technology reference case with high feedstock availability  
ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	455	502
Australia	0	0	66	247	627	1,172
Canada	145	259	898	984	1,004	1,020
China	297	0	848	3,397	4,132	5,063
Central and South America	3,788	4,771	6,016	7,053	7,824	8,619
Eastern Europe	699	783	872	953	1,037	1,149
Former Soviet Union	0	0	6	19	57	173
India	313	833	1,300	1,642	1,980	2,399
Japan	263	325	448	736	1,008	1,100
Middle East	0	0	0	0	0	0
Mexico	0	0	30	130	83	130
Other Asia	0	0	0	526	1,912	2,828
South Korea	264	335	400	414	413	413
United States	3,984	11,668	17,188	19,797	23,562	28,684
Western Europe	736	4,241	4,373	5,086	7,563	7,923
<b>Total</b>	<b>10,789</b>	<b>23,546</b>	<b>32,809</b>	<b>41,385</b>	<b>51,656</b>	<b>61,173</b>

**Table A-309: Delayed technology reference case with high feedstock availability  
ethanol net trade [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	-145	-259	-640	-205	0	0
China	47	0	-626	-2,404	-2,568	-1,812
Central and South America	1,484	3,508	6,305	10,914	14,910	16,568
Eastern Europe	-589	-557	-444	-215	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	86	220	423
Japan	-263	-325	-353	-388	-395	-453
Middle East	0	0	0	0	0	0
Mexico	0	0	170	431	553	535
Other Asia	0	0	0	-526	-1,912	-2,828
South Korea	-264	-335	-375	-389	-388	-388
United States	-134	-256	-2,419	-5,452	-8,061	-12,044
Western Europe	-136	-1,776	-1,618	-1,851	-2,358	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>



**Table A-110: Delayed technology reference case with high feedstock availability  
grain ethanol production [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Argentina	0	0	11	11	57	61
Australia	0	0	0	0	0	0
Brazil	0	0	0	0	0	0
Canada	0	0	0	0	0	0
Caribbean basin	0	0	0	0	0	0
China	344	0	0	325	0	0
Colombia	0	0	0	0	0	0
Eastern Europe	110	226	348	477	367	251
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	3,850	11,413	14,038	13,613	11,781	9,863
Western Europe	600	2,465	2,589	2,542	3,178	3,604
<b>Total</b>	<b>4,904</b>	<b>14,104</b>	<b>16,985</b>	<b>16,968</b>	<b>15,384</b>	<b>13,778</b>

**Table A-121: Delayed technology reference case with high feedstock availability  
sugar ethanol production [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	300	330	364	402	444	490
Argentina	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Brazil	4,866	7,998	11,104	15,434	18,507	18,507
Canada	0	0	0	0	0	0
Caribbean basin	210	280	682	682	682	683
China	0	0	0	0	0	0
Colombia	196	0	0	0	0	0
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	313	833	1,086	1,086	1,086	1,086
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	0	0	0	0
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>5,884</b>	<b>9,442</b>	<b>13,236</b>	<b>17,604</b>	<b>20,719</b>	<b>20,765</b>

# World Biofuels Study

**Table A-312: Delayed technology reference case with high feedstock availability  
cellulosic ethanol production [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	11	11
Argentina	0	0	59	438	516	547
Australia	0	0	66	247	627	1,172
Brazil	0	0	296	890	2,085	4,504
Canada	0	0	259	779	1,004	1,020
Caribbean basin	0	0	0	0	0	0
China	0	0	222	667	1,564	3,251
Colombia	0	0	170	512	887	887
Eastern Europe	0	0	80	261	670	897
Former Soviet Union	0	0	6	19	57	173
India	0	0	214	642	1,114	1,736
Japan	0	0	95	348	612	647
Middle East	0	0	0	0	0	0
Mexico	0	0	199	561	635	665
Other Asia	0	0	0	0	0	0
South Korea	0	0	25	25	25	25
United States	0	0	732	732	3,720	6,777
Western Europe	0	0	166	693	2,027	4,320
<b>Total</b>	<b>0</b>	<b>0</b>	<b>2,588</b>	<b>6,813</b>	<b>15,554</b>	<b>26,630</b>

**Table A-313: Delayed technology reference case with high feedstock availability  
grain ethanol consumption [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	344	0	0	325	0	0
Central and South America	0	0	11	11	57	61
Eastern Europe	110	226	348	477	367	251
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	3,850	11,413	14,038	13,613	11,781	9,863
Western Europe	600	2,465	2,589	2,542	3,178	3,604
<b>Total</b>	<b>4,904</b>	<b>14,104</b>	<b>16,985</b>	<b>16,968</b>	<b>15,384</b>	<b>13,778</b>

**Table A-314: Delayed technology reference case with high feedstock availability  
sugar ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	444	490
Australia	0	0	0	0	0	0
Canada	145	259	640	205	0	0
China	0	0	626	2,318	2,348	1,389
Central and South America	3,788	4,771	5,980	6,917	7,634	8,425
Eastern Europe	589	557	444	215	0	0
Former Soviet Union	0	0	0	0	0	0
India	313	833	1,086	1,086	1,086	1,086
Japan	263	325	353	388	395	453
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	44
Other Asia	0	0	0	526	1,912	2,828
South Korea	217	335	375	389	388	388
United States	134	256	1,750	3,306	4,154	5,662
Western Europe	136	1,776	1,618	1,851	2,358	0
<b>Total</b>	<b>5,884</b>	<b>9,442</b>	<b>13,236</b>	<b>17,604</b>	<b>20,719</b>	<b>20,765</b>

**Table A-315: Delayed technology reference case with high feedstock availability  
cellulosic ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	11	11
Australia	0	0	66	247	627	1,172
Canada	0	0	259	779	1,004	1,020
China	0	0	222	754	1,784	3,674
Central and South America	0	0	26	125	133	133
Eastern Europe	0	0	80	261	670	897
Former Soviet Union	0	0	6	19	57	173
India	0	0	214	556	894	1,313
Japan	0	0	95	348	612	647
Middle East	0	0	0	0	0	0
Mexico	0	0	30	130	83	86
Other Asia	0	0	0	0	0	0
South Korea	0	0	25	25	25	25
United States	0	0	1,400	2,878	7,627	13,160
Western Europe	0	0	166	693	2,027	4,320
<b>Total</b>	<b>0</b>	<b>0</b>	<b>2,588</b>	<b>6,813</b>	<b>15,554</b>	<b>26,630</b>

**Table A-316: Delayed technology reference case with high feedstock availability  
grain ethanol net trade [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	0	0	0	0	0
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	0	0	0	0
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-317: Delayed technology reference case with high feedstock availability  
sugar ethanol net trade [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	-145	-259	-640	-205	0	0
China	0	0	-626	-2,318	-2,348	-1,389
Central and South America	1,484	3,508	5,806	9,199	11,555	10,764
Eastern Europe	-589	-557	-444	-215	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	-263	-325	-353	-388	-395	-453
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	-44
Other Asia	0	0	0	-526	-1,912	-2,828
South Korea	-217	-335	-375	-389	-388	-388
United States	-134	-256	-1,750	-3,306	-4,154	-5,662
Western Europe	-136	-1,776	-1,618	-1,851	-2,358	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-318: Delayed technology reference case with high feedstock availability  
cellulosic ethanol net trade [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	-86	-220	-423
Central and South America	0	0	499	1,715	3,355	5,804
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	86	220	423
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	170	431	553	579
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	-669	-2,146	-3,907	-6,382
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-319: Delayed technology reference case with high feedstock availability  
biomass-to-liquids production [Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Argentina	0	0	21	158	186	197
Australia	0	0	0	0	0	0
Brazil	0	0	106	320	750	1,333
Canada	0	0	93	280	361	367
Caribbean basin	0	0	0	0	0	0
China	0	0	80	240	563	1,031
Colombia	0	0	61	184	319	319
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	77	231	401	625
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	72	202	229	239
Other Asia	0	0	0	0	0	0
South Korea	0	0	31	53	58	58
United States	0	0	750	1,561	2,242	2,908
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>1,291</b>	<b>3,229</b>	<b>5,107</b>	<b>7,075</b>

**Table A-320: Delayed technology reference case with high feedstock availability  
biomass-to-liquids consumption [Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	0	0	0	0	0
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	1,291	3,229	5,107	7,076
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>1,291</b>	<b>3,229</b>	<b>5,107</b>	<b>7,076</b>

**Table A-321: Delayed technology reference case with high feedstock availability  
biomass-to-liquids net trade [Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	93	280	361	367
China	0	0	80	240	563	1,031
Central and South America	0	0	189	662	1,255	1,849
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	77	231	401	625
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	72	202	229	239
Other Asia	0	0	0	0	0	0
South Korea	0	0	31	53	58	58
United States	0	0	-542	-1,668	-2,865	-4,168
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-322: Delayed technology reference case with high feedstock availability  
biodiesel production [Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Argentina	0	333	877	1,642	1,642	198
Australia	0	0	0	0	0	0
Brazil	0	333	835	1,473	1,473	1,105
Canada	0	0	0	0	0	0
Caribbean basin	0	95	310	742	1,611	3,359
China	0	0	0	0	0	0
Colombia	0	119	358	838	1,648	2,074
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	1,182	1,640	1,747	1,850	2,024
Western Europe	998	3,178	3,578	3,930	4,468	4,788
<b>Total</b>	<b>998</b>	<b>5,238</b>	<b>7,597</b>	<b>10,372</b>	<b>12,692</b>	<b>13,547</b>

**Table A-323: Delayed technology reference case with high feedstock availability  
biodiesel consumption [Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	158	472	984	1,306	1,490
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	1,182	1,713	2,581	4,065	4,475
Western Europe	998	3,898	5,412	6,807	7,321	7,582
<b>Total</b>	<b>998</b>	<b>5,238</b>	<b>7,597</b>	<b>10,372</b>	<b>12,692</b>	<b>13,547</b>

**Table A-324: Delayed technology reference case with high feedstock availability  
biodiesel net trade [Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	720	1,907	3,711	5,068	5,245
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	-73	-834	-2,215	-2,451
Western Europe	0	-720	-1,834	-2,877	-2,853	-2,794
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>



## A-19 Delayed Technology Reference Case with Low Feedstock Availability

**Table A-325: Delayed technology reference case with low feedstock availability ethanol production [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	455	502
Argentina	0	178	755	1,141	1,147	1,147
Australia	0	0	66	247	635	1,172
Brazil	4,866	4,894	6,282	7,363	8,942	11,817
Canada	0	143	401	921	1,115	1,130
Caribbean basin	162	80	34	0	0	0
China	344	366	608	965	1,564	2,290
Colombia	0	196	418	433	433	433
Eastern Europe	110	226	434	780	1,037	1,149
Former Soviet Union	0	0	6	18	54	165
India	313	0	214	645	1,512	2,807
Japan	0	0	95	348	612	647
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	35	35	35	35
United States	3,850	11,612	15,767	18,998	22,316	24,911
Western Europe	600	2,570	2,755	3,398	5,291	8,392
<b>Total</b>	<b>10,544</b>	<b>20,594</b>	<b>28,234</b>	<b>35,693</b>	<b>45,149</b>	<b>56,596</b>

**Table A-326: Delayed technology reference case with low feedstock availability  
ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	455	502
Australia	0	0	66	247	635	1,172
Canada	101	128	361	829	1,004	1,020
China	126	0	0	0	790	1,497
Central and South America	3,764	4,831	6,116	7,097	7,780	8,571
Eastern Europe	699	226	434	780	1,037	1,149
Former Soviet Union	0	0	6	18	54	165
India	313	0	214	613	1,361	2,399
Japan	257	132	298	698	1,008	1,062
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	264	0	400	414	413	413
United States	3,984	11,612	15,767	19,347	22,962	28,414
Western Europe	736	3,335	4,208	5,249	7,649	10,233
<b>Total</b>	<b>10,544</b>	<b>20,594</b>	<b>28,234</b>	<b>35,693</b>	<b>45,149</b>	<b>56,596</b>

**Table A-327: Delayed technology reference case with low feedstock availability  
ethanol net trade [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	-101	14	40	92	112	110
China	218	366	608	965	774	794
Central and South America	1,264	517	1,373	1,840	2,742	4,826
Eastern Europe	-589	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	32	151	408
Japan	-257	-132	-203	-350	-395	-415
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	-264	0	-365	-379	-378	-378
United States	-134	0	0	-348	-647	-3,504
Western Europe	-136	-765	-1,454	-1,851	-2,358	-1,841
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-328: Delayed technology reference case with low feedstock availability  
grain ethanol production [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Argentina	0	178	676	833	839	839
Australia	0	0	0	0	0	0
Brazil	0	0	0	0	0	0
Canada	0	143	143	143	0	0
Caribbean basin	0	0	0	0	0	0
China	344	366	366	298	0	0
Colombia	0	0	0	0	0	0
Eastern Europe	110	226	348	477	367	251
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	3,850	11,612	15,000	15,000	15,000	15,000
Western Europe	600	2,570	2,589	2,705	3,178	3,813
<b>Total</b>	<b>4,904</b>	<b>15,094</b>	<b>19,121</b>	<b>19,455</b>	<b>19,384</b>	<b>19,904</b>

**Table A-329: Delayed technology reference case with low feedstock availability  
sugar ethanol production [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	444	490
Argentina	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Brazil	4,866	4,894	5,978	6,473	6,857	7,093
Canada	0	0	0	0	0	0
Caribbean basin	162	80	34	0	0	0
China	0	0	0	0	0	0
Colombia	0	196	248	0	0	0
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	313	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	0	0	0	0
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>5,640</b>	<b>5,500</b>	<b>6,624</b>	<b>6,875</b>	<b>7,301</b>	<b>7,584</b>

# World Biofuels Study

**Table A-330: Delayed technology reference case with low feedstock availability  
cellulosic ethanol production [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	11	11
Argentina	0	0	79	308	308	308
Australia	0	0	66	247	635	1,172
Brazil	0	0	304	890	2,085	4,723
Canada	0	0	259	779	1,115	1,130
Caribbean basin	0	0	0	0	0	0
China	0	0	243	668	1,564	2,290
Colombia	0	0	170	433	433	433
Eastern Europe	0	0	85	303	670	897
Former Soviet Union	0	0	6	18	54	165
India	0	0	214	645	1,512	2,807
Japan	0	0	95	348	612	647
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	35	35	35	35
United States	0	0	767	3,998	7,316	9,911
Western Europe	0	0	166	693	2,113	4,579
<b>Total</b>	<b>0</b>	<b>0</b>	<b>2,489</b>	<b>9,363</b>	<b>18,464</b>	<b>29,109</b>

**Table A-331: Delayed technology reference case with low feedstock availability  
grain ethanol consumption [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	128	143	143	0	0
China	126	0	0	0	0	0
Central and South America	0	36	113	148	115	115
Eastern Europe	110	226	348	477	367	251
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	132	203	298	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	218	0	163	0	0	0
United States	3,850	11,612	15,000	15,000	15,000	15,000
Western Europe	600	2,960	3,151	3,389	3,902	4,537
<b>Total</b>	<b>4,904</b>	<b>15,094</b>	<b>19,121</b>	<b>19,455</b>	<b>19,384</b>	<b>19,904</b>

**Table A-332: Delayed technology reference case with low feedstock availability  
sugar ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	444	490
Australia	0	0	0	0	0	0
Canada	101	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	3,764	4,795	6,002	6,124	6,210	7,020
Eastern Europe	589	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	313	0	0	0	0	0
Japan	257	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	46	0	0	0	0	0
United States	134	0	0	348	647	73
Western Europe	136	375	258	0	0	0
<b>Total</b>	<b>5,640</b>	<b>5,500</b>	<b>6,624</b>	<b>6,875</b>	<b>7,301</b>	<b>7,584</b>

**Table A-333: Delayed technology reference case with low feedstock availability  
cellulosic ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	11	11
Australia	0	0	66	247	635	1,172
Canada	0	0	219	687	1,004	1,020
China	0	0	0	0	790	1,497
Central and South America	0	0	0	824	1,455	1,436
Eastern Europe	0	0	85	303	670	897
Former Soviet Union	0	0	6	18	54	165
India	0	0	214	613	1,361	2,399
Japan	0	0	95	401	1,008	1,062
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	237	414	413	413
United States	0	0	767	3,998	7,316	13,341
Western Europe	0	0	800	1,859	3,748	5,696
<b>Total</b>	<b>0</b>	<b>0</b>	<b>2,489</b>	<b>9,363</b>	<b>18,464</b>	<b>29,109</b>

**Table A-334: Delayed technology reference case with low feedstock availability  
grain ethanol net trade [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	14	0	0	0	0
China	218	366	366	298	0	0
Central and South America	0	143	562	684	724	724
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	-132	-203	-298	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	-218	0	-163	0	0	0
United States	0	0	0	0	0	0
Western Europe	0	-390	-562	-684	-724	-724
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-335: Delayed technology reference case with low feedstock availability  
sugar ethanol net trade [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	-101	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	1,264	375	258	348	647	73
Eastern Europe	-589	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	-257	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	-46	0	0	0	0	0
United States	-134	0	0	-348	-647	-73
Western Europe	-136	-375	-258	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-336: Delayed technology reference case with low feedstock availability  
cellulosic ethanol net trade [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	40	92	112	110
China	0	0	243	668	774	794
Central and South America	0	0	553	807	1,372	4,029
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	32	151	408
Japan	0	0	0	-53	-395	-415
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	-202	-379	-378	-378
United States	0	0	0	0	0	-3,430
Western Europe	0	0	-634	-1,167	-1,635	-1,117
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-337: Delayed technology reference case with low feedstock availability  
biomass-to-liquids production [Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Argentina	0	0	29	111	111	111
Australia	0	0	0	0	0	0
Brazil	0	0	97	320	750	1,363
Canada	0	0	93	280	401	407
Caribbean basin	0	0	0	0	0	0
China	0	0	57	240	563	824
Colombia	0	0	61	156	156	156
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	77	232	544	1,010
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	36	52	52	52
United States	0	0	786	1,253	1,849	2,406
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>1,235</b>	<b>2,643</b>	<b>4,425</b>	<b>6,327</b>

**Table A-338: Delayed technology reference case with low feedstock availability  
biomass-to-liquids consumption [Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	0	0	0	0	0
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	788	1,253	3,025	6,328
Western Europe	0	0	447	1,391	1,400	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>1,235</b>	<b>2,643</b>	<b>4,425</b>	<b>6,328</b>

**Table A-339: Delayed technology reference case with low feedstock availability  
biomass-to-liquids net trade [Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	93	280	401	407
China	0	0	57	240	563	824
Central and South America	0	0	187	587	1,017	1,630
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	77	232	544	1,010
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	36	52	52	52
United States	0	0	-2	0	-1,176	-3,921
Western Europe	0	0	-447	-1,391	-1,400	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>



**Table A-340: Delayed technology reference case with low feedstock availability  
biodiesel production [Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Argentina	0	333	877	1,491	1,472	1,458
Australia	0	0	0	0	0	0
Brazil	0	333	835	1,537	1,569	1,569
Canada	0	0	0	0	0	0
Caribbean basin	0	95	310	742	1,145	1,220
China	0	0	0	0	0	0
Colombia	0	0	0	0	0	0
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	1,238	1,640	1,803	1,907	2,128
Western Europe	998	2,910	3,578	3,930	4,468	4,788
<b>Total</b>	<b>998</b>	<b>4,908</b>	<b>7,239</b>	<b>9,503</b>	<b>10,561</b>	<b>11,163</b>

**Table A-341: Delayed technology reference case with low feedstock availability  
biodiesel consumption [Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	126	438	936	1,262	1,448
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	1,238	2,494	4,131	4,319	4,927
Western Europe	998	3,544	4,307	4,437	4,981	4,788
<b>Total</b>	<b>998</b>	<b>4,908</b>	<b>7,239</b>	<b>9,503</b>	<b>10,561</b>	<b>11,163</b>

**Table A-342: Delayed technology reference case with low feedstock availability  
biodiesel net trade [Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	634	1,583	2,834	2,924	2,798
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	-854	-2,327	-2,412	-2,798
Western Europe	0	-634	-729	-507	-512	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**A-20 Delayed Technology Reference Case with High Oil Price****Table A-343: Delayed technology reference case with high oil price ethanol production [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	455	502
Argentina	0	178	699	1,549	1,653	1,665
Australia	0	0	71	267	709	1,174
Brazil	4,866	5,977	7,624	9,926	11,947	13,779
Canada	0	0	259	779	914	914
Caribbean basin	210	360	573	683	779	890
China	344	384	614	1,064	1,966	2,951
Colombia	196	215	411	782	1,502	2,231
Eastern Europe	110	226	434	780	1,037	1,055
Former Soviet Union	0	0	6	19	57	175
India	313	279	541	992	1,893	2,822
Japan	0	0	95	369	608	648
Middle East	0	0	0	0	0	0
Mexico	0	0	199	601	1,408	1,546
Other Asia	0	0	0	0	0	0
South Korea	0	0	35	35	35	35
United States	3,850	11,612	15,732	16,851	19,096	22,833
Western Europe	600	2,570	2,755	3,235	5,291	8,392
<b>Total</b>	<b>10,789</b>	<b>22,131</b>	<b>30,411</b>	<b>38,332</b>	<b>49,349</b>	<b>61,609</b>

**Table A-344: Delayed technology reference case with high oil price ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	455	502
Australia	0	0	71	267	709	1,174
Canada	145	0	259	895	911	914
China	265	0	0	1,064	2,713	5,063
Central and South America	3,788	4,856	6,140	7,236	8,029	8,936
Eastern Europe	699	226	872	953	1,037	1,055
Former Soviet Union	0	0	6	19	57	175
India	313	279	541	992	1,893	2,399
Japan	295	320	410	757	1,041	1,101
Middle East	0	0	0	0	0	0
Mexico	0	0	30	601	1,030	1,052
Other Asia	0	0	0	0	0	530
South Korea	264	335	400	414	413	413
United States	3,984	11,612	17,042	19,647	23,412	28,594
Western Europe	736	4,173	4,276	5,086	7,650	9,702
<b>Total</b>	<b>10,789</b>	<b>22,131</b>	<b>30,411</b>	<b>38,332</b>	<b>49,349</b>	<b>61,609</b>

**Table A-345: Delayed technology reference case with high oil price ethanol net trade [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	-145	0	0	-116	3	0
China	80	384	614	0	-747	-2,112
Central and South America	1,484	1,874	3,167	5,704	7,852	9,628
Eastern Europe	-589	0	-438	-173	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	423
Japan	-295	-320	-315	-388	-433	-453
Middle East	0	0	0	0	0	0
Mexico	0	0	170	0	378	493
Other Asia	0	0	0	0	0	-530
South Korea	-264	-335	-365	-379	-378	-378
United States	-134	0	-1,310	-2,796	-4,317	-5,762
Western Europe	-136	-1,604	-1,521	-1,851	-2,359	-1,310
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-346: Delayed technology reference case with high oil price grain ethanol production [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Argentina	0	178	640	1,243	1,317	1,317
Australia	0	0	0	0	0	0
Brazil	0	0	0	0	0	0
Canada	0	0	0	0	0	0
Caribbean basin	0	0	0	0	0	0
China	344	344	344	344	344	344
Colombia	0	0	0	0	0	0
Eastern Europe	110	226	348	477	394	278
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	3,850	11,612	15,000	15,000	15,000	15,000
Western Europe	600	2,570	2,589	2,542	3,178	3,813
<b>Total</b>	<b>4,904</b>	<b>14,930</b>	<b>18,921</b>	<b>19,607</b>	<b>20,233</b>	<b>20,752</b>

**Table A-347: Delayed technology reference case with high oil price sugar ethanol production [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	444	490
Argentina	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Brazil	4,866	5,977	7,329	9,036	10,406	12,233
Canada	0	0	0	0	0	0
Caribbean basin	210	360	573	683	779	890
China	0	40	48	53	58	64
Colombia	196	215	241	270	302	338
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	313	279	327	347	381	450
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	0	0	0	0
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>5,884</b>	<b>7,201</b>	<b>8,882</b>	<b>10,790</b>	<b>12,371</b>	<b>14,465</b>

**Table A-348: Delayed technology reference case with high oil price cellulosic ethanol production [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	11	11
Argentina	0	0	59	306	335	347
Australia	0	0	71	267	709	1,174
Brazil	0	0	296	890	1,541	1,546
Canada	0	0	259	779	914	914
Caribbean basin	0	0	0	0	0	0
China	0	0	222	667	1,564	2,543
Colombia	0	0	170	512	1,199	1,893
Eastern Europe	0	0	85	303	644	778
Former Soviet Union	0	0	6	19	57	175
India	0	0	214	645	1,512	2,373
Japan	0	0	95	369	608	648
Middle East	0	0	0	0	0	0
Mexico	0	0	199	601	1,408	1,546
Other Asia	0	0	0	0	0	0
South Korea	0	0	35	35	35	35
United States	0	0	732	1,851	4,096	7,833
Western Europe	0	0	166	693	2,113	4,579
<b>Total</b>	<b>0</b>	<b>0</b>	<b>2,609</b>	<b>7,934</b>	<b>16,746</b>	<b>26,392</b>

**Table A-349: Delayed technology reference case with high oil price grain ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	265	0	0	344	1,020	587
Central and South America	0	36	105	201	165	167
Eastern Europe	110	226	348	477	394	278
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	192	267	388	433	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	530
South Korea	80	295	144	379	43	378
United States	3,850	11,612	15,000	15,000	15,000	15,000
Western Europe	600	2,570	3,057	2,817	3,178	3,813
<b>Total</b>	<b>4,904</b>	<b>14,930</b>	<b>18,921</b>	<b>19,607</b>	<b>20,233</b>	<b>20,752</b>

**Table A-350: Delayed technology reference case with high oil price sugar ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	444	490
Australia	0	0	0	0	0	0
Canada	145	0	0	116	0	0
China	0	0	0	53	125	1,509
Central and South America	3,788	4,820	6,035	6,947	7,864	8,770
Eastern Europe	589	0	438	173	0	0
Former Soviet Union	0	0	0	0	0	0
India	313	279	327	347	381	450
Japan	295	128	48	0	0	453
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	185	40	0	0	0	0
United States	134	0	788	2,753	3,094	1,483
Western Europe	136	1,604	882	0	464	1,310
<b>Total</b>	<b>5,884</b>	<b>7,201</b>	<b>8,882</b>	<b>10,790</b>	<b>12,371</b>	<b>14,465</b>

**Table A-351: Delayed technology reference case with high oil price cellulosic ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	11	11
Australia	0	0	71	267	709	1,174
Canada	0	0	259	779	911	914
China	0	0	0	667	1,567	2,966
Central and South America	0	0	0	88	0	0
Eastern Europe	0	0	85	303	644	778
Former Soviet Union	0	0	6	19	57	175
India	0	0	214	645	1,512	1,949
Japan	0	0	95	369	608	648
Middle East	0	0	0	0	0	0
Mexico	0	0	30	601	1,030	1,052
Other Asia	0	0	0	0	0	0
South Korea	0	0	256	35	370	35
United States	0	0	1,254	1,894	5,319	12,112
Western Europe	0	0	338	2,269	4,008	4,579
<b>Total</b>	<b>0</b>	<b>0</b>	<b>2,609</b>	<b>7,934</b>	<b>16,746</b>	<b>26,392</b>

**Table A-352: Delayed technology reference case with high oil price grain ethanol net trade [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	80	344	344	0	-676	-243
Central and South America	0	143	535	1,042	1,152	1,151
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	-192	-267	-388	-433	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	-530
South Korea	-80	-295	-144	-379	-43	-378
United States	0	0	0	0	0	0
Western Europe	0	0	-468	-275	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-353: Delayed technology reference case with high oil price sugar ethanol net trade [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	-145	0	0	-116	0	0
China	0	40	48	0	-67	-1,446
Central and South America	1,484	1,732	2,108	3,042	3,624	4,692
Eastern Europe	-589	0	-438	-173	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	-295	-128	-48	0	0	-453
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	-185	-40	0	0	0	0
United States	-134	0	-788	-2,753	-3,094	-1,483
Western Europe	-136	-1,604	-882	0	-464	-1,310
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>



**Table A-354: Delayed technology reference case with high oil price cellulosic ethanol net trade [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	3	0
China	0	0	222	0	-3	-423
Central and South America	0	0	525	1,619	3,076	3,786
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	423
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	170	0	378	493
Other Asia	0	0	0	0	0	0
South Korea	0	0	-222	0	-335	0
United States	0	0	-523	-43	-1,223	-4,279
Western Europe	0	0	-172	-1,576	-1,895	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-355: Delayed technology reference case with high oil price biomass-to-liquids production [Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Argentina	0	0	21	110	121	125
Australia	0	0	0	0	0	3
Brazil	0	0	106	320	554	556
Canada	0	0	93	280	329	329
Caribbean basin	0	0	0	0	0	0
China	0	0	80	240	563	915
Colombia	0	0	61	184	431	681
Eastern Europe	0	0	0	0	125	326
Former Soviet Union	0	0	0	0	0	0
India	0	0	77	232	544	853
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	72	216	506	556
Other Asia	0	0	74	336	863	1,578
South Korea	0	0	36	51	51	51
United States	0	0	750	2,267	3,143	4,058
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>1,369</b>	<b>4,237</b>	<b>7,231</b>	<b>10,031</b>

**Table A-356: Delayed technology reference case with high oil price biomass-to-liquids consumption [Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	3
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	0	0	0	0	0
Eastern Europe	0	0	0	0	125	326
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	74	336	863	1,578
South Korea	0	0	0	0	0	0
United States	0	0	975	3,572	6,242	8,124
Western Europe	0	0	321	329	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>1,369</b>	<b>4,237</b>	<b>7,231</b>	<b>10,031</b>

**Table A-357: Delayed technology reference case with high oil price biomass-to-liquids net trade [Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	93	280	329	329
China	0	0	80	240	563	915
Central and South America	0	0	189	614	1,106	1,362
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	77	232	544	853
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	72	216	506	556
Other Asia	0	0	0	0	0	0
South Korea	0	0	36	51	51	51
United States	0	0	-225	-1,305	-3,099	-4,066
Western Europe	0	0	-321	-329	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-358: Delayed technology reference case with high oil price biodiesel production [Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Argentina	0	333	776	819	827	827
Australia	0	0	0	0	0	0
Brazil	0	333	835	1,537	1,768	1,357
Canada	0	0	0	0	0	0
Caribbean basin	0	95	310	675	802	898
China	0	0	0	0	0	0
Colombia	0	119	298	474	650	782
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	1,238	1,640	1,747	1,907	2,128
Western Europe	998	3,445	4,172	5,110	5,532	5,997
<b>Total</b>	<b>998</b>	<b>5,561</b>	<b>8,030</b>	<b>10,362</b>	<b>11,485</b>	<b>11,989</b>

**Table A-359: Delayed technology reference case with high oil price biodiesel consumption [Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	158	458	969	1,300	1,486
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	1,238	1,713	1,747	1,907	3,517
Western Europe	998	4,165	5,860	7,646	8,278	6,986
<b>Total</b>	<b>998</b>	<b>5,561</b>	<b>8,030</b>	<b>10,362</b>	<b>11,485</b>	<b>11,989</b>

**Table A-360: Delayed technology reference case with high oil price biodiesel net trade [Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	720	1,761	2,535	2,747	2,378
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	-73	0	0	-1,389
Western Europe	0	-720	-1,688	-2,535	-2,747	-989
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**A-21 Delayed Technology Reference Case with Low Oil Price****Table A-361: Delayed technology reference case with low oil price ethanol production [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	455	490
Argentina	0	178	664	973	1,003	1,015
Australia	0	0	66	217	585	1,172
Brazil	4,866	5,977	7,624	9,752	11,947	13,338
Canada	0	0	259	650	650	650
Caribbean basin	210	328	573	683	683	683
China	344	384	614	993	1,228	1,228
Colombia	196	215	411	782	1,501	2,227
Eastern Europe	110	226	434	780	1,037	1,149
Former Soviet Union	0	0	0	0	0	0
India	313	275	534	974	1,850	2,527
Japan	0	0	95	348	612	644
Middle East	0	0	0	0	0	0
Mexico	0	0	199	601	1,408	1,546
Other Asia	0	0	0	0	0	0
South Korea	0	0	30	30	30	30
United States	3,850	11,612	15,732	16,156	17,521	21,444
Western Europe	600	2,549	2,755	3,398	5,291	8,013
<b>Total</b>	<b>10,789</b>	<b>22,074</b>	<b>30,353</b>	<b>36,739</b>	<b>45,802</b>	<b>56,157</b>

# World Biofuels Study

**Table A-362: Delayed technology reference case with low oil price ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	455	490
Australia	0	0	66	217	585	1,172
Canada	145	0	233	585	650	650
China	297	0	0	259	450	430
Central and South America	3,788	4,853	6,134	7,161	7,959	8,860
Eastern Europe	699	226	872	953	1,037	1,149
Former Soviet Union	0	0	0	0	0	0
India	313	275	534	925	1,850	2,399
Japan	263	250	339	698	1,008	1,060
Middle East	0	0	0	0	0	0
Mexico	0	0	30	78	183	201
Other Asia	0	0	0	0	0	0
South Korea	264	335	400	414	413	413
United States	3,984	11,612	17,037	19,797	23,562	28,685
Western Europe	736	4,193	4,344	5,249	7,649	10,649
<b>Total</b>	<b>10,789</b>	<b>22,074</b>	<b>30,353</b>	<b>36,739</b>	<b>45,802</b>	<b>56,157</b>

**Table A-363: Delayed technology reference case with low oil price ethanol net trade [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	-145	0	26	65	0	0
China	47	384	614	734	778	798
Central and South America	1,484	1,845	3,137	5,029	7,175	8,403
Eastern Europe	-589	0	-438	-173	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	49	0	128
Japan	-263	-250	-244	-350	-395	-415
Middle East	0	0	0	0	0	0
Mexico	0	0	170	523	1,225	1,345
Other Asia	0	0	0	0	0	0
South Korea	-264	-335	-370	-384	-383	-382
United States	-134	0	-1,305	-3,641	-6,042	-7,240
Western Europe	-136	-1,644	-1,589	-1,851	-2,358	-2,636
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-364: Delayed technology reference case with low oil price grain ethanol production [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Argentina	0	178	604	667	667	668
Australia	0	0	0	0	0	0
Brazil	0	0	0	0	0	0
Canada	0	0	0	0	0	0
Caribbean basin	0	0	0	0	0	0
China	344	344	344	325	0	0
Colombia	0	0	0	0	0	0
Eastern Europe	110	226	348	477	367	251
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	3,850	11,612	15,000	15,000	15,000	14,477
Western Europe	600	2,549	2,589	2,705	3,178	3,604
<b>Total</b>	<b>4,904</b>	<b>14,909</b>	<b>18,885</b>	<b>19,175</b>	<b>19,212</b>	<b>19,000</b>

**Table A-365: Delayed technology reference case with low oil price sugar ethanol production [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	444	490
Argentina	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Brazil	4,866	5,977	7,329	8,862	10,406	11,793
Canada	0	0	0	0	0	0
Caribbean basin	210	328	573	683	683	683
China	0	40	48	0	0	0
Colombia	196	215	241	270	302	334
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	313	275	320	329	338	332
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	0	0	0	0
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>5,884</b>	<b>7,165</b>	<b>8,874</b>	<b>10,546</b>	<b>12,174</b>	<b>13,632</b>

# World Biofuels Study

**Table A-366: Delayed technology reference case with low oil price cellulosic ethanol production [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	11	0
Argentina	0	0	59	306	335	347
Australia	0	0	66	217	585	1,172
Brazil	0	0	296	890	1,541	1,546
Canada	0	0	259	650	650	650
Caribbean basin	0	0	0	0	0	0
China	0	0	222	668	1,228	1,228
Colombia	0	0	170	512	1,199	1,893
Eastern Europe	0	0	85	303	670	897
Former Soviet Union	0	0	0	0	0	0
India	0	0	214	645	1,512	2,196
Japan	0	0	95	348	612	644
Middle East	0	0	0	0	0	0
Mexico	0	0	199	601	1,408	1,546
Other Asia	0	0	0	0	0	0
South Korea	0	0	30	30	30	30
United States	0	0	732	1,156	2,521	6,967
Western Europe	0	0	166	693	2,113	4,410
<b>Total</b>	<b>0</b>	<b>0</b>	<b>2,593</b>	<b>7,018</b>	<b>14,416</b>	<b>23,525</b>

**Table A-367: Delayed technology reference case with low oil price grain ethanol consumption [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	297	0	0	259	0	0
Central and South America	0	36	100	127	100	102
Eastern Europe	110	226	348	477	367	251
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	192	196	67	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	47	295	148	0	0	0
United States	3,850	11,612	15,000	15,000	15,000	14,477
Western Europe	600	2,549	3,094	3,246	3,745	4,170
<b>Total</b>	<b>4,904</b>	<b>14,909</b>	<b>18,885</b>	<b>19,175</b>	<b>19,212</b>	<b>19,000</b>



# World Biofuels Study

**Table A-368: Delayed technology reference case with low oil price sugar ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	444	490
Australia	0	0	0	0	0	0
Canada	145	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	3,788	4,818	6,035	6,909	7,859	8,759
Eastern Europe	589	0	412	108	0	0
Former Soviet Union	0	0	0	0	0	0
India	313	275	320	329	338	332
Japan	263	58	48	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	217	40	0	0	0	0
United States	134	0	788	2,753	2,687	2,110
Western Europe	136	1,644	908	44	846	1,941
<b>Total</b>	<b>5,884</b>	<b>7,165</b>	<b>8,874</b>	<b>10,546</b>	<b>12,174</b>	<b>13,632</b>

**Table A-369: Delayed technology reference case with low oil price cellulosic ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	11	0
Australia	0	0	66	217	585	1,172
Canada	0	0	233	585	650	650
China	0	0	0	0	450	430
Central and South America	0	0	0	125	0	0
Eastern Europe	0	0	111	368	670	897
Former Soviet Union	0	0	0	0	0	0
India	0	0	214	597	1,512	2,067
Japan	0	0	95	632	1,008	1,060
Middle East	0	0	0	0	0	0
Mexico	0	0	30	78	183	201
Other Asia	0	0	0	0	0	0
South Korea	0	0	252	414	413	413
United States	0	0	1,249	2,044	5,875	12,098
Western Europe	0	0	343	1,958	3,059	4,538
<b>Total</b>	<b>0</b>	<b>0</b>	<b>2,593</b>	<b>7,018</b>	<b>14,416</b>	<b>23,525</b>

**Table A-370: Delayed technology reference case with low oil price grain ethanol net trade [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	47	344	344	67	0	0
Central and South America	0	143	505	541	567	566
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	-192	-196	-67	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	-47	-295	-148	0	0	0
United States	0	0	0	0	0	0
Western Europe	0	0	-505	-541	-567	-566
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-371: Delayed technology reference case with low oil price sugar ethanol net trade [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	-145	0	0	0	0	0
China	0	40	48	0	0	0
Central and South America	1,484	1,702	2,108	2,906	3,533	4,051
Eastern Europe	-589	0	-412	-108	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	-263	-58	-48	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	-217	-40	0	0	0	0
United States	-134	0	-788	-2,753	-2,687	-2,110
Western Europe	-136	-1,644	-908	-44	-846	-1,941
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-372: Delayed technology reference case with low oil price cellulosic ethanol net trade [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	26	65	0	0
China	0	0	222	668	778	798
Central and South America	0	0	525	1,582	3,076	3,786
Eastern Europe	0	0	-26	-65	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	49	0	128
Japan	0	0	0	-284	-395	-415
Middle East	0	0	0	0	0	0
Mexico	0	0	170	523	1,225	1,345
Other Asia	0	0	0	0	0	0
South Korea	0	0	-222	-384	-383	-382
United States	0	0	-518	-888	-3,355	-5,130
Western Europe	0	0	-177	-1,266	-946	-128
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-373: Delayed technology reference case with low oil price biomass-to-liquids production [Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Argentina	0	0	21	110	121	125
Australia	0	0	0	0	0	0
Brazil	0	0	106	320	554	556
Canada	0	0	93	234	234	234
Caribbean basin	0	0	0	0	0	0
China	0	0	80	240	442	442
Colombia	0	0	61	184	431	681
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	77	232	544	790
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	72	216	506	556
Other Asia	0	0	0	0	0	0
South Korea	0	0	31	65	65	65
United States	0	0	750	2,467	3,398	4,383
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>1,291</b>	<b>4,067</b>	<b>6,295</b>	<b>7,830</b>

**Table A-374: Delayed technology reference case with low oil price biomass-to-liquids consumption [Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	0	0	0	0	0
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	1,107	3,972	6,295	7,831
Western Europe	0	0	184	96	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>1,291</b>	<b>4,068</b>	<b>6,295</b>	<b>7,831</b>

**Table A-375: Delayed technology reference case with low oil price biomass-to-liquids net trade [Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	93	234	234	234
China	0	0	80	240	442	442
Central and South America	0	0	189	614	1,106	1,362
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	77	232	544	790
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	72	216	506	556
Other Asia	0	0	0	0	0	0
South Korea	0	0	31	65	65	65
United States	0	0	-357	-1,505	-2,897	-3,448
Western Europe	0	0	-184	-96	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-376: Delayed technology reference case with low oil price biodiesel production [Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Argentina	0	333	776	819	827	239
Australia	0	0	0	0	0	0
Brazil	0	333	877	1,642	2,353	1,359
Canada	0	0	0	0	0	0
Caribbean basin	0	95	310	675	802	898
China	0	0	0	0	0	0
Colombia	0	119	298	474	650	782
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	1,238	1,640	1,747	1,907	2,072
Western Europe	998	2,643	3,281	3,307	3,760	4,114
<b>Total</b>	<b>998</b>	<b>4,760</b>	<b>7,182</b>	<b>8,664</b>	<b>10,299</b>	<b>9,465</b>

**Table A-377: Delayed technology reference case with low oil price biodiesel consumption [Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	158	477	985	1,309	1,494
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	1,238	1,713	1,747	2,313	3,413
Western Europe	998	3,364	4,992	5,932	6,677	4,557
<b>Total</b>	<b>998</b>	<b>4,760</b>	<b>7,182</b>	<b>8,664</b>	<b>10,299</b>	<b>9,465</b>

**Table A-378: Delayed technology reference case with low oil price biodiesel net trade [Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	720	1,784	2,625	3,324	1,784
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	-73	0	-406	-1,341
Western Europe	0	-720	-1,711	-2,625	-2,917	-443
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

## A-22 Delayed Technology Reference Case with High Oil Price and High Feedstock Availability

**Table A-379: Delayed technology reference case with high oil price and high feedstock availability ethanol production [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	455	502
Argentina	0	59	125	504	581	607
Australia	0	0	71	267	709	1,174
Brazil	5,225	8,034	12,103	16,859	20,867	26,166
Canada	0	0	259	779	950	950
Caribbean basin	164	282	687	920	942	942
China	344	119	579	1,602	2,173	3,860
Colombia	0	0	170	512	887	887
Eastern Europe	110	226	428	721	1,037	1,055
Former Soviet Union	0	0	6	19	57	175
India	313	842	1,300	1,728	2,200	2,822
Japan	0	0	95	369	608	648
Middle East	0	0	0	0	0	0
Mexico	0	0	199	601	665	665
Other Asia	0	0	0	0	0	0
South Korea	0	0	27	27	27	27
United States	3,850	11,413	14,769	15,865	16,465	17,006
Western Europe	600	2,465	2,755	3,235	5,205	7,923
<b>Total</b>	<b>10,905</b>	<b>23,771</b>	<b>33,937</b>	<b>44,408</b>	<b>53,828</b>	<b>65,409</b>

**Table A-380: Delayed technology reference case with high oil price and high feedstock availability ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	455	502
Australia	0	0	71	353	929	1,174
Canada	103	261	850	895	948	950
China	442	202	2,039	3,397	4,132	5,063
Central and South America	3,764	4,783	6,025	7,072	7,838	8,632
Eastern Europe	699	783	872	953	1,037	1,055
Former Soviet Union	0	0	6	19	57	175
India	313	842	1,300	1,642	1,980	2,399
Japan	300	325	448	757	1,041	1,139
Middle East	0	0	0	0	0	0
Mexico	0	0	30	998	1,030	1,052
Other Asia	0	0	0	2,637	3,004	3,472
South Korea	264	335	400	414	413	413
United States	3,984	11,668	17,188	19,784	23,400	28,677
Western Europe	736	4,241	4,344	5,086	7,563	10,707
<b>Total</b>	<b>10,905</b>	<b>23,771</b>	<b>33,937</b>	<b>44,408</b>	<b>53,828</b>	<b>65,409</b>

**Table A-381: Delayed technology reference case with high oil price and high feedstock availability ethanol net trade [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	-86	-220	0
Canada	-103	-261	-592	-116	2	0
China	-98	-83	-1,460	-1,795	-1,959	-1,204
Central and South America	1,624	3,593	7,060	11,723	15,439	19,970
Eastern Europe	-589	-557	-444	-233	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	86	220	423
Japan	-300	-325	-353	-388	-433	-490
Middle East	0	0	0	0	0	0
Mexico	0	0	170	-398	-365	-387
Other Asia	0	0	0	-2,637	-3,004	-3,472
South Korea	-264	-335	-373	-387	-386	-386
United States	-134	-256	-2,419	-3,919	-6,935	-11,671
Western Europe	-136	-1,776	-1,589	-1,851	-2,358	-2,783
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>



# World Biofuels Study

**Table A-382: Delayed technology reference case with high oil price and high feedstock availability grain ethanol production [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Argentina	0	59	66	66	66	61
Australia	0	0	0	0	0	0
Brazil	0	0	0	0	0	0
Canada	0	0	0	0	0	0
Caribbean basin	0	0	0	0	0	0
China	344	0	0	325	0	0
Colombia	0	0	0	0	0	0
Eastern Europe	110	226	348	477	474	358
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	3,850	11,413	14,038	14,815	12,984	10,846
Western Europe	600	2,465	2,589	2,542	3,178	3,604
<b>Total</b>	<b>4,904</b>	<b>14,163</b>	<b>17,040</b>	<b>18,225</b>	<b>16,701</b>	<b>14,868</b>

**Table A-383: Delayed technology reference case with high oil price and high feedstock availability sugar ethanol production [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	300	330	364	402	444	490
Argentina	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Brazil	5,225	8,034	11,807	15,969	18,782	22,055
Canada	0	0	0	0	0	0
Caribbean basin	164	282	687	920	942	942
China	0	119	358	609	609	609
Colombia	0	0	0	0	0	0
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	313	842	1,086	1,086	1,086	1,086
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	0	0	0	0
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>6,001</b>	<b>9,608</b>	<b>14,302</b>	<b>18,987</b>	<b>21,863</b>	<b>25,183</b>

# World Biofuels Study

**Table A-384: Delayed technology reference case with high oil price and high feedstock availability cellulosic ethanol production [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	11	11
Argentina	0	0	59	438	516	547
Australia	0	0	71	267	709	1,174
Brazil	0	0	296	890	2,085	4,111
Canada	0	0	259	779	950	950
Caribbean basin	0	0	0	0	0	0
China	0	0	222	667	1,564	3,251
Colombia	0	0	170	512	887	887
Eastern Europe	0	0	80	243	563	697
Former Soviet Union	0	0	6	19	57	175
India	0	0	214	642	1,114	1,736
Japan	0	0	95	369	608	648
Middle East	0	0	0	0	0	0
Mexico	0	0	199	601	665	665
Other Asia	0	0	0	0	0	0
South Korea	0	0	27	27	27	27
United States	0	0	732	1,050	3,481	6,161
Western Europe	0	0	166	693	2,027	4,320
<b>Total</b>	<b>0</b>	<b>0</b>	<b>2,595</b>	<b>7,196</b>	<b>15,264</b>	<b>25,358</b>

**Table A-385: Delayed technology reference case with high oil price and high feedstock availability grain ethanol consumption [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	344	0	0	325	0	0
Central and South America	0	12	19	66	58	61
Eastern Europe	110	226	348	477	474	358
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	48	47	0	7	0
United States	3,850	11,413	14,038	14,815	12,984	10,846
Western Europe	600	2,465	2,589	2,542	3,178	3,604
<b>Total</b>	<b>4,904</b>	<b>14,163</b>	<b>17,040</b>	<b>18,225</b>	<b>16,701</b>	<b>14,868</b>

**Table A-386: Delayed technology reference case with high oil price and high feedstock availability sugar ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	444	490
Australia	0	0	0	0	0	0
Canada	103	261	592	116	0	0
China	98	202	1,818	2,404	2,568	1,389
Central and South America	3,764	4,771	5,980	6,929	7,647	8,438
Eastern Europe	589	557	444	233	0	0
Former Soviet Union	0	0	0	0	0	0
India	313	842	1,086	1,086	1,086	1,086
Japan	300	325	353	388	433	490
Middle East	0	0	0	0	0	0
Mexico	0	0	0	398	941	895
Other Asia	0	0	0	2,637	3,004	3,472
South Korea	264	288	327	387	379	386
United States	134	256	1,750	2,156	3,002	5,752
Western Europe	136	1,776	1,589	1,851	2,358	2,783
<b>Total</b>	<b>6,001</b>	<b>9,608</b>	<b>14,302</b>	<b>18,987</b>	<b>21,863</b>	<b>25,183</b>

**Table A-387: Delayed technology reference case with high oil price and high feedstock availability cellulosic ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	11	11
Australia	0	0	71	353	929	1,174
Canada	0	0	259	779	948	950
China	0	0	222	667	1,564	3,674
Central and South America	0	0	26	77	133	133
Eastern Europe	0	0	80	243	563	697
Former Soviet Union	0	0	6	19	57	175
India	0	0	214	556	894	1,313
Japan	0	0	95	369	608	648
Middle East	0	0	0	0	0	0
Mexico	0	0	30	601	89	157
Other Asia	0	0	0	0	0	0
South Korea	0	0	27	27	27	27
United States	0	0	1,400	2,813	7,414	12,079
Western Europe	0	0	166	693	2,027	4,320
<b>Total</b>	<b>0</b>	<b>0</b>	<b>2,595</b>	<b>7,196</b>	<b>15,264</b>	<b>25,358</b>

**Table A-388: Delayed technology reference case with high oil price and high feedstock availability grain ethanol net trade [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	48	47	0	7	0
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	-48	-47	0	-7	0
United States	0	0	0	0	0	0
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-389: Delayed technology reference case with high oil price and high feedstock availability sugar ethanol net trade [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	-103	-261	-592	-116	0	0
China	-98	-83	-1,460	-1,795	-1,959	-780
Central and South America	1,624	3,545	6,514	9,960	12,077	14,559
Eastern Europe	-589	-557	-444	-233	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	-300	-325	-353	-388	-433	-490
Middle East	0	0	0	0	0	0
Mexico	0	0	0	-398	-941	-895
Other Asia	0	0	0	-2,637	-3,004	-3,472
South Korea	-264	-288	-327	-387	-379	-386
United States	-134	-256	-1,750	-2,156	-3,002	-5,752
Western Europe	-136	-1,776	-1,589	-1,851	-2,358	-2,783
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-390: Delayed technology reference case with high oil price and high feedstock availability cellulosic ethanol net trade [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	-86	-220	0
Canada	0	0	0	0	2	0
China	0	0	0	0	0	-423
Central and South America	0	0	499	1,763	3,355	5,411
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	86	220	423
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	170	0	576	508
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	-669	-1,763	-3,933	-5,918
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-391: Delayed technology reference case with high oil price and high feedstock availability biomass-to-liquids production [Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Argentina	0	0	21	158	186	197
Australia	0	0	0	0	0	0
Brazil	0	0	106	320	750	1,333
Canada	0	0	93	280	342	342
Caribbean basin	0	0	0	0	0	0
China	0	0	80	240	563	1,031
Colombia	0	0	61	184	319	319
Eastern Europe	0	0	0	23	170	399
Former Soviet Union	0	0	0	0	0	0
India	0	0	77	231	401	625
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	72	216	239	239
Other Asia	0	0	74	336	863	1,578
South Korea	0	0	31	57	57	57
United States	0	0	750	2,240	3,109	4,014
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>1,365</b>	<b>4,285</b>	<b>6,998</b>	<b>10,133</b>

# World Biofuels Study

**Table A-392: Delayed technology reference case with high oil price and high feedstock availability biomass-to-liquids consumption [Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	0	0	0	0	0
Eastern Europe	0	0	0	23	171	400
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	74	336	863	1,578
South Korea	0	0	0	0	0	0
United States	0	0	1,291	3,926	5,965	8,156
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>1,365</b>	<b>4,285</b>	<b>6,998</b>	<b>10,134</b>

**Table A-393: Delayed technology reference case with high oil price and high feedstock availability biomass-to-liquids net trade [Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	93	280	342	342
China	0	0	80	240	563	1,031
Central and South America	0	0	189	662	1,255	1,849
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	77	231	401	625
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	72	216	239	239
Other Asia	0	0	0	0	0	0
South Korea	0	0	31	57	57	57
United States	0	0	-542	-1,686	-2,856	-4,142
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

# World Biofuels Study

**Table A-394: Delayed technology reference case with high oil price and high feedstock availability biodiesel production [Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Argentina	0	333	877	1,642	1,642	198
Australia	0	0	0	0	0	0
Brazil	0	333	876	1,399	1,399	1,103
Canada	0	0	0	0	0	0
Caribbean basin	0	95	310	742	1,611	3,359
China	0	0	0	0	0	0
Colombia	0	119	358	838	1,648	2,074
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	1,182	1,640	1,747	1,850	2,072
Western Europe	998	3,445	4,172	5,110	5,532	5,997
<b>Total</b>	<b>998</b>	<b>5,505</b>	<b>8,232</b>	<b>11,478</b>	<b>13,682</b>	<b>14,802</b>

**Table A-395: Delayed technology reference case with high oil price and high feedstock availability biodiesel consumption [Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	158	464	975	1,303	1,488
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	1,182	1,713	2,529	4,014	3,402
Western Europe	998	4,165	6,055	7,974	8,365	9,912
<b>Total</b>	<b>998</b>	<b>5,505</b>	<b>8,232</b>	<b>11,478</b>	<b>13,682</b>	<b>14,802</b>

**Table A-396: Delayed technology reference case with high oil price and high feedstock availability biodiesel net trade [Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	720	1,956	3,646	4,997	5,245
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	-73	-782	-2,164	-1,330
Western Europe	0	-720	-1,883	-2,864	-2,833	-3,915
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>



## A-23 Delayed Technology Reference Case with Low Oil Price and Low Feedstock Availability

**Table A-397: Delayed technology reference case with low oil price and low feedstock availability ethanol production [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	455	490
Argentina	0	178	735	1,108	1,114	1,114
Australia	0	0	66	217	585	1,172
Brazil	4,866	4,894	6,282	7,363	8,942	11,845
Canada	0	143	401	851	1,167	1,167
Caribbean basin	162	80	34	15	0	0
China	344	366	588	1,033	1,564	1,564
Colombia	0	196	366	369	369	369
Eastern Europe	110	226	434	780	1,037	1,149
Former Soviet Union	0	0	0	0	0	0
India	313	0	214	645	1,512	2,807
Japan	0	0	95	348	612	644
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	35	35	35	26
United States	3,850	11,612	15,767	18,450	21,743	25,031
Western Europe	600	2,570	2,755	3,398	5,291	8,392
<b>Total</b>	<b>10,544</b>	<b>20,594</b>	<b>28,135</b>	<b>35,013</b>	<b>44,426</b>	<b>55,770</b>

**Table A-398: Delayed technology reference case with low oil price and low feedstock availability ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	455	490
Australia	0	0	66	217	585	1,172
Canada	101	128	361	766	1,050	1,050
China	121	0	0	0	0	444
Central and South America	3,764	4,831	6,105	7,083	7,767	8,557
Eastern Europe	699	226	434	780	1,037	1,149
Former Soviet Union	0	0	0	0	0	0
India	313	0	214	613	1,361	2,386
Japan	263	132	216	615	997	1,083
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	264	0	400	414	413	413
United States	3,984	11,612	15,767	18,874	23,112	28,564
Western Europe	736	3,335	4,208	5,249	7,649	10,461
<b>Total</b>	<b>10,544</b>	<b>20,594</b>	<b>28,135</b>	<b>35,013</b>	<b>44,426</b>	<b>55,770</b>

**Table A-399: Delayed technology reference case with low oil price and low feedstock availability ethanol net trade [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	-101	14	40	85	117	117
China	224	366	588	1,033	1,564	1,120
Central and South America	1,264	517	1,312	1,771	2,659	4,770
Eastern Europe	-589	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	32	151	421
Japan	-263	-132	-121	-267	-385	-439
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	-264	0	-365	-379	-378	-387
United States	-134	0	0	-424	-1,369	-3,533
Western Europe	-136	-765	-1,453	-1,851	-2,358	-2,069
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-400: Delayed technology reference case with low oil price and low feedstock availability grain ethanol production [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Argentina	0	178	675	833	839	839
Australia	0	0	0	0	0	0
Brazil	0	0	0	0	0	0
Canada	0	143	143	72	0	0
Caribbean basin	0	0	0	0	0	0
China	344	366	366	366	0	0
Colombia	0	0	0	0	0	0
Eastern Europe	110	226	348	477	367	251
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	3,850	11,612	15,000	15,000	15,000	15,000
Western Europe	600	2,570	2,589	2,705	3,178	3,813
<b>Total</b>	<b>4,904</b>	<b>15,094</b>	<b>19,121</b>	<b>19,453</b>	<b>19,384</b>	<b>19,904</b>

**Table A-401: Delayed technology reference case with low oil price and low feedstock availability sugar ethanol production [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	444	490
Argentina	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Brazil	4,866	4,894	5,978	6,473	6,857	7,093
Canada	0	0	0	0	0	0
Caribbean basin	162	80	34	15	0	0
China	0	0	0	0	0	0
Colombia	0	196	196	0	0	0
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	313	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	0	0	0	0
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>5,640</b>	<b>5,500</b>	<b>6,572</b>	<b>6,890</b>	<b>7,301</b>	<b>7,584</b>

# World Biofuels Study

**Table A-402: Delayed technology reference case with low oil price and low feedstock availability cellulosic ethanol production [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	11	0
Argentina	0	0	59	275	275	275
Australia	0	0	66	217	585	1,172
Brazil	0	0	304	890	2,085	4,751
Canada	0	0	259	779	1,167	1,167
Caribbean basin	0	0	0	0	0	0
China	0	0	222	667	1,564	1,564
Colombia	0	0	170	369	369	369
Eastern Europe	0	0	85	303	670	897
Former Soviet Union	0	0	0	0	0	0
India	0	0	214	645	1,512	2,807
Japan	0	0	95	348	612	644
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	35	35	35	26
United States	0	0	767	3,450	6,743	10,031
Western Europe	0	0	166	693	2,113	4,579
<b>Total</b>	<b>0</b>	<b>0</b>	<b>2,442</b>	<b>8,670</b>	<b>17,742</b>	<b>28,282</b>

**Table A-403: Delayed technology reference case with low oil price and low feedstock availability grain ethanol consumption [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	128	143	72	0	0
China	121	0	0	0	0	0
Central and South America	0	36	110	144	111	111
Eastern Europe	110	226	348	477	367	251
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	132	121	267	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	224	0	245	99	0	0
United States	3,850	11,612	15,000	15,000	15,000	15,000
Western Europe	600	2,960	3,154	3,394	3,905	4,541
<b>Total</b>	<b>4,904</b>	<b>15,094</b>	<b>19,121</b>	<b>19,453</b>	<b>19,384</b>	<b>19,904</b>

**Table A-404: Delayed technology reference case with low oil price and low feedstock availability sugar ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	444	490
Australia	0	0	0	0	0	0
Canada	101	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	3,764	4,795	5,995	6,063	5,514	7,093
Eastern Europe	589	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	313	0	0	0	0	0
Japan	263	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	41	0	0	0	0	0
United States	134	0	0	424	1,342	0
Western Europe	136	375	213	0	0	0
<b>Total</b>	<b>5,640</b>	<b>5,500</b>	<b>6,572</b>	<b>6,890</b>	<b>7,301</b>	<b>7,584</b>

**Table A-405: Delayed technology reference case with low oil price and low feedstock availability cellulosic ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	11	0
Australia	0	0	66	217	585	1,172
Canada	0	0	219	694	1,050	1,050
China	0	0	0	0	0	444
Central and South America	0	0	0	876	2,141	1,353
Eastern Europe	0	0	85	303	670	897
Former Soviet Union	0	0	0	0	0	0
India	0	0	214	613	1,361	2,386
Japan	0	0	95	348	997	1,083
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	155	315	413	413
United States	0	0	767	3,450	6,770	13,564
Western Europe	0	0	841	1,855	3,744	5,920
<b>Total</b>	<b>0</b>	<b>0</b>	<b>2,442</b>	<b>8,670</b>	<b>17,742</b>	<b>28,282</b>

**Table A-406: Delayed technology reference case with low oil price and low feedstock availability grain ethanol net trade [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	14	0	0	0	0
China	224	366	366	366	0	0
Central and South America	0	143	565	689	728	728
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	-132	-121	-267	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	-224	0	-245	-99	0	0
United States	0	0	0	0	0	0
Western Europe	0	-390	-565	-689	-728	-728
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-407: Delayed technology reference case with low oil price and low feedstock availability sugar ethanol net trade [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	-101	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	1,264	375	213	424	1,342	0
Eastern Europe	-589	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	-263	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	-41	0	0	0	0	0
United States	-134	0	0	-424	-1,342	0
Western Europe	-136	-375	-213	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-408: Delayed technology reference case with low oil price and low feedstock availability cellulosic ethanol net trade [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	40	85	117	117
China	0	0	222	667	1,564	1,120
Central and South America	0	0	533	658	589	4,043
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	32	151	421
Japan	0	0	0	0	-385	-439
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	-121	-280	-378	-387
United States	0	0	0	0	-27	-3,533
Western Europe	0	0	-675	-1,163	-1,631	-1,341
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-409: Delayed technology reference case with low oil price and low feedstock availability biomass-to-liquids production [Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Argentina	0	0	21	99	99	99
Australia	0	0	0	0	0	0
Brazil	0	0	97	320	750	1,333
Canada	0	0	93	280	420	420
Caribbean basin	0	0	0	0	0	0
China	0	0	79	240	563	563
Colombia	0	0	61	133	133	133
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	77	232	544	1,010
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	36	66	66	66
United States	0	0	786	1,253	1,849	2,406
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>1,250</b>	<b>2,623</b>	<b>4,423</b>	<b>6,029</b>

**Table A-410: Delayed technology reference case with low oil price and low feedstock availability biomass-to-liquids consumption [Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	0	0	0	0	0
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	774	1,253	3,821	6,029
Western Europe	0	0	477	1,370	602	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>1,250</b>	<b>2,623</b>	<b>4,423</b>	<b>6,029</b>

**Table A-411: Delayed technology reference case with low oil price and low feedstock availability biomass-to-liquids net trade [Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	93	280	420	420
China	0	0	79	240	563	563
Central and South America	0	0	180	552	982	1,565
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	77	232	544	1,010
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	36	66	66	66
United States	0	0	12	0	-1,972	-3,623
Western Europe	0	0	-477	-1,370	-602	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>



**Table A-412: Delayed technology reference case with low oil price and low feedstock availability biodiesel production [Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Argentina	0	333	877	1,491	1,472	1,458
Australia	0	0	0	0	0	0
Brazil	0	333	835	1,537	1,748	1,647
Canada	0	0	0	0	0	0
Caribbean basin	0	95	310	742	1,145	1,220
China	0	0	0	0	0	0
Colombia	0	0	0	0	0	0
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	1,238	1,644	1,803	1,907	2,128
Western Europe	998	2,643	2,984	3,240	3,684	4,114
<b>Total</b>	<b>998</b>	<b>4,641</b>	<b>6,650</b>	<b>8,813</b>	<b>9,956</b>	<b>10,567</b>

**Table A-413: Delayed technology reference case with low oil price and low feedstock availability biodiesel consumption [Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	126	443	937	1,265	1,453
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	1,238	2,494	4,055	3,623	5,000
Western Europe	998	3,277	3,713	3,822	5,068	4,114
<b>Total</b>	<b>998</b>	<b>4,641</b>	<b>6,650</b>	<b>8,813</b>	<b>9,956</b>	<b>10,567</b>

**Table A-414: Delayed technology reference case with low oil price and low feedstock availability biodiesel net trade [Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	634	1,579	2,833	3,101	2,872
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	-850	-2,251	-1,716	-2,872
Western Europe	0	-634	-729	-582	-1,385	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**A-24 Delayed Technology Reference Case with E20****Table A-415: Delayed technology reference case with E20 ethanol production**  
[Million gallons]

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	455	502
Argentina	0	178	699	1,607	1,665	1,309
Australia	0	0	66	247	630	1,172
Brazil	4,866	5,977	7,624	9,926	12,492	13,634
Canada	0	0	259	779	1,020	1,020
Caribbean basin	210	328	703	779	779	779
China	344	384	614	1,041	1,319	1,319
Colombia	196	215	411	782	1,501	1,574
Eastern Europe	110	226	434	780	1,037	1,149
Former Soviet Union	0	0	6	19	57	175
India	313	279	541	992	1,893	2,543
Japan	0	0	95	348	612	647
Middle East	0	0	0	0	0	0
Mexico	0	0	199	601	1,408	1,546
Other Asia	0	0	0	0	0	0
South Korea	0	0	35	35	35	35
United States	3,850	11,612	15,767	19,509	22,849	24,199
Western Europe	600	2,568	2,755	3,398	5,291	8,013
<b>Total</b>	<b>10,789</b>	<b>22,097</b>	<b>30,571</b>	<b>41,243</b>	<b>53,043</b>	<b>59,614</b>

**Table A-416: Delayed technology reference case with E20 ethanol consumption**  
[Million gallons]

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	455	502
Australia	0	0	66	247	630	1,172
Canada	145	0	233	701	918	1,020
China	297	0	0	0	545	1,463
Central and South America	3,788	4,853	6,148	7,248	8,030	8,797
Eastern Europe	699	226	872	780	1,037	1,149
Former Soviet Union	0	0	6	19	57	175
India	313	279	541	942	1,704	2,399
Japan	263	288	373	698	1,008	1,100
Middle East	0	0	0	0	0	0
Mexico	0	0	30	78	183	201
Other Asia	0	0	0	0	0	0
South Korea	264	335	400	414	413	413
United States	3,984	11,612	17,249	24,464	30,414	32,293
Western Europe	736	4,174	4,290	5,249	7,649	8,934
<b>Total</b>	<b>10,789</b>	<b>22,097</b>	<b>30,571</b>	<b>41,243</b>	<b>53,043</b>	<b>59,614</b>

**Table A-417: Delayed technology reference case with E20 ethanol net trade**  
[Million gallons]

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	-145	0	26	78	102	0
China	47	384	614	1,041	774	-144
Central and South America	1,484	1,845	3,289	5,845	8,407	8,500
Eastern Europe	-589	0	-438	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	50	189	144
Japan	-263	-288	-278	-350	-395	-453
Middle East	0	0	0	0	0	0
Mexico	0	0	170	523	1,225	1,345
Other Asia	0	0	0	0	0	0
South Korea	-264	-335	-365	-379	-378	-378
United States	-134	0	-1,482	-4,955	-7,565	-8,094
Western Europe	-136	-1,607	-1,535	-1,851	-2,358	-920
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

# World Biofuels Study

**Table A-418: Delayed technology reference case with E20 grain ethanol production**  
[Million gallons]

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Argentina	0	178	640	1,260	1,317	962
Australia	0	0	0	0	0	0
Brazil	0	0	0	0	0	0
Canada	0	0	0	0	0	0
Caribbean basin	0	0	0	0	0	0
China	344	344	344	325	0	0
Colombia	0	0	0	0	0	0
Eastern Europe	110	226	348	477	367	251
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	3,850	11,612	15,000	15,000	15,000	14,640
Western Europe	600	2,568	2,589	2,705	3,178	3,604
<b>Total</b>	<b>4,904</b>	<b>14,928</b>	<b>18,921</b>	<b>19,767</b>	<b>19,862</b>	<b>19,457</b>

**Table A-419: Delayed technology reference case with E20 sugar ethanol production**  
[Million gallons]

	2005	2010	2015	2020	2025	2030
Africa	300	330	364	402	444	490
Argentina	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Brazil	4,866	5,977	7,329	9,036	10,651	11,793
Canada	0	0	0	0	0	0
Caribbean basin	210	328	703	779	779	779
China	0	40	48	48	48	48
Colombia	196	215	241	270	302	302
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	313	279	327	347	381	348
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	0	0	0	0
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>5,884</b>	<b>7,169</b>	<b>9,011</b>	<b>10,882</b>	<b>12,606</b>	<b>13,760</b>

# World Biofuels Study

**Table A-420: Delayed technology reference case with E20 cellulosic ethanol production [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	11	11
Argentina	0	0	59	347	347	347
Australia	0	0	66	247	630	1,172
Brazil	0	0	296	890	1,841	1,841
Canada	0	0	259	779	1,020	1,020
Caribbean basin	0	0	0	0	0	0
China	0	0	222	668	1,271	1,271
Colombia	0	0	170	512	1,199	1,272
Eastern Europe	0	0	85	303	670	897
Former Soviet Union	0	0	6	19	57	175
India	0	0	214	645	1,512	2,196
Japan	0	0	95	348	612	647
Middle East	0	0	0	0	0	0
Mexico	0	0	199	601	1,408	1,546
Other Asia	0	0	0	0	0	0
South Korea	0	0	35	35	35	35
United States	0	0	767	4,509	7,849	9,560
Western Europe	0	0	166	693	2,113	4,410
<b>Total</b>	<b>0</b>	<b>0</b>	<b>2,639</b>	<b>10,594</b>	<b>20,574</b>	<b>26,397</b>

**Table A-421: Delayed technology reference case with E20 grain ethanol consumption [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	297	0	0	0	0	0
Central and South America	0	36	105	209	167	131
Eastern Europe	110	226	348	477	367	251
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	192	230	303	0	453
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	47	295	144	23	0	378
United States	3,850	11,612	15,000	15,000	15,000	14,640
Western Europe	600	2,568	3,094	3,756	4,329	3,604
<b>Total</b>	<b>4,904</b>	<b>14,928</b>	<b>18,921</b>	<b>19,767</b>	<b>19,862</b>	<b>19,457</b>

**Table A-422: Delayed technology reference case with E20 sugar ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	444	490
Australia	0	0	0	0	0	0
Canada	145	0	0	0	0	0
China	0	0	0	0	48	48
Central and South America	3,788	4,818	6,043	7,040	7,864	8,666
Eastern Europe	589	0	412	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	313	279	327	347	381	348
Japan	263	96	48	48	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	217	40	0	0	0	0
United States	134	0	788	2,753	3,094	3,289
Western Europe	136	1,607	1,029	293	776	920
<b>Total</b>	<b>5,884</b>	<b>7,169</b>	<b>9,011</b>	<b>10,882</b>	<b>12,606</b>	<b>13,760</b>

**Table A-423: Delayed technology reference case with E20 cellulosic ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	11	11
Australia	0	0	66	247	630	1,172
Canada	0	0	233	701	918	1,020
China	0	0	0	0	497	1,415
Central and South America	0	0	0	0	0	0
Eastern Europe	0	0	111	303	670	897
Former Soviet Union	0	0	6	19	57	175
India	0	0	214	596	1,323	2,051
Japan	0	0	95	348	1,008	647
Middle East	0	0	0	0	0	0
Mexico	0	0	30	78	183	201
Other Asia	0	0	0	0	0	0
South Korea	0	0	256	392	413	35
United States	0	0	1,461	6,711	12,320	14,365
Western Europe	0	0	166	1,200	2,545	4,410
<b>Total</b>	<b>0</b>	<b>0</b>	<b>2,639</b>	<b>10,594</b>	<b>20,574</b>	<b>26,397</b>

World Biofuels Study

**Table A-424: Delayed technology reference case with E20 grain ethanol net trade**  
[Million gallons]

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	47	344	344	325	0	0
Central and South America	0	143	535	1,051	1,151	831
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	-192	-230	-303	0	-453
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	-47	-295	-144	-23	0	-378
United States	0	0	0	0	0	0
Western Europe	0	0	-506	-1,051	-1,151	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-425: Delayed technology reference case with E20 sugar ethanol net trade**  
[Million gallons]

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	-145	0	0	0	0	0
China	0	40	48	48	0	0
Central and South America	1,484	1,702	2,229	3,045	3,869	4,209
Eastern Europe	-589	0	-412	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	-263	-96	-48	-48	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	-217	-40	0	0	0	0
United States	-134	0	-788	-2,753	-3,094	-3,289
Western Europe	-136	-1,607	-1,029	-293	-776	-920
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>



# World Biofuels Study

**Table A-426: Delayed technology reference case with E20 cellulosic ethanol net trade [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	26	78	102	0
China	0	0	222	668	774	-144
Central and South America	0	0	525	1,749	3,387	3,460
Eastern Europe	0	0	-26	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	50	189	144
Japan	0	0	0	0	-395	0
Middle East	0	0	0	0	0	0
Mexico	0	0	170	523	1,225	1,345
Other Asia	0	0	0	0	0	0
South Korea	0	0	-222	-357	-378	0
United States	0	0	-694	-2,202	-4,471	-4,805
Western Europe	0	0	0	-508	-432	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-427: Delayed technology reference case with E20 biomass-to-liquids production [Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Argentina	0	0	21	125	125	125
Australia	0	0	0	0	0	0
Brazil	0	0	106	320	662	662
Canada	0	0	93	280	367	367
Caribbean basin	0	0	0	0	0	0
China	0	0	80	240	457	457
Colombia	0	0	61	184	431	458
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	77	232	544	790
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	72	216	506	556
Other Asia	0	0	0	0	0	0
South Korea	0	0	36	50	50	50
United States	0	0	786	1,253	1,849	2,406
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>1,332</b>	<b>2,900</b>	<b>4,992</b>	<b>5,871</b>

**Table A-428: Delayed technology reference case with E20 biomass-to-liquids consumption [Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	0	0	0	0	0
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	1,059	2,812	4,992	5,871
Western Europe	0	0	273	88	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>1,332</b>	<b>2,901</b>	<b>4,992</b>	<b>5,871</b>

**Table A-429: Delayed technology reference case with E20 biomass-to-liquids net trade [Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	93	280	367	367
China	0	0	80	240	457	457
Central and South America	0	0	189	629	1,218	1,245
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	77	232	544	790
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	72	216	506	556
Other Asia	0	0	0	0	0	0
South Korea	0	0	36	50	50	50
United States	0	0	-273	-1,559	-3,143	-3,465
Western Europe	0	0	-273	-88	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

# World Biofuels Study

**Table A-430: Delayed technology reference case with E20 biodiesel production**  
[Million gallons ethanol equivalent]

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Argentina	0	333	776	819	827	239
Australia	0	0	0	0	0	0
Brazil	0	333	877	1,642	1,793	1,355
Canada	0	0	0	0	0	0
Caribbean basin	0	95	310	675	802	898
China	0	0	0	0	0	0
Colombia	0	119	298	474	650	782
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	1,238	1,640	1,747	1,907	2,072
Western Europe	998	3,178	3,578	3,930	4,468	4,788
<b>Total</b>	<b>998</b>	<b>5,294</b>	<b>7,479</b>	<b>9,287</b>	<b>10,448</b>	<b>10,134</b>

**Table A-431: Delayed technology reference case with E20 biodiesel consumption**  
[Million gallons ethanol equivalent]

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	158	472	984	1,306	1,490
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	1,238	1,713	1,747	1,907	2,072
Western Europe	998	3,898	5,294	6,556	7,235	6,572
<b>Total</b>	<b>998</b>	<b>5,294</b>	<b>7,479</b>	<b>9,287</b>	<b>10,448</b>	<b>10,134</b>

**Table A-432: Delayed technology reference case with E20 biodiesel net trade**  
**[Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	720	1,788	2,626	2,767	1,784
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	-73	0	0	0
Western Europe	0	-720	-1,716	-2,626	-2,767	-1,784
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

## A-25 Delayed Technology Reference Case with \$50 per Tonne CO<sub>2</sub>

**Table A-433: Delayed technology reference case with \$50 per tonne CO<sub>2</sub> ethanol production [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	73	83	91	98
Argentina	0	178	664	910	940	952
Australia	0	0	66	262	704	1,174
Brazil	4,866	5,977	7,624	9,752	12,283	14,455
Canada	0	0	259	779	1,014	1,014
Caribbean basin	210	328	683	683	779	890
China	344	384	614	1,045	1,622	2,607
Colombia	196	215	411	782	1,501	2,231
Eastern Europe	110	226	428	738	1,037	1,149
Former Soviet Union	0	0	0	0	0	0
India	313	279	541	992	1,893	2,822
Japan	0	0	95	348	579	579
Middle East	0	0	0	0	0	0
Mexico	0	0	199	601	1,408	1,546
Other Asia	0	0	0	0	0	0
South Korea	0	0	30	30	30	32
United States	3,850	11,612	15,767	16,455	18,676	19,862
Western Europe	600	2,570	2,755	3,235	5,291	8,183
<b>Total</b>	<b>10,789</b>	<b>22,099</b>	<b>30,209</b>	<b>36,694</b>	<b>47,847</b>	<b>57,592</b>

**Table A-434: Delayed technology reference case with \$50 per tonne CO<sub>2</sub> ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	73	83	91	98
Australia	0	0	66	262	704	1,174
Canada	145	0	233	779	912	924
China	294	0	0	399	1,622	3,030
Central and South America	3,788	4,853	6,141	7,153	7,958	8,865
Eastern Europe	699	226	872	953	1,037	1,149
Former Soviet Union	0	0	0	0	0	0
India	313	279	541	992	1,893	2,399
Japan	265	291	373	698	974	1,031
Middle East	0	0	0	0	0	0
Mexico	0	0	30	78	1,031	1,053
Other Asia	0	0	0	0	0	0
South Korea	264	335	400	414	413	413
United States	3,984	11,612	17,166	19,797	23,562	28,385
Western Europe	736	4,173	4,313	5,086	7,650	9,071
<b>Total</b>	<b>10,789</b>	<b>22,099</b>	<b>30,209</b>	<b>36,694</b>	<b>47,847</b>	<b>57,592</b>

**Table A-435: Delayed technology reference case with \$50 per tonne CO<sub>2</sub> ethanol net trade [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	-145	0	26	0	101	90
China	50	384	614	646	0	-423
Central and South America	1,484	1,845	3,241	4,974	7,545	9,663
Eastern Europe	-589	0	-444	-215	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	423
Japan	-265	-291	-278	-350	-395	-453
Middle East	0	0	0	0	0	0
Mexico	0	0	170	523	377	493
Other Asia	0	0	0	0	0	0
South Korea	-264	-335	-370	-384	-383	-381
United States	-134	0	-1,400	-3,342	-4,886	-8,522
Western Europe	-136	-1,604	-1,559	-1,851	-2,359	-889
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-436: Delayed technology reference case with \$50 per tonne CO<sub>2</sub> grain ethanol production [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Argentina	0	178	604	604	604	604
Australia	0	0	0	0	0	0
Brazil	0	0	0	0	0	0
Canada	0	0	0	0	0	0
Caribbean basin	0	0	0	0	0	0
China	344	344	344	325	0	0
Colombia	0	0	0	0	0	0
Eastern Europe	110	226	348	477	367	251
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	3,850	11,612	15,000	15,000	14,132	11,111
Western Europe	600	2,570	2,589	2,542	3,178	3,604
<b>Total</b>	<b>4,904</b>	<b>14,930</b>	<b>18,886</b>	<b>18,949</b>	<b>18,282</b>	<b>15,571</b>

**Table A-437: Delayed technology reference case with \$50 per tonne CO<sub>2</sub> sugar ethanol production [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	73	83	91	98
Argentina	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Brazil	4,866	5,977	7,329	8,862	10,406	12,578
Canada	0	0	0	0	0	0
Caribbean basin	210	328	683	683	779	890
China	0	40	48	53	58	64
Colombia	196	215	241	270	302	339
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	313	279	327	347	381	452
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	0	0	0	0
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>5,884</b>	<b>7,170</b>	<b>8,701</b>	<b>10,297</b>	<b>12,018</b>	<b>14,420</b>

# World Biofuels Study

**Table A-438: Delayed technology reference case with \$50 per tonne CO<sub>2</sub> cellulosic ethanol production [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Argentina	0	0	59	306	335	347
Australia	0	0	66	262	704	1,174
Brazil	0	0	296	890	1,877	1,877
Canada	0	0	259	779	1,014	1,014
Caribbean basin	0	0	0	0	0	0
China	0	0	222	667	1,564	2,543
Colombia	0	0	170	512	1,199	1,893
Eastern Europe	0	0	80	261	670	897
Former Soviet Union	0	0	0	0	0	0
India	0	0	214	645	1,512	2,371
Japan	0	0	95	348	579	579
Middle East	0	0	0	0	0	0
Mexico	0	0	199	601	1,408	1,546
Other Asia	0	0	0	0	0	0
South Korea	0	0	30	30	30	32
United States	0	0	767	1,455	4,544	8,751
Western Europe	0	0	166	693	2,113	4,579
<b>Total</b>	<b>0</b>	<b>0</b>	<b>2,623</b>	<b>7,448</b>	<b>17,548</b>	<b>27,601</b>

**Table A-439: Delayed technology reference case with \$50 per tonne CO<sub>2</sub> grain ethanol consumption [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	294	0	0	325	0	0
Central and South America	0	36	100	118	94	95
Eastern Europe	110	226	348	477	367	251
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	192	230	0	294	363
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	50	295	148	88	216	34
United States	3,850	11,612	15,000	15,000	14,132	11,223
Western Europe	600	2,570	3,060	2,940	3,178	3,604
<b>Total</b>	<b>4,904</b>	<b>14,930</b>	<b>18,886</b>	<b>18,949</b>	<b>18,282</b>	<b>15,571</b>



**Table A-440: Delayed technology reference case with \$50 per tonne CO<sub>2</sub> sugar ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	73	83	91	98
Australia	0	0	0	0	0	0
Canada	145	0	0	0	0	0
China	0	0	0	53	58	64
Central and South America	3,788	4,818	6,042	6,909	7,449	7,045
Eastern Europe	589	0	418	153	0	0
Former Soviet Union	0	0	0	0	0	0
India	313	279	327	347	381	452
Japan	265	99	48	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	215	40	0	0	0	0
United States	134	0	788	2,753	3,961	6,761
Western Europe	136	1,604	1,005	0	77	0
<b>Total</b>	<b>5,884</b>	<b>7,170</b>	<b>8,701</b>	<b>10,297</b>	<b>12,018</b>	<b>14,420</b>

**Table A-441: Delayed technology reference case with \$50 per tonne CO<sub>2</sub> cellulosic ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	66	262	704	1,174
Canada	0	0	233	779	912	924
China	0	0	0	21	1,564	2,966
Central and South America	0	0	0	125	415	1,724
Eastern Europe	0	0	106	323	670	897
Former Soviet Union	0	0	0	0	0	0
India	0	0	214	645	1,512	1,947
Japan	0	0	95	698	680	668
Middle East	0	0	0	0	0	0
Mexico	0	0	30	78	1,031	1,053
Other Asia	0	0	0	0	0	0
South Korea	0	0	252	326	197	379
United States	0	0	1,379	2,044	5,469	10,400
Western Europe	0	0	248	2,146	4,396	5,467
<b>Total</b>	<b>0</b>	<b>0</b>	<b>2,623</b>	<b>7,448</b>	<b>17,548</b>	<b>27,601</b>

**Table A-442: Delayed technology reference case with \$50 per tonne CO<sub>2</sub> grain ethanol net trade [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	50	344	344	0	0	0
Central and South America	0	143	505	486	510	509
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	-192	-230	0	-294	-363
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	-50	-295	-148	-88	-216	-34
United States	0	0	0	0	0	-112
Western Europe	0	0	-471	-398	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-443: Delayed technology reference case with \$50 per tonne CO<sub>2</sub> sugar ethanol net trade [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	-145	0	0	0	0	0
China	0	40	48	0	0	0
Central and South America	1,484	1,702	2,211	2,906	4,038	6,761
Eastern Europe	-589	0	-418	-153	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	-265	-99	-48	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	-215	-40	0	0	0	0
United States	-134	0	-788	-2,753	-3,961	-6,761
Western Europe	-136	-1,604	-1,005	0	-77	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-444: Delayed technology reference case with \$50 per tonne CO<sub>2</sub> cellulosic ethanol net trade [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	26	0	101	90
China	0	0	222	646	0	-423
Central and South America	0	0	525	1,582	2,997	2,392
Eastern Europe	0	0	-26	-62	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	423
Japan	0	0	0	-350	-101	-90
Middle East	0	0	0	0	0	0
Mexico	0	0	170	523	377	493
Other Asia	0	0	0	0	0	0
South Korea	0	0	-222	-296	-166	-347
United States	0	0	-612	-589	-925	-1,649
Western Europe	0	0	-82	-1,453	-2,282	-889
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-445: Delayed technology reference case with \$50 per tonne CO<sub>2</sub> biomass-to-liquids production [Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Argentina	0	0	21	110	121	125
Australia	0	0	0	0	0	0
Brazil	0	0	106	320	675	675
Canada	0	0	93	280	365	365
Caribbean basin	0	0	0	0	0	0
China	0	0	80	240	563	915
Colombia	0	0	61	184	431	681
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	77	232	544	853
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	72	216	506	556
Other Asia	0	0	0	0	0	0
South Korea	0	0	31	41	42	42
United States	0	0	786	3,104	4,211	5,624
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>1,327</b>	<b>4,727</b>	<b>7,458</b>	<b>9,835</b>

**Table A-446: Delayed technology reference case with \$50 per tonne CO<sub>2</sub> biomass-to-liquids consumption [Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	0	0	0	0	0
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	1,057	4,370	7,457	9,835
Western Europe	0	0	271	356	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>1,327</b>	<b>4,727</b>	<b>7,457</b>	<b>9,835</b>

**Table A-447: Delayed technology reference case with \$50 per tonne CO<sub>2</sub> biomass-to-liquids net trade [Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	93	280	365	365
China	0	0	80	240	563	915
Central and South America	0	0	189	614	1,227	1,481
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	77	232	544	853
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	72	216	506	556
Other Asia	0	0	0	0	0	0
South Korea	0	0	31	41	42	42
United States	0	0	-271	-1,267	-3,246	-4,211
Western Europe	0	0	-271	-356	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

# World Biofuels Study

**Table A-448: Delayed technology reference case with \$50 per tonne CO<sub>2</sub> biodiesel production [Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Argentina	0	333	776	819	827	94
Australia	0	0	0	0	0	0
Brazil	0	333	835	1,537	1,792	1,362
Canada	0	0	0	0	0	0
Caribbean basin	0	95	310	675	802	898
China	0	0	0	0	0	0
Colombia	0	119	298	474	650	782
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	1,238	1,640	1,747	1,907	2,016
Western Europe	998	3,178	3,578	4,175	4,566	5,191
<b>Total</b>	<b>998</b>	<b>5,294</b>	<b>7,437</b>	<b>9,426</b>	<b>10,544</b>	<b>10,343</b>

**Table A-449: Delayed technology reference case with \$50 per tonne CO<sub>2</sub> biodiesel consumption [Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	158	472	984	1,306	1,490
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	1,238	1,713	1,747	1,907	2,016
Western Europe	998	3,898	5,252	6,696	7,331	6,837
<b>Total</b>	<b>998</b>	<b>5,294</b>	<b>7,437</b>	<b>9,426</b>	<b>10,544</b>	<b>10,343</b>

**Table A-450: Delayed technology reference case with \$50 per tonne CO<sub>2</sub> biodiesel net trade [Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	720	1,746	2,520	2,766	1,646
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	-73	0	0	0
Western Europe	0	-720	-1,674	-2,520	-2,766	-1,646
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

## A-26 Delayed Technology Reference Case with \$20 per Tonne Growers' Payment

**Table A-451: Delayed technology reference case with \$20 per tonne growers' payment ethanol production [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	455	502
Argentina	0	178	664	910	940	952
Australia	0	0	66	247	625	1,172
Brazil	4,866	5,977	7,624	9,752	11,947	13,338
Canada	0	0	259	779	1,004	1,004
Caribbean basin	210	328	573	683	775	775
China	344	384	614	1,041	1,374	1,374
Colombia	196	215	411	782	1,501	2,227
Eastern Europe	110	226	428	738	1,037	1,149
Former Soviet Union	0	0	6	19	57	174
India	313	279	541	992	1,893	2,543
Japan	0	0	95	348	612	647
Middle East	0	0	0	0	0	0
Mexico	0	0	199	601	1,408	1,546
Other Asia	0	0	0	0	0	0
South Korea	0	0	35	35	35	35
United States	3,850	11,612	15,767	16,400	17,491	21,182
Western Europe	600	2,568	2,755	3,398	5,291	8,013
<b>Total</b>	<b>10,789</b>	<b>22,097</b>	<b>30,400</b>	<b>37,125</b>	<b>46,444</b>	<b>56,630</b>

# World Biofuels Study

**Table A-452: Delayed technology reference case with \$20 per tonne growers' payment ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	455	502
Australia	0	0	66	247	625	1,172
Canada	145	0	233	779	1,004	1,020
China	297	0	0	344	600	1,374
Central and South America	3,788	4,853	6,134	7,153	7,958	8,859
Eastern Europe	699	226	872	953	1,037	1,149
Former Soviet Union	0	0	6	19	57	174
India	313	279	541	992	1,893	2,399
Japan	263	288	373	699	1,008	1,100
Middle East	0	0	0	0	0	0
Mexico	0	0	30	78	183	201
Other Asia	0	0	0	0	0	0
South Korea	264	335	400	414	413	413
United States	3,984	11,612	17,091	19,797	23,562	28,684
Western Europe	736	4,174	4,289	5,249	7,650	9,586
<b>Total</b>	<b>10,789</b>	<b>22,097</b>	<b>30,400</b>	<b>37,125</b>	<b>46,444</b>	<b>56,630</b>

**Table A-453: Delayed technology reference case with \$20 per tonne growers' payment ethanol net trade [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	-145	0	26	0	0	-16
China	47	384	614	697	774	0
Central and South America	1,484	1,845	3,137	4,974	7,205	8,433
Eastern Europe	-589	0	-444	-215	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	144
Japan	-263	-288	-278	-351	-395	-453
Middle East	0	0	0	0	0	0
Mexico	0	0	170	523	1,225	1,345
Other Asia	0	0	0	0	0	0
South Korea	-264	-335	-365	-379	-378	-378
United States	-134	0	-1,324	-3,397	-6,071	-7,503
Western Europe	-136	-1,607	-1,535	-1,851	-2,359	-1,572
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>



**Table A-454: Delayed technology reference case with \$20 per tonne growers' payment grain ethanol production [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Argentina	0	178	604	604	604	604
Australia	0	0	0	0	0	0
Brazil	0	0	0	0	0	0
Canada	0	0	0	0	0	0
Caribbean basin	0	0	0	0	0	0
China	344	344	344	325	0	0
Colombia	0	0	0	0	0	0
Eastern Europe	110	226	348	477	367	251
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	3,850	11,612	15,000	15,000	15,000	14,903
Western Europe	600	2,568	2,589	2,705	3,178	3,604
<b>Total</b>	<b>4,904</b>	<b>14,928</b>	<b>18,885</b>	<b>19,112</b>	<b>19,149</b>	<b>19,363</b>

**Table A-455: Delayed technology reference case with \$20 per tonne growers' payment sugar ethanol production [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	444	490
Argentina	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Brazil	4,866	5,977	7,329	8,862	10,406	11,793
Canada	0	0	0	0	0	0
Caribbean basin	210	328	573	683	775	775
China	0	40	48	48	48	48
Colombia	196	215	241	270	302	334
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	313	279	327	347	381	348
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	0	0	0	0
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>5,884</b>	<b>7,169</b>	<b>8,882</b>	<b>10,612</b>	<b>12,356</b>	<b>13,787</b>

# World Biofuels Study

**Table A-456: Delayed technology reference case with \$20 per tonne growers' payment cellulosic ethanol production [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	11	11
Argentina	0	0	59	306	336	347
Australia	0	0	66	247	625	1,172
Brazil	0	0	296	890	1,541	1,546
Canada	0	0	259	779	1,004	1,004
Caribbean basin	0	0	0	0	0	0
China	0	0	222	668	1,326	1,326
Colombia	0	0	170	512	1,199	1,893
Eastern Europe	0	0	80	261	670	897
Former Soviet Union	0	0	6	19	57	174
India	0	0	214	645	1,512	2,196
Japan	0	0	95	348	612	647
Middle East	0	0	0	0	0	0
Mexico	0	0	199	601	1,408	1,546
Other Asia	0	0	0	0	0	0
South Korea	0	0	35	35	35	35
United States	0	0	767	1,400	2,491	6,279
Western Europe	0	0	166	693	2,113	4,410
<b>Total</b>	<b>0</b>	<b>0</b>	<b>2,633</b>	<b>7,401</b>	<b>14,939</b>	<b>23,480</b>

**Table A-457: Delayed technology reference case with \$20 per tonne growers' payment grain ethanol consumption [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	297	0	0	296	0	0
Central and South America	0	36	100	118	94	95
Eastern Europe	110	226	348	477	367	251
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	192	230	29	0	131
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	47	295	144	33	0	378
United States	3,850	11,612	15,000	15,000	15,000	14,903
Western Europe	600	2,568	3,064	3,158	3,688	3,604
<b>Total</b>	<b>4,904</b>	<b>14,928</b>	<b>18,885</b>	<b>19,112</b>	<b>19,149</b>	<b>19,363</b>

**Table A-458: Delayed technology reference case with \$20 per tonne growers' payment sugar ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	300	330	364	402	444	490
Australia	0	0	0	0	0	0
Canada	145	0	0	0	0	16
China	0	0	0	48	48	48
Central and South America	3,788	4,818	6,035	6,909	7,864	8,763
Eastern Europe	589	0	418	153	0	0
Former Soviet Union	0	0	0	0	0	0
India	313	279	327	347	381	348
Japan	263	96	48	0	0	178
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	217	40	0	0	0	0
United States	134	0	788	2,753	3,093	2,372
Western Europe	136	1,607	902	0	526	1,572
<b>Total</b>	<b>5,884</b>	<b>7,169</b>	<b>8,882</b>	<b>10,612</b>	<b>12,356</b>	<b>13,787</b>

**Table A-459: Delayed technology reference case with \$20 per tonne growers' payment cellulosic ethanol consumption [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	11	11
Australia	0	0	66	247	625	1,172
Canada	0	0	233	779	1,004	1,004
China	0	0	0	0	552	1,326
Central and South America	0	0	0	125	0	0
Eastern Europe	0	0	106	323	670	897
Former Soviet Union	0	0	6	19	57	174
India	0	0	214	645	1,512	2,051
Japan	0	0	95	670	1,008	791
Middle East	0	0	0	0	0	0
Mexico	0	0	30	78	183	201
Other Asia	0	0	0	0	0	0
South Korea	0	0	256	381	413	35
United States	0	0	1,304	2,044	5,469	11,409
Western Europe	0	0	324	2,091	3,435	4,410
<b>Total</b>	<b>0</b>	<b>0</b>	<b>2,633</b>	<b>7,401</b>	<b>14,939</b>	<b>23,480</b>

# World Biofuels Study

**Table A-460: Delayed technology reference case with \$20 per tonne growers' payment grain ethanol net trade [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	47	344	344	29	0	0
Central and South America	0	143	505	486	510	509
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	-192	-230	-29	0	-131
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	-47	-295	-144	-33	0	-378
United States	0	0	0	0	0	0
Western Europe	0	0	-475	-453	-510	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-461: Delayed technology reference case with \$20 per tonne growers' payment sugar ethanol net trade [Million gallons]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	-145	0	0	0	0	-16
China	0	40	48	0	0	0
Central and South America	1,484	1,702	2,107	2,906	3,619	4,138
Eastern Europe	-589	0	-418	-153	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	-263	-96	-48	0	0	-178
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	-217	-40	0	0	0	0
United States	-134	0	-788	-2,753	-3,093	-2,372
Western Europe	-136	-1,607	-902	0	-526	-1,572
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-462: Delayed technology reference case with \$20 per tonne growers' payment cellulosic ethanol net trade [Million gallons]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	26	0	0	0
China	0	0	222	668	774	0
Central and South America	0	0	525	1,582	3,076	3,786
Eastern Europe	0	0	-26	-62	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	144
Japan	0	0	0	-322	-395	-144
Middle East	0	0	0	0	0	0
Mexico	0	0	170	523	1,225	1,345
Other Asia	0	0	0	0	0	0
South Korea	0	0	-222	-346	-378	0
United States	0	0	-537	-644	-2,978	-5,130
Western Europe	0	0	-158	-1,398	-1,322	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table A-463: Delayed technology reference case with \$20 per tonne growers' payment biomass-to-liquids production [Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Argentina	0	0	21	110	121	125
Australia	0	0	0	0	0	0
Brazil	0	0	106	320	554	556
Canada	0	0	93	280	361	361
Caribbean basin	0	0	0	0	0	0
China	0	0	80	240	477	477
Colombia	0	0	61	184	431	681
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	77	232	544	790
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	72	216	506	556
Other Asia	0	0	0	0	0	0
South Korea	0	0	36	52	52	52
United States	0	0	786	2,986	4,061	5,230
Western Europe	0	0	0	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>1,332</b>	<b>4,620</b>	<b>7,107</b>	<b>8,826</b>

**Table A-464: Delayed technology reference case with \$20 per tonne growers' payment biomass-to-liquids consumption [Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	0	0	0	0	0
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	1,059	4,532	7,107	8,827
Western Europe	0	0	273	88	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>1,332</b>	<b>4,620</b>	<b>7,107</b>	<b>8,827</b>

**Table A-465: Delayed technology reference case with \$20 per tonne growers' payment biomass-to-liquids net trade [Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	93	280	361	361
China	0	0	80	240	477	477
Central and South America	0	0	189	614	1,106	1,362
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	77	232	544	790
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	72	216	506	556
Other Asia	0	0	0	0	0	0
South Korea	0	0	36	52	52	52
United States	0	0	-273	-1,546	-3,046	-3,597
Western Europe	0	0	-273	-88	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

# World Biofuels Study

**Table A-466: Delayed technology reference case with \$20 per tonne growers' payment biodiesel production [Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Argentina	0	333	776	819	827	239
Australia	0	0	0	0	0	0
Brazil	0	333	877	1,642	1,793	1,355
Canada	0	0	0	0	0	0
Caribbean basin	0	95	310	675	802	898
China	0	0	0	0	0	0
Colombia	0	119	298	474	650	782
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	1,238	1,640	1,747	1,907	2,072
Western Europe	998	3,178	3,578	3,930	4,468	4,788
<b>Total</b>	<b>998</b>	<b>5,294</b>	<b>7,479</b>	<b>9,287</b>	<b>10,448</b>	<b>10,134</b>

**Table A-467: Delayed technology reference case with \$20 per tonne growers' payment biodiesel consumption [Million gallons ethanol equivalent]**

	2005	2010	2015	2020	2025	2030
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	158	472	984	1,306	1,490
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	1,238	1,713	1,747	1,907	2,724
Western Europe	998	3,898	5,294	6,556	7,235	5,920
<b>Total</b>	<b>998</b>	<b>5,294</b>	<b>7,479</b>	<b>9,287</b>	<b>10,448</b>	<b>10,134</b>

**Table A-468: Delayed technology reference case with \$20 per tonne growers' payment biodiesel production [Million gallons ethanol equivalent]**

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Africa	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Canada	0	0	0	0	0	0
China	0	0	0	0	0	0
Central and South America	0	720	1,788	2,626	2,767	1,784
Eastern Europe	0	0	0	0	0	0
Former Soviet Union	0	0	0	0	0	0
India	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Middle East	0	0	0	0	0	0
Mexico	0	0	0	0	0	0
Other Asia	0	0	0	0	0	0
South Korea	0	0	0	0	0	0
United States	0	0	-73	0	0	-652
Western Europe	0	-720	-1,716	-2,626	-2,767	-1,132
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>