ABSTRACT

The ability of Obligated Parties to meet the Renewable Fuel Standard (RFS) requirements will become much more difficult and costly in the next few years due to the significant marketing barriers to expanded ethanol use in gasoline. The growth potential for E85 does not appear promising and the rollout of E15 in the marketplace is fraught with a multitude of regulatory, environmental, and marketing issues. With the increased use of ethanol stymied for the next several years, RFS compliance will rely heavily on the increased blending of biodiesel into on-road diesel fuel and heating oil. Compliance costs to satisfy the 2012 RFS biodiesel blending requirement are estimated to account for more than 80 percent of total RFS compliance costs. Unless the current RFS requirements are significantly modified to reflect marketplace realities, including the actual availabilities of specified biofuels and various economic issues, the net result will be an increase in energy costs, which will pose a threat to long-term economic growth and make the United States (U.S.) less competitive in the world market.

Introduction

The Energy Policy Act of 2005 established the first national Renewable Fuel Standard (RFS). At that time, Congress authorized the Environmental Protection Agency (EPA) to establish annual minimum volumes of renewable fuel required to be blended into the Nation’s transportation fuel supply under the RFS. The RFS requires gasoline and diesel fuel producers and importers to increase the blending of renewable fuels over time. The original RFS was updated as part of the “Energy Independence and Security Act” (EISA) in December 2007, and the EPA established the most recent RFS renewable volume requirements on March 26, 2010.1

This paper provides an analysis of current and projected RFS compliance issues facing transportation fuel marketers and “Obligated Parties.” (An Obligated Party is a producer or importer of gasoline or diesel fuel within the U.S. – excluding Alaska.) It discusses current and future trends in biofuels production, how RFS compliance is achieved, and how technical, as well as supply/demand issues, may threaten future RFS compliance.

RFS Overview and Background

The RFS established different categories of renewable fuel that are classified based on the fuel’s “lifecycle emissions.” The term lifecycle emissions refers to the total greenhouse gas (GHG) emissions that are attributable to a fuel throughout its production, distribution, and ultimate combustion. This is also referred to as the “well to wheels” approach of calculating GHG emissions of different transportation fuels. A renewable fuel’s lifecycle emissions are calculated and compared to those for the corresponding hydrocarbon (petroleum-based) fuel, i.e., conventional gasoline or diesel fuel, as a measure of the “renewable” content of the fuel. For example, the RFS has deemed that ethanol made from corn (“corn ethanol”) reduces lifecycle emissions by 20 percent (%) compared to conventional gasoline. This means that 80% of the energy content of corn ethanol fuel is non-renewable after accounting for the non-renewable energy sources that are consumed in growing the corn, processing it in an ethanol plant, and transporting it to market.

The RFS makes a major delineation between renewable fuels – conventional biofuels versus “advanced” biofuels. Conventional biofuels, such as corn ethanol, provide between a 20% to 50% reduction in lifecycle emissions. To be classified as an “advanced” biofuel, the fuel must offer a 50%, or greater, reduction in lifecycle emissions. Cellulosic biofuels, biomass-based diesel (biodiesel), and ethanol produced from sugar cane (sugar ethanol) all qualify for the advanced biofuel category. The latest RFS requirements are shown in the table below:

<table>
<thead>
<tr>
<th>Year</th>
<th>Minimum Total RFS</th>
<th>Maximum Corn-Based Ethanol</th>
<th>Minimum Advanced Biofuel</th>
<th>Other Advanced Biofuel</th>
<th>Minimum Advanced Total</th>
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</thead>
<tbody>
<tr>
<td>2009</td>
<td>11.10</td>
<td>10.50</td>
<td>----</td>
<td>0.50</td>
<td>0.10</td>
</tr>
<tr>
<td>2010</td>
<td>12.95</td>
<td>12.00</td>
<td>0.10</td>
<td>0.65</td>
<td>0.20</td>
</tr>
<tr>
<td>2011</td>
<td>13.95</td>
<td>12.60</td>
<td>0.25</td>
<td>0.80</td>
<td>0.30</td>
</tr>
<tr>
<td>2012</td>
<td>15.20</td>
<td>13.20</td>
<td>0.50</td>
<td>1.00</td>
<td>0.50</td>
</tr>
<tr>
<td>2013</td>
<td>16.55</td>
<td>13.80</td>
<td>1.00</td>
<td>1.00</td>
<td>0.75</td>
</tr>
<tr>
<td>2014</td>
<td>18.15</td>
<td>14.40</td>
<td>1.75</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>2015</td>
<td>20.50</td>
<td>15.00</td>
<td>3.00</td>
<td>1.00</td>
<td>1.50</td>
</tr>
<tr>
<td>2016</td>
<td>22.25</td>
<td>15.00</td>
<td>4.25</td>
<td>1.00</td>
<td>2.00</td>
</tr>
<tr>
<td>2017</td>
<td>24.00</td>
<td>15.00</td>
<td>5.50</td>
<td>1.00</td>
<td>2.50</td>
</tr>
<tr>
<td>2018</td>
<td>26.00</td>
<td>15.00</td>
<td>7.00</td>
<td>1.00</td>
<td>3.00</td>
</tr>
<tr>
<td>2019</td>
<td>28.00</td>
<td>15.00</td>
<td>8.50</td>
<td>1.00</td>
<td>3.50</td>
</tr>
<tr>
<td>2020</td>
<td>30.00</td>
<td>15.00</td>
<td>10.50</td>
<td>1.00</td>
<td>3.50</td>
</tr>
<tr>
<td>2021</td>
<td>33.00</td>
<td>15.00</td>
<td>13.50</td>
<td>1.00</td>
<td>3.50</td>
</tr>
<tr>
<td>2022</td>
<td>36.00</td>
<td>15.00</td>
<td>16.00</td>
<td>1.00</td>
<td>4.00</td>
</tr>
</tbody>
</table>

Note (1): Other advanced biofuel includes sugar-based ethanol.
(2): May be increased by EPA, but no less than 1.0 billion gallons per year.

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3 40 CFR §80.1403.
As indicated above, the RFS establishes minimum annual volume requirements for: (1) total renewable fuels; (2) cellulosic biofuel; (3) biodiesel; and (4) total advanced biofuels. The “Other Advanced Biofuel” category (which includes primarily sugar ethanol) is not a minimum requirement because cellulosic biofuel and biodiesel that are blended in excess of their minimums can be applied to satisfy the total advanced biofuel category.

The RFS limits the amount of corn ethanol that can be blended to comply with the overall minimum RFS requirements. It is established by subtracting the minimum total advanced biofuel requirement from the total renewable fuel requirement. As shown in the table above, the corn ethanol volume that can be applied to RFS compliance is capped at 15 billion gallons per year (BGY) from 2015 onward.

The minimum biodiesel requirement is set at 1.0 BGY from 2012 onward, but may be increased in the future. As stated in 42 U.S.C. §7545(o)(2)(B)(ii), the EPA administrator has the authority to increase the biodiesel requirement after completing an analysis of:

“(I) the impact of the production and use of renewable fuels on the environment, including air quality, climate change, conversion of wetlands, eco-systems, wildlife habitat, water quality, and water supply;
(II) the impact of renewable fuels on the energy security of the United States;
(III) the expected annual rate of future commercial production of renewable fuels, including advanced biofuels in each category (cellulosic biofuel and bio-massed based diesel);
(IV) the impact of renewable fuels on the infrastructure of the United States, including deliverability of materials, goods, and products other than renewable fuel, and the sufficiency of infrastructure to deliver and use renewable fuel;
(V) the impact of the use of renewable fuels on the cost to consumers of transportation fuel and the cost to transport goods; and
(VI) the impact of the use of renewable fuels on other factors, including job creation, the price and supply of agricultural commodities, rural economic development, and food prices.”

The EPA issued a notice of proposed rulemaking (NPRM) in July 2011 to increase the 2013 biodiesel requirement to 1.28 BGY. Since that original notice, the EPA has not pursued this increase and has missed the deadline of November 2011 required to enact a final rule for the 2013 biodiesel requirement. It is anticipated that the EPA will submit a NPRM to increase the 2014 biodiesel requirement, but will need to finalize this rule by November 2012.

The most problematic – and contentious – RFS requirement is that for cellulosic biofuel (predominantly cellulosic ethanol). Cellulosic biofuel is biofuel made from wood, straw, switch grass, and other forms of agricultural refuse. A legislative effort is under way to include algae-based fuels in the definition of cellulosic biofuel, but this has not been accomplished to date. No cellulosic biofuel was produced in 2011, despite an RFS requirement of 250 million gallons. Despite extensive (largely government funded) research into this product, considerable technical and economic factors continue to inhibit the start-up and sustainability of commercial operations. The EPA charged Obligated Parties approximately $6.8 million in penalties for not blending

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4 76 FR 38873-4, Preamble, Section IV.D., July 1, 2011.
5 EPA Regulatory Announcement, EPA Office of Transportation and Air Quality, EPA-420-F-11-044.
cellulosic biofuel in 2011, even though none was available. The current RFS assumes a 53% annual average growth rate in cellulosic biofuel from 2011 through 2022, ending at a requirement of 16 BGY in 2022. The RFS cellulosic biofuel growth rate is especially aggressive at 100% per year for years 2012 and 2013. This disconnect between the legislation and actual production will eventually need to be addressed in future RFS volume requirements.

Requirements for Producers or Importers

An Obligated Party’s Renewable Volume Obligation (RVO) is based on the total gallons of gasoline and diesel fuel produced or imported during each calendar year. The RVOs for each of the four separate regulated categories are calculated by the EPA, as prescribed in the RFS regulations, and are posted at the end of each year for the upcoming year. The RVOs are calculated as percentages to be applied to each Obligated Party’s total gasoline and diesel annual volume. For 2012, the RVO percentages are:

- 0.006% Cellulosic biofuel
- 0.91% Biodiesel
- 1.21% Advanced biofuel (includes the biodiesel and cellulosic biofuel percentages)
- 9.23% Total renewable fuel (includes the advanced biofuel percentage; the balance is corn ethanol)

As an example of this calculation, if Company A produced and/or imported a total of one billion gallons of combined gasoline and diesel in 2012 (equivalent to an average of 65,000 barrels per day [B/D]), its RVOs for 2012 would be:

- 60,000 gallons of cellulosic biofuel
- 9.1 million gallons of biodiesel
- 12.1 million gallons of total advanced biofuel
- 2.94 million gallons of advanced biofuel, in addition to the cellulosic and biodiesel
- 92.3 million gallons of total renewable fuel
- 80.2 million gallons of renewable fuel (primarily corn ethanol) in addition to the advanced biofuel requirement

The “currency” used for RFS compliance is the Renewable Identification Number (RIN). A RIN is generated when a gallon of renewable fuel is produced by a renewable fuel producer that has registered with the EPA. Foreign imports of renewable fuel generate RINs after the fuel has been imported. RINs can only be used for compliance once they are “separated,” i.e., when the renewable fuel is blended with hydrocarbon fuel. Any renewable fuel that is exported by itself, or in a fuel blend, must have the RINs associated with this renewable fuel “retired.”

An Obligated Party can meet its RVOs under the RFS either by actually blending renewable fuel (and separating the RINs) or by purchasing RINs from non-Obligated Parties or Obligated Parties with surplus RINs. Thus, RINs are traded back and forth among various industry participants. The value of RINs is determined by their supply and demand. If an Obligated Party has acquired surplus RINs in any year, it may carry over 20% of these to meet the immediately following year’s RVOs.

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There are five different types of RINs that can be generated:

- Cellulosic ethanol (code D3) – none produced yet
- Biodiesel (code D4)
- Other advanced biofuel (code D5)
- Conventional renewable (corn ethanol) (code D6)
- Cellulosic diesel (code D7) – none produced yet

All RINs are ethanol-equivalent, and one RIN-gallon (RIN-Gal.) counts towards one gallon of the four RVOs in the Company A example above. Since biodiesel has about 1.5 times the heat content of ethanol, it has a 1.5 RIN equivalency factor, i.e., one gallon of biodiesel generates 1.5 RIN-Gals. Thus, Company A can meet its 2012 RVOs by obtaining the following RINs:

- 60,000 cellulosic ethanol RIN-Gals. (2012 compliance will again need to be met by purchases from the EPA unless some RINs are generated)
- 13.65 million RIN-Gals. of biodiesel (equates to 9.1 million actual gallons of biodiesel)
- 2.94 million RIN-Gals. of advanced biofuel (can be sugar ethanol, additional biodiesel, or other non-corn candidates)
- 80.2 million RIN-Gals. of corn ethanol

Based on the current RIN market prices, Company A’s 2012 RIN compliance costs would be:

<table>
<thead>
<tr>
<th>RIN Type</th>
<th>RIN-Gallons Required</th>
<th>RIN Cost ($/RIN-Gal.)</th>
<th>Total RIN Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cellulosic Biofuel</td>
<td>60,000</td>
<td>0.780</td>
<td>$ 46,800</td>
</tr>
<tr>
<td>Biodiesel</td>
<td>13.65 million</td>
<td>1.430</td>
<td>$19,519,500</td>
</tr>
<tr>
<td>Advanced Biofuel</td>
<td>2.94 million</td>
<td>0.730</td>
<td>$ 2,146,200</td>
</tr>
<tr>
<td>Corn Ethanol</td>
<td>80.2 million</td>
<td>0.025</td>
<td>$ 2,005,000</td>
</tr>
</tbody>
</table>

**Company A 2012 RFS Compliance Cost**  
$23,717,500

Thus, if it blended no renewable fuel, Company A would need to purchase RINs worth $23,717,500 (at current market prices) to meet its 2012 RVOs for its 1 BGY (about 65,000 B/D) of gasoline plus diesel produced – equivalent to about 2.4 cents per gallon. This can be thought of as Company A’s economic burden (whether it actually blends renewable fuel or merely purchases RINs) for RFS compliance. Based on the RIN costs indicated above, over 80% of these costs are associated with biodiesel.

**2011 Biofuel Balance**

In 2011, approximately 13.6 BGY of corn ethanol and 1.1 BGY of biodiesel were produced domestically.\(^7\) Of this, the U.S. had net exports of 1.1 BGY of corn ethanol and 0.1 BGY of biodiesel. A total of 0.2 BGY of sugar ethanol was imported.

The 2011 RFS requirement of 13.95 BGY was achieved through the domestic blending of 12.5 BGY of corn ethanol, 0.2 BGY of sugar ethanol, and 1.0 BGY of biodiesel. Net biodiesel

blending of 1.0 BGY was 0.2 BGY above the RFS minimum of 0.8 BGY. Since each incremental biodiesel gallon counts as 1.5 gallons of advanced biofuel, this resulted in 0.1 BGY of additional advanced biofuel credits. The balance of the 2011 RFS requirement was met through 2010 RIN carryover.

Future Limitations on Domestic Ethanol Usage

The U.S. gasoline market is currently almost entirely “saturated” with ethanol at 10 volume percent (Vol.%) – the maximum that has historically been permitted. Current U.S. gasoline consumption is approximately 8.7 million B/D – the equivalent of about 133 BGY. Thus, at 10 Vol.%, the maximum quantity of ethanol that can be accommodated is 13.3 BGY – only marginally more than what is presently being blended. In other words, we have essentially reached the so-called “blend wall.” Thus, although the RFS allows for up to a maximum of 15 BGY of corn-based ethanol, this level cannot be achieved through E10 blending alone. An increase in total gasoline consumption could (hypothetically) allow more corn ethanol to be blended, but gasoline demand in the U.S. is expected to decline in the future, only exacerbating the blend wall problem.

There are only two potential pathways to increase ethanol usage in the domestic automotive fuel pool: (1) expanded usage of E85; and/or (2) introduction of higher ethanol blends, such as E15. The following sections describe some of the issues associated with these two potential avenues.

E85 – A Potential Near-Term Option Not So “Near”

E85 is a nominal blend of 85 Vol.% ethanol and 15 Vol.% gasoline. The 15 Vol.% gasoline is required to permit the blend to vaporize easily during engine start-up – pure ethanol has too low a vapor pressure. The E85 blend is often adjusted in colder climates, as well as in winter months, to as much as 32 Vol.% gasoline (68 Vol.% ethanol) to avoid start-up problems, although it is still referred to as “E85.” On a year-round basis, E85 averages only about 74 Vol.% ethanol.

Expanded usage of E85 could help alleviate the “blend wall” issue in the near-term, but such increased usage faces a number of impediments.

E85 is not a direct substitute for “gasoline” in most vehicles on the road today and can only be used in so-called “flex-fuel” vehicles (FFVs). These vehicles have fuel systems that are resistant to ethanol-induced corrosion, as well as sensors that adjust fuel and ignition conditions for varying ethanol content. Unfortunately, there are only about 14 million FFVs on the road today (about 6% of the current U.S. light-duty vehicle population), and only about 3 million per year are being added. In addition to the limited number of FFVs, only about 2,500 retail outlets (less than 1.6% of the 157,000 in the U.S.) offer E85. Not surprisingly, most of these are located in the upper Midwest where ethanol production is concentrated. Thus, unless there is a very substantial increase in the production and sale of FFVs, as well as a significant expansion in E85 fueling stations outside the Midwest, growth in E85 consumption will continue to be severely constrained.

The track record for rapid E85 growth and sustenance is not promising – even in states that have actively endorsed E85, such as Minnesota. Many consumers, even those with FFVs and convenient refueling locations, have been reluctant users of E85. This is because E85 contains about 25% less energy content as compared to E10. Thus, the consumer’s breakeven

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9 Ibid., Tables 39 and 40.
(indifference) price for E85 must be about 25% lower than E10 (about $0.95/gallon less when gasoline is selling for $3.80/gallon). Statistics indicate that E85 is often priced only about 20% lower, meaning that it is actually more expensive than gasoline on a per mile basis. Also, because they get fewer miles per gallon, consumers need to fill up more frequently, often a costly inconvenience considering the lack of stations. In Minnesota, which boasts 15% of the country’s E85 fueling stations, E85 usage peaked in 2007-2008, and there has been no increase in the station count since 2008. Minnesotan E85 consumption in 2011 was down 10% from peak levels. Last year, domestic E85 consumption of an estimated 140 million gallons comprised less than 1% of total domestic ethanol consumption. Most projections are that E85 usage will grow at no more than 10-15% annually on top of a very small base, the equivalent of only about 160 million gallons in 2012. Thus, expanded E85 usage does not appear to be a practical alternative pathway to relieve the blend wall problem.

**E15 – Still a Long Road Ahead**

In 2011, the EPA issued a waiver (*not* a mandate) for the use of “E15” (i.e., a blend of 85% gasoline and 15% ethanol) in all 2001 model year and newer (MY2001+) cars, light-duty trucks, and sport utility vehicles (SUVs). EPA’s waiver came following a testing program to identify the extent of any potential engine or fuel system problems with such vehicles. EPA’s waiver did not cover MY2000 and older cars, light-duty trucks, and SUVs. It also excludes all motorcycles, heavy-duty engines, off-road vehicles (boats, snowmobiles), and off-road equipment (lawnmowers, chain saws, etc.). The EPA waiver means that gasoline retailers, assuming they meet all other regulatory compliance issues, can sell E15 as a separate fuel grade. Pumps dispensing E15 must be labeled to indicate that it is for use only in MY2001+ vehicles and is prohibited in all other vehicles by federal law. Approximately one-half of the gasoline-fuelled U.S. cars, light-duty trucks, and SUVs on the road today are in the MY2001+ category. If all of these vehicles switched from E10 to E15, the potential demand for ethanol could increase by about 25%, or about 3.3 BGY. This would permit corn-based ethanol to reach its 15 BGY maximum under the current RFS and temporarily relieve the blend wall. However, serious impediments exist to the widespread marketing of E15.

Several lawsuits have been filed contesting EPA’s E15 waiver, and they have all been consolidated under a single action. The suit alleges that the EPA did not conduct sufficient testing on E15, and that the fuel’s use could cause premature engine failure, reduced fuel efficiency, and void engine warranties. Oral arguments are scheduled for the D.C. Circuit Court on April 17, 2012. In addition, House Bill H.R. 523, the “American Fuel Protection Act of 2011” challenges EPA’s E15 waiver. Even if these various legal and political challenges fail, they will likely delay any implementation of E15 marketing.

Assuming that the EPA prevails in the challenges to its waiver, this is only the first step in the E15 regulatory process. E15 marketing involves a state-by-state approval process because state laws are all written to allow only blends containing between 9-10% ethanol. To date, only a few

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12 76 FR 4662-83, January 26, 2011.
states have passed the necessary bills to allow the 15% ethanol blend. Such revision and approval of state regulations can often be a lengthy process.

After receiving state approval, a retailer wishing to market E15 must register with the EPA and submit a misfueling mitigation plan for approval. The potential for misfueling (i.e., a consumer inadvertently fueling a non-approved vehicle with E15) has been a major concern of both the EPA and fuel marketers. The EPA has recently approved the misfueling mitigation plan submitted by the Renewable Fuels Association (RFA). The RFA plans to provide the misfueling mitigation plan documentation free of charge to retailers in order to smooth the EPA registration process. An E15 marketer’s mitigation plan must include participation in a third-party survey of compliance to ensure the proper labeling of all pumps and dispensers. The survey requires quarterly sampling of all gasoline grades, not just E15. Such survey work could prove a significant cost burden to smaller retailers.

Gasoline dispensers used at service stations are normally required by local fire marshals to have the approval of Underwriters Laboratory, Inc. (UL), an independent product safety certification organization. Since few dispensers are fully UL certified for E15 blends, a marketer desiring to sell E15 will need to upgrade its dispensers to new E15 UL-certified equipment. The former UL testing of E10 pumps included ethanol levels up to 15% ethanol; however, UL has not specifically approved the former E10 dispensers for use with E15. UL has left the decision to allow former E10 dispensers in E15 service to local fire marshals due to this gray area of definition. Assuming the reluctance to approve heritage E10 dispensers without the full support of UL, the cost of installing new dispensing equipment is another impediment to E15 marketing. Ethanol producers and their supporters are encouraging retailers to invest in new “blender pumps” that would allow delivery to the consumer of any ethanol blend ranging from E10 to E85. This would be achieved by blending E10 with varying amounts of either E85 or fuel ethanol. Apart from being more expensive than other dispensers, such blender pumps would present another problem.

“Conventional” E10 gasoline (i.e., non-RFG) currently qualifies for the EPA’s so-called “RVP waiver,” which permits gasoline blended with between 9-10% ethanol to exceed the normal Reid vapor pressure (RVP) specification by 1.0 pound per square inch (psi). This waiver makes it easier for refiners, especially in the summertime, to produce the special low RVP blendstock required for ethanol blending. The EPA did not extend this RVP waiver to E15 blends. Thus, E15 will require its own special ultra-low RVP blendstock in the summertime in order to be a compliant blend. Although the widespread availability of this blendstock may be problematic in itself, if a retailer tries to use a blender pump to blend conventional E10 (covered by the RVP waiver) using either E85 or fuel ethanol in order to make E15, the resulting product will be unlawful under the RVP standards referenced above. Thus, the sale of E15 through the use of a blender pump would mean giving up the 1.0 psi RVP waiver for conventional E10. This would have significant economic consequences for refiners, marketers, and the driving public. Granting E15 the same 1.0 psi RVP waiver currently enjoyed by conventional E10 would require a legislative change to the Clean Air Act, and is not under the discretion of the EPA.

The blending and marketing of RFG E15 presents other issues as well. The EPA has approved RFG blended with 15% ethanol for use in the Complex Model, but has also required separate

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16 42 U.S.C. §7545(h)(4) and 40 CFR §80.27(d)(2).
labeling on product transfer documents of specific Reformulated Blendstock for Oxygenated Blending (RBOB) for E10 and E15 blending. It is unclear whether this will require separate RBOBs for E10 and E15. In addition, some states limit the ethanol content because of permeability and other local environmental reasons. For example, the California Air Resources Board (CARB) restricts ethanol content because of its effect on oxides of nitrogen, which are known smog precursors. In order to allow the use of 10% ethanol in CARB gasoline, refiners had to lower the sulfur content of the California Reformulated Blendstock for Oxygenated Blending (CARBOB) to levels much lower than that allowed in RBOB marketed outside of California.

Finally, many retailers are worried about the product liability issues associated with E15 marketing. In some states, independent retailers have been granted some liability protection in the event of consumer misfueling or mechanical problems that may arise from the use of this new fuel. However, this liability protection has not been extended to branded outlets. The vast majority of automobile manufacturers’ warranties for non-FFVs do not currently cover any ethanol-blended fuel other than E10. For this reason alone, it is anticipated that most branded outlets will prohibit E15 sales. There have been no announcements of any major fuel brands planning to market E15. If this continues, availability would be restricted to independent operators.

Due to this multiplicity of issues, we do not expect significant adoption of E15, at least for the next several years. The first E15 marketers will likely comprise some smaller independent retailers located in the Midwest – where most of the E85 is currently sold. Whether, and how soon, this market develops may depend largely on the future economics of ethanol blending. Change in federal legislation that allows E15 a 1.0 psi RVP waiver, or removing the RVP waiver for all ethanol-blended gasoline is a possibility; however, the prospects of such legislation are unknown at this time.

Biodiesel – The Expensive Road to Compliance

With no near-term potential growth in ethanol usage in the domestic transportation fuel system, and with the demand for hydrocarbon-based gasoline generally in decline, the primary way to meet upcoming RFS requirements over the next few years must be through the increased use of biodiesel. With the current wholesale price of biodiesel (referred to as B100, or 100% biodiesel) at about $5.00 per gallon, and the 2012 biodiesel RIN market values in the $1.40-$1.45 range, biodiesel compliance costs account for more than 80% of total RFS compliance costs. The increased demand by Obligated Parties to meet their RVOs through biodiesel blending is likely to put upward pressure on both B100 prices and biodiesel RIN market values. (B100 prices include the attached RINs which can later be sold after the B100 is blended, if the purchaser does not need them for RVO compliance.)

The major difference in marketing biodiesel blends and ethanol blends is product quality issues. Unlike ethanol, which is a single molecule, biodiesel can be produced from a wide variety of feedstocks, including restaurant grease, animal fat, and vegetable oils from different plants, such as soybeans, corn, canola, rapeseed, jatropha, sunflower, and many others. The main problem with biodiesel produced from different feedstocks is the wide variety in cold-flow properties of the B100 product. In colder climates, some biodiesel blends can form a gel-like substance that restricts fuel flow through diesel engine filters. Most major marketers have approved biodiesel

blends up to 5 Vol.% (B5) in hydrocarbon diesel, as long as the B100 properties, especially the cold-flow properties, are within the specifications for the application. Confidence by major marketers and many engine manufacturers for blends above B5 is not assured at this point.18

Biodiesel blending at terminals requires significant expenditures for heated tankage, piping, and metering up to the point of inline injection. While there are some independent blenders that “splash blend” biodiesel, most biodiesel is blended inline into the diesel at the terminal. (Splash blending is the term used when a truck is first partially filled with petroleum diesel prior to having the B100 added. This method relies on the sloshing around of the mixture within the truck to homogenize the components, and is sometimes not 100% efficient.) The addition of biodiesel blending infrastructure at terminals is slowly increasing, but is limiting widespread distribution of biodiesel blends.

Biodiesel production economics have been highly volatile due to the availability or non-availability of the biodiesel blenders’ excise tax credit. The latter is a direct credit against the federal diesel excise tax that has historically been enjoyed by blenders of B100 to encourage its use. From 2004 to 2009, the biodiesel blenders’ credit was $1.00 per gallon of B100 ($0.50 per gallon for biodiesel produced from restaurant grease or recycled oils). It expired on December 31, 2009, but in December 2010, it was reinstated (retroactively) for calendar years 2010 and 2011. It was again allowed to expire on December 31, 2011, and remains unavailable at this time. There are efforts by industry lobbyists and within Congress to reinstate it again. However, federal budget problems, as well as the fact that minimum volumes of biodiesel are already mandated (and are likely to be increased) under the RFS, make reinstatement uncertain.

An additional issue with biodiesel production has to do with “RIN fraud” that surfaced in the biodiesel market during the last half of 2011, which has created severe economic difficulties for small biodiesel producers. The EPA has filed lawsuits involving biodiesel RIN fraud against Clean Green Fuel LLC for selling 32 million fraudulent biodiesel RINs and Absolute Fuels LLC for selling 48 million fraudulent biodiesel RINs. The EPA alleges that the renewable fuels associated with the RINs sold were never produced. The EPA issued notices of violation (NOVs) to purchasers of these fraudulent RINs and ordered these companies to replace them with valid RINs or they would be deemed to be noncompliant with RFS requirements. The EPA is authorized to impose fines as high as $37,500 per day per violation for Obligated Parties found to have used invalid RINs for RFS compliance. At least 24 different companies, including major oil companies, received such NOVs. The EPA stated a “buyer beware” position with regards to RIN purchasers, even though the RINs were allowed into EPA’s Moderated Transaction System for RIN trading. In response to the RIN fraud and EPA’s actions, all purchasers of biodiesel RINs started into an extensive due diligence process that basically froze RIN transactions for several months. Several small biodiesel producers that relied on the cash flow from the sale of valid RINs have ceased operations and have gone out of business as a result of these events.19 The ability of individual companies to insure 100% proof of valid RINs is an exercise of unknown complexity at this point.

Complicating fuel marketing efforts are a patchwork of individual city and state mandates for biodiesel blends from B2 to B5 currently and, in some cases, increasing with time to B20. In addition to using biodiesel as a blendstock for on-road diesel, RFS compliance can also be met by

blending biodiesel into heating oil. Three states, as well as New York City, have enacted mandates and tax incentives for blending biodiesel into heating oil (typically B2).

Total annual average on-road diesel and heating oil use is about 3.9 million B/D or 59 BGY. If this entire volume was blended at the B5 level, this would equate to a biodiesel demand of almost 3 BGY, or about 2 BGY above the current level of usage. Although it is expensive, biodiesel blending provides the only practical logistical pathway for Obligated Parties to achieve RFS compliance over the next few years. The blending of more biodiesel is attractive because each additional biodiesel gallon blended in excess of the 1.0 BGY minimum counts as 1.5 gallons against the advanced biofuels RFS requirement. However, even this pathway may be restricted if the EPA increases the minimum annual biodiesel requirements, as it has indicated it may do in the future.

Conclusion

The current structure and implementation of the RFS is essentially a “wish list” of requirements intended to wean American consumers off of historical fossil fuels and onto fuels from renewable sources. There are many arguments for and against such a radical transition in the Nation’s energy utilization. However, unless the current RFS is significantly modified by Congress, it appears that the net result will be an increase in energy costs, which will pose a threat to long-term economic growth and make the U.S. less competitive in the world market.