Corn Ethanol Current and Future Status

Issue

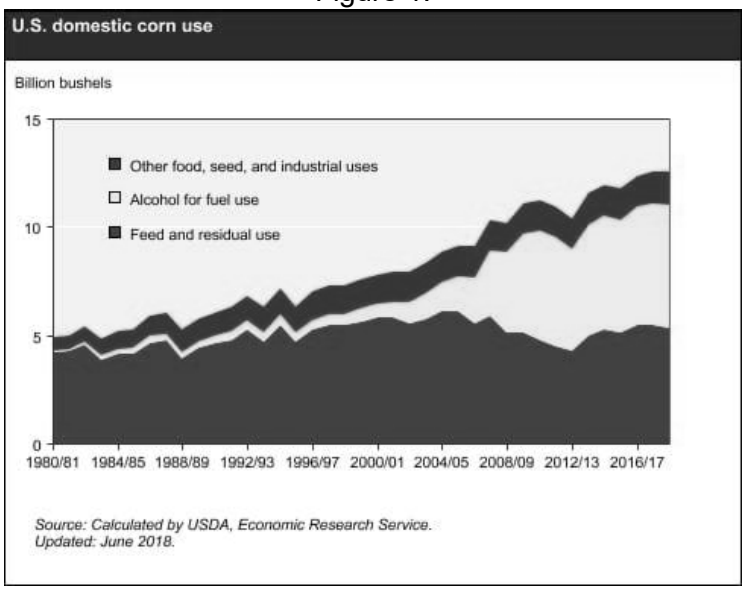
Corn is an important crop for many farmers across the country, including in Tennessee. Following passage of the Renewable Fuel Standard, corn use for ethanol has increased significantly. The market for fuel is ever changing and is affected by many factors including foreign oil, domestic oil production, and consumer demand. The economic impact of COVID-19 has decreased fuel demand and thus lowered demand for ethanol. Additionally, there is a consumer and industry shift toward electric vehicles and this could have a major impact on fuel demand. Depressed conditions for ethanol have contributed to depressed price for corn.

Background

Corn Production and Ethanol Use

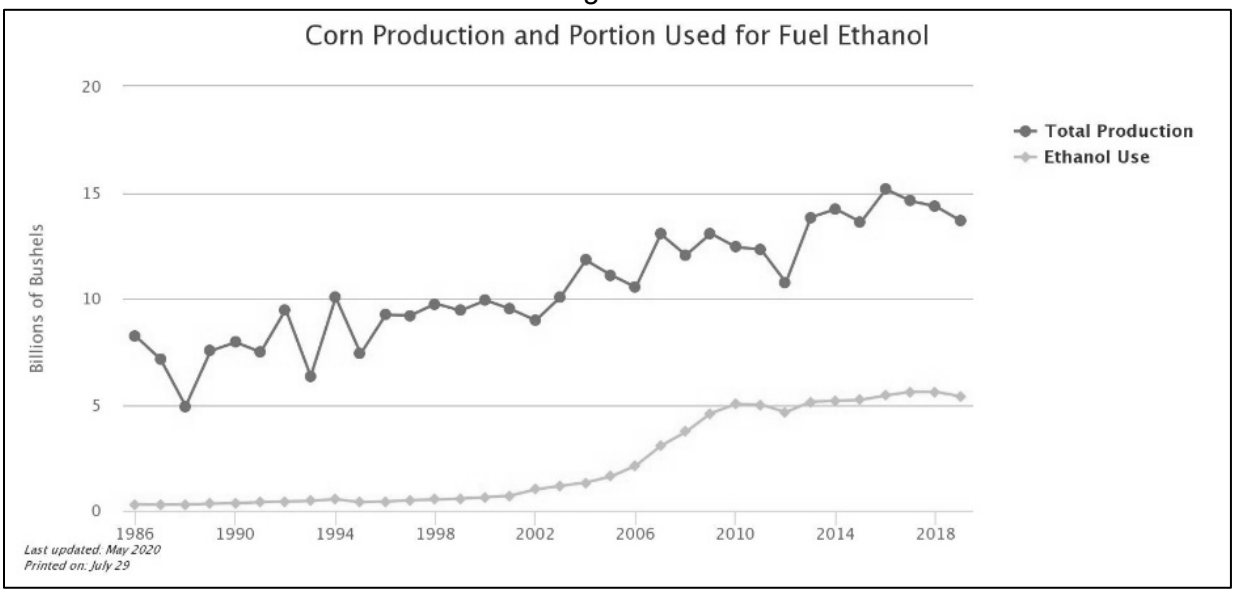
Corn production has increased over time as higher yields follow improvements in technology through seed varieties, fertilizers, pesticides, machinery, and in production practices such as reduced tillage, irrigation, crop rotations, and pest management systems. Historically, corn has been primarily used for food, seed, and industrial uses and is a major component of livestock feed. Converting corn into ethanol for fuel use has increased significantly, particularly after the Renewable Fuel Standard (RFS) was established by the Energy Policy Act of 2005 and expanded in 2007 by the Energy Independence and Security Act. The RFS began with 4 billion gallons of renewable fuel in 2006 and is scheduled to ascend to 36 billion gallons by 2022. The Environmental Protection Agency (EPA) has statutory authority to determine the volume amounts after 2022. Figure 1 shows corn's domestic use overtime.

Figure 1.



Estimates today show that up to 40% of corn's initial purpose domestically goes into ethanol use. Figure 2 shows total U.S. corn use from 1986 to 2019. The overall trend has been one of increasing production with a small decline in 2019. The amount of corn used for ethanol production increased substantially between 2001 and 2010, as nearly all gasoline was transitioned to 10% ethanol as required by the RFS.

Figure 2.



Source: United States Department of Agriculture, Economic Research Service, Feed Grain Yearbook.

An important component of ethanol production is the co-products which the process develops: distillers grains, gluten feed, and gluten meal. These co-products are important to manufacturers' profitability. According to the Renewable Fuels Association, in 2019 U.S. ethanol producers generated 39.6 million metric tons (mmt) of distillers grains, gluten feed, and gluten meal. These co-products are valuable corn and soybean meal substitutes in rations used for feeding livestock. On average, a bushel of corn processed by a dry mill ethanol plant produces:

- 2.92 gallons denatured fuel ethanol
- 15.86 pounds of distillers grains animal feed (10% moisture)
- 0.80 pounds of corn distillers oil for animal feed and biodiesel production
- 16.50 pounds of biogenic carbon dioxide for food, beverage, and chemical manufacturing

Ethanol production has a substantial impact on the economic vitality of many rural communities. Short transportation distances and local investment have led to most ethanol facilities being centrally located to corn producing areas in Tennessee and across the United States, providing more economic independence and energy security to our country while supporting local jobs. According to the National Corn Growers Association, in 2019 the American ethanol industry supported nearly 349,000 direct and indirect jobs, contributed more than $43 billion to the Gross Domestic Product, added $23.3 billion to American household income, and generated more than $10 billion in tax revenue for federal, state, and local governments.

Tennessee has two facilities which convert corn into ethanol: Green Plains Incorporated in Rives and Tate and Lyle PLC in Loudon. According to the Renewable Fuels Association, these two plants annually produce 225 million gallons of ethanol, 430,000 tons of distillers grain, and purchase $431 million worth of corn.

RFS, Crude Oil Imports, and Shale Oil Production

The RFS's purpose was to use ethanol as a bridge to energy independence at times of high fuel prices and dependence on foreign oil in the United States. In 2005 when Congress first established the RFS, the United States imported a record 3.695 billion barrels of crude oil. Figure 3 and Figure 4 come from the United States Energy Information Administration and shows imports of crude oil over time (Figure 3) and average retail gasoline prices (Figure 4).

Figure 3

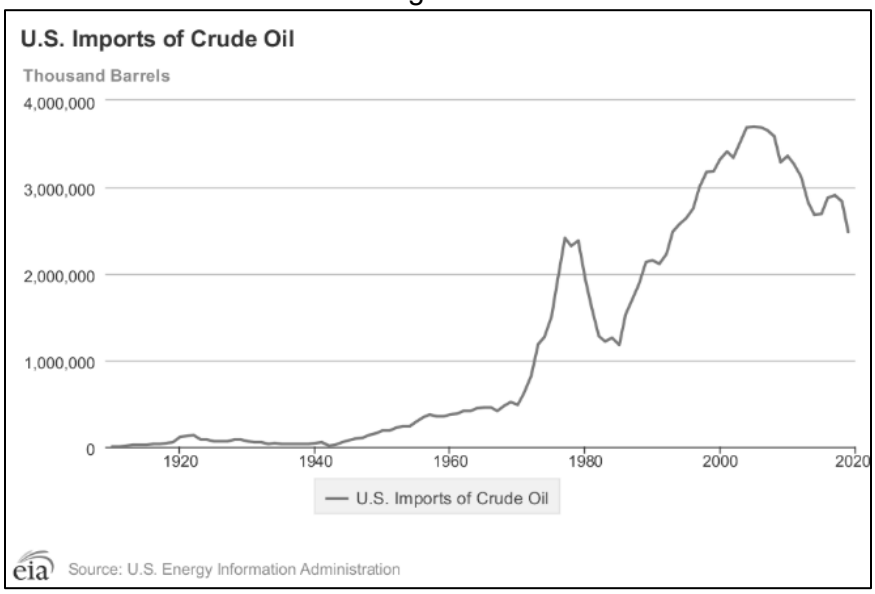
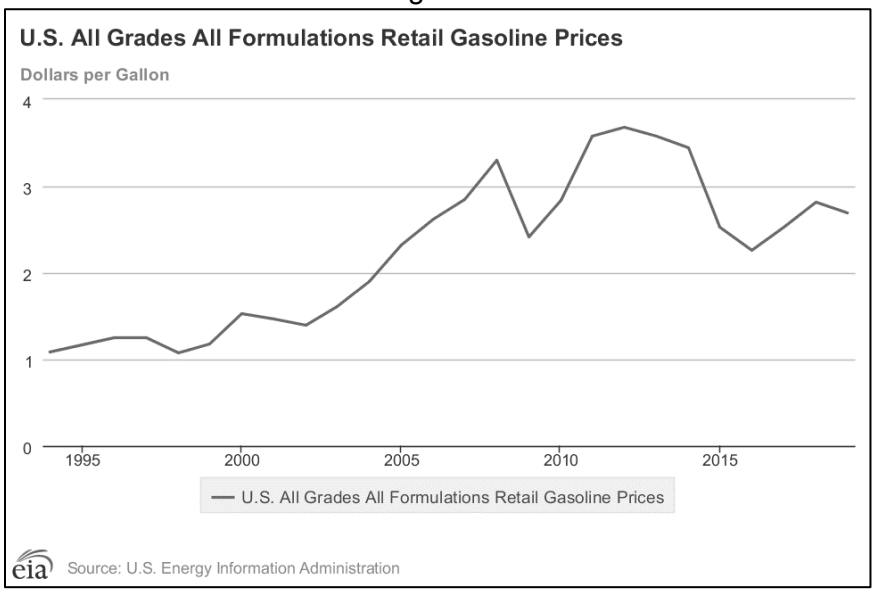
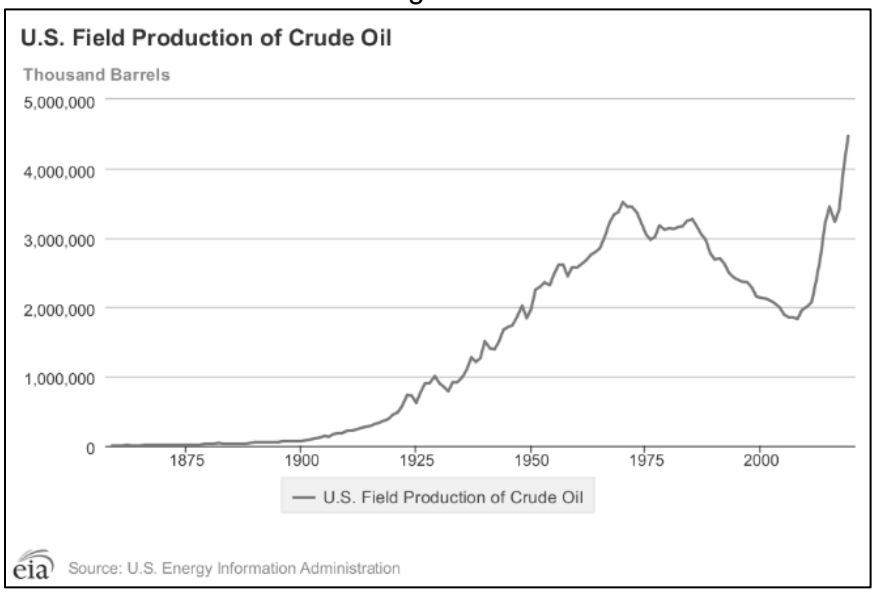


Figure 4



In the years following passage of the RFS, something unexpected was the advent of the ability to attain oil from shale in 2011. Shale oil production in the United States since 2011 has grown 133%. This has led to the United States becoming the world's top oil and gas producer. Figure 5 shows production of crude oil in the United States over time.

Figure 5



Current RFS Standard and E-15

In December of 2019, the EPA finalized a rule that establishes the required renewable volumes under the Renewable Fuel Standard (RFS) program for 2020 and the biomass-based diesel volume for 2021. Through this rule, EPA has claimed to modify the RFS program by projecting small refinery relief to ensure these final volumes are met, while adjudicating small refinery relief when appropriate. As proposed, EPA is finalizing a projection methodology based on the 2016-2018 annual average of exempted volumes. EPA strictly followed the Department of Energy (DOE) recommendations of 770 million Renewable Identification Numbers (RINs) in those years, including granting 50% relief where DOE recommended 50% relief. EPA claims this will be its general approach to adjudicating Small Refinery Exemption (SRE) petitions going forward, beginning with 2019 SRE petitions and including 2020 SRE petitions and beyond. According to EPA, the key elements of its action are as follows:

- “Conventional” biofuel volumes, primarily met by corn ethanol, will be maintained at the 15 billion gallon target set by Congress for 2020.
- Cellulosic biofuel volumes for 2020, and thus advanced biofuel volumes, will increase by almost 170 million gallons over the 2019 standard.
- Biomass-based diesel volumes for 2021 will be equivalent to the standard for 2020, still more than double the statutory requirement.
- EPA will closely examine the labeling requirements for E15 fuel and move forward with clarifying regulations as needed.
- EPA has modified the way RFS obligations are determined to better ensure these volumes are met, while still allowing for relief for small refineries consistent with the direction provided by Congress under the statute.

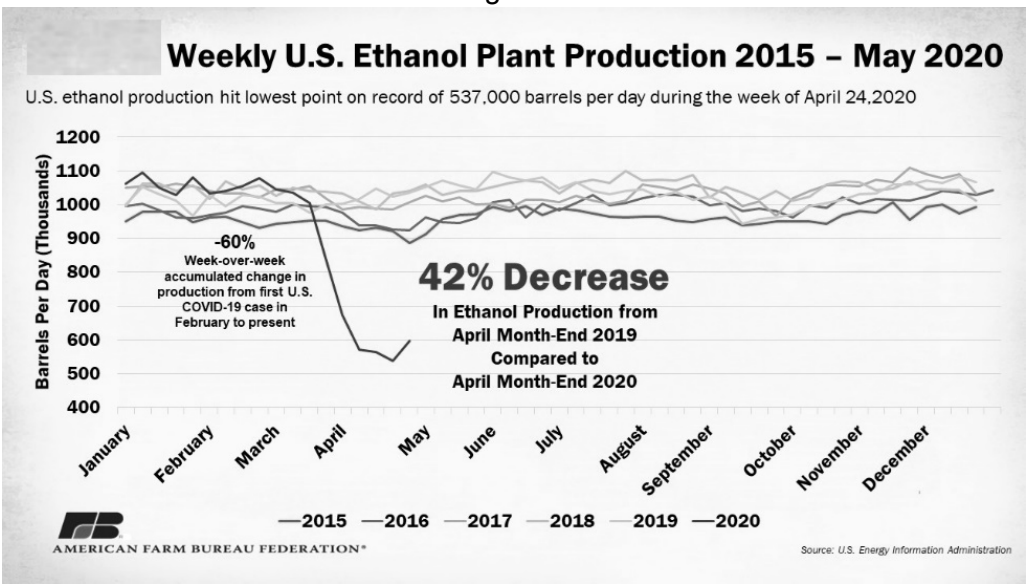
Another EPA finalized rule from 2019 extends the 1-psi Reid vapor pressure (RVP) waiver to fuel blends containing gasoline and up to 15% ethanol (E15). E15 is now allowed year-round where prior to 2019 only E10 was allowed all year. This rule applies to all fuel containing 15%, regardless of how it's marketed at stations. E15 is approved for use in 2001 and newer cars, over 90% of the cars on the road today. As the market for E15 grows it has the potential to increase the fuel's availability, reduce refiner RIN costs, and open much-needed market access for surplus corn. Ultimately it will be up to retailers to provide E15. There is an ongoing court case against this rule. Claimants believe the administration does not have the authority to extend E15 year round and only Congress can make this decision.

Challenges Brought by COVID-10

Ethanol production and use have nearly ground to a halt as COVID-19 precautions coupled with stay-at-home orders have slashed fuel consumption. In April, sixty-two (62) ethanol plants reported slowdowns and reduced capacity, while forty-four (44) plants completely stopped production. When ethanol demand goes down, corn prices follow. The uncertainty of ethanol demand has left many wondering how the industry will get back to normal.

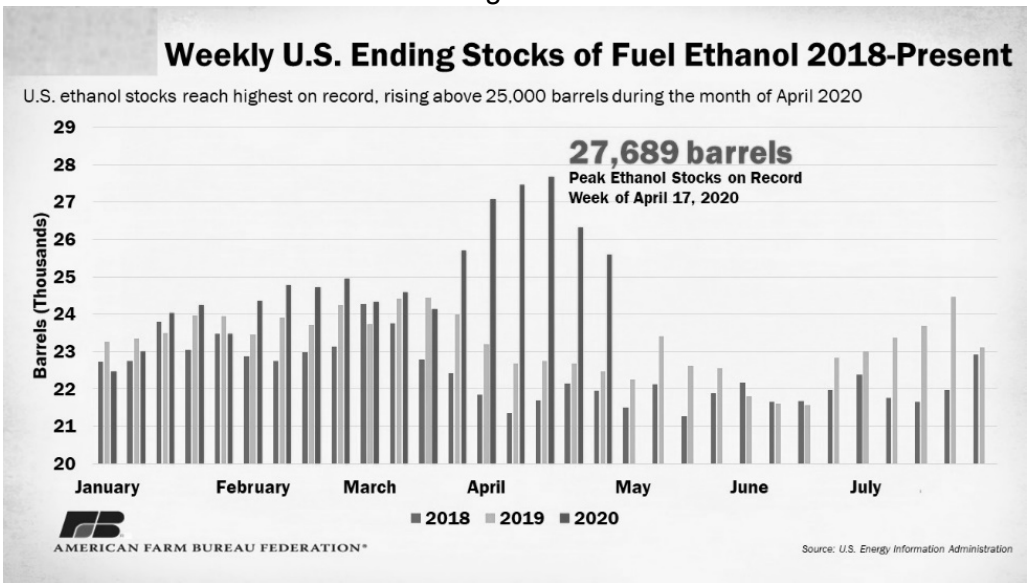
Over time, ethanol production has slowly increased since the Energy Information Administration began reporting on the industry in 2010. Regular weekly production has grown from a range of 800-900 thousand barrels per day to 900-1,000 thousand barrels per day through 2019. Since the first case of COVID-19 was announced in the U.S. in February, ethanol production has accumulated a 60% week-over-week decrease in output volume. Ethanol production hit its low during the week of April 24, when production levels were at a meager 537,000 barrels per day. As of the end of April 2020, ethanol production was 42% lower compared to the same week in 2019. At the same time in 2019, ethanol production held steady between 850,000 to 1.1 million barrels per day. During COVID-19, ethanol production has lingered within 500,000 to 600,000 barrels per day for the month of April. Figure 6 displays historic weekly ethanol production levels for the past five years and includes the beginning of 2020.

Figure 6



With the slow pace of consumption and production of ethanol, ethanol inventories continue to climb. Historically, ethanol stocks have been on the rise since 2010, ranging between 15,000 barrels to 20,000 barrels. In 2017, stocks settled in a range between 20,000 barrels and 25,000 barrels. It was not until this March, ethanol stocks topped 25,000 barrels and climbed higher. Ethanol stocks peaked at 27,689 barrels the week of April 17 and remain above 25,000 barrels. Ethanol stocks were 14% higher at the end of April 2020 than they were at the end of April 2019. Since COVID-19 was announced in the U.S. in February, ethanol stocks have accumulated week-over-week growth of 7%. It was not until the week of April 24 that ethanol stocks saw their first reduction since the end of March when ethanol plants began slowing production. Additionally, 2020 ethanol exports are behind last years by 51 million gallons according to the University of Illinois. Figure 7 displays weekly ending stocks for 2018, 2019, and the beginning of 2020.

Figure 7



Since April, consumption volumes have gradually rebounded as the economy has reopened, but they have not returned to historical levels. From March through June 2020, the total decline in ethanol production and consumption exceeded 1.3 billion gallons. Fuel consumption is still significantly lower than use before COVID-19 and this trend is likely to persist for several months as a result of reduced economic activity. According to the Renewable Fuels Association, industry revenues have been reduced by over $3.4 billion and if market conditions do not change, COVID-19 related revenue loss to the industry could be nearly $7 billion in 2020 and $1.8 billion in 2021. The effects of the ethanol production slowdown may ripple through many industries long after the U.S. reopens. There have been several discussions in Washington D.C. about what (if anything) could be done to support the ethanol industry.

Electric Vehicles

A concern to consider on the horizon is the increased trend for more electric vehicles. The main driver of ethanol consumption is use as fuel in vehicles. Consumers, companies, and governments are pushing the manufacturers of vehicles toward increasing electric vehicle production. In Europe, countries like France and the United Kingdom have passed mandates that will ban the sale of vehicles that use diesel and gasoline by the year 2040, while the Netherlands and Norway's goal is 2025. Members of the United States Congress have presented proposals to take similar measures domestically, such as what is known as the Green New Deal.

Companies and vehicle manufacturers have developed goals for electric car use and/or production. For example, in September 2019 Amazon announced plans to make all shipments net-zero carbon, with 50% net-zero carbon by 2030. General Motors (GM) has plans to phase out gas powered vehicles with a goal of "all-electric future" but has not set a date for this goal. Volvo has a goal of 50% of sales being electric by the end of 2025. Most other major brands have announced heavy investment into developing their electric vehicle line.

Questions

1. What steps should be taken to protect the ethanol industry in the short and long term?
2. What is the future for corn consumption if the trend towards electric vehicles continues?

TFBF Policy

Renewable Fuels

The United States must become less dependent on unstable and overpriced foreign sources of fuel. A valuable option is the production of ethanol and biodiesel from various commodities and crop residues.

More promotion and research should be placed into alternative energy sources. Farmers have the potential to provide clean, abundant, renewable energy sources for our state and nation. The same visionary ambition and technology that advanced our nation as the leader in food and fiber production can place our state and nation to the forefront of renewable energy production and use.

Federal renewable energy policies have developed the ethanol industry. Continuing the federal incentives for ethanol will nurture this industry. Congress should extend the tax incentive for biodiesel. Incentives taken at the blender level should be passed on to the actual user in order to lower the price and promote use. Biodiesel also has the potential to make a major contribution to our energy supplies, as well as to cleaner air and water.

Farm Bureau should aggressively support any legislation that provides favorable economic conditions to expand the ethanol and biodiesel industry as well as increasing the Renewable Fuels Standard. As production of ethanol and biodiesel expands in the coming years, Farm Bureau should make every effort to support the availability of these products at the retail level. coming years, Farm Bureau should make every effort to support the availability of these products at the retail level.

We encourage farmers, foresters, state and local governments and all consumers to request fuels that are at least a blend of farm grown products. The Tennessee Air Quality Control Board should promote the use of renewable fuels to improve air quality. State incentives should be developed to encourage the use of renewable fuels in local government vehicles and mass transit. We should depend on our domestic agricultural resources, rather than imported petroleum products.

We endorse the “25 x ‘25 vision” of Agriculture’s Role in Ensuring U.S. Energy Security which reads: “Agriculture will provide 25 percent of the total energy consumed in the United States by 2025 while continuing to produce abundant, safe and affordable food and fiber”.

While a variety of renewable energy resources, including wind, hydro, solar, and geothermal, will be needed to meet this goal, we are particularly interested in the utilization of biomass from agriculture and forestry.

Ethanol has helped develop new markets for commodities and reduced the national grain surplus. We support and welcome this industry in Tennessee and encourage utilization of locally produced commodities. Tennessee ethanol plants also produce valuable by-products such as dried distillers grain, corn oil, and CO2 gas products. This further diversifies the value chain of corn and provides food and feed products for consumers and farmers.

We support state and local efforts to locate renewable fuel plants in and adjacent to Tennessee. We applaud the State Legislature for the new age cooperative law which will enhance the potential for local farmers to realize better commodity prices and also to participate in the ownership of the facilities. We commend and support the University of Tennessee and Oak Ridge National Laboratories for their research on alternative energy and their comprehensive look at both the agricultural sector and the state economic impacts.

We recognize the effort and assistance of USDA Rural Development in providing grant funds for Tennessee alternative fuel projects. We commend the producers, grant writers and entrepreneurs who have taken the lead in these endeavors.

We urge TDA to monitor all ethanol and biodiesel sold in the state to ensure that it meets or exceeds American Society of Testing and Materials (ASTM) standards.

AFBF Policy

404 / Renewable Fuels
1. We support: 1.1. Full research and development for the increased production of all forms of renewable energy from agricultural resources including solutions to help producers effectively manage soil and water conservation issues and control invasive species;

1.2. Private and public efforts to develop and promote new uses for agricultural products;
1.3. Research into the viability and economic potential of agricultural products and commodities used for energy generation;
1.4. Production and use of agricultural based fuels;
1.5. Research and demonstration programs that use renewable fuel as a fuel for fuel cell engine development;
1.6. The Renewable Fuels Standard 2 (RFS2) as passed in the Energy Independence and Security Act of 2007; and
1.7. The availability of multi-grade non-ethanol gasoline for small engine, marine and boutique uses, and all agricultural uses.

2. Biofuels 2.1. We support: 2.1.1. The establishment and enforcement of national quality standards for biodiesel, renewable fuel and related co-products. Biodiesel shall be defined by meeting the specifications of the American Society of Testing and Materials 6751 or its properly designated successor;
2.1.2. Diesel to be a biodiesel blend and gasoline be a renewable fuel blend;
2.1.3. Efforts to educate consumers and industry on the benefits of biofuel blends higher than ten percent;
2.1.4. Legislation requiring the production of clear gasoline that would accommodate year-round blending with ethanol in all fuels;
2.1.5. Research for the development of alternative denaturing options, in an attempt to make the denaturing of renewable fuel more economical;
2.1.6. Including biodiesel in all the Department of Energy's (DOE) policies and materials regarding alternative and renewable fuels;
2.1.7. Legislative and regulatory approval for use of higher ethanol blends in low-carbon, high-octane fuels to help automobile manufacturers meet fuel efficiency standards;
2.1.8. Standardization of all new gasoline dispensers to be Underwriters Laboratories (UL) certified for a minimum of E-25;
2.1.9. U.S. Department of Defense adoption and use of renewable fuels; and
2.1.10. Efforts to expand the use of renewable fuel in commercial aviation, maritime, and other large-volume users.

2.2. We oppose: 2.2.1. Attempts to defund, repeal or rollback implementation of the RFS2; and
2.2.2. Small Refinery Exemption waivers under the RFS and support the reallocation of waived gallons as originally mandated under the RFS2.

3. Biomass
3.1. We support: 3.1.1. Defining biomass to include all forms of plant fiber harvested from all lands, public and private;
3.1.2. Harvesting of lowland and riparian areas for biomass use except lands enrolled in retirement programs;
3.1.3. Increasing the establishment, production and utilization of eligible biomass energy crops through the Biomass Crop Assistance Program (BCAP); and
3.1.4. Retaining and developing policies which support the biomass fuels industry.

3.2. We oppose declaring any potential biomass crop ineligible for use in any biomass energy incentive program simply because it is non-native.

4. Co-products
4.1. We support: 4.1.1. Continued research and education into ruminant and non-ruminant feed utilization of renewable fuel co-products;
4.1.2. Renewable fuel producers be encouraged and offered incentives to use recycled effluent water produced by local municipal wastewater treatment facilities in the production process; and
4.1.3. Adding price reporting for corn and its co-products, including dry distillers grains (DDGs), to the U.S. Census Bureau Current Industrial Reports as well as to the Bureau's domestic and international market reports.

5. Emissions
5.1. We support: 5.1.1. Oxygenate standards unless there are enhancements of laws and regulations (anti-backsliding) that preserve the improvements in air quality that renewable fuel provides as a fuel;

5.1.2. Promoting, using and expanding renewable fuel as an octane or cetane enhancer, fuel source, or lubricity agent to improve air quality. Our goal is to expand the use of renewable fuels;
5.1.3. Continuing tests on E diesel to prove the viability of an ethanol additive to lower the particulates in diesel engine emissions;
5.1.4. Amending the Clean Air Act to hold states harmless for emission levels resulting from emergency waivers granted by EPA;
5.1.5. Designating the cost of purchasing biodiesel as an allowable expense in the Congestion Mitigation Air Quality program;
5.1.6. Changing tests for low-sulfur fuel to be based on levels of sulfur rather than testing for red dye;
5.1.7. Using biodiesel to meet up to 100 percent of an affected utility or government fleet emission reduction requirements under the Energy Policy Act of 1992; and
5.1.8. Accommodation issues surrounding Reid Vapor Pressure to ensure ethanol volumes can continue to expand.

5.2. We are opposed to states being exempt from the oxygenate requirements of the Clean Air Act.

6. Engines and Vehicles
6.1. We support: 6.1.1. Research for better performing engines that run on renewable fuels;
6.1.2. Legislation to require all new gasoline-powered vehicles be flex-fuel;
6.1.3. Industry standards that would require all vehicles capable of burning E85 fuel to be equipped with a yellow gas cap to distinguish this capability; and
6.1.4. Using renewable fuels in all federal vehicles where available.

7. Infrastructure
7.1. We support: 7.1.1. Timely certification by UL of dispensing equipment for all renewable fuel products, including all storage tanks and pumping equipment;
7.1.2. All diesel engine manufacturers adopting biodiesel as an alternative for complying with EPA emission control standards;
7.1.3. Streamlining and expediting the process for issuing permits for the construction and operation of refineries for the production of renewable fuels and coal gasification;
7.1.4. Distributing renewable fuels via pipelines or other cost-effective means;
7.1.5. Color coding fuel pumps to indicate blends of liquid energy; and
7.1.6. Reporting and publishing of renewable fuel production and renewable fuel plant construction on a timely basis by an entity such as the DOE.

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