Iowa Department of REVENUE

Iowa's Biofuel Retailers' Tax Credits

Tax Credits Program Evaluation Study

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Preface

During the 2005 Legislative Session the Iowa Department of Revenue received an appropriation to establish the Tax Credits Tracking and Analysis Program to track tax credit awards and claims. In addition, the Department was directed to assist the legislature by performing periodic economic studies of tax credit programs. This is the third economic study completed for these tax credits, with the first completed in 2009 and the second evaluated exactly the same four tax credits in 2014.

As part of the evaluation, an advisory panel was convened to provide input and advice on the study's scope and analysis. We wish to thank the members of the panel:

Dawn Carlson (John Maynes)	FuelIowa
Biswa Das	Iowa State University
Tim Johnson (Kevin Kuhle, Matt Steinfeldt)	Iowa Farm Bureau
Paul Ovrom	Iowa Department of Agriculture and Land Stewardship
Monte Shaw (Nathan Hohnstein)	Iowa Renewable Fuels Association
Doug Struyk	Iowa Biodiesel Board
Stephanie Weisenbach	Iowa Economic Development Authority

The assistance of an advisory panel implies no responsibility for the content and conclusions of the evaluation study.

This study contains descriptions of some components of the four tax credits. Nothing in this study should be construed as legal advice or guidance about claiming of the tax credits. Summaries of the laws and regulations related to the tax credits discussed in this study are not binding on the Iowa Department of Revenue, or the State of Iowa.

This study and other evaluations of Iowa tax credits can be found on the Tax Credits Tracking and Analysis Program web page on the Iowa Department of Revenue website.

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Executive Summary

Various refundable tax credits were enacted in 2006 for Iowa biofuel retailers to help the State promote biofuel sales to meet the goal established by the Iowa General Assembly House File (HF) 2754 that 25 percent of all petroleum used in gasoline in Iowa be replaced by biofuels by 2020. Currently there are four tax credits provided for biofuel retailers in Iowa: the Ethanol Promotion Tax Credit, the E85 Gasoline Promotion Tax Credit, the E15 Plus Gasoline Promotion Tax Credit, and the Biodiesel Blended Fuel Tax Credit.

Ethanol Promotion Tax Credit

- First available January 1, 2009, the Ethanol Promotion Tax Credit (EPTC) is calculated using the pure amount of ethanol gallons sold by a retailer in Iowa and multiplying those gallons by the tax credit rate. For example, 10 gallons of E10 equals one gallon of pure ethanol. The tax credit is set to be repealed on January 1, 2021.

- The EPTC rate earned by a retailer varies from $0.08 to $0.04. The tax credit rate is a function of the size of the retailer (whether sales exceed 200,000 gallons a year) and is determined by the difference between the biofuel threshold percentage and the retailer's biofuel distribution percentage. Biofuel distribution percentage is calculated as the overall percentage of pure ethanol plus pure biodiesel gallons sold as compared to total gallons of gasoline (excluding any biodiesel or diesel gallons sold). The required biofuel threshold percentage steadily increases over the life of the tax credit from 6 percent for small retailers and 10 percent for large retailers, in 2009, to 25 percent for all retailers in 2020.

E85 Gasoline Promotion Tax Credit

- First available January 1, 2006, the E85 Gasoline Promotion Tax Credit (E85GC) provides a credit for each gallon of E85 sold by a retailer during the tax year. For tax years 2012 through 2024, the tax credit rate is $0.16 per gallon. E85 requires dedicated pumps and can only be used in flex fuel vehicles. The repeal date of the tax credit is January 1, 2025.

E15 Plus Gasoline Promotion Tax Credit

- First available July 1, 2011, the E15 Plus Gasoline Promotion Tax Credit (E15GC) is available for retailers who sell blended gasoline with 15 to 69 percent ethanol, which is classified as E15 Plus. Through 2013, the tax credit rate was $0.03 per gallon of E15 sold during a year. For tax years 2014 through 2024, the tax credit rate is $0.03 per eligible gallon sold throughout the year, except June 1 through September 15, when the rate is higher at $0.10 per gallon. Only vehicles model year 2001 or newer, or flex fuel vehicles, have been cleared by manufacturers to use E15 sold by retailers. The repeal date of the tax credit is January 1, 2025.

Biodiesel Blended Fuel Tax Credit

- First available January 1, 2006, the Biodiesel Blended Fuel Tax Credit (BBFC) is available to retailers of biodiesel blended at 2 percent or higher. In calendar year 2012, the tax credit rate was $0.02 per gallon for B2-B4 or $0.045 for B5 or higher. In calendar years 2013 through 2017, the tax credit equaled $0.045 per gallon for B5 or higher; lower blends were no longer eligible. From 2018 to 2024, the credit equals $0.035 per gallon for B5-B10 and $0.055 for B11 or higher; blends lower than B5 are no longer eligible. The repeal date of the tax credit is January 1, 2025.

Tax Credits, Mandates, and Incentives for Biofuel Retailers Across the United States

- Along with Iowa, four other states currently offer tax credits for retailers based on the amount of biofuels sold at retail stations. Twenty-two states including Iowa offer a tax deduction or excise tax exemption for sales of biofuels.

- Five states currently offer tax credits for retailers based on investment made in the infrastructure necessary to sell biofuels. Nine states (including Iowa) and the federal government offer grants or non-tax incentives for investment in biofuel retail infrastructure.

- The federal government mandates biofuel usage through the Renewable Fuels Standard (RFS). Some other states also have mandates or explicit goals for biofuel usage.

- In Iowa, besides the four tax credits discussed in this study, the State funds other programs to promote biofuel sales. The major programs include: excise tax rate reductions for ethanol or biodiesel at rack level, the Biodiesel Production Sales Tax Refund ($0.02 per eligible biodiesel gallon), and the Renewal Fuel Infrastructure Grant Program.

Other Major Determinants of Biofuel Sales

- The primary hurdle preventing fuel stations from adding higher ethanol blends is upgrading costs. Many existing retail facilities in Iowa will need significant infrastructure upgrades to sell E15 or E85. Upgrading infrastructure incurs direct costs (primarily including equipment and materials, as well as labor costs of removing existing equipment and installing replacement equipment) and hidden costs (such as revenue lost while shutting down the stations). Because of the large scope of work, the costs can be a significant investment for retailers.

- Gasoline pipeline changes can change the usage of ethanol. Starting September 15, 2013, Iowa's largest pipeline operator, Magellan Midstream Partners, stopped shipping regular 87-octane gasoline to its Iowa terminals. Instead, the pipeline operator started shipping 84-octane gasoline, which cannot be legally sold in Iowa because Iowa requires a minimum of 87-octane fuel be sold at gas pumps. Boosting the fuel to the minimum octane requires either blending with ethanol or with more expensive 91-octane premium gasoline. This one-time pipeline change increased ethanol sales in Iowa around 2014.

- Flex fuel vehicles (FFV) are designed to run on gasoline or ethanol blends of up to 85 percent. As of January 2019, there were 347,766 FFVs registered with the State of Iowa, which is short of the State target of 550,000 FFVs. Also, not all the FFVs are using E85.

- The popularity of electronic vehicles in the future could reduce the usage of both gasoline and biofuels.

- In addition, prices of ethanol and biodiesel compared to gasoline and diesel determines the biofuel sales, since consumers are sensitive to prices.

Ethanol and Biodiesel Sales in Iowa

- The Retailers Motor Fuel Gallons Annual Reports are completed by Iowa retailers to report sales to consumers of gasoline, diesel, and biofuels each calendar year. The reports allow the tracking of progress toward meeting the State goal of reaching a biofuel distribution percentage of 25 percent by 2020.

- According to 2007-2018 Retailers Motor Fuel Gallons Annual Reports, in general, the statewide biofuel distribution percentage was increasing, starting at 7.9 percent in 2007, rising to 9.1 percent in 2008, then increasing gradually in following years, reaching 13.4 percent in 2018 (where the increase to 11.4% in 2014 may reflect the pipeline change during that year).

- Using the same data, E15 or E20 sales started at 0.1 million gallons in 2011 and increased quickly in recent years reaching 36.5 million gallons in 2018. E85 sales started at 4.2 million gallons in 2007 and increased to 20.2 million gallons in 2018.

- B1-B4 sales, in general, are decreasing, starting at 66.8 million gallons in 2007 and shrinking to 12.9 million gallons in 2018. B5-B10 sales generally increased from 2007 to 2013, peaking at 181.6 million gallons in 2013, then decreased to 139.5 million gallons in 2018. In general, sales of B11 or higher have been increasing (except for a few years), reaching over 300 million gallons in 2018.

Biofuel Retailers' Tax Credit Claims

- The number of EPTC claimants was 991 in tax year 2009, but declined each of the following years, falling to less than 270 in tax year 2017, the most recent complete tax year (see Table 18). The decline is likely due to retailers being unable to meet the increasing biofuel threshold percentages. Total claims were $4.7 million in tax year 2009. In tax year 2017, total claims had fallen to $0.7 million.

- In tax year 2006, the number of the E85GC claimants was 107. In tax year 2017 the number of claimants increased to 304 (see Table 20). The total claim amount started at $0.5 million in 2006, reaching $2.5 million in tax year 2017.

- In tax year 2011, the number of E15GC claimants started at 28. Those claimants claimed over $18,252 in tax credits (see Table 22). The claim of this tax credit has increased rapidly. Numbers for tax year 2017, show 167 claimants for the E15GC exceeding $2.0 million in credits.

- In tax year 2006, the number of BBFC claimants was 76 (see Table 24). By 2017, the number of claims increased to 457 with claims totaling $19.2 million from $2.6 million in 2006.

The Future of Biofuel Retailers' Tax Credits in Iowa

- Using data from the Retailers Motor Fuel Gallons Annual Report, future biofuel sales by retailers in Iowa were forecasted. In order to produce the forecasts, a variety of assumptions about the growth of Iowa fuel sales are applied, including aggregate annual sales growth rates by type of fuel and growth in the number of stations selling biofuels.

- EPTC claims are expected to experience a continued decrease dropping to an estimated $0.9 million in 2020 as fewer retailers qualify over time. E85GC claims are estimated to increase from $2.0 million in 2017 to an estimated $4.5 million in 2024 due to the steady tax credit rate and continued growth in sales. E15GC claims are forecasted to increase from $2 million in 2017 to an estimated $5.7 million in 2024. The claim amount for BBFC is estimated to increase to $16.4 million in 2017 and rise steadily to an estimated $23.5 million in 2024.

- The statewide biofuel distribution percentage, 13.4 percent in 2018, is forecasted to continue increasing moderately, rising to 14.7 percent in 2024. This estimated percentage will be significantly lower than the goal of HF 2754, which had the State replacing 25 percent of sold gasoline with biofuels.

I. Introduction

In the Unites States, various public policies are aimed at increasing biofuel consumption and reducing crude oil consumption for energy independence and reducing carbon emissions. Among these policies, some tax incentive programs are created with the purpose of raising biofuel sales for biofuel retailers, who provide fuels to final consumers in the fuel market.

In 2006, the Iowa General Assembly enacted HF 2754, an act pertaining to the promotion of biofuels usage. The act provided incentives for the installation of biofuels infrastructure and the promotion of biofuel sales, including three biofuel retailers' tax credits. The incentives were included to assist in meeting the legislation's goal that 25 percent of all petroleum used in the formulation of gasoline consumed in the state be replaced by biofuels by the year 2020. In Iowa, there are currently four tax credits provided for biofuel retailers: the Ethanol Promotion Tax Credit (EPTC), the E85 Gasoline Promotion Tax Credit (E85GC), the E15 Plus Gasoline Promotion Tax Credit (E15GC), and the Biodiesel Blended Fuel Tax Credit (BBFC).

This study analyzes the claims of these tax credits using historical data from tax years 2006 through 2017 (with 2017 being an incomplete tax year). During this period, the U.S. economy has been in a positive phase of the economic cycle. As a result, economic expansion can be one factor (among other factors) that drives the growth in biofuel sales during these years. The objective of this study is to examine the patterns of claimants and the claims of these four tax credits, and evaluate the effectiveness of these tax credits compared to the possibility for the state achieving the goal established in HF 2754 based on biofuel sales forecasts.

Since the passage of HF 2754, the Iowa Department of Revenue (IDR) has completed two evaluation studies on the related tax credits. In 2009, the first evaluation study of Iowa's four biofuel retailers' tax credits effective in tax years 2002 through 2009, which included the Ethanol Blended Gasoline Tax Credit (EBGC) (enacted for tax years 2002 through 2008), the E85GC, and the BBFC. The 2009 evaluation study included claim information through tax year 2007. The 2009 study also presented information on the newly enacted the EPTC which was first available in tax year 2009. The 2014 evaluation study evaluated the same four tax credits as this study for claims made in tax years through 2012.

Section II of this report provides a description of each of the tax. Section III provides information about tax incentives and similar tax credits in other states and at the federal level. Section IV provides an overview of the major factors affecting ethanol and biodiesel sales. Section V presents a literature review of the impacts of biofuel mandates or tax credits. Section VI reviews biofuel retail sales from Iowa Retailers Fuel Gallons Annual Reports. Section VII presents the claims of the Iowa biofuel retailers' tax credits while Section VIII provides forecasts of Iowa biofuel sales. Section IX will discuss Iowa's spending on biofuel blending and sales. The final section of this report provides a brief conclusion.

II. Description of Iowa Biofuel Retailers' Tax Credits

Retailers selling biofuels out of fuel pumps in Iowa are eligible to claim any of the four retailers' tax credits, including the Ethanol Promotion Tax Credit, the E85 Gasoline Promotion Tax Credit, the E15 Plus Gasoline Promotion Tax Credit, and the Biodiesel Blended Fuel Tax Credit, for which they qualify. The purpose of these tax credits is to provide tax incentives to fuel retailers for selling renewable biofuels to help achieve the goal that by January 1, 2020, biofuels will replace 25 percent of petroleum used in the formulation of gasoline consumed in Iowa.[1] Retailers in this study refer to retail dealers of gasoline who operate fuel pumps at an Iowa retail fuel site, where tank wagons are considered retail fuel sites

The four tax credits offered to biofuel retailers have common characteristics as follows:

- The tax credits are automatic and do not require an award. This means that any retailer who meets the sales requirement is eligible to make a claim.

- The tax credits are refundable. While a nonrefundable tax credit can only reduce a taxpayer's tax liability to zero, a refundable tax credit allows the taxpayer to receive a refund from the State when the tax credit claim amount exceeds tax liability. Instead of a refund, the taxpayer may choose to carry forward credit to the next tax year.

- The tax credits are not transferable.

The tax credits can be claimed against Iowa individual income tax (including fiduciaries) or corporation income tax. Businesses that are organized as partnerships, S-corporations, limited liability companies (LLC), estates, or trusts must allocate the pro rata share of any earned tax credits to the individual members of the entity. In these cases, the claims would be made against individual income tax with a reference to the pass-through entity who has earned the tax credit. These claimants are referred to as "pass-through taxpayers."

Under current law there are some overlaps between these tax credits. For the same tax year for the same ethanol gallons sold, a retailer can claim both the EPTC and E15GC for E15 sales, or both EPTC and E85GC for E85 sales if they meet the requirements of each of these tax credits.

The IA 148 Tax Credits Schedule must be filed with the tax return on which any of the four tax credits are claimed. In addition to the IA 148, taxpayers must also include Form IA 137 to claim the EPTC, Form IA 135 to claim the E85GC, Form IA 138 is required to claim the E15GC, and the IA 8864 is required to claim the BBFC.

[1] The goal in HF 2754 is stated as "It is the goal of this state that by January 1, 2020, all biofuel will replace twenty-five percent of all petroleum used in the formulation of gasoline." "Biofuel" is defined as ethanol or biodiesel.

A. Ethanol Promotion Tax Credit

Ethanol is a renewable, produced alcohol fuel made from plant material, such as corn, sugar cane, or grasses. Using ethanol can reduce oil dependence and greenhouse gas (GHG) emissions. A new U.S. Department of Agriculture (USDA) study, by Lewandrowski et. al. (released March 25, 2019), finds greenhouse gas emissions from corn-based ethanol are 39-43 percent lower than gasoline. According to the Energy Information Administration (EIA), the energy content of ethanol is about 33 percent less than pure gasoline. Most of the gasoline now sold in the United States contains 10 percent ethanol (E10).

The Ethanol Promotion Tax Credit was created to replace the Ethanol Blended Gasoline Tax Credit, which expired December 31, 2008. Beginning January 1, 2009, motor fuel retailers selling ethanol blended gasoline, including E10, E85, and E15, may be eligible to claim the EPTC. The tax credit is set to be repealed on January 1, 2021.

The amount of the EPTC tax credit is calculated using the pure amount of ethanol gallons sold by a retailer in Iowa. For example, 10 gallons of E10 equals one gallon of pure ethanol. The tax credit rate of the EPTC earned by a retailer depends on the size of the retailer and the difference between the applicable biofuel threshold percentage and the retailer's biofuel distribution percentage. The retailer's biofuel distribution percentage is calculated as the ratio of pure ethanol gallons plus pure biodiesel gallons to total gasoline gallons sold (excluding any biodiesel or diesel gallons sold).

For retailers selling more than 200,000 gallons per year at all retail locations (large retailers), the applicable biofuel threshold percentage was 10 percent in calendar year 2009, increasing one percentage point each year reaching 15 percent in calendar year 2014, then increasing two percentage points each year until it reaches 25 percent in calendar year 2019 and after (see Table 1).

The applicable biofuel threshold percentage for retail dealers selling no more than 200,000 gallons per year (small retailers) was 6 percent in calendar years 2009 and 2010 and 10 percent in 2011. The threshold increases one percentage point each year through 2016 until it reaches 15 percent, at which time it increases two percentage points each year until reaching 21 percent in calendar year 2019. Then it will increase to 25 percent in calendar year 2020.

Because the EPTC was established on a calendar year basis, retailers who file tax returns on a fiscal year basis that involve two calendar years must calculate the tax credit rate separately based on sales in each calendar year. However, those retailers must annualize sales for each calendar year to determine whether they are considered large retailers or small retailers in each calendar year.

When the tax credit was passed in 2006, the tax rates were as follows:

- Retail dealers meeting or exceeding the applicable biofuel threshold percentage were eligible for a $0.065 credit per gallon of pure ethanol sold.

- Retail dealers with a biofuel distribution percentage no more than two percentage points below the applicable threshold was eligible for a $0.045 credit per gallon of pure ethanol sold.
- A retailer whose biofuel distribution percentage was between 2.01 and 4.00 percentage points below the applicable biofuel threshold percentage was eligible for a $0.025 credit for each gallon of pure ethanol sold.
- For retailers with a biofuel distribution percentage more than four percentage points below the applicable biofuel threshold percentage, no credit was allowed.

Legislation in 2011 increased the EPTC rate at each level of compliance as follows:

- The top tax credit rate, available for any retailer meeting or exceeding the applicable biofuel threshold percentage, is $0.08 per gallon of pure ethanol sold beginning in calendar year 2011.
- For retailers within two percentage points of the applicable biofuel threshold percentage, the tax credit rate equals $0.06.
- For retailers within four percentage points of the applicable biofuel threshold percentage, the tax credit rate rose to $0.04 for calendar years 2012 through 2020 from $0.025 in calendar year 2011.
- There was no change in the ineligibility threshold: for retailers with a biofuel distribution percentage more than four percentage points below the applicable biofuel threshold percentage, no credit is allowed.

When the EPTC was first created, a retailer was required to calculate its biofuel distribution percentage and biofuel threshold percentage disparity based on the total sales at all retail locations. EPTC claims were then calculated separately for each retail site operated based on pure ethanol sold at each retail station.

With the 2011 law change, retail dealers have the option of calculating the biofuel distribution percentage, the EPTC rate, and the claim amount on either a company-wide basis or a site-by-site basis. However, the gallons sold at all sites in Iowa must still be considered in determining if the taxpayer is considered a large or small retailer and thus the applicable biofuel threshold percentage. Once the retail dealer makes the election to use either a site-by-site or company-wide basis to calculate the tax credit, the election is binding for subsequent tax years unless the Iowa Department of Revenue consents to a change in the method. To date, only one retailer has requested a change in method from company-wide to site-by-site.

B. E85 Gasoline Promotion Tax Credit

E85 is a blend of gasoline that contains between 70 percent and 85 percent ethanol. Unlike E10, E85 requires dedicated pumps, and is for flexible fuel vehicles (FFVs) only. E85 is also referred to as “flex fuel.”

Beginning January 1, 2006, retail dealers of motor fuel that sell E85 gasoline can claim the E85 Gasoline Promotion Tax Credit (E85GC). The tax rates are as follows (see Table 2):

- For calendar years 2006, 2007 and 2008: $0.25 per gallon;

- For calendar years 2009 and 2010: $0.20 per gallon;
- For calendar year 2011: $0.10 per gallon;
- For calendar years 2012 through 2024: $0.16 per gallon.

For retail dealers of gasoline whose tax year is not on a calendar year basis, the retail dealer computes the tax credit on the gallons of E85 sold during the year using the applicable credit amounts as shown above.

When the tax credit was passed in 2006, the tax credit rate was scheduled to fall one cent per year down to a final rate of one cent per gallon sold in 2020, with expiration set for January 1, 2021. Legislation in 2011 raised the credit to $0.16 per gallon starting in calendar year 2012 through 2017 and moved the expiration date to January 1, 2018. A law change passed in 2016 (Senate File 2309) extended the sunset date for this tax credit to January 1, 2025.

The tax credit applies to E85 gallons sold on a company-wide basis.

C. E15 Plus Gasoline Promotion Tax Credit

E15 Plus are blends of gasoline that contain between 15 percent and 69 percent ethanol (note that E15 Plus does not include E85). Vehicles model year 2001 or newer were cleared by the U.S. Environmental Protection Agency (EPA) in 2011 to use E15 sold by registered E15 retailers. Blends above E15 or E15 sold by nonregistered retailers can only be used in a flex fuel engine.

Beginning July 1, 2011, the E15 Plus Gasoline Promotion Tax Credit (E15GC) was available to retail dealers of gasoline who sell blended gasoline that is classified as E15 Plus but not classified as E85 gasoline. By creating this tax credit, Iowa became the first state in the country to incentivize E15-specific sales. Beginning July 2011 through 2013, the tax credit rate per eligible gallon sold was $0.03 (see Table 3). This tax credit applies to qualifying gallons sold on a company-wide basis.

During the 2014 Legislative Session (SF 2344), the E15GC was made seasonal. Beginning January 1, 2014, gallons sold from June 1 through September 15 earned a tax credit of $0.10 per blended gallon. For all other dates, the tax credit remained $0.03 per blended gallon. The higher tax credit rate allowed during the summer reflected EPA regulations (“the Reid Vapor Pressure rules”) that made it more difficult to sell E15 during the summer months. The regulations disallowed the sale of E15 during the summer months as a regular fuel, unless the ethanol was blended with low volatile gasoline to meet air quality regulations. However, that low volatile gasoline is not typically available to be blended with ethanol in Iowa. In 1978, E10 blends were granted a waiver from those regulations, but the same waiver has not been granted to higher ethanol blends. As a result of these regulations, during the summer months E15 could only be sold by registered retailers in Iowa, with existing gasoline supplies, as a flex fuel. The higher tax credit rate during the summer is designed to incentivize retailers to take the additional steps required to continue selling E15 through registered pumps year-round.

The credit was initially set to expire January 1, 2018. In 2016, the Legislature extended the sunset date for this tax credit to January 1, 2025.

On May 31, 2019, the EPA approved E15 to be sold year around by extending the waiver from Reid Vapor Pressure rules that inhibited the sales of E15 from June 1 to September 15. However, there is still some uncertainty about the EPA's new rule. On June 10, 2019, the American Fuels and Petrochemical Association filed a petition for review with the U.S. Court of Appeals for the District of Columbia, seeking to block the EPA's new rule allowing year-round sales. Growth Energy - the leading biofuel trade association of the United States - filed a motion in the U.S. Court of Appeals for the District of Columbia Circuit to intervene in support of the EPA's final rule. It may take over 18 months to know the results of these lawsuits and to clear out any of the uncertainty.

D. Biodiesel Blended Fuel Tax Credit

Biodiesel is a renewable, biodegradable fuel manufactured from a variety of feedstocks including soybean oil, canola oil, corn oil, recycled feedstocks (such as used cooking oils and yellow grease), and animal fats. According to Alternative Fuels Data Center (AFDC), installing equipment compatible with B6 to B20 is the same as installing conventional diesel equipment. Biodiesel has a positive energy balance, meaning that biodiesel yields 4.56 units of energy for every unit of fossil energy consumed over its life cycle. Greenhouse gas emissions, on a life cycle basis from production to end use, are eighty percent below petroleum diesel.

Starting January 1, 2006, retail dealers that sell biodiesel blended fuel can claim the Biodiesel Blended Fuel Tax Credit. For 2006 through 2008, to qualify for the tax credit, on a company-wide basis, 50 percent or more of the total gallons of diesel fuel sold by the retailer in Iowa must have been biodiesel fuel containing a minimum percentage of two percent biodiesel by volume (B2). Effective in 2009 through 2011, eligibility for the tax credit was determined separately at each retail location, where at least 50 percent of diesel sales must have been B2 or higher blend biodiesel sales. Through calendar year 2011, the tax credit equaled $0.03 multiplied by the total number of gallons of biodiesel blended fuel gallons of B2 or higher sold at each qualifying retail location (see Table 4).

In 2011, the Legislature made several changes to eligibility and tax credit rates to the BBFC:

- Effective for tax years beginning on or after January 1, 2012, the 50 percent biodiesel sales requirement was eliminated so that the BBFC now applies to all biodiesel sold on a company-wide basis regardless of its share of sales at each retail location.
- The tax credit rate was lowered to $0.02 per gallon for blends between B2 and B4 and raised to $0.045 per gallon for blends classified as B5 or higher.
- In calendar years 2013 through 2017, the tax credit equals $0.045 per gallon for blends classified as B5 or higher; lower blends are no longer eligible.

- For sales in calendar year 2018 through 2024, the tax credit equals $0.035 per gallon for blends classified as B5-B10 and $0.055 per gallon for blends classified as B11 or higher.

Initially, this credit was set to expire January 1, 2018. In 2016, the Legislature extended the sunset date for the tax credit to January 1, 2025.

III. Tax Credits, Incentives and Mandates for Biofuel Retailers Across the United States

Along with Iowa, four other states currently offer tax credits for retailers based on the amount of biofuels sold at retail stations. Twenty-two states offer a tax deduction or excise tax exemption for sales of biofuels. Additionally, there are programs to encourage biofuel retail investment. Five states currently offer tax credits for retailers based on investment made in the infrastructure necessary to sell biofuels. Nine states (including Iowa) and the federal government offer some other type of incentive, such as a grant or tax deduction, for investment in biofuel retail infrastructure. The federal government and some other states have a mandate or explicit goal for biofuel usage in the near future. These incentives for biofuel retailers are briefly discussed below, focusing on currently operational programs.[2]

A. Incentives for Retail Sales

Programs for retailer sales are discussed separately for tax credits, followed by other incentive programs, so that the four Iowa tax credits can be compared to related tax credits in other states.

A1. Tax Credits for Retail Sales

Iowa, Kansas, Montana, North Dakota, and Oklahoma have established tax credit programs for biofuel sales (see Table 5).

Iowa is the only state that offers income tax credits for biofuel sales. Kansas and North Dakota offer a sales tax credit while Oklahoma and Montana offer credits against fuel taxes.

Only Iowa and Oklahoma offer a tax credit for ethanol blends less than E85. Oklahoma's tax credit rate is $0.016 per gallon of ethanol blend sold and Iowa's Ethanol Promotion Tax Credit rate is from $0.08 to $0.04 per gallon of pure ethanol. Therefore, when comparing the credits, the tax credit for a gallon of E10 in Oklahoma is equal to $0.016 and in Iowa the highest tax credit earned for the same gallon would be $0.008 or half of the credit earned in Oklahoma.

[2] This section focuses on incentives for biofuel sales, programs for biofuel production are not discussed here. On December 20, 2019, the expired federal biodiesel tax credit was extended from TY 2018 through TY 2022. This tax credit is for biodiesel producers, therefore is not expanded upon in this study.

Oklahoma explicitly requires retailers to pass the entire credit onto consumers, but does not have any threshold of sales to be eligible for the credit. Iowa is the only state that offers a tax credit (E15GC) explicitly for ethanol blends sales between E15 and E85. Iowa's E85GC is the only retailer tax credit specifically for E85 fuel gallons.

For biodiesel retailers, Iowa's $0.055 per gallon for B11 or higher ($0.035 per gallon for B5-B10) is the highest tax credit rate for biodiesel among all the biodiesel retailer tax credits available in the United States. In North Dakota, the rate is $0.05 per gallon for B5 or higher. Montana offers a $0.01 per gallon refund of fuel taxes paid by retailers on biodiesel produced entirely from Montana components, with no mentioned limit of the blend percentage.

Kansas has a fuel retailer tax incentive program for ethanol and biodiesel blends. In Kansas' program a qualified motor fuel retailer would be eligible for up to $0.065 for every gallon of renewable fuel sold and up to $0.03 for every gallon of biodiesel sold, if a required threshold percentage is met. The threshold is determined by calculating the percent of total gasoline sales that is renewable fuel or biodiesel. This threshold is similar to Iowa's Ethanol Promotion Tax Credit threshold. Kansas's tax credit (against motor fuel tax) can be claimed quarterly, while Iowa's EPTC (against income tax) is claimed annually.

A2. Other Incentive Programs for Biofuel Sales

Twenty-two states, including Iowa, offer incentives for sales of biofuels, typically through reduced excise fuel tax rates or sales tax rates or exemption of fuel taxes. Nine of them provide exemptions for specified biofuel types; the remaining states, including Iowa, provide tax rate reductions for biofuels.

Like Iowa, Montana also offers a quarterly biodiesel tax refund. A licensed distributor in Montana who pays the special fuel tax on biodiesel may claim a refund equal to $0.02 per gallon of biodiesel sold during the previous quarter if the biodiesel is made entirely from components produced in Montana. Additionally, the owner or operator of a retail motor fuel outlet may claim a refund equal to $0.01 per gallon of biodiesel purchased from a licensed distributor if the biodiesel is made entirely from components produced in the state.

B. Incentives for Retailers' Investments

Because investing on retailer infrastructure takes years to earn the profits back, many states provide some incentive programs to retailers for infrastructure investments.

B1. Tax Incentives for Retailers' Investments

Five states - Kansas, Louisiana, Montana, North Dakota, and South Carolina - currently offer some type of tax credit for investment in biofuel infrastructure by retailers (see Table 7). State tax credits for biofuel infrastructure investment range from 10 percent (North Dakota) to 40 percent (Kansas) of the cost of construction or equipment for alternative fuel filling stations. All of the income tax credits are nonrefundable with carry forward periods ranging from three to ten years.

Kansas offers a tax credit from corporation income tax for installing alternative fueling infrastructure after January 1, 2009. The credit is only available to entities with corporate income tax liability (C corporations). Qualified property must be directly related to the delivery of alternative fuel into the fuel tank of a motor vehicle propelled by such fuel.

Louisiana's Act 325 effective on June 22, 2017 modified the Alternative Fuel Vehicle and Fueling Infrastructure Tax Credit, including clarifying that the costs associated with fueling station infrastructure that are not directly related to the delivery of an alternative fuel into the fuel tank of motor vehicles are not eligible for the credit.

Montana allows a tax credit for up to 15 percent of the equipment costs incurred the year blending begins for investment made in storage and blending equipment used to blend biodiesel made from Montana-based feedstocks where by the end of the third year, biodiesel sales will at least total 2 percent of diesel sales.

North Dakota offers a 10 percent income tax credit for the direct costs to adapt or add equipment that enables a facility to sell at least 2 percent biodiesel blends (B2).

South Dakota allows a tax credit for up to 25 percent of the purchase, construction, and installation costs for the fueling facility including pumps, storage tanks, and related equipment taken in three equal annual installments. Qualifying fuels include blends containing at least 70 percent ethanol (E70) dispensed at the retail level for use in motor vehicles, and pure ethanol or biodiesel fuel dispensed.

B2. Other Programs for Retailer Investments

Nine states including Iowa and the federal government provide some incentives (including loans and grants) established to encourage investment in alternative fuel filling stations (see Table 8).[3]

Among the nine states, Nebraska, North Dakota, Oregon, and Vermont provide loans. The other five states, Iowa, Maryland, South Dakota, Texas, and Washington offer grants to encourage biofuel investment.

C. Mandates or Explicit Goals

The federal Energy Independence and Security Act of 2007, signed into law on December 19, 2007, increased and extended the previous Renewable Fuels Standard (RFS) minimum annual goal for renewable fuel use from 5.4 billion gallons to 9.0 billion gallons in 2008 and to 36 billion gallons by 2022. Starting in 2016, all of the fuel

[3] The federal government offers the Rural Energy for America Program (REAP) which provides loan guarantees and grants to agricultural producers and rural small businesses to purchase renewable energy systems or make energy efficiency improvements. This program used to provide loans to flex fuel pumps, or blender pumps, which dispense intermediate ethanol blends. But in recent years those pumps are no longer eligible for this program.

increases in the RFS target must be met by advanced biofuels, defined as fuels derived from a feedstock other than corn starch.

Eight states, Hawaii, Louisiana, Minnesota, Missouri, New Mexico, Oregon, Pennsylvania, and Washington, have existing mandates for biofuel sales independent of the federal requirements (see Table 9). Among them, only New Mexico and Washington's mandates are limited to biodiesel only; only Missouri's mandate is for ethanol only; the remaining states' mandates are for either ethanol or biodiesel. The changes of the mandates in Minnesota and Montana are as follows:

Under Minnesota's mandate, fuel retailers in Minnesota have the option of selling either E10 or gasoline blended with 10 percent biobutanol, cellulosic ethanol, or any other biofuel approved by the EPA as a gasoline substitute, as the result of a law enacted during the 2013 Legislative Session. Beginning May 1, 2018, all diesel sold in Minnesota for summer months (April to September) must contain at least 20 percent biodiesel, as the state officially implements the B20 mandate passed in 2008. Diesel fuel sold during the remainder of the year must contain at least 5 percent biodiesel (B5). Minnesota became the first state to require B20 for summer months.

Montana repealed the state ethanol mandate which requires E10 with some exceptions in 2017.

Like Iowa has a goal to replace 25 percent of gasoline in the state with biofuels by the year 2020, some other states currently have set some explicit goals:

- Rhode Island has a target as opposed to mandates for biofuel use or promotion within their state. The Petroleum Savings and Independence Advisory Commission (Commission) was established to provide recommendations and monitor programs designed to reduce the state's dependence on petroleum-based fuels in the transportation and heating sectors. Established targets may not provide less than a 30% overall reduction in petroleum consumption from 2007 levels by 2030 and a 50% overall reduction from 2007 levels by 2050.

- Wisconsin had a state biofuels promotion plan. The Wisconsin Office of Energy Independence (OEI) would ensure that 25 percent of Wisconsin's transportation fuels are generated from renewable sources by 2025. In addition, OEI serves as a single-point of contact for citizens, businesses, local units of government, and non-governmental organizations pursuing biofuels development, energy efficiency, and energy independence.

D. Other Major Iowa Programs Supporting Biofuel Sales

Besides the four current tax credits supporting biofuel sales which will be discussed in detail in this study, the State of Iowa also funds other programs supporting biofuel sales in Iowa. The three major programs are described below.

The first major program is the Iowa Excise Tax Reduction for Biofuels (at the Rack). The Iowa fuel excise tax rate is currently $0.305 per gallon while the fuel tax on ethanol blended fuel is $0.29 per gallon ($0.015 lower), where the rates are set for a fiscal year based on the share of taxable ethanol-blended gasoline gallons distributed in the prior calendar year (see Iowa Code 452A.3 for more details). The fuel tax is levied at the terminal; however, a significant number of gallons of ethanol-blended fuel are blended downstream, that is between the terminal and the retailer. Blenders are thus eligible to receive a refund from the Department of Revenue of the $0.015 when gasoline is blended into E10 or any other higher ethanol blend. B11 or higher blends are taxed at $0.295 per gallon, $0.03 lower than $0.325 tax rate for diesel.

The tax rate gap between ethanol and non-ethanol gasoline started at $0.01 in FY 1989, and was increased to $0.011 in FY 2002 and $0.013 in FY 2003. From FY 2004 through FY 2020, the gap has been as high as $0.02 and as low as $0.015 (see Table 10). The tax rate gap for biodiesel has remained unchanged at $0.03 per gallon from July 1, 2015 to FY 2020. Multiplying the ethanol and B11 or higher sold gallons each fiscal year, the total tax revenue reductions due to the lower excise tax rate are reported in Table 11. In FY 2019, the excise tax reduction for ethanol was $19.7 million and for B11 or higher was $2.9 million at the rack. The overall impacts of fuel tax reduction are not limited to rack prices; the retail prices would be affected as well, although relevant data are not able to be accessed.

A recent paper examined whether lower wholesale E10 and E85 prices are passed through as lower retail prices. Based on a panel dataset consisting of monthly observations from 2007 to March 2015 on wholesale and retail prices for 274 Minnesota gas stations that sell both E10 and E85, Li and Stock (2019) confirms complete pass-through in the E10 market to final consumers, which is consistent with a large body of literature. The same paper finds only partial pass-through to the E85 retail price of the E85 wholesale price. E85 pass-through is found higher at stations with more local E85 competitors. On average, retailers pass on only half of the Renewable Fuel Standard implicit subsidy to consumers, where renewable identification number (RIN) is considered as a subsidy for biofuels and as a tax on fuels with high petroleum content for E85.

Compared to the retailer tax credits, for the same type of biofuel, a larger share of the excise tax reduction is believed to be passed through to biofuel blenders. Retailers likely keep almost all retailer tax credits so that little is passed through to final consumers, unless the market is competitive so that the pressure from competitors would raise the pass-through proportion.

This program has provided a total of $15.8 million tax savings on ethanol sales in FY 2016, $19.8 million in FY 2017, $16.9 million in FY 2018, and $19.7 million in FY 2019. For B11 plus sales, the program has provided $0.9 million in FY 2016, $1.5 million in 2017, $2.0 million in FY 2018, and $2.9 million in 2019.

Iowa also provides the Biodiesel Production Sales Tax Refund to qualified biodiesel producers. Enacted in 2011, the refund equaled $0.03 per gallon produced in calendar year 2012, the refund fell to $0.025 per gallon produced in 2013, and dropped to $0.02 in 2014. The refund was originally scheduled to expire after 2014, but was extended through the end of 2018 during the 2014 Legislative Session. In 2016, the $0.02 per gallon credit was extended to its current sunset date at the end of CY 2024. The refund is claimed against the sales tax which is filed on a quarterly basis, allowing producers to receive the State incentive every three months, unlike an income tax incentive that is paid annually.

For calendar years 2014 to 2024, each qualified biodiesel producer may apply for a sales tax refund equal to $0.02 per gallon produced, each quarter, up to 25 million gallons each year. The producer must be engaged in the manufacturing of biodiesel and must have registered with the EPA as a manufacturer of biodiesel. The biodiesel manufactured must be used in biodiesel blended fuel. This program has provided a total of $5.0 million in refunds for 2012, $4.8 million for 2013, and around $4 million each year from 2014 to 2018 to Iowa biodiesel producers (see Table 12).

In addition to the two previously mentioned programs, Iowa offers the Renewable Fuel Infrastructure Grant Program through the Iowa Department of Agriculture and Land Stewardship that provides financial assistance to qualified E15, E85, and biodiesel retailers to update their infrastructure (see more details in IA Code 159A.14). Under this program, cost-share grants are available for up to $30,000 for a three-year contract, $50,000 for a five-year contract, or $100,000 for heated biodiesel terminal equipment. Since its inception in 2007 through FY 2019, over $32 million in grants have been disbursed by the State to 851 projects around the state (see Table 13). Through these years (2007-2019), projects for biodiesel received the largest portion (52.5% of the total amount) of this program, followed by E85 (40.7% of the total amount) and E15 (accounting for 5.7%). For the first half year of FY 2020, the total amount of grants for biodiesel is the highest.

For every dollar of state funding invested in the program since its inception, nearly 6 dollars of private investment have resulted, totaling over $200 million in private economic activity.

IV. Major Factors Affecting Ethanol and Biodiesel Sales

Numerous factors can affect ethanol and biodiesel sales, including but not limited to, retailer infrastructure, production, blending, retailing, consumer preference, competing fuels, and public policies, etc. This section briefly discusses a few of the major factors that affect biofuels sales in Iowa.

A. Infrastructure

The primary hurdle preventing fuel stations from adding higher ethanol blends is upgrading costs. The infrastructure costs are a significant capital investment for most

retailers. Because equipment components compatible with the sale of E15 and E85 became commercially available in 2007-2008, the vast majority of existing retail facilities will need significant infrastructure upgrades to sell these products.

The infrastructure costs for selling ethanol can vary significantly among different retailers, depending on the station's goals for future sales, the compatibility of their current fuel systems, funding sources available to them, and other factors.

Usually equipment and materials (like concrete) account for the largest part of the direct costs. The major investment portion of equipment is usually the dispensing equipment, containment sumps, underground piping, and concrete work. When a fuel station upgrades the infrastructure, usually four or more, rather than one, dispensing pump is installed. One blender pump usually costs from $20,000 to $35,000 (excluding installing labor costs, tax, and freight cost). Excluding the cost associated with dispensers and dispenser installation, replacing the underground piping, sumps, and accessories necessary to install dispensers, retailers at a traditional three-tank-and-four-dispenser site will spend between $75,000 and $125,000 to upgrade a site before dispensers are purchased and installed. If one or more of the underground storage tanks located at the retail location need replaced, costs will increase dramatically. Excluding labor for removal and installation, one underground tank will cost between $10,000 and $20,000. Because of the large scope of work associated with removing and replacing an existing underground tank and associated piping, most stations plan on using an underground tank and associated piping for approximately 25-30 years.

Besides equipment, labor costs are also significant because of the large scope of the projects. For existing stations, labor costs not only include installing new equipment and materials, but also include removing and replacing existing concrete over tanks, piping, dispenser islands, and parking lots. Costs associated with environmental investigation or remediation may also be incurred upon removal of existing equipment.

Besides the above direct costs, other hidden costs often are incurred during upgrading, such as the station's revenue lost when the station is shut down for system upgrades. Such revenue lost is not covered by most grants; but for some big stations the revenue lost can be significant.

To sell biodiesel, existing trucks, tanks, dispenser pumps, and blending facilities can be used for B20 and lower (according to National Biodiesel Board, September 2019). Selling biodiesel higher than B20 requires special infrastructure. When installing infrastructure to sell E15 or E85, many large stations choose to install infrastructure to sell biodiesel as well.

B. Gasoline Pipeline Changes

All of the non-ethanol gasoline sold in Iowa is piped into the state. Therefore, pipeline changes can be another factor impacting ethanol sales in Iowa.

For instance, beginning September 15, 2013 Iowa's largest pipeline operator - Magellan Midstream Partners - stopped shipping regular 87-octane gasoline to its Iowa terminals. This change included terminals in Iowa, Nebraska, and South Dakota, some of the last states experiencing a change to the grade of fuel to 84-octane. Instead, 84 octane gasoline along with the more-expensive 91 octane premium gasoline has been shipped to the Iowa pipeline operator system, which cannot be legally sold because Iowa requires a minimum 87-octane fuel at gas pumps. Boosting the fuel to the minimum required 87-octane requires either blending with ethanol (87-octane fuel can be created by blending 90 percent 84-octane gasoline with 10 percent ethanol) or with 91-octane premium gasoline. Because 87-octane regular fuel or 91-octone premium fuel without ethanol cost more at the pump, blending 84-octane with E10 has become the most favorable option due to lower cost.

Although a one-time impact on the fuel market, this pipeline change boosted ethanol sales in Iowa in 2014. The Retailers Fuel Gallons Annual Report data show that the share of ethanol in ethanol and gasoline together jumped to 85.8 percent in 2014 from 82.2 percent in 2013.

C. Flex Fuel Vehicles

Flex fuel vehicles are designed to run on ethanol blends of up to E85 as well as gasoline. According to the EPA (onwww.fueleconomy.gov), except for a few engine and fuel system modifications, they are identical to gasoline-only models. FFVs experience no loss in engine performance when operating on E85, and some generate more torque and horsepower than when operating on gasoline. However, according to independent studies by the University of Nebraska, American Coalition for Ethanol, and the Rochester Institute for Technology, since ethanol contains less energy per volume than gasoline, FFVs get about 15 to 27 percent less energy per gallon when fueled with E85 compared to gasoline with no added ethanol, depending upon the study.

Based on data from the Iowa Department of Transportation (IDOT), the share of FFVs to total vehicles registered in Iowa has increased steadily, from 3.4 percent in 2010 to 8.5 percent in 2018 (see Table 14). The legislation that established the State goal of replacing 25 percent of gasoline with biofuels by 2020, HF 2754, also established target numbers of FFVs identified for successful implementation of the goal (see Figure 1). The targets were 250,000 FFVs by the end of 2010; 350,000 FFVs by the end of 2013; 450,000 FFVs by the end of 2016; and 550,000 FFVs by the end of 2018. According to vehicle registration data from IDOT, Iowa missed all four goals, but the percentage by which the goal was missed has become smaller over time. Through 2010, the number of FFVs registered in Iowa was 138,802, 44.5 percent below the end-of-year goal. Through 2013, there were 242,054 FFVs registered with the State of Iowa, missing the goal of 350,000 registered vehicles by 30.8 percent. Through 2016, registered FFVs missed the goal by 24.0 percent; through 2018, FFVs registered in Iowa missed the target by 30.3 percent. It should be noted that the Internal Revenue Service (IRS) does not currently offer a tax benefit for FFVs (only a tax benefit on qualified plug-in electric vehicles is allowed by IRS).

A question naturally rises for FFV owners: do the FFVs' owners fill their vehicles with E85, or do they use other fuels? According to Grimes (2010), multiple national surveys find many owners of FFVs either are not aware their vehicles have this capability or have never used ethanol blends. Comparing the total gallons of E85 sold in Iowa to the number of registered FFVs, the total gallons of E85 per FFV is below potential utilization of E85. In 2009, registered FFVs only purchased an average of 42 gallons per vehicle of E85 from Iowa retailers (see Table 15). The average gallons of E85 per FFV then rose to 72 gallons per FFV in 2009 and then equaled 53 gallons per FFV in 2018. This suggests a significant share of FFVs owners have not been using E85. In addition, it is likely that a certain share of those FFVs' owners use E15 rather than E85.

D. Alternative to Conventional Fuel Vehicles: Electric Vehicle Technology

According to the Energy Information Agency (EIA), demand for gasoline and ethanol has been negative for years, likely a result of greater vehicle efficiency and growth of electric vehicle technology.

Across the country, EIA forecasts (released January 28, 2019) indicate that energy use per passenger-mile of travel in light-duty vehicles will decline nearly 40 percent between 2018 and 2050, because newer, more fuel-efficient vehicles will continue to enter the market, including both more efficient conventional gasoline vehicles and highly efficient alternatives such as battery electric vehicles. The combined share of fuel sales attributable to gasoline vehicles and FFVs is estimated to drop from 93 percent in 2018 to 75 percent in 2050 because of the growth in battery electric vehicle (BEV), plug-in hybrid electric vehicle (PHEV), and hybrid electric vehicle sales.

In Iowa, as of September 2018 there were 800 BEV and another 1,900 PHEV registered. Based on the IDOT's EV / PHEV Supplemental Fee Report through December 30, 2019, there were 4,599 electric vehicles (EV) registered (including 1,964 EV passenger, 2,586 PHEV passenger, and 49 EV or PHEV motorcycle). Between 2018 and 2040, BEV and PHEV numbers are forecast by IDOT to increase from their current level of approximately 3,000 vehicles to nearly 1.1 million vehicles in the high growth scenario, or around 0.42 million in medium scenarios, or slightly over 0.2 million in a low scenario. By 2040, BEVs are forecast to dominate the marketplace for electric vehicles and make up approximately 80 percent of the total number of registered BEVs and PHEVs in Iowa. It is not surprising that the growth in estimated electric vehicle technology would reduce the usage of conventional fuels including both petroleum and biofuels. However, due to forecasted barriers to greater EV market share (such as charging infrastructure, limited vehicle models, higher EV vehicle cost), the estimated share of total BEVs or PHEVs vehicles on the road in the near future would still be low.

E. Prices of Biofuels, Gasoline, and Diesel

Fuel consumers are sensitive to price (Hirtzer, 2018). Ethanol's prices dropped significantly in the second half of 2018 when prices reached their lowest levels in over a decade, as low as $1 per gallon. Irwin (2019) attributed this price drop to increased ethanol production. E85 is typically priced around 50 cents less per gallon than unleaded gasoline with no ethanol.

In general, vehicle fuel economy may decrease by about 3 percent when using E10 relative to gasoline that does not contain fuel ethanol. Due to alternative fuels' lower energy content, prices on an energy-equivalent basis of biofuels are generally higher than the prices per gallon (although some sources note that FFVs can achieve better energy efficiency on E85 than gasoline). According to 2011-2019 Clean Cities Alternative Fuel Price Reports (Alternative Fuels Data Center, U.S. Department of Energy), if energy content is considered, the national average price of E85 was $3.00 per Gasoline Gallon Equivalent in April 2019, slightly higher than the E10 gasoline price of $2.76 per gallon.

Iowa Clean Cities Coalition at the Iowa Economic Development Authority has been collecting fuel retail prices data from fuel retail stations in Iowa. According to the 2011-2019 data, E10, E85, and gasoline prices in Iowa have changed closely (see Figure 2). In recent years, the price of B20 is slightly lower than diesel (see Figure 3). In the most recent data point for October 2019, fuel (i.e., gasoline and ethanol lower than E10) price was $2.81 per gallon, $2.40 per gallon for E10, and $2.08 for E85; B20 was $2.81 per gallon, compared to diesel which was $2.83 per gallon.

V. Literature Review

Impacts of U.S. biofuel public policies, including import tariffs, mandates, tax incentives, and subsidies, have been extensively assessed in the literature (e.g., de Gorter and Just, 2009; Babcock, 2010; Knittel, 2011; Oladosu, 2017).[4] These evaluations touch upon a broad spectrum of subjects, including but not limited to, biofuel production, biofuel consumption, fuel prices, corn prices, food commodity prices, crude oil importation, land use, air quality, and farmers' welfare.

However, there is little published research on the effectiveness of tax incentives particularly for biofuel retailers, likely because it is hard to identify the impact of tax incentives when there are numerous factors driving biofuel sales. This section discusses studies on the impacts of three public policies related to biofuels: the Renewable Fuel Standard, the federal Volumetric Ethanol Excise Tax Credit, and the Oklahoma Ethanol Fuel Retailer Tax Credit. Although only the last one is a tax incentive directly for biofuel retailers, research methodology in the first two federal programs can be used to examine the effectiveness of tax incentives for biofuel retailers.

A. Impacts of the Renewable Fuel Standard

The effectiveness of the Renewable Fuel Standard on ethanol promotion is well documented. For example, Smith (2012) reports that the ethanol infrastructure boom

[4] From the 1980s to 2011, domestic ethanol producers were protected by an import tariff equal to $0.54 per gallon, mainly intended to offset the Ethanol Blending Tax Credit of the same amount, the Volumetric Ethanol Excise Tax Credit, so that only domestic ethanol producers would benefit from the tax credit (Renewable Fuels Association, 2007). The effect of the tariff was to prevent large-scale direct imports from foreign countries such as Brazil. It, along with the tax credit, expired on December 31, 2011.

post-2005 could be mainly attributed to the RFS. In 2005, there were 4.3 billion gallons of ethanol-production capacity and 1.8 billion gallons of capacity under construction in the United States; in only one year's time, capacity under construction had tripled.

De Gorter et. al. (2019) finds that the cost of increasing biofuel mandates under the federal RFS, given a binding ethanol blend wall - the upper limit to the total amount of ethanol that can be blended into U.S. gasoline - will fall disproportionately on diesel fuel consumers. Most of the burden on diesel fuel consumers can be directly attributed to the ethanol blend wall.

B. Impact of the Federal Volumetric Ethanol Excise Tax Credit

An ethanol blender that is registered with the IRS may be eligible for a tax incentive in the amount of $0.45 per gallon of pure ethanol (minimum 190 proof) blended with gasoline. Only entities that have produced and sold or used the qualified mixture as a fuel in their trade or business are eligible for the tax credit. This tax credit was effective beginning 2004 and expired December 31, 2011. The estimated impact of the federal Volumetric Ethanol Excise Tax Credit (VEETC), which expired at the end of 2011, is much smaller than the impact of the RFS.[5] For example, Babcock, Barr, and Carriquiry (2010) shows eliminating the VEETC would impact ethanol markets only "moderately" (p. 19), with the projected ethanol production declining by an average of only about 700 million gallons (-5%) in the Unites States.

Bielen, Newell, and Pizer (2018) estimates the subsidy incidence accruing to corn farmers, ethanol producers, gasoline blenders, and gasoline consumers around the time of expiration of the VEETC, using commodity price data. They find at the date of VEETC expiration, ethanol producers captured about 25 cents of the 45 cents subsidy per gallon of ethanol blended into fuel. Suggestive, albeit inconclusive, evidence was found that a portion of this benefit (about 5 cents per gallon) was passed further upstream from ethanol producers to corn farmers. Most of the remainder seems likely to have been captured by the blenders themselves.

A number of papers claim that U.S. federal tax credit programs for biofuel consumption or production have unintended consequences with the RFS in place. De Gorter and Just (2009) argues that with a consumption mandate under the RFS, an ethanol consumption tax credit aimed to reduce crude oil consumption did "the exact opposite" (p. 21), because the tax credit acts as a gasoline consumption subsidy instead of a subsidy for biofuels. Similarly, de Gorter and Just (2012) argues that with a binding consumption mandate, the federal biofuel tax credit had no effect on the ethanol price and provided little help for corn or ethanol producers.

[5] The VEETC was a tax credit administrated by the Internal Revenue Service between 2004 and 2011 for gasohol blenders. It expired on December 31, 2011. Gasoline suppliers who blend ethanol with gasoline were eligible for a tax credit of 51 cents per gallon of ethanol between 2005 and 2008 and 45 cents per gallon between 2009 and 2011. See more details in IRS Publication 510 (Revised July 2013).

C. Effectiveness of Oklahoma Ethanol Fuel Retailer Tax Credit

PFM Group Consulting LLC (2017) evaluates the Oklahoma Ethanol Fuel Retailer Tax Credit, a $0.016 tax credit for each gallon of ethanol contained in gasoline sold by a retailer. To be qualified for the tax credit, the retailer must reduce the price of the ethanol sold by the amount of the credit to reduce the costs to customers, thereby making ethanol more financially attractive to consumers. Among all the similar tax credits in other states, this tax credit is the only one requiring it be passed through to consumers. The PFM Group Consulting LLC uses the IMPLAN online economic impact model with a dataset from the State of Oklahoma (2014 Model) and finds negative estimated return on investment for this tax incentive program for the State of Oklahoma. The study concludes this tax credit is not effective and recommends repealing this tax credit.

VI. Biofuel Retail Sales from Iowa Retailers Fuel Gallons Annual Reports

HF 2754 required IDR to report the state biofuel distribution percentage at least annually to allow the Legislature to monitor whether policies need to be adjusted to meet the goal that biofuels replace 25 percent of the petroleum used in gasoline in Iowa by 2020. Beginning in calendar year 2007, the Department has annually surveyed retailers to provide fuel sales information. Information collected on the Retailers Fuel Gallons Annual Report includes name, address, and calendar year gasoline, diesel, and biofuel sales for each retail location in Iowa. Annual reports are due to the Department by January 31 in the following year, and using those data IDR submits a report to the Legislature by April 1 each year.

The participation rate for all retail locations across the state have ranged between 85.9 percent and 91.8 percent over calendar years 2007 and 2018.The variation in the numbers of report forms sent out across the years reflects variation in efforts to remove stations with zero sales reported in previous years from the mailing list. The average response rate for the most recent three years (2016-2018) was 89.2 percent.

A. Biofuel Retail Sales 2007-2018

The Retailers Fuel Gallons Annual Reports data reflect actual retail sales to final consumers. Ethanol sales were 998.9 million gallons in calendar year 2007, jumped to 1,270 million gallon in 2008, then grew to 1,357 million gallons in 2018 (see Table 16). The share of gasoline that was reported as an ethanol blend was 71.1 percent in calendar year 2007, and then remained over 80 percent through 2008 to 2012, reaching 87.0 percent in calendar year 2018. The ethanol-blended share at the retail level should be higher than at the terminal, because these sales reflect downstream blending of ethanol blended fuel. For example, the calendar year 2018 ethanol-blended share was 63.2 percent at the terminal level (based on IDR's monthly fuel tax report data) but as high as 87.0 percent at the retailer level.

E85 sales were 4.2 million gallons in calendar year 2007 when the E85GC rate was set at 25 cents per gallon of E85 sold. Sales bounced around between 2008 and 2012, then rising to 20.2 million gallons in calendar year 2018.

E15 sales, including blends from E15 through E69, were 0.1 million gallons in calendar year 2011, the first year that the Annual Report included E15-E69 as a separate biofuel blend. Reported E15-69 sales increased for calendar years 2012-2016, reaching 9.0 million gallons in calendar year 2016. Then in 2017, E15 sales jumped to 28.9 million gallons and reached 36.5 million gallons in 2018.

Biodiesel sales, including blends ranging from B2 to B99, were 160.8 million gallons in calendar year 2007. Sales grew to 458.9 million gallons in 2018. The share of biodiesel in total diesel sales increased from 22.6 percent for 2007 to 55.5 percent in 2018.

B1-B4 sales have been steady accounting for less than 2 percent of total diesel sales from 2016 to 2018. B5-B10's share in total diesel sales was less than 20 percent in the most recent three years. Unlike B1-B4 or B5-B10, B11 or plus sales have grown quickly in recent years: B11 or plus has observed a nearly 30 percent (29.1%) jump from 2016 to 2017; 2018 sales were almost as high as 2017 level.

B. Retail Stations Selling Biofuel vs. Not Selling

Using the Retailers Fuel Gallons Annual Report data, this section compares the stations reporting gasoline sales but reporting zero E15 or E85 sales to look into those stations' characteristics. In addition, the stations having diesel sales but not having biodiesel sales are compared to those having biodiesel sales. CY 2018 data are presented as an example (previous years' data demonstrate similar patterns).

In all the stations reporting fuel sales in 2018, the share of stations located in urban counties was 43.1 percent (see Table 17). The average biofuel distribution percentage for all stations was 12.3 percent per station. Compared to stations reporting E15 or E85 sales, 35.9 percent of stations reporting gasoline sales but not E15-E85 sales located in urban counties, reflecting a larger share of stations not selling any ethanol blends were located in rural areas. The average size of stations having zero E15-E85 sales were significantly smaller (an average 0.2 million gallons of any fuel) than those reporting E15-E85 sales (1.7 million gallons). This suggests that the stations not selling any ethanol are likely small rural stations where the investment required to upgrade their equipment to sell ethanol is too expensive.

The average size of stations reporting E85 sales were larger than those with E15-E20 sales. The average biofuel distribution percentage for E85 stations was 19.1 percent, the highest of all of the categories. It should also be noted that ethanol sales are nearly 10 times the amount of gasoline sales when the option is available.

For stations that reporting having diesel sales but no biodiesel sales, only 35.0 percent were located in urban areas. Once again, the average size of stations reporting diesel sales but no biodiesel was smaller (0.8 million gallons of any fuel) than those stations

with biodiesel sales, where stations with B1-B-10 sales averaged 1.8 million gallons of any fuel and B11+ stations averaged 2.1 million gallons of any fuel. This once again suggests that the stations not selling biodiesel tend to be small rural stations where the infrastructure required to sell biodiesel is too expensive.

The above comparisons show that E85 stations or B11 plus stations are concentrated in urban areas and on average larger stations tend to sell E85 or B11 plus, likely reflecting economies of scale. Smaller stations or stations in rural counties more likely encounter difficulty to make it profitable to sell E85 or B11 plus (due to the smaller number of potential customers and the costs for required infrastructure).

VII. Claims of Iowa Retailers' Tax Credits

Two data sources are used to describe claims of Iowa retailers' tax credits. The first data source is the Retailers Fuel Gallons Annual Report. Although retailers are required to complete the report, there is no penalty for non-compliance. For the 2018 report, 2,133 (87.8%) retailers out of 2,429 potential retail locations identified by IDR completed the report.

The second data source is Tax Credit Award, Claim & Transfer Administration System (CACTAS). When taxpayers claim any of the four tax credits, the IA 148 Tax Credits Schedule must be filed. The database includes the tax credit being claimed, the tax credit amount (earned by the taxpayer or received from a pass-through entity), and pass-through information, if relevant. The most recent tax year is 2017 (although data are incomplete). The claim data presented below divides the claims based on the type of taxpayer making the claim, corporations, individuals, or pass-through. If the retailer is a pass-through entity (limited liability company, S corporation, or partnership), claims are made by the shareholders of those entities and those are the taxpayers counted, not the number of entities earning a credit. A claim attributed to an individual indicates the taxpayer was the sole owner of the retailer.

The take-up rates of the four tax credits have been examined by merging the claims data to the annual report data. It is found that the take-up rates for these four tax credits have been quite high, reflecting major retailers are aware of these tax credits and have claimed them when they have eligible sales.

A. Ethanol Promotion Tax Credit

According to the data from Retailers Fuel Gallons Annual Reports, ethanol sales totaled 998.9 million gallons in calendar year 2007, jumping to 1,269.9 million gallons in calendar year 2008, and peaking at 1,369.4 million in 2016 (see Table 16). The share of gasoline that was an ethanol blend was 71.1 percent in calendar year 2007 and then remained over 80 percent in 2008 to 2018.

The IA 148 forms show that the number of EPTC claimants was over 80 in tax year 2008 for taxpayers filing a fiscal year return that included sales made during calendar

year 2009 (see Table 18). The number increased dramatically to 991 in 2009 but declined year by year in following years, falling to just over 260 in tax year 2017 (data are incomplete). The decline reflects the decrease in the number of all three types of claimants, corporation, individual, and pass-through taxpayers. A handful of fiduciary income tax taxpayers are combined into pass-through taxpayers.[6] The results show that the vast majority of individual claimants received the tax credit as a member of a pass-through entity, although some individuals are direct owners of fuel retailers.

Total claims were $1.1 million in tax year 2008, jumped to $4.7 million in tax year 2009, then dropped steadily. In tax year 2016, claims totaled $0.7 million, with the average corporate claim of $11,648 and $1,694 for individuals.

Claims for the EPTC are concentrated, where the analysis is based on claims earned by retailers and not by the claiming taxpayers, because one retailer who earns the tax credit is likely to pass through the tax credit to multiple owners. For tax years 2009 to 2017, the top 20 entities who earned the largest claims ranged from 69.5 percent for 2009 to 91.8 percent for 2017 (see Table 19).

B. E85 Gasoline Promotion Tax Credit

E85 sales were 4.2 million gallons in calendar year 2007 (based on the Retailers Fuel Gallons Annual Report). E85 sales rose to 20.2 million gallons in calendar year 2018 (see Table 16). The share of E85 of total gasoline sales grew from 0.3 percent for 2007 to 1.3 percent for 2018.

In tax year 2006, the number of claimants to this tax credit started at 107, with pass-through taxpayers accounting for the largest group (see Table 20). The number of claimants increased to 309 in tax year 2016, pass-through remained the largest claimant group. The total claim amount started at $0.5 million in 2006, reaching $2.2 million in tax years 2015 and 2016. The drop between 2010 and 2011 reflects the drop in the tax credit rate.

The share of the top 20 entities who earned largest claim amounts for each year increased from 88.4 percent in 2007 to 90.8 percent in 2017 (see Table 21).

C. E15 Plus Gasoline Promotion Tax Credit

E15 sales were introduced in the Retailers Fuel Gallons Annual Report in 2011. From 2011 to 2014, the Annual Report required stations to report E15 or E20 sales on one line. Beginning 2015 and later, E15 registered, E15 flex fuel, and E20 sales have been reported separately. E15 plus started at 0.1 million gallons in calendar year 2011 (based on the Retailers Fuel Gallons Annual Report). The sales grew to 9.0 million gallons in 2016, jumped to 28.9 gallons in 2017, and increased again to 36.5 million gallons in 2018 (see Table 16). The share of E15 of total gasoline sales increased from 0.1 percent for 2012 to 2.3 percent for 2018.

[6] Fiduciary taxpayers include members of a trust or estate that may own or be a shareholder in a motor fuel retailer. In those instances, claims would be made on a fiduciary income tax return.

A handful of taxpayers claimed this tax credit in 2010 because they are fiscal year filers. In tax year 2011 (note that this tax credit was available on gallons sold on or after July 1, 2011), 10 corporations submitted claims for the E15GC covering single or multiple retail locations (see Table 22). Those corporations claimed over $18,000 in credits, for an average of $1,313 per claimant. In tax year 2011, 18 pass-through claimants submitted claims for the E15GC. Those pass-through claimants claimed more than $5,120 in credits, for an average of $284 per claimant. In tax year 2017, pass-through shareholders claimed $1.9 million E15GC, noticeably higher than corporations or individuals. The jump in total claim amounts from 2013 to 2014 reflected the increased summer tax credit rate.

The share of credits earned by the top ten entities who earned largest tax credit amounts ranged between 54.2 percent and 93.3 percent each tax year (see Table 23).

D. Biodiesel Blended Fuel Tax Credit

Biodiesel blended fuel sales (including blends ranging from B2 to B99) were 160.8 million gallons in calendar year 2007 (based on the Retailers Fuel Gallons Annual Report). Sales increased to 458.9 million gallons (including blends ranging from B1-B100) in calendar year 2018 (see Table 16). The share of biodiesel blended gallons in total diesel fuel sales grew from 22.6 percent for 2007 to 55.5 percent in 2018.

In tax year 2006, the number of the BBFC claimants started at 76, including 27 corporations, 7 individuals, and 42 pass-through taxpayers (see Table 24). Unlike the other three tax credits in this study, the numbers of claimants only varied slightly across the years except a dip in 2010 reflecting a temporary drop in the number of pass-through taxpayers. The total claim amount increased each year from 2006 to 2016. In 2016, the average claim amount was $71,667 for corporations, $9,379 for individuals, and $38,079 for pass-through taxpayers. The number of claims in 2017 increased to 457 with total claims increasing to $19.2 million.

The noticeable increase from 2011 to 2012 in the number of claims and the amount claimed was likely driven by the elimination of the 50 percent biodiesel sales requirement effective in 2012 (recall that in tax years 2006 through 2008, to be eligible for the credit, 50 percent of diesel sales must have been biodiesel sales company-wide; for tax years 2009 through 2011, the requirement applied by retail location). The increase in total claim amounts from 2012 to 2013 reflected the effect of higher tax credit rates for B5 or above, which more than offset the elimination of B2-B4 sales from qualifying for the tax credit.

The top 20 entities who earned the tax credit made a disproportionate share of the BBFC amounts. The share of the top 20 entities who earned the tax credit accounted for around 90 percent each year (see Table 25).

VIII. Forecasts of Biofuel Retail Sales

This section provides forecasts for future biofuel retailers' tax credit claims from 2019 through 2024 (because three tax credits are scheduled to expire at the end of 2024) and evaluates how close the state may get to the 25 percent target by 2020. The base year data used to produce these forecasts are from the 2018 Retailers Fuel Gallons Annual Report. To produce the forecasts, a variety of assumptions about the growth of Iowa fuel sales are applied, including aggregate annual sales growth rates by type of fuel and growth in the number of stations selling biofuels.

- The first set of assumptions uses aggregate annual growth rates in fuel consumption (the long-term U.S. liquid fuel consumption forecasts) forecasted by Energy Information Administration (EIA) from 2018 to 2050 for various fuel types (released January 2019).

- The second set of assumptions is the growth in the number of individual retail stations selling biofuels, since stations that did not report certain biofuel sales in 2018 may start selling those biofuels after 2018 (referred to as "new stations" hereafter). Trends in the number of new stations selling various biofuels reflected in the Annual Report data were examined to estimate the number of new stations in the future. To avoid distortions resulting from variations in response rates across years, trends are measured over the past five years.

- For the existent biofuel retail stations, biofuel sales are forecasted to grow each year. The growth rates applied are based on the EIA forecasts noted above with adjustments accounting for the introduction of new stations each year.

- The forecast assumptions also incorporate the projected boost of E15 after year-around sales.

- The forecast model assumes federal law and related RFS would generally continue at 2018 levels and there would be no significant changes.

These assumptions, combined with the 2018 retailers' data, are used to forecast sales of each station. These gallons are then used to forecast tax credit claims for all eligible stations and the statewide biofuel distribution percentage in each year from 2018 through 2024 to forecast how close the state may get to meet the 25 percent target in future years.

There are a few limitations of this forecast method, primarily associated with the fact that the data to produce the forecasts are one-year self-reported survey data (to be distinguished from administrative data). Because the data are a snapshot of retailers' self-reported sales in 2018, possible abnormalities that occurred in 2018 were carried forward in the following years. Furthermore, sales at the estimated 296 stations who did not respond to the Annual Report in 2018 could not be included in the analysis (response rate was 87.8%). In addition, the information reported by the retailers might

not be completely accurate despite the efforts to correct apparent errors in the reported information.

A. Forecast of the Retailers' Tax Credits Claims

The projected EPTC claims are expected to experience a continued decrease from an estimated $1.3 million in tax year 2019 to an estimated $0.9 million in 2020 (see Table 26). This decrease in claims primarily reflects projections of fewer retailers being able to meet the rising biofuel threshold percentage as it moves up to 25 percent.

In contrast to the EPTC, claims for the remaining three tax credits (E85GC, E15GC, and BBFC) are projected to increase between tax years 2019 and 2024 (all three tax credits are scheduled to expire after the end of 2024). In particular, E85GC claims are estimated to increase from $3.2 million in tax year 2019 to an estimated $4.5 million in tax year 2024. E15GC claims are forecasted to increase from $4.0 million in tax year 2019 to an estimated $5.7 million in tax year 2024. From 2018 to 2019, the estimated increase of $0.4 million worth of E15GC claims primarily reflects a projected increase in summer sales after the summer sales ban was lifted in 2019. The claim amount for BBFC, the most utilized tax credit for biofuel retailers under current law, is estimated to increase from $22.1 million in tax year 2019 to an estimated $23.5 million in tax year 2024.

B. Forecast of Statewide Biofuel Distribution Percentage

The statewide biofuel distribution percentage between 2007 and 2018, in general, has increased moderately, according to the Department's Retailers Fuel Gallons Annual Reports. Looking forward, the biofuel distribution percentage is estimated to continue increasing moderately, rising from 13.5 percent in 2019 to 13.7 percent in 2020, and to 14.6 percent in 2024 (Figure 4). The forecasted biofuel distribution percentage reaches nearly 60 percent of the targeted goal of biofuel replacing 25 percent of petroleum in 2020.

The estimated portion of the biofuel distribution percentage attributed to pure ethanol jumped from 8.7 percentage points in 2013 to 9.1 percentage points in 2014, reflecting the shift from gasoline to ethanol-blended fuel as a result of the September 2013 pipeline changes (E10 sales jumped from 1.18 billion gallons to 1.27 billion that year). The portion attributed to pure ethanol is projected to increase gradually, reaching 10.0 percentage points in 2020 as a result of increases in E85 and E15 sales, while E10 is expected to fall. The share accounted for by pure biodiesel is projected to increase from 3.7 percentage points in 2019 to 4.1 percentage points in 2024. B1-B10 gallons are estimated to remain 12.9 million from 2019 to 2024; B11 or plus are estimated to increase from 312.7 million in 2019 to 338.3 million gallons in 2024.

Overall, the forecasts demonstrate that under current policies, the likelihood for Iowa to achieve the 2020 goal of biofuel replacing 25 percent of petroleum in the formulation of gasoline is unlikely.

C. Estimated Revenue Gains if Lowering E15GC Summer Rate

This section assesses the revenue gains to the General Fund if the E15GC summer tax credit rate is reduced from the current $0.10 per gallon to $0.03 per gallon (which equals the tax credit rate for the rest of a year). Prior to the summer sales ban being lifted, as Parker and Dlouhy (2019) states, the three-and-a-half-month blackout period deterred some retailers from selling E15 at all, since they would need to change pumps and warning labels at the start and end of each summer. After the EPA lifted the summertime ban on the sales of E15 on May 31, 2019, the higher rate during summer time for E15GC is no longer needed to incentivize retailers to take extra steps to sell the E15 during those months. However, because the American Fuel and Petrochemical Manufacturers (AFPM)'s filed an appeal about the EPA change in June 2019, the ban lift is still uncertain.

The forecast in this section uses the IDR forecast model with the 2018 Retailers Fuel Gallons Annual Report as base year data. Unfortunately, that report does not separate annual sales by season, data from the IA 138 E15GC Tax Credit forms indicated 34.9 percent of sales are currently subject to the higher tax credit rate. With the summer ban removed, E15 sales are expected to increase (e.g., Schmidt, 2019). The summer sales for 2019 and later are assumed to account for 39.4 percent of the whole year sales. In 2019, the summer E15-E69 sales are estimated to be 13.6 million gallons in 2020, increasing each year, and reaching 19.2 million gallons in 2024. The revenue impact to the General Fund is estimated to be around $1.0 million gain for tax year 2020, and increase to $1.3 million in 2024 (see Table 27).

IX. State of Iowa's Spending on Biofuel Blending and Sales

The biofuel industry has made significant contributions to Iowa's economy, including but not limited to creating jobs, increasing demand for corn and soybeans, and providing alternative energy for Iowans to use. According to Urbanchuk's 2019 estimate for the Iowa Renewable Fuels Association, during 2018, the renewable fuels industry accounted for more than $5 billion (or about 3 percent) of Iowa GDP; generated $2.5 billion of income for Iowa households, and supported more than 48,000 jobs in Iowa (2.3 percent of total Iowa employment).[7]

The growth of the Iowa biofuel industry has benefited from the financial support of various programs from the State of Iowa. This section aims to answer the question, "How much has the State of Iowa spent and is it estimated to spend on retail biofuel sales from FY 2007 to FY 2025, focusing on tax credits, tax rate reduction, biodiesel production refund, and the renewable fuel infrastructure program?" These four programs are the focus of this section only because data for these programs are available to IDR; however, the State of Iowa's support to the biofuel industry is by no means limited to the four programs. FY 2007 is chosen as the starting year because TY 2006 is the starting year of three of the four biofuel retailer tax credits, the fiscal impact

[7] The estimate in Urbanchuk (2019) uses IMPLAN (Impact Analysis for Planning) economic model to come up with the contribution of biofuel industry to Iowa's economy.

of which began in FY 2007. FY 2025 is chosen as the ending year because TY 2024 is currently the last year of three of the four tax credits and the largest portion of TY 2024 claims would occur in FY 2025 (the tax credit claims for TY 2024 would have a small portion realized in FY 2026 and FY 2027, which is not considered in this section). The estimates in this section assumes current programs would continue through FY 2025 (for example, the excise tax rates are required in IA 452A.3 to be determined each calendar year; this section assumes current tax rate reduction will continue through FY 2025).

Through FY 2007 to FY 2025, fuel excise tax reduction would account for the largest share, nearly one half (46.3 percent), of all these programs.[8] The four tax credits discussed in this study would account for the second largest share (42.2 percent) of these programs. In sum, the State of Iowa has spent $501.8 million on biofuel retail sales through FY 2019; the State is estimated to spend another $356.3 million in total from FY 2020 through FY 2025 (see Table 28).[9]

X. Conclusion

Among various Iowa incentive programs aimed at boosting the use of biofuels, currently there are four tax credits provided to biofuel retailers in Iowa: the Ethanol Promotion Tax Credit, the E85 Gasoline Promotion Tax Credit, the E15 Plus Gasoline Promotion Tax Credit, and the Biodiesel Blended Fuel Tax Credit.

Claims of the EPTC have been declining over time due to the increase of required biofuel distribution thresholds. Fewer fuel retailers have been able to meet the required thresholds necessary to claim the EPTC.

Claims for the other three tax credits demonstrate the increase of E85, E15, and biodiesel sales over time. The changes in biodiesel (B1-B4, B5-B10, and B11 or higher) sales across years reflect the revisions of the BBFC (eligibility, credit rates, etc.), suggesting biodiesel retailers have acted (such as reducing blends lower than B5 and increasing blend B11 or higher) to respond to the tax credit revision.

It is forecasted that the statewide biofuel distribution percentage will be nearly 15 percent in 2024, significantly below the goal established in HF 2754 that 25 percent of all petroleum used in gasoline in Iowa be replaced by biofuels by 2020.

[8] The overall impacts of fuel tax rate reduction are not limited to rack prices; the retail prices are affected as well.

[9] Note that because the total spending in this section starts FY 2007, the claims of Ethanol Blended Gasoline Tax Credit (which expired at the end of 2008) is not included (claims of which were between FY 2005 and FY 2012).

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Iowa's Biofuel Retailers' Tax Credits

Tables and Figures

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Table 1. Ethanol Promotion Tax Credit Rate Schedule

Calendar Year of Sales	Credit Rate Per Gallon of Pure Ethanol Sold			Biofuel Distribution Percentage					
				Large Retailers			Small Retailers		
				Retail Dealers Selling More Than 200,000 Gallons Per Year			Retail Dealers Selling 200,000 or Fewer Gallons Per Year		
	Rate 1	Rate 2	Rate 3	No Less Than Threshold	Below Threshold by 0.01% - 2.00%	Below Threshold by 2.01% - 4.00%	No Less Than Threshold	Below Threshold by 0.01% - 2.00%	Below Threshold by 2.01% - 4.00%
2009	$0.065	$0.045	$0.025	10%	8%	6%	6%	4%	2%
2010	$0.065	$0.045	$0.025	11%	9%	7%	6%	4%	2%
2011	$0.08	$0.06	$0.025	12%	10%	8%	10%	8%	6%
2012	$0.08	$0.06	$0.04	13%	11%	9%	11%	9%	7%
2013	$0.08	$0.06	$0.04	14%	12%	10%	12%	10%	8%
2014	$0.08	$0.06	$0.04	15%	13%	11%	13%	11%	9%
2015	$0.08	$0.06	$0.04	17%	15%	13%	14%	12%	10%
2016	$0.08	$0.06	$0.04	19%	17%	15%	15%	13%	11%
2017	$0.08	$0.06	$0.04	21%	19%	17%	17%	15%	13%
2018	$0.08	$0.06	$0.04	23%	21%	19%	19%	17%	15%
2019	$0.08	$0.06	$0.04	25%	23%	21%	21%	19%	17%
2020	$0.08	$0.06	$0.04	25%	23%	21%	25%	23%	21%
2021 and after	NA	NA	NA	NA	NA	NA	NA	NA	NA

Source: Iowa Code 422.11N and 422.33(11A).
Note: Retail dealers can claim the highest credit rate for which they are eligible based on the taxpayer's total sales and biofuel threshold percentage. Tax credit expires on January 1, 2021.

Table 2. E85 Gasoline Promotion Tax Credit Rate Schedule

Calendar Year of Sales	Credit Per Gallon Sold
2006-2008	$0.25
2009-2010	$0.20
2011	$0.10
2012-2024	$0.16
2025 and after	N/A

Source: Iowa Code 422.11O and 422.33(11B).
Note: For retail dealers of gasoline whose tax year is not on a calendar year basis, the retail dealer may compute the tax credit on the eligible gallons sold during each year using the applicable credit amounts. Tax credit is repealed January 1, 2025.

Table 3. E15 Plus Gasoline Promotion Tax Credit Rate Schedule

Calendar Years of Sales	Date of Sales		
	January 1-May 31	June 1-September 15	September 16-December 31
July 1, 2011-December 31, 2011	$0.03	$0.03	$0.03
2012-2013	$0.03	$0.03	$0.03
2014-2024	$0.03	$0.10	$0.03
2025 and After	NA	NA	NA

Source: Iowa Code 422.11Y and 422.33 (11D).
Note: Tax credit is repealed on January 1, 2025.

Table 4. Biodiesel Blended Fuel Tax Credit Rate Schedule

Calendar Year of Sales	Calculation		Eligibility	Basis of Calculation
	Designed Rate Per Gallon	Number of Gallons of X Biodiesel Blended Fuel Gallons Sold		
2006-2008	$0.03	B2 or higher	50 percent biodiesel sales requirement	Company-wide
2009-2011	$0.03	B2 or higher	50 percent biodiesel sales requirement	Retail station
2012	$0.02, $0.045	B2-B4, B5 or higher	B2 or higher	Company-wide
2013-2017	$0.045	B5 or higher	B5 or higher	Company-wide
2018-2024	$0.035, $0.055	B5-B10, B11 or higher	B5 or higher	Company-wide
2025 or After	NA	NA	NA	NA

Source: Iowa Code 422.11P and 422.33(11C).
Note: Tax credit is repealed January 1, 2025.

Table 5. Federal and State Comparison of Tax Credits for Biofuel Sales by Retailers or Blenders

Government	Tax Credit Name	Tax Type	Current Tax Credit Rate	Eligible Biofuels	Tax Credit Cap	Refundable	Carry Forward	Dates Applicable
Iowa	E15 Plus Gasoline Promotion Tax Credit	Individual Income Tax Corporation Income Tax	$0.03 per gallon all the other time; and $0.10 between June 1 - September 15	E15	No	Yes	No	January 1, 2006 through December 31, 2024
	E85 Gasoline Promotion Tax Credit		$0.16 per gallon	E85	No	Yes	No	January 1, 2006 through December 31, 2024
	Biodiesel Blended Fuel Tax Credit		$0.035 per gallon of B5-B10; $0.055 per gallon of B11 or higher	B5 or higher	No	Yes	No	January 1, 2006 through December 31, 2024
	Ethanol Promotion Tax Credit		$0.08 - $0.04 per gallon of pure ethanol	Above biofuel distribution percentage	No	Yes	No	January 1, 2009 through December 31, 2020
Kansas	Renewable Fuel Retailer Tax Incentive	Sales tax	$0.065 per gallon of renewable fuel sold, $0.03 per gallon of biodiesel sold, if the threshold percent is met.	Renewable fuels, including biodiesel	No	No	No	January 1, 2009 through January 1, 2026. (Unfunded from 2013 to date)
Montana	Biodiesel Tax Refund	Special fuel tax	$0.01 per gallon refund of taxes paid by retailers on biodiesel produced entirely from Montana components.	Biodiesel produced entirely from Montana components	No	No	No	Not Available
North Dakota	Biodiesel and Renewable Diesel Blender Tax Credit	Sales Tax	$0.05 per gallon for fuel containing at least 5% biodiesel or renewable diesel.	B5 or higher	No	Yes	5 years	Not Available
Oklahoma	Ethanol Fuel Retailer Tax Credit	Motor fuel tax	$0.016 for each gallon of ethanol blend of gasoline containing up to 15% ethanol by volume (E15) sold if retailer provides price reduction of equal amount.	Ethanol up to E15	No	No	No	January 1, 2006 to present

Source: U.S. Department of Energy, Alternative Fuels Data Center, http://www.eere.energy.gov/afdc/, accessed August 2019, and relevant webpages of Department of Revenue of each state.

Table 6. State Comparison of Other Incentive Programs for Biofuel Sales

Government	Incentive for Sales	Description
Alaska	Ethanol Fuel Blend Tax Rate Reduction	The tax rate on fuel containing ethanol is $0.06 per gallon less than the tax rate on other motor fuels in certain geographic areas. This reduced rate is in effect during months ethanol fuel blends must be sold, transferred, or used to operate motor vehicles to reduce carbon monoxide emissions and attain federal or state air quality standards.
Colorado	Special Fuels Tax Rate Reduction	The special fuels (including diesel fuel, kerosene, and ethanol blends of more than 10 percent ethanol, when used for the generation of power to propel a motor vehicle on highways) tax is assessed at a rate of $0.205 per gallon, compared to $0.22 tax per gallon for gasoline and E10
Hawaii	Alternative Fuel Tax Rate Reduction	A distributor of any alternative fuel used to operate an internal combustion engine must pay a license tax of $0.0025 for each gallon of alternative fuel the distributor sells or uses. In addition, a distributor must pay a license tax for each gallon of fuel sold or used by the distributor for operating a motor vehicle on state public highways according to the following rates: Ethanol 0.145 times the rate for diesel Methanol 0.11 times the rate for diesel Biodiesel 0.25 times the rate for diesel Propane 0.33 times the rate for diesel
Illinois	Biofuels Tax Exemption	From January 1, 2019 through December 31, 2023, sales and use taxes do not apply to the proceeds from the sale of biodiesel blends containing between 11% and 99% biodiesel (B11-B99) or fuels containing between 70% and 90% ethanol (E70-E90). Taxes will apply to 100% of the proceeds from the sale of biodiesel and ethanol fuel blends made after December 31, 2023.
Indiana	Special Fuel Tax Exemption	The sale of biodiesel, blended biodiesel, and natural gas used to power an internal combustion engine or motor is exempt from state gross retail tax. Biodiesel Blend Tax Exemption: Biodiesel blends of at least 20% (B20) that are used for personal, noncommercial use by the individual that produced the biodiesel portion of the fuel are exempt from the special fuel license tax. The maximum number of gallons of fuel for which the exemption may be claimed is based on the percentage volume of biodiesel in each gallon used.
	Biodiesel Blend Tax Exemption	Biodiesel blends of at least 20% (B20) that are used for personal, noncommercial use by the individual that produced the biodiesel portion of the fuel are exempt from the special fuel license tax. The maximum number of gallons of fuel for which the exemption may be claimed is based on the percentage volume of biodiesel in each gallon used.
Iowa	Motor Fuel Tax Rate Reduction	Beginning July 1, 2019, ethanol tax rate is $0.015 per gallon lower than gasoline ($0.29 compared to $0.305); B11+ tax rate is $0.03 per gallon lower than diesel ($0.295 compared to $0.325).
	Biodiesel Producer Tax Refund	A biodiesel producer may apply for a refund of Iowa state sales or use taxes paid on purchases. To qualify, the producer must be registered with the U.S. Environmental Protection Agency and any biodiesel produced must be used in biodiesel fuel blends. The refund amount is based on the total gallons of biodiesel produced in the state multiplied by the designated rate of $0.02. A biodiesel producer is only eligible to receive a refund for up to 25 million gallons of biodiesel produced during each calendar year through 2017. The producer must file refund claims with the Iowa Department of Revenue on a quarterly basis. Refunds received may not be included as income for Iowa individual and corporation income tax purposes. The incentive expires January 1, 2025.
Kansas	E85 Tax Rate Reduction	The minimum motor vehicle fuel tax rate on E85 is $0.17 per gallon, compared to the conventional motor fuel tax rate of $0.24 per gallon.

Table 6 (Con't). State Comparison of Other Incentive Programs for Biofuel Sales

Government	Incentive for Sales	Description
Kentucky	Alternative Fuel Tax Reduction	An excise tax rate of 9% of the average wholesale price on a per gallon basis applies to all special fuels, including diesel, natural gas, propane, ethanol, biodiesel, hydrogen, and any other combustible gases and liquids, excluding gasoline, used to propel motor vehicles. Additionally, a highway motor fuel tax of $0.02 per gallon applies to all special fuels.
Maine	Excise Tax Rate Reduction	Tax rate for E85 is $0.30, B90-B100 is $0.287 per gallon, compared to $0.30 for gasoline E10 is and $0.312 for diesel.
Minnesota	Alternative Fuel Tax Reduction	The Minnesota Department of Revenue imposes an excise tax on the first licensed distributor that receives E85 fuel products in the state and on distributors, special fuel dealers, or bulk purchasers of other alternative fuels. E85 is taxed at the pump at a rate of $0.2025 per gallon, pure biodiesel (B100) is taxed at $0.285 per gallon, propane is taxed at $0.2135 per gallon, liquefied natural gas is taxed at $0.171 per gallon, and compressed natural gas is taxed at the rate of $2.50 per thousand cubic feet.
Montana	Biodiesel Tax Refund	A licensed distributor who pays the special fuel tax on biodiesel may claim a refund equal to $0.02 per gallon of biodiesel sold during the previous quarter if the biodiesel is made entirely from components produced in Montana. Additionally, the owner or operator of a retail motor fuel outlet may claim a refund equal to $0.01 per gallon of biodiesel purchased from a licensed distributor if the biodiesel is made entirely from components produced in the state. Refund requests must be filed on a quarterly basis.
Nevada	Alternative Fuel Tax Reduction	Special fuels, including biodiesel, biodiesel blends, biomass-based diesel, biomass-based diesel blends, and liquefied natural gas (LNG), have a reduced tax rate of $0.27 per gallon. Liquefied petroleum gas (LPG or propane) and compressed natural gas (CNG) are taxed at a rate of $0.064 and $0.21 per gallon, respectively.
Nebraska	Ethanol and Biodiesel Tax Exemption	Motor fuels sold to an ethanol or biodiesel production facility and motor fuels manufactured at and sold from an ethanol or biodiesel facility are exempt from certain motor fuel tax laws enforced by the Motor Fuels Division of the Nebraska Department of Revenue.
New Mexico	Biodiesel Tax Deduction	Entities and individuals that receive or manufacture and deliver biodiesel within the state for blending or resale are eligible for a tax deduction for the fuel.
North Carolina	Alternative Fuel Tax Exemption	The retail sale, use, storage or consumption of alternative fuels is exempt from the state retail sales and use tax.
Rhode Island	Biodiesel Tax Exemption	Biodiesel is exempt from the $0.30 per gallon state motor fuel tax. Biodiesel may be blended with other fuel for use in motor vehicles, but only the biodiesel portion of the blended fuel is exempt.
South Dakota	Biodiesel Tax Reduction	$0.02 reduction on the tax rate of biodiesel for biodiesel producer (who engages in the business of producing biodiesel for sale, use, or distribution). This tax reduction will be repealed once thirty-five million gallons of taxed biodiesel and biodiesel blend are sold after the effective date of the tax rate reduction, once biodiesel production facilities in South Dakota reach a name plate capacity of at least twenty million gallons per year and fully produce at least ten million gallons of biodiesel within one year.

Table 6 (Con't). State Comparison of Other Incentive Programs for Biofuel Sales

Government	Incentive for Sales	Description
Tennessee	Methanol Tax Exemption	Methanol sold for use as a motor fuel that is not blended with gasoline, diesel, or other fuels or petroleum products is exempt from gasoline and diesel fuel use taxes.
Texas	Diesel Fuel Blend Tax Exemption	Biodiesel or ethanol blended with taxable diesel, that is identified when sold or used as a biodiesel or ethanol fuel blend, is exempt from the diesel fuel tax.
Utah	Alternative Fuel Tax Exemptions and Reductions	Propane, natural gas, electricity, and hydrogen, also known as clean fuel or special fuel, used to operate motor vehicles are exempt from state fuel taxes, but subject to a special fuel tax at the rate of three-nineteenths of the conventional motor fuel tax. A reduction in special fuel tax is permissible if the fuel is already taxed by the Navajo Nation. Retailers, wholesalers, and suppliers of special fuel are eligible for a refund of the special fuel tax if dyed diesel fuel is mixed with special fuel and the mixed special fuel is returned to the refinery.
Washington	Biodiesel Feedstock Tax Exemption	Waste vegetable oil, specifically cooking oil gathered from restaurants or commercial food processors, used by an individual to produce biodiesel for personal use is exempt from state sales and use taxes. The purchaser must provide the seller with an exemption certificate from the Washington Department of Revenue.
Wisconsin	Alternative Fuel Tax Exemption	A county, city, village, town, or other political subdivision may not levy or collect any excise, license, privilege, or occupational tax on motor vehicle fuel, alternative fuels, or the purchase, sale, handling, or consumption of motor vehicle fuel or alternative fuels.

Source: U.S. Department of Energy, Alternative Fuels Data Center, http://www.eere.energy.gov/afdc/, accessed August 2019, and relevant webpages of Department of Revenue of each state.

Table 7. State Comparison of Tax Credits for Investments in Biofuel Infrastructure by Retailers

Government	Tax Credit Name	Eligible Investments	Tax Type	Tax Credit Rate	Tax Credit Cap	Refundable	Carry Forward	Dates Applicable
Kansas	Alternative Fueling Infrastructure Tax Credit	Cost of installing alternative fueling infrastructure after January 1, 2009. Qualified property must be directly related to the delivery of alternative fuel into the fuel tank of a motor vehicle propelled by such fuel. The credit is only available to entities with corporate income tax liability.	Corporation Income Tax	40% of the total cost	Up to $100,000 per fueling station	No	3 years	2003 to present
Louisiana	Alternative Fuel Vehicle and Fueling Infrastructure Tax Credit	The cost of the qualified clean-burning motor vehicle fuel property being purchased to (1) convert vehicles propelled by gasoline or diesel to an alternative fuel or (2) build fueling stations (only cost directly related to the delivery of an alternative fuel into the fuel tank of motor vehicles).	Income tax	30% of the cost	No cap for cost of building fueling stations; up to $2,500 or 10% of the cost for the new original equipment	No	3 years	1991 to December 31, 2021
Montana	Biodiesel Blending Tax Credit	Investment made in storage and blending equipment used to blend biodiesel made from Montana-based feedstocks where by the end of the third year, biodiesel sales will at least total 2% of diesel sales.	Income tax	Up to 15% of the equipment costs incurred the year blending begins	$52,500 cap per retailer, $7,500 cap per owner or operator of a motor fuel outlet	No	May be carried forward until the total amount has been deducted from tax liability	2005 to present
North Dakota	Biodiesel and Renewable Diesel Sales Equipment Tax Credit	Costs to adapt or add equipment that enables a facility to sell at least 2% biodiesel blends.	Income tax	10% of direct costs	Limited to $50,000 cumulative credit claims per taxpayer for all taxable years, credit is allowed in each of five taxable years beginning the year biodiesel sales begin	Yes	5 years	January 1, 2005 to present
South Carolina	Biofuels Distribution Infrastructure Tax Credit	Qualified commercial facilities for distributing or dispensing biofuels.Qualifying fuels include blends containing at least 70% ethanol (E70) dispensed at the retail level for use in motor vehicles, and pure ethanol or biodiesel fuel dispensed	Income tax	Up to 25% of the purchase, construction, and installation costs for the fueling facility including pumps, storage tanks, and related equipment taken in three equal annual installments	No	No	10 years	January 1, 2007 through January 1, 2026

Source: U.S. Department of Energy, Alternative Fuels Data Center, http://www.eere.energy.gov/afdc/, accessed August 2019, and relevant webpages of Department of Revenue of each state.
Note: Federal currently does not have tax credit for biofuel infrastructure.

Table 8. Federal and State Comparison of Grants or Non-Tax Incentives for Investments in Biofuel Infrastructure by Retailers

Government	Incentive for Investment	Type of Inventive	Description
Federal	Ethanol Infrastructure Grants and Loan Guarantees	Grants and Loan Guarantees	The Rural Energy for America Program (REAP) provides loan guarantees and grants to agricultural producers and rural small businesses to purchase renewable energy systems or make energy efficiency improvements. Eligible renewable energy systems include flexible fuel pumps, or blender pumps, that dispense intermediate ethanol blends. The maximum loan guarantee is $25 million and the maximum grant funding is 25% of project costs. At least 20% of the grant funds awarded must be for grants of $20,000 or less. This program's funding is subject to congressional appropriations.
Iowa	The Iowa Renewable Infrastructure Program	Grants	The program is designed to assist retail operators of motor fuel dispensing sites or fueling stations in the conversion of their equipment to allow the expanded use of renewable fuels in Iowa. The program utilizes grant incentives to encourage these upgrades. Reimbursement can be for 50% of the costs for specific components of a project with a three-year commitment required to sell certain renewable fuels. A five-year commitment to store and sell renewable fuels and install certain equipment can result in up to 70% reimbursement for specific equipment or installation costs. Heat biodiesel terminal equipment and/or infrastructure can receive funding for up to $100,000 per project.
Maryland	The Maryland Alternative Fuel Infrastructure Program	Grants	The program provides grants to plan, install, and operate public access alternative fueling and charging infrastructure.Applicant cost share must be at least 50%. Maxium grant award per station for ethanol is $35,000.
Nebraska	AFV and Fueling Infrastructure Loans	Loans	Nebraska Energy Office administers the Dollar and Energy Saving Loans Program which makes low-cost loans available for the construction or purchase of a refueling station or equipment. The maximum loan amount is $150,000 per borrower, and the interest rate is 5% or less.
North Dakota	Biofuel Loan Program	Loans	Biofuels Partnership in Assisting Community Expansion (PACE) Loan Program will provide a 5% interest buy down to biofuel retailers for refueling infrastructure installation.
Oregon	Alternative Fuel Loans	Loans	The Oregon Department of Energy administers the State Energy Loan Program (SELP) which offers low-interest loans for qualified projects. Eligible alternative fuel projects include fuel production facilities, dedicated feedstock production, fueling infrastructure, and fleet vehicles. Loan recipients must complete a loan application and pay a loan application fee.
South Dakota	Ethanol Infrastructure Grants	Grants	Grants are provided to offset the cost of installing ethanol blender pumps and underground storage tanks (UST) for ethanol at retail fueling stations throughout the state. Awardees may receive up to $25,000 for the installation of the station’s first blender pump, and up to $10,000 for the installation of each additional pump. Additionally, awardees may receive up to $40,000 per station for the installation of a UST that allows for the use of ethanol blender pumps.

Table 8 (Con't). Federal and State Comparison of Grants or Non-Tax Incentives for Investments in Biofuel Infrastructure by Retailers

Government	Incentive for Investment	Type of Inventive	Description
Texas	Clean Vehicle and Infrastructure Grants	Grants	The Texas Commission on Environmental Quality administers the Emissions Reduction Incentive Grants Program and Rebate Grants Program as part of the Texas Emissions Reduction Plan (TERP). The ERIG Program provides grants for various types of clean air projects to improve air quality in the state's nonattainment areas and other affected counties. Eligible projects include those that involve replacement, retrofit, repower, or lease or purchase of new heavy-duty vehicles; alternative fuel dispensing infrastructure; idle reduction and electrification infrastructure; and alternative fuel use. The Rebate Grants Program provides grants to upgrade or replace diesel heavy-duty vehicles and non-road equipment. Qualifying projects must reduce emissions of nitrogen oxides or other pollutants by at least 25% as compared to baseline levels and must meet operational and fuel usage requirements.
Vermont	Alternative Fueling Infrastructure Incentive	Loans	The Vermont State Infrastructure Bank (SIB) offers loan assistance to municipalities, regional development corporations, political subdivisions of the state, and private companies working for the state to finance public electric vehicle charging and natural gas fueling stations. 1% fixed loans are available to municipalities and 3% fixed loans are available to private sector borrowers. Other terms and conditions may apply.
Washington	Alternative Fueling Infrastructure Funding Program	Grants	The Washington State Department of Transportation (WSDOT) has developed a pilot funding program to strengthen and expand the West Coast Electric Highway network by deploying direct current (DC) fast charging infrastructure along highway corridors in Washington. The pilot program ends June 30, 2019. Effective August 1, 2019, the funding program expands to include hydrogen fueling infrastructure along highway corridors in Washington.

Source: U.S. Department of Energy, Alternative Fuels Data Center, http://www.eere.energy.gov/afdc/, accessed August 2019, and relevant webpages of Department of Revenue of each state.

Table 9. Federal and State Biofuels Mandates or Goals and Other Investment or Sales Incentive Programs

Government	Mandate or Goal	Biofuel Type	Description
Federal	Mandate	Renewable fuel	In 2008, 9 billion gallons of renewable fuel was required to be blended, increasing to 36 billion gallons per year by 2022. Beginning in 2016, a certain percentage of the renewable fuels must be advanced and/or cellulosic based biofuels and biomass-based diesel, pending final rulemaking by EPA.
Hawaii	Mandate	Alternative fuels	Alternative fuels will provide 20% of highway fuel demand by 2020 and 30% by 2030. For the purposes of the alternative fuels standard, cellulosic ethanol is equivalent to 2.5 gallons of non-cellulosic ethanol.
Iowa	Goal	Ethanol or biodiesel	Replace 25% of petroleum used in gasoline in the state with biofuels (ethanol or biodiesel) by January 1, 2020.
Louisiana	Mandate	Ethanol and biodiesel	Within six months following the point at which cumulative monthly production of denatured ethanol produced in the state equals or exceeds an annual production volume of at least 50 million gallons, 2% of the total gasoline sold by volume in the state must be denatured ethanol produced from domestically grown feedstock or other biomass materials. Within six months following the point at which cumulative monthly production of biodiesel produced in the state equals or exceeds an annual production volume of 10 million gallons, 2% of the total diesel sold by volume in the state must be biodiesel produced from domestically grown feedstock.
Minnesota	Mandate	E10	All gasoline sold or offered for sale in Minnesota must contain at least:10% corn-based ethanol by volume or the maximum percent by volume of corn-based ethanol authorized in a waiver issued by the U.S. EPA, whichever is greater; or 10% other biofuel authorized in an EPA waiver by volume, or a biofuel formulation registered by EPA under Title 42 of the Code of Federal Regulations, section 7545.Any biofuel may be used to meet the standards above, but corn-based ethanol may comprise no less than the following percentages of the total biofuel use in the state by the date specified: by January 1, 2020, 60%; by January 1, 2025, no minimum.
		B5, B10, B20	During the months of April through September, diesel fuel sold in the state must contain at least 20% biodiesel (B20). Diesel fuel sold during the remainder of the year must contain at least 5% biodiesel (B5). From April 1 to April 14, diesel fuel sold in the state can be a lower blend than B20, but not less than 10% biodiesel (B10).
Missouri	Mandate	E10	Missouri Renewable Fuel Standard requires that, after January 1, 2008, all gasoline sold or offered for sale at retail stations within the state must contain 10% ethanol. This requirement is waived only if a distributor is unable to purchase ethanol or ethanol-blended gasoline at the same or lower price as unblended gasoline. Premium gasoline is exempt from this requirement.
New Mexico	Mandate	B5	All diesel fuel sold for use in on-road motor vehicles to state agencies, political subdivisions of the state, and public schools must contain at least 5% biodiesel (B5). All diesel fuel sold to consumers for use in on-road motor vehicles is mandated to contain at least B5. As of December 12, 2018, the biodiesel blend mandate is suspended through June 15, 2019.

Table 9 (Con't). Federal and State Biofuels Mandates or Goals and Other Investment or Sales Incentive Programs

Government	Mandate or Goal	Biofuel Type	Description
Oregon	Mandate	E10, B2 or B5	All gasoline sold in the state must be blended with 10% ethanol since mid-2008, three months after retailers were notified by the Oregon Department of Agriculture (ODA) that Oregon ethanol production has reached 40 million gallons per year. In addition, all diesel fuel sold in the state must be blended with 2% biodiesel within three months after retailers are notified by the ODA that biodiesel production from sources in the Pacific Northwest (consisting of Oregon, Washington, Idaho, and Montana) has reached a level of at least five million gallons on an annualized basis for at least three months. The biodiesel blending requirement increases to 5% when the annual production level reaches at least 15 million gallons on an annualized basis for at least three months.
Pennsylvania	Mandate	E10+, B5+, B10+,B20+	One year after in-state production has reached 350 million gallons of cellulosic ethanol and sustained this volume for three months, all gasoline sold in Pennsylvania must contain at least 10% cellulosic ethanol. All diesel fuel sold in Pennsylvania must contain at least 2% biodiesel (B2) one year after in-state production of biodiesel reaches 40 million gallons. The mandated biodiesel blend level will continue to increase according to the following schedule: •5% biodiesel (B5) one year after in-state production of biodiesel reaches 100 million gallons; •10% biodiesel (B10) one year after in-state production of biodiesel reaches 200 million gallons; and •20% biodiesel (B20) one year after in-state production of biodiesel reaches 400 million gallons. All biodiesel retailers in Pennsylvania must register with the Pennsylvania Department of Agriculture each year. Additional compliance and blending standards, in-state registration requirements, and certification and enforcement guidelines apply.
Rhode Island	Targets in Petroleum Reduction Initiative	NA	The Petroleum Savings and Independence Advisory Commission (Commission) was established to provide recommendations and monitor programs designed to reduce the state's dependence on petroleum-based fuels in the transportation and heating sectors. Established targets may not provide less than a 30% overall reduction in petroleum consumption from 2007 levels by 2030 and a 50% overall reduction from 2007 levels by 2050. Recommendations will include those related to incentives, plug-in electric vehicle deployment, implementation of a clean fuels standard, and land use planning. The Commission must report on monitoring activities to the General Assembly at least every two years.
Washington	Mandate	B2+	At least 2% of the diesel sold must be biodiesel, beginning November 30, 2008, or when a determination is made by the Director of the Department of Ecology that feedstock grown in Washington State can satisfy a 2% fuel blend requirement. The biodiesel requirement would increase to 5% once in-state feedstocks and oil-seed crushing capacity can meet a 3% requirement. Additionally, by December 1, 2008, at least 2% of the total gasoline sold in the state must be denatured ethanol. The ethanol requirement could be increased to 10% if the Director of the Department of Ecology determines that this would not jeopardize continued attainment of federal Clean Air Act standards.

Table 9 (Con't). Federal and State Biofuels Mandates or Goals and Other Investment or Sales Incentive Programs

Government	Mandate or Goal	Biofuel Type	Description
Wisconsin	Goal	Renewable sources	Increase the use of renewable energy and renewable fuels by 25% by 2025 in the State of Wisconsin
Fifteen States	Goal	Renewable sources	Agricultural products will provide 25% of the total energy consumed in the United States by the year 2025.

Source: U.S. Department of Energy, Alternative Fuels Data Center, http://www.eere.energy.gov/afdc/, accessed August 2019, and relevant webpages of Department of Revenue of each state.

In fifteen states, including Alabama, California, Colorado, Florida, Georgia, Illinois, Kansas, Louisiana, Mississippi, Montana, Nebraska, North Dakota, South Dakota, Tennessee, Vermont, state legislative passed "25 x 25" vision, in which renewable energy will provide 25% of the total energy consumed in the United States by the year 2025.

Table 10. Iowa Fuel Excise Tax Rates at Rack Level, 1989 – July 2020

Effective Date of Change	Gasoline Tax Rate	Ethanol Tax Rate	Diesel Tax Rate (including B0-B10)	B11 Plus	Tax Rate Reduction for Ethanol	Tax Rate Reduction for B11 Plus
1989	$0.200	$0.19	$0.225	$0.225	$0.010	NA
1-Jul-02	$0.201	$0.19	$0.225	$0.225	$0.011	NA
1-Jul-03	$0.203	$0.19	$0.225	$0.225	$0.013	NA
1-Jul-04	$0.205	$0.19	$0.225	$0.225	$0.015	NA
1-Jul-05	$0.207	$0.19	$0.225	$0.225	$0.017	NA
1-Jan-06	$0.207	$0.19	$0.225	$0.225	$0.017	NA
1-Jul-06	$0.210	$0.19	$0.225	$0.225	$0.020	NA
1-Jul-07	$0.207	$0.19	$0.225	$0.225	$0.017	NA
1-Jul-08	$0.210	$0.19	$0.225	$0.225	$0.020	NA
1-Mar-15	$0.310	$0.29	$0.325	$0.325	$0.020	NA
1-Jul-15	$0.308	$0.293	$0.325	$0.295	$0.015	$0.03
1-Jul-16	$0.307	$0.29	$0.325	$0.295	$0.017	$0.03
1-Jul-17	$0.305	$0.29	$0.325	$0.295	$0.015	$0.03
1-Jul-18	$0.307	$0.29	$0.325	$0.295	$0.017	$0.03
1-Jul-19	$0.305	$0.29	$0.325	$0.295	$0.015	$0.03
1-Jul-20	$0.305	$0.29	$0.325	$0.295	$0.015	$0.03

Source: Iowa Department of Revenue, also see Iowa Code 452A.3.
Note: January 1, 2006 through July 1, 2007, the Fuel Tax Rate for E85 was 17 cents per gallon.

Table 11. Iowa Sales of Ethanol and B11 Plus and Tax Reduction at Rack Level, Fiscal Years 2007 – 2019

Fiscal Year	Ethanol Rack Level Sales (Million Gallons)	B11 Plus Rack Level Sales (Million Gallons)	Ethanol Tax Reduction (Million)	B11 Plus Tax Reduction (Million)
2007	1,137.6	NA	$22.8	NA
2008	1,212.2	NA	$20.6	NA
2009	1,181.5	NA	$23.6	NA
2010	1,195.0	NA	$23.9	NA
2011	1,219.6	NA	$24.4	NA
2012	1,196.1	NA	$23.9	NA
2013	1,143.3	NA	$22.9	NA
2014	1,197.7	NA	$24.0	NA
2015	1,240.4	NA	$24.8	NA
2016	1,051.8	31.1	$15.8	$0.9
2017	1,162.2	48.5	$19.8	$1.5
2018	1,129.2	66.1	$16.9	$2.0
2019	1,156.1	95.5	$19.7	$2.9

Source: Iowa Monthly Fuel Tax Report data. Note: The overall impacts of fuel tax rate reduction are not limited to rack prices; the retail prices are affected as well but the impact is not included in the table.

Table 12. Quarterly Iowa Biodiesel Production Sales Tax Refund, Calendar Years 2012 – 2019 (2019 First Two Quarters Only)

Calendar Year	Gallons (Million) and Refunds (Million $)									
	1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		Total	
	Gallons	Refund	Gallons	Refund	Gallons	Refund	Gallons	Refund	Gallons	Refund
2012	41.87	$1.3	54.99	$1.6	44.22	$1.3	25.88	$0.8	166.95	$5.0
2013	42.77	$1.1	56.74	$1.4	50.64	$1.3	43.07	$1.1	193.21	$4.8
2014	38.48	$0.8	52.28	$1.0	51.05	$1.0	39.36	$0.8	181.17	$3.6
2015	40.44	$0.8	65.09	$1.3	41.73	$0.8	36.73	$0.7	183.98	$3.7
2016	57.19	$1.1	73.11	$1.5	55.49	$1.1	36.02	$0.7	221.81	$4.4
2017	47.77	$1.0	67.58	$1.4	59.47	$1.2	31.35	$0.6	206.17	$4.1
2018	75.12	$1.5	77.01	$1.5	45.46	$0.9	19.84	$0.4	217.43	$4.3
2019	70.75	$1.4	69.38	$1.4	NA	NA	NA	NA	140.13	$2.8

Source: Iowa Department of Revenue.

Table 13. Iowa Renewable Fuel Infrastructure Grant Program Projects and Grants, Fiscal Years 2007 –2020 (Half Year)

Fiscal Year	Number of Projects						Total Amount of Grants					
	E15	E85	Biodiesel	Replace Pump	Bonus	**Total**	E15	E85	Biodiesel	Replace Pump	Bonus	**Total**
2007	0	35	53	0	0	**88**	$0	$654,159	$1,378,115	$0	$0	**$2,032,274**
2008	0	19	48	0	0	**67**	$0	$583,400	$1,297,400	$0	$0	**$1,880,800**
2009	0	31	73	1	5	**110**	$0	$1,294,600	$2,446,400	$26,300	$30,000	**$3,797,300**
2010	0	19	28	0	6	**53**	$0	$778,600	$1,037,400	$0	$36,000	**$1,852,000**
2011	0	32	25	1	8	**66**	$0	$1,500,500	$1,048,800	$22,300	$48,000	**$2,619,600**
2012	0	29	31	0	8	**68**	$0	$1,350,700	$1,371,850	$0	$48,000	**$2,770,550**
2013	0	16	23	0	4	**43**	$0	$791,391	$941,626	$0	$24,000	**$1,757,018**
2014	0	23	31	0	2	**56**	$0	$1,082,947	$1,152,156	$0	$12,000	**$2,247,102**
2015	0	11	22	0	3	**36**	$0	$518,272	$992,897	$0	$18,000	**$1,529,169**
2016	2	48	30	0	11	**91**	$100,000	$2,148,838	$1,506,770	$0	$66,000	**$3,821,608**
2017	3	30	37	0	7	**77**	$125,151	$1,473,027	$1,623,018	$0	$42,000	**$3,263,196**
2018	18	14	28	0	0	**60**	$644,226	$700,000	$1,487,924	$0	$0	**$2,832,150**
2019	19	4	13	0	0	**36**	$950,000	$200,000	$588,434	$0	$0	**$1,738,434**
2020 (Half Year)	3	9	17	0	0	**29**	$147,359	$437,965	$778,498	$0	$0	**$1,363,822**
Total (2007-2019)	**42**	**311**	**442**	**2**	**54**	**851**	**$1,819,376**	**$13,076,434**	**$16,872,790**	**$48,600**	**$324,000**	**$32,141,200**
Share in Total (2007-2019)	4.9%	36.5%	51.9%	0.2%	6.3%	100.0%	5.7%	40.7%	52.5%	0.2%	1.0%	100.0%

Source: Iowa Department of Agriculture & Land Stewardship.

Table 14. Number of Flexible Fuel Vehicles (FFVs) Registered in Iowa, Calendar Years 2010 – 2019

Calendar Year	Passenger FFVs	Light Truck FFVs	Total FFVs	Total FFVs Annual Growth Rate	Total Vehicles	Percentage of FFVs of Total Vehicles
2010	94,759	44,043	138,802	0.0%	4,141,397	3.4%
2011	109,446	59,353	168,799	21.6%	4,176,857	4.0%
2012	122,442	75,900	198,348	17.5%	4,203,979	4.7%
2013	150,346	91,708	242,054	22.0%	4,250,858	5.7%
2014	176,774	106,075	282,849	16.9%	4,282,200	6.6%
2015	202,176	112,397	314,573	11.2%	4,341,801	7.2%
2016	224,535	117,258	341,793	20.8%	4,408,540	7.8%
2017	243,938	121,127	365,065	6.8%	4,462,565	8.2%
2018	259,078	124,404	383,482	5.0%	4,517,539	8.5%
2019	239,292	108,474	347,766	-9.3%	4,531,728	7.7%

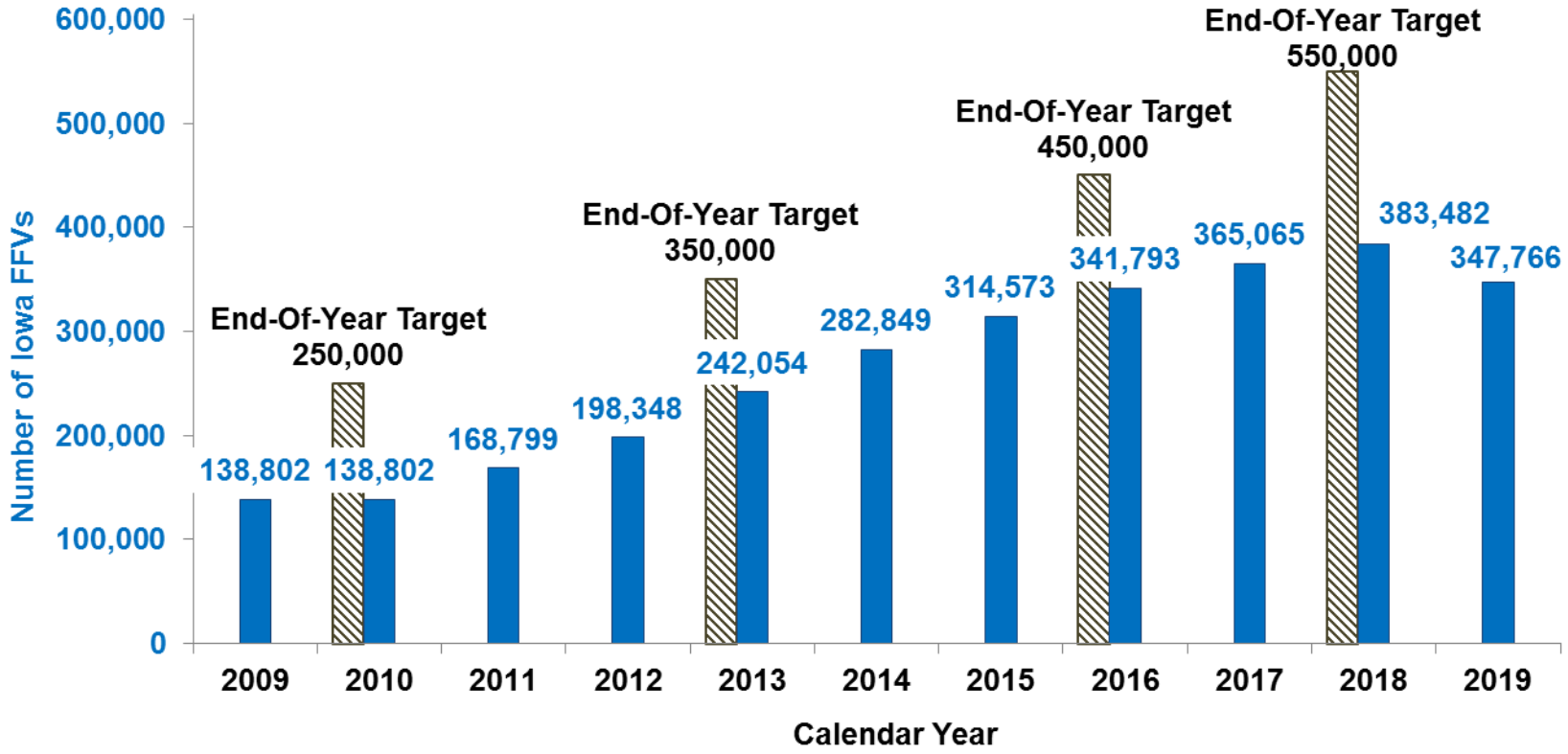
Source: Registered Flexible Fuel Vehicles Data, Iowa Department of Transportation.

Table 15. Total Number of Flex Fuel Vehicles (FFVs) and E85 or E15-E20 Sales in Iowa, Calendar Years 2009 – 2018

Calendar Year	Total FFVs	E85 Gallons Sold	E85 Gallons per FFV	E15-E20 Gallons Sold	E15-E20 Gallons per FFV
2009	138,802	5,892,280	42	NA	NA
2010	138,802	10,019,508	72	NA	NA
2011	168,799	10,674,574	63	105,766	1
2012	198,348	9,017,410	45	2,098,443	11
2013	242,054	11,152,763	46	2,614,911	11
2014	282,849	12,081,095	43	3,953,477	14
2015	314,573	13,784,909	44	8,742,718	28
2016	341,793	13,471,861	39	9,034,588	26
2017	365,065	20,570,648	56	28,884,059	79
2018	383,482	20,161,858	53	36,454,737	95

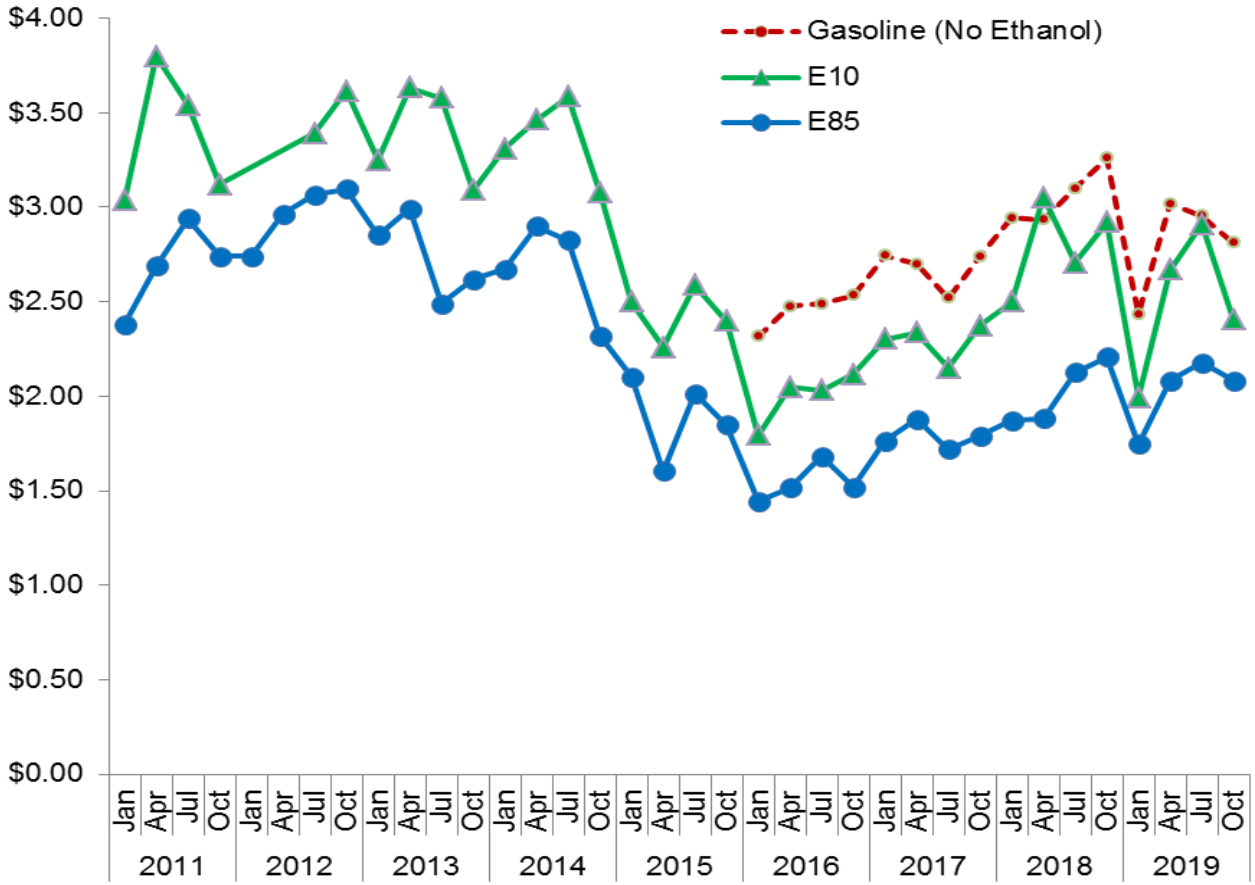
Source: Iowa Department of Transportation and IDR's Iowa Retailers Fuel Gallons Annual Report.
Note: Table does not report 2019 because E85 sold for 2019 is not available yet.

Figure 1. Targeted and Actual Number of Flex Fuel Vehicles, Calendar Years 2009 – 2019



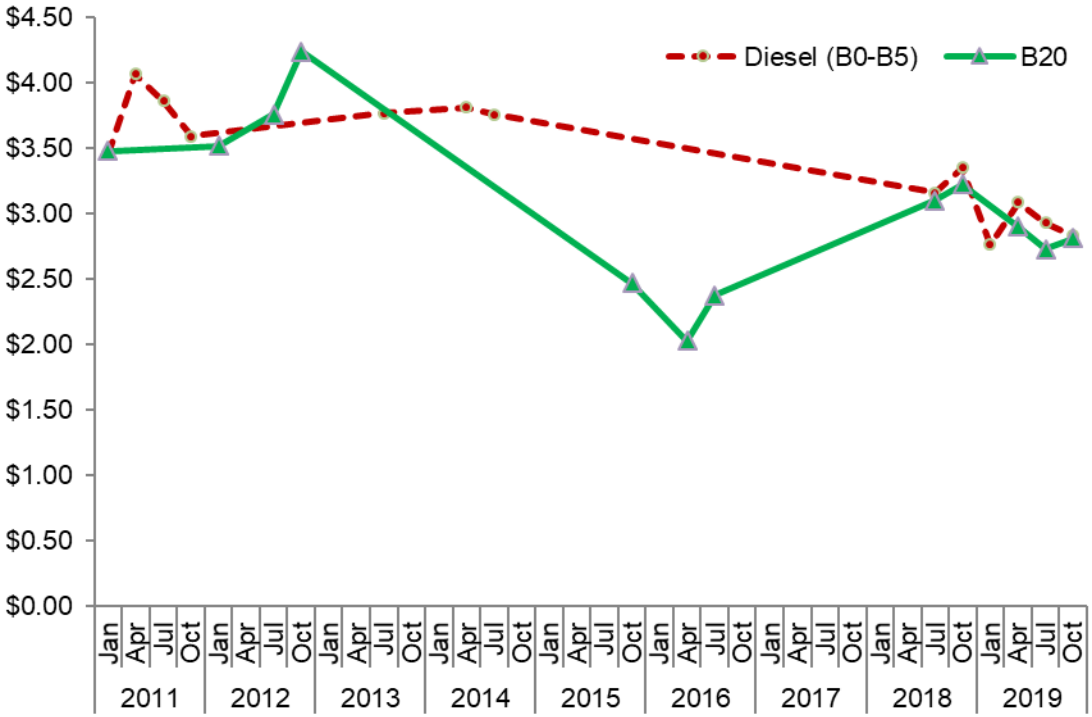
Source: HF 2754 for targets and Iowa Department of Transportation for actual numbers.

Figure 2. Iowa Average Retail, Gasoline, E10 and E85 Prices per Gallon, Calendar Years 2011 – 2019



Source: The Iowa Clean Cities Coalition at the Iowa Economic Development Authority.

Figure 3. Iowa Average Retail Diesel and B20 Prices per Gallon, Calendar Years 2011 – 2019



Source: The Iowa Clean Cities Coalition at the Iowa Economic Development Authority.

Table 16. Ethanol and Biodiesel Retail Sales, Calendar Years 2007 – 2018

Calendar Year	Total Ethanol Sales (E10, E15, E20, E85, Other Ethanol)			Total E85 Sales			Total E15 or E20 Sales			Total Biodiesel Sales		
	Million Gallons	Year-over-Year Increase	Ethanol Share of Total Gasoline Sales	Million Gallons	Year-over-Year Increase	E85 Share of Total Gasoline Sales	Million Gallons	Year-over-Year Increase	E15 or E20 Share of Total Gasoline Sales	Million Gallons	Year-over-Year Increase	Biodiesel Share of Total Diesel Sales
2007	998.9	NA	71.1%	4.2	NA	0.3%	NA	NA	NA	160.8	NA	22.6%
2008	1,269.9	27.1%	82.3%	7.7	84.5%	0.5%	NA	NA	NA	226.8	41.1%	30.0%
2009	1,203.3	-5.2%	81.4%	5.9	-23.2%	0.4%	NA	NA	NA	175.7	-22.5%	31.9%
2010	1,289.7	7.2%	82.5%	10.0	70.0%	0.6%	NA	NA	NA	239.8	36.5%	32.4%
2011	1,187.6	-7.9%	82.1%	10.7	6.5%	0.7%	0.1	NA	NA	245.2	2.3%	33.7%
2012	1,199.2	1.0%	81.7%	9.0	-15.5%	0.6%	2.1	1884.0%	0.1%	285.8	16.6%	42.6%
2013	1,198.9	0.0%	82.2%	11.2	23.7%	0.8%	2.6	24.6%	0.2%	347.8	21.7%	49.2%
2014	1,285.7	7.2%	85.8%	12.1	8.3%	0.8%	4.0	51.2%	0.3%	354.8	2.0%	48.9%
2015	1,341.3	4.3%	85.9%	13.2	8.9%	0.8%	8.7	121.1%	0.6%	342.0	-3.6%	41.3%
2016	1,369.4	2.1%	86.2%	13.5	2.4%	0.8%	9.0	3.3%	0.6%	379.8	11.0%	45.1%
2017	1,364.3	-0.4%	87.2%	20.6	52.7%	1.3%	28.9	219.7%	1.8%	435.0	14.5%	51.9%
2018	1,356.7	-0.6%	87.0%	20.2	-2.0%	1.3%	36.5	26.2%	2.3%	458.9	5.5%	55.5%

Calendar Year	Total Biodiesel Sales (B1-B100)			Total B1-B4 Sales			Total B5-B10 Sales			Total B11 Plus Sales		
	Million Gallons	Year-over-Year Increase	Biodiesel Share of Total Diesel Sales	Million Gallons	Year-over-Year Increase	B1-B4 Share of Total Diesel Sales	Million Gallons	Year-over-Year Increase	B5-B10 Share of Total Diesel Sales	Million Gallons	Year-over-Year Increase	B11 Plus Share of Total Diesel Sales
2007	160.8	NA	22.6%	66.8	NA	7.7%	49.1	NA	5.6%	44.9	NA	5.1%
2008	226.8	41.1%	30.0%	79.5	19.0%	8.1%	32.1	-34.7%	3.3%	115.2	156.7%	11.7%
2009	175.7	-22.5%	31.9%	120.5	51.6%	14.2%	74.6	132.6%	8.8%	10.1	-91.3%	1.2%
2010	239.8	36.5%	32.4%	83.4	-30.8%	13.0%	66.2	-11.3%	10.3%	55.6	452.8%	8.6%
2011	245.2	2.3%	33.7%	100.6	20.6%	10.3%	114.2	72.6%	11.7%	31.2	-43.9%	3.2%
2012	285.8	16.6%	42.6%	37.4	-62.8%	5.6%	174.9	53.1%	26.0%	73.6	135.7%	10.9%
2013	347.8	21.7%	49.2%	15.2	-59.5%	2.1%	181.6	3.9%	25.7%	151.0	105.3%	21.4%
2014	354.8	2.0%	48.9%	12.9	-14.6%	1.8%	155.0	-14.7%	21.4%	186.8	23.7%	25.8%
2015	342.0	-3.6%	41.3%	22.1	70.3%	2.7%	146.7	-5.3%	17.7%	173.6	-7.1%	20.9%
2016	379.8	11.0%	45.1%	11.6	-47.2%	1.4%	126.7	-13.6%	15.1%	241.5	39.1%	28.7%
2017	435.0	14.5%	51.9%	10.6	-9.3%	1.3%	112.6	-11.1%	13.4%	311.9	29.1%	37.2%
2018	458.9	5.5%	55.5%	12.9	22.2%	1.6%	139.5	23.9%	16.9%	306.5	-1.7%	37.1%

Source: Iowa Retailers Fuel Gallons Annual Reports, 2007-2018.

Table 17. Fuel Stations Average Sizes and Share in Urban Areas by Category, Calendar Year 2018

	A	B	C	D	E	F	G
	All the Stations Having Sales of Any Fuel	Stations Having Nonzero Gasoline Sales but Zero E15-E20, E85 Sales	Stations Having E15-E20 Sales	Stations Having E85 Sales	Stations Having Deiseal Sales but Without Biodiesel Sales	Stations Having B1-B10 Sales	Stations Having B11+ Sales
Number of Stations	2,070	64	226	310	658	710	508
Share in Urban Area	43.1%	35.9%	44.7%	44.5%	35.0%	44.9%	43.7%
Average Sales of Any Fuel	1,152,199	221,247	1,481,508	1,796,102	792,586	1,860,983	2,132,846
Average Sales of Gasoline	97,737	75,032	99,560	136,955	65,611	131,825	142,441
Average Sales of Ethanol	655,401	0	888,847	986,770	439,239	899,609	979,949
Average Sales of Pure Ethanol	73,165	0	141,077	148,464	47,917	106,923	107,560
Average Sales of Diesel (Nonbiodiesel)	177,384	146,200	192,575	301,548	287,736	220,486	248,496
Average Sales of Biodiesel	221,677	14	300,525	370,829	0	609,063	761,959
Average Sales of Pure Biodiesel	28,409	1	30,478	37,281	0	77,391	105,321
Average Biofuel Distribution Percentage	12.3%	0.02%	18.7%	19.1%	9.4%	17.9%	18.4%

Source: the 2018 Iowa Retailers Fuel Gallons Annual Report data

Note: These categories have some overlaps. For example, E85 stations are included in categories A, B, C, and D (or even E, F, G depending on their diesel and biodiesel sales).

Table 18. Taxpayer Claims to Ethanol Promotion Tax Credit Reported on IA 148, Tax Years 2008 – 2017

Tax Year	Number of Claims				Total EPTC Claims				Average EPTC Claims		
	Corporation	Individual	Pass-Through	Total	Corporation	Individual	Pass-Through	Total	Corporation	Individual	Pass-Through
2008	69	**	12	**	$1,045,613	$9,465	$56,278	$1,111,356	$15,154	**	$4,690
2009	122	130	739	991	$2,539,039	$178,018	$1,956,631	$4,673,688	$20,812	$1,369	$2,648
2010	121	104	705	930	$1,998,276	$109,263	$1,706,510	$3,814,049	$16,515	$1,051	$2,421
2011	105	81	543	729	$1,505,285	$64,187	$1,777,254	$3,346,726	$14,336	$792	$3,273
2012	74	49	414	537	$686,124	$40,740	$1,378,992	$2,105,856	$9,272	$831	$3,331
2013	61	51	349	461	$698,141	$35,174	$1,588,659	$2,321,974	$11,445	$690	$4,552
2014	51	26	297	374	$675,346	$13,256	$1,263,642	$1,952,244	$13,242	$510	$4,255
2015	38	19	296	353	$331,625	$5,423	$1,105,756	$1,442,804	$8,727	$285	$3,736
2016	23	**	239	**	$267,907	$1,074	$404,845	$673,826	$11,648	**	$1,694
2017*	13	**	250	**	$249,877	$979	$427,561	$678,417	$19,221	**	$1,710
Total	677	470	3,844	4,991	$9,997,233	$457,579	$11,666,128	$22,120,940	$14,767	$974	$3,035

Source: Tax Credit Award, Claim & Transfer Administration System (CACTAS). Notes: * Tax year 2017 data are incomplete. A small number of fiduciary taxpayers are included. ** Cells with counts lower than 5 are not revealed to protect taxpayers' confidentiality.

Table 19. Concentration of Ethanol Promotion Tax Credit Claims, Tax Years 2008 – 2017

Tax Year	Number of Entities Which Earned the Tax Credit	Total Claims	Claims by Top 20 Entities Which Earned the Tax Credit	Share of Claims Made by Top 20 Entities
2008	79	$1,111,356	$978,758	88.1%
2009	522	$4,674,974	$3,247,440	69.5%
2010	468	$3,813,907	$2,725,110	71.5%
2011	377	$3,346,619	$2,480,798	74.1%
2012	258	$2,108,312	$1,551,246	73.6%
2013	226	$2,323,056	$1,868,120	80.4%
2014	158	$1,954,174	$1,614,173	82.6%
2015	121	$1,443,233	$1,307,302	90.6%
2016	78	$673,735	$588,537	87.4%
2017*	65	$495,927	$455,137	91.8%

Source: Iowa Department of Revenue Tax Credit Award, Claim & Transfer Administration System (CACTAS).
Note: * Tax year 2017 data are incomplete.

Table 20. Taxpayer Claims to E85 Gasoline Promotion Tax Credit Reported on IA 148, Tax Years 2006 – 2017

	Number of Claims				Total Claims				Average Claims		
Tax Year	Corporation	Individual	Pass-Through	Total	Corporation	Individual	Pass-Through	Total	Corporation	Individual	Pass-Through
2006	24	7	76	107	$334,958	$5,510	$164,261	$504,729	$13,957	$787	$2,161
2007	31	33	89	153	$600,878	$20,536	$354,655	$976,069	$19,383	$622	$3,985
2008	38	27	142	207	$492,908	$22,002	$852,546	$1,367,456	$12,971	$815	$6,004
2009	43	20	248	311	$480,877	$39,491	$796,489	$1,316,857	$11,183	$1,975	$3,212
2010	40	7	196	243	$298,621	$20,570	$1,208,056	$1,527,247	$7,466	$2,939	$6,164
2011	50	12	214	276	$381,088	$11,614	$737,839	$1,130,541	$7,622	$968	$3,448
2012	50	11	200	261	$396,469	$20,118	$1,012,252	$1,428,839	$7,929	$1,829	$5,061
2013	50	15	221	286	$644,655	$21,767	$1,237,660	$1,904,082	$12,893	$1,451	$5,600
2014	49	19	215	283	$644,214	$28,784	$1,305,708	$1,978,706	$13,147	$1,515	$6,073
2015	48	14	208	270	$789,890	$12,864	$1,373,603	$2,176,357	$16,456	$919	$6,604
2016	48	21	248	317	$714,099	$28,998	$1,400,162	$2,143,259	$14,877	$1,381	$5,646
2017*	30	17	257	304	$548,845	$31,387	$1,930,385	$2,510,617	$18,295	$1,846	$7,511
Total	501	203	2,314	3,018	0 $6,327,502	$263,641	$12,373,616	$18,964,759	$12,630	$1,299	$5,347

Source: Iowa Department of Revenue Tax Credit Award, Claim & Transfer Administration System (CACTAS).
Notes: * Tax year 2017 data are incomplete.
Individual taxpayers include a small number of fiduciary taxpayers.

Table 21. Concentration of E85 Gasoline Promotion Tax Credits, Tax Years 2006 – 2017

Tax Year	Number of Entities Which Earned the Tax Credit	Total Claims	Claims by Top 20 Entities Which Earned the Tax Credit	Share of Claims Made by Top 20 Entities
2006	51	$504,729	$446,006	88.4%
2007	87	$976,069	$765,059	78.4%
2008	100	$1,367,456	$1,103,118	80.7%
2009	127	$1,316,857	$968,170	73.5%
2010	110	$1,527,247	$1,159,096	75.9%
2011	119	$1,130,541	$863,313	76.4%
2012	116	$1,428,526	$1,156,123	80.9%
2013	122	$1,904,392	$1,575,329	82.7%
2014	113	$1,978,529	$1,661,300	84.0%
2015	109	$2,183,858	$1,895,810	86.8%
2016	119	$2,157,176	$1,846,328	85.6%
2017*	93	$1,993,633	$1,809,840	90.8%

Source: Iowa Department of Revenue Tax Credit Award, Claim & Transfer Administration System (CACTAS).
Note: * Tax year 2017 data are incomplete.

Table 22. Taxpayer Claims to E15 Plus Gasoline Promotion Tax Credit Reported on IA 148, Tax Years 2010 – 2017

	Number of Claims				Total Claims				Average Claims		
Tax Year	Corporation	Individual	Pass-Through	Total (Except Individual)	Corporation	Individual	Pass-Through	Total	Corporation	Individual	Pass-Through
2010	2	0	**	**	$1,217	$0	$275	$1,492	$609	$0	$138
2011	10	0	18	28	$13,132	$0	$5,120	$18,252	$1,313	$0	$284
2012	21	0	37	58	$27,000	$0	$6,595	$33,595	$1,286	$0	$178
2013	29	0	51	80	$45,774	$0	$10,352	$56,126	$1,578	$0	$203
2014	27	**	65	92	$71,086	$0	$24,585	$95,671	$2,633	**	$378
2015	31	0	65	96	$149,505	$0	$37,064	$186,569	$4,823	$0	$570
2016	31	**	72	103	$205,996	$757	$219,762	$426,515	$6,645	**	$3,052
2017*	21	**	146	167	$101,538	$4,469	$1,894,426	$2,000,433	$4,835	**	$12,976
Total	172	**	456	624	$615,248	$5,226	$2,198,179	$2,818,653	$3,577	**	$4,821

Source: Iowa Department of Revenue Tax Credit Award, Claim & Transfer Administration System (CACTAS).
Notes: Tax year 2010 claims were made by a handful of fiscal-year filers. * Tax year 2017 data are incomplete.
Individual taxpayers include a small number of fiduciary taxpayers.
** Cells with counts lower than 5 are not revealed to protect taxpayers' confidentiality.

Table 23. Concentration of E15 Plus Gasoline Promotion Tax Credit, for Tax Years 2011 – 2017

Tax Year	Number of Entities Which Earned the Tax Credit	Total Claims	Claims by Top 20 Entities Which Earned the Tax Credit	Share of Claims Made by Top 20 Entities	Claims by Top 10 Entities	Share of Claims Made by Top 10 Entities
2011	17	$18,252	$18,252	100.0%	$17,027	93.3%
2012	36	$33,595	$30,702	91.4%	$24,176	72.0%
2013	43	$56,098	$49,535	88.3%	$36,527	65.1%
2014	46	$95,739	$79,747	83.3%	$51,919	54.2%
2015	49	$186,489	$159,862	85.7%	$132,240	70.9%
2016	49	$426,788	$397,704	93.2%	$355,845	83.4%
2017*	44	$831,344	$814,203	97.9%	$664,959	80.0%

Source: Iowa Department of Revenue Tax Credit Award, Claim & Transfer Administration System (CACTAS).

Note: * Tax year 2017 data are incomplete.

Table 24. Taxpayer Claims to Biodiesel Blended Fuel Tax Credit Reported on IA 148, Tax Years 2006 – 2017

Tax Year	Number of Claims				Total Claims				Average Claims		
	Corporation	Individual	Pass-Through	Total	Corporation	Individual	Pass-Through	Total	Corporation	Individual	Pass-Through
2006	27	7	42	76	$1,282,814	$62,009	$1,298,647	$2,643,470	$47,512	$8,858	$30,920
2007	20	54	95	169	$522,557	$375,305	$3,851,591	$4,749,453	$26,128	$6,950	$40,543
2008	16	35	102	153	$347,454	$150,080	$4,176,089	$4,673,623	$21,716	$4,288	$40,942
2009	16	23	127	166	$213,020	$164,623	$5,029,870	$5,407,513	$13,314	$7,158	$39,605
2010	13	10	77	100	$408,334	$103,398	$5,188,478	$5,700,210	$31,410	$10,340	$67,383
2011	14	12	135	161	$482,895	$77,689	$6,492,688	$7,053,272	$34,493	$6,474	$48,094
2012	26	14	221	261	$1,526,476	$380,824	$11,119,602	$13,026,902	$58,711	$27,202	$50,315
2013	35	10	238	283	$3,151,067	$84,871	$12,972,775	$16,208,713	$90,030	$8,487	$54,507
2014	37	23	274	334	$2,696,652	$214,596	$12,623,638	$15,534,886	$72,882	$9,330	$46,072
2015	41	16	294	351	$2,928,646	$120,735	$13,582,296	$16,631,677	$71,430	$7,546	$46,198
2016	40	13	366	419	$2,866,671	$121,931	$13,937,081	$16,925,683	$71,667	$9,379	$38,079
2017*	33	15	409	457	$3,294,749	$121,145	$15,827,781	$19,243,675	$99,841	$8,076	$38,699
Total	**318**	**232**	**2,380**	**2,930**	**$19,721,335**	**$1,977,206**	**$106,100,536**	**$127,799,077**	**$62,017**	**$8,522**	**$44,580**

Source: Iowa Department of Revenue Tax Credit Award, Claim & Transfer Administration System (CACTAS).
Notes: * Tax year 2017 data are incomplete. Individual taxpayers include a small number of fiduciary taxpayers.

Table 25. Concentration of Biodiesel Blended Fuel Tax Credits, Tax Years 2006 – 2017

Tax Year	Number of Entities Which Earned the Tax Credit	Total Claims	Claims by Top 20 Entities Which Earned the Tax Credit	Share of Claims Made by Top 20 Entities
2006	54	$2,643,470	$2,289,502	86.6%
2007	117	$4,734,174	$4,249,796	89.8%
2008	90	$4,673,623	$4,335,178	92.8%
2009	88	$5,407,215	$4,983,653	92.2%
2010	66	$5,700,210	$5,385,055	94.5%
2011	85	$7,053,272	$6,616,961	93.8%
2012	116	$13,020,566	$12,000,938	92.2%
2013	122	$16,207,167	$14,814,629	91.4%
2014	142	$15,537,378	$14,139,251	91.0%
2015	133	$16,552,923	$14,991,494	90.6%
2016	146	$16,936,750	$15,156,408	89.5%
2017*	150	$16,415,450	$14,913,936	90.9%

Source: Iowa Department of Revenue Tax Credit Award, Claim & Transfer Administration System (CACTAS).
Note: * Tax year 2017 data are incomplete.

Table 26. Actual and Forecasted Biofuel Retailers' Tax Credit Claims, Tax Years 2006 – 2024

	Millions $			
Tax Year	EPTC	E85GC	E15GC	BBFC
2006	NA	$0.5	NA	$2.6
2007	NA	$1.0	NA	$4.7
2008	$1.1	$1.4	NA	$4.7
2009	$4.7	$1.3	NA	$5.4
2010	$3.8	$1.5	$0.001	$5.7
2011	$3.3	$1.1	$0.02	$7.1
2012	$2.1	$1.4	$0.03	$13.0
2013	$2.3	$1.9	$0.06	$16.2
2014	$2.0	$2.0	$0.10	$15.5
2015	$1.4	$2.2	$0.19	$16.6
2016	$0.7	$2.2	$0.43	$16.9
2017*	$0.5	$2.0	$2.00	$16.4
2018 (F)	$1.3	$3.2	$2.9	$21.7
2019 (F)	$1.0	$3.5	$4.0	$22.1
2020 (F)	$0.9	$3.7	$4.2	$22.4
2021 (F)	NA	$3.9	$4.6	$22.7
2022 (F)	NA	$4.2	$5.0	$23.0
2023 (F)	NA	$4.4	$5.4	$23.2
2024 (F)	NA	$4.5	$5.7	$23.5

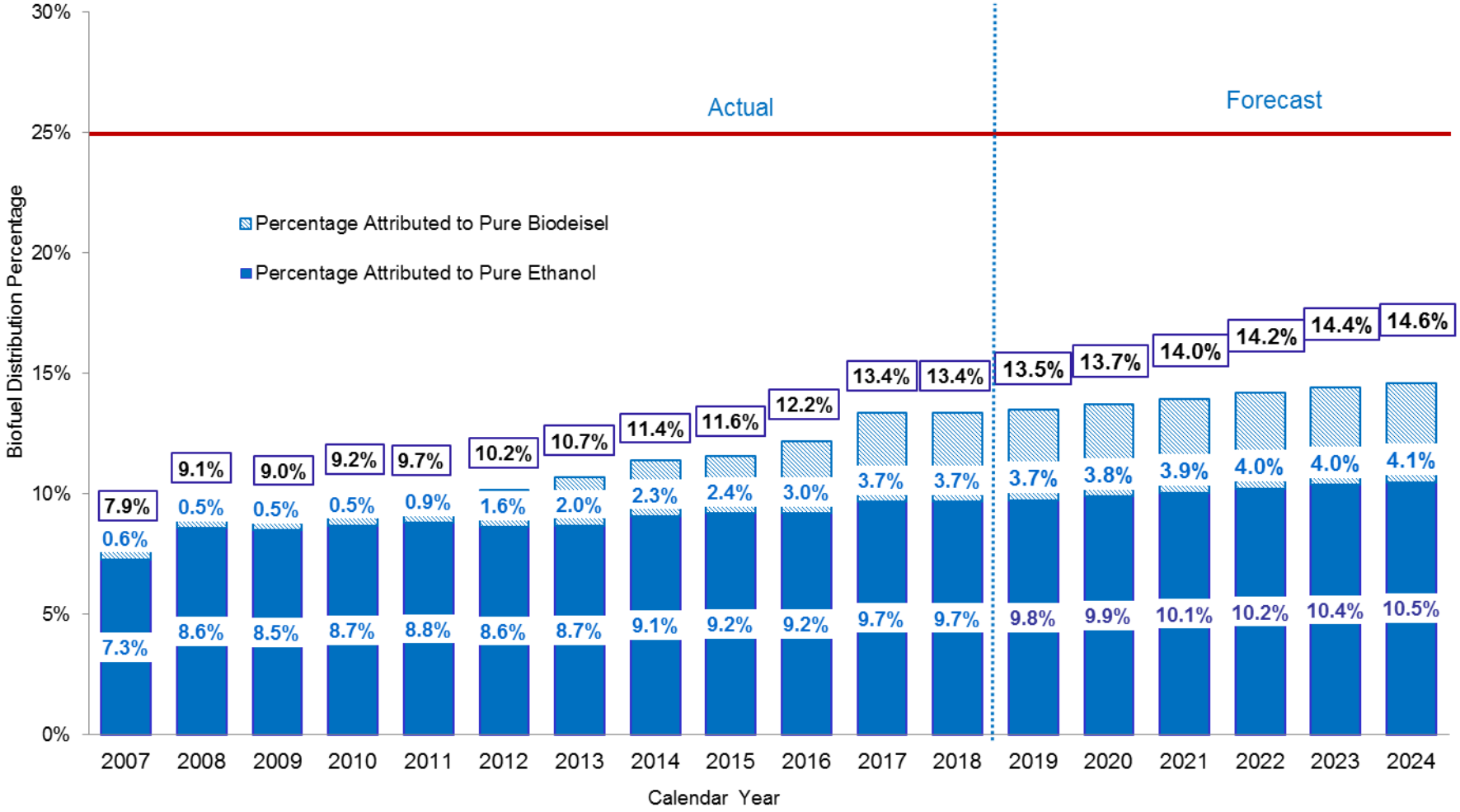
Source: Iowa Department of Revenue Tax Credit Award, Claim & Transfer Administration System (CACTAS) and 2018 Retailers Fuel Gallons Annual Report.
Notes: Actual claims data are presented for tax years 2006-2017. *Tax year 2017 claims data are incomplete. (F) Indicates forecasted claim amounts in nominal millions of dollars.

Table 27. Estimated Revenue Impacts If Summer E15GC Rate is Revised from $0.10 to $0.03

	Estimated E15-E69 Gallons (Million)			Estimated E15GC Claims (Million $)		
Tax Year	Summer	Nonsummer	Total	Under Current Summer Rate $0.10	Under Summer Rate $0.03	Estimated Revenue Impact (Million $)
2020	13.6	32.0	45.5	$2.3	$1.4	$1.0
2021	15.2	35.7	50.9	$2.6	$1.5	$1.1
2022	16.6	39.1	55.8	$2.8	$1.7	$1.2
2023	17.9	42.1	60.1	$3.1	$1.8	$1.3
2024	19.2	45.0	64.1	$3.3	$1.9	$1.3

Source: IDR forecast model (using the 2018 Retailers Fuel Gallons Annual Report data as base year) data for 2020 to 2024.

Figure 4. Actual and Forecasted Biofuel Distribution Percentage, Calendar Years 2007 – 2020



Sources: Retailers Fuel Gallons Annual Reports 2007 to 2018; IDR forecast model (using data from the 2018 Retailers Fuel Gallons Annual Report) for 2019 to 2024.
Notes: The biofuel distribution percentage in 2013 was adjusted from 10.8 percent in the published report to 10.7 percent in this study, reflecting a confirmation from a few respondents that E10 sales were misreported as E15 sales.

Table 28. Actual and Estimated Resources of State of Iowa Dedicated to Biofuel Retail and Production, Fiscal Years 2007 – 2025

	Amount in Million $			Share in Total		
	FY 2007-FY 2019 Total	FY 2020-FY 2025 Total	FY 2007-FY 2025 Total Spending (Million $)	FY 2007-FY 2019 Total	FY 2020-FY 2025 Total	FY 2007-FY 2025 Total Spending (Million $)
Four Retailer Tax Credits	$149.2	$187.8	**$380.4**	16.6%	20.8%	**42.2%**
Fuel Tax Rate Reduction	$290.2	$127.5	**$417.7**	32.2%	14.1%	**46.3%**
Biodeisel Production Refund	$30.2	$25.3	**$55.5**	3.4%	2.8%	**6.2%**
Renewable Fuel Infrastructure Program	$32.1	$15.7	**$47.8**	3.6%	1.7%	**5.3%**
Total	**$501.8**	**$356.3**	**$901.4**	**55.7%**	**39.5%**	**100.0%**

Note: *The Ethanol Blended Gasoline Tax Credit (which expired beginning 2008) is not included in this table (from FY 2005 to FY 2012 claim amount totaling $29.2 million).
Fuel tax rate reduction only calculates the tax rate reduction at rack level for blenders; the impact on retail prices is not included.