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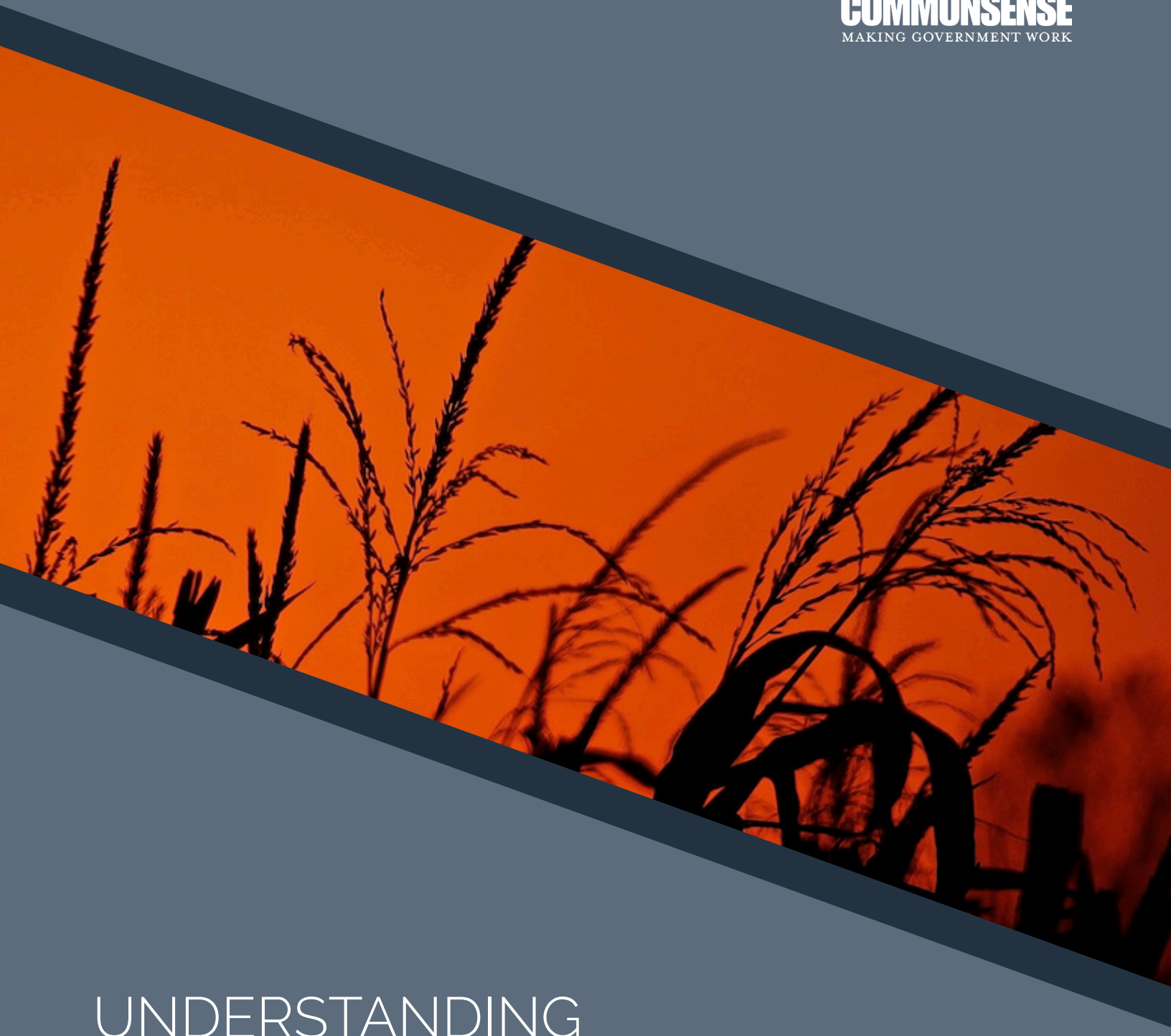

UNDERSTANDING FEDERAL SUBSIDIES FOR THE BIOFUELS & BIOMASS INDUSTRIES

SEPTEMBER 2015

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Elephant grass biofuel fields. © Creative Commons, Flickr.com

Introduction

Since its creation of the domestic market for corn ethanol after the energy crisis of the 1970s, the federal government has nurtured and maintained the ethanol industry with a steady stream of subsidies. Biofuels and biomass sources were originally sold as a way to help achieve U.S. energy independence, reduce greenhouse gas emissions, and spur rural economic development. The federal government has propped up the biofuels and biomass industries – primarily the mature corn ethanol industry – through billions in subsidies, special interest tax breaks, taxpayer-backed loan guarantees, and a variety of other supports for blender pumps and other infrastructure. Biofuels enjoy a guaranteed market as their production is mandated by the federal government through the Renewable Fuel Standard (RFS).

However, the next generation of biofuels and bioenergy has failed to meet its lofty expectations. Unintended consequences of increased corn demand have included higher food and feed costs, greater greenhouse gas emissions, and the conversion of millions of acres of native grasslands, wetlands, and other sensitive land to corn and other commodity crop acres.[1] Biofuel and biomass subsidies have allowed the federal government to pick winners and losers, distorted energy and agriculture markets, and contributed to expansion and overproduction of certain types of bioenergy.

After more than 30 years of federal backing for certain biofuels such as corn ethanol, the federal government should be scaling back – not expanding – its role in subsidizing the long supply chain of biofuels production. It's time the biomass and biofuels industries survived without taxpayer support.

Overview of Federal Biofuels and Biomass Subsidies

Biofuels and biomass subsidy programs are administered by various federal agencies, including the (USDA), Energy (DOE), Treasury, and the Environmental Protection Agency (EPA).

Department of Agriculture

Biomass subsidies in the federal Farm Bill's energy title are administered by USDA. The so-called Farm Bill, renewed approximately every five years, is a wide ranging piece of legislation that funds everything from nutrition assistance programs and broadband internet to agricultural subsidies for the production of crops such as corn and soybeans. More specifically, the energy title of the Farm Bill, first introduced in 2002 and reauthorized in 2008 and 2014, provides grants, loans, and other subsidies to energy efficiency, biofuels, and bioenergy (heat and power) projects.

Department of Energy

DOE administers various research and development programs for bioenergy, in addition to its Title XVII Loan Guarantee Program. Created as part of the Energy Policy Act of 2005, the program has $34 billion in authority to provide loan guarantees to various technologies, including nuclear, coal, energy efficiency, or renewables (wind, solar, geothermal, or biofuels). Aside from this authority, a Stimulus add-on known as the 1705 program also had about $2.4 billion in American Reinvestment and Recovery Act funds to pay for credit subsidies for renewable and energy efficiency projects, but those funds expired on September 30, 2011. Only two companies, Abengoa Bioenergy U.S. Holding and POET, LLC, have received the final go-ahead for a taxpayer-backed loan on a biofuels or biomass energy project although POET later withdrew from the program. Other biofuels/biomass companies are awaiting final approval of their loan guarantee applications, and given the program's past defaults, taxpayers could stand to lose even more if additional DOE loan guarantees are granted to risky projects.

Department of the Treasury

The Department of the Treasury administers a maze of biofuels and biomass tax breaks created by various pieces of legislation such as the 2005 and 2007 energy bills and so-called tax extenders packages that have been typically renewed at the end of calendar years with tax breaks for other industries. The main biomass tax break is the production tax credit (PTC), while subsidies for ethanol blender pumps, biodiesel, cellulosic ethanol, and many others litter the tax code.

Environmental Protection Agency

EPA administers the RFS, in addition to overseeing future biomass greenhouse gas (GHG) accounting regulations. The RFS requires 36 billion gallons of biofuels to be blended into U.S. gasoline by 2022. The Agency has failed to announce annual renewable fuel volumes on-time, as required by law, for the past several years, leading to a recent announcement for three calendar years (2014-16) of standards even though the 2014 standards were due a year and a half ago. The Agency has also failed to implement and enforce various RFS regulations properly, leading to new production of corn, for instance, on wetlands, native grasslands, highly erodible land, and other sensitive acres.

Farm Bill Energy Title Programs

The Farm Bill, a massive piece of legislation covering topics ranging from nutrition assistance to broadband internet, provides government subsidies for the now-mature ethanol industry, including corporate agribusiness giants such as Archer Daniels Midland. The majority of support for corn ethanol in the Farm Bill comes from energy title programs such as the Bioenergy Program for Advanced Biofuels, trade programs such as the Market Access Program, and other commodity and crop insurance supports for corn and ethanol blender pumps. Energy title programs enacted as part of the most recent 2014 Farm Bill are expected to cost taxpayers $879 million over the next ten years.[2]

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GAMING THE SYSTEM

Realizing that the corn ethanol industry had already received its fair share of federal handouts, Congress prohibited corn starch ethanol from qualifying for new energy title spending authorized in the 2008 Farm Bill, which was reauthorized in 2014. The intent was to allow the next generation of biofuels (advanced fuels made from non-food sources like agricultural residues, wood waste, and perennial grasses) to receive a greater share of grants, loan guarantees, and other subsidies. But despite corn ethanol facilities being prohibited from receiving energy title funding, at least four of the 15 programs allowed nearly $90 million dollars to be spent on corn-based biofuels from 2009 to 2013. This is in addition to potential taxpayer liabilities with the federal backing of conditional loan guarantees in the USDA's Biorefinery, Renewable Chemical, and Biobased Product Manufacturing Assistance Program.

Corn Ethanol Subsidies in the Farm Bill Energy and Trade Titles

Farm Bill Section	Program/Fund Name	Description	Corn-based biofuels projects receiving funding	Funding for corn-based biofuels from 2009 - 2014
Energy Title	Corn Ethanol Subsidies in the Farm Bill Energy and Trade Titles	Payments to advanced biofuels facilities to expand annual production	1 corn oil biodiesel facility and several corn ethanol facilities, presumably because some also use milo (in addition to corn) as a feedstock in the refining process.	$55 million (grants and loans)
	Biorefinery, Renewable Chemical, and Biobased Product Manufacturing Assistance Program	Grants and loan guarantees for advanced biofuels and heat and power facilities	SoyMor, a facility using corn and soybean oil for biodiesel production, received a conditional loan guarantee in 2009.	$25 million (conditional loan guarantee)
	Repowering Assistance Program	Reimbursements for biorefineries to replace fossil fuel power sources with biomass (like wood chips, municipal solid waste, or perennial grasses)	Two corn ethanol facilities received taxpayer funding to replace natural gas and fossil energy with a biomass boiler and a biogas digester.	$6.9 million (reimbursement payments)
Trade Title	Market Access Program	Market trade promotion program designed to expand agricultural exports	In FY15, the U.S. Grains Council received $5,073,674 for its overall trade missions, but the amount spent on ethanol specifically is unknown.[3] The Council notes that the Renewable Fuels Association and Growth Energy also accompanied it on ethanol trade missions, but these 2 organizations aren't direct recipients of MAP subsidies.[4]	Unknown
Commodity Title	Commodity Credit Corporation	Traditionally a fund reserved to pay out farm subsidies and farm loans, USDA proposed also using CCC funds to subsidize ethanol	In May 2015, USDA announced CCC funding for ethanol blender pumps, which primarily benefit corn ethanol.	$100 million is to be spent after USDA solicitation is posted in summer of 2015

* Note that until enactment of the Farm Bill in Feb. 2014, the Rural Energy for America Program (REAP) also provided $3.3 million in subsidies for fuel pumps dispensing corn ethanol even though the program was designed to fund grants and loan guarantees for rural energy efficiency and renewable energy projects, including solar, wind, hydropower, geothermal, and biomass.

Woody Biomass Subsidies in Farm Bill Energy and Rural Development Title Programs

Farm Bill Title	Program Name	Description	How Woody Biomass Receives Funding through Each Program	Woody Biomass Subsidies, 2009-13
Energy Title Programs	Biorefinery, Renewable Chemical, and Biobased Product Manufacturing Assistance Program (formerly the Biorefinery Assistance Program)	Grants and loan guarantees for advanced biofuels and heat and power facilities	Loan guarantees for facilities using woody biomass, in addition to other energy feed-stocks; some loans have been finalized while others are conditional or for companies that failed (such as Range Fuels)	$653 million
	Biomass Research and Development Initiative	Grants for research, development, and demonstration projects for biofuels and biobased chemicals and products	Several companies and universities received research and development cost-share funds to analyze woody biomass as a feedstock in biofuels and bioenergy production	$23.75 million
	Bioenergy Program for Advanced Biofuels	Payments to advanced biofuels facilities and their feedstock suppliers to expand annual production	Wood pellet companies received payments for bioenergy and biofuels use	$4.98 million
	Repowering Assistance Program	Reimbursements for biorefineries to replace fossil fuel power sources with biomass (like wood chips, municipal solid waste, or perennial grasses)	Corn ethanol facility received payment to install a boiler that is powered by wood and other biomass sources	$1.9 million
	Rural Energy for America Program (REAP)	Grants and loan guarantees for rural energy efficiency and renewable energy projects, including solar, wind, hydropower, geothermal, and biomass	Wood pellet mills, hardwood floor companies, and others receive grants and loan guarantees for renewable energy systems	$1.14 million for woody biomass but due to a lack of available information, could be much greater
	Biomass Crop Assistance Program (BCAP)	Payments to individuals and companies for producing, harvesting, collecting, and transporting crops or feedstocks that can be used in bioenergy or biofuels facilities	Two out of 11 approved project areas will grow trees for cellulosic ethanol production or other uses; project locations include NY and OR; collection, harvest, storage, and trans-portation payments are also available for woody biomass	Landowners in approved project areas will receive annual payments but it is unknown how much funding is allocated to each project or feedstock type
	Community Wood Energy Program	Grants to develop community wood energy plans and purchase wood energy systems that use woody biomass for fuel		Farm Bill authorized up to $5 million annually, but since it was a discretionary, or "optional" spending program, spending was never appropriated

Woody biomass harvest. © 2009, Eric L. Taylor. Creative Commons, Flickr.com

Woody Biomass Subsidies in Farm Bill Energy and Rural Development Title Programs, cont'd

Farm Bill Title	Program Name	Description	How Woody Biomass Receives Funding through Each Program	Woody Biomass Subsidies, 2009-13
Rural Development Title Programs	Rural Utilities Service Loans	Loans to provide or improve rural energy generation, transmission, or distribution, including rural energy projects such as "solar, wind, hydropower, biomass, or geothermal."[5]	Biomass facilities converting wood into biofuels, heat, or power receive loans to "acquire, construct, extend, upgrade, and otherwise improve energy generation facilities;" 2012 loans were awarded to facilities in CO, HA, and TX/LA.[6]	At least $264 million awarded to woody biomass facilities in 2012, but a total of $7 billion in loans were outstanding in FY2013[7]
	Rural Business Enterprise Grants (RBEG)	Loans for rural economic development projects benefiting small and emerging businesses.[8]	Funds to "assist… businesses that produce biomass feedstocks for energy products and specialty chemicals" and "collect data on… woody biomass, the viability of a biomass pyrolysis process and the market for biochar."[9]	$232,500 for woody biomass projects announced in August 2010 and July 2013, but due to lack of detail provided by USDA, total may be higher.[10]

* Note: for more information on each of these programs, click on hyperlinks in the table. All programs in the table except for Rural Utilities Service (RUS) loans and Rural Business Enterprise Grants (RBEG) are funded through the Farm Bill energy title; rural development (RD) programs are funded through the RD title of the Farm Bill.

Rural Energy for America Program

The Rural Energy for America Program (REAP) was created in the 2008 Farm Bill to provide federal grants and loans to renewable energy projects and is administered by USDA's Rural Development office. While designed to primarily promote rural solar, wind, hydropower, geothermal, and similar projects, the program has also provided taxpayer subsidies to the mature corn ethanol industry. When Congress authorized REAP and other Farm Bill energy title programs, corn ethanol was prohibited from receiving taxpayer funding since lawmakers intended to promote the development of next generation (advanced) biofuels and energy sources from non-food crops. However, the corn ethanol industry successfully convinced the USDA to alter program regulations in 2011 to allow corn ethanol interests to apply for REAP blender pump funding. While the 2014 Farm Bill, enacted in February, prohibited future taxpayer spending on ethanol blender pumps through REAP, USDA unilaterally announced $100 million in new ethanol blender pump funding in May 2015 through a different agency funding account, the Commodity Credit Corporation.

Eighty percent of grant and loan checks from Nov. 2010 to Apr. 2015 were written for solar, energy efficiency, energy audits, grain dryer, and anaerobic digesters. The remaining taxpayer dollars went to the following types of projects: biomass for use in biofuels or heat/power production (five percent), wind (five percent), hydropower (three percent), irrigation systems (two percent), corn ethanol and ethanol blender pumps (one percent), geothermal (one percent), and soy and waste vegetable oil biodiesel (one percent). The final one percent was spent on other projects like oxygen monitoring systems for catfish farms, installation of tobacco production equipment, replacement of a "syrup evaporator," construction of confined poultry feeding operations, unclassified renewable energy projects, and others with no description at all.

Projects Funded in Rural Energy for America (REAP) Program, Nov. 2010 to Apr. 2015

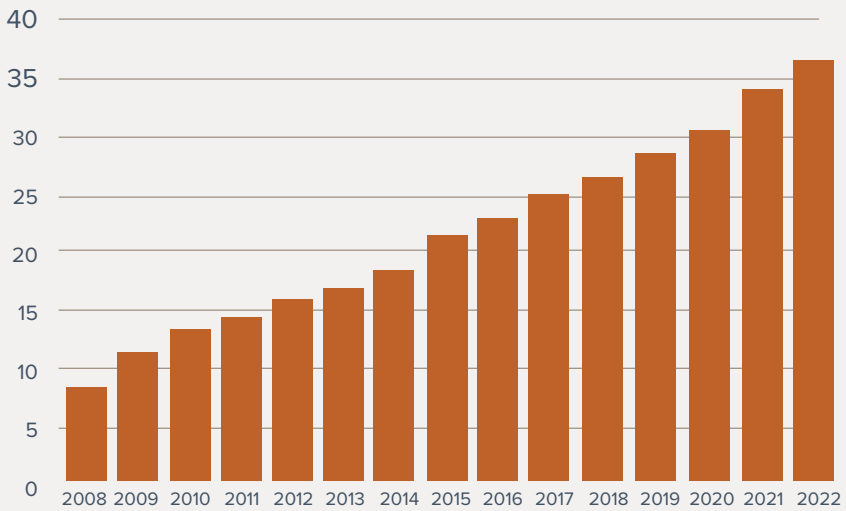
Types of Projects	Number of Projects	Percent of Projects	Loan/Grant Amount	Percent of Amount
Solar	1412	30.0%	$115,715,353	51%
Energy efficiency and energy audits*	1663	35.3%	$35,352,365	16%
Grain dryers*	705	15.0%	$18,414,858	8%
	40	0.8%	$12,246,254	5%
	184	3.9%	$11,900,596	5%
	96	2.0%	$12,125,489	5%
	27	0.6%	$5,938,286	3%
	249	5.3%	$3,630,394	2%
	82	1.7%	$3,335,040	1%
	62	1.3%	$2,494,730	1%
	151	3.2%	$3,120,701	1%
	14	0.3%	$2,040,602	1%
	21	0.4%	$240,054	0.1%
TOTAL	**$4,706**		**$226,554,723**	

* Note that some grain dryer and irrigation projects may be categorized under "energy efficiency" projects since USDA did not provide detailed information for some entries. Therefore, the number of grain dryers and irrigation systems that received grants or loans under REAP may be underestimated. **Sources**: *See endnotes.*

Renewable Fuels Standard

The RFS mandate requires oil and gas companies to blend increasing amounts of biofuels with gasoline each year through 2022, and corn ethanol comprises a majority (more than 80 percent) of the mandate. The Energy Policy Act (EPAct) of 2005 established the first renewable fuel volume (RFS1) which required 7.5 billion gallons of renewable- fuel to be blended into gasoline by 2012. The Energy Independence and Security Act (EISA) of 2007 created the RFS2, which increased the volume of renewable fuel required to be blended into transportation fuel from 9 billion gallons in 2008 to 36 billion gallons by 2022. Corn ethanol has routinely exceeded its RFS mandate since it originated, and if the EPA approves corn butanol as an "advanced biofuel," the production of additional corn-based biofuels would be incentivized by the federal government. If mixtures of gasoline and ethanol increase from the current 10 percent ethanol (E10 blend) to E15 (which was approved by EPA), corn-based biofuels could consume an even greater portion of the RFS mandate.

FIGURE 1. RFS2 Fuel Volume Requirements,
in Billions of Gallons



Types of Biofuels Mandated in the Federal Renewable Fuel Standard

Type of Biofuel	Annual Production Mandate by 2022	Definition of Biofuel	Examples	Minimum Reduction in Greehouse Gas Emissions
Conventional ethanol	15 billion gallons/year	Ethanol derived from corn starch	- Corn starch ethanol	20%, but due to a grandfathering clause, nearly every ethanol facility was able to circumvent this minimal requirement [11]
Advanced biofuels	21 billion gallons/year	"Renewable fuel, other than ethanol derived from corn starch, that has lifecycle greenhouse gas emissions (GHG) that are at least 50% less than baseline GHG emissions"	- Cellulosic ethanol - Ethanol from non-corn feedstocks such as sugar - Ethanol from waste materials such as crop residues, food waste, animal waste, etc. - Biodiesel from soybeans, other vegetable oil, animal fats, etc. - Biogas from landfills - Butanol from renewable biomass such as corn (currently under review by EPA)	50%

Types of Advanced Biofuels Mandated in the Renewable Fuel Standard

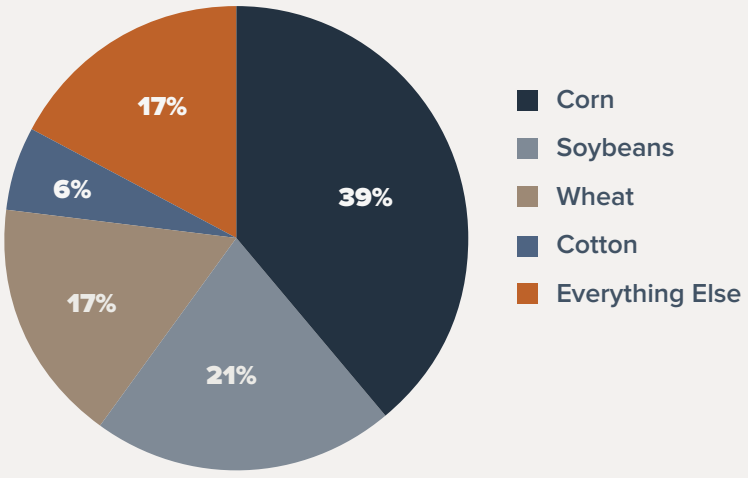
Type of Advanced Biofuel	Annual Production Mandate by 2022	Definition of Advanced Biofuel	Examples	Minimum Reduction in Greehouse Gas Emissions
Cellulosic ethanol	16 billion gallons/year	Renewable fuel derived from any cellulose, hemicellulose, or lignin	- Ethanol produced from waste materials like crop residues, food waste, or woody biomass	60%
Biomass-based diesel	At least 1 billion gallons/year, set annually by EPA	Biodiesel produced from vegetable oil or "a diesel fuel substitute produced from nonpetroleum renewable resources [including] animal wastes, including poultry fats and poultry wastes, and other waste materials, or municipal solid waste and sludges and oils derived from wastewater"	- Biodiesel produced from soybeans, other vegetable oil, algae, animal fats, used cooking oil, etc. - Other diesel fuel substitutes produced from municipal solid waste, animal wastes, etc.	50%
"Other" advanced biofuels	4 billion gallons/year	Any other fuel that meets the definition of an "advanced biofuel"	- Ethanol from non-corn feedstocks such as sugar - Butanol from renewable biomass (including butanol derived from corn, currently under review at EPA)[12] - May also include biomass-based diesel (see above)	50%

Federal Crop Insurance

Federal crop insurance is a highly taxpayer-subsidized program that allows agricultural producers to shift much of their business risk onto taxpayers. Originally designed as a way to help producers recover from natural disasters, it has since morphed into an income guarantee program for the most profitable farm businesses. Primarily benefitting growers of only four crops (corn, soybeans, wheat, and cotton), a large portion of which is used for biofuels production, crop insurance is now the most expensive taxpayer support for agriculture, outstripping all other agriculture safety net programs. It is a shining example of a government program filled with costly inefficiencies that detract from its goals and produce unintended consequences. On average, taxpayers pay 62 cents for every dollar of crop insurance premiums that a producer selects. While crop insurance has cost taxpayers less in recent years, in Fiscal Year 2012, government costs totaled a record $14 billion.[13]

Figure 2 shows that over 80 percent of federal crop insurance premium subsidies go to three major crops used in U.S. biofuels production – corn, soybeans, and wheat – in addition to cotton.[14] Over 90 percent of U.S. ethanol is produced from corn; in 2014, corn ethanol production, which uses 40 percent of the U.S. corn crop every year, reached an estimated 14.3 billion gallons.[15] Soybeans are the primary crop used in biodiesel production, but the fuel can also be derived from used cooking oil, animal fats, and other vegetable oils. About one-fourth of the U.S. soybean crop is used for soy biodiesel production each year.[16] Wheat can be used in ethanol production, but it is sparsely used compared to the large portion of corn and soybean crops dedicated to biofuels production.

FIGURE 2. Federal Crop Insurance Premium Subsidies by Crop, **2013 Crop Year**



Federal Tax Subsidies

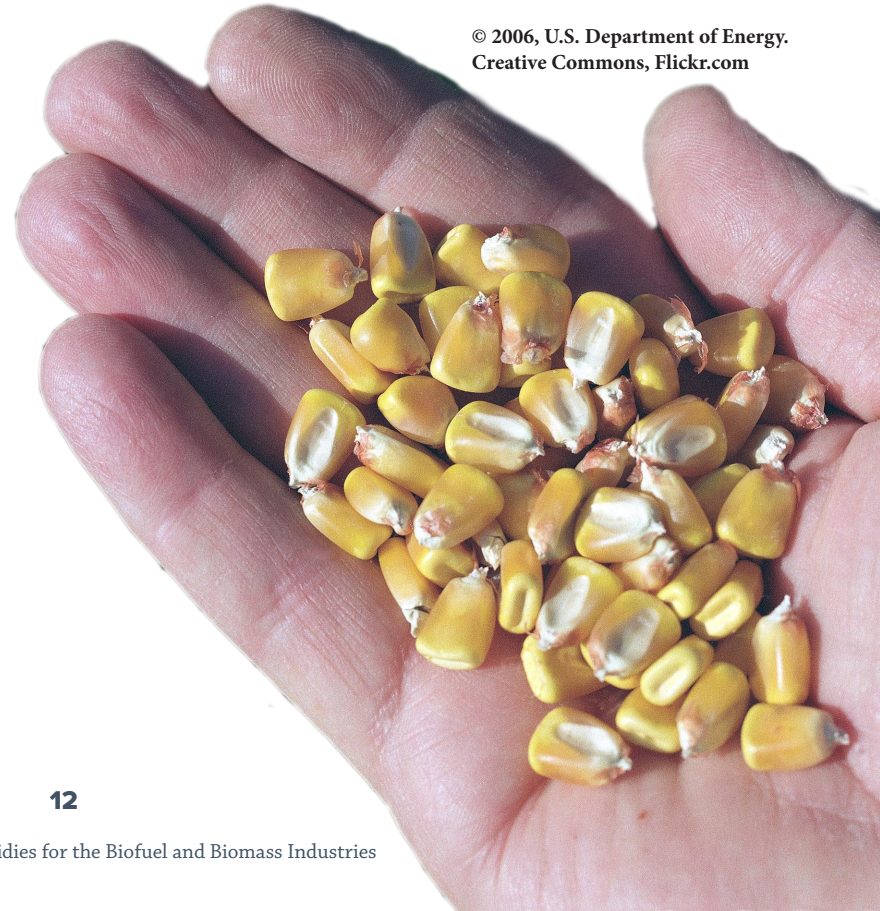
Subsidies for corn ethanol also litter the tax code – including tax breaks for biodiesel and blender pumps which dispense higher blends of ethanol– in addition to DOE programs and other subsidies scattered throughout the federal government such as the RFS mandate for the use of corn ethanol administered by EPA. Late last year, Congress passed a tax extenders package which once again extended the Alternative Fuel Vehicle Refueling Property Credit, which provides a 30 percent tax break for gasoline stations or other facilities installing biodiesel or 85 percent ethanol (E85) blender pumps. The credit received a one-year retroactive extension for calendar year 2014. While Congress has signaled an intent to take a different approach than routinely extending this package of tax breaks each year, time will tell if any wasteful tax credits are ended later this year.

Biofuels and biomass industries are also subsidized through the federal tax code. Table 9 provides descriptions of fuels and materials qualifying for production, mixture, infrastructure, and other tax credits. Importantly, like Farm Bill energy subsidies, biofuels are not required to reduce GHG emissions by a certain amount to qualify for federal tax credits. However, in Dec. 2013, former Senate Finance Committee Chairman Baucus (D-MT) proposed the creation of new "clean transportation" fuel and renewable energy tax credits which would partially take carbon emissions into account. Unfortunately, his proposal would have recreated subsidies such as VEETC, which expired in 2011 after years of TCS opposition, by providing subsidies for corn ethanol produced at facilities powered by biomass. Former House Ways and Means Committee Chairman Dave Camp (R-MI) also proposed the elimination of biofuels and biomass subsidies in Feb. 2014, but ultimately put the savings toward deficit reduction instead of the creation of new subsidies. However, neither of these proposals were voted on by Congress.

Corn ethanol processing plant. © Creative Commons, Flickr.com

Corn Ethanol Supports in Federal Tax Code

Tax Credit Name	Description	Total Ten-Year Cost (FY15-24)
Alternative Fuel Vehicle Refueling Property Credit	Facilities dispensing certain alternative fuels can receive a refueling property credit in the form of a 30% tax break. Eligible facilities include gasoline stations, those installing biodiesel or 85% ethanol (E85) blender pumps, or repowering sites for electric vehicles. Stations dispensing natural gas, liquefied natural gas (LNG), and liquefied petroleum gas (LPG) are also eligible.[17] The credit was most recently extended at the end of 2014 for the 2014 calendar year.	$380 million[18]
Master Limited Partnerships[19]	"An MLP is typically a limited liability company (LLC) treated as a partnership for taxation purposes and traded on a public exchange… Investors are treated for tax purposes as if they directly earned the MLP's income. By avoiding double taxation, MLPs have access to lower cost of capital, which allows them to build and operate low-return assets to provide a sufficient rate of return to attract investors."[20] Of the 100 entities benefiting from the MLPs' special tax treatment, most are in the oil and gas industry, but in 2008, the transportation and storage of ethanol, biodiesel, and other alternative fuels also became eligible.[21]	$11.6 billion (for FY14-23)[22]
Volumetric Biodiesel Excise Tax Credit and Renewable Biodiesel Tax Credit	The biodiesel production tax credit of $1 per gallon supports eligible feedstocks such as "virgin oils, esters derived from corn, soybeans, sunflower seeds, cotton-seeds, canola, crambe, rapeseeds, safflowers, flaxseeds, rice bran, mustard seeds, and camelina, and from animal fats."[23] The credit was most recently extended at the end of 2014 for the 2014 calendar year.	$14.5 billion ($1/gallon tax credit multiplied by future production levels, as estimated by the Energy Information Administration)[24]



Biofuels and Biomass Subsidies in the Federal Tax Code

Tax Credit Name	Description
Alternative Fuel Vehicle Refueling Property Credit*	Facilities dispensing certain alternative fuels can receive a refueling property credit in the form of a 30% tax break. Eligible facilities include gasoline stations, those installing biodiesel or 85% ethanol (E85) blender pumps, or repowering sites for electric vehicles. Stations dispensing natural gas, liquefied natural gas (LNG), and liquefied petroleum gas (LPG) are also eligible.[25]
Credit for Alternative Fuel Mixtures*	50 cent-per-gallon credit for mixtures "containing at least 0.1% gasoline, diesel, or kerosene. Qualified alternative fuels are: compressed natural gas (based on 121 cubic feet), liquefied natural gas, liquefied petroleum gas, P-Series fuel, liquid fuel derived from coal through the Fischer-Tropsch process, and compressed or liquefied gas derived from biomass."[26]
Master Limited Partnerships[27]	"An MLP is typically a limited liability company (LLC) treated as a partnership for taxation purposes and traded on a public exchange… Investors are treated for tax purposes as if they directly earned the MLP's income. By avoiding double taxation, MLPs have access to lower cost of capital, which allows them to build and operate low-return assets to provide a sufficient rate of return to attract investors."[28] Of the 100 entities benefiting from the MLPs' special tax treatment, most are in the oil and gas industry, but in 2008, the transportation and storage of ethanol, biodiesel, and other alternative fuels also became eligible.[29]
Biomass Production Tax Credit*	1.1 cents and 2.3 cents per kilowatt-hour production tax credit for open- and closed-loop biomass conversion to power sources. Open-loop biomass includes sources such as "agricultural livestock waste, cellulosic waste material, mill and harvesting residues, waste pellets, crates, manufacturing and construction wood wastes, tree trimmings, orchard tree crops, vineyard, grain, legumes, sugar, and other crop byproducts or residues" while closed-loop sources include "any organic matter from a plant which is planted exclusively for purposes of being used at a qualified facility to produce electricity."[30]
Production Tax Credit for Cellulosic Ethanol and Plant Depreciation Deduction Allowance*	$1.01-per-gallon production tax credit for cellulosic ethanol and "additional depreciation tax deduction allowance equal to 50% of the adjusted basis of the property."[31] "Second generation biofuel is defined as liquid fuel produced from any lignocellulosic or hemicellulosic matter that is available on a renewable basis or any cultivated algae, cyanobacteria, or lemna"[32] (such as agricultural residues, wood waste, perennial grasses, etc.), with no requirements for minimum GHG reductions.
Volumetric Biodiesel Excise Tax Credit and Renewable Biodiesel Tax Credit*	The biodiesel production tax credit of $1 per gallon supports eligible feedstocks such as "virgin oils, esters derived from corn, soybeans, sunflower seeds, cottonseeds, canola, crambe, rapeseeds, safflowers, flaxseeds, rice bran, mustard seeds, and camelina, and animal fats,"[33] with no requirements for minimum GHG reductions.

* Note: Please note that while some of these tax breaks expired at the end of 2014, they are typically renewed in end-of-the-year tax extenders packages, sometimes retroactively. **Sources:** *Joint Committee on Taxation, President's FY15 budget request*

Corn Ethanol Subsidies at the Departments of Energy & Transportation

Program Name	Description	Total Cost
DOE Clean Cities Program	The Clean Cities Program was created in 1993 after passage of the Energy Policy Act of 1992, which "required certain vehicle fleets to acquire alternatively-fueled vehicles"; the program provides "informational, technical, and financial resources to EPAct-regulated fleets and voluntary adopters of alternative fuels and vehicles" in nearly 100 U.S. cities.[34] Clean Cities works with national parks, municipalities, and state-based incentive programs to promote greater consumption of alternative fuels and the installation of new fueling equipment, including 85 percent ethanol (E85) blender pumps. Many recent projects were funded through 2009 American Recovery and Reinvestment Act grants.[35] See a full list of recipients in Table 4 below.	Nearly $300 million spent on 2009 Recovery Act (stimulus) grants for fueling infrastructure and alternatively fueled vehicles.[36]
DOE State Energy Programs (SEP)	State Energy Programs "provide financial and technical [energy] assistance to states through formula and competitive grants"; the program has been funded by the 2009 American Recovery and Reinvestment Act although additional grants are awarded annually depending on available funding.[37] Grants have been awarded for the installation of E85 blender pumps, alternative power sources for ethanol biorefineries, and ethanol promotional events. Table 4 includes a list of recipients.	$3.1 billion of total SEP funding to U.S. states under the 2009 Recovery (stimulus) legislation
DOT Congestion Mitigation and Air Quality (CMAQ) Improvement Program	The CMAQ program, authorized in 1991, "was implemented to support surface transportation projects and other related efforts that contribute air quality improvements and provide congestion relief"; it is jointly administered by the Federal Highway Administration and the Federal Transit Administration.[38] The City of Hoover received funding through the Alabama Clean Fuels Coalition for a new E85 tank and dispenser at its Public Safety Center.[39]	$4.4 billion in total for the program in 2013-14, funded by the Moving Ahead for Progress in the 21st Century Act of 2012 (MAP-21)[40]
DOT Biobased Transportation Research Program/Sun Grant Initiative	One of the 2007 Regional Competitive Grants was awarded to David Holland of Washington State University to examine "crop and fuel production for biodiesel, corn ethanol, and cellulosic ethanol in the Pacific Northwest using potential price and productivity scenarios"; the $200,000 grant was entitled "Regional Economic Analysis of Feedstock Production and Processing in the Pacific Northwest."[41]	At least $200,000 in 2007

Corn Ethanol Subsidies Awarded through 2009 Recovery Act via DOE's Clean Cities or State Energy Programs (SEP)

State	Recipient Name	Description	Total Cost
AL, FL, & GA	Protec Fuel Management, LLC	In partnership with the Renewable Fuel Association, Growth Energy, Testing LLC, General Motors, the National Ethanol Vehicle Coalition, NASA, the U.S. Postal Service, and Enterprise Rent-A-Car, received award to open 30 E85 and B20 stations in FL, AL, & GA.	Up to $900,000
CA	Clean Energy Manufacturing Program	Stimulus funding provided $59.5 million for the Energy Commission's Alternative and Renewable Fuel and Vehicle Technology Program and $30.6 million for the State Energy Program (SEP) Clean Energy Business Financing Program. A portion was used to fund "ethanol production incentives" which will "re-start idle corn ethanol production facilities by providing price assurance to the plant owners."[42]	Received $6 million for "ethanol production incentives"
CA	Low Carbon Fuel Infrastructure Investment Initiative	Installation of up to 75 new E85 stations by 2012; also funded by Propel Fuels and the California Energy Commission.[43]	Unknown
CO	Cities of Fort Collins & Boulder	Using alternative fuel vehicles utilizing power sources such as compressed natural gas, biodiesel, hybrid, electric, and E85.[44]	Unknown
ID	State of Idaho	Awards for "two new 12,000-gallon fuel tanks (one for gasoline, one for ethanol) and [an ethanol blender pump]."[45]	Unknown, but ID received $28.57 million in SEP funding from the 2009 Recovery Act[46]
IA	Kum & Go, L.C.	In partnership with the Iowa Department of Natural Resources, Iowa Corn Growers Association, Iowa Renewable Fuels Association, National Ethanol Vehicle Coalition, and the Iowa Farm Bureau, received award to install 30 more E85 blender pumps along interstates.[47]	Up to $1 million
KS	State of Kansas Energy Division	Western Plains Energy in Oakley, KS, received an award, administered by the Kansas Department of Commerce, for "the construction of a biomethane digester at the Western Plains' [corn] ethanol plant… the digester will convert feedlot and other waste into biogas."[48]	Received $15.6 million out of $38.3 million of total SEP funding
KY	Mammoth Cave National Park	1st national park to participate in the National Clean Cities Initiative; utilized flex fuel vehicles & E85 blender pumps.[49]	Unknown
MD	Maryland Grain Producers Utilization Board	In partnership with PMG, Mid-Atlantic Petroleum Properties, LLC, Phillips, and Montgomery County, received award to build E85 blender pumps, 20 percent biodiesel (B20), and propane refueling facilities in MD, VA, and DC.	Up to $469,364
MN	American Lung Association of the Upper Midwest	In partnership with the Minnesota Clean Air Choice Team, the Twin Cities Clean Cities Coalition, Kwik Trip, Holiday Companies, the Farmers Union Oil Co., and the Minnesota Corn Growers Association, received an award to construct 15 new E85 blender pump stations in MN.	Up to $377,350
MN	Energy Division of Minnesota's Department of Commerce	Through Clean Cities and SEP, received funding to distribute several alternative fuels, including E85, and "clean out tanks and ensure proper fuel equipment compatibility" since ethanol corrodes existing fueling equipment and storage tanks.	Unknown, but MN received $54.17 million in SEP funding from the 2009 Recovery Act[50]
ND	North Dakota Office of Renewable Energy and Energy Efficiency	ND launched a "Blender Pump Pilot Project… in 2009 [that] utilize[d] SEP funding to offer grants to North Dakota motor fuel retailers to purchase pumps for dispensing ethanol or biodiesel. SEP funds… supported the installation of 80 blender pumps [and]… also promote[d] the use of alternative fuels."[51]	Unknown, but ND received $24.59 million in SEP funding from the 2009 Recovery Act

Corn Ethanol Subsidies Awarded through 2009 Recovery Act via DOE's Clean Cities or State Energy Programs (SEP), cont'd

State	Recipient Name	Description	Total Cost
NV	Nevada State Motor Pool	Fueling infrastructure [awards]… for the use of ethanol based fuels (E85) for state vehicles [in Las Vegas]."[52]	Received $170,250 out of $34.71 million of total SEP funding
PA	Greater Philadelphia Clean Cities (GPCC)	With funding from DOE and a state Alternative Fuels Incentive Grant, an E85 corridor with at least 19 flex fuel stations was created from State College to Philadelphia; funds were also used to teach "consumers how use a vehicle identification number to determine E85 compatibility."[53] Participants ranged from small gas stations to large companies such as AMERIgreen, Shipley Energy, and Sheetz.[54]	Unknown, but PA received $99.68 million in SEP funding from the 2009 Recovery Act[55]
SD	State of South Dakota	Awards paid for a statewide energy audit and the "installation of ethanol fueling pumps at 3 fleet locations [of state owned facilities in] Sioux Falls, Rapid, and Pierre"[56]	Unknown, but SD received $23.71 million in SEP funding from the 2009 Recovery Act
TN	Knoxville Utilities Board	Utilize E85-powered flexible fuel vehicles, among other alternatively fueled vehicles.[57]	Unknown
TN	University of Tennessee	In partnership with the Clean Energy Coalition, Ann Arbor Clean Cities, Clean Fuels Ohio, the Kentucky Clean Fuel Coalition, the East Tennessee Clean Fuels Coalition, Clean Cities-Atlanta, Middle Georgia Clean Cities, the Florida Solar Energy Center, the Space Coast Clean Cities, and the Gold Coast Clean Cities Coalition, received an award to increase the availability of E85 and B20 along I-75.	Up to $818,091
TX	City of Austin	Utilize E85-powered flexible fuel vehicles, among other alternatively fueled vehicles.[58]	Unknown
WI	State of Wisconsin	In partnership with the Wisconsin Retail Gas Stations/Fuel Distributors, Innovation Fuels Tanco Milwaukee and CHS, Inc., Wisconsin Clean Cities, and Southeast Area, Inc., received award "to build 27 new E85 fueling stations and install biodiesel blending equipment at three terminal locations."	Up to $1 million
—	Alternative Fuel Trade Alliance	Alliance of the Renewable Fuels Association, the National Biodiesel Foundation, the Clean Vehicle Education Foundation, and the Propane Education and Research Council received an award to "hold more than 45 workshops and at least 64 stakeholder events to increase knowledge about alternative fuels & advanced vehicle technologies."	Up to $1.6 million

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