

# **The Renewable Fuel Standard: Why is the President Ignoring America's Most Successful Climate Policy?**



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## Introduction

Since its inception in 2005, the U.S. Renewable Fuel Standard (RFS) has been remarkably successful in driving expansion of domestic biofuels production and use, reducing petroleum consumption, and cutting greenhouse gas (GHG) emissions from the transportation sector.

Transportation-related emissions—which account for 27% of total U.S. GHG emissions—have steadily trended downward since adoption of the RFS, and current levels are 10% below 2005 levels.<sup>1</sup> The U.S. Environmental Protection Agency (EPA) cites “using renewable fuels such as low-carbon biofuels” as an important factor in reduced GHG emissions from the transportation sector, while the U.S. Department of Energy (DOE) states that “increased consumption of biofuels” is a key reason that transportation-related GHG emissions are falling faster than vehicle miles traveled.<sup>2,3</sup>

As a result of these successes, the U.S. RFS has been widely heralded around the world as the preeminent example of how progressive energy and climate policy can stimulate technology innovation and help de-carbonize transportation systems. For the past decade, the United States has been viewed as a global pacesetter in renewable fuel and climate policy, and nations around the world have endeavored to emulate the RFS model.

Indeed, as world leaders gather in Paris in December for the 21<sup>st</sup> Session of the Conference of the Parties to the U.N. Framework Convention of Climate Change (COP21), many nations will lay out plans to implement RFS-like policies and expand biofuels usage as a means of reducing GHG emissions. Our review of “Intended Nationally Determined Contribution” (INDC) submissions reveals that increased use of biofuels is expected to play a central role in achieving the GHG reduction commitments of nearly 30 countries, including both developed and developing nations.

What is an INDC?
An “Intended Nationally Determined Contribution,” or INDC, outlines the actions a country intends to take as part of the Paris international climate agreement. INDCs often describe specific policy measures and actions that a country will implement to reduce GHG emissions and combat climate change.

Surprisingly, however, as nations around the world are following the U.S. lead on biofuels policy, the INDC submission from the United States itself does not identify the RFS as a component of planned post-2020 U.S. climate actions, nor does it mention biofuels as a key catalyst of the GHG reductions observed over the past decade. In fact, the terms “RFS” and “biofuels” don’t even appear in the U.S. submission. Thus, while other countries—from Brazil to India to Uruguay—will proudly promote the achievements of their biofuels industries and pledge to redouble efforts to expand biofuels at COP21, the United States appears poised to ignore the most successful U.S. climate-energy policy ever enacted.

<sup>1</sup> U.S. EPA (2014). U.S. Greenhouse Gas Inventory. <http://www3.epa.gov/climatechange/ghgemissions/usinventoryreport.html>

<sup>2</sup> U.S. EPA. Sources of GHG Emissions. <http://www3.epa.gov/climatechange/ghgemissions/sources/transportation.html#Trends>

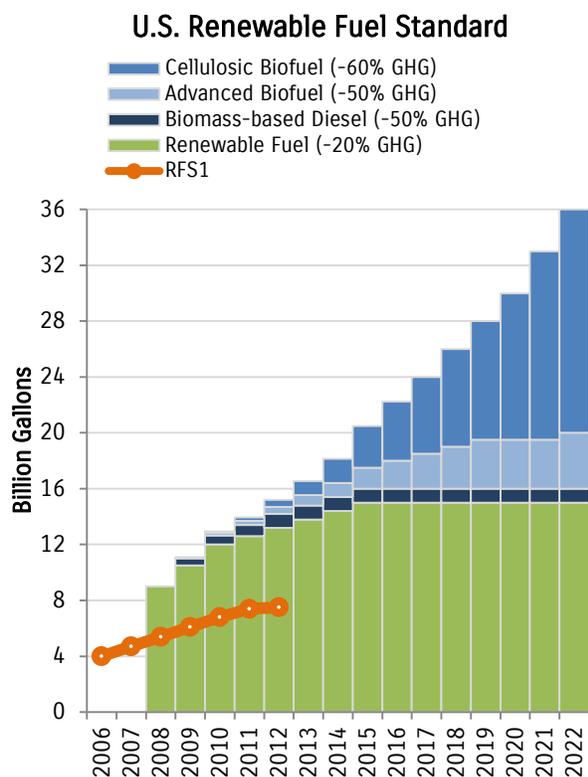
<sup>3</sup> U.S. Energy Information Administration (2011). Emissions of GHGs in the United States, 2009 [http://www.eia.gov/environment/emissions/ghg\\_report/pdf/0573%282009%29.pdf](http://www.eia.gov/environment/emissions/ghg_report/pdf/0573%282009%29.pdf)

## Background

The Energy Policy Act (EPAAct) was signed into law in August 2005, establishing the first-ever Renewable Fuel Standard (RFS). The original RFS required gasoline refiners, blenders and importers to incorporate annually increasing volumes of renewable fuels into the gasoline supply, starting with 4 billion gallons (bg) in 2006 and rising to 7.5 bg by 2012.

Just two years later, against a backdrop of rising petroleum imports and spiking oil prices, Congress passed the Energy Independence and Security Act (EISA). Among other provisions, EISA greatly extended the RFS and expanded its scope. The expanded RFS (often called “RFS2”) required gasoline and diesel refiners and importers to blend at least 9 bg of renewable fuel into the fuel supply in 2008, increasing to 36 bg by 2022—roughly 25% of projected gasoline demand. In addition, the RFS2 distinguished between conventional biofuels, advanced and cellulosic biofuels, and biomass-based diesel, creating specific annual volumetric requirements for each.

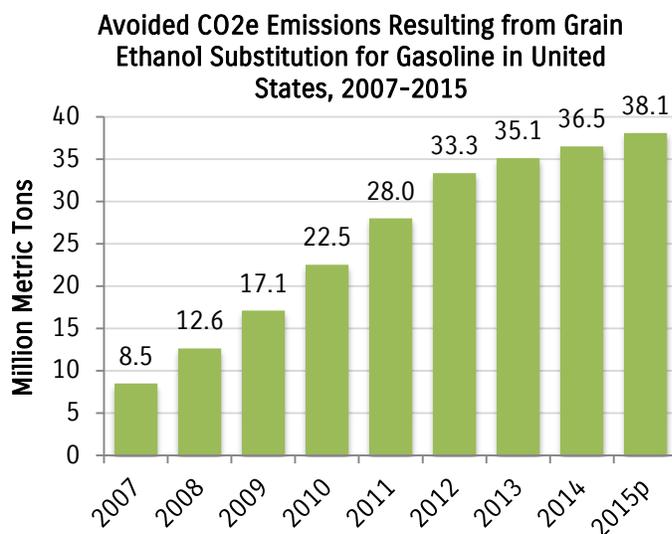
The RFS2 program also established sustainability requirements for renewable fuels, including land use restrictions and GHG reduction criteria. Specifically, in order to qualify for the RFS2, conventional biofuels must reduce GHG emissions by at least 20% compared to petroleum, advanced biofuels must reduce GHGs by 50%, and cellulosic biofuels must achieve a 60% or greater GHG reduction. Finally, EISA capped the amount of corn ethanol that could contribute to the RFS2 at 15 bg in 2015, requiring that all post-2015 growth come from advanced biofuels.



Passage of the RFS in 2005 finally guaranteed that biofuels would have access to a market traditionally dominated by petroleum. In response to the market certainty provided by the RFS, investment in renewable fuel technologies and production facilities surged. In 2006, ethanol production rose to 4.9 bg, 23% higher than the RFS requirement for that year and more than double the output from just four years earlier. By 2008, ethanol output had virtually doubled again to 9.3 bg. By 2010, ethanol accounted for almost 10% of the nation’s gasoline supply; and in 2014, U.S. ethanol output set a new record of 14.3 bg. Meanwhile, just as envisioned by Congress in 2007, advanced biofuels production and use began its own surge, with consumption ramping up from about 1 bg (ethanol equivalent) in 2006 to roughly 3 bg in 2014.

## RFS a “Vital Part” of U.S. Climate Strategy

The expansion of biofuels consumption under the RFS has inarguably reduced GHG emissions from the transportation sector. In 2007, the U.S. Department of Energy’s Argonne National Laboratory estimated that “average” corn ethanol reduced full lifecycle GHG emissions by 19% compared to gasoline, while ethanol produced at newer plants using the “dry mill” process reduced GHG emissions by 28%.<sup>4</sup> The latest analysis from Argonne finds that 2012-era corn ethanol reduced GHG emissions by 34%, on average, compared to gasoline. Notably, this estimate includes consideration of theoretical emissions associated with potential indirect land use changes stimulated by biofuels expansion.<sup>5</sup> U.S. EPA’s own analysis, which assumes a far larger theoretical land use change emissions impact, has recently certified that corn ethanol produced using today’s technology reduces GHG emissions by 20-29% compared to 2005-era gasoline.<sup>6</sup>



Substituting ethanol for gasoline in the U.S. has resulted in substantial aggregate GHG emission reductions from the transportation sector, ramping up from 8.5 million metric tons (mmt) of avoided CO<sub>2</sub>-equivalent in 2007 to a projected 38.1 mmt in 2015.<sup>7</sup> The cumulative GHG savings resulting from U.S. grain ethanol consumption since 2007 is roughly 232 mmt of CO<sub>2</sub>e, which is the equivalent of removing more than 5 million cars from the road each year since RFS2 enactment.

Notably, the GHG savings discussed here only account for the contributions of grain ethanol (corn/milo) under the RFS; increased use of advanced biofuels in recent years provides additional GHG reductions not accounted for in this report. Analyses by Argonne show that biodiesel and renewable diesel reduce emissions by more than 50% compared to petroleum, while emergent cellulosic biofuels provide GHG savings in the range of 88-108%.<sup>8</sup> Indeed, the proven GHG reductions resulting from biofuels use under the RFS prompted U.S. EPA Administrator Gina McCarthy to recently remark that “the RFS is **a tool to address climate change**. That is what it is designed for...” and that biofuels are a “**vital part** of the president’s climate-change agenda.”<sup>9</sup>

<sup>4</sup> M. Wang, M. Wu & H. Huo. “Life-cycle energy and greenhouse gas emissions impacts of different corn ethanol plant types.” *Environ. Res. Lett.* 2 (2007) 024001 (13 pp).

<sup>5</sup> M. Wang et al. “Well-to-wheels energy use and greenhouse gas emissions of ethanol from corn, sugarcane and cellulosic biomass for US use.” *Environ. Res. Lett.*, 7 (2012) 045905 (13pp).

<sup>6</sup> U.S. EPA. Approved Pathways for Renewable Fuel. <http://www2.epa.gov/renewable-fuel-standard-program/approved-pathways-renewable-fuel>

<sup>7</sup> See Appendix for details on calculations of GHG savings.

<sup>8</sup> M. Wang et al. (2012). See footnote 5.

<sup>9</sup> The Hagstrom Report (Sep. 15, 2015). “McCarthy: EPA will stick to schedule on the RFS.”

[http://www.hagstromreport.com/2015news\\_files/2015\\_0915\\_mccarthy-epa-stick-schedule-rfs.html](http://www.hagstromreport.com/2015news_files/2015_0915_mccarthy-epa-stick-schedule-rfs.html)

## Biofuels Play Central Role in Nearly 30 Countries' Climate Action Plans

Dozens of other nations apparently agree with Administrator McCarthy that biofuels are an important tool for fighting climate change. In fact, nearly one quarter of the INDCs submitted to the U.N. prominently feature biofuels policy measures as part of their post-2020 climate action plans. For example, in the weeks leading up to Paris, Brazilian President Dilma Rousseff proudly proclaimed that “no car moves without ethanol in this country,”<sup>10</sup> and the country’s INDC states that “Brazil already has one of the largest and most successful biofuel programs to date.” The INDC also includes “expanding biofuel consumption” and “increasing ethanol supply” as measures the nation intends to adopt to further reduce GHG emissions.

Brazil isn’t alone in recognizing the ability of biofuels to combat climate change. As shown in the table below, nearly 30 of the 128 submitted INDCs include some discussion of biofuels as a strategy for meeting GHG emissions reduction commitments made under COP21.<sup>11</sup>

COUNTRY	ROLE OF BIOFUELS IN INDC
Argentina	Cites “actions linked to biofuels” as being a critical strategy for reducing GHG emissions by 15% by 2030.
Barbados	States that the country is “investing in alternative vehicles and fuels such as...ethanol...and encouraging their adoption through tax incentives.”
Belize	Lists “promoting the use of bio-fuels” as a means of meeting goal to reduce transportation-related GHG by 20% by 2033.
Brazil	Announces intent to “increase the share of sustainable biofuels in the Brazilian energy mix to approximately 18% by 2030, by expanding biofuel consumption, increasing ethanol supply, and increasing the share of advanced biofuels...” Proclaims that “Brazil already has one of the largest and most successful biofuel programs to date.”
Burkina Faso	Includes target of 10% ethanol blends and 5% biodiesel blends by 2030 as a GHG mitigation strategy.
Cabo Verde	Includes use of biodiesel as a means of increasing renewable energy consumption by 2020-2025.
Canada	States that Canada “has in place legislative instruments to address climate change...” and highlights that “renewable fuels regulations require that gasoline contain an average 5% renewable fuel content and that most diesel fuel contain an average 2% content.”

<sup>10</sup> Agencia Brasil (Oct. 14, 2015). “Rousseff asks for unity and says crisis is moment for building bridges.” <http://agenciabrasil.ebc.com.br/en/politica/noticia/2015-10/rousseff-asks-unity-and-says-crisis-moment-building-bridges>

<sup>11</sup> As of Oct. 30, 2015, 128 INDC submissions had been posted on the UNFCCC INDC website. [http://unfccc.int/focus/indc\\_portal/items/8766.php](http://unfccc.int/focus/indc_portal/items/8766.php)

<b>Congo</b>	Lists “agro industry/biofuels” as an action being taken by the government to meet GHG reduction targets.
<b>Ethiopia</b>	Highlights that “ethanol has already...enable[d] enhanced generation and use of clean and renewable energy.”
<b>Grenada</b>	Cites “introduction of biofuels” as a strategy for reducing transportation sector emissions by 20% by 2025.
<b>Guinea</b>	Plans to “increase the supply of biofuels” as part of a goal to achieve 30% renewable energy by 2030.
<b>Guyana</b>	States that “Guyana is interested in piloting small scale fermentation and distillation techniques for the production of ethanol and [other] bio-fuels.”
<b>India</b>	Cites “National Policy on Biofuels,” which includes targets of “20% blending of biofuels, both for bio-diesel and bio-ethanol.”
<b>Kiribati</b>	Includes “use of coconut oil as biodiesel for transport” as a GHG mitigation objective.
<b>Laos</b>	Lists “Renewable Energy Strategy” as a key component of GHG mitigation plan, including an objective to “increase the share of biofuels to meet 10% of the demand for transport fuel by 2025.”
<b>Liberia</b>	Mitigation scenario includes use of 5% biofuels in transportation fuels mix.
<b>Macedonia</b>	Plans to get 5% of energy supply from biofuels by 2020, or as much as 10% under a “higher ambition mitigation scenario.”
<b>Malawi</b>	Endeavors to “produce 18 million litres of ethanol per year” and conditionally increase production to 40 million litres of ethanol per year.
<b>Mali</b>	Includes “local biofuel production” as a means of addressing GHG emissions.
<b>Mozambique</b>	Intends to implement “biofuels policy and strategy” to assist in mitigating GHG emissions between 2020 and 2030.
<b>Norway</b>	States that government will maintain tax exemptions for bioethanol and biodiesel through 2020.
<b>Philippines</b>	References “Biofuels Act of 2006” as a successful action that “led to the increase in the utilization of renewable energy sources, reinforcing and institutionalizing climate change mitigation actions.”
<b>Seychelles</b>	Intends to amend import regulations to increase use of biofuels and fuel efficient vehicle technologies.
<b>Sierra Leone</b>	Cites development of alternative energy sources such as bio-fuels from sugarcane, corn, and rice hulls as a potential GHG mitigation strategy.
<b>Swaziland</b>	Plans to “introduce the commercial use of a 10% ethanol blend in petrol by 2030.”

<b>Uruguay</b>	Aims to “increase the percentage of biofuels in gasoline and diesel” and states that currently “the use of biodiesel accounts for 7% and bioethanol 10% of total vehicle fleet, both with entirely domestic production.”
<b>Zambia</b>	Intends to “introduce and increase blending of bio-fuels with fossil fuels and, where possible, [complete] substitution with bio-fuels.”
<b>Zimbabwe</b>	References implementation of the country’s “biofuels policy” and “ethanol blending” as GHG mitigation strategies.

## RFS Not “Vital” Enough to Appear in U.S. INDC?

While measures to increase biofuels consumption appear in the INDC submissions of countries from all over the world, the RFS and biofuels are conspicuously absent from the U.S. INDC. Is this purposeful omission indicative of a larger shift in biofuels policy support in the U.S.? Perhaps.

In May 2015, the administration released a proposal that would, for the first time ever, reduce the RFS program’s total renewable fuel and advanced biofuel blending requirements to levels below the volumes established by Congress in 2007.<sup>12</sup> Inexplicably, the proposal adopts the petroleum industry’s self-interested position that the U.S. fuel supply simply can’t absorb any more biofuel, even though the biofuels industry has ample capacity to supply the volumes specified in the law. This sets up quite a dilemma for the White House as world leaders embark for Paris. How can President Barack Obama suggest the United States is leading the world in combating climate change when his administration’s own proposals seek to eviscerate the most successful transportation-related GHG mitigation strategy ever adopted? The president’s predicament is further complicated by the fact that the Paris climate talks are scheduled to begin on November 30—the exact same date that U.S. EPA is expected to release the final rule for 2014–2016 RFS volume requirements.

The U.S. INDC submission states that “[t]he United States has already undertaken substantial policy action to reduce its emissions...” yet fails to reference the RFS as one of those actions. The document outlines a GHG reduction target of 26–28% below 2005 levels by 2025, and suggests that “[a] number of existing laws, regulations, and other domestically mandatory measures are relevant to the implementation of the target...” The INDC goes on to cite the following specific actions as “relevant” to meeting the goal:

- fuel economy standards;
- commercial building measures;
- energy conservation standards for appliances and equipment;
- power plant emissions standards;

<sup>12</sup> U.S. EPA. Proposed RFS for 2014, 2015 and 2016, and Biomass-Based Diesel Volume for 2017. <http://www2.epa.gov/renewable-fuel-standard-program/proposed-renewable-fuel-standards-2014-2015-and-2016-and-biomass>

- reduced use of hydrofluorocarbons with high global warming potential;
- methane emissions controls for landfills and oil/gas operations; and
- reduced GHG emissions from Federal government operations.

Not a single mention of the RFS is included in the U.S. INDC submission, despite the fact that the program has delivered real GHG savings and served as the “gold standard” example of energy-climate policy over the past decade.

## Biofuel Producers Sign President Obama’s Climate Pledge

The snub to biofuels and the RFS in the U.S. INDC is even more perplexing given the fact that the biofuel industry has strongly supported the president’s climate agenda. In fact, eight of the 81 companies signing on to President Obama’s American Business Act on Climate Pledge own and operate U.S. biofuel production facilities, and several other companies signing the pledge are technology providers to the biofuel supply chain.<sup>13</sup> Companies who sign the pledge are “voicing support for a strong Paris outcome” and “demonstrating an ongoing commitment to climate action.” The following companies directly involved in biofuel production signed the pledge and outlined specific actions they will take to reduce the carbon intensity of their products and operations:

- **Abengoa Bioenergy US** – owns and operates seven ethanol biorefineries in the U.S., as well as ethanol and biodiesel facilities in Europe and South America
- **Aemetis, Inc.** – owns and operates an ethanol biorefinery in the U.S., as well as an advanced biofuel/renewable chemical facility in India
- **Cargill** – owns and operates multiple ethanol and biodiesel facilities in the U.S. and internationally
- **DSM North America** – in partnership with POET, operates one of the world’s first commercial-scale cellulosic ethanol biorefineries in the U.S.
- **Fulcrum Bioenergy, Inc.** – developing a waste-to-fuel biorefinery project in the U.S.
- **Pacific Ethanol, Inc.** – owns and operates eight ethanol biorefineries in the Western and Midwestern U.S.
- **POET** – owns and operates 27 ethanol biorefineries in the U.S., including one of the world’s first commercial-scale cellulosic ethanol facilities (in partnership with DSM)
- **QCCP/Syngenta** – QCCP owns and operates a cellulosic/conventional ethanol biorefinery in the U.S.; in partnership with Syngenta, QCCP licenses cellulosic ethanol technology

Other companies signing the pledge, such as Monsanto and Novozymes, are also heavily engaged in the U.S. and global biofuels industries. These businesses joined some of the world’s most recognizable companies—including Apple, AT&T, Coca-Cola, GE, General Motors, Google, IBM,

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<sup>13</sup> The White House (Oct. 19, 2015). “FACT SHEET: White House Announces Commitments to the American Business Act on Climate Pledge.” <https://www.whitehouse.gov/the-press-office/2015/10/19/fact-sheet-white-house-announces-commitments-american-business-act>

McDonald's, Microsoft, Proctor & Gamble, Starbucks, Target, Walmart—in supporting President Obama's objectives in Paris.

All of this begs an important question: Why isn't the president using COP21 as an opportunity to showcase the policy that has supported companies who share his vision for innovation and combating climate change? Ironically, the administration's proposal to roll back the RFS hurts the very businesses who have pledged to support aggressive efforts to curb climate change.

## **Conclusion: U.S. Should Highlight—Not Hide—RFS Success Story in Paris**

Given the accomplishments of the RFS program, one might expect that the United States would be among the countries aggressively pursuing fortification and expansion of biofuels policies as a means of further reducing GHG emissions under COP21 agreements. However, the U.S. INDC submission does not mention the RFS or biofuels as a component of planned post-2020 U.S. climate actions, nor does it identify the RFS as a key driver of the GHG reductions observed over the past decade. In fact, the terms "RFS" and "biofuels" don't even appear in the U.S. submission.

Thus, while nearly 30 other countries are expected to promote the achievements of their biofuels industries and pledge to renew and expand renewable fuel policy commitments, the United States appears poised to shun the most successful national energy-climate policy ever enacted.

While the exact reasons for omitting biofuels policy from the U.S. INDC remain unclear, all eyes will be focused on President Obama's approach to the RFS in the Paris climate discussions. Biofuel producers, farmers and ranchers, climate advocates, clean-tech investors, national security hawks, and others will all be watching Paris closely in hopes that President Obama appropriately promotes the RFS program's successful record of reducing U.S. GHG emissions, and recognizes the ability of biofuels to play an even larger role in future efforts to combat climate change.

## Appendix:

### Calculations of GHG Savings Resulting from Grain Ethanol Substitution for Gasoline, 2007-2015

#### Ethanol and Gasoline Energy Content<sup>1</sup>

	Megajoule/Gal.
Ethanol	81.51
Gasoline	119.53

	U.S. Ethanol Blended <sup>2</sup>	Gasoline Equivalent	Ethanol Lifecycle Carbon Intensity <sup>3</sup>	Gasoline Lifecycle Carbon Intensity <sup>4</sup>
	Million Gals.		g CO <sub>2</sub> e/MJ	
<b>2007</b>	5,737	3,913	<b>74.9</b>	<b>93.0</b>
<b>2008</b>	7,984	5,445	73.6	93.0
<b>2009</b>	10,120	6,902	72.3	93.0
<b>2010</b>	12,007	8,189	<b>71.0</b>	<b>94.0</b>
<b>2011</b>	12,485	8,515	66.5	94.0
<b>2012</b>	12,775	8,713	<b>62.0</b>	<b>94.0</b>
<b>2013</b>	13,044	8,896	61.2	94.0
<b>2014</b>	13,321	9,085	60.4	94.0
<b>2015p</b>	13,658	9,315	<b>59.8</b>	<b>94.0</b>

	Ethanol Emissions	Gasoline Equivalent Emissions	Avoided Emissions from Ethanol Substitution
	Million MT CO <sub>2</sub> e		
<b>2007</b>	35.0	43.5	<b>8.5</b>
<b>2008</b>	47.9	60.5	<b>12.6</b>
<b>2009</b>	59.7	76.7	<b>17.1</b>
<b>2010</b>	69.5	92.0	<b>22.5</b>
<b>2011</b>	67.7	95.7	<b>28.0</b>
<b>2012</b>	64.6	97.9	<b>33.3</b>
<b>2013</b>	65.1	100.2	<b>35.1</b>
<b>2014</b>	65.6	102.1	<b>36.5</b>
<b>2015p</b>	66.6	104.7	<b>38.1</b>

<sup>1</sup> Argonne National Laboratory GREET1 2015 Model.

<sup>2</sup> U.S. Energy Information Administration. "U.S. Refinery and Blender Net Input of Fuel Ethanol." 2015 is projected based on Jan.-Aug. totals. <http://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=MFERIUS1&f=M>

<sup>3</sup> 2007 based on M. Wang, M. Wu & H. Huo. "Life-cycle energy and greenhouse gas emission impacts of different corn ethanol plant types." *Environ. Res. Lett.* 2 (2007) 024001 (13 pp); 2010 based on M. Wang et al. "Energy and greenhouse gas emission effects of corn and cellulosic ethanol with technology improvements and land use changes." *Biomass & Bioenergy* 35 (2011) 1885-1896; 2012 based on M. Wang et al. "Well-to-wheels energy use and greenhouse gas emissions of ethanol from corn, sugarcane and cellulosic biomass for US use." *Environ. Res. Lett.*, 7 (2012) 045905 (13pp); 2015 is based on GREET1\_2015 model. 2008, 2009, 2011, 2013, 2014 are interpolated. Estimates from 2010-2015 include land use change emissions.

<sup>4</sup> *Id.*