United States Senate Committee on Agriculture, Nutrition and Forestry

Advanced Biofuels: Creating Jobs and Lower Prices at the Pump

Written Testimony of:

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Good morning, Chairwoman Stabenow, Ranking Member Cochran, and Members of the Committee. My name is Brooke Coleman and I am the Executive Director of the Advanced Ethanol Council (AEC).

The Advanced Ethanol Council represents worldwide leaders in the effort to develop and commercialize the next generation of ethanol fuels and products, ranging from cellulosic ethanol made from switchgrass, wood chips and agricultural waste to advanced ethanol made from sustainable energy crops, municipal solid waste and algae. Our members include those endeavoring to operate production facilities, those interested in augmenting conventional biofuel plants with "bolt on" or efficiency technologies, and those developing and deploying the technologies necessary to make advanced biofuel production a commercial reality.

This is a timely hearing, and we are honored to be here today to discuss renewable fuels and the emerging advanced biofuels industry. My role today is to talk about the continued development of the advanced biofuels industry. However, we would also like to provide context for the ongoing discourse about the rationale for, and efficacy of, ongoing federal policy support for biofuels.

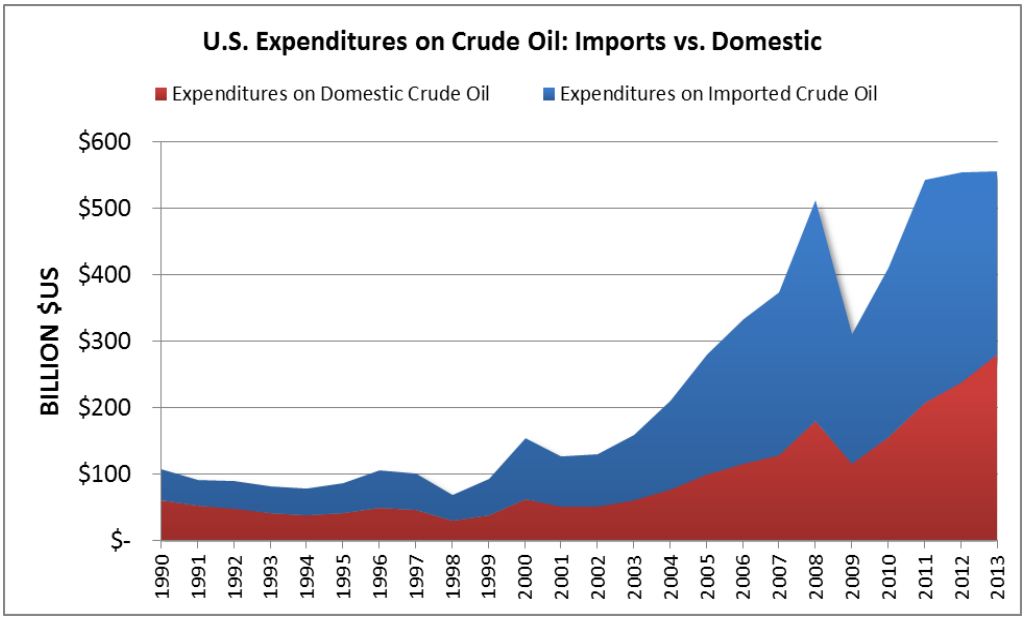
1. Oil dependence is still a problem, and recent trends are not changing the big picture

With fiscal responsibility on the minds of nearly every member of Congress, there is no bigger drain on our economy and revenues than foreign oil dependence. It is the single largest piece of the federal trade deficit, and represents a huge fraction of annual spending by U.S. consumers that is not recirculating through our economy. Between 2000 and 2012, the cumulative total of U.S. spending on imports of goods and services exceeded U.S. export earnings by $7.1 trillion dollars – U.S. trade deficits in crude oil and refined petroleum products were $2.87 trillion during this period, or 40.5 percent of the cumulative deficit in all goods and services (petroleum accounted for 55 percent of the trade deficit in 2012).[1]

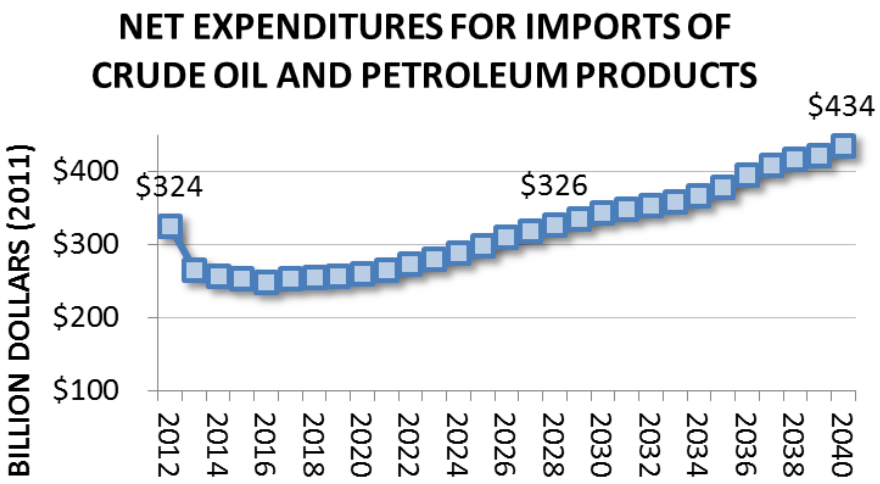
[11] See http://www.bea.gov/iTable/iTable.cfm?reqid=6&step=3&isuri=1&600=3#reqid=6&step=3&isuri=1&600=3

U.S. oil imports have dropped over the last several years due to increases in domestic supply, but they have not dropped enough to change the big picture with regard to the impacts of oil dependence on consumers and the U.S. economy as a whole. The issue is that while the U.S. now produces a slightly higher percentage of the world's oil (~ 10%), we consume more than 20 percent of the world's oil and the price of a barrel of oil continues to increase. In essence, this means that the oil shale "boom" is not changing the fact that the U.S. continues to be highly dependence on foreign oil, consumers continue to spend enormous sums of money on foreign oil, and the U.S. economy continues to suffer at the hands of its dependence on foreign oil.

Speaking to this last point, former Central bank chairman Ben Bernanke recently stated that, "sustained rises in the prices of oil or other commodities would represent a threat both to economic growth and to overall price stability, particularly if they were to cause inflation expectations to become less well anchored." The magnitude of the economic drain in recent years is staggering. Americans transferred nearly $1 trillion to OPEC member states during the oil price spike of 2008, in just 6-8 months. EIA forecasts suggest that recent trends above $100 per barrel are not a spike, but are instead a new equilibrium.[2]



[2] Oil prices are not coming down for a number of reasons, including but not limited to: (a) increases in global demand from countries like China and India; (b) dwindling supplies of cheaper, light sweet crude; and, (c) the relative expense of extracting and producing unconventional oil (e.g. tar sands, tight oil, etc.). See http://www.eia.gov/forecasts/aeo/er/pdf/0383er%282014%29.pdf, at p. 1, figure 1.



Source: Prepared by RFA, based on U.S. Energy Information Administration data

There is also the issue of energy security risk, in the more macro sense, stemming from two important considerations: (1) there is virtually no transparency when it comes to "source data" for the myriad of claims about future oil markets made on an everyday basis by analysts in the sector; and, (2) the oil industry and its analysts have a long history of seriously overestimating the vastness of its claimed reserves.

With regard to transparency, Russia (one of the world's largest conventional oil producers) declared all oil data a state secret in 2004. Neither Saudi Arabia nor Venezuela share data publicly when they make claims about future capacity. This is a concern in part because "there are political and financial pressures to misreport figures."[3] OPEC member quotas are based on reported reserves; the higher the reserve, the higher the quota relative to other members. OPEC members also face the challenge of attracting investment, from both government and outside sources. As reported in a recent peer-reviewed article in *Science*, "there are fears that Saudi oil reserves (and others) may have been over-estimated by at least 40%," and, "[a]t best Saudi reserves are seen as near maturity," given that 7 million barrels of sea water are being injected in the main field on a daily basis to increase flow.[4] The oil industry and OPEC also has the incentive of exaggerating reserves to weaken political and market interest in developing alternatives. OPEC first admitted its focus on alternative fuels in 2006, when it openly admitted that its price setting is designed partially to deter their use.[5]

With regard to overestimation, recent statements about game changing oil reserves should be regarded carefully because we have heard similar claims in the past about Alaska and the Gulf of

[3] Chapman, I., *The end of Peak Oil? Why this topic is still relevant despite recent denials*, Energy Policy (2013). http://dx.doi.org/10.1016/j.enpol.2013.05.010 at p. 3.
[4] See Chapman, I., *The end of Peak Oil? Why this topic is still relevant despite recent denials*, Energy Policy (2013). http://dx.doi.org/10.1016/j.enpol.2013.05.010 at p. 4.
[5] See http://www.foxnews.com/story/0,2933,222840,00.html

Mexico. In 2002, the U.S. Geological Survey estimated that the National Petroleum Reserve-Alaska contained 10.6 billion barrels (mean estimate) of oil. In late 2010, USGS revised their estimate to 896 million barrels – a downward adjustment of roughly 90 percent.[6] When BP discovered the Thunder Horse field in the Gulf of Mexico in 1999, they estimated that the reserve contained more than a billion barrels of oil. The discovery fundamentally changed projections about U.S. oil capacity and was credited with changing the global price of oil. BP and partners built the largest oil platform in the Gulf. However, oil extraction was delayed by more than 3 years due to technical difficulties, and according to a consultant for oil exploration, "Thunder Horse hasn't reached anywhere near its expected potential."[7] Tight oil plays (e.g. the Bakken) face similar challenges. As noted in an April 2013 article in *Science*, "data on reserves of many unconventional sources are now regarded as optimistic, compounded by thermodynamic inefficiencies in the processes, often relying on high energy inputs, will ultimately limit the net gain to provide fuel quantities well below predicted figures."[8] As a point of reference, the 4.3 billion barrels of technically recoverable tight oil from the Bakken (as estimated by the U.S. Geological Survey) is less than one year's worth of crude oil consumption by U.S. refineries.

2. <u>The United States is not going to "free market" its way out of its foreign oil dependence problem or emerge as the global leader in advanced biofuel development without aggressive policies to attract investment</u>

In a competitive marketplace, the increasing cost and scarcity of crude oil would play to the benefit of alternatives such as advanced biofuels. That is, the declining production cost of biofuels would attract investment over the increasing cost and scarcity of petroleum, and new alternative fuel products would emerge to replace petroleum. In essence, free markets reward innovation. However, U.S. and global liquid fuel markets are not free markets. They are distorted by the price-controlling behavior of OPEC, driven by policy as opposed to price, and are dominated by highly-consolidated and vertically integrated incumbent oil companies that continue to receive the large majority of federal subsidies to the U.S. fuel energy sector. While many of these policies lie outside of the jurisdiction of this committee, ongoing support for bioenergy from programs within the jurisdiction of this committee should not be held to a different standard than those reviewed and managed by other committees.

For example, the largest leaseholder in the Bakken told the Senate Finance Committee in 2012 that "[w]ithout the current capital [federal tax] provisions in place … that let us keep our own money … we would not have been able to fail over and over again, which is what it took to advance the technology needed to produce the Bakken and numerous other [tight oil/fracking] resource plays

[6] See http://www.newsminer.com/news/alaska_news/oil-estimates-slashed-for-national-petroleum-reserve-alaska/article_999d982e-5823-59c2-82f7-8b6bb65d8fd6.html.
[7] See http://www.theoildrum.com/node/6415.
[8] Chapman, I., *The end of Peak Oil? Why this topic is still relevant despite recent denials*, Energy Policy (2013). http://dx.doi.org/10.1016/j.enpol.2013.05.010.

across America."[9] It is critical to point out that cellulosic biofuel producers and "tight oil" producers have something in common; they are both endeavoring to supply the country and world markets with what the Energy Information Administration (EIA) terms "unconventional fuel." While facing similar technology risk, the cellulosic biofuels industry does not receive the same tax treatment as companies like Continental Resources (from the perspective of value or duration).

More broadly, the fossil fuels industry enjoys the benefit of a number of unique federal tax allowances – unavailable to renewable fuels – that de-risk and lower the cost of the ongoing development of oil and gas resources relative to other sources of liquid fuel. For example, a recent study estimates that fossil fuels received 70 percent of U.S. federal energy subsidies between 2002 and 2008, to the tune of more than $70 billion during this time period. [10] This number does not include the loopholes in oil and gas laws that, according to the Government Accountability Office (GAO), allowed petroleum companies to forego paying $53 billion in royalty payments, over just four years, for extracting natural resources from lands owned by the American taxpayer. The federal government also helps incumbent industries develop new technologies. According to a recent Congressional Research Service report, [f]or the period from 1948 through 2012, 11.6% of Department of Energy R&D spending went to renewables, 9.7 % to efficiency, 25% to fossil energy, and 49.3% to nuclear.[11] According to a recent report, "energy innovation has driven America's growth since before the 13 colonies came together to form the United States, and government support has driven that innovation for nearly as long."[12] Governmental support drove investment in coal, timber, engine innovations, land settlement for resource extraction and other forms of innovation in the 19th and 20th centuries, and domestic energy consumption and GDP have tracked closely for at least 200 years.[13] Given the importance of energy security, we believe that the federal government's engagement in domestic energy development is appropriate, and there is a clear case for making advanced biofuels a focal point of that effort going forward.

3. Federal Biofuel Policies Are Working to Create Jobs and Reduce Gas Prices

While some level of support for renewable fuel development traces back to at least the 1980s, the federal government's commitment to the industry began in earnest just ten years ago. And the return on investment is very clear.

» **Jobs and Economic Development**

A recent state-by-state analysis of the ethanol industry conducted by Cardno ENTRIX concluded that the ethanol industry alone supports roughly 383,000 direct and indirect jobs across all

[9] http://www.finance.senate.gov/imo/media/doc/Hamm%20Testimony1.pdf, p. 2.
[10] See http://www.elistore.org/Data/products/d19_07.pdf.
[11] See http://www.fas.org/sgp/crs/misc/RS22858.pdf
[12] See note 2, at p. 11.
[13] *Id.*

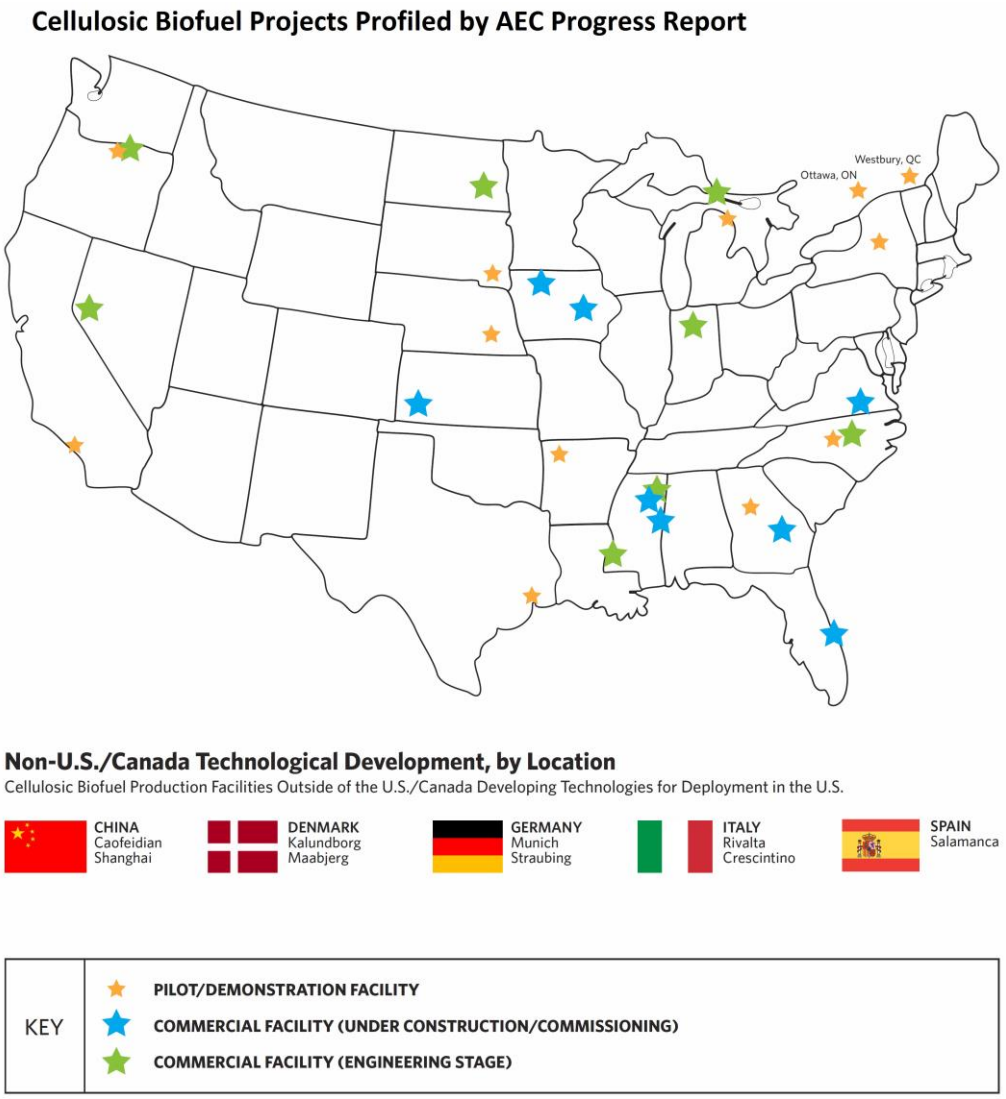
sectors, and contributed $43.3 billion to GDP and $30.2 billion in household income.[14] More broadly, a recent assessment published by the Oak Ridge National Laboratory found that the RFS is producing significant positive economic effects ("the net global economic effects of the RFS2 policy are positive with an increase of 0.8% in U.S. gross domestic product (GDP) in 2022…[well in excess of $100 billion]" stemming from the fact that the RFS is reduces crude oil prices, decreases crude oil imports, increases gross domestic product (GDP), and is having only minimal impact on global food markets and land use.[15] Roughly half of the projected economic benefits will stem from advanced biofuel production. The economic picture is even more robust in certain states. For example, the renewable fuels industry in Iowa generated $5.6 billion in economic activity in 2013, which equates to 4 percent of the Iowa GDP. The Iowa ethanol industry alone generated $10.62 billion in purchases, $5.04 billion in GDP, $3.74 billion in household earnings, and supported 55,161 jobs.[16]

While there are not bright lines between conventional biofuel and advanced biofuel jobs, due to the fact that so many conventional biofuel industry employees are also working on advanced biofuel development, it is clear that the industry is well on its way to fulfilling its promise. For example, the biodiesel industry alone has created an estimated 60,000 jobs.[17] Environmental Entrepreneurs, an offshoot of NRDC, estimates that the first two dozen or so new cellulosic/advanced biofuel projects under construction will create tens of thousands of direct and indirect jobs.[18] With regard to assessing advanced biofuel jobs, it is important to remember that emerging industries are extremely fluid and should also be analyzed from the perspective of opportunity. According to the Sandia National Laboratory, the U.S. could produce 75 billion gallons per year of cellulosic biofuels (one subset of the advanced biofuel industry, and 4.5 times the amount of cellulosic biofuel required by the RFS) without displacing food and feed crops.[19] A Bloomberg analysis released in 2012 looked at eight select regions to assess the potential for next generation ethanol production.[20] The study found that eight regions -- Argentina, Australia, Brazil, China, EU-27, India, Mexico and the United States – could displace up to 50 percent of their demand for gasoline by 2030 making ethanol from a very small percentage of its each region's agricultural residue supply. In this scenario, GHG emissions are reduced by more than 25 percent from the motor fuel sector.

The cellulosic biofuels industry is acutely aware of concerns about our rate of deployment. But we would encourage the committee to focus closely on the clear visual and data-statistical evidence of real progress in our industry. From an RFS perspective, the production capacity of the broader advanced biofuels industry (i.e. all types of fuel qualifying as advanced biofuel under the

[14] See http://ethanolrfa.org/page/-/rfa-association-site/studies/2012%20Ethanol%20Economic%20Impact_By%20State.pdf?nocdn=1.
[15] See http://www.future-science.com/doi/abs/10.4155/bfs.12.60?journalCode=bfs.
[16] See http://www.iowarfa.org/documents/2014IowaEconomicImpact.Final.pdf
[17] For example, the biodiesel industry estimates that it has created 62,000 jobs.
[18] See http://www.e2.org/ext/doc/E2AdvancedBiofuelMarketReport2013.pdf
[19] See https://share.sandia.gov/news/resources/news_releases/biofuels-can-provide-viable-sustainable-solution-to-reducing-petroleum-dependence-say-sandia-researchers/.
[20] See http://www.novozymes.com/en/sustainability/benefits-for-the-world/biobased-economy/white-papers-on-biofuels/Documents/Next-Generation%20Ethanol%20Economy_Executive%20Summary.pdf

RFS) exceeded the 2013 statutory target of 2.75 billion gallons established by Congress via RFS2.[21] U.S. EPA relied on the administrative flexibility provided to the agency by Congress to allow more bio-/renewable diesel and less cellulosic biofuel to be used to meet the 2013 standard. But delay should not be interpreted to mean failure when it comes to the commercial deployment of the most carbon-reductive, innovative fuels in the world. As shown in the Progress Report recently released by the AEC (see U.S. Map below), the cellulosic biofuels industry is breaking through at commercial scale just seven years after the enactment of RFS2 and notwithstanding the global recession.[22]



[21] See http://www.epa.gov/otaq/fuels/rfsdata/2013emts.htm
[22] See AEC Progress Report: Cellulosic Biofuels at http://ethanolrfa.3cdn.net/96a2f9e04eb357bbbd_1sm6vadqk.pdf.

While the report details ~ 20 projects, we would like to highlight three projects coming online this year:

- Abengoa (Hugoton, KS): The global renewable energy company has completed construction of a 25 million gallon per year plant in southwest Kansas that will produce ethanol and renewable electricity from agricultural waste. The company has contracted with local farmers to secure the roughly 1,100 dry tons per day of waste feedstock needed to run the plant, and is in position to replicate its successes quickly via its other ethanol plants.

- DuPont (Nevada, IA): DuPont has invested approximately $225 million in its cellulosic ethanol facility, which is completing construction this year. The 30 million gallon per year plant will use corn stover biomass secured from up to 500 farmers within a 30-mile radius around the facility. The project created 1000 construction jobs and will maintain 85 permanent jobs.

- POET/DSM (Emmetsburg, IA): Project Liberty – a joint venture between POET and Royal DSM – will make ethanol from corn cobs, leaves, husk and stalk that pass through the combine during corn harvest. The 25 million gallon per year plant will produce enough renewable electricity, as a co-product, to power itself and the POET grain ethanol plant next door.

The emergence of the industry owes itself to several factors. First, the federal RFS is the global gold standard when it comes to advanced biofuels policy. Second, there are complementary policies that have helped the industry get off the ground. For example, the bioenergy and bio-refining assistance programs first introduced (and recently amended) as part of the energy title in the 2008 Farm Bill have been critical to the development of the industry. We very much appreciate the committee's leadership when it comes to protecting the energy title in the farm bill. These programs are working. As noted by a recent assessment by U.S. EPA, the production cost of cellulosic biofuels continues to fall; the industry continues to make significant progress towards producing cellulosic biofuel at prices competitive with petroleum fuels; production and capital costs are expected to continue to decline as more facilities come online and the so-called "commercial learning curve" is achieved; and, first commercial projects in the pipeline for cellulosic biofuels have made great progress in securing the necessary feedstock for their plants.[23] These industrial benchmarks are also widely reported in a number of academic studies and surveys.[24] For example, an industry survey conducted by Bloomberg New Energy Finance concluded that "[t]he operating costs of the [cellulosic biofuel] process have dropped significantly since 2008 due to leaps forward in the technology [emphasis added]… [f]or example, the enzyme cost for a litre of cellulosic ethanol has come down 72% between 2008 and 2012."[25]

[23] See Docket ID No. EPA-HQ-OAR-2012-0546: Regulation of Fuels and Fuel Additives: 2013 Renewable Fuel Standards
[24] See: *Cellulosic Ethanol Heads for Cost-Competiveness by 2016, http://about.bnef.com/press-releases/cellulosic-ethanol-heads-for-cost-competitiveness-by-2016/;* Brown, T., Brown, R. "A review of cellulosic biofuel commercial-scale projects in the United States." Biofuels, Bioprod. Bioref. DOI:10.1002/bbb.1387 (2013).
[25] See http://about.bnef.com/press-releases/cellulosic-ethanol-heads-for-cost-competitiveness-by-2016/

From the broader perspective of agricultural policy and rural America, some of the benefits of biofuel policy and advanced biofuel technology utilization are more subtle. It is true that the ethanol industry, for example, has built more than 200 biorefineries since 1988, now employs hundreds of thousands of Americans directly and indirectly, has increased national GDP by close to $50 billion, and has raised household income by tens of billions of dollars. But it is also true that the conventional ethanol industry is converting grain to ethanol more efficiently with technologies and enzymes developed by the advanced ethanol industry, is putting higher quality dried distillers grains into the marketplace partly as a result of this technology, and in many cases is leading the effort to diversify feedstock (via cellulose) by leveraging first generation biofuel infrastructure and assets.

The primary critics of biofuel development continue to rely on the false underlying presumption that, before biofuels, we had a good balance between supply and demand in the agricultural sector, and that sub-$2/bushel corn was good for America, good for government spending, and good for world hunger. But it is not long ago that U.S. farmers were "price takers" selling over-supplied grains at below cost and struggling to make a living. Some industries benefitted from the availability of below cost grains, but the federal government was forced to intervene with multi-billion dollar assistance efforts to make sure that rural America did not collapse under the weight of its own success in producing more grain from each acre of land over time. We believe that Congress was right to pursue policies to promote value-added agriculture, that the development of cellulosic biofuels is part of this vision, and that more prosperity and new markets in rural America is one of the major reasons why the federal government was able to pass a farm bill in 2014 with substantial, multi-billion dollar spending cuts to key agricultural programs. We are concerned that current proposals to rollback policy support for bioenergy and biofuel is not as sensitive as it should be to the reality of what that means (and meant) economically and policy-wise for rural America.

» **Lower Prices at the Pump**

Former Shell Oil President John Hofmeister recently stated, "[w]e need a competitor for oil. We need to open the market to replacement fuels … Competition will drive transportation fuel prices down, structurally and sustainably."[26] This is exactly what is happening with renewable fuels. The RFS and complementary renewable fuel policies have the practical effect of increasing the available supply of affordable liquid fuel during a period of tightness in the global supply of petroleum. Energy economist Philip K. Verleger (who served as an advisor on energy issues to both the Ford and Carter administrations) recently said, "the U.S. renewable fuels program has cut annual consumer expenditures in 2013 between $700 billion and $2.6 trillion … [t]his translates to consumers paying between $0.50 and $1.50 per gallon less for gasoline."[27] Verleger adds:

[26] See http://www.fuelfreedom.org/John-hofmeister-former-president-of-shell-oil-company-joins-fuel-freedom-foundations-board-of-advisors

[27] See http://www.pkverlegerllc.com/assets/documents/130923_Commentary.pdf.

> These prices today are between **$15 and $40 per barrel lower** than they would be had Congress not endorsed his proposals to boost ethanol production and blending with gasoline. Today, the Bush measures ***add the equivalent of Ecuador's crude oil output to the world market at a time of extreme tightness***." - Philip K. Verleger (September 23, 2013)

Other assessments have reached a similar conclusion.[28] The most recent is a paper published by Bruce A. Babcock and Sebastien Pouliet from the Center for Agricultural and Rural Development (CARD), with support from the National Science Foundation, which sought to "to provide a transparent economic analysis of the impact on consumer fuel prices from mandates that increase the consumption of ethanol;" or, more specifically, "to estimate the impact of [RFS] RIN prices on the pump price of fuel."[29] CARD has developed a model to predict a range of different market impacts occurring as a result of the RFS. Among other findings, the paper concluded that:

- "… feasible increases in the ethanol mandate in 2014 will cause a small *decline* in the price of E10 [the predominant blend of gasoline in the market today]."

- "… one of the costs that does not need to be considered is an increase in the pump price of fuel, because we show that the most likely outcome from increasing ethanol mandates is a drop in pump prices, not an increase."

- "The oil industry continues to rely on their own commissioned study (NERA 2012) that predicts gasoline producers will have no choice but to cut domestic sales of gasoline to reduce their obligations under the RFS … [t]he study's conclusions – that expansion of ethanol mandates would cause severe damage to the economy – are simply not credible unless EPA were to ignore set mandates at such a high level that they literally could not be met regardless of the level of investment in new fueling infrastructure."

- "Our results should reassure those in Congress and the Administration who are worried that following the RFS commitment to expanding the use of renewable fuels will result in sharply higher fuel prices for consumers."

When considering these assessments, it is important to note that they are looking at two different aspects of the impact of renewable fuels on pump prices. The Verleger model is focused on the impact of renewable fuels on the global price of oil, and attempts to extract from the marketplace what would happen if tightness in global liquid fuel supplies was exacerbated by the hypothetical non-existence of renewable fuels. The Babcock model is focused more acutely on the

[28] See, for example, Cui, J., H. Lapan, G. Moschini, and J. Cooper. (2010). "Welfare impacts of Alternative Biofuel and Energy Policies." American Journal of Agricultural Economics 93(5): 1235-1256.
[29] See http://www.card.iastate.edu/publications/dbs/pdffiles/14pb18.pdf at p. 5.

U.S. motor fuel marketplace, and attempts to test whether the federal RFS (and higher RIN prices) is increasing the cost of gasoline. In both cases, the presence of renewable fuels in the marketplace reduces pump prices.

Conclusion: The Path Forward

We are often asked by members of Congress if there are ways to accelerate the deployment of the advanced biofuels industry. We would like to respectfully suggest the following:

1. A Stronger Commitment to No Backsliding/Policy Certainty Would Help Attract Project Finance to U.S. Advanced Biofuel Markets

The U.S. has a number of well-designed policies in place that are driving innovation in the biofuels sector, including but not limited to the RFS, several important tax provisions currently being considered for extension (e.g. the second generation biofuel producer credit, the special depreciation allowance for second generation biofuel plant properties, etc.) and the critical energy title programs in the farm bill. The issue around these policies is not their design; but rather, their dependability as related to legislated permanence (i.e. the perpetual risk of expiration) and funding (i.e. the perpetual risk that they are de-funded). By contrast, federal government support for the fossil fuels industry – primarily through the federal tax code but also indirectly via infrastructure and other policies – is almost always permanent. This clear inequity has the practical effect of increasing the risk of investing in renewable versus fossil energy, which in turn drives the development of clean energy overseas to countries with more durable policy commitments (e.g. China, Brazil, etc.). Ironically, policy risk is often more perceptive than substantive and incumbents leverage this investment reality to create a perpetual cloud of uncertainty around landmark biofuel programs. As such, it is absolutely critical to our industry to protect landmark programs – RFS and farm bill energy title among them – at both the messaging and substantive levels. Changing the rules in the middle of the game for any of these policies – however framed politically – has the practical effect of spooking investors and making the U.S. less competitive globally. Ultimately, it will also be critical to reform the federal tax code to, at minimum, remove the inequities that distort investment markets.

2. Transparency in RFS RIN Trading Markets Would Help Reduce Unnatural Volatility in RIN Markets and Put the RFS on a More Stable Path Going Forward

The RFS is designed to drive investment in advanced biofuels and more renewable fuel blending (including infrastructural development). The primary driver of additional biofuel market access within the RFS is the RIN. A RIN is an identification number generated when a gallon of RFS-qualifying renewable fuel is produced. The RIN is attached to the renewable fuel gallon at the point of sale to obligated parties (i.e. oil companies), but can be separated (from the liquid gallon) by obligated parties and sold for whatever price the market will bear. The primary value of the RIN

program, other than facilitating compliance accounting and some level of compliance flexibility, is its ability to increase market access for renewable fuels. That is, when an oil company refuses to blend more liquid biofuel, they can buy a RIN on the open market instead. If a significant number of oil companies refuse to blend liquid gallons and seek RINs on the open market, RIN trading and values will increase as a result of their affirmative non-compliance. Higher RIN prices should not be considered a bug in the RFS; they actually provide an extra incentive for other obligated parties to blend liquid renewable fuel gallons, because they acquire a valuable and saleable RIN free of charge with each gallon of renewable fuel purchased. In essence, higher RIN values reward good behavior and facilitate the objectives of the RFS.

Some oil companies and refiners are trying to miscast higher RIN prices as a potential cause for higher gas prices. The Babcock analysis discussed above – which was not funded industry – clearly shows that higher RIN prices do not increase gas prices primarily because: (a) RINs enter the marketplace free-of-charge with each gallon of renewable fuel; (b) RIN values are created by trading among obligated parties, so it is often the oil industry itself on the profit side of the RIN transaction;[30] and, (c) higher RIN prices actually *reduce* the cost of a gallon of renewable fuel at the wholesale level, which erases the threat of higher gas prices at the retail level.

That said, the current RIN trading marketplace lacks transparency to the point in which it is difficult for traders and obligated parties to make trades based on dependable, real-time information. While it is not clear what percentage of the 2013 spike in D6 RIN prices came as a result of the lack of transparency in RIN markets – either through hoarding from (blind) "shortage mentality" or other strategies – it is clear that a non-transparent RIN marketplace could be a liability for the program, and in turn, a point of uncertainty for advanced biofuel investing.

We are aware of this committee's jurisdiction when it comes to the Commodity Futures Trading Commission (CFTC), and very much appreciate Chairwoman Stabenow's efforts to engage the CFTC on the RFS and RINs.[31] This is absolutely the right approach to the problem, and we would very much like to follow up with the committee on this issue. We believe that federal agencies (e.g. EPA in collaboration with the CFTC) could set up an electronic trading platform – similar to those used in other commodity markets – to ensure that RIN positions and trades are disclosed in real time. We believe this can be done expeditiously and would have an immediate calming effect in the marketplace with regard to RIN volatility and predictability.

[30] See http://www.ethanolrfa.org/exchange/entry/what-do-big-oils-quarterly-earnings-say-about-the-real-impact-of-rins-on-u/
[31] See http://www.ag.senate.gov/newsroom/press/release/chairwoman-stabenow-calls-on-cftc-to-review-possible-manipulation-of-renewable-fuels-market

3. Market Access to Allow Fair Competition

There are a number of incongruencies between the goal of increasing the production of advanced biofuels and the regulations that largely dictate outcomes in U.S. liquid fuel markets. It is a basic economic notion that emerging advanced ethanol fuels need a market to deploy at commercial scale. And yet, EPA has yet to resolve a number of roadblocks for the increased use of ethanol in gasoline. For example, EPA has thus far refused to address regulatory inconsistencies with regard to vapor pressure for E15 that are contributing to the slower than necessary deployment of the fuel. There is no real substantive issue that supports treating E10 and E15 differently with regard to vapor pressure, but the practical effect is gasoline retailers cannot offer E15 year round. This discourages the utilization of pump infrastructure for marketing and selling of E15. We are also concerned about EPA's ongoing refusal to provide proper credit for Flex Fuel Vehicles (FFVs) in the updated CAFE fuel efficiency standards. Ongoing devaluation and uncertainty with regard to FFV credits dissuades automakers from making simple adjustments to future vehicles to allow price-driven fungibility in gasoline/ethanol markets. Ensuring that every new car manufactured in the U.S. is an FFV would cost consumers next to nothing, but would open up new frontiers for the advanced ethanol industry.

It is both an exciting and challenging time for the cellulosic biofuels industry and the advanced biofuel industry as a whole. The technology is commercial ready and the industry is deploying at commercial scale. We are embarking on the process of securing efficiencies that can only be achieved via commercialization (i.e. the "experience curve") and economies of scale. When the corn ethanol industry started building plants, their production costs exceeded their feedstock costs by a large margin. However, corn ethanol producers have reduced their production costs by roughly 60 percent since the first commercial plants were built in the 1980s. Likewise, some solar companies have seen a similar 60-70% production cost reduction in just the last ten years, as capacity has increased significantly. The U.S. is in position to lead the world when it comes to the development of advanced, low carbon biofuels. And yet, we face as much policy uncertainty as we ever have before. Incumbents in the fuel energy space are going after our tax provisions, our farm bill programs, and of course, the RFS. We very much appreciate the opportunity today to highlight the fact that advanced biofuels are emerging, that renewable fuels are creating jobs and driving pump prices down, and efforts to undercut biofuel programs are occurring because these programs are working, not vice-versa.

Thank you for the privilege of speaking before you today. I look forward to your questions.

Attachment A

Easy Answers to a Number of Complex Allegations Made Against Biofuels

1. **"Biofuel programs increase feed prices and hurt the livestock industry."**

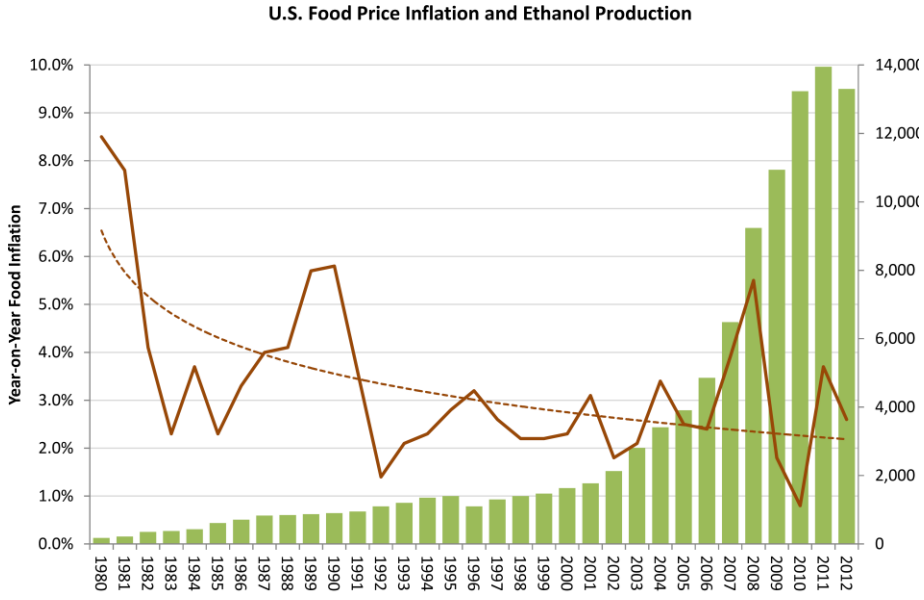
Corn prices today are almost identical to corn prices on the day that President Bush signed RFS2 in December 2007. And while higher oil prices have driven up commodity prices nearly across the board, it is not clear that livestock is suffering. The gross farm value of livestock, dairy and poultry production has increased from an average of $123 billion per year before passage of the RFS to roughly $148 billion per year since 2008. The average profit margin for livestock and poultry values over purchased feed costs has increased by nearly $6 billion per year on average.

2. **Higher RFS-RIN prices in 2013 are a cost of compliance for oil companies that will ultimately increase gas prices**

Many oil companies are now on record on earnings calls attesting to the fact that they are the ones *profiting* from higher RIN values, because they get the RIN for free when they buy a gallon of renewable fuel and can sell it to other obligated parties.[32]

3. **"Biofuels have increased food prices in the grocery aisle."**

Food prices are not increasing, and they are decreasing *against* the increase in ethanol use.



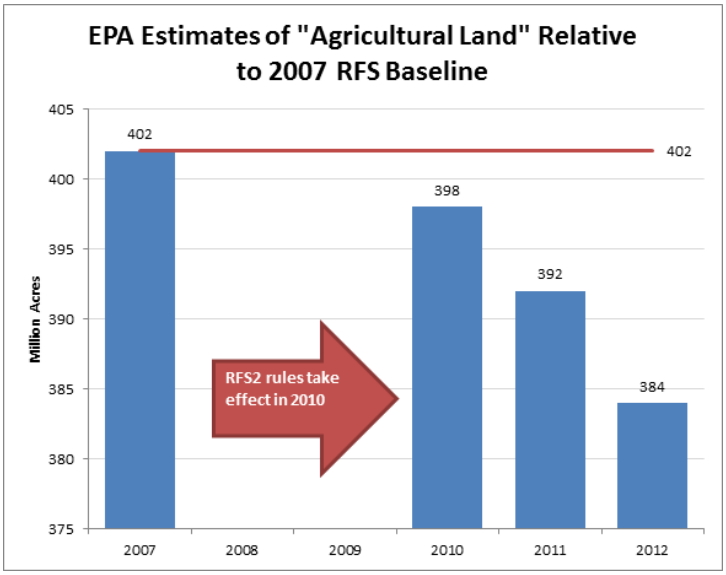
[32] See: http://www.fuelsamerica.org/blog/entry/something-funny-about-those-oil-company-profits

4. "E15 is a threat to boaters and small engines."

E15 is an option at the pump, as opposed to the new baseline fuel. Boaters and small engine users can simply fill up with other fuel to avoid higher ethanol blends if they want to.

5. "The increased use of biofuels has resulted in the plowing of virgin and pristine land."

The national agricultural footprint is not expanding, it's contracting.



There is always some regional variation with regard to agricultural land use, but recent allegations about prairie conversion are misleading:

- Critics of the RFS point to reduced acreage in the Conservation Reserve Program (CRP), but acreage in the program went down commensurate with the funding cut in the 2008 farm bill.
- Allegations about "15 million more corn acres planted" are true, but should be considered relative to the more than 20 million acres of wheat taken out of production during the same period. Crops are generally rotating, not expanding.
- Wheat acres dropped more than corn acres increased in the specific states that the Associated Press claimed were using pristine lands for corn ethanol production.

6. "Biofuels do not decrease climate change emissions."

First generation biofuels are a step in the right direction as compared to gasoline. Cellulosic biofuels, on the other hand, are the lowest carbon fuels in the world. They are lower carbon than electric drive and hydrogen fuel cells, and are in some cases carbon neutral or better.[33]

[33] See http://www.greencarcongress.com/2013/01/wang-20130122.html