

## HOW THE US CAN REALIZE THE FULL POTENTIAL OF THE RFS

*by Doug Durante<sup>1</sup>*

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Almost two years to the day, the editors at *F.O. Licht World Ethanol and Biofuels Report* asked me to write an article that would update the situation in the United States as it pertained to the ethanol industry and the Renewable Fuels Standard. It was not difficult to come up with the title, *Ethanol Under Fire, Tough Times for America's Homegrown Fuel*. At that period in time we were experiencing the wave of more than 100 new Members of Congress who had been elected in November 2010 and were targeting any and every government program for reduction or outright elimination. Dealing with trillion dollar budget deficits became job one for Congress and the public demanded action to reduce the size of government. Ethanol was a visible and easy target despite the tremendous success the industry has had.

But now a full two years later, we take stock of the US situation once

again and quite frankly little progress has been made with respect to Congress and the public gaining a true appreciation for what the ethanol industry has done for the country.

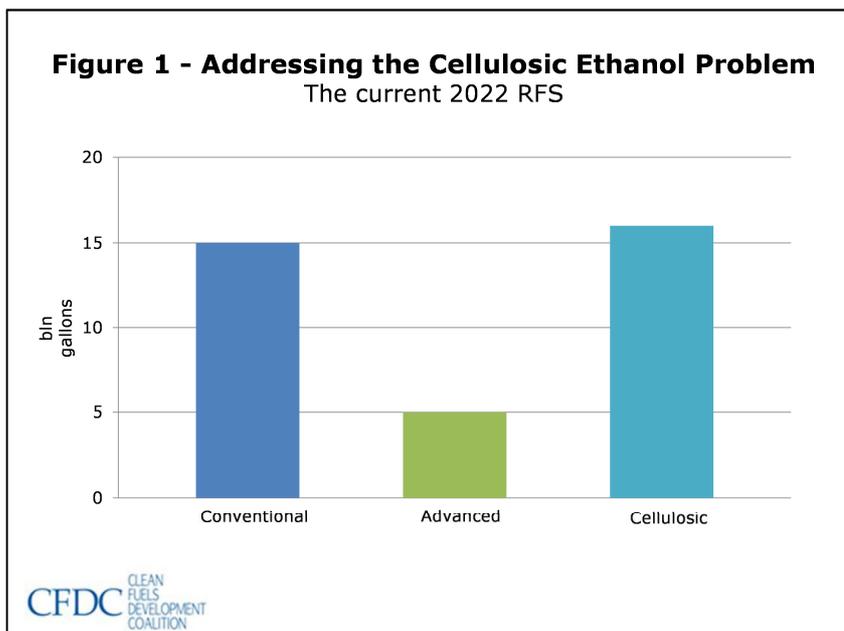
As I predicted in the 2011 article, the tax incentive was not extended and in what was a botched effort by all concerned it was made into a poster boy for the new wave of budget cutters and small government advocates and simply went away. In all fairness, however, the argument that a tax incentive was necessary along with a requirement to use ethanol such as the Renewable Fuels Standard (RFS) was a difficult one to make. Most reasonable people associated with the ethanol industry acknowledged that fact and the RFS became a much more important driver than the tax incentive ever could. That said, there was an opportunity throughout the process to perhaps bargain and use some of the monies



budgeted for the tax exemption to be put towards the refueling infrastructure. Unfortunately that did not happen. There was simply too much ire directed at the ethanol industry and opposition based on everything from rising food prices to pesticide runoff was laid at ethanol's doorstep.

Fast forward now to our Independence Day of July 4, 2013 and curiously little has changed. The mood in Washington remains tense. Congress cannot seem to agree on *anything*. Budget pressures have not been enough to allow Democrats and Republicans to strike any kind of agreement and forced cuts, through what we call the sequester are taking place with across the board reductions in virtually every government program. In recent week we have seen the House of Representatives fail to pass a Farm Bill which is the 5 year reauthorization of almost every program that has anything to do with agriculture. Production quotas, nutrition programs, and crop insurance are among the major issues that require government management yet the House voted down the bill because Republicans felt it did not cut enough in terms of funding and Democrats thought it did not fund enough. Former US Senator Robert Dole of Kansas, one of the leading Republican lawmakers of his generation, recently said in an interview that the Republican Party should put a sign on their doors saying "Closed for Repairs." He went so far as to say that even Ronald Reagan would not be accepted by today's Republican Party because of their inability to compromise.

In our business of energy and biofuels that is particularly disturbing because one would hope Congress could at least agree that we want to get off oil and reduce the \$479 bln we spent on gasoline in 2012. The schizophrenic signals our Congress sends to industry has a chilling effect on investments. Take for example the heightened interest shown by our military for biofuels and the energy security aspects that could support significant biofuel use in planes, ships, vehicles, and other energy consuming tools of the military. Yet efforts in the Senate by some extremists attempted to zero out all military funding for biofuels in recent budget



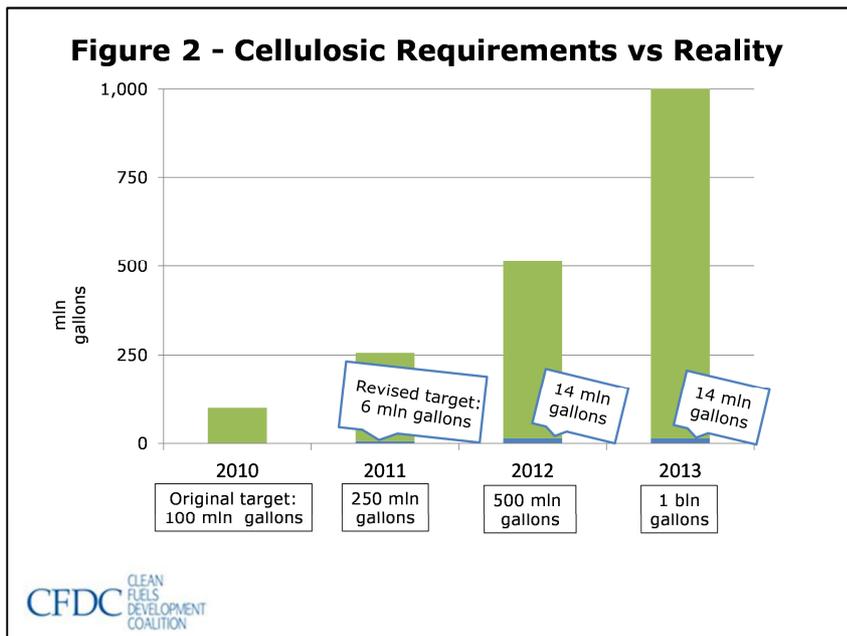
activity. As anti-government sentiment remains very strong and with the tax exemption for ethanol eliminated, the Tea party has turned their attention to the evils of the RFS in terms of too much regulation. The petroleum industry has come out of the closet so to speak and called for a full repeal of the RFS based largely on those regulations that have focused on the requirements for cellulosic ethanol and other advanced biofuels that frankly do not exist in the marketplace. They have seized this opportunity to once again bond with food producers, small engine manufacturers, and many other groups to not only attack the RFS but ethanol in general. It has been a relentless daily pounding with a multimillion dollar PR effort attacking ethanol.

It has resulted in waves of legislation to gut or repeal the RFS, to overturn the approval of 15% volume blends (E-15), deny funding for refueling infrastructure, and just about anything else they can think of that would slow down progress. Even the most ardent opponents of ethanol are finding, however, that it is much more difficult to repeal laws than to pass them. The RFS has achieved great success and because it is a program already in place, the focus is largely on the regulations governing that program which shifts some of the action from the legislative to the regulatory branch of government.

### The E in Ethanol May as Well Stand for EPA

Clearly the Clean Air Act of 1990 which established oxygen requirements in both winter and summer fuel blends was a rebirth to ethanol. Because of that ethanol is now under the jurisdiction of the Environmental Protection Agency (EPA). While those oxygen requirements were dropped they were in effect traded for the Renewable Standard and EPA remains the key regulatory agency governing the program. There are some research and development programs under both the Departments of Energy and Agriculture, but no agency impacts the day-to-day use and future prospects of ethanol the way that EPA does. Every aspect of ethanol use as a motor fuel falls under EPA control and every option to break through the blend wall is dependent on their actions. In that 2011 article I referenced, even then the blend wall was upon us as essentially all gasoline in the United States contained 10% ethanol blends.

Several factors have combined to flat line ethanol use since then with the two most prominent being nearly one-billion gallons in exports combined with nearly one-billion gallons in idle capacity. Without that we would be awash in ethanol in the US and would have seen even more plant shutdowns. E-15 had been seen as a relief valve for ethanol and despite being approved by EPA with support



from the Department of Energy, it has unleashed a torrent of opposition that has left ethanol supporters battered and bruised with a lot more to come.

EPA continues to stand by their work that supported their decision to allow E-15 blends in all automobiles from the year 2001 onward. That represents roughly 75% of the cars on the road today. It was critical to understand E-15 would be an optional blend provided by a marketer/retailer and in no way required or forced upon consumers. Despite that fact it has been portrayed as a requirement and been a rallying point for boaters, motorcycle owners, and people who own lawn mowers, chain saws, garden equipment, and literally anything that runs on gasoline to rise in protest. In Florida for example the state ethanol requirements was repealed due largely to pressure brought by the boating industry.

E-15 has also raised issues related to misfueling and liability for that small segment of the auto population that is not recommended to use the higher ethanol blend. These 2001 and older vehicles are already out of warranty so it is curious that the argument of voiding warranties is getting so much attention. Uncertainties as to the legal ramifications of misfueling have clearly slowed adoption of E-15 from a retail standpoint. This is unfortunate because while E-15 in and of itself could not single-handedly break through the blend wall and save the RFS, it could buy

precious time over the next several years to absorb billions of gallons. The trump card is not surprisingly held by the oil industry which could make E-15 blending all but impossible by failing to provide suitable blend stock. One definition of suitable blend stock would be vapor pressure and this once again brings us back to EPA and the critical role they play in determining the future of ethanol.

All that notwithstanding, E-15 got a definite boost in late June when the US Supreme Court rejected a motion by the petroleum industry to overturn the district court's decision that upheld EPA's original decision. This clears the way to some degree for E-15, at least from a legal standpoint.

### A Highly Regulated Pathway to Market

EPA is unquestionably the gatekeeper to the market and access is determined by the rules and regulations they establish. They will decide if ethanol is an alternative fuel or gasoline additive by addressing these issues relating to vapor pressure, tailpipe emissions, and perhaps most importantly, determining the carbon footprint. Many casual observers of the RFS may not realize that the real value proposition for ethanol beginning in the very near future will be its ability to reduce greenhouse gas (GHG) emissions. Advanced biofuels not only must come from feedstock other than corn, but must demon-

strate a 50% GHG reduction from baseline gasoline. How that calculation is derived is critical and EPA models that many believe unfairly assess land use penalties could make it impossible for ethanol and other biofuels to even qualify for the RFS.

This is doubly important because of the GHG reduction requirements of the new fuel economy regulations that have been implemented, formerly known as the CAFE Program (Corporate Average Fuel Economy). Beginning in 2017 automobiles must demonstrate a reduction in CO<sub>2</sub> emissions in addition to simply becoming more fuel efficient. That might be derived from a combination of factors including reduced fuel consumption, less carbon inputs in the manufacturing process and numerous other pathways. So add up the impacts of GHG reductions, implementation of the RFS, new fuel economy standards, and overall fuel quality regulations that are required by the Clean Air Act and you wind up with EPA holding up all the cards. For the ultimate trump card EPA can reset the RFS levels based on several factors, but they do have the authority to significantly change this program.

### Adjusting the RFS

EPA is required to promulgate a rule if 20% of the volume established in the original RFS legislation is waived for two years or 50% for one year. While we have not had a problem in meeting overall volume, we are nearing the cap point for corn ethanol sometimes referred to as conventional biofuel. The limit on corn ethanol that can be used towards the overall program totals for the year 2013 is 13.8 bln gallons, in 2014 that increases to 14.4 bln gallons, and from 2015 forward it can never be more than 15 bln gallons. At that point advanced biofuel requirements, including the cellulosic ethanol subset, ramp up dramatically and that is where significant problems may arise.

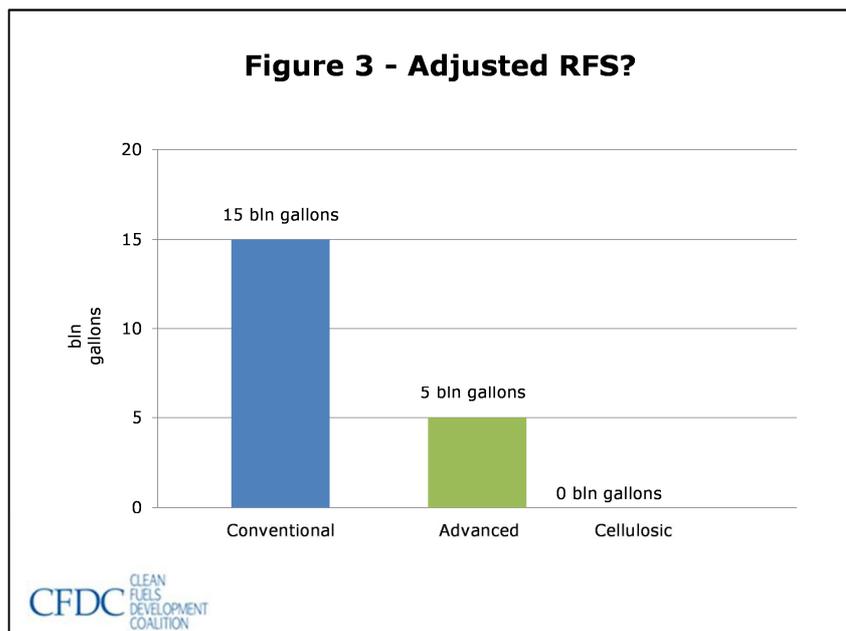
EPA can modify the volumes for all years following the year 2016, which in many respects could be viewed as a mid-course review and likely correction. They could, for example, take stock of the situation in 2016 and assess existing and likely ethanol

production. Based on what they deem is a reasonable expectation, they could set a one-time permanent number for the remaining years of the program. If that number was based on cellulose requirements versus reality the program is in trouble.

As noted previously the pressure has already begun from Congress on EPA to start modifying this program. Repeated hearings in Congress have resulted in EPA officials being hauled before various committees which are demanding they make changes and claim that the program has failed. The question then becomes whether EPA will respond to this pressure. If the problem is to be fixed it is constructive to look at the basis of these accusations of failure.

The first is what we in the policy business often refer to as the "old faithfuls", i.e., those issues that one can reach into a grab bag of objections at any time and demand an answer. Net energy balance, the use of food, energy/mileage loss, water usage, emissions, land use, engine damage, etc., are all objections that the ethanol industry can easily deal with since they are for the most part contrived and we have decades of experience in addressing them. However, the next two fundamental areas of complaint bear a bit more attention. A great deal of this centers on the fact there is nowhere to put the fuel, i.e., the blend wall and secondly, that we cannot produce enough fuel with regard to cellulosic ethanol. Opponents of the RFS have labeled cellulosic ethanol as the "Phantom Fuel".

The program is constructed in such a way that EPA can require the petroleum industry to either use these advanced/cellulosic fuels or essentially pay fines for not doing so. In this era of backlash against government regulations and cries for a free market you simply could not come up with a more vulnerable mechanism. With regard to the cellulose requirements consider that the targets established in the law call for one billion gallons of cellulosic ethanol in 2013. Further, we should have had 500 mln last year and 250 mln the year before. As of right now we have none. While these numbers were established in the law, they are for the most part targets given the fact



that EPA has such discretion in setting the requirements. However, defending these requirements is becoming increasingly difficult given the lack of any product to show for it. In passing these very aggressive production numbers in 2008, Congress must have assumed that it would force the petroleum industry to invest in these renewable technologies and for a while that appeared to be the case. Royal Dutch Shell, BP, and other huge oil interests all had indicated plans to develop ethanol, but many have cooled, perhaps understandably, given the blend wall issue. Why invest in this space if there is nowhere to put the fuel, they ask. This leaves us with EPA trying to defend a program many believe they are not particularly enamored with to begin with. This defense requires them to levy fines and enforce compliance in what many believe is an impossible situation.

Permeating all of these issues is the food versus fuel debate which simply has not gone away. The prolonged and constant high price of corn has allowed this myth to continue and it seems it is being passed on to the next generation of lawmakers, media, and the public. Frighteningly irresponsible articles appearing globally suggest the US ethanol industry is taking food from starving people which is regrettable given the fact that the ethanol demand has spurred a new generation of productivity and increased yields that will only benefit mankind in years to come. That

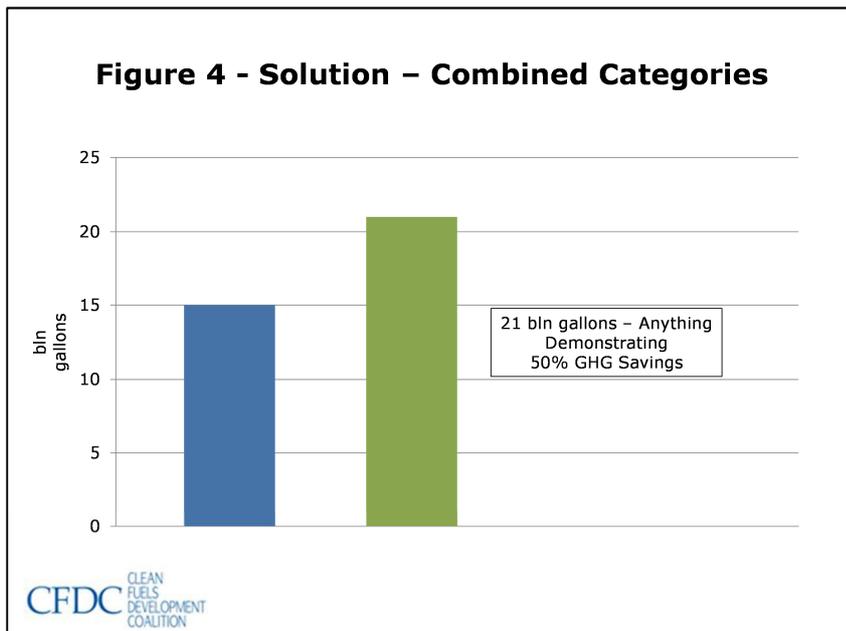
aside, the question the industry needs to ask itself is how to shake off these negatives and move forward.

### Achieving the Renewable Fuels Standard: How Do We Get There From Here?

First of all we need to define what is there, and what is here. If the industry were to take honest stock of itself it would see that despite comprising more than 10% of the fuel pool, "here" is a place where we are stymied by the blend wall, faced with significant opposition, and lack a coherent and comprehensive message and pathway. We risk losing everything gained in the past decade.

Many of our Coalition supporters and members believe "there" is a place we are using ethanol so its greatest strength of high octane and high oxygen is maximized, and its only two demerits of lower energy content and higher blending vapor pressure are minimized. In short, use it where and in a manner so it gets its greatest value.

The pathway forward for ethanol in the US must be laid out in terms of short term, mid-term, and long-term steps. The short-term is to get past the blend wall with E-15 and a significant increase in E-85. Mid-terms steps must be focused on the development of significant and meaningful flex-fuel markets that allow for E-30, E-40, E-50, as well as E-85 over the next three years. Long-term development includes a move towards



greater efficiency blends such as optimized E-30.

Then the path must identify RFS specific remedies and they must include our deficiencies in bringing cellulosic biofuels to market and the fact there is nowhere to put the fuel even if we can produce it. Furthermore, we need to be open to modifying volumes and schedules with various categories of fuel within the existing regulatory structure. In other words, the law clearly needs to remain intact and utilize the broad discretion of EPA to recognize the strengths and weaknesses of the categorical requirements will only make the program stronger. And finally, it is critical that ethanol finds its highest value. For years it was viewed simply as a fuel extender and rarely if ever achieved even gasoline value. Recognition, however, of its high octane and environmental advantages suggests its value is far greater than has historically been realized and part of that may be due to misuse.

As for the cellulose problem, as shown in in Figure 1, the RFS allows no more than 15 bln gallons of corn derived ethanol with no more than 5 bln of advanced, leaving essentially a cellulose mandate of 16 bln gallons. That of course is where the deficit is most glaring and where it may be possible to make some repairs.

Figure 2 shows the requirements versus reality and the undeniable shortfall. The concern of many in the industry is that the failure to produce

cellulosic ethanol could result in either repeal of the entire program or elimination of the cellulosic category. Consequently we could wind up with an “adjusted RFS” by EPA that looks like Figure 3.

Under that scenario the single largest quantity of ethanol would be eliminated and with it the technology and advancements for future fuels would be lost. It is in fact the mandate that these fuels be derived from cellulosic materials that is holding them back. It was simply too much too soon and other fuels that could be contributing both to energy security and the environment are stymied because of the cap on their category. It is also important to note that the advanced biofuel category of 5 bln gallons includes biodiesel which has a multiplier to further incentivize its production. Given this multiplier it is conceivable that the actual gallons plus the multiplier credits would result in far less than 5 bln real gallons. A simple solution of combining the 16 bln gallon cellulosic category with the 5 bln gallon advanced category creates an open, flexible and exciting market for 21 bln gallons of advanced fuel with the requirement that it meet a minimum 50% GHG reduction remaining intact (Figure 4).

A range of non-corn feedstocks, including sorghum which has been approved as an advanced biofuel, and small grains like barley, could conceivably meet the 50% threshold and contribute to the biofuel supply. Cellulosic ethanol meeting the 60%

GHG reduction would be able to sell those credits above 50% in order to continue to incentivize its development. This is a win-win for all concerned as the program moves forward and is not bound by unrealistic expectations from a single category.

### Where to put it?

With the promise of those gallons looking bright, we can then turn to market issues of cars and pumps. An incentive exists to provide the vehicles and infrastructure due to the certainty that the fuels will be there. We have seen a remarkable increase in the amount of flex-fuel vehicles in the United States as the industry has gone from just under 10 mln vehicles to 14 mln vehicles over the past two years.

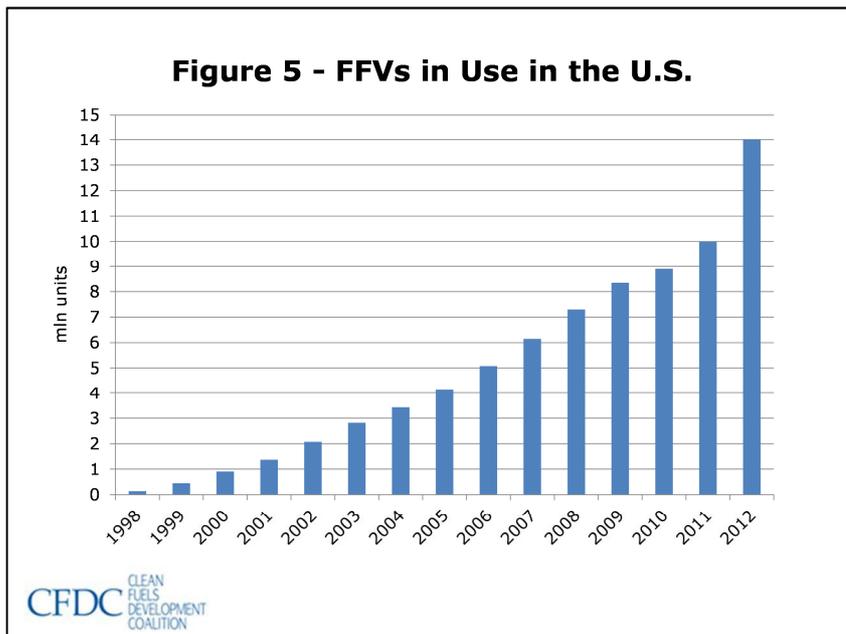
With proper incentives, US automakers could continue to produce these vehicles although their current regulatory incentive is not very attractive to them. Much of that is based on the diminished value ethanol is given as a replacement motor fuel which is largely due to flawed modeling and punitive land use assumptions. Dramatic increases in corn yield as well as corn's critical role in carbon sequestration have largely been ignored. When combined with a gradual transition to biomass boilers and other renewable heat sources, conventional ethanol could have a significant and positive impact. As noted previously while fuel economy credits the auto industry received for the production of flex-fuel vehicles are being phased out, stringent requirements to show reduced GHG emissions are being phased in and this could position ethanol as an attractive motor fuel. There simply must be a value proposition to the auto industry for them to make flex-fuel vehicles capable of running on any of aforementioned blends.

In what I and others in the biofuels industry consider a great injustice, electric vehicles, natural gas vehicles, and other alternatives are clearly favored in the regulatory structure under the new fuel economy GHG program. In fact, electric vehicles in the first year of the program count literally double their mileage credits in an effort to incent automakers to

produce them. For example, an electric vehicle that might be rated at 100 miles per gallon for the first year of the program would count as 200 mpg which is then averaged into the fleet and spread among all vehicles. Similarly, natural gas vehicles have a multiplier of 1.7 which gives them a significant advantage. Flex-fuel vehicles do not receive the favorable treatment and in fact can actually receive a negative credit.

Whatever credits are available to biofuels must be the result of demonstrated usage which requires complex calculations by EPA to predict ethanol volumes above E-10 and further assume a rate of use. For example in the one year they have established a formula, EPA has determined that the CO<sub>2</sub> emissions of E-85 are approximately 5% less than gasoline, but the limited use of E-85 assumes that a flex-fuel vehicle is operating on that fuel only 20% of the time. Thus a FFV would receive 20% of 5% which is a paltry 1% GHG reduction. In the event of production shortfalls or other considerations that could change from year to year resulting in so much uncertainty that automakers have expressed grave concerns. For the ethanol and biofuels industry the task must be to get EPA to recognize greater reductions in GHG and other emissions in order to make these vehicles more attractive to automakers. Modeling must recognize improved corn yields, land use, and other considerations and take steps to eliminate the bias towards electric vehicles. Ford Motor Company concluded in a 2012 study that E-85 represents a range of 4 to 7% CO<sub>2</sub> emission benefits over conventional gasoline and several other studies by the ethanol industry suggest values even higher than that.

The next step in this path forward is to focus on pumps and infrastructure in order to distribute the fuel. With more than 750,000 pumps in the US, roughly 10% are routinely replaced every year. All of these could be replaced with flex pumps that offer a range of ethanol blends. At this rate in just a few years we could see a significant impact with regard to the availability of these fuels which in turn elicits more production from automakers. Despite the budget restrictions and prevailing attitudes



towards tax incentives opportunities remain within the federal government to assist in this refueling infrastructure either through tax breaks or very attractive loan programs.

A final element running parallel to the production of the fuels, and the use and distribution, is the need to establish and maintain value. For the auto industry in the US and the world the need is quite clear. They are looking for low carbon, high octane fuels to meet fuel economy and GHG requirements. Study after study is emerging from the auto industry confirming that dramatic efficiency gains are indeed possible but would require small bore, high compression engines that require very high octane. As noted previously, a challenge for ethanol is to find its best value and octane may lie at the heart of that search. In the Ford 2012 study it was said that, *“substantial societal benefits may be associated with capitalizing on the inherent high octane rating of ethanol for future high octane needs.”* Chrysler offered similar praise for ethanol by saying in 2012 that, *“ethanol offers low carbon content and less GHG emissions and offers the most expedient and least expensive means to lessen CO<sub>2</sub> for liquid fuels.”* GM echoed this in 2012 by stating that, *“ethanol can be used to produce new, higher octane fuels that can be used more efficiently .... Using ethanol to increase octane in fuels could be a cost-effective means to reduce GHG.”*

At the Clean Fuels Development Coalition we have been directly involved in meetings with the US auto industry to identify the best ways to use ethanol. It appears E-30 may be a sweet spot utilizing strengths such as octane and minimizing weaknesses such as mileage penalties normally associated with E-85. E-30 could initially be used in FFVs and eventually in optimized vehicles that truly take advantage of high octane. Clearly, FFVs play an important transition role by providing compatibility to any blend put into the market.

Meanwhile this strategy of FFVs utilizing high octane fits well with EPA and their current responsibilities. Fuel economy/GHG restrictions and a focus on the reduction of sulfur in gasoline open the door for significant ethanol use. The evaporative emissions associated with high vapor pressure ethanol blends are negated to a large degree as ethanol volumes increase. E-30 vapor pressure is significantly less than even E-10 and at E-50 a zero vapor pressure bump combined with super high octane could make an outstanding fuel. Finally, emphasis on climate change and GHG is admirable but there remain other serious considerations to gasoline emissions to which ethanol can play a key role. Octane is derived from the most toxic, carbon intensive and harmful components in oil which are termed aromatics. They are regulated under the air toxics provision of the Clean Air Act and

EPA is required to limit benzene, toluene, and xylene to the greatest extent possible. EPA has long acknowledged the octane value of ethanol and even a modest but meaningful reduction in air toxics may result in a significant demand for clean and low carbon octane.

## **Conclusion**

Ethanol can overcome its current challenges and move forward by breaking the problem down to bite-size pieces.

For the cellulosic ethanol production gap the solution is simply to make one advanced category and for EPA to insert as much flexibility in this schedule as possible.

For market issues, we can simply improve the incentives and reward automakers for making such cars, like we are doing with electric vehicles.

As for the need for more pumps, the retail industry will respond to continued fuel production and auto availability, and if even modest incentives were available we would see a dramatic changeover towards flex-fuel pumps.

To ensure ethanol receives its value in the market, its contribution to GHG reductions and the health benefits associated with clean octane must be illustrated and quantified.

Our Coalition is part of a broader effort called the Urban Air Initiative which seeks to focus on the clean octane issue as a replacement for air

toxics like benzene, toluene, and xylene which, when combined with all of the other attributes of ethanol might finally define its value in a sustaining manner. (Visit [www.urbanairinitiative.com](http://www.urbanairinitiative.com) in addition to [www.cleanfuelsdc.org](http://www.cleanfuelsdc.org) for further information on this important subject.)

I have always maintained that ethanol's value is the sum of its parts and it can vary within a period of time. The combination of economic stimulus, energy security, improved health and environment, and all the positive things that flow from that make it incumbent on us to keep moving forward and make this program work.

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Mr. Durante founded the CFDC in 1987 after working for Congress and the Department of Energy. CFDC represents ethanol, agricultural, automotive and technology interests on a range of biofuel related issues and is a highly respected source for information, policy analysis, and educational programs.