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Subj: PUBLIC COMMENT ON EPA RENEWABLE FUEL STANDARD FOR 2014

Encl: (1) Comments on RFS2
(2) *Twenty-First Century Snake Oil* reference on energy and biofuels

Honorable Lady and Gentlemen,

RFS2 is an unmitigated disaster and has achieved the exact opposite of its intentions in almost every possible way. Both the US and German National Academies of Science have published studies that recommend ending biofuel mandates because of marginal or negative energy balance, marginal to negative GHG reductions, food competition, and failure to achieve stated policy objectives.[1,2] The World Bank, UNFAO, WFP, FAO, IFAD, IMF, OECD, WTO, UN HLTF and other international aid organizations have formally petitioned the G20 to abandon biofuel mandates because they are doing more harm than good and have pushed 850 million more people into food poverty and malnutrition.[3]

In my enclosed comments I show from the government's own data and from other reputable sources well known to the EPA that the RFS2 program of mandates and subsidies, particularly with respect to ethanol-blended gasoline, is:

- Killing additional Americans

- Increasing air pollution

- Increasing damage to the environment (land, water, biodiversity)

- Increasing greenhouse gas emissions

- Increasing the price of food

- Increasing the price of energy

- Damaging engines and infrastructure

- Siphoning money from the economy

- Undermining energy independence, and

- Achieving other perverse outcomes contrary to desired results.

No program funded by federal tax money should be allowed to continue at all if these are its demonstrable outcomes. It is not just time to roll back the destructive RFS2 program; it is time to stop adding oxygenates to our fuel supply at all, and time to stop all subsidies of food crop-based biofuels.

As a taxpayer, a father, a military strategist, and an energy researcher, I implore Congress to take decisive action to remove all ethanol from gasoline and to end all Farm Bill and EPA RFS subsidies and blending mandates for any food crop-based fuel. I furthermore urge Congress to rein in the EPA's political activism against particular industries and fuels, and compel the agency to operate in an evenhanded way that addresses each threat to the nation's air, water, land, and health in accordance with the best science. I recommend Congress enact legislation to remove the EPA's abused rule-making authority and clearly restrict the EPA (and other agencies) from taking the following destructive actions:

1. Establishing any regulation or program that increases the American death rate.

2. Promoting the use of any food crop as a fuel (this includes corn, sugarcane, soy, oil seeds, sugar beet, wheat, potatoes, rice, sorghum, etc.)

3. Incentivizing or mandating production or blending of any biofuel that does not achieve valid greenhouse gas (GHG) emission reductions with its current production pathway and feedstock. This includes prohibiting the agency from grandfathering older refineries or giving current credit for optimistic predictions of future performance, or otherwise using creative accounting to cook the books.

4. Ignoring federal law and treating all biofuels as 100% renewable despite their large fraction of non-renewable content. Biofuels contain non-renewable raw material and energy inputs that include natural gas (ammonia fertilizer, processing plant heat, electricity, hydrotreatment hydrogen), petroleum (herbicides, pesticides, designer enzymes, transportation fuel), coal and nuclear electricity, potash minerals (75% imported), phosphate minerals (11% imported), and water from over-pumped or fossil sources such as the US High Plains and Central Valley aquifers. Federal law requires that anything claiming to be renewable be labeled with the percentage of renewable content unless renewable energy credits (REC) are purchased to cover the difference (16 CFR 260.15). If EPA properly complied with this statute, it would require biofuel producers to buy RECs to cover the non-renewable inputs before being able to claim Renewable

Identification Numbers (RIN) from the EPA for tax credits. With an EROI of 1.25:1, the truly renewable fraction of corn ethanol is approximately 20%.

5. Relying on internally-generated projections or models or calculations that contradict the weight of evidence of academically rigorous studies published by reputable and apolitical authorities such as the National Research Council of the National Academies, federally-funded research and development corporations (e.g., RAND Defense Research Institute), and the national laboratories.

6. Using tax credits, tax-funded subsidies, blending mandates, or any other regulation or incentive to intentionally or indirectly encourage the import of any fuel or biofuel into the USA, encourage the export of fuel from the USA, or otherwise undermine US energy independence.

7. Creating and enforcing regulations and incentives that are based on overly narrow and insufficient metrics such as fuel volume or tailpipe emissions without explicit consideration of other vitally important aspects of energy service costs and benefits such as energy density, energy return on investment (EROI), engine and infrastructure compatibility, and full environmental footprint including direct and indirect land use change. All evaluations should consider both the benefits and costs of alternative fuel options across their full production and consumption lifecycles.

8. Demonizing and regulating as a pollutant a single GHG (i.e., $CO_2$), while ignoring other far more potent GHGs. Methane ($CH_4$) has a global warming potential (GWP) 34 times higher than $CO_2$, is currently responsible for 17.7% of global warming, yet it is not regulated by the EPA. Nitrous oxide ($N_2O$) has a GWP 298 times higher than CO2, is responsible for 6.2% of global warming, is the number one ozone-depleting gas, is growing in emissions proportionately faster than any other GHG, but is not regulated by the EPA – perhaps because it is emitted by biofuels agriculture. Nitrogen triflouride ($NF_3$) is 17,200 times worse than CO2, but is not regulated by the EPA – perhaps because it is released in the manufacture of solar panels. Rational climate protection policies must create penalties and incentives in direct proportion to the GWP of each offending gas regardless of which industries or technologies or political constituencies are impacted, or they are guaranteed to channel Americans from bad behavior to worse, and to achieve perverse outcomes.[4]

9. Violating Executive Order 13112 by promoting the cultivation of invasive species, alien species, and noxious weeds including Arundo donax (giant reed), Pennisetum purpureum (elephant grass/napier grass), Saccharum spontaneum hybrids (energy cane), Thlaspi arvense (pennycress/stinkweed/french weed), Miscanthus x giganteus (miscanthus), and Camelina sativa (camelina).

By delegating to EPA the authority to determine what chemical compounds are fuels and which are pollutants, Congress has abdicated its Constitutional responsibility to ensure such fundamental and sweeping determinations capable of reframing a nation's entire economy are made by elected officials accountable to voters. Present policy allows partisan political appointees to make decisions that can devastate entire industries almost

at whim, and puts far too much unchecked power in the executive branch. The agency wielding such power has also proved time and again that it is not a good student of history, mathematics, or economics. Even as it administered higher corporate average fuel economy (CAFÉ) standards for increased vehicle mpg, it failed to anticipate a reduction in fuel use and factor that in to renewable volume obligation (RVO) refinery blending mandates. It also failed to anticipate the reduced fuel consumption following the 2008 economic crash that has followed all historical economic recessions and fuel price spikes. The current pattern of reduced gasoline consumption and increased fuel efficiency happens to be an exact parallel of the US economic response to the oil shocks of 1973 and 1979-80. If EPA performed analytical due diligence before their rulemaking, they would not put themselves in the position of fining refineries for not blending non-existent biofuel, nor repeatedly establishing cellulosic ethanol RVOs thousands of times higher than actual production, nor creating a "blendwall" for E10.

The above grant of authority has also guided EPA to think in terms of fuels instead of in the broader terms of the energy services they deliver; and it has steered the agency to think in negative terms of regulation instead of positive terms of optimization. All of the above is strong evidence that energy and fuel rulemaking should be taken back by Congress. EPA's real mandate should be to ensure essential energy services are delivered to Americans in a sustainable way, with the greatest efficiency and the least environmental impact. Rather than promoting biofuels, the EPA should be promoting transportation options that deliver better performance on the metrics of passenger-miles traveled per units of finite resources consumed and pollutants and GHGs emitted. They should not predetermine winners and losers, but should let all technologies and industries compete on a level field and grade them agnostically.

I further recommend that Congress take positive action to reduce the wasteful redirection of finite fossil fuel energy into inefficient biofuels production by enacting legislation to prohibit use of fossil fuel-derived fertilizer and agrichemicals on biomass energy crops. Lifecycle analyses reveal that intensively-cultivated liquid biofuel crops are essentially stealing and repackaging energy from fossil fuels. If a biofuel is not sustainable without fossil fuel inputs then it is not truly "renewable," "green," or "clean," in the first place. Similarly, natural gas-to-liquid (NGTL) fuel processes should be recognized as synthetic fuels, not biofuels, even when there is some biological intermediary process. Any fuel process where the input energy is largely from fossil fuels should not be eligible for RFS advantages.

It is ironic and tragic that current EPA policies are increasing air pollution and water pollution and mortality, are encouraging the import of foreign sugarcane ethanol made from a food crop, are increasing global and domestic food prices, are incentivizing the export of US gasoline to South America and US diesel fuel to Europe, and are prohibiting the domestic production and purchase of super-high-efficiency vehicles comparable to the 81-mpg Volkswagen Polo. Policies based on preconceived ideologies and intuitive judgments of what is "clean" and "green" are achieving the opposite of the sustainable and secure future we all want for our children.

The National Environmental Policy Act of 1970 that created the EPA states that its goal is "to create and maintain conditions, under which humans and nature can exist in productive harmony, and that permit fulfilling the social, economic, and other requirements of present and future generations." That is a very good definition of “sustainability,” and one which I believe politicians and citizens of every partisan persuasion would rally behind. We need Congress and the EPA to make policies that actually support sustainability by being based on sound science and the empirical evidence of what actually works.

Thank you for your consideration.

Sincerely,

**Comments on EPA Renewable Fuel Standard (RFS) for 2014**

T. A. "Ike" Kiefer, CAPT, USN (ret.)

## 1. RFS2 is killing Americans

a. According to the National Academy of Sciences and the EPA itself, the full implementation of RFS2 is calculated to result in the premature death of 245 more adults per year from the combustion of biofuels than from alternative combustion of unblended petroleum gasoline and diesel.[5]

b. An independent study presented to the National Institute of Medicine arrived at a similar figure of 260 premature deaths each year.[6]

c. Ethanol is the principal culprit in RFS2 excess mortality. Widespread E85 adoption will increase ozone-related mortality, hospitalization, and asthma by 4% compared to 100% gasoline.[7]

## 2. RFS2 is increasing air pollution

a. Per the references above, the increase in deaths is mostly due to an increase in ozone and particulate emissions from ethanol combustion.

b. A 2011 National Academy of Sciences report surveyed many studies on biofuels and concluded that "overall production and use of ethanol was projected to result in increases in the pollutant concentration . . . Those projected air-quality effects from ethanol fuel would be more damaging to human health that those from gasoline use."[8] According to this report, corn and cellulosic ethanol produced under RFS2 increases these harmful lifecycle emissions compared to 100% gasoline:[9]

- $PM_{2.5}$ particulates (2.5 microns or less in diameter)
- ozone (oxidant and smog precursor)
- hydrocarbons and volatile organic compounds (VOC)
- nitrogen oxides (NOx)
- sulfur oxides (SOx)
- acetaldehyde
- peroxyacetyl nitrate (PAN)
- ammonia
- ethanol
- carbon monoxide

c. Because ethanol increases evaporative emissions of smog precursors over pure gasoline, the EPA has been forced to grant it a hypocritical standing waiver for Reid Vapor Pressure (RVP) in order to allow ethanol-blended gasoline to be sold without violating its own pollution regulations (See 42 USC § 7545(h)(4)).

d. The fact that ethanol increases total lifecycle emissions of carbon monoxide is particularly troubling and deeply ironic because reducing carbon monoxide levels in urban

areas was EPA's intent for fuel oxygenation in the first place in accordance with the Clean Air Act of 1990.

e. Additionally, ethanol in gasoline does nothing to reduce tailpipe carbon monoxide emissions of US cars built since 1993 that all have fuel injection, oxygen sensors, catalytic converters, and engine computers that automatically adjust the air and fuel mixture to achieve stoichiometrically balanced combustion and minimize carbon monoxide in the exhaust. This technology emerged after the Clean Air Act of 1990 and it has eliminated the need for gasoline oxygenates; this is why Federal law was changed in 2006 to no longer require oxygenates in gasoline. Only the few cars on the road that are more than 20 years old, carbureted, and out of tune now stand any chance to have their emissions reduced by oxygenated fuels. For this tiny benefit, EPA penalizes the rest of America's massive fleet of fuel-injected gasoline vehicles by forcing them to needlessly carry around the unnecessary weight of oxygen that displaces hydrocarbon energy in their gas tanks and reduces their gas mileage by 3% (E10) to 28% (E85). The cost clearly outweighs the benefit.

f. The mortality impact calculated in #1 above is based on an equal energy substitution of ethanol for gasoline in the gas tank. However, that is not a sufficient methodology. A proper comparison as required by the 2007 Energy Independence and Security Act is to compare the full lifecycle of ethanol creation and combustion to the full lifecycle of gasoline creation and combustion. When this is done, the advantage of gasoline's much higher EROI becomes very apparent – it takes far less energy to extract crude and refine it into a gallon of gasoline than to cultivate and harvest and mill and distill the 1.5 gallons of ethanol with the equivalent energy content. When the 8:1 to 20:1 lifecycle EROI of gasoline is compared to the 1.25:1 lifecycle EROI of corn ethanol, the latter is found to emit more than 3 times the amount of $CO_2$ and polluting emissions above, while also consuming more than 1,000 times as much water.[10]

g. In August 2012, the German National Academy of Sciences, of a country very aggressive in its pursuit of alternative energy, released the report of a 3-year study that concluded biofuels offer little or no benefit in reducing GHG emissions, and that "the larger scale use of biomass as energy source is not a real option for countries like Germany." The German scientists even went so far as to flatly recommend that all of Europe abandon their biofuel production mandates.[11]

### 3. RFS2 is increasing damage to the environment (land, water, biodiversity)

a. RFS2 is accelerating the use of water resources. The most authoritative voice on the subject of water footprint is the University of Twente, who maintain the data base used by UNESCO at www.waterfootprint.org. The water footprint for fossil fuel is 22 gallons of fresh water input per gallon of ethanol-equivalent energy output. This compares to 1,220 gallons for US corn ethanol and 11,397 gallons for soy biodiesel. This production-side comparison reveals that biofuels use 55 to 905 times as much water as petroleum fuels. The full production and consumption lifecycle comparison is even worse because of the extreme difference in EROI.

b. A conservative lifecycle comparison of corn ethanol to gasoline based on their EROIs finds that corn ethanol requires 1,000 times more water and 300 times more land per unit of energy produced than refined petroleum fuels (including all the water for fracking, enhanced oil recovery, and refining).[12] Soy biodiesel, with only 1/5th the fuel yield per acre of corn ethanol, requires even more water and 1,400 times as much land as refined petroleum fuels.

c. Ethanol in gasoline threatens water quality and increases the environmental hazard of fuel spills. Just like the MTBE-blended gasoline it replaced, ethanol-blended gasoline is more water-soluble and leaches through the soil faster than straight gasoline. When it encounters the water table, it mixes with the water instead of floating on top and brings carcinogenic benzene, toluene, and xylene with it. The EPA has known since 1999 that ethanol extends gasoline soil and groundwater pollution plumes 25-40% and inhibits natural gasoline biodegradation in the soil, but as yet the agency has established no national monitoring for environmental ethanol contamination as it did for MTBE.[13]

d. Corn ethanol and soy biodiesel increase nitrogen poisoning (eutrophication) of the nation's rivers and lakes and the Gulf of Mexico. Displacing just 10% of the nation's gasoline already consumes more than 40% of the nation's corn crop, and these acres are each fertilized with 100-200 lb of nitrogen in the form of liquid ammonia or solid ammonium-nitrate. Today, nitrate poisoning already affects 1/3 of US streams and 2/5 of US lakes, and is implicated in human disease.[14]

e. RFS2 is increasing pressure on limited land resources. The California Kern County oilfield has 9,000 wells on 20 square miles pumping an average of 10.6 barrels of crude oil a day. That represents a power density of 116 W/m2 (630 hp/acre). The best case power density of corn ethanol corresponding to an optimal yield of 500 gallons per acre per year is 0.315 W/m2 (1.7 hp/acre).[15] Corn ethanol impacts more than 350 times as much land per unit of energy delivered as petroleum. Best case soy biodiesel production is 70 gallons per acre per year, which equates to a power density of 0.069 W/m2, which means this soy biodiesel requires 4.5 times more land than corn ethanol per joule of energy produced and nearly 1,700 times as much land as petroleum. The environmental footprint of biofuels per unit of energy is enormous.

f. To replace all of the nation's 195 billion-gallon annual use of transportation fuel with corn ethanol would require 700 million acres of new cornfield, which is equal to all the forest land in the continental US, and is 3 times as much farm land as is currently harvested each year (223 million acres). This quadrupling of intensively-cultivated farm land would also quadruple the use of agrichemicals and the damage to the Gulf of Mexico, which already has a huge persistent dead zone due to nitrogen and phosphate fertilizer runoff.

g. Since it was expanded in 2007, the corn ethanol mandate has contributed to plowing up more than 23 million acres of US wetlands and grasslands to plant crops – an area the size of Indiana.[16]

h. The number of acres dedicated to corn production has increased from 79 million acres between 2000 and 2006 to 90 million acres between 2007 and 2012. This conversion has happened while 288 acres per day of farmland have been lost to urban sprawl.

i. RFS2 is also contributing to increased damage to the ozone layer. $N_2O$ is now the number one ozone-depleting gas in the atmosphere. Between 1% and 5% of the nitrogen applied as crop fertilizer is released to the atmosphere as $N_2O$. Greatly expanding agriculture for fuels will not only increase $N_2O$'s 6.2% current fraction of global warming responsibility, but also its damage to the ozone layer.[17]

j. Ethanol-blended fuel is a net burden on society. A Blue Ribbon panel of experts commissioned by the EPA in 1999 recommended discontinuing the use of all oxygenates in gasoline due to the high social costs with little offsetting benefit.[18] The EPA has chosen to ignore that recommendation for 14 years.

k. Executive Order 13112 obligates EPA and other federal agencies to mitigate dangers of invasive and non-native species and promote biodiversity. Ironically, RFS2 is promoting deforestation and cultivation of conservation land, loss of habitat and natural biodiversity to cultivated monocultures of commodity crops, and release of new hybrid and genetically-modified crops without understanding all the consequences. RFS2 is specifically promoting the cultivation of the following invasive species, alien species, noxious weeds and nuisance weeds for biofuel feedstock:

- Arundo donax (giant reed) for cellulosic biofuel
- Pennisetum purpureum (elephant grass/napier grass) for cellulosic biofuel
- Saccharum spontaneum hybrids (energy cane) for cellulosic biofuel
- Miscanthus x giganteus (miscanthus) for cellulosic biofuel
- Thlaspi arvense (pennycress/stinkweed/french weed) hydrotreated jet fuel
- Camelina sativa (camelina) for biodiesel and hydrotreated jet fuel

This is the same pattern of going off half-cocked that resulted in the MTBE fiasco of widespread groundwater contamination from an EPA-mandated program of fuel oxygenation. In focusing too narrowly on fossil fuels and greenhouse gases as the only enemy, EPA has devised a cure that is worse than the disease and is active driving people from one set of behaviors that put the environment at risk (i.e., the petroleum fuel lifecycle) to an even worse set of behaviors that do more net damage to the land and water and biodiversity the agency is supposed to protect (i.e., the cultivated biofuel lifecycle).

## 4. RFS2 is increasing greenhouse gas emissions

a. EPA's is violating the intent of Congress to reduce GHG emissions by subsidizing and mandating blending of corn ethanol it knows to be actually increasing GHG emissions.

i. The EPA has unilaterally grandfathered all domestic and foreign biofuel facilities in existence or having commenced construction prior to December 19, 2007 so that they are not required to meet even the minimal 20% greenhouse gas reduction threshold for the general renewable fuel category of RFS1 or RFS2. This means that 14 to 17 billion gallons of corn ethanol in global production (mostly in the US) and virtually all Brazilian sugarcane ethanol can collect renewable identification numbers (RIN) without any demonstrated reduction in GHG emissions.[19]

ii. EPA's own estimate is that GHG emissions for today's corn ethanol production are 21 to 33 percent greater than gasoline's. To justify continued subsidy and blending mandates of corn ethanol for RFS2, EPA made a baseless assumption that major yield and efficiency improvements would materialize by 2022 to reduce corn ethanol GHG emissions to 17 to 27 percent less than gasoline.[20]

iii. EPA's hugely optimistic assumption for corn ethanol yield efficiency improvements is baseless because exhaustive corn ethanol biorefinery data collected over the past 6 years show that national average US corn yields have plateaued at 160 bushel/acre and ethanol yields have plateaued at 2.8 gallon/bushel for a net yield of less than 500 gallon/acre.[21] In fact, the energy efficiency of US agriculture is currently falling due to the emergence of herbicide-resistant weeds.

iv. The EPA's own analysis shows lifecycle greenhouse gas emissions of corn ethanol were higher than an energy equivalent of gasoline in 2012 and will be higher in 2017 (See Docket No. EPA-HQ-OAR-2005-0161-3173.5). All but three corn ethanol production pathways increased emissions in 2012, and only nine corn ethanol production pathways are expected to meet greenhouse gas reduction standards for corn ethanol in 2017. Independent researchers have concluded that the cumulative lifetime GHG emissions of corn ethanol through 2044 will be about 1.4 billion tons –300 million tons more (28 percent more) than emissions from an energy-equivalent amount of gasoline.[22]

v. The impact of the above is that more than $50 billion in public assistance to corn ethanol paid as Crop Program subsidies and US Treasury tax credits under RFS1 and RFS2 since 2005 have been and still today are funding increased $CO_2$ emissions, and there is little prospect to achieve break-even let alone a true 20% reduction with this energy-intensive crop.

b. Recent rigorous lifecycle analyses performed since 2008 that consider land use change find that other biofuels are little better than corn ethanol and also increase GHG emissions. Endnote 131 of the enclosed "Snake Oil" paper cites seven recent studies that

find increased GHG emissions for biofuels on this basis. Another study with the same conclusions was just published by an MIT research team.[23]

## 5. RFS2 is increasing the price of food

a. In 2012, the US diverted 129 million tons of grain to ethanol production – more than the entire grain crop of Russia. That number represented 30% of the total US grain crop and more than 40% of the corn crop to displace 9.5% of the gasoline in American gas tanks.

b. Sugarcane ethanol has no justifiable basis for being ruled an "advanced biofuel" by the EPA because it is a first-generation process made from a food crop feedstock (#11 bulk sugar from sugarcane is undeniably a global market food commodity).

c. Biofuels competition with food agriculture resources such as water, land, fertilizer, machinery, and financing has raised global food prices by 50% and pushed 850 million more people into food poverty.[24]

d. There are also issues with using distillers dry grains and solubles (DDGS), the byproduct of corn ethanol, as animal feed:

- Antibiotics used to keep bacteria from interfering with the fermentation yeast are concentrated in DDGS

- Natural plant poisons (mycotoxins) are concentrated in DDGS

- Negative nutritional effects due to high fat content and variable protein content of DDGS (reduced milk fat in cows, reduced meat quality in pork)

- Environmental concerns because of increased nitrates and phosphorus in animal excrement.

## 6. RFS2 is increasing the price of fuel

a. Ethanol and biodiesel, even after 8 years of more than $6 billion a year in crop program subsidies and RFS tax credits and blending mandates, are still more expensive per joule of energy than petroleum gasoline and diesel. As of October 2013, the DoE reported that, on an equivalent energy basis, ethanol was 85 cent/gal more than gasoline and biodiesel was 61 cent/gal more than petroleum diesel.[25] As the DoE report reveals, ethanol is clearly increasing the pump price of E10 gasoline per unit of energy delivered into the gas tank, not reducing it. The same is true for biodiesel and its blends.

b. American Automobile Association surveys of pump prices reflect that E85 and biodiesel are consistently more expensive on an MPG-corrected basis than the highest-octane gasoline and conventional diesel.[26] If the prices of ethanol and biodiesel are plotted

out against those of gasoline and petroleum diesel over the past 8 years, they reveal the same degree of volatility, but with a consistent price disadvantage.

c. Based on the reduced energy density and MPG of ethanol versus gasoline, Americans in 2012 paid $8.1 billion a year at the gas pump for energy not put into their gas tanks because they got gallons of inferior ethanol instead of gasoline. Combined with the cost of federal subsidies for corn ethanol, US taxpayers and consumers are now paying $14.2 billion a year to put ethanol fuel additive into their gas tanks instead of getting the cheaper domestically-refined gasoline that is instead being exported in growing quantities to locations such as Venezuela.

d. The number of American's killed by the increased pollution of corn ethanol likely pales in comparison with the number killed by the energy poverty caused by corn ethanol. More evidence of the hidden dependency of biofuel on fossil fuels is the current tripling of propane prices. Forty percent of this year's corn crop was harvested for corn ethanol. Because it was a wet and cold year, the corn was planted late and was harvested wet to avoid an early frost. Corn farmers in the Midwest consumed and extraordinary amount of propane drying corn in their silos this fall. Now the nation is feeling the loss of that propane as the nation is gripped by cold weather and the price is skyrocketing. 95,000 more Americans die during the winter months than during the months preceding or following. This "excess winter mortality" is a function of energy price, income, and energy efficiency. The increase in energy prices due to biofuels since 2008 and this year's colder weather has likely already killed many thousands more. National energy policies have national consequences, for good or for ill, that are in this case, predictable, attributable, and tragic.

**7. RFS2 is damaging engines and infrastructure**

a. Ethanol, unlike hydrocarbons, is a polar molecule that conducts electricity, greatly accelerating galvanic corrosion compared to pure petroleum. It is corrosive of metal and plastic and polymer piping and elastomeric rubber seals. It's affinity for water amplifies its corrosive nature. Water brings ethanol out of uniform solution with hydrocarbons and instead concentrates it in aqueous solution at the bottom of tanks or pipelines. This stratification also amplifies corrosion.

b. Biodiesel's cocktail of fats and acids and esters also contain polar molecules that are electrically conductive, and have a much higher affinity for water than do true hydrocarbons. This fuel also is much more waxy and has high viscosity in low temperatures that impacts volatility and flow.

c. Oxygen is present in large amounts in both ethanol and biodiesel, and it attacks the hydrocarbon molecules, reducing the shelf-life of the fuel by causing it to gum up (polymerize) and block filters.

d. Fatty-acid methylated esters (FAME) biodiesel has poor cold-flow characteristics, requires 5 times the hydrogen of conventional feedstock in hydrotreament, and evolves $CO_2$ and water, which are problematic for the equipment.

e. FAME is more chemically active than petroleum-based diesel, and it degrades and forms corrosive acids during storage. Exposure to air and water accelerates this degradation. In addition, FAME can undergo biological degradation in contact with water. This process forms a scum at the oil-water interface that will plug downstream filters.

f. For all the above reasons, ethanol and biodiesel are prohibited in commercial aircraft and military tactical vehicles and oil pipelines. These negative attributes make these fuels more damaging than pure hydrocarbons. The exact amount of accelerated capital depreciation due to biofuels, if RFS is continued and blending limits are permitted to expand, could be staggering.

g. Ethanol is a very costly way to increase octane in terms of price, environmental costs, and social costs as noted above, and is tantamount in its effects to MTBE. There are better alternatives including reformulations of gasoline with higher aromatic content or different additives that do not add oxygen or decrease energy density.

h. Much of petroleum diesel today is mixed with low biodiesel blends (e.g., B5 = 5%) which serve the purpose of adding lubricity back into ultra-low sulfur diesel (ULSD) mandated by EPA since 2006. Sulfur is the primary source of lubricity (lubrication and resistance to wear) in diesel fuel and a principle reason for diesel engines' renowned durability. Imposing such extreme measures has the unintended but predictable consequence of compelling refineries and diesel operators to locally reformulate fuels with various additives to restore lubricity, which adds uncertainty into what is actually being burned in these engines and released into the air, and what damage may be occurring to pollution control systems.

i. While sulfur dioxide from diesel fuel emissions has some negative environmental consequences in large concentrations such as promoting emission of particulates and contributing to acid rain, it is also beneficial with respect to global warming in that it provides condensation nuclei that increase cloud formation and thickness and have a dramatic near-term cooling effect on the climate. Large amounts of sulfur dioxide released by Mount Pinatubo's eruption in 1991 cooled the earth about a half degree Celsius for 3 years. When EPA reduced diesel sulfur limits from a reasonable 500 PPM (0.05 percent) to an extreme 15 PPM (0.0015 percent), it arguably overshoots the point of beneficial reduction. The emission levels are now so low that charbroiling a single hamburger emits more particulates than driving a diesel tractor-trailer rig 143 miles.[27]

## 8. RFS2 is siphoning money from the economy

a. RFS is a drag on the US economy and treasury. It is wealth redistribution from the nation's taxpayers and consumers at large to the corn belt, and it is corporate welfare for

big agriculture. It is energy taxation from high EROI energy sources to low EROI energy sources and energy sinks.

b. The United States needs liquid transportation fuels with minimum EROI of 6:1 to sustain itself, and higher EROI to grow. Our economy will literally starve if forced to subsist on corn ethanol at 1.25:1 and soy biodiesel at 1.9:1.[28]

c. Congress repealing RFS would have an immediate positive stimulus effect upon the nation's economy, and the resulting lower fuel and food prices and increased energy production efficiency (i.e., EROI) would measurably improve energy security and reduce the federal budget deficit – directly by ending direct subsidies and tax breaks, and indirectly by increasing revenues from the healthier economy that would first be seen in the transportation sector. Repealing the requirement for fuel oxygenation and removing ethanol from gasoline would immediately achieve a nationwide 3.3% improvement in gas mileage.

d. As of 2010 the Federal government and all agencies were subsidizing oil and gas at an annual rate of $2.82 billion and alternative energy at $14.7 billion, including all subsidies and tax breaks and financial assistance as officially reported to Congress by the Department of Energy.[29] Normalized to the amount of energy each delivered to America in 2010,[30] this equates to the following rates:

- Oil & Gas: 45 cents per barrel of oil energy equivalent (BOE) = 0.027 cent/kWh
- Coal: 36 cents per BOE = 0.021 cent/kWh
- Nuclear: $1.72 per BOE = 0.101 cent/kWh
- Geothermal: $7.63 per BOE = 0.448 cent/kWh
- Biofuels: $10.39 per BOE = 0.610 cent/kWh
- Wind: $31.39 per BOE = 1.843 cent/kWh
- Solar: $52.30 per BOE= 3.017 cent/kWh

While this Administration has poured $90 billion into alternative energy without significant return on that investment as revenue to the Treasury, it has gotten a much better ROI on oil & gas. In 2009 the Federal government collected $13.7 billion from oil and gas company corporate taxes and $42.4 billion in consumer-paid oil and gas excise taxes for a total of $56.1 billion.[31] In 2011, the total was more than $58.2 billion.[32] These taxes represents a 2,000% return on investment on oil and gas subsidies, and do not include more than $12 billion the Federal government collected in land lease fees, nor the billions of dollars collected by state and local governments in oil and gas fees and taxes.[33] The high EROI of fossil fuels allows them to subsidize the government, while the low EROI of biofuels requires that they be subsidized by the government and by fossil fuel energy.

e. RINs create a pseudo market for fuel (or a market for pseudo fuel depending on one's perspective), and thus distort the markets and add needless layers of complexity and potentials for increased price volatility for RINs and ethanol and gasoline, as well as corn and soy and livestock. They link the volatility of the agricultural markets to the volatility of

the fuels markets, increasing rather than reducing risk.

f. RIN fraud is an unsolved problem, and RFS mandates and RINs are being used to susbidize the import of Brazilian sugar cane ethanol, which undermines both US energy security and the US economy. EPA has neither the manpower nor the infrastructure to administer a sound RIN program. With the state of current government funding, the massive IRS itself is saying it cannot even verify citizens' income for eligibility for Healthcare enrollment. RINs are a recipe for corruption that have already proven themselves to be ripe for abuse. The best solution to prevent widespread fraud is to abolish them.

g. Achieving the renewable fuel standard would increase the federal budget outlays, mostly as a result of increased spending on grants, loans, loan guarantees, and other payments to support the development of cellulosic biofuels and foregone revenue as a result of biofuel tax credits. Moreover, nutritional and other income assistance programs are often adjusted for changes in the general price level. If food retail prices go up, expenses could increase for the Supplemental Nutrition Assistance Program and Special Supplemental Assistance Program for Women, Infants, and Children, as well as for much larger income assistance programs, such as Social Security, military and civilian retirement programs, and Supplemental Security Income Program.

**9. RFS2 is undermining energy independence and national security**

a. The more we scale up biofuels, the more dependent we become on non-renewable fertilizer imports. The world's phosphate mostly comes from Morocco, an Islamic kingdom in North Africa where Al Qaeda is resurgent. The US imports 11% of its phosphate from Morocco. Coincidentally, this is the same fraction of crude oil we import from Persian Gulf nations today. Trading dependence on foreign oil imports for dependence on foreign mineral imports is no increase in national security.

b. Basing our transportation fuel on agriculture not only fails to make us energy independent, but puts both our food and fuel economies in jeopardy of a single mineral embargo, or drought, or freeze, or blight, or bio-attack. We are better served if food and fuel are independent variables rather than mutually dependent and competitive for the same resources and vulnerable to the same threats.

**10. EPA's entire RFS program is an example of how poorly crafted policy achieves perverse results contrary to its intentions**

a. A recent report by the National Research Council of the US National Academies documents how the EPA's RFS policies, regulations, mandates, and incentives have very little return in progress on a huge investment of taxpayer money. In fact, the study found that federal subsidies and tax breaks favoring biofuels have actually had the perverse effects of increasing gasoline consumption, increasing gasoline exports, and increasing GHG emissions. The study author, Dr. William Nordhaus, professor emeritus at Yale, is also the

author of DICE, one of the major global warming integrated assessment models that informed the recent OMB recalculation of the social cost of carbon. His credentials are impeccable and he is certainly no shill for big oil.[34]

b. EPA Motor Fuel Policies have a history of perverse outcomes

i. In response to the Clean Air Act of 1990, the EPA mandated the blending of the oxygenate MTBE into gasoline to reduce carbon monoxide emissions. Unfortunately, the agency folks trying to protect the air didn't consult with the folks trying to protect the water, and this action led to a nation-wide epidemic of groundwater contamination. Insidiously enough, ethanol in fuel today has the exact same accelerating effect on groundwater and surface water fuel contamination as MTBE, but EPA refuses to track it.

ii. In 2006, the EPA implemented Ultra-Low Sulfur Diesel fuel (ULSD) regulations. The expensive additions this imposed on refineries raised the price of diesel fuel from below that of gasoline to much higher, and thereby completely stopped the US migration from gasoline engine passenger cars to more efficient and environmentally friendly diesel engines. It also opened up the European market to US diesel fuel and has resulted in a dramatic increase in export of US fuel that would otherwise be consumed domestically and contribute to energy independence. The EPA's extreme regulations on diesel particulates also continue to thwart all US manufacturers' attempts to field super high-efficiency diesel-engine passenger cars comparable to the 81-mpg Volkswagen Polo which is available in Europe but illegal to buy in America.

c. EPA's rulemaking process for fuels is not grounded in science nor effective in protecting the environment or climate. By demonizing $CO_2$ alone and ignoring other far more potent GHGs, the agency is driving Americans from bad behaviors to worse behaviors with respect to the climate. If the EPA's regulations to protect the climate were grounded in science and logic instead of ideology and political favoritism, they would address all major GHGs and provide incentives and penalties for each in direct proportion to the global warming potential (GWP) rating established by the United Nations International Panel on Climate Change (IPCC). The EPA should be focused on the harmful emissions themselves, not targeting or favoring specific industries or technologies behind them. It is harmful to the climate and logically indefensible to regulate the $CO_2$ from coal but not the nitrous oxide from biofuels or the nitrogen triflouride from solar panels.

i. For example, where are EPA's GHG regulations for nitrous oxide ($N_2O$), a non-condensing, well-mixed GHG with a GWP rating *298 times higher than $CO_2$*? Nitrous oxide is also recognized by the IPCC as the number one ozone-depleting gas in the world. $N_2O$ is principally emitted by ammonia fertilizer production and application -- i.e., food and biofuels production.

ii. Where are the EPA GHG regulations for methane ($CH_4$), a non-condensing, well-mixed GHG with a GWP rating *34 times higher than $CO_2$*? Methane is principally emitted by farming, landfills, and natural gas operations.

iii. Where are the EPA GHG regulations for nitrogen triflouride ($NF_3$), a non-condensing, well-mixed GHG with a GWP rating *17,200 times higher than $CO_2$*? $NF_3$ is principally emitted during production of solar panels and computer chips?

**Conclusion:**

The question the EPA and Congress should be asking themselves today is not what is the proper level for the corn ethanol RVO, but why are we continuing to mandate and incentivize diversion of food and agricultural resources to fuel *at all*? Why are we continuing to mandate ethanol in gasoline when the evidence says it is killing Americans, it is harming the environment and climate, it is reducing mileage, it is damaging engines and fuel systems, it is increasing GHG emissions, it is increasing air pollution, it is increasing environmental damage to lakes and rivers and the Gulf of Mexico, it is consuming 1,000-times more water and 300-times more land per unit of energy than fossil fuels? Why are we promoting biofuels that accelerate the consumption of finite natural gas by diverting it to terribly inefficient use as fertilizer and agrichemicals and distillation plant energy instead of its best use as electrical power plant fuel? Why are we continuing to mandate adding oxygenates to gasoline when it has no effect on reducing carbon monoxide in all vehicles manufactured since 1993 that already achieved complete combustion and reduction of carbon monoxide with oxygen sensors and engine computers and catalytic converters?

An honest answer to each of the above questions reveals that, with legislation and regulation related to the Renewable Fuel Standard, the US EPA has been failing miserably in its mandate to protect the nation's air, water, and land, and the US Congress has been failing miserably in its mandate to promote the general welfare of its citizens. The sensible cure is to follow the recommendations provided in the cover letter above and immediately abolish RFS, biofuel crop subsidies, and fuel oxygenation.

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