Subcommittee on Oversight, Investigations and Regulations
Committee on Small Business
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Green Isn't Always Gold: Are EPA Regulations Harming Small Businesses

Testimony
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Chairman Coffman, members of the committee, I am honored to be with you this morning to discuss the great potential for isobutanol as an alternative transportation fuel in America and current challenges we have with US EPA regulations.

Gevo is a leading renewable chemicals and advanced biofuels company. We are developing biobased alternatives to petroleum-based products using a combination of synthetic biology and chemistry. We plan to produce isobutanol, a versatile platform chemical for the liquid fuels and petrochemical markets. Isobutanol has broad market applications as a solvent and a gasoline blendstock that can help refiners meet their renewable fuel and clean air obligations. It can also be further processed using well-known chemical processes into jet fuel and feedstocks for the production of synthetic rubber, plastics, and polyesters. Gevo's technology is designed to retrofit existing ethanol plants of all kinds.

Isobutanol is an important platform chemical with broad applications in large chemicals and fuels markets. As a "drop-in" product isobutanol should allow customers to replace petroleum-derived raw materials with isobutanol-derived raw materials without modification to their equipment or production processes. Since isobutanol can be dropped into an existing

infrastructure, it provides for easy integration into existing refining and petrochemical production processes. This type of technology is a business born in America and is creating new jobs today to build the next generation of biofuels and make contributions towards reducing our dependence on foreign oil.

We support the manner in which the EPA has allowed the Renewable Fuel Standard (RFS2) advanced pool mandates to continue despite shortfalls in some categories under their statute. This will help to drive more gallons in the short term using technologies such as Gevo that is economically competitive with current oil prices. However, legacy EPA policies are creating supply chain challenges with 2nd generation biofuels. Gevo and the Advanced Biofuels industry in general believe that the EPA should review its regulatory regime and to the extent possible should assure that biofuels other than ethanol have equal and unfettered access to the market.

The EPA's one pound waiver rule implementation is a regulatory obstacle to the development of advanced biofuels. There is a relatively straightforward change that could be made to EPA's testing regime that would eliminate this hurdle.

Under the Clean Air Act (CAA) §211 (h)(4) and 40 CFR § 80.27 (d)(2), gasoline containing between nine and ten percent ethanol may exceed the reed vapor pressure (RVP) limit for straight gasoline by 1.0 pounds per square inch (psi). EPA currently tests the RVP of gasoline by obtaining samples at retail outlets.

Under current testing procedures, EPA protocol does not account for the presence of alcohol additives other than ethanol. Thus, if E10 is mixed with gasoline containing isobutanol or another drop in alcohol, the resulting mix would be found to be non-compliant because the ethanol would be diluted below the nine and ten percent ratio required for the RVP waiver. Due

to the fact that testing occurs in the field, there is currently no way to determine if the E10, prior to mixing with another alcohol blend fuel, would have met the RVP limit. A direct linear relationship exists between ethanol content, isobutanol content, and RVP, allowing the extrapolation of the ethanol content of the fuel before it is mixed with an isobutanol blend.

Through guidance (or a simple revision of EPA regulations), EPA could require the ASTM test, used to determine the ethanol content of a fuel, to also determine the amount of isobutanol (and other alcohols) present in the fuel. In the event that isobutanol and/or other alcohols were present, the revised regulation would direct the laboratory to extrapolate the RVP of the fuel as if the fuel had not been mixed with an isobutanol blend (or another alcohol blend). Revising the test regulations provides a non-controversial, easily-implemented solution to a major barrier to the production and sale of 2nd generation biofuels.

In conclusion significant amount of progress has been made over the last three years by Gevo with isobutanol and its potential in the advanced biofuels sector. Isobutanol can make significant contributions towards diversifying America's world's transportation fuels. Thank you for the opportunity to be with you today. I look forward to your questions.

Regulatory History of RVP Waiver for 10 Percent Ethanol Blends

In contrast to methanol blend fuels, EPA did not issue a waiver for ethanol blends, called gasohol by the agency beginning in the 1970s. Rather, the agency did not act within the statutory deadline after receiving a request for a waiver and according to CAA Section 211(f)(4), as in effect at the time, the waiver automatically was granted after 180 days.[1] Thus, until the late 1980s, ethanol blend fuels were not required to meet specific RVP limits, in contrast to methanol blends that were subject to RVP limits as part of their waiver conditions.

In 1987, EPA proposed to establish RVP limits for gasoline as part of an overall mobile source evaporative emission control strategy aimed at reducing ambient ozone levels.[2] CAA Section 172 required compliance with the National Ambient Air Quality Standard (NAAQS) for ozone beginning on December 31, 1982, with the deadline for compliance extended to December 31, 1987 for areas with particularly severe ozone problems.[3] Because many areas were expected to remain in violation of the ozone NAAQS by the end of 1987, EPA sought to establish additional controls to limit emissions of ozone precursors.[4]

In the proposed volatility rule, EPA noted that the practice of splash blending ethanol and base gasoline results in an RVP increase of about 1.0 psi over the RVP of the straight gasoline.[5] The agency further noted that additional volatility increases result in the field when alcohol blend fuels and straight gasoline are mixed, either in vehicle fuel tanks or in service station storage tanks.[6] EPA found that this practice increases the in-use RVP of gasohol by up to 0.2 psi.[7]

To reduce emissions associated with gasohol use, EPA proposed three control options: 1) continue to exempt gasohol from RVP limits, 2) establish a 1.0 psi allowance for ethanol blends, or 3) require gasohol to meet RVP limits for base gasoline.[8] The agency considered three additional permutations of the third option: a) applying the same limit nationwide, b) applying the same limit only in ozone non-attainment areas and establishing a 1.0 psi allowance in other areas, or c) delaying the requirement to meet the straight gasoline RVP limit until 1993 and providing a 1.0 psi allowance in the meantime.[9] EPA did not propose to adopt Option 1,

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[1] 42 U.S.C. § 7545(f)(4). This section was revised by Section 251 of the Energy Independence and Security Act (EISA) of 2007 and now requires EPA to act on a petition for a fuel waiver within 270 days of receipt. If the agency does not act, however, the waiver is no longer granted automatically.

[2] *Regulation of Fuels and Fuel Additives: Volatility Regulations for Gasoline and Alcohol Blends Sold in 1989 and Later Calendar Years and Control of Air Pollution From New Motor Vehicles and New Motor Vehicle Engines: Evaporative Emissions Regulations for 1990 and Later Model Year Gasoline-Fueled Light-Duty Vehicles, Light-Duty Trucks, and Heavy-Duty Vehicles*, 52 Fed. Reg. 31,274 (Aug. 19, 1987).

[3] *Id.* at 31,275.

[4] *Id.*

[5] 52 Fed. Reg. at 31,292.

[6] *Id.*

[7] *Id.*

[8] *Id.* at 31,294.

[9] *Id.*

exempting ethanol blends from any RVP limits, due to concerns over making the fuel a "dumping ground" for gasoline that already had high RVP levels, further increasing emissions of ozone precursors. The agency also did not propose to adopt Option 3b because it was not expected to reduce the economic impacts on the gasohol industry.[10]

In the final rule, EPA adopted the second proposed option, establishing a 1.0 psi allowance for blends containing at least 9 percent ethanol and not exceeding the ethanol content allowable by any applicable waiver under CAA Section 211(f)(4).[11] EPA also established labeling and documentation requirements with which an ethanol blend fuel must comply in order to qualify for the 1.0 psi allowance.[12] The agency did not provide a lengthy overview of comments received on the proposed RVP limit for ethanol blends but noted that even the ethanol industry did not support the continued non-regulation of gasohol RVP.[13] The main concern, which EPA stated was supported in comments, was that high-RVP gasoline would be blended with ethanol in order to circumvent the RVP limits for gasoline.[14] EPA determined that the 1.0 psi allowance for ethanol blends would continue to allow splash blending while preventing the production and sale of high-RVP gasoline as a blend stock.[15]

EPA did not intend the 1.0 psi allowance established in the 1989 final rule to be the agency's final decision on the RVP limit for ethanol blend fuels. EPA stated that it planned to "address how to treat alcohol blend RVP in a final fashion with our analysis of the second phase of RVP control."[16] As discussed further below, however, Congress enacted CAA Section 211(h)(4) as part of the 1990 CAAA, precluding EPA from revising the ethanol blend RVP limit.

The EPA regulation currently in place requires gasoline to contain at least 9 percent and no more than 10 percent ethanol by volume in order to be allowed to exceed by 1.0 psi the RVP limits established for other gasolines.[17] The specification that the gasoline must not exceed 10 percent ethanol was added as part of the 2002 final rule on reformulated gasoline.[18] In addition, each invoice, loading ticket, bill of lading, delivery ticket, and other shipment documents must clearly state the ethanol content.[19]

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[10] *Id.* at 31,295.
[11] *Volatility Regulations for Gasoline and Alcohol Blends Sold in Calendar Years 1989 and Beyond*, 54 Fed. Reg. 11,868, 11879 (March 22, 1989).
[12] *Id.* at 11,879.
[13] *Id.* at 11,881.
[14] *Id.*
[15] *Id.*
[16] *Id.*
[17] 40 C.F.R. § 80.27(d)(2).
[18] *Regulation of Fuel and Fuel Additives: Reformulated Gasoline Transition*, 67 Fed. Reg. 8729, 8736 (Feb. 26, 2002).
[19] 40 C.F.R. § 80.27(d)(3).

Legislative History of Section 211(h)(4)

Clean Air Act Amendments of 1990

Congress took up the issue of ethanol blend RVP levels concurrently with the EPA regulatory effort, beginning with the proposed 1987 Clean Air Act Amendments. The Committee Report accompanying the original Senate bill, S.1894, included a discussion of a 1.0 psi volatility waiver for gasoline/ethanol blends. The language in the proposed bill closely resembled the language ultimately adopted three years later as part of the 1990 CAAA.[20]

Identical language resurfaced as part of the 1989 proposed amendments to the CAA. The discussion of the provision from the Report of the Committee on Environment and Public Works accompanying S.1630 stated:

> The reported bill includes a one pound volatility waiver for ethanol/gasoline blends containing 10 percent denatured anhydrous ethanol. This provision was included in recognition that gasoline and ethanol are mixed after the refining process has been completed. It was recognized that to require ethanol to meet a 9 pound RVP would require the creation of a production and distribution network for sub-nine pound RVP gasoline. The cost of producing and distributing this type of fuel would be prohibitive to the petroleum industry and would likely result in the termination of the availability of ethanol in the marketplace… This provision would impose RVP controls on ethanol blends for the first time and would forego regulation of a very small percentage of the total nationwide volatile organic compounds emissions inventory. This provision will allow ethanol blending to continue to be a viable alternative fuel, with its beneficial environmental, economic, agricultural, energy security and foreign policy implications. Finally, this provision will remove the possibility that ethanol blends would be used to circumvent the proposed volatility restrictions.[21]

The floor debates over ethanol centered on the bill's oxygen mandate, which required that fuels with at least 3.1 percent oxygen content be sold in all areas classified as nonattainment for ozone from October 1st to March 31st. The Senators disagreed about whether adding ethanol to gasoline would, in fact, contribute further to ozone pollution. Sen. Bob Kasten (R-WI) raised this issue during the Senate debates of January 25, 1990. He was concerned that ethanol's greater potential to volatilize would contribute significant to ozone pollution, especially in the summer. Sen. Kasten proposed an amendment to CAA Section 211(h) that stated: "(5) A State which contains an ozone nonattainment area shall not be prohibited from adopting a lower Reid vapor pressure than that established under par. (4) for fuel blends containing gasoline and 10 per centum denatured anhydrous ethanol if the State demonstrates that the higher Reid vapor

[20] S. Rep. No. 100-231, at 147-50 (1987), 1990 CAA Leg. Hist. 9436, 9585-89.
[21] S. Rep. 101-228, at 109-10 (1989), 1990 CAA Leg. Hist. 8338, 8450.

pressure established under par. (4) is contrary to the ozone control strategy in the State's implementation plan."[22] This amendment was not adopted.

During the March 7, 1990 Senate Debate on S. 1630, Sen. Tom Harkin (D-IA) disagreed with Sen. Kasten, citing a study from Systems Application, Inc: "If regular 87-octane gasoline with 10 psi Reid vapor pressure is given a rating of 1 in terms of ozone-forming capacity, then a 91 octane, 9 psi gasoline, splash blended with 10 percent ethanol, would have an ozone forming rating of 0.79. That is, ethanol-blended gasoline would form 21 percent less ozone than regular gasoline."[23] And in the March 29, 1990 Senate debate on S. 1630, Sen. Tom Daschle (DE-SD) stated that several studies had disproved the theory that ethanol blends with higher vapor pressures gave more evaporative emissions in summer conditions.[24]

CAA Section 211(h), including the RVP waiver for fuels between 9 and 10 percent ethanol, was added to the Clean Air Act as Section 216 of Pub. L. 101-549, 101 Stat. 2488, on November 15, 1990.

Energy Policy Act of 2005

Under the Energy Policy Act (EPAct) of 2005, the language to 211(h)(4) was not amended, but a new Section 211(h)(5) was added. This section allows governors to exclude 10% ethanol blends from the RVP waiver in section (h)(4) if the governor decides that the higher vapor pressure limit would contribute to increased ambient ozone levels.

In the years preceding the enactment of EPAct 2005, Sen. Bob Smith (R-NH) introduced S. 950, a bill that would have rescinded entirely the 1.0 psi RVP waiver for ethanol blends. The Federal Reformulated Fuels Act of 2001 had seven cosponsors, including Sen. Lincoln Chafee (R-RI), Sen. Jon Corzine (D-NJ), Sen. Dianne Feinstein (D-CA), Sen. Jack Reed (D-RI), Sen. Harry Reid (D-NV), Sen. Charles Schumer (D-NY), and Sen. Olympia Snowe (R-ME). S.950 was presented to the Senate Committee on Environment and Public Work on May 24, 2001, along a draft EPA staff analysis entitled, "Supply Analysis of S. 950--The Federal Reformulated Fuels Act of 2001." The staff report noted that it was possible to produce a sub-RVP grade of gasoline for blending with ethanol to offset the RVP increase, and that some refiners produced such a grade of gasoline for downstream blending. However, the report noted that requiring all gasoline blendstock destined for ethanol blending to be distributed separately would place an additional challenge for the distribution system. The report determined that lowering the RVP by 1.0 psi RVP would require the removal of 1.5% of the gasoline in the form of butane, and that it would cost "about 0.4 cents per gallon of gasoline to eliminate enough butane to lower the RVP of ethanol-blended gasoline to 9 pounds per square inch."[25] The expected cost of "replacing butane

[22] 136 Cong. Rec. S35, 405 (daily ed. Jan. 25, 1990).
[23] 136 Cong. Rec. 6, S2293-94 (1990).
[24] 136 Cong. Red. 6, S3512 (1990).
[25] 148 Cong. Rec. 9, S485 (2002).

and other evaporative blendstocks in the 0.4 million barrels of ethanol-blended gasolines that are sold each day would be about $65 million annually."[26]

S.950 was approved by the Environment and Public Works Committee in 2001, but it did not reach the full Senate floor in its original form. The Daschle-Bingaman substitute amendment, also known as the Energy Policy Act of 2002, included portions of S. 950, but not the provision that would have rescinded the ethanol waiver. Instead, it included a provision similar to the one that was eventually approved as part of EPAct 2005. Section 810(c) of EPAct 2002 allowed governors to require ethanol blends to meet the 9 psi RVP in order to address air quality problems that might arise through the use of ethanol. This seemed widely acceptable.

Sen. Jim Jeffords did remark that he "would have preferred a bill that, in addition to eliminating the oxygen content requirement, simply eliminated the existing one-pound waiver of Reid vapor pressure requirements for ethanol blends and allowed all Governors to opt-in easily to the RFG program for their whole States. But, at least this language expedites Governors' access to that RVP waiver's elimination and provides accelerated opt-in authority to the entire States in the ozone transport region, where the ozone problems are quite serious."[27] He thought that S. 950's original language went further toward providing even greater air quality benefits.

The 2002 Energy Policy Act was a precursor to the EPAct of 2005, Pub. L. 109-58, which Congress enacted on July 29, 2005 and President George Bush signed on August 8, 2005. The ethanol waiver provision of the CAA has not been amended since that time. In its current form, Section 211(h)(1) requires all gasoline sold during the high ozone season to have an RVP of less than 9.0 psi. The only exemption from this limit is for ethanol blends between 9 and 10 percent, as specified in Section 211(h)(4), and state governors can opt out of this RVP allowance pursuant to Section 211(h)(5).

Revising the 1.0 psi RVP Testing Location for Ethanol

Changing the Location where Testing for Ethanol Content is Conducted

A option to eliminate the compliance problems posed by RVP and other changes resulting from the commingling of gasoline with 10 percent ethanol and gasoline containing other alcohols would be amending the fuel testing process. EPA inspectors currently test gasoline RVP in the field, at service stations. If the sample does not meet the RVP limit using field assessment methods, it is sent for further testing. The RVP testing is conducted pursuant to ASTM D 5191-01, according to EPA regulations,[28] and the ethanol content is determined by using ASTM D 5599-00[29] or ASTM D 4815-03 if the only oxygenates present are MTBE, ETBE, TAME, DIPE tertiary-amyl alcohol, and C_1 to C_4 alcohols.[30] EPA regulations provide that a violation of the

[26] *Id.*
[27] 148 Cong. Rec. 9, S2320 (2002).
[28] 40 C.F.R. § 80.46(c).
[29] 40 C.F.R. § 80.46(g)(1).
[30] 40 C.F.R. § 80.46(g)(2)(i).

gasoline volatility requirements can be found at refineries or importer facilities, branded or unbranded distributor, reseller, or ethanol blending facilities, and branded or unbranded retail outlets or wholesale purchaser-consumer facilities.[31] The EPA regulations also provide defenses for each type of facility.[32]

Revising the EPA fuel test regulations and provisions on liability for violations would be relatively simple, procedurally speaking, as EPA would simply have to delete the provisions on liability for violations at retail outlets or wholesale facilities. To detect isobutanol (and some other alcohols), no change in testing methods would be required because ASTM D 4815-03 could be used to detect the presence and level of isobutanol

[31] 40 C.F.R. § 80.28.
[32] 40 C.F.R. § 80.28(g).