growth energy™
America's Ethanol Supporters

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May 31, 2022

Joshua Cunningham
Chief, Advanced Clean Cars Branch
California Air Resources Board
1001 I Street
Sacramento, CA 95814
Via electronic mail: cleancars@arb.ca.gov

RE: Comments on the Advanced Clean Cars II Proposal

Dear Mr. Cunningham:

Thank you for the opportunity to comment on the Board's proposed Advanced Clean Cars II Regulation. Growth Energy is the world's largest association of biofuel producers, representing 89 U.S. plants that each year produce more than 8 billion gallons of renewable fuel; 103 businesses associated with the production process; and tens of thousands of biofuel supporters around the country. Together, we are working to bring better and more affordable choices at the fuel pump to consumers, improve air quality, and protect the environment for future generations. We remain committed to helping our country diversify our energy portfolio in order to grow more green energy jobs, decarbonize our nation's energy mix, sustain family farms, and drive down the costs of transportation fuels for consumers.

We sincerely appreciate the California Air Resources Board's (CARB) attention and hard work to reshape California's transportation mix to make it more sustainable. This objective is a central driver for our industry, and we look forward to continuing our work with California on our common goals. Specifically, liquid fuels will continue to play an important role in the transportation sector for decades to come, even as alternative technologies flourish.[1,2] As such, it is imperative to consider the vital role that environmentally sustainable fuel options such as bioethanol will play in reducing greenhouse gas emissions and cutting consumer costs from the current and future California vehicle fleet.

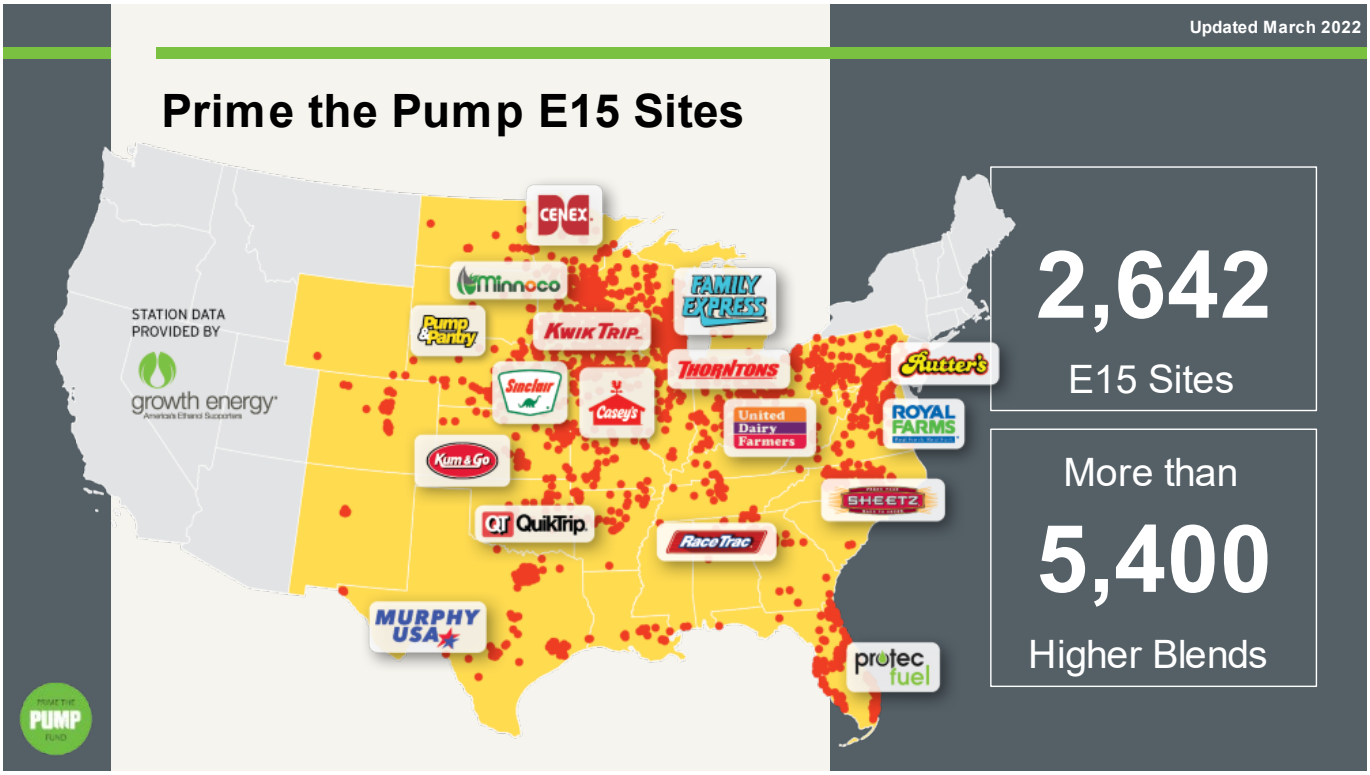
As we have continued to advocate, a primary solution for cleaning up the liquid fuel supply is the promotion of additional use of bioethanol, from starch and cellulosic sources. According to recent data from Environmental Health and Engineering, today's bioethanol reduces

[1] https://calepa.ca.gov/climate/carbon-neutrality-studies/
[2] https://ww2.arb.ca.gov/sites/default/files/2022-05/2022-draft-sp.pdf

greenhouse gas emissions (GHG) by an average of 46 percent compared to gasoline and can provide even further GHG reductions with additional readily available technologies.[3] In the existing light duty fleet, higher bioethanol blends can be immediately deployed to achieve immediate GHG reductions, reduce harmful air toxics, and reduce consumer costs at the pump.

Already, we have seen biofuels provide the foundation for the state's low carbon fuel standard (LCFS). In fact, biofuels like bioethanol have generated more than 75 percent of LCFS credits. Additionally, even with room to further improve GHG lifecycle modeling, CARB recognizes the significant improvement in bioethanol's carbon intensity. In 2011, CARB reported the average carbon intensity (CI) for bioethanol at 88 g/MJ. Through 2021, the average recorded CI for ethanol has decreased to 59.02 g/MJ, a 33 percent reduction in CI.[4] Additional CI reductions are anticipated as projects of diverse technological variety at ethanol biorefineries come on-line starting this year.

Bioethanol's additional environmental benefits are also noteworthy. As has been researched by the University of California, Riverside and the University of Illinois at Chicago, the use of more bioethanol and bioethanol-blended fuel reduces air toxics such as carbon monoxide, benzene, and other harmful particulates.[5] To fully realize these and other important air quality benefits, there needs to be a clear policy with a firm future for the role and growth of cleaner-burning, affordable bioethanol fuels.

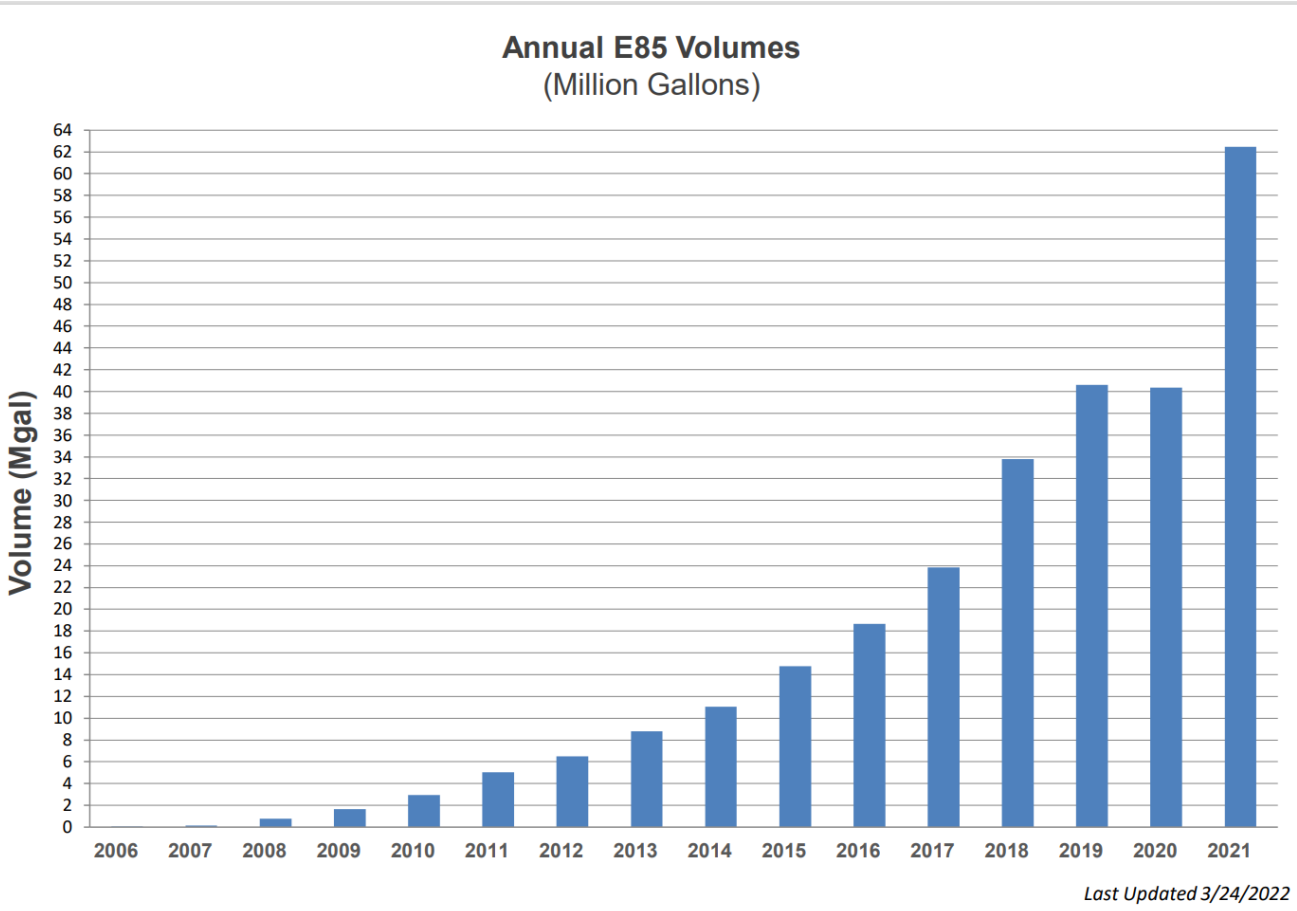


[3] Environmental Research Letters: Carbon intensity of corn ethanol in the United States: state of the science (iop.org)
[4] CARB LCFS Data: https://ww2.arb.ca.gov/resources/documents/lcfs-pathway-certified-carbon-intensities
[5] University of California Riverside: https://fixourfuel.com/wp-content/uploads/2018/04/UC-Riverside-Study.pdf; University of Illinois at Chicago: https://grains.org/wp-content/uploads/2018/11/Complete-Study-Summary.pdf

E15 and the Current Light-Duty Fleet

As we have noted previously, we continue to urge CARB to further develop clear policies that recognize the realities of today's fuel market and examine how homegrown biofuels can immediately contribute to achieving GHG reductions. Today, nearly all gasoline in California - and across the U.S. - is blended with 10 percent bioethanol. E15, a blend consisting of 15 percent bioethanol, has been approved for use by the U.S. Environmental Protection Agency (EPA) in all passenger vehicles model year 2001 and newer, more than 96 percent of the vehicles on the road today, and is now for sale at more than 2,600 locations in 31 states.

California is also in the process of evaluating E15 through its multi-media evaluation process. We will continue to work with CARB and the other state agencies to complete their multi-media evaluation of E15, so that it can be approved for use and made available to California drivers to further drive down GHG emissions and help the state achieve its carbon neutrality goals. To be able to gain further GHG reductions, it is critical that the multi-media working group complete its evaluation of E15.



This chart shows annual E85 volumes in California and is based on reported Test Program Exemption data.

E85 and Flex-fuel Vehicles

Additionally, with California's significant growth of E85 used in flex-fuel vehicles (more than 62 million gallons sold at more than 300 locations across the state in 2021 alone), the use of E85 will promote even greater reductions in GHG emissions and reductions of air toxics. We would continue to encourage CARB to push for policies that continue to strongly encourage and incentivize the production and use of flex-fuel vehicles, as well as continued investment in infrastructure for expanded access to E85 in the state.

Beyond the use of higher bioethanol blends such as E15 and E85 in today's vehicle fleet, we would offer a few items as CARB moves forward on its clean cars regulation:

Mobil Station, San Diego, CA 4/6/20222

High Octane/Midlevel Bioethanol Blends

As CARB considers the future fleet, it is important to consider the benefits of using higher octane fuels such as bioethanol in conjunction with more efficient engines. Growth Energy has been an industry leader in advocacy in this area, first commenting to both CARB and EPA about the need for higher octane, midlevel bioethanol blends when the GHG standards for vehicles were being first developed in 2012. At that time, we submitted a proposal for a 100 Research Octane Number (RON), E30 (30 percent bioethanol) fuel blend for both vehicle certification and

for consumer use. The science supporting the benefits of a high-octane fuel -- specifically a midlevel ethanol blend in the E20 to E30 range in conjunction with a high compression ratio engine – is not new and has been well explored by several national laboratories including Oak Ridge National Laboratory, National Renewable Energy Laboratory, and Argonne National Laboratory as well as automobile manufacturers and other scientific institutions. Bioethanol has a very high-octane number relative to other gasoline hydrocarbons, has a lower carbon content than the gasoline components it generally replaces, and has many other benefits that assist in combustion to increase engine efficiency and reduce both tailpipe GHG and criteria pollutant emissions.

To briefly summarize, multiple studies have shown that a high RON, midlevel bioethanol blend (e.g., 96-RON E20 or 100-RON E30) when paired with various higher compression ratio engines yield tailpipe CO_2 emissions reductions of at least 5 percent, which in most instances were also coupled with efficiency gains. Some studies also showed significant volumetric miles per gallon savings associated with the higher efficiency engines and a high-octane fuel. One study that was submitted to EPA in response to their Draft Technical Assessment Report (TAR) by Air Improvement Resources, "Evaluation of Costs of EPA's 2022-2025 GHG Standards with High Octane Fuels and Optimized High Efficiency Engines," showed that the use of a 98 RON, E25 would reduce the cost of a MY 2025 vehicle by $400 and a popular crossover SUV by as much as $873. Not only are the benefits of midlevel bioethanol blends well understood by the scientific community, but the automobile industry has for years acknowledged the importance of affordable, high-octane fuels coupled with high-compression ratio engines as important to attaining regulatory compliance and improving vehicle performance in the most economical manner possible.

When you examine the data, there are clear benefits of moving to a high-octane, midlevel bioethanol blend, such as E30, including vehicle engine efficiency, lower tailpipe emissions, and increased use of renewable fuel. We believe that the use of midlevel bioethanol blends will continue to drive investment in more efficient vehicles, as well as lower carbon biofuels.

Bioethanol/Fuel Cell Technology

Direct bioethanol fuel cells for the use in motor vehicle transportation have been in development by Nissan for some time. As recently as January of 2020, Nissan and Lawrence Berkeley National Laboratory have published research on the use of 100 percent bioethanol in fuel cell technologies and innovations.[6] This technology not only meets zero emission vehicle requirements, but further eliminates particulates from tailpipe emissions. Using bioethanol in conjunction with a fuel cell would require less infrastructure change and investment and would help the state meet its ambitious goals for climate and vehicle. As CARB considers policies on zero emission vehicles in conjunction with the LCFS, we would strongly encourage CARB to consider ways to further develop this technology for consideration.

[6] Lawrence Berkeley National Laboratory: https://eta.lbl.gov/publications/ethanol-internal-reforming-solid

More broadly, we look forward to working as you work through the regulatory process to ensure the role of biofuels in making California's fuel mix more sustainable and help the state achieve its climate goals through the expanded use of bioethanol.

Thank you in advance for your consideration.

Sincerely,

Chris Bliley
Senior Vice President of Regulatory Affairs
Growth Energy

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