

National Clean Fuels Technology & Health Effects Leadership Forum

United Nations Foundation, Washington, DC

February 6, 2020



9:15 a.m. | Ending the Public and Regulatory Policy Stalemate

*Moderator: Doug Durante, Executive Director, Clean Fuels Development
Coalition*

Timothy Wirth, Vice Chair, United Nations Foundation; former U.S. Senator (D-CO)
Ambassador C. Boyden Gray, Partner, Boyden Gray & Associates; former White
House Counsel to President George H.W. Bush



10:15 a.m. | Gasoline Aromatics and EPA's Duty to Control Them

Moderator: Reid Detchon, United Nations Foundation

Carol Werner, Director Emeritus & Senior Policy Fellow, Environmental & Energy Study Institute

Steve VanderGriend, Technical Director, Urban Air Initiative



URBAN **AIR** INITIATIVE

Improving Our Air with Ethanol

www.FixOurFuel.com

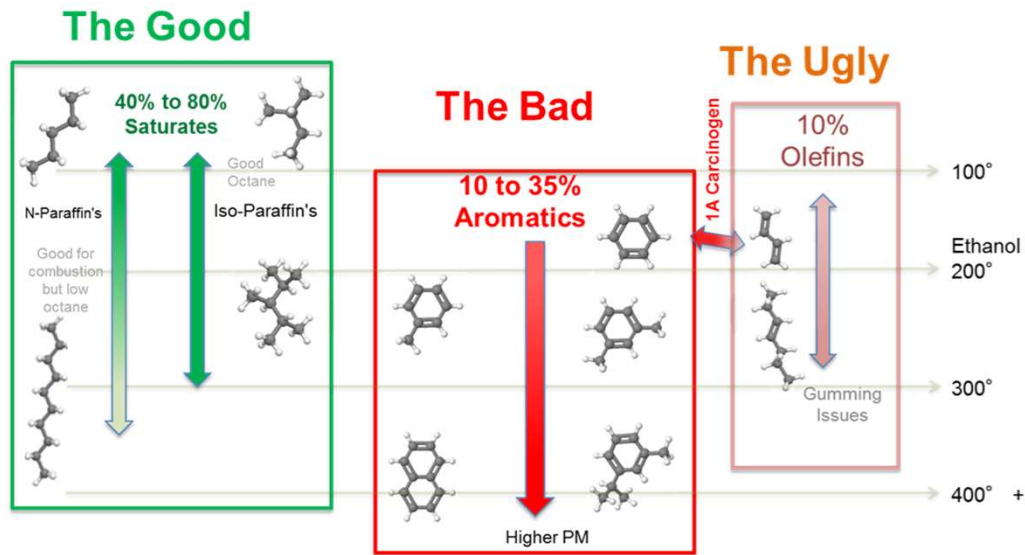
Making a Cleaner Fuel for Today & Tomorrow's Vehicles

Steve Vander Griend
Urban Air Technical Director
fuels@urbanairinitiative.com
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What Should We Be Comparing? Answer: Octane

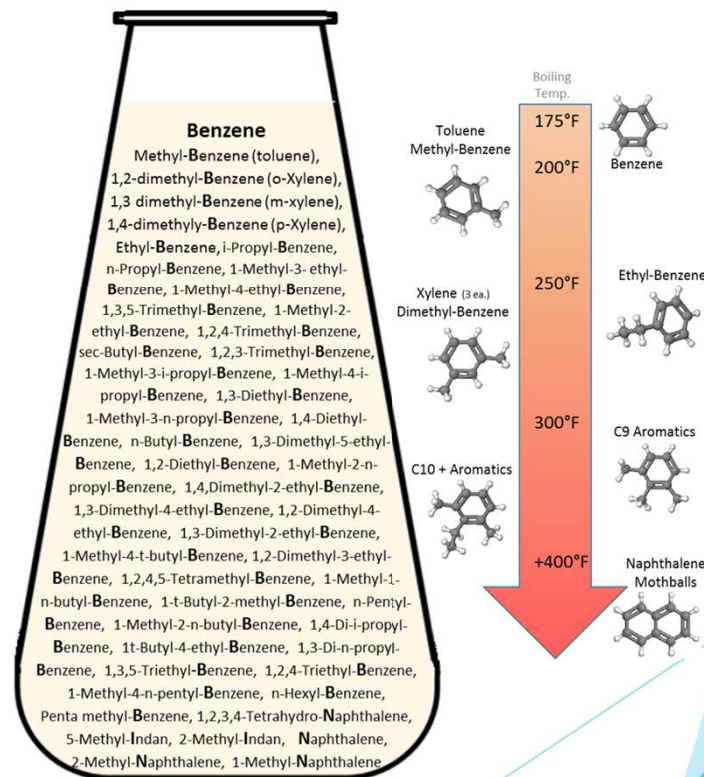
- **Aromatics**- While high in octane, aromatics are the most carbon intensive to produce. Plus the combustion creates several areas of health concerns.
- **Ethanol**- Lowest carbon intensity to produce, more efficient in combustion, renewable and reduces toxicity of emissions. Plus ethanol has nearly twice the octane blending value compared to aromatics.

The Breakdown of Gasoline



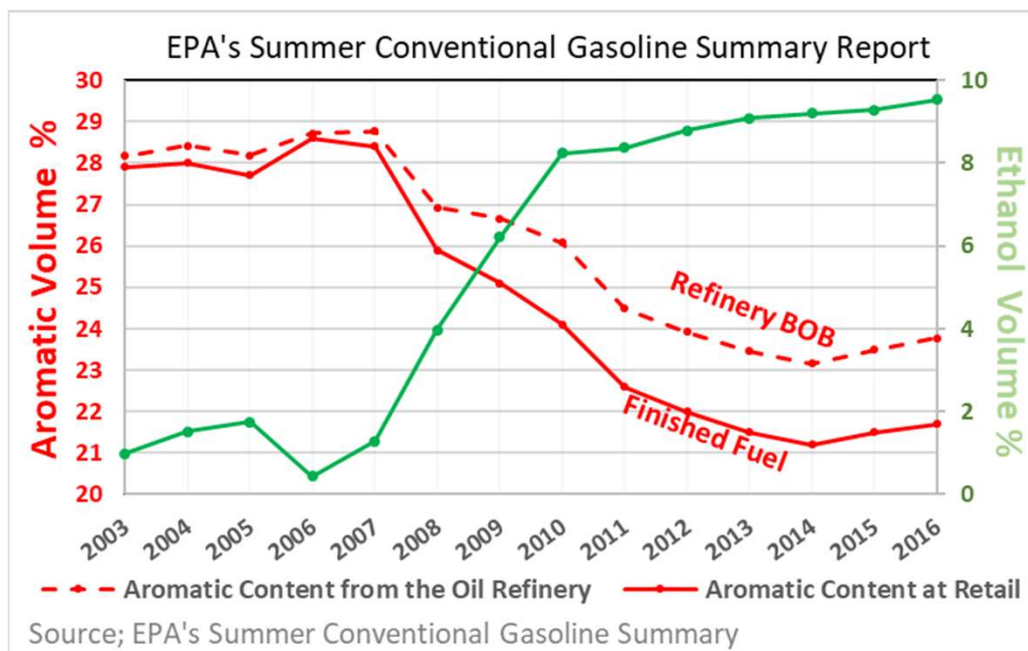
Aromatics: Welcome to the Family Tree of Benzene Hydrocarbons

- Aromatics are toxic petroleum components refiners process in order to raise octane
- Average: Summer- 25%, Winter- 20%
- Primary source for gasoline toxic and particulate emissions
- Highest emission rate for any component of gasoline
- Highest carbon intensity to produce and to combust
- Highest contribution to material compatibility problems



The Untold Success Story of E10

- Oil companies embraced ethanol's octane- and refineries reduced aromatic content
- Ethanol in the E10 market today reduces aromatics in our gasoline supply by 7 to 8 billion gallons annually
- Unfortunately, aromatics are now increasing due to oil refineries economics



Aromatics have Concerned Automotive Engineers for Years

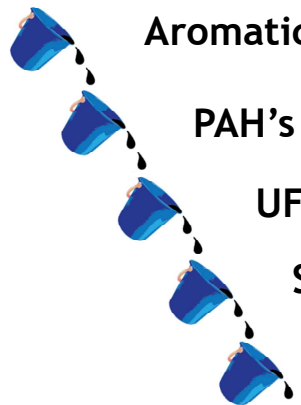
It is common knowledge that PM emissions contribute to smog formation and **adverse health effects** such as **respiratory diseases** and **lung cancer**. It has been shown that most **severe toxicological** effects are caused by small particles.high surface area per mass and thus may contain high levels of **toxic** compounds like **PAH's**.
General Motors Powertrain SAE 2008-01-1746

Over the past 10 years, there has been increasing evidence that particulates generated by combustion of fossil fuels **adversely affect health**. Nano-scale particles ... **penetrate cell membranes** and defenses, **damage DNA**, and **increase cancer** risk. National Renewable Energy Laboratory. SAE 2010-01-2125

...several health studies have related PM to both environmental pollution and **human health risk** such as **respiratory diseases, heart-attacks, and cancer**. The health effects are found to correlate more with the **size of PM** and less with the mass. Massachusetts, Institute of Technology SAE 2011-01-1305

The nanoparticles may pass **through the lungs** and be retained in the human body.smaller particulates with **higher surface area**, ...**toxic chemicals** components covering the surface may do **more harm** to the human body. Japans National Safety and Environment Laboratory SAE 2008-01-2437

Aromatics Create Dangerous Emissions



Aromatics BTEX Along with 40 Plus other aromatics

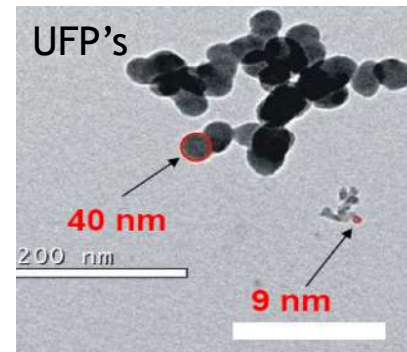
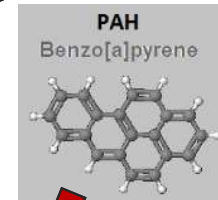
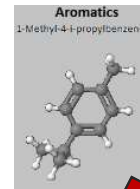
PAH's - Polycyclic Aromatic Hydrocarbon

UFP's - Ultrafine Particles

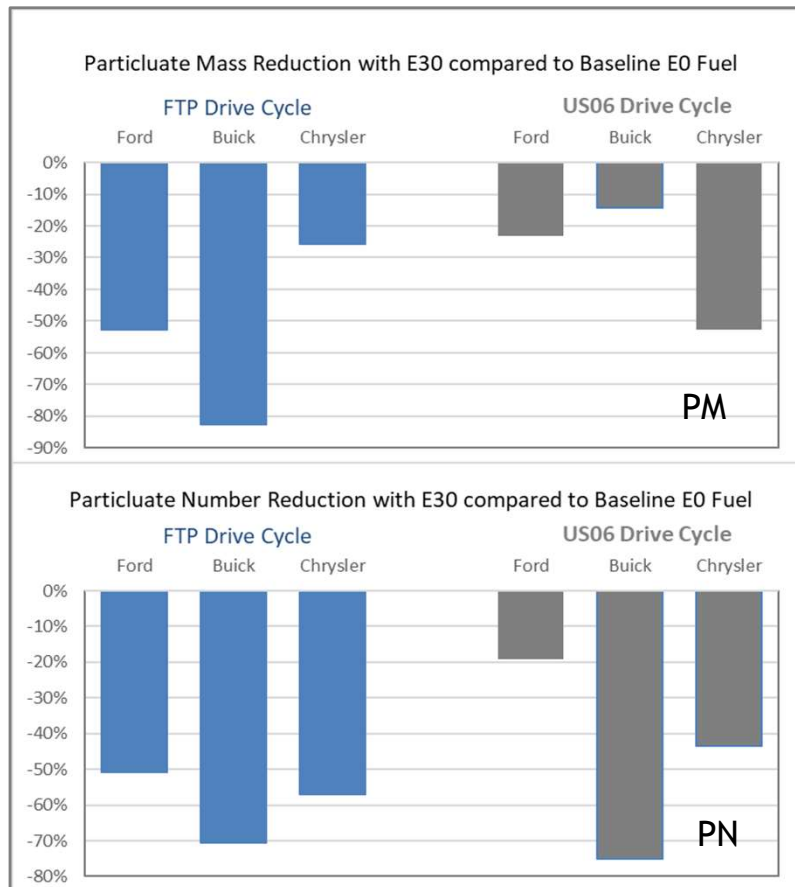
SOA's - Secondary Organic Aerosols & Ozone

PM 2.5 - Particulate Matter

After the Tailpipe



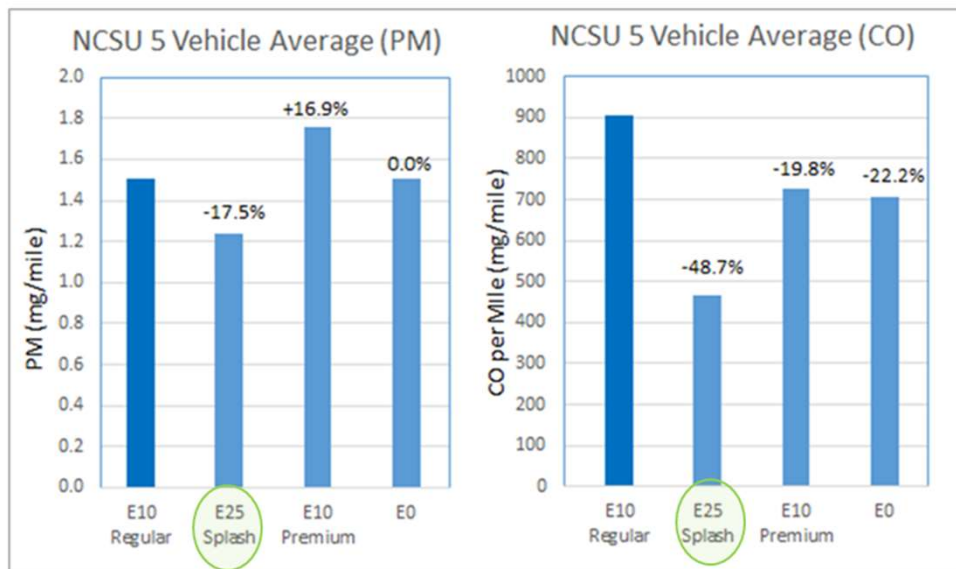
Emission Studies- Aromatics vs. Ethanol



Fuel Property Effects on Particulates in Spark Ignition Engines [Vuk. C., SAE 2013-01-1124](#)

- Simply adding ethanol reduced emission, both particulate mass and number.
- Due to ethanol's ability to dilute aromatics and have a cleaner combustion.
- Increasing aromatic volumes raised emissions, both particulate mass and number.

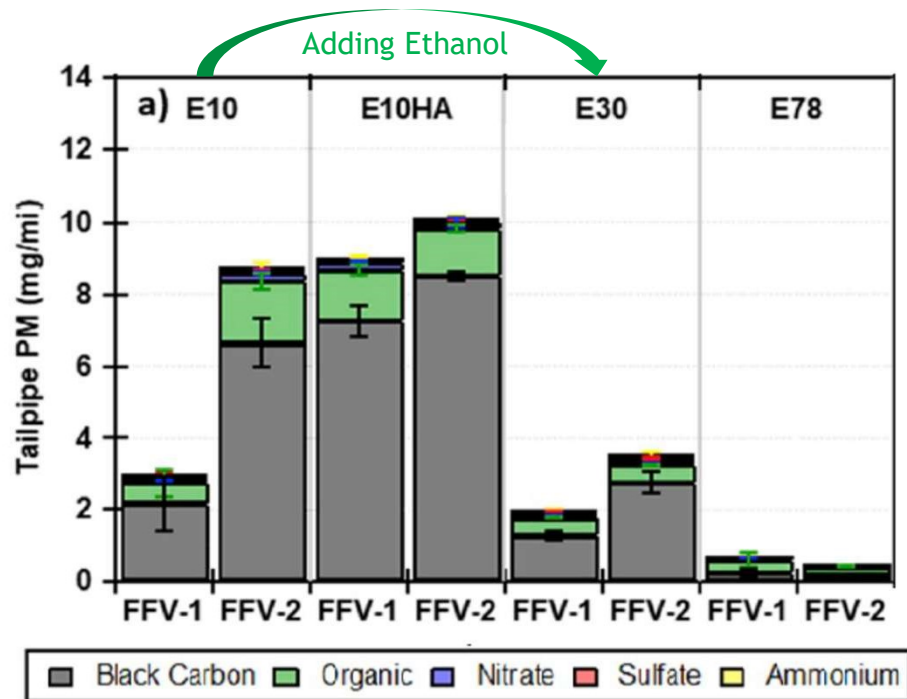
Emission Studies- Aromatics vs. Ethanol



Comparison of real-world vehicle fuel use and tailpipe emissions for gasoline-ethanol fuel blends [Yuan, w., 2019](#)

- Simply adding ethanol to create E25 lowered CO and PM emissions.
- Non-Flex vehicles adapted to higher ethanol blends.
- Octane from increasing ethanol instead of aromatics reduced CO₂ per mile.

Emission Studies- Aromatics vs. Ethanol



Atmospheric Environment 220 (2020) 117064

Intermediate and high ethanol blends reduce secondary organic aerosol formation from gasoline direct injection vehicles [Roth, P., 2019](#)

- Simply adding ethanol reduces SOA emissions.
- The higher aromatics E10 had higher SOA emissions compared to lower aromatic E10.
- Aromatics increased PM and SOA's.

Emission Studies- Aromatics vs. Ethanol

Emissions from a flex fuel GDI vehicle operating on ethanol fuels show marked contrast in chemical, physical and toxicological characteristics as a function of ethanol content Yang, J., 2019 [University of California, Riverside](#)

- Trends in toxicity emission rates were driven primarily by PM mass emission.
- PM did not exhibit any measurable mutagenicity.



Mutagenic atmospheres resulting from photooxidation of aromatics hydrocarbon and NOx mixtures Riedel, T., 2018 [Environmental Protection Agency \(EPA\)](#)



- Although Tailpipe VOC emissions are regulated to limit air pollution, the photooxidation products generally are not
- Mutagenicity was due exclusively to direct-acting late-generation products of the photooxidation re-actions (i.e. SOA formation)
- Aromatic VOCs are emitted almost exclusively from anthropogenic (man-made) sources.

Biggest Challenge in Creating a Cleaner Fuel The Blending of Test Fuels

- There are no standards for creating test fuels for emission studies.
- Whoever selects the test fuel parameters impacts the outcome of the study. Often researchers are not fuel experts and unclear on fuel details.
- The lack of consistency has created conflicting results when it comes to ethanol's impacts on emissions and material compatibility



Two Ways to Blend Test Fuels

- **Match Blending** attempts to hold a few parameters the same while making a host of changes in the gasoline as ethanol is added. For instance, adding more aromatics as ethanol is added too.
- **Splash Blending** makes no changes to the gasoline and simply adds ethanol to the fuel.

Issues with T50 and T90 as Match Criteria for Ethanol-Gasoline Blends

[Anderson, J., SAE 2014-01-9080](#)

- That the exclusive use of a match blending approach by EPA has fundamental flaws.
- The primarily increase in emissions is due to the added aromatics, but has often been incorrectly attributed to the ethanol.

Working to Improve Emission Modeling with Ethanol

1. Effects of Ethanol Blends on Light-Duty Vehicle Emissions: A Critical Review
[January 2019](#)
2. Emissions from Low-and Mid-Level Blends of Anhydrous Ethanol in Gasoline
[Clark, N., 2019-01-0997](#)
3. Quantification of Ethanol Blend Emissions Effects -Accepted in The Journal of Air & Waste Management Association (A&WMA) Publishing February, 2020)
4. Work is underway with Future Fuel Strategies to write a Fuel Blending Guide with hopes to make this an SAE Recommended Practice. Involvement includes Autos, Oils, Test Fuel Providers, CARB, and a few Academic Researchers.

Reducing Aromatics is Simple

“EPA has a mandatory duty to cut “mobile source air toxics” to “the greatest degree . . . achievable.”

Clean Air Act § 202(l).

Ethanol is a readily available solution.
Simply adding ethanol to gasoline, reduces emissions,
increases octane, and protects public health.

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For More Information

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11:15 a.m. | High Yield Corn and Corn Ethanol's
Plummeting Carbon Footprint
Moderator: Anne Steckel, National Farmers Union

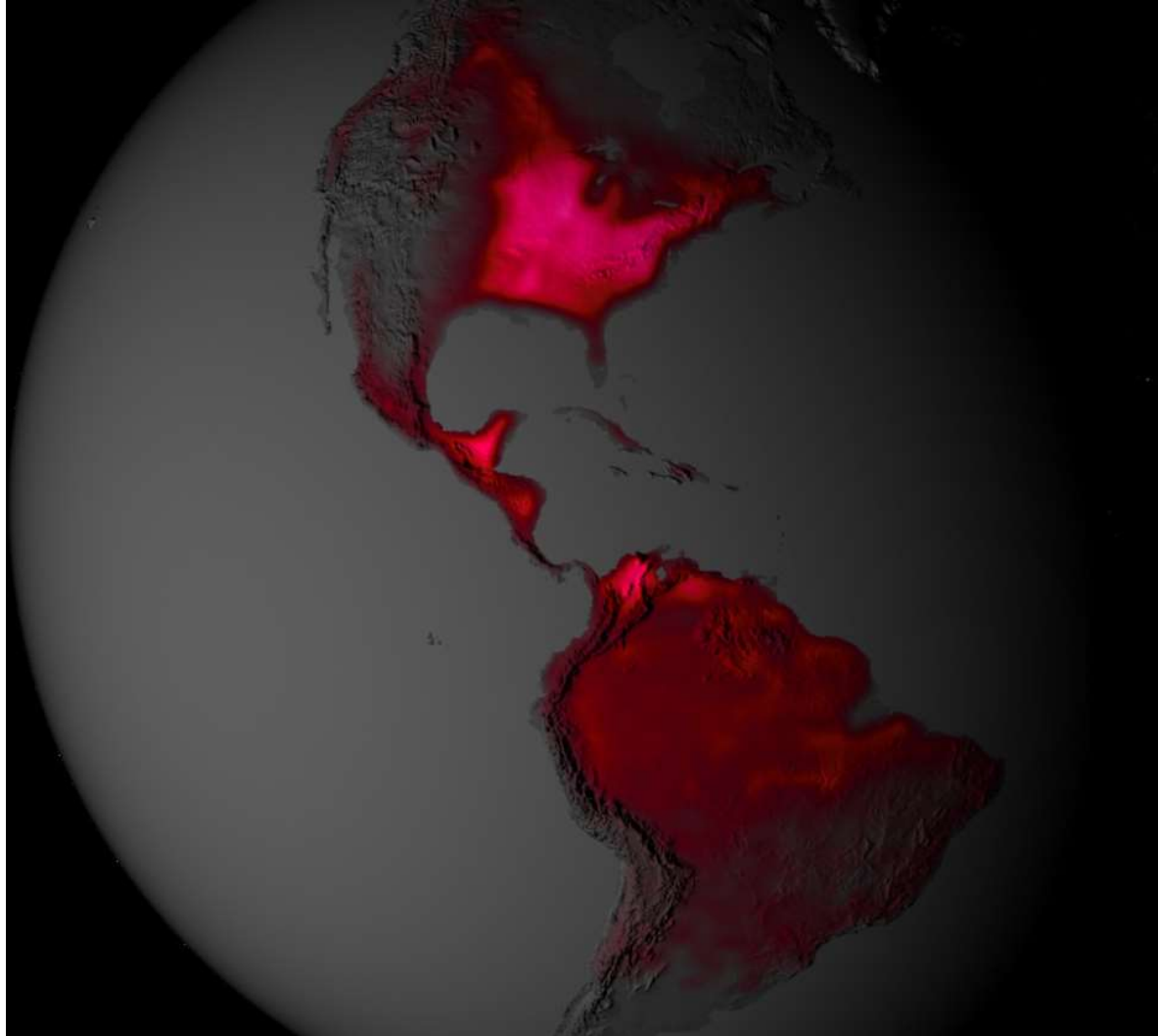
Geoff Cooper, CEO, Renewable Fuels Association



Taking a Second Look at Corn Ethanol's Carbon Footprint

Geoff Cooper
Renewable Fuels Association





“Data from satellite sensors show that during the Northern Hemisphere’s growing season, **the Midwest region of the United States boasts more photosynthetic activity than any other spot on Earth**, according to NASA and university scientists.”

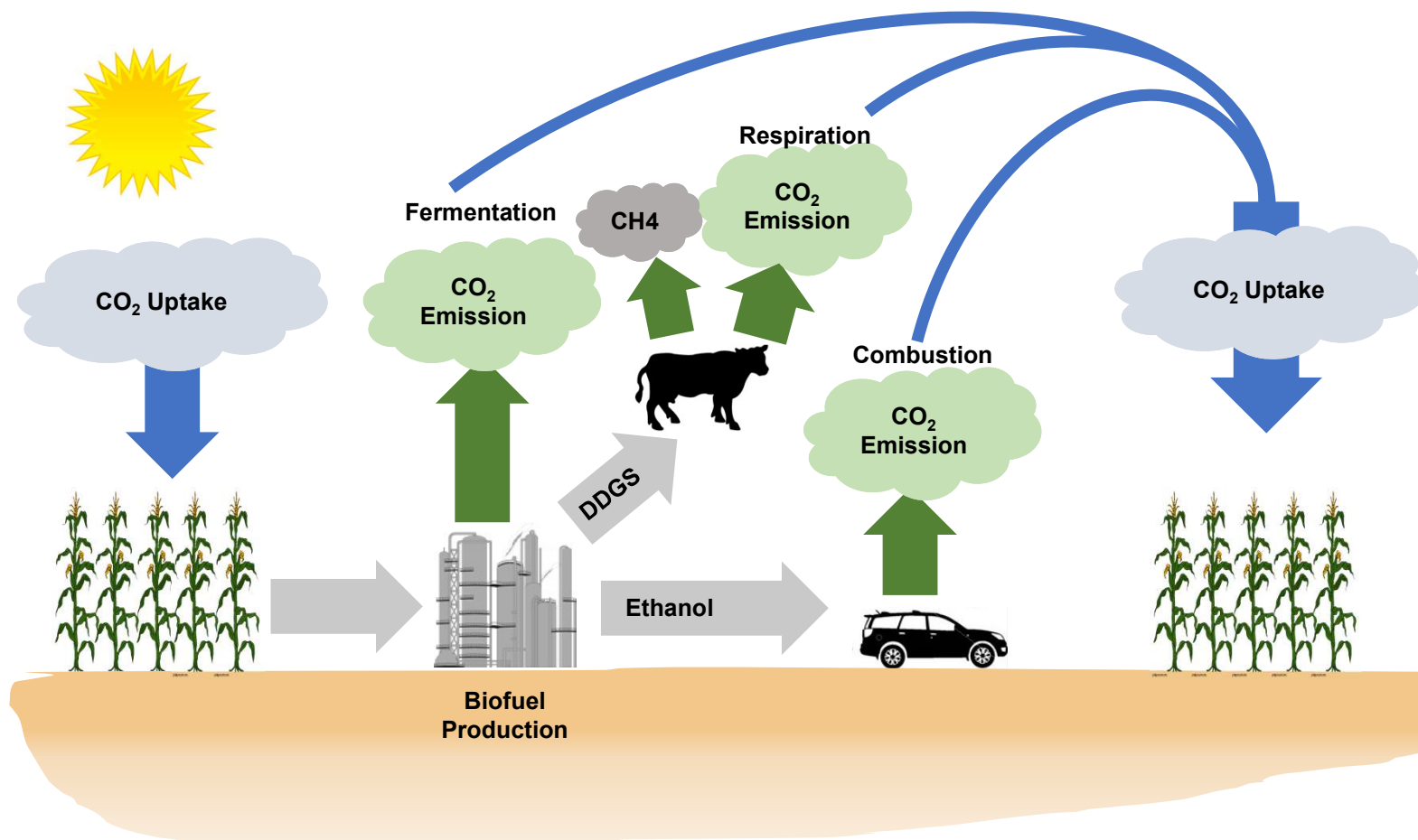
“**Corn plants are very productive in terms of assimilating carbon dioxide from the atmosphere.** This needs to be accounted for going forward in trying to predict how much of the atmospheric carbon dioxide will be taken up by crops in a changing climate.”

Global and time-resolved monitoring of crop photosynthesis with chlorophyll fluorescence

Luis Guanter, Yongguang Zhang, Martin Jung, Joanna Joiner, Maximilian Voigt, Joseph A. Berry, Christian Frankenberg, Alfredo R. Huete, Pablo Zarco-Tejada, Jung-Eun Lee, M. Susan Moran, Guillermo Ponce-Campos, Christian Beer, Gustavo Camps-Valls, Nina Buchmann, Damiano Gianelle, Katja Klumpp, Alessandro Cescatti, John M. Baker, and Timothy J. Griffis
PNAS April 8, 2014 111 (14) E1327-E1333; first published March 25, 2014
<https://doi.org/10.1073/pnas.1320008111>



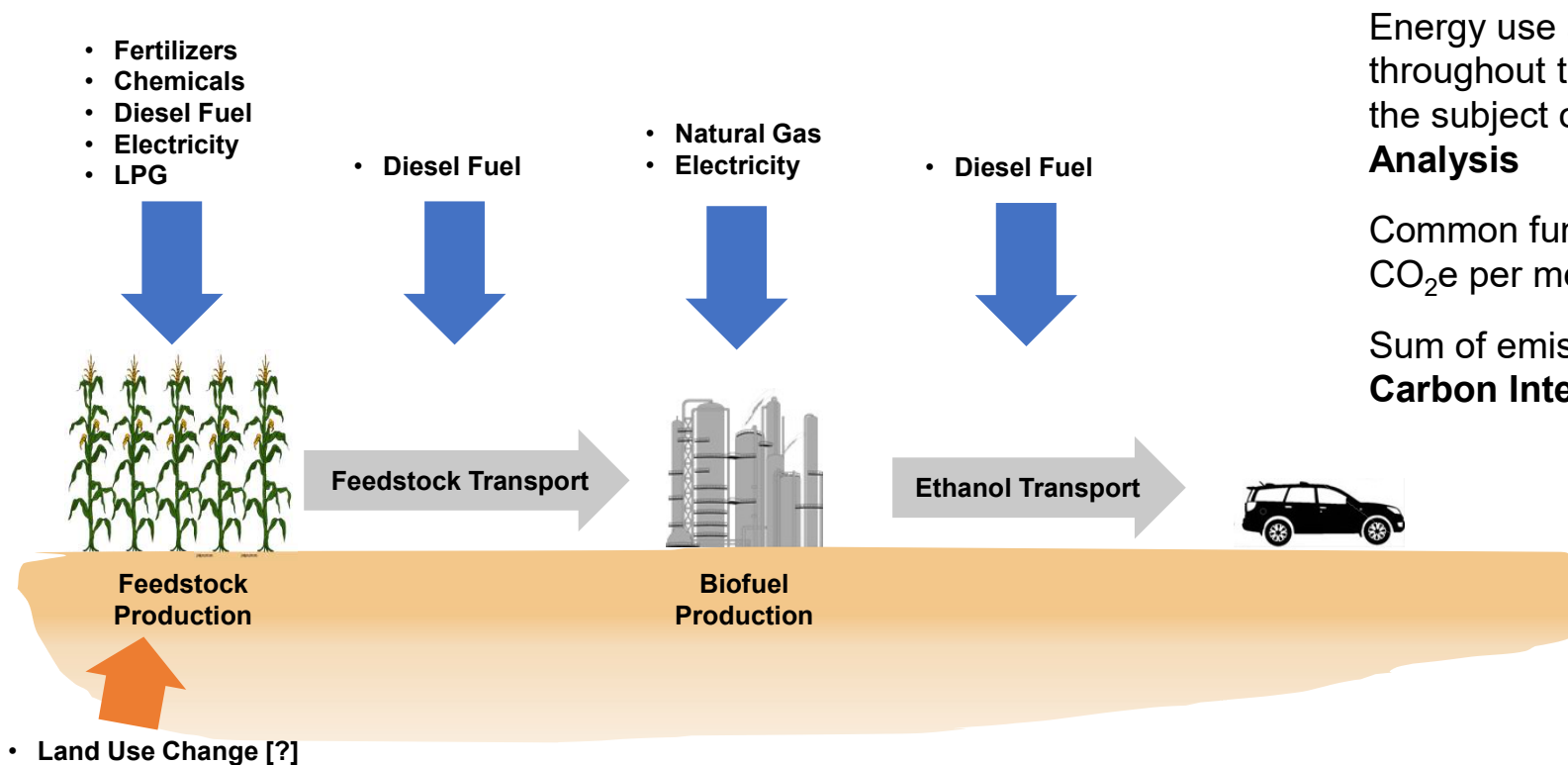
Where does all that CO₂ go?



What is the fate of the carbon stored in the corn kernel?

- 1/3 is released as CO₂ via fermentation
- 1/3 is passed through in animal feed co-products (DDGS)
 - Later released via respiration
- 1/3 is passed through in fuel ethanol
 - Later released via fuel combustion

What about energy use and GHG emissions associated with production?



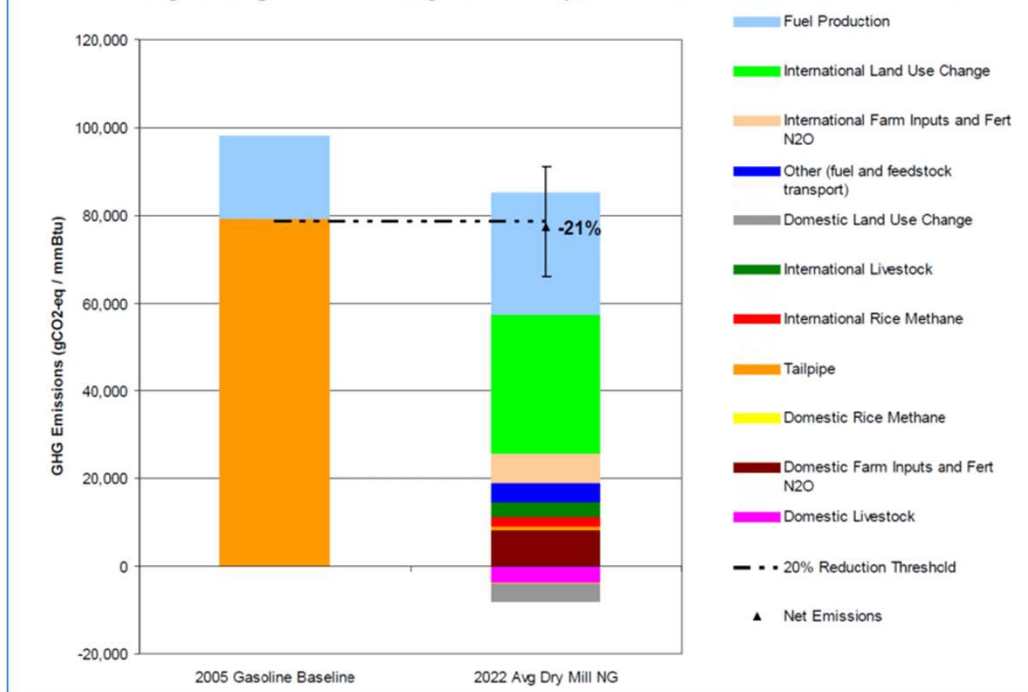
Energy use and related emissions throughout the production process is the subject of **Lifecycle GHG Analysis**

Common functional unit = grams of CO₂e per megajoule of energy (g/MJ)

Sum of emissions often referred to as **Carbon Intensity (CI) Score**

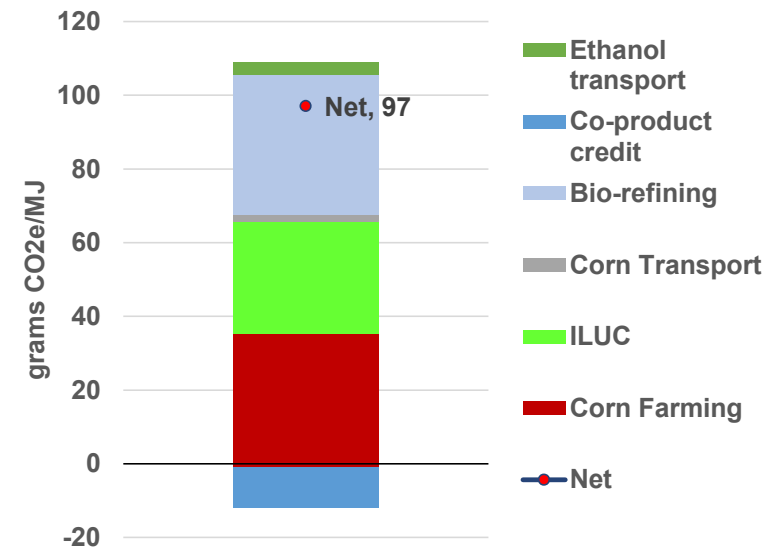
Early Analyses by U.S. EPA and CARB

Figure 2.6-2. Results for a New Natural Gas Fired Corn Ethanol Plant by Lifecycle Stage
Average 2022 plant: natural gas, 63% dry, 37% wet DGS (w/ fractionation)



EPA (2009). Average corn ethanol reduces GHG emissions by 21% in 2022

CARB: Average Corn Ethanol



CARB (2009). Average corn ethanol does not reduce GHG versus gasoline

Hindsight is Always 20/20

- Real-world data show early “land use change” emissions estimates were **grossly** overstated
 - No net expansion of U.S. cropland
 - No identifiable relationship between biofuel production and deforestation
- Original ILUC/LUC estimates:
 - Searchinger et al. (2008) = 104 g/MJ
 - EPA RFS2 (2009) = 28 g/MJ
 - CARB LCFS (2010) = 30 g/MJ
- Latest LUC estimates:
 - CARB LCFS (2015) = 19 g/MJ
 - Purdue University (2019) = 12 g/MJ
 - Argonne National Laboratory (2019) = 4-7 g/MJ
- Empirical data also show gross overestimation of other energy use and emissions from production lifecycle (fertilizer use, ethanol plant energy use, etc.)

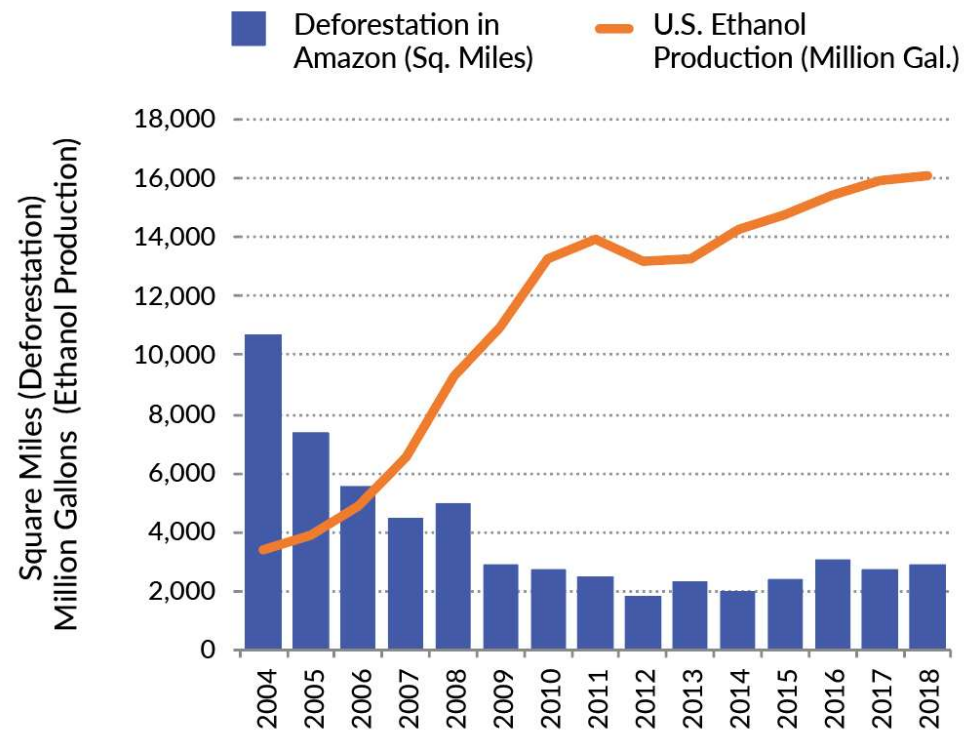
U.S. EPA Determination of Agricultural Land Use vs. 2007 Baseline



Overall agricultural land use has dropped significantly since EPA established the 2007 baseline with the expansion of the Renewable Fuel Standard.

Source: RFA using U.S. Environmental Protection Agency data

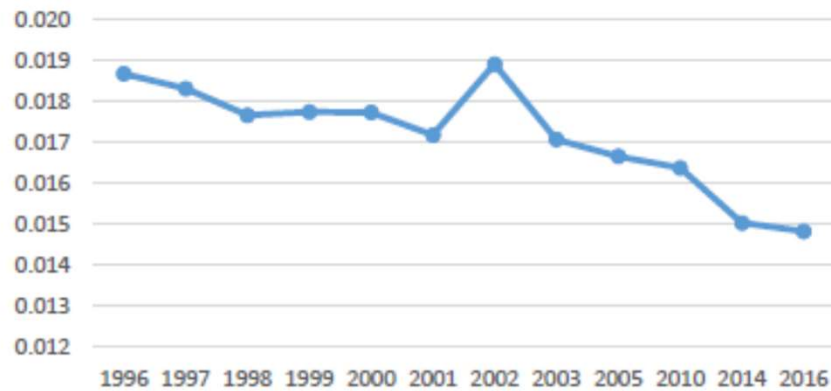
Amazon Deforestation Rates vs. U.S. Ethanol Production



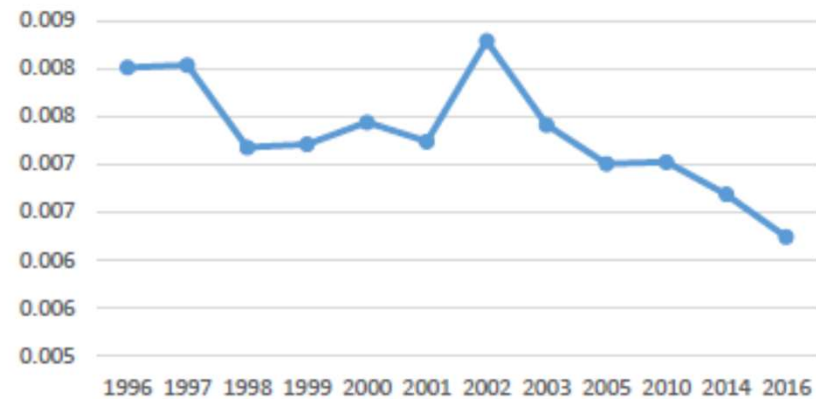
Source: RFA using Brazil National Institute for Space Research & U.S. Energy Information Administration data

Improvements on the Farm

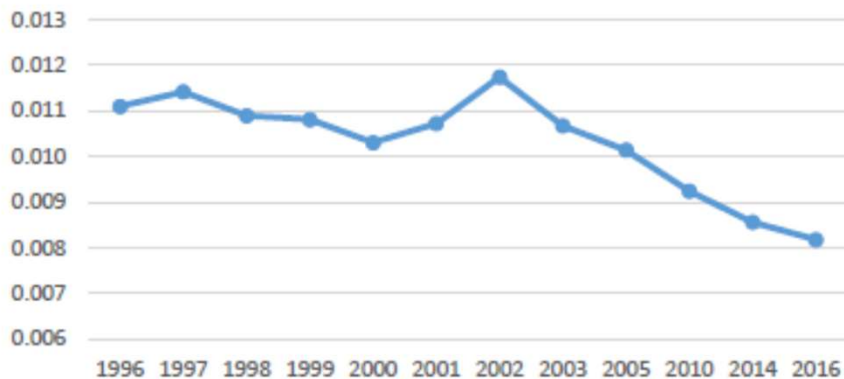
Lb. Nitrogen Input per Lb. Corn Output



Lb. Potassium Input per Lb. Corn Output

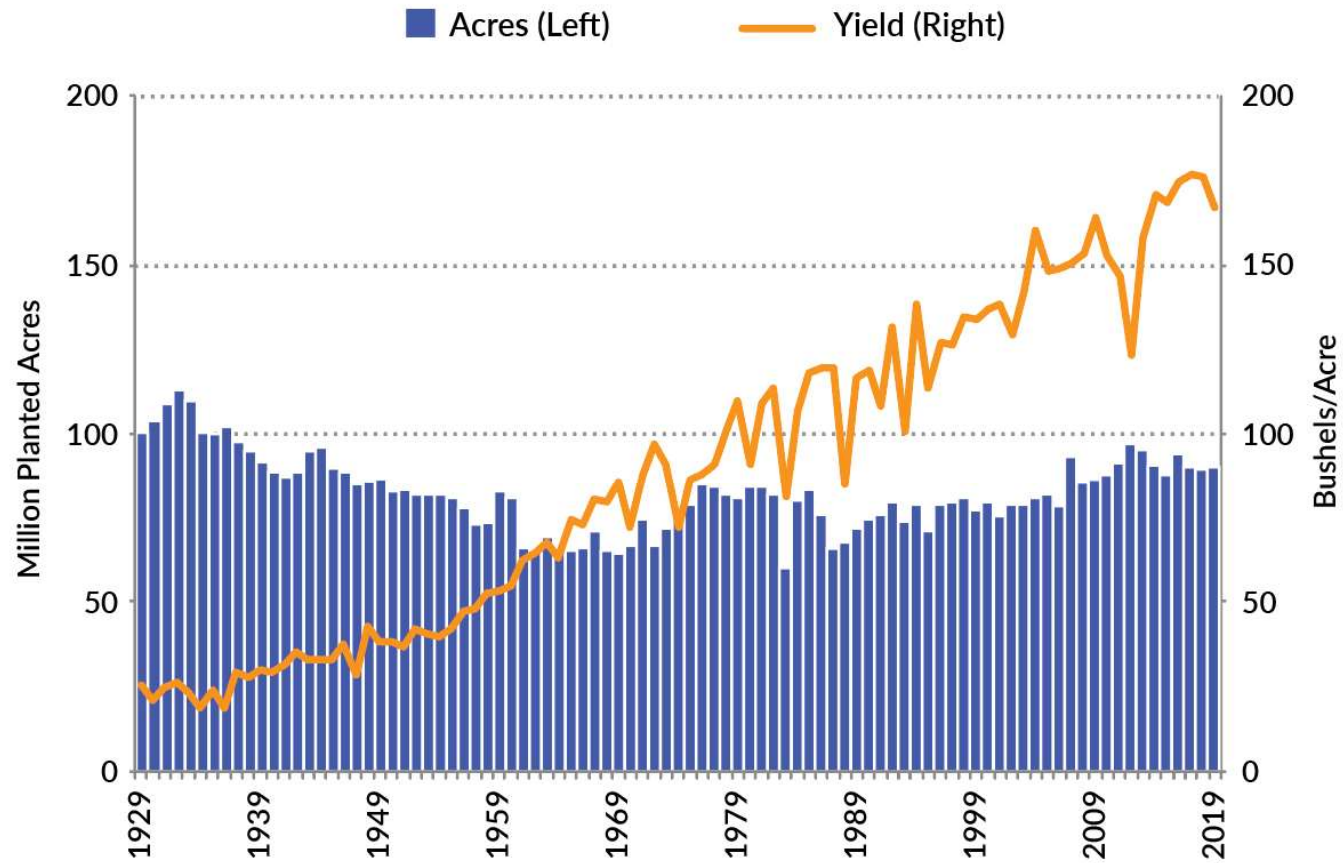


Lb. of Potash Input per Lb. Corn Output



20-30% reductions in nutrient use for corn production in past 20 years

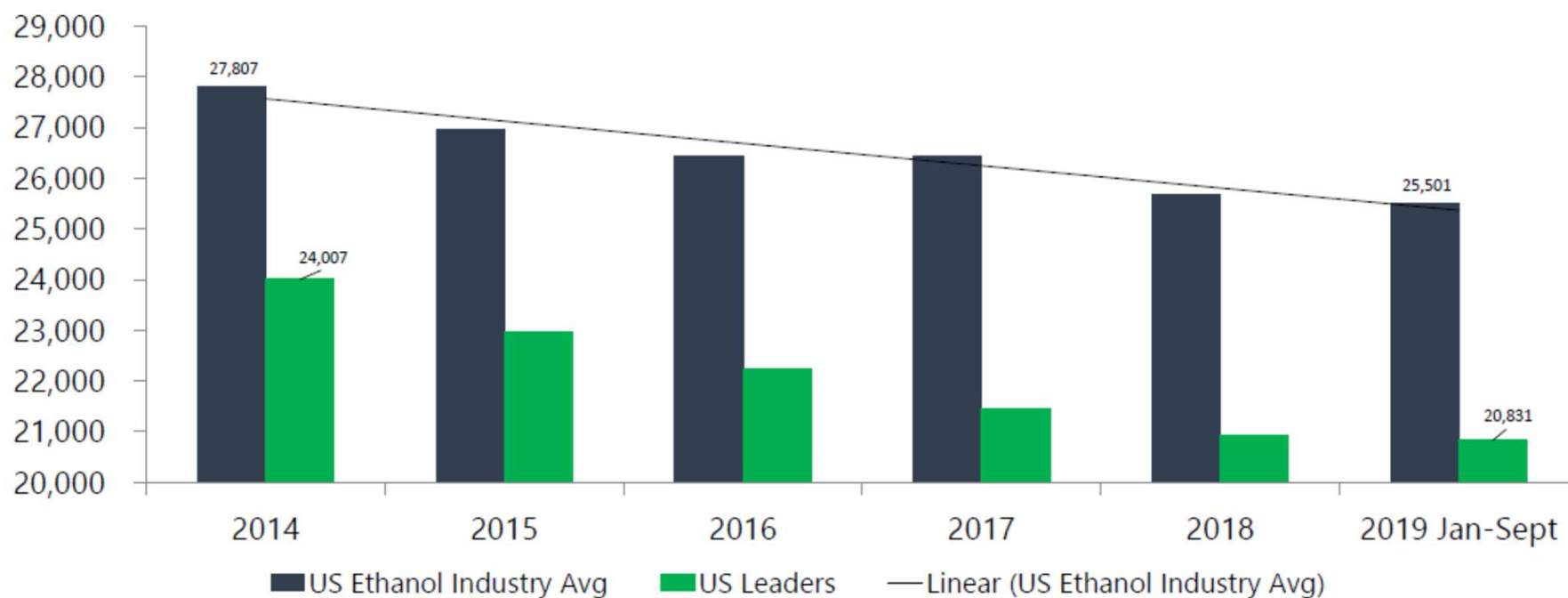
Corn Yield per Acre and Planted Acres



Source: RFA using U.S. Dept. of Agriculture data

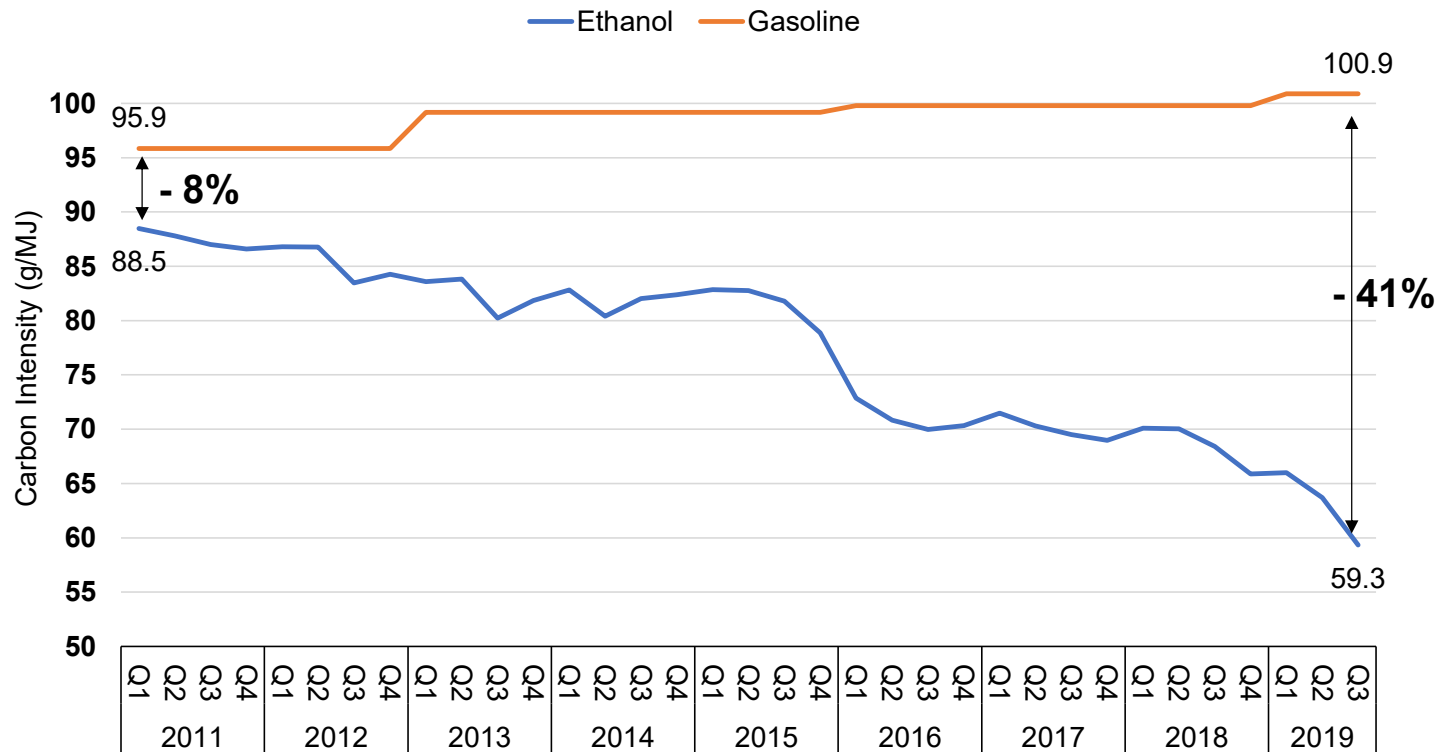
Improvements at the Ethanol Plant

Energy Usage (BTUs / Production Gallon)



Average Ethanol CI in California

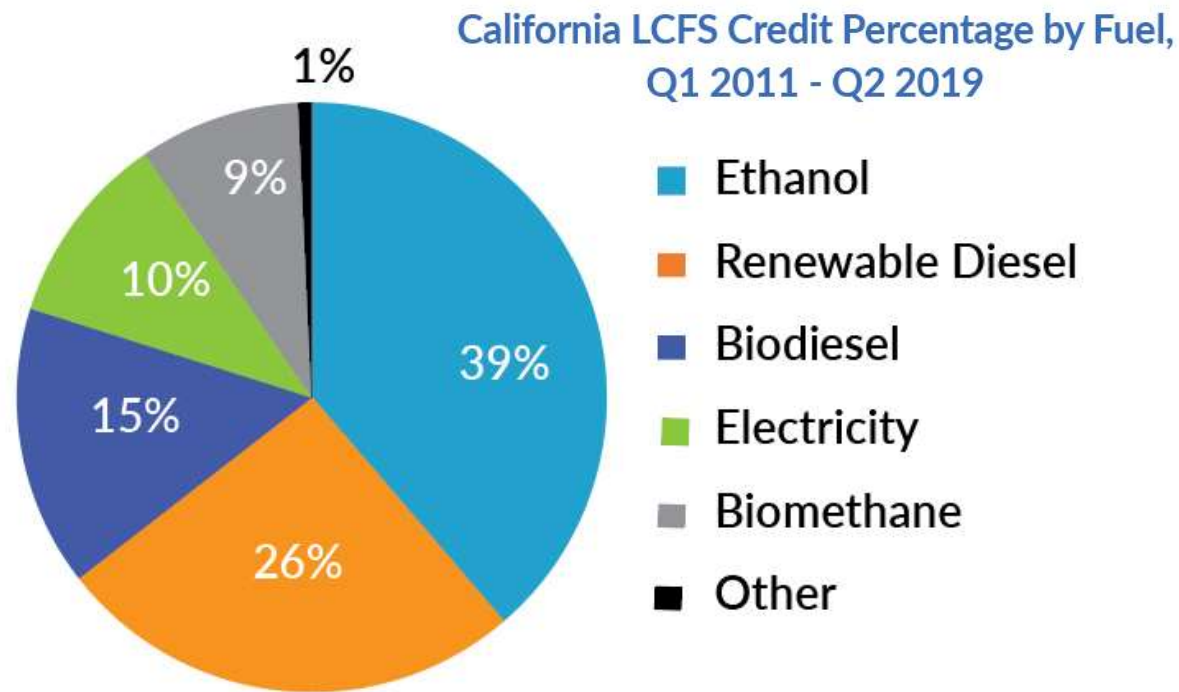
Carbon Intensity of California Gasoline and Ethanol



- CARB data show the average CI of ethanol used in the state in 2019Q3 was 59.3 g/MJ – a 41% reduction compared to gasoline
- ...even with a 19 g/MJ land use change penalty!
- The average CI of ethanol consumed in California has been reduced by 33% since 2011

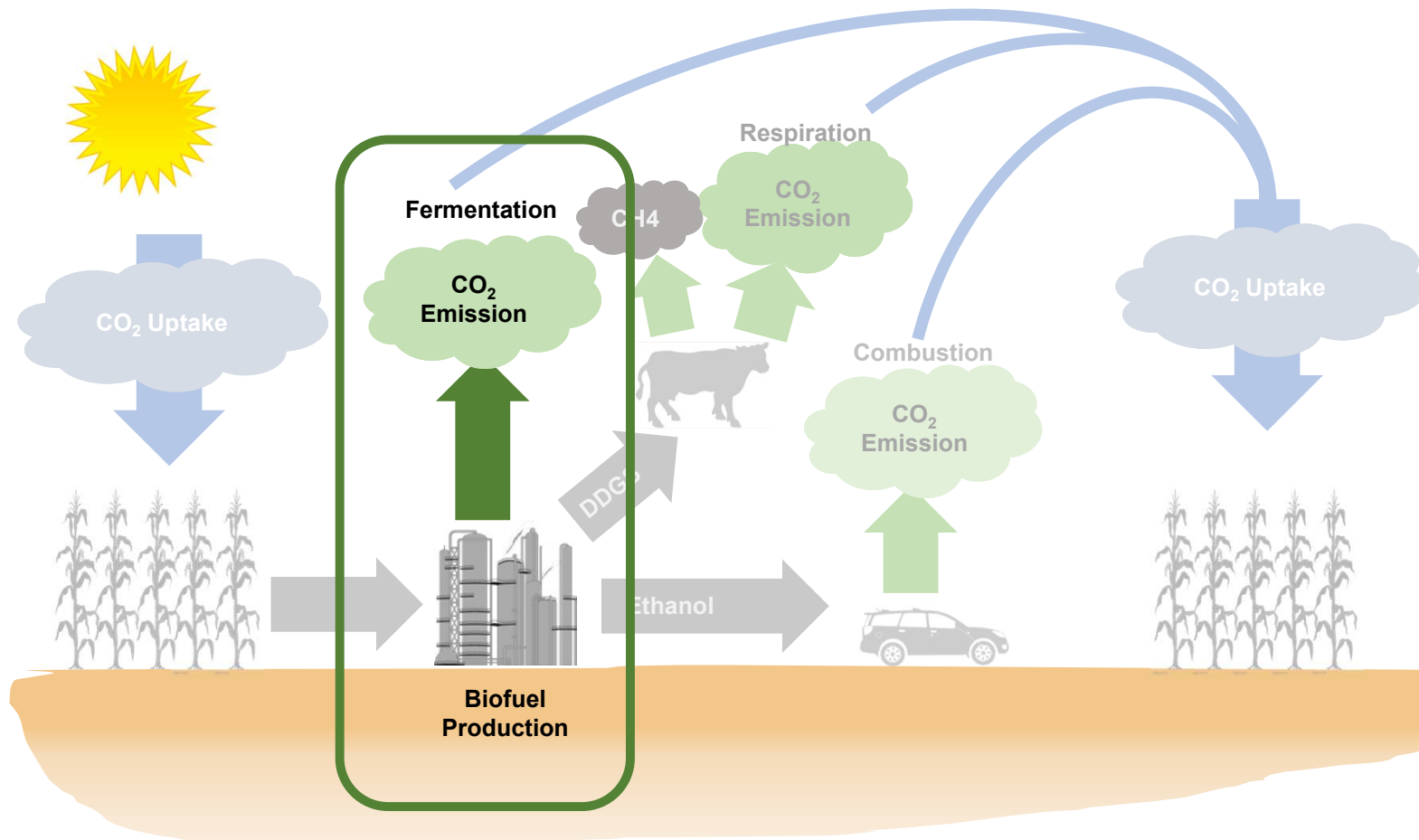


Ethanol has reduced GHG emissions by 22 MMT in California since 2011



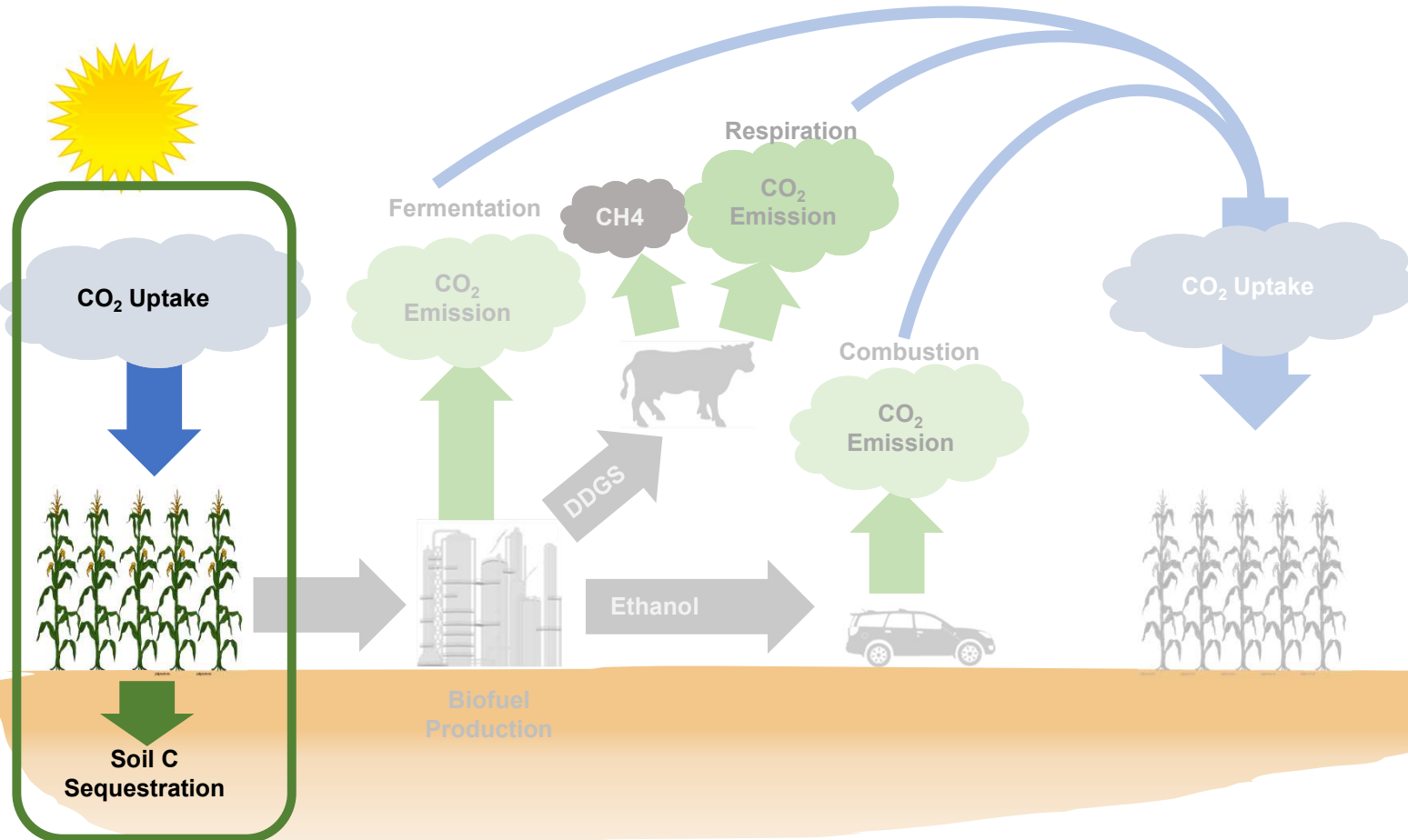
Source: RFA using California Air Resources Board data

Fermentation CO₂ offers huge potential for CCS/EOR



- Industry generates roughly 40-50 million tons of biogenic CO₂ from fermentation
- CO₂ from fermentation is among the purest forms of industrial CO₂ available
- Today, roughly 15-20% of industry's fermentation CO₂ emissions are captured and sold into industrial markets (bottling, dry ice, etc.)
- Remainder is vented
- Only a handful of plants supply CO₂ for EOR today

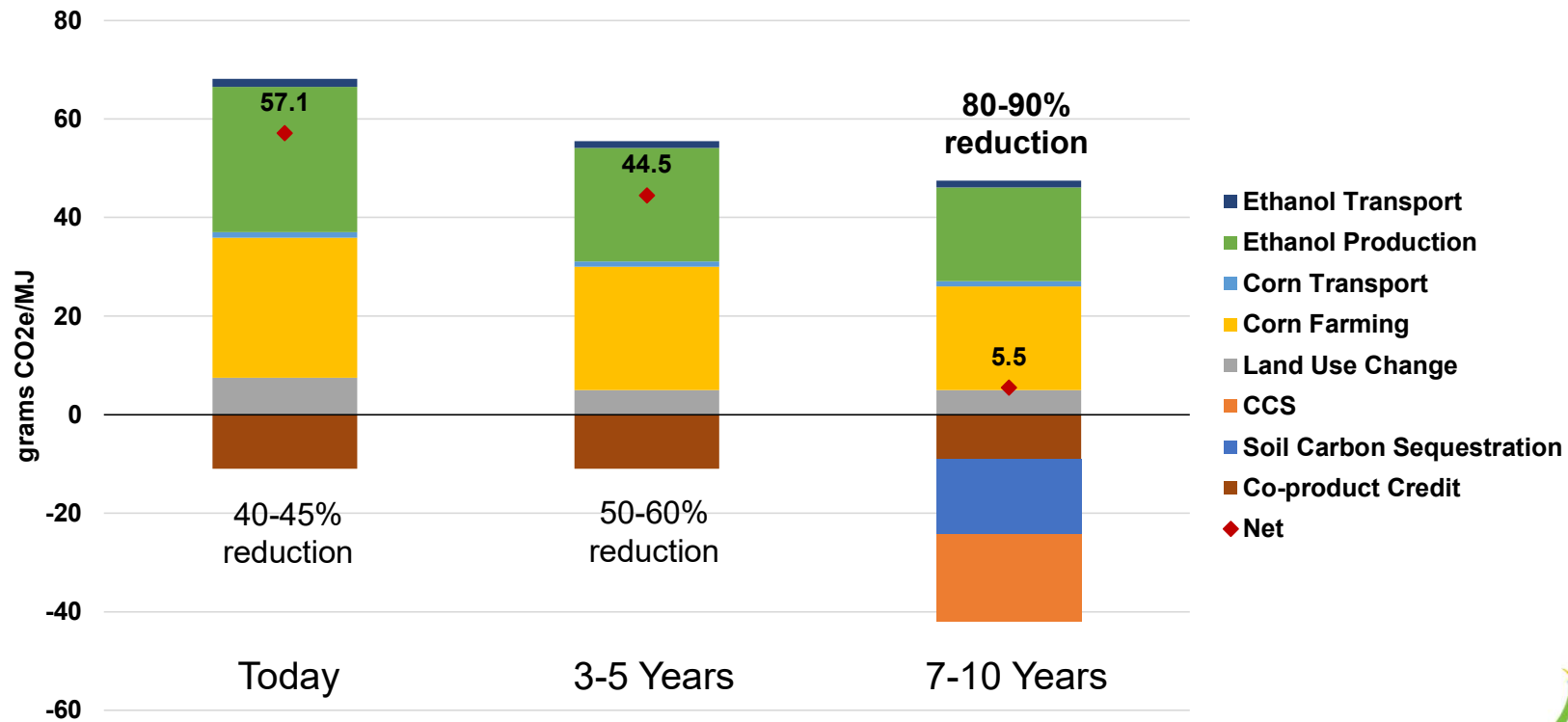
Soil C sequestration offers huge potential too!



- Modern tillage practices and soil carbon management can result in significant carbon sequestration in agricultural soils
- Current regulations and lifecycle analysis tools generally do not account for soil C sequestration or allow for credit toward ethanol's CI score

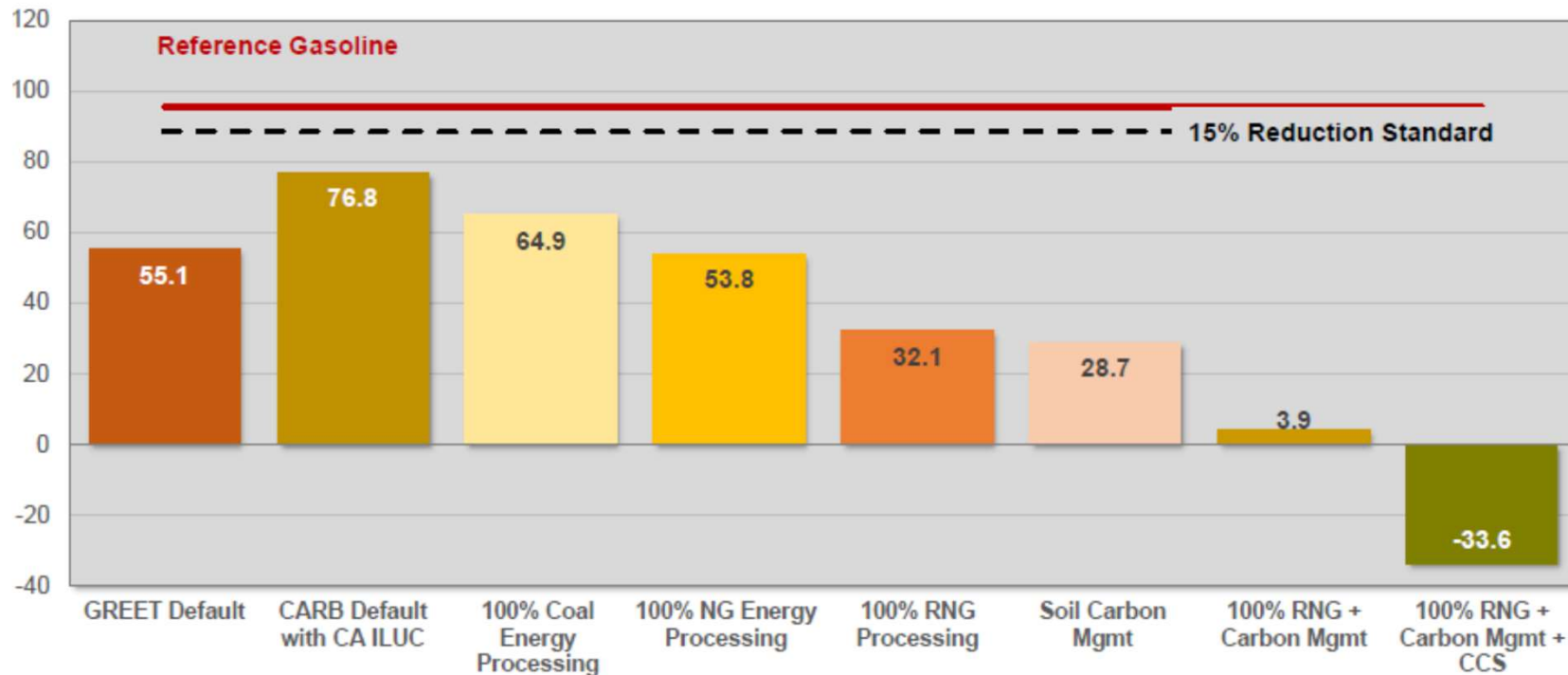
Ultra low carbon corn ethanol is coming

Grain Ethanol Carbon Intensity: Today and Tomorrow



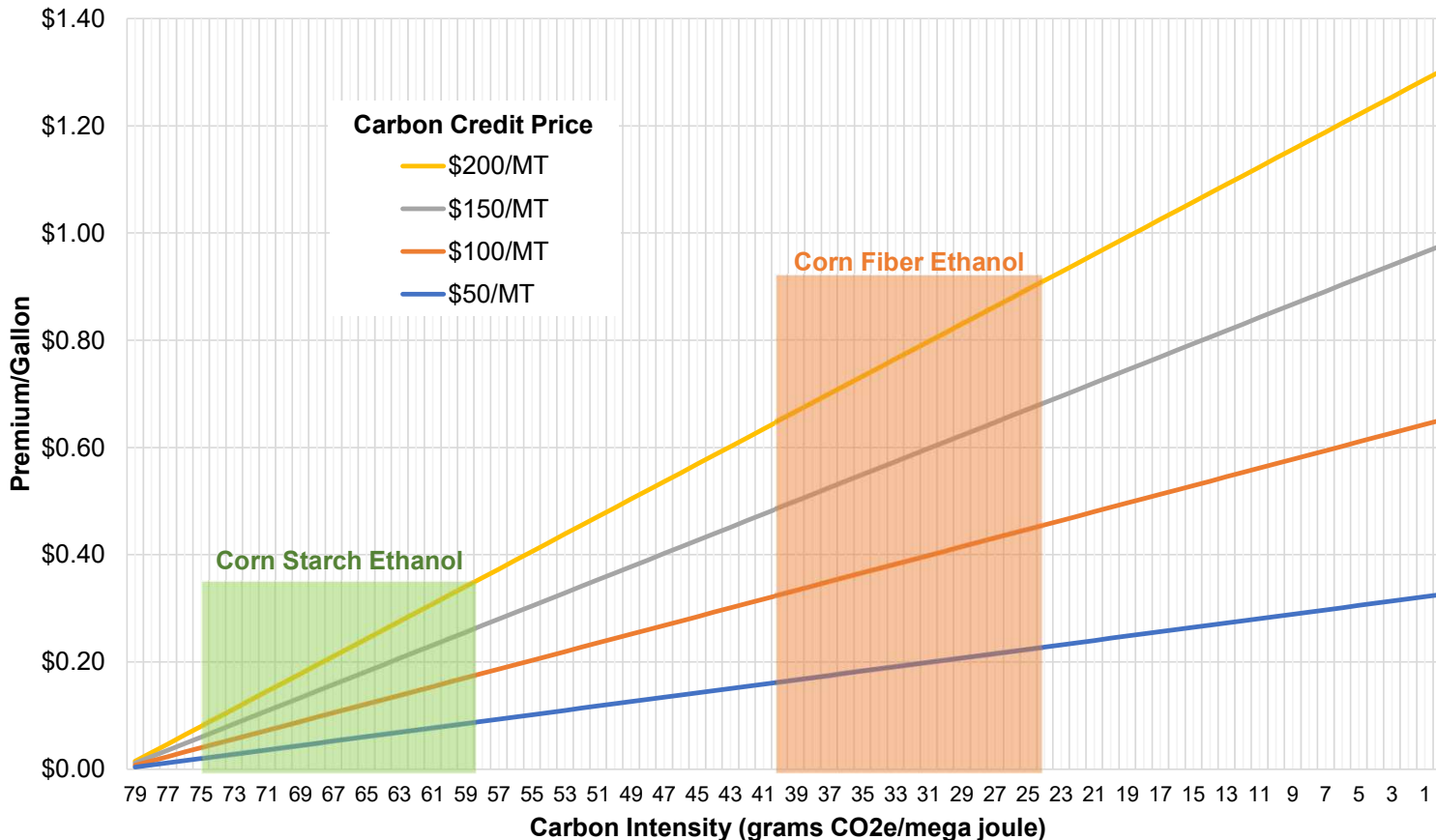
Ultra low or *carbon negative* corn ethanol

Gasoline Alternative Pathways: Example Ethanol Carbon Intensity Comparison in 2025



LCFS provides incentive to re-invest in low carbon technologies

California LCFS Premiums Based on Various Carbon Intensity Scores and Carbon Credit Values



- At current LCFS credit prices (\$200/MT), most corn starch ethanol should be getting a 15-35 cpg premium.
- Most corn kernel fiber ethanol would be getting a 60-80 cpg premium.

12:40 p.m. | States Taking the Lead to Protect the Public Health and Welfare and Learning from the Brazilian Model

Moderator: Larry Pearce, Executive Director, Governors' Biofuels Coalition

Letter: **Governor Kristi Noem** (R-SD); Chair, Governors' Biofuels Coalition

Video: **Plinio Nastari**, President, DATAGRO (Sao Paulo, Brazil); Member, Brazil's
CNPE (National Council on Energy Policy)



Status Report on Brazil's Successful E27 Program

*Plinio Nastari, President, DATAGRO (Sao Paulo, Brazil); Member, Brazil's CNPE
(National Council on Energy Policy)*



1:15 p.m. | Technological Advances Are Transforming Biofuels Production and Use

Moderator: David Hallberg, Principal, Dakota AG Energy

Doug Sombke, President, Farmers Union Enterprises and South Dakota Farmers Union; Chairman, Safe Gasoline Campaign

James A. Seurer, Chief Executive Officer, Glacial Lakes Energy





America's Farms Protecting America's Cities

National Clean Fuels Technology & Health Effects Leadership Forum

United Nation's Foundation

February 6, 2020

Doug Sombke

President, Farmers Union Enterprise
& South Dakota Farmers Union

Why Ethanol?

- ☑ It saves jobs, taxes, and lives
 - 210 ethanol plants in 27 states
 - Capable of producing 16.1 Billion Gallons of clean, renewable ethanol
 - Creating demand for more than 5 billion bushels of high protein animal feed, oils, and starch

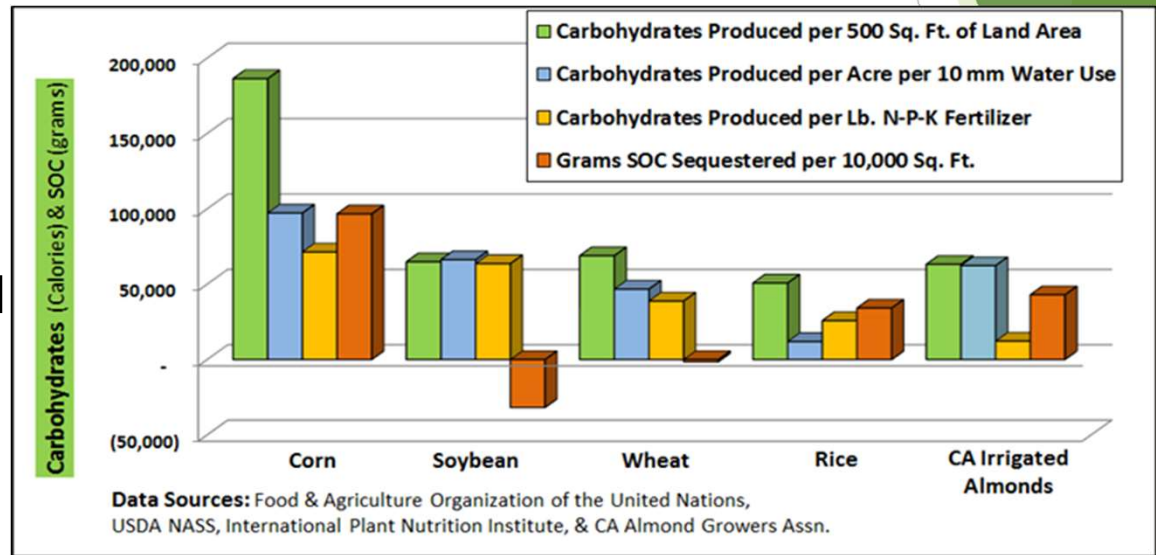
Ethanol Production from American Agriculture Meets a Wide Range of Public Policy Goals

| | |
|--------------------------------|---|
| ✓ Health Care | Reduces benzene emissions and other toxic/carcinogenic pollution to reduce disease, premature deaths, and health care costs |
| ✓ The Economy | The real cost of oil and gasoline draining the economy and geological capital. It is proven more fuels in a free market reduces the cost of oil and gasoline. |
| ✓ Wealth and Income Inequality | Biofuel policy changes will create more jobs, technology, food and byproducts to trade |
| ✓ Climate Change | Biofuels reduce greenhouse gases and toxics - to save the humans too |
| ✓ Taxes | <u>\$81 billion to defend world's oil each year</u> and another <u>\$20 billion in federal and state subsidies to oil and gas companies</u> (\$500 billion globally). |
| ✓ Jobs | Sustaining rural America and agriculture creates more jobs lowers migration to city and strains on social services |
| ✓ Foreign Affairs | Less oil/gasoline use improves geopolitics and reduces the funding of terrorist organizations |
| ✓ Crime | Increasing jobs with biofuel production reduces crime and cost/tax of jails |
| ✓ The Military | Biofuel production reduces funding to terrorists for buy weapons to use against our troops |

Why Corn?

Corn is the most Efficient, Resilient, Beneficial Crop The Nation's Farmers Can Grow

- ☑ Carbon sequestration value greater than previously understood and is improving annually.
- ☑ Greater Yields with Less Inputs



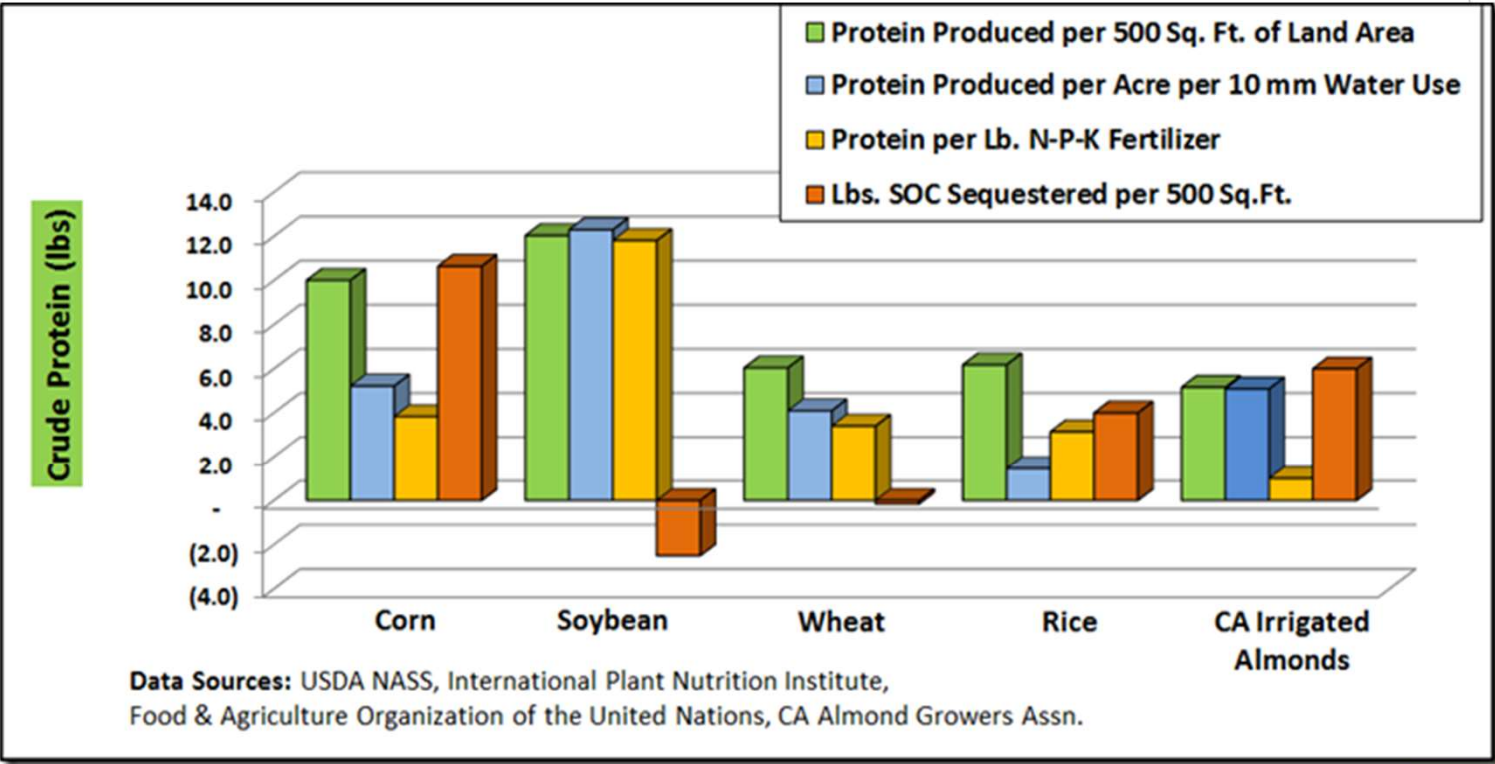
Don't give away the farm or the money

Before ethanol, a bushel of feed corn was limited to a single purpose. Today we add value through ethanol, with a typical dry mill ethanol plant adding nearly \$2 of additional value—or 55%—to every bushel of corn processed.

- \$ Ethanol \$3.84
- \$ Distillers Grains \$1.16
- \$ Corn Distillers Oil \$0.19
- \$ TOTAL \$5.19

Food, Feed and Fuel

The world is awash in starch and starving for protein



The Economic Stimulation from Ethanol Production Protects Rural America and our Cities

In 2018, the production of 16.1 billion gallons of ethanol and 43 million metric tons of co-products and distillers oil had substantial economic impacts, including:

- ☑ 71,367 direct jobs
- ☑ 294,516 indirect and induced jobs
- ☑ \$46 billion contribution to GDP
- ☑ \$25 billion in household income
- ☑ \$10 billion in tax revenue

How did we get here?

Support for farmers created an ethanol industry

Tractorcade

175

1992: Oxy-Fuel Program

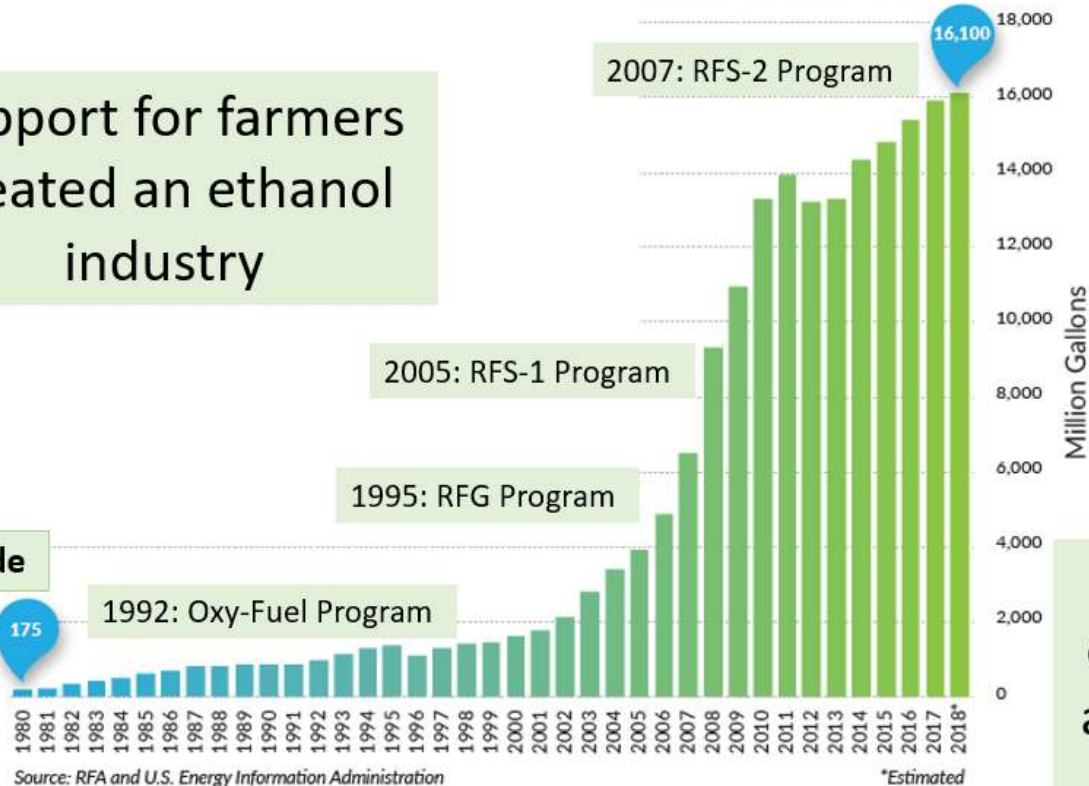
1995: RFG Program

2005: RFS-1 Program

2007: RFS-2 Program

16,100

U.S. Fuel Ethanol Production



Support for ethanol created a new clean fuel industry

By the early 1980's lead levels declined by 80%

Where are we headed and what's the goal?

- For the same public health reasons the public demanded lead phasedown, the United States must now phase down the carcinogenic aromatic and carbon content of gasoline.
- By defining a pathway to safer and higher-octane standard, EPA can reduce the amount of mobile source air toxics from gasoline emissions “to the greatest extent achievable” as required by the Clean Air Act.

Eliminating Barriers

- Establish a Timely Transition Plan to Reach High-Octane Standard of 100 RON
- Correct the Agency's Misinterpretation of 211(f) Substantially Similar Rule – this defines gasoline as only up to 15% ethanol and extend the 1 psi RVP Waiver to all blends of ethanol – last year's ruling limits it to 15% ethanol
- Approve a Mid-Level Ethanol Blend Certification Fuel
- Update and Reform the Agency's MOVES2014 Model
- Update the Agency's 2007 Mobile Source Air Toxics (MSAT) Cost-Benefit Analysis (CBA)
- Update The Agency's Corn Ethanol Life Cycle Analysis (LCA)
- Comply with the Mandatory Toxic Reduction Provisions of the CAAA
- Reinstate Credits for Automakers Producing Engines Optimized for High Octane to reduce aromatics & GHGs. and pathway to E30.

What's in it for all of us?

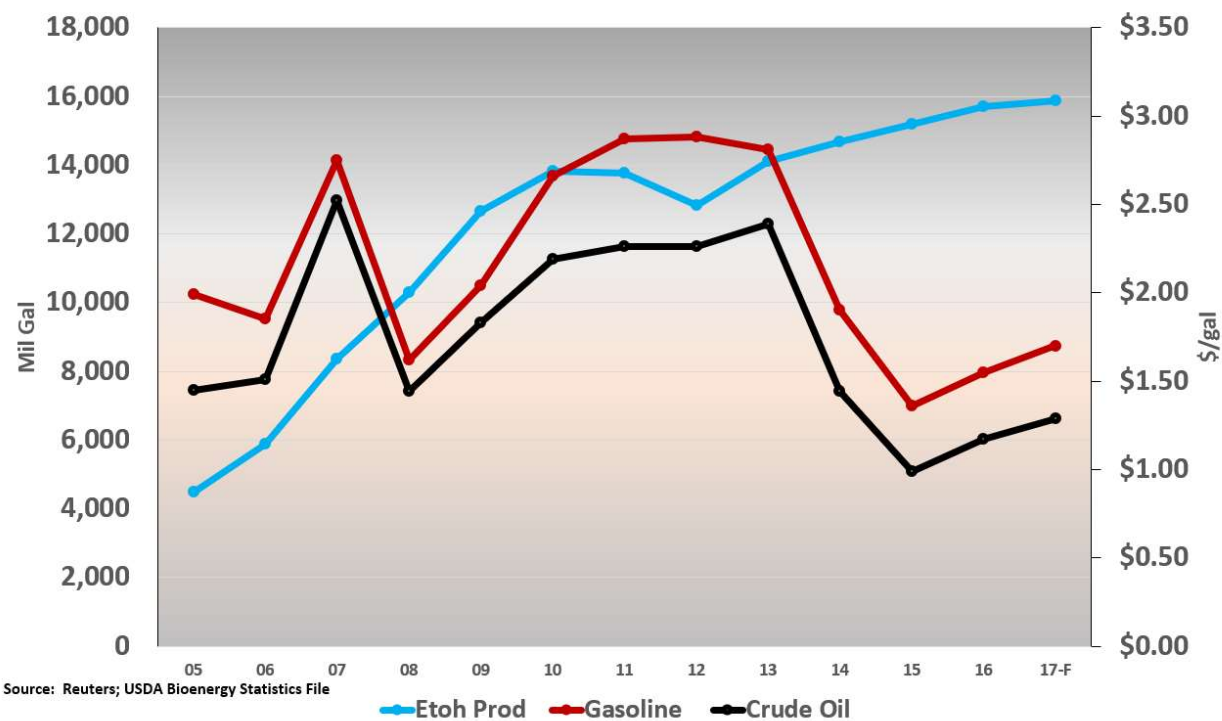
- ✓ Fulfill RFS targets without the need for imposing RIN obligations on petroleum refiners;
- ✓ restore competitive marketplace forces while providing flexibility for small refiners;
- ✓ make possible immediate and substantial reductions in the U.S. transportation sector carbon footprint (consistent with the pending SAFE Rule);
- ✓ reduce oil imports by one billion barrels a year and reducing the trade deficit by nearly \$100 billion annually;
- ✓ save consumers and automakers billions of dollars by providing cleaner-burning, higher performance fuels needed to power advanced internal combustion engines;
- ✓ save taxpayers billions of dollars per year by reducing the most dangerous urban pollutants, thereby improving public health and productivity;
- ✓ reinvigorate the rural economy without need for taxpayer supports;
- ✓ create tens of thousands of quality jobs in rural America;
- ✓ reduce American agriculture's dependence on export markets; and
- ✓ bring EPA into full compliance with the *Clean Air Act*.

Ethanol provides the lowest cost highest-octane enhancer in the world. If ethanol was used to make premium it could cut the price spread from regular to premium to pennies. .

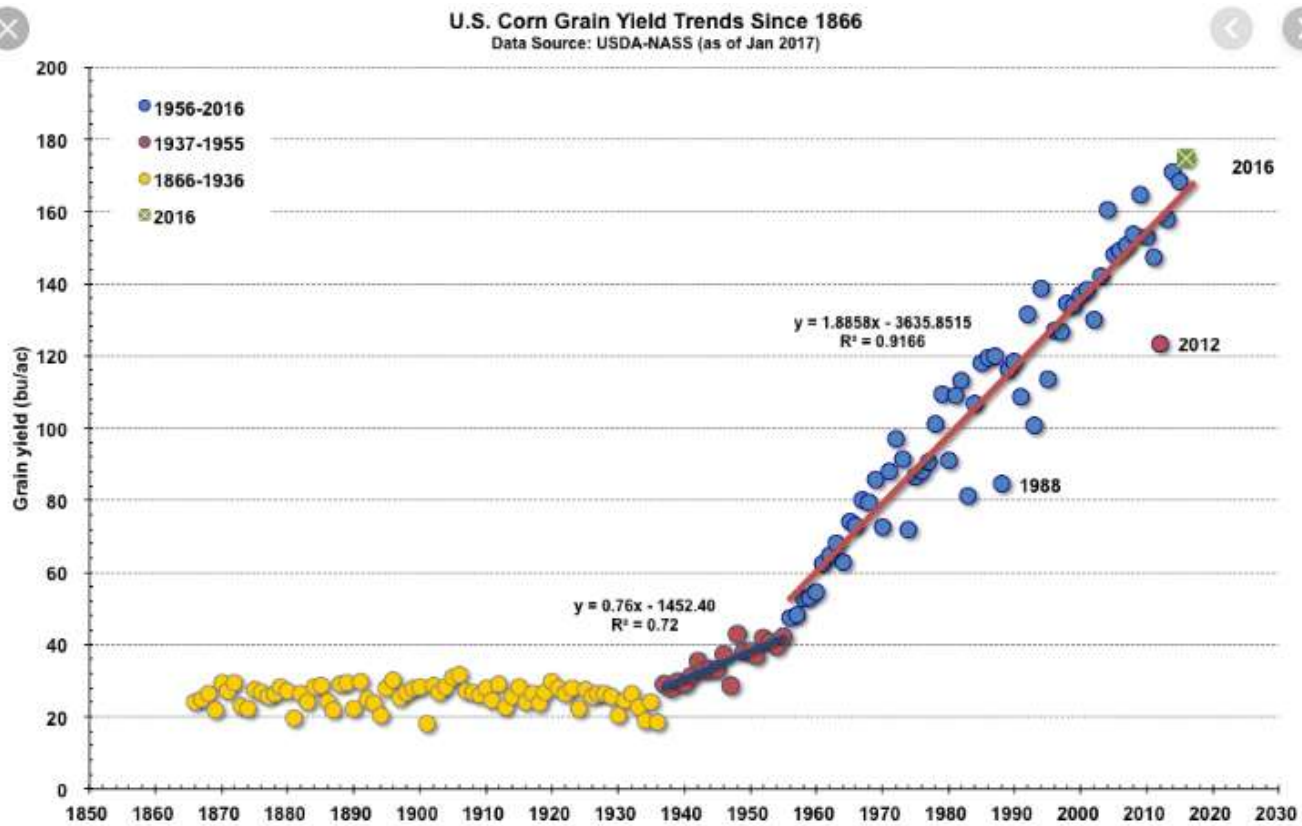


Show everyone the money

Increasing Ethanol Prod Forces Gasoline Prices Down



Can we get from here to there?





Doug Sombke, President

Farmers Union Enterprise & South Dakota Farmers Union

(605) 352-6761 - DSombke@sdfu.org



“Premium E30..The Fuel of the Future”

Jim Seurer, CEO

February 6, 2020



What is the “E30 Challenge” ?

The “E30 Challenge” is a campaign to TRIAL the use of Premium E30 Fuel in ALL Vehicles (FFVs and Legacy Non-FFVs)

We are challenging conventional wisdom that 2001 & newer non-FFV autos can operate, at most, on a blend of E15

The MAIN PURPOSES:

**DRIVE CHANGE – SUPPORT RURAL AMERICA –
CLEAN UP & IMPROVE URBAN AIR**



The Goals of “E30 Challenge”

- ✓ Increase the Level of Awareness
- ✓ Gather Engine Performance Data
- ✓ Dispel Myths about Premium E30
- ✓ Change Consumer Preference/Behavior
- ✓ Create a “Prototype” for Government & Industry





The Basics...What is Premium E30

30% Ethanol + 70% Gasoline = Premium E30

Lower Toxins (BTX – Benzene, Toluene, Xylene)

More Affordable

Higher Performance @ 94/95 Octane



Critical Partnerships Needed

- ✓ Automotive Dealerships
- ✓ Auto Service Shops
- ✓ Automotive Technicians
- ✓ Lake Area Technical Institute
- ✓ Fuel Retailers
- ✓ Our Employees



Glacial Lakes Energy, LLC



Our Local Expert Andy Wicks, Owner

**DynoTune Speed & Performance Inc.
Watertown, SD**



- **DynoTune Speed & Performance LLC of Watertown, SD -Established 2003**
- **Specializes in High Performance Fuel Injected Engines – over 15,000 tested and tuned across the US**
- **Since 2006, tested ethanol in OEM and high performance applications on a vast array of makes and models of vehicles**
- **Developed and sold 3,000+ Flex Fuel Conversion Kits for non-flex vehicles across US & abroad**
- **EFI trainer for GM, Ford, Chrysler aftermarket tuning**



Will Premium E30 work in my Auto?

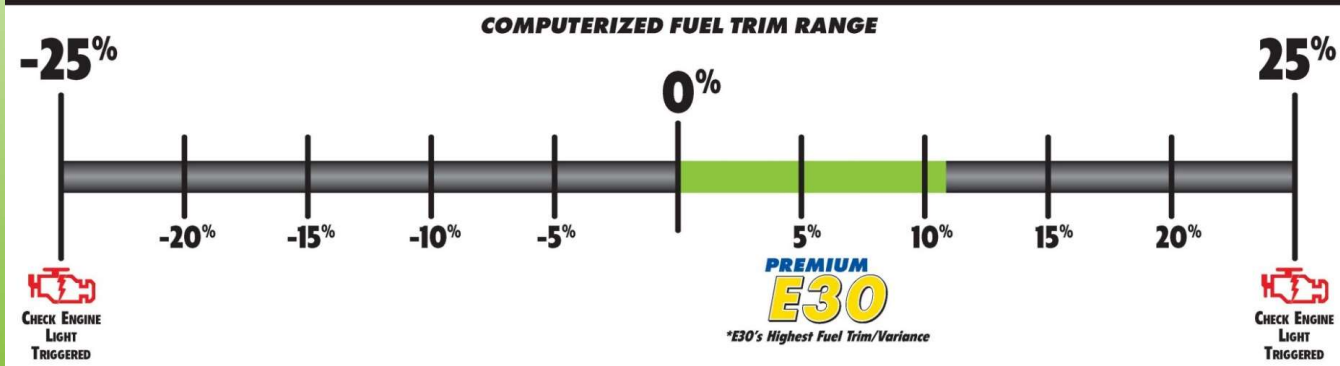
- Vehicles will react somewhat differently although data was fairly consistent in all test subjects
- Any car with closed loop fuel control (Most anything 1988 and newer, anything OBDII)
- Adaptive Fueling Strategy Technology
- Large scale testing has been done
- Significant parts compatibility research has been done previously with higher blends of ethanol disproving corrosion issues



Glacial Lakes Energy, LLC



DOES E30 REALLY TRIGGER A CHECK ENGINE LIGHT?





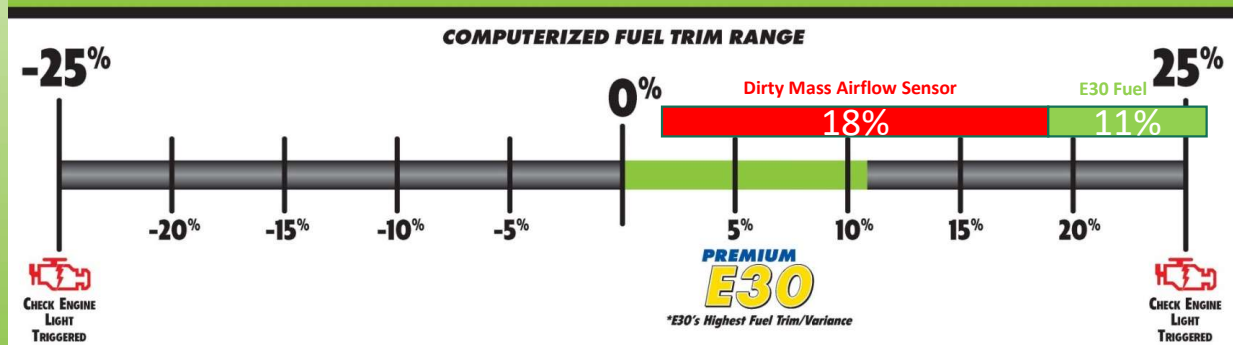
Check Engine Light and Your Vehicle

- **OEM's (ORIGINAL EQUIPMENT MANUFACTURERS) HAVE OVER 2,000 CODES THAT CAN BE TRIGGERED BY FAILING ENGINES, TRANSMISSIONS, AND BRAKE SYSTEMS**
- **CHECK ENGINE LIGHTS FOR MOST VEHICLE MAKES AND MODELS TRIGGER AROUND 25% (FUEL TRIM RANGE)**
- **PREMIUM E30 WILL NOT BE A DIRECT OR ROOT CAUSE OF A CHECK ENGINE LIGHT ILLUMINATING (NORMALLY 10-12% OF RANGE)**





DOES E30 REALLY TRIGGER A CHECK ENGINE LIGHT?





E30 Test Vehicles

- **Dataloggers**

- Same as those used by EPA and multiple other test labs
- Record 17-19 PIDs every SECOND of engine runtime
- Monitor fuel economy, engine parameters, and HP output

- **Tested 50 Random Makes & Model Vehicles**

- Import, Domestic, Car, Truck, & SUV's

- **Fuel Test**

- Three tanks each of E10 & E30 consecutively



E30 TEST VEHICLE  **POWERED BY 30% Ethanol!**



E30 CHALLENGE TEST VEHICLES:

| | | | |
|---------------------------|------------------------------|-------------------------------|--------------------------|
| 2007 Buick Rainer | 2014 Chevrolet Cruze | 2015 Ford Escape | 2008 Pontiac Grand Prix |
| 2010 Buick Enclave | 2006 Chrysler Town & Country | 2015 Ford Expedition | 2005 Toyota Avalon |
| 2013 Buick LaCrosse | 2007 Dodge Charger | 2007 GMC Sierra 1500 Quad Cab | 2007 Toyota Camry |
| 2016 Cadillac XTS | 2009 Dodge Challenger | 2015 GMC Acadia | 2008 Toyota Avalon |
| 2003 Chevrolet Silverado | 2010 Dodge Journey | 2016 GMC Canyon | 2010 Toyota Sienna Van |
| 2004 Chevrolet 2500 6.0 L | 2010 Dodge Ram 1500 | 2006 Honda Civic | 2011 Toyota Highlander |
| 2005 Chevrolet Colorado | 2011 Dodge Ram 1500 | 2013 Honda Pilot | 2012 Toyota Prius Hybrid |
| 2005 Chevrolet Equinox | 2012 Dodge Avenger | 2008 Hyundai Entourage Van | 2013 Toyota Rav 4 |
| 2006 Chevrolet Silverado | 2005 Ford F150 5.4 Triton | 2015 Jeep Wrangler | 2013 Toyota Tundra |
| 2011 Chevrolet Equinox | 2011 Ford F150 | 2008 KIA Rondo | 2015 Transit Van |
| 2011 Chevrolet Malibu | 2011 Ford Taurus | 2016 Lincoln Navigator | 2002 Volkswagon Bug |
| 2012 Chevrolet Camaro | 2013 Ford C Max Hybrid | 2008 Mercedes ML 350 | |
| 2012 Chevrolet Traverse | 2015 Ford Edge | 2006 Nissan Armada | |



Glacial Lakes Energy, LLC



E30 Challenge Results

- Over 80,000 “test” Miles Driven (E30 in Test Vehicles)
- No Reduction in Performance...Some Felt Increase
- Stable or Improved Fuel Economy
- High Compression Engines Performed Significantly Better
- Horsepower Increase (Dyno tune results)
- Thousands in Fuel Savings
- No Check Engine Lights from E30 Alone
- Improved Air Quality



"I use E30 in my 2012 Chevy Camaro and I have not seen any negative effects. I wonder why we aren't all using E30 in our cars, it's great. We love it!"

- Cheryl Hohn



Who's Using E30...?

- **Fleet Vehicle “Conversions”**
 - 2 Rural Electrical Coops
 - City of Watertown
 - Watertown Police Dept.
 - Watertown Fire Dept.
 - Watertown Area Transit
 - Watertown Historic Trolley
 - Brown County (Aberdeen) Fleet
 - Brown County Sheriff's Office
 - Aberdeen Boys & Girls Club
 - Numerous Private Businesses
- **On-Farm Bulk Sales**





Watertown Area Transit, Inc.

Fueling with E30.....since October 1, 2016

- 4 Mini Vans & 9 buses
- 2016 = E10 Regular vs. 2017 = Premium E30
- 268,645 fleet miles
- All but 1 vehicle (bus) slightly increased mileage
- Average savings of \$0.30 per gallon





City of Watertown: Police, Fire & Street Department

- **Watertown City Police & Street department saving \$4,000+ per year with Premium E30**
- **There are no plans to revert back to the previously used E10 fuel (10% blend).**

"We haven't experienced any performance or mechanical issues as a result of E30,"
-Captain Kirk Ellis





Aberdeen Boys & Girls Club

Fueling with E30.....since summer 2017



- 11 mini vans & 1 bus
- Vehicles driven to pick up over 280 children daily
- Average about 4,200 miles per month (a little over 50,000 per year)

"The performance of our fleet has been very good, no problems this spring or winter. Vehicles have started in the extreme cold with no problems. We have experienced no major engine or emission problems at all."

- Mike Herman, Aberdeen Boys & Girls Club



E30 Challenge Success!

**5.87 million gallons sold in NE
South Dakota since May 2016**

@ 20 MPG = 117 MILLION MILES



Questions?

2:00 p.m. | Time for a Truthful Accounting of Gasoline Aromatics' Health Effects

Moderator: Ernie Shea, President, Natural Resource Solutions

Reid Detchon, UN Foundation, former Executive Director, Energy Future Coalition

David Hallberg, Principal, Dakota AG Energy

Burl Haigwood, Member Advisory Board, Clean Fuels Development Coalition



The background features abstract, overlapping green geometric shapes in various shades, including light lime green, medium green, and dark forest green. These shapes are primarily located on the left and right sides of the slide, framing the central text.

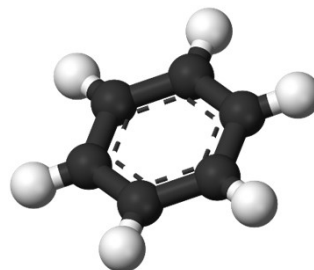
Aromatics and Public Health

Reid Detchon
February 6, 2020

Energy and transportation

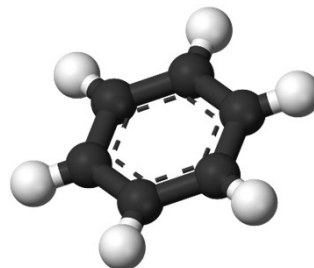
- ▶ Automakers need higher octane to achieve higher fuel economy
 - ▶ Obama rule set fleet-average target of 54.5 mpg by 2025
 - ▶ Engine efficiency depends on higher compression ratios, which require higher octane
- ▶ Octane choices: Lead, aromatics, alcohol fuels
 - ▶ Aromatics (BTEX): Benzene, toluene, ethylbenzene, xylene
 - ▶ 1990 Clean Air Act Amendments limit aromatics, require regulation of mobile source air toxics
 - ▶ Aromatics still comprise ~25% of every gallon of gasoline

Aromatics and public health: How the dots connect



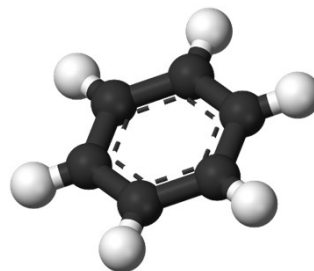
- ▶ Aromatics are stable compounds that contain a benzene ring
 - ▶ They are difficult to fully combust - useful for octane
 - ▶ They produce emissions of particulate matter (PM)
- ▶ Aromatics are the most carbon-intensive fraction of gasoline
 - ▶ Long-chain hydrocarbons, energy-intensive to produce
- ▶ Primary emissions recombine into secondary organic aerosol (SOA)
 - ▶ Able to travel long distances
 - ▶ Effects on heart and lung function, premature mortality
 - ▶ Exposure to PM_{2.5} from aromatics in gasoline has been estimated to cause 3800 premature mortalities and total social costs of \$28.2 billion/year
 - ▶ 7,000 American soldiers have lost their lives in Afghanistan, Iraq, and Pakistan since 9/11

Aromatics and public health: EPA's 2014 Tier 3 rule



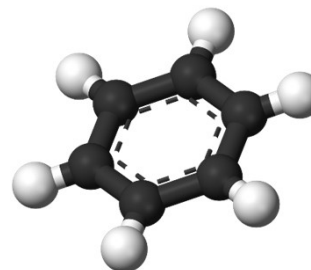
- ▶ Light-duty vehicle emissions contribute to ambient levels of air toxics ... The population experiences an elevated risk of cancer and other noncancer health effects from exposure to the class of pollutants known collectively as “air toxics.” These compounds include, but are not limited to, benzene, ... [and] polycyclic organic matter.
- ▶ The term polycyclic organic matter (POM) defines a broad class of compounds that includes the polycyclic aromatic hydrocarbon compounds (PAHs). ... POM compounds are formed primarily from combustion and are present in the atmosphere in gas and particulate form. Cancer is the major concern from exposure to POM. ... Studies have found that maternal exposures to PAHs in a population of pregnant women were associated with several adverse birth outcomes, including low birth weight and reduced length at birth, as well as impaired cognitive development in preschool children (3 years of age).
- ▶ Mobile sources are also large contributors to precursor emissions which react to form secondary concentrations of air toxics.

Aromatics and public health: Alla Zelenyuk, PNNL



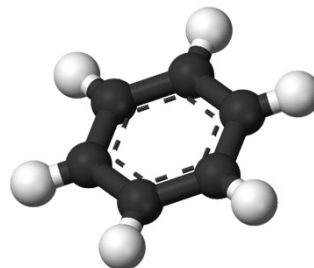
- ▶ When secondary organic aerosol (SOA) particles are formed ... in the presence of gas-phase polycyclic aromatic hydrocarbons (PAHs), their formation and properties are significantly different from SOA particles formed without PAHs. ... Compared to 'pure' SOA particles, these particles exhibit slower evaporation kinetics, have higher fractions of non-volatile components ... and higher viscosities, assuring their longer atmospheric lifetimes. In turn, the increased viscosity and decreased volatility provide a shield that protects PAHs from chemical degradation and evaporation, allowing for the long-range transport of these toxic pollutants.
- ▶ The magnitude of the effect of PAHs on SOA formation is surprisingly large. The presence of PAHs during SOA formation increases mass loadings by factors of two to five, and particle number concentrations, in some cases, by more than a factor of 100.

Aromatics and public health: The dangers of PAHs



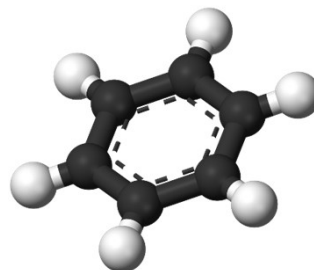
- ▶ PAHs ride along and weaponize the ultrafine particles in SOA
 - ▶ Polycyclic aromatic hydrocarbons
 - ▶ High-molecular-weight PAHs derive from combustion of aromatics in gasoline
 - ▶ (PAHs are generally not present in fuel)
- ▶ Correlated with serious pre-natal risks (e.g., for IQ, autism)
 - ▶ A long-term study in New York by Frederica Perera of Columbia University found that exposure of pregnant women to PAHs in the single-digit parts per trillion was associated with a variety of adverse developmental effects in their children, including IQ deficits similar to those from exposure to lead
- ▶ 2018 Harvard study: High daily exposure to PAHs may cause molecular changes that accelerate biological aging: ... trigger damage to DNA methylation [which] has been found by other studies to be associated with premature death, even after accounting for cardiovascular and other disease risk factors.

Aromatics and public health: 2018 Korean study in Nature



- ▶ Fine particulate matters less than 2.5 μm (PM_{2.5}) in the ambient atmosphere are strongly associated with adverse health effects. However, it is unlikely that all fine particles are equally toxic in view of their different sizes and chemical components. ...
- ▶ Our results disclosed higher toxicity of combustion than non-combustion aerosols. ... The mutagenic effects of soot particles are suggested to be associated with the organic components (e.g., PAH) generating reactive oxygen species (ROS) that are able to break DNA strands. ... Gasoline engine exhaust particles also showed comparable or lower toxicity relative to diesel engine exhaust particles based on various endpoints. ...
- ▶ The aging process of freshly emitted particles in the ambient atmosphere may also modulate toxicity. For instance, aged combustion particles oxidized by ozone are suggested to exacerbate lung injury and inflammation relative to non-oxidized particles.

Aromatics and public health: EPA 2015 ultrafine workshop



- ▶ For many years available atmospheric models were not able to predict SOA formation. ... All models relied on the assumptions that SOA particles were well-mixed low viscosity solutions. ...
- ▶ Recent studies ... demonstrated that these assumptions were wrong and that SOA particles must be viscous semi-solid.
- ▶ These studies showed also that there is a synergetic effect between PAHs and SOA since PAHs trapped inside the SOA particles slow down SOA evaporation and increase SOA yield and lifetime. This can explain the long-range transport of toxic compounds like PAHs and other persistent pollutants.
- ▶ In conclusion, a new SOA paradigm has been developed: particles are semi-solid, nearly non-volatile and trap organic material during formation.

Environment and public health: What is the answer?

- ▶ Mid-level ethanol blends (25-30%) contain the octane of premium gasoline, allowing increase in compression ratio
 - ▶ Greater engine efficiency offsets lower energy content (Oak Ridge)
 - ▶ “Renewable super premium” fuels
 - ▶ Mercedes-Benz engineer: “Ridiculous power and good fuel economy”
- ▶ Displace aromatics with mid-level ethanol blends
 - ▶ E30 would displace 60% of the aromatics in gasoline



Time for EPA to “Get Real” & Control Gasoline’s “Phantom Poisons”

National Clean Fuels Technology & Health Effects Leadership Forum
UN Foundation Headquarters

Washington, DC | February 6, 2020

Presenter: David Hallberg
Dakota AG Energy, LLC

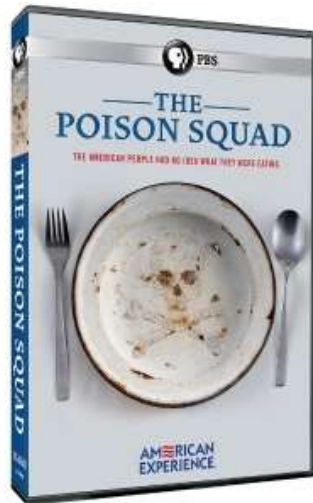


Clean Fuels Technology & Health Effects Leadership Forum



History Repeating Itself? Last Century's Food Adulteration is Today's Fuel Adulteration

WSJ Television Review:
"Regulation can be a dirty word to American business, but "The Poison Squad"...does an inspiring job of detailing how filthy things can get when you don't have any regulation at all."



- Recent PBS special on "The Poison Squad" highlighted the scourge of food adulteration in early 1900s
- Americans did not know that what was in their food was killing and maiming them and their children
- **A century later, most Americans don't know that what is in their gasoline is killing and maiming them and their children**
- There are parallels, but one major distinction: We don't have to wait for Congress to pass a new law

Three Critical Inflection Points: 1990 CAAA, 2005 EPACT, 2020 SAFE Rule

- This story starts with the use of lead in gasoline (a deadly heavy metal neurotoxin)
- We will focus on three primary inflection points:
 1. 1990 Clean Air Act Amendments which banned leaded gasoline and restricted BTEX
 2. 2005 EPACT law which greatly expanded ethanol production and reaffirmed Congressional restrictions on BTEX
 3. 2020 SAFE Rule and “Clean Octane” demands
- Today, a mandatory Congressional “endangerment finding” remains in force—there is no need for additional legislative action



The U.S. Transportation Sector is Dominated by Gasoline



- Gasoline internal combustion engines (ICEs) are primary source of the most harmful urban emissions, including toxics and carbon
- Cars have gotten cleaner while EPA has given petroleum refiners a free pass on their toxic gasoline
- Americans drive trillions of miles on 270 million light-duty vehicles powered by more than **140 billion gallons each year of gasoline**
- 25 – 30% of a typical gallon of gasoline is comprised of carcinogenic, highly toxic benzene-based octane boosting compounds known as “aromatics”, or BTEX
- BTEX compounds are the most toxic, carbon-intensive, and expensive fraction of gasoline
- **96% of the LDVs on U.S. roads are powered by gasoline**—diesel vehicles represent a miniscule share, and they are equipped with particulate filters

Ford Fought Rockefeller Over Octane 100 Years Ago But Lost



Internal combustion engines (ICEs) require high octane gasoline to promote efficient combustion.

- Today, there are only two legally permissible options:
 - BTEX on which Congress has imposed limits
 - Ethanol which EPA has blocked by erecting improper/illegal regulatory obstacles

How did we get here?

- Henry Ford fought hard for E30 high octane blends and warned about the devastating health effects from leaded gasoline (TEL) and BTEX
- Rockefeller needed to dispose of his “waste gasoline” product; hated ethanol because it was produced from agricultural products and because it displaced 30 percent of his own product
- Even though lead was a known poison, Rockefeller’s powerful lobbying juggernaut persuaded Congress and regulators to allow its use

Ethanol's Octane Properties Are Superior to BTEX (and Less Costly)

- A 1933 US Navy Annapolis report found that an E30 blend provided the same octane boost as 3 grams of tetraethyl lead and 40% BTEX
- In 1920, *Scientific American* wrote: **"It is a universal assumption that ethyl alcohol in some form will be a constituent of the motor fuel of the future."**
- Oak Ridge National Lab experts found E30's octane would allow automakers to substantially increase their compression ratios cost effectively and safely



Leaded Gasoline Cost the Global Economy Trillions of Dollars & Ruined Millions of Lives

- UN-commissioned report estimated global **annual** impacts of leaded gasoline to be:
 - 1.1 million deaths
 - Loss of 322 million IQ points
 - Close to 60 million crime cases
 - Economic loss of USD 2.4 TRILLION per year (4% of global GDP)
- Chicago Tribune Series: **Concluded elimination of leaded gasoline was a major reason why U.S. crime rates dropped sharply nationwide during the 1990s**
- As EPA began to phase out leaded gasoline, experts warned that aromatics/BTEX were as bad or worse

“In a 2009 study of the effects of PAHs on children’s IQ in NYC...the mothers’ exposure during her pregnancy...was associated with a decrease in IQ among the more exposed children. The extent of this effect was similar to that of low-level lead exposure.”

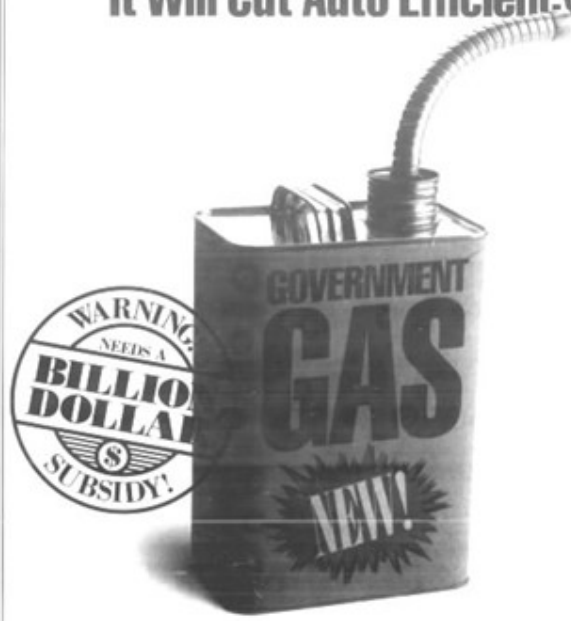
DR. LINDA BIRNBAUM

Inflection Point #1: 1990 Clean Air Act Amendments

- 1987, EPA report proposed increasing the BTEX limit for certification gasoline to 45%
- Despite enormous oil industry and EPA opposition, Congress passed a mandatory “legislative endangerment finding” that requires EPA to substantially reduce gasoline BTEX as technologies present themselves
- Oil industry was determined to somehow eliminate ethanol’s threat to oil-based BTEX

“Unfortunately, EPA has known about this problem for more than a decade and has repeatedly failed to address it...”- Senator Tom Daschle

**It Won't Cure The Smog Problem.
It Will Cost You More.
It Will Cut Auto Efficiency.**



So Why Let Politicians Write The Chemical Formula for Gasoline?

Politicians in Washington are writing a specific gasoline formula for use in urban areas where about one-third of American motorists live. Motorists will have to buy "Government Gas." They will have no choice. Yet, no testing has been done to show "Government Gas" as less polluting, more efficient or affordable.

According to the Environmental Protection Agency, "This formula continues to be the most expensive."

All of us want clearer air. Automakers and oil companies are running thousands of tests on cars with 25 different fuels in search of the best clean-burning gasoline. Answers are just months away.

But politicians are rushing to impose a single formula designed to dramatically increase the use of ethanol. Sierra Research says motorists will be "paying more for dirtier air." The last thing taxpayers need is a million-dollar-a-gallon ethanol tax.

EPA Sided with the Oil Industry & Consistently Erected Roadblocks to Ethanol's Use



- EPA: Simply no alternatives to BTEX once lead was banned except for MTBE and ethanol
- Refiners refused to use ethanol because they controlled the production of MTBE (made from fossil fuels).
- MTBE itself was banned after it contaminated water supplies in California and nationwide
- EPA accused ethanol of raising gasoline and refused to provide relief for use of expanded ethanol use
- **EPA asserted it could not comply with the Congressional 202(I) mandate to replace BTEX with ethanol because there simply was not enough ethanol to fill the gap**

Inflection Point #2: 2005 EPACT Law, RFS1, & Doubling Down on MSAT/202(1)

- Congress called EPA's bluff
 - Repealed the reformulated gasoline MTBE program
 - Replaced with the first Renewable Fuels Standard (RFS) that mandated nationwide ethanol use
- Oil interests and EPA pulled out all the stops to repeal MSAT/202(1) but Congress refused and "doubled down"
- **Congress directed EPA to finally promulgate an MSAT reduction rulemaking within eighteen months**
- Predictably, EPA failed to faithfully do its job
 - Used obsolete and fallacious predicates in its cost– benefit analysis

2012 Tier 3 Rule Was a Huge Missed Opportunity: EPA Limited Focus to Sulfur

- Stated objective was to protect LDV emissions control systems (TWC) & reduce tailpipe emissions
- EPA praised E30's octane properties in the proposed rule but then shut the door in the final rule
- FOIA'ed comms **prove inappropriate interaction between EPA and oil industry representatives**



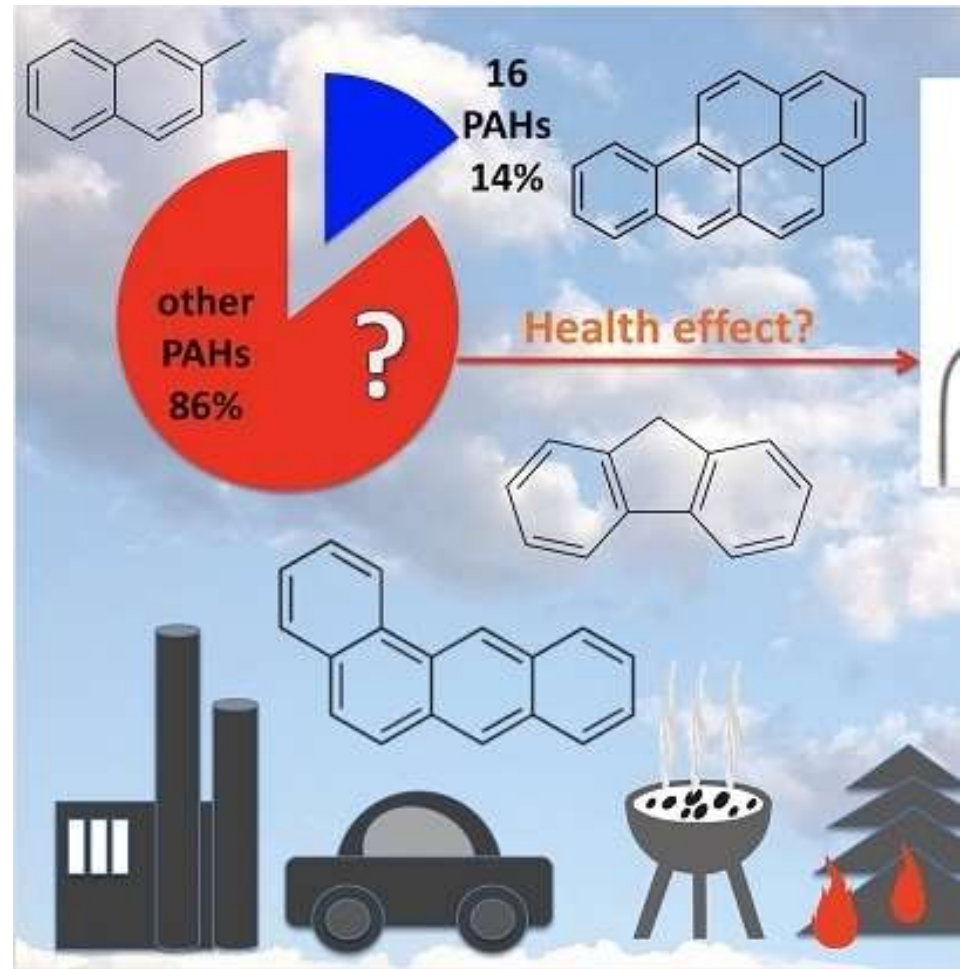
Expanding Ethanol Production Forces EPA to Invent New Excuses for Stonewalling: The Advent of “Unicorn Fuels”

- EPA colluded with oil interests to manipulate their models and pin BTEX emissions’ products on ethanol
- EPA’s MOVES Model uses manipulated test fuels
- EPA insists upon relying upon atmospheric models that it has recently admitted are defective



In 2015 EPA Finally Admitted to the BTEX – SOA Linkage

- EPA has finally confessed that its models are defective
- PAHs “weaponize” SOA = insulate, preserve, and ensure long-range transport
 - Perera et al. confirm PAHs pervasiveness and potency, especially their adverse health effects on pregnant women and infants/children
 - EPA contractor attacked MOVES Model
- Technologies are widely available to conduct real-world emissions testing.
- **EPA refuses to use real-time fuels and measurements**



EPA Track Record is Abysmal: Using Fake Science to Block Ethanol Replacement of BTEX Utterly Fails to Pass the MACT Standard Test Set by Congress

EPA Assertion

- Not enough ethanol, too expensive →
- Ethanol volatility exacerbates ozone →
- BTEX doesn't produce SOAs →
- PAHs dissipate after 300 meters →
- Emission control systems capture MSATs →
- Corn increases GHG/carbon emissions →
- E30 blends require special FFVs (which don't exist) →
- More ethanol = more particulate matter →
- U.S. ethanol industry can't produce enough ethanol →
- Must wait for electric vehicles →

Best Available Science/EPA Admission

- Ethanol output soars, tax credits eliminated, ethanol less expensive than BTEX
- The more ethanol the lower gasoline's volatility
- EPA admits its atmospheric models are defective and that PAHs "weaponize" SOAs for long-range transport
- Real-time measurements confirm SOAs/PAHs travel tens of miles & are preserved and "age" for weeks/months
- TWCs do not capture particulate-borne toxics
- U.S. corn acres are a major carbon sink
- E30 blends work well in standard vehicles, even better in optimized next-generation high compression vehicles
- EPA colluded with oil interests to manipulate fuel samples by adding more BTEX while adding more ethanol
- Only barrier is EPA illegal regulatory policy
- Millions of children will be harmed/die prematurely before EVs arrive



Clean Fuels Technology & Health Effects Leadership Forum



Inflection Point #3: 2020 SAFE Rule Offers Ideal Vehicle for Solution to Multiple EPA Challenges

- Final rule now under review by OMB
- EPA requested recommendations for how to encourage national higher-octane gasoline standard “consistent with Title II of the Clean Air Act”
- **Only legally permissible solution is E30 100 RON High Octane Low Carbon (HOLC) fuels**
- All the pieces are in place: vehicles, infrastructure, ethanol supply
- **MULTIPLE WINNERS!**

EPA Owes Policymakers, Public, & Press an Updated, Honest Benefit – Cost Analysis

- Trade Deficit Reductions = 1 Billion Barrels/year = \$1 Trillion over ten years
- 45 – 85% reductions in SOA/PAH/black carbon emissions = tens of billions/year in health cost savings
- 7% improvement in fuel efficiency and 7% reduction in tailpipe CO₂
- 90+ million tons of soil carbon sequestration/year = equivalent of taking 30 million cars off the road





**TIME
TO
ACT**

Summing It All Up

- Section 202(l) is a mandatory provision = **EPA MUST act**
- All pieces are in place to act NOW
- SAFE Rule offers immediate pathway, Congressional action is not needed.
- The only remaining alternative will be litigation to compel EPA enforcement of the mandatory provision.

GASOLINEGATE

A Report from Farmers Union Enterprises

July 4, 2019



DANGER
CONTAINS

Gasolinegate Trumps Dieselgate

National Clean Fuels Technology & Health Effects
Leadership Forum

United Nation's Foundation
February 6, 2020

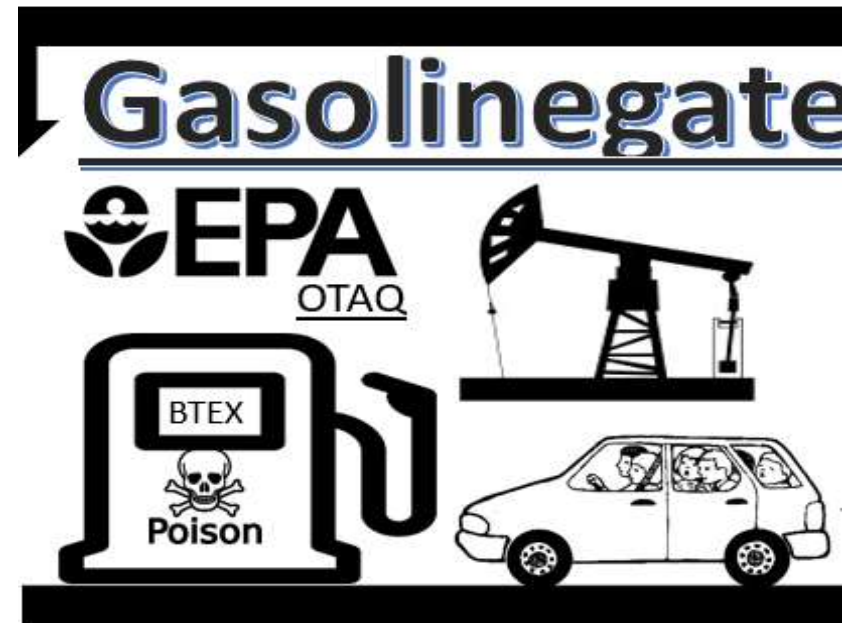
Burl Haigwood, Board of Advisors

Clean Fuels Development Coalition &
Clean Fuels Foundation



What's the problem?

- Gasoline is a Problem--Big Oil is a Big Problem
- Automakers are held responsible for Big Oil's Problem
- EPA should be held responsible for all three problems



A growing number of industry observers believe that for three decades EPA has been negligent of protecting public health *"to the greatest extent achievable,"* by concocting fake fuels that produce fake results that penalize ethanol, and by colluding with Big Oil to thwart competition to gasoline.

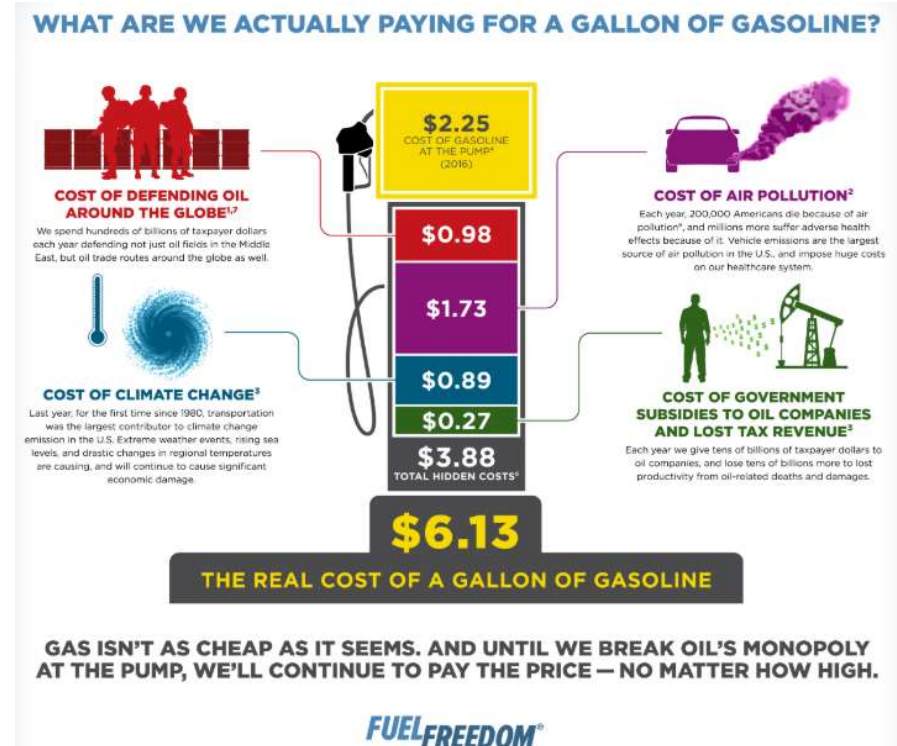
What's the Real Cost of Gasoline?

Consumer and Taxpayers pay the burden of the problem - \$81 billion to defend world's oil each year and another \$20 billion in federal and state subsidies to oil and gas companies (\$500 billion globally).

The May 2019 International Monetary Fund reported fossil fuel subsidies for 191 countries were \$4.7 trillion in 2015. The 3 largest subsidizers were China (\$1.4 trillion), United States (\$649 billion), and Russia (\$551 billion).

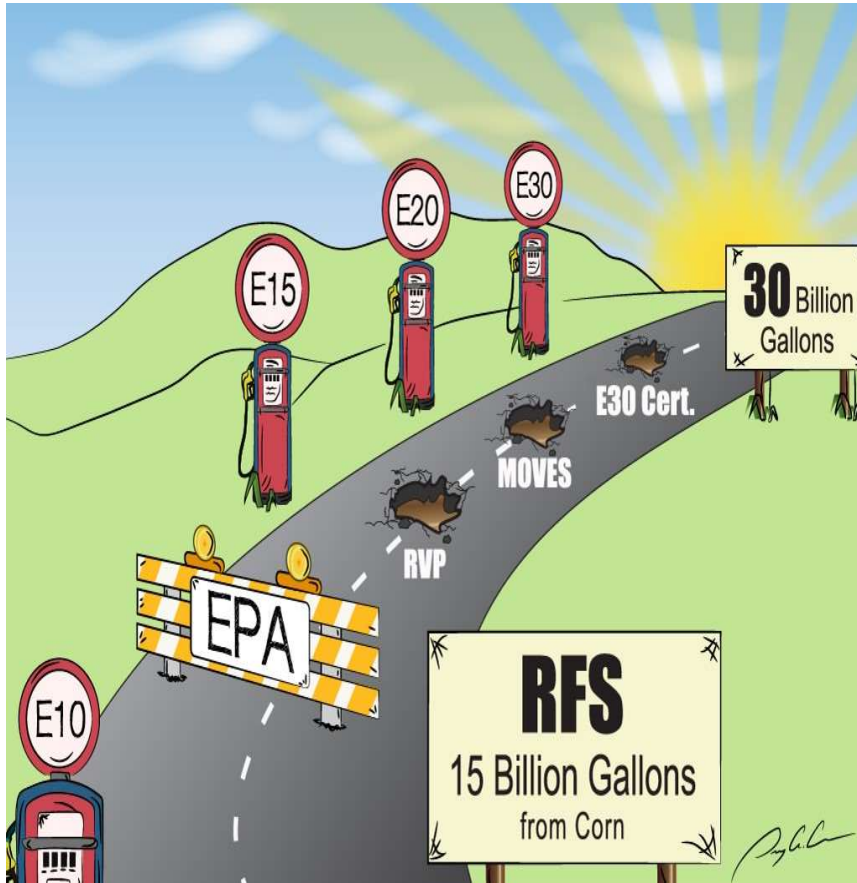
Then add the cost of war, climate change, and healthcare.

Like NATO, there needs to be cost shared burden to actualize the real cost of gasoline.



Biofuels are cheaper, better, cleaner, safer than gasoline – and faster to market than EVs

We Believe EPA has embraced a culture of...



- ☑ Roadblocks, Detours, and Delays
- ☑ Ignoring Overdue Reports
- ☑ Downplaying public health risks
- ☑ Using Outdated Cost/Benefit Analysis
- ☑ Bad Rule Interpretations
- ☑ Colluding with Big Oil
- ☑ Developing Anti-Competitive regulations
- ☑ Use of Rulemakings to block the use of higher blends of ethanol
- ☑ Failing to emphasize mobile sources
- ☑ Not acknowledging the changing science of air pollution, Ag and ethanol – unfair burden of proof
- ☑ We found the smoking gun and the bullets.



10,000 FOIA Emails Later

Objectives of the Gasolinegate Report



Provide enough credible information to make a case that EPA has failed to protect public health - in the court of public opinion



Provide the research needed to change existing PR induced negative perceptions about ethanol and provide information about aromatics.



The Above-Average Body of Key Influencers (e.g. Media, Congress, NGO's, Activists) They must know what we know – then decide

KEY FINDINGS



Safe Gasoline



www.safegasolinecampaign.org/

"I simply do not trust EPA to implement a program that has been stonewalled for more than a decade....the oil industry is one of the most powerful industries in the world. The EPA is not immune to pressure, both from well financed lobbying and from divergent interests with the Administration itself." --- U.S. Senator Tom Daschle, proposing the regulation of mobile source toxics, March 29, 1990



"The EPA has a demonstrated pattern and practice of hiding and withholding data from the public to advance their agenda."— Senator David Vitter, member Senate Committee on Environment and Public Works. June 6, 2013.

Part 1 - EPA Circumvents Energy, Environment, and National Security Laws & Policies

11 Pieces of Legislation Favor Ethanol
CAAA Provides a \$30 to \$1 ROI
Ethanol vs Toxics ignored

Part 2 - The Trail of Tears: Documented EPA Actions against Environmental Progress

10 Compelling Tell-Tale Events and 10,000 emails

Collaboration, Conspiracy, or Just Negligence?

Part 3 - The Health Effects and Failing to Protect: *Fear* [Becoming one of] *the Walking Dead*

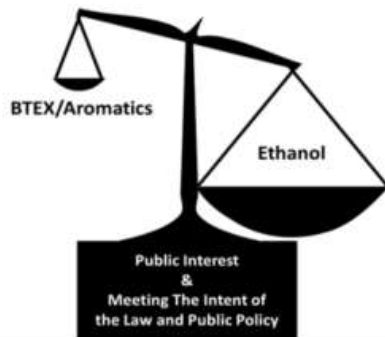
200,000 Premature Deaths: 50,000 from transportation

7 of the 10 top Ten Causes of Death = Air Pollution

Tobacco → Lead → Aromatics



Weighing The Cost and Health Benefits to The Consumer/Taxpayer



Solutions

- Use of Public Transportations
- Walking
- Bicycles
- Hybrids vehicles
- Hydrogen fuel cells
- Change the way we live and think



Ethanol Often Does Not Make The List



Part 4: Lives per Gallon and Health Care Costs

Gasoline is a Health Care Tax: An extra 17 cents to \$2 per gallon
Cleaning the air saves \$2 Trillion

1 trillion gal of aromatics, 30 Billion gallons of benzene in the pool since 1990

Part 5: A Readily Available Alternative to High Levels of Aromatics

The Cover Up: Denial for Health Effects of Aromatics and Detours for Ethanol

Big Oil's Achilles Heel #1: Ethanol Lowers the Price of Gasoline and Crude Oil

Big Oil's Achilles Heel #2: Ethanol Lowers toxics/carcinogens and makes gasoline cleaner

Part 6: Is This a Grand Conspiracy? Adversaries or Partners?

Magnitude: Dieselgate = 500K cars, Gasolinegate = 263MM cars

EPA Admits in email they don't have technical capability

Violated Federal Advisory Committee Act & other Guidelines

Part 7 - The People v Big Oil & EPA: Preserving Power and Wealth at any Cost

Understanding the Revolving Door Process

Let's Do the Math

They've Got Money We've Got the Truth

Part 8 - The People v Big Oil & EPA: The Anti-Ethanol Wars

"A lie can travel around the world and back again while the truth is lacing up its boots." — Mark Twain.

The War is NOT OVER: API wants to kill the RFS and Section 202 (I)

With 763 reported oil and gas lobbyists, there could be more than one representative for each member of the House, Senate, and the 37 committees that have oversight over EPA, each federal agency, and each of the President's Cabinet.



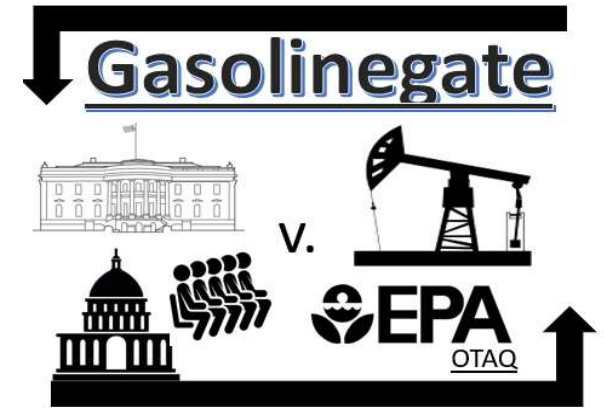
Photo Credit: OpenSecrets.org



What's at Stake? Benzene vs. Biofuels

Starting Point

Will new octane demand needed by automakers to meet the SAFE Ruel requirements be met with domestic renewable biofuels or petroleum-based carbon-intense toxic/carcinogenic aromatics?



Endgame

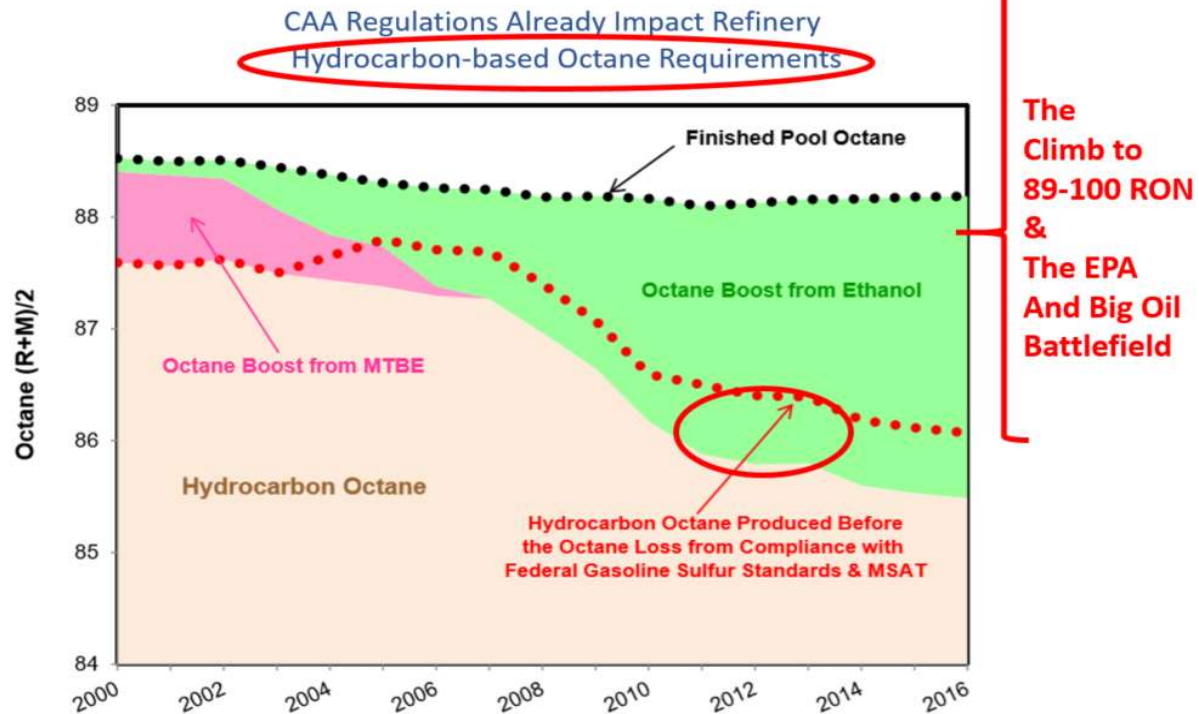
Every 1 vol % reduction in aromatic content is about a 1 vol % increase in octane demand for ethanol.

Therefore, 1 vol % of a 140 billion gpy gasoline market is = to 1.4 billion gallons of ethanol. Using ethanol to meet a 98-100 RON can lower the amount of aromatics in gasoline from a current average of 25 vol % to as low as 11 vol %.



It's Already Working!

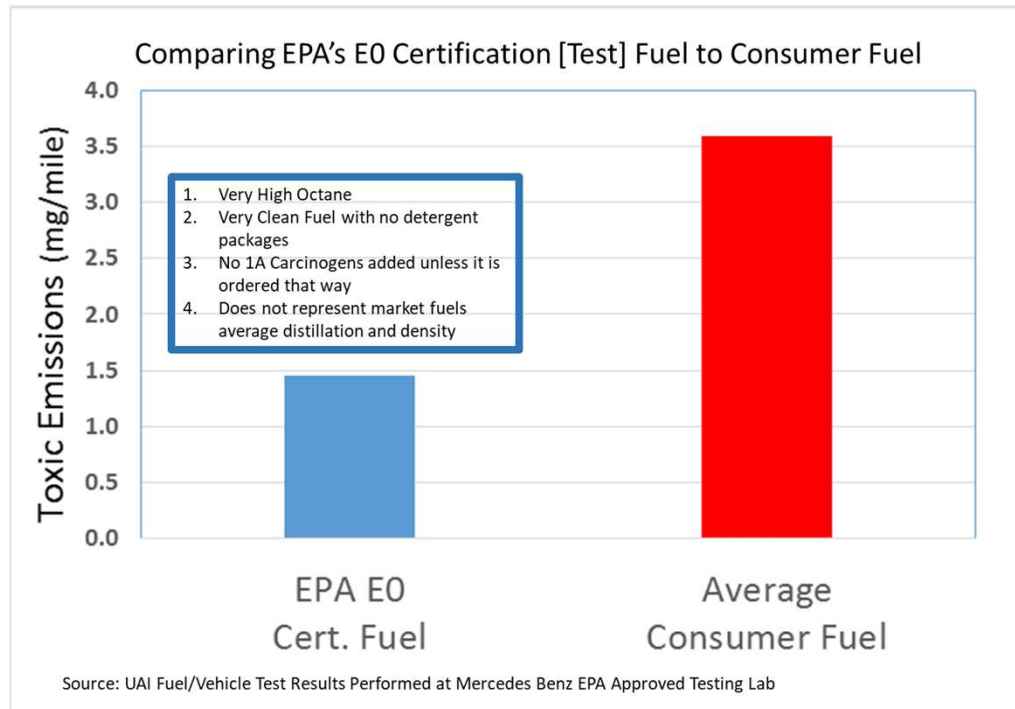
Section 202 (I) of the CAAA
Needs to Stop Refiners From Using
More Aromatics for Octane



Source: [THiggins Energy Consulting](#), OPIS Octane Value Forum, October 2017

Why Not More? Gasolinegate!

Figure 1



500,000 Vehicles
Recalled for
Dieselgate



263 Million Vehicles
Impacted by
Gasolinegate

Summary of Findings: The Greatest Story Never Told



SURGEON GENERAL'S WARNING: Quitting Smoking Now Greatly Reduces Serious Risks to Your Health.

OTAQ's
EMISSION
TESTING

Not Real³

No Real-World Fuels +
No Real-World Testing +
No Real Results =

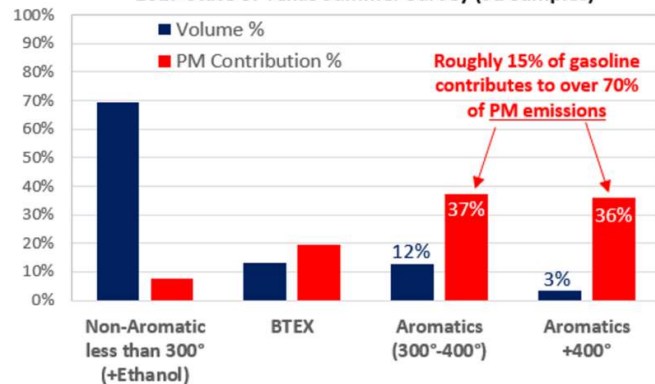
Gasolinegate



The American Petroleum Institute (API) stated as early as 1948 that "it is generally considered that the only absolutely safe concentration for benzene is zero"

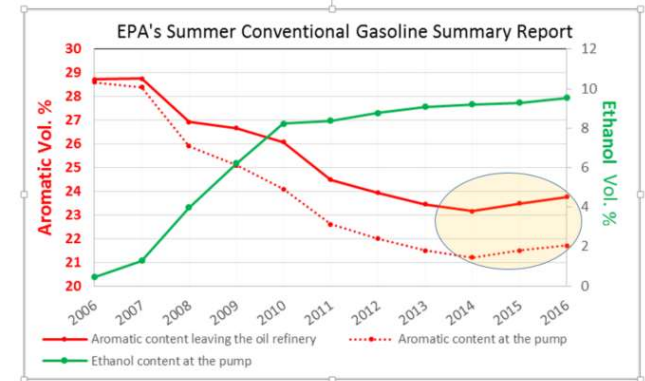
Figure 3

2017 State of Texas Summer Survey (91 Samples)



"Octane is the single most important property of gasoline when determining engine design." Mercedes Benz comments to EPA Tier 3 rule, July 1, 2013

Figure 1
Aromatic Market Compare to Increased Ethanol in the US Market (EPA)



Source: <https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100T5J6.pdf>

3:15 p.m. | Auto Industry's Advanced ICE Technologies Require Higher Octane Fuels to Substantially Reduce Mobile Source Toxics and Carbon Emissions

Moderator: Doug Durante, Executive Director, Clean Fuels Development Coalition

Reg Modlin, Senior advisor, Natural Resource Solutions; former Director, Regulatory Affairs, Fiat Chrysler Automobiles



3:45 p.m. | Roadmap to Near- and Mid-Term Solutions Without Congressional Action

Moderator: Doug Durante, Clean Fuels Development Coalition

Doug Sombke, Farmers Union Enterprises

Reg Modlin, Natural Resource Solutions

Carol Werner, Environmental & Energy Study Institute

Reid Detchon, UN Foundation

Anne Steckel, National Farmers Union

Ernie Shea, Natural Resource Solutions

David Hallberg, Dakota AG Energy

