

PMAA Spring Meeting

May 17, 2018

Strategies to Increase Engine Efficiency

Drivers

- Corporate Average Fuel Economy (CAFE) standards
- Air Pollution
- Climate change
- Greenhouse gases



Approach

- Increased compression ratio
 - Greater thermodynamic efficiency
- Engine downsizing/downspeeding
 - Smaller engines operating at low-speed/higher load are more efficient
 - Optimized with 6 to 9 speed transmission
- Turbocharging
 - Recovering energy from the engine exhaust
 - Increase specific power allowing smaller engine
- Direct injection
 - Cooling the air-fuel mixture, fuel evaporates in combustion cylinder

High Octane Fuel for High Efficiency Engines

- Formulation
 - Compatibility
 - Fungibility

- Introduction

- Transition
- Replace existing product
- Add as new product

- Misfuelling
 - New vehicles
 - Old vehicles



- Labeling

- Octane
- Content

- Liability

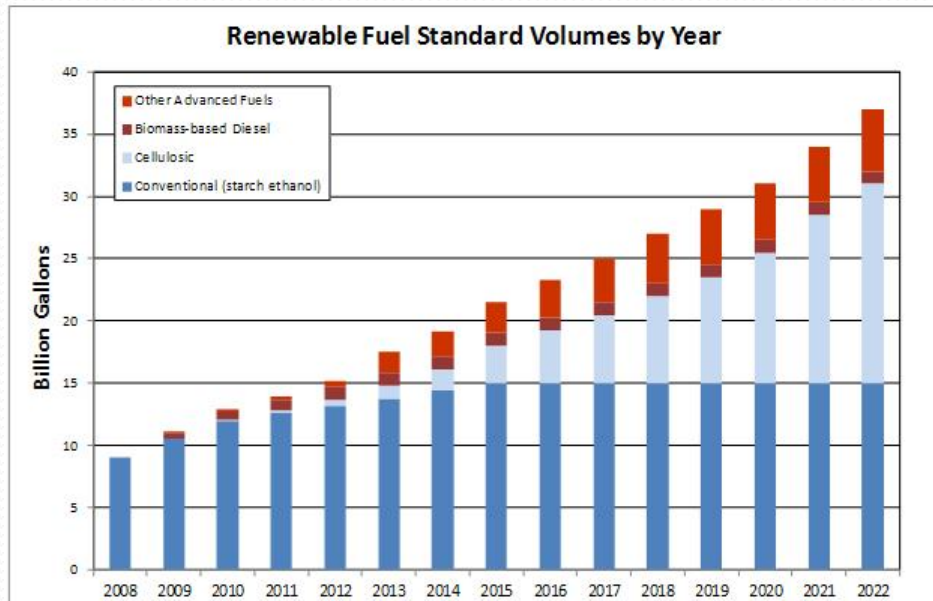
- Misfuelling
- Product quality

- Regulatory

- Approval of fuel
- Competing regulatory programs
- Federal versus state



Ethanol and High Octane Fuel



- High octane number
- Lower cost blendstock
- Lower cost fuel
- Lower life-cycle GHG emissions (9-19%)



E10+ Blends

- Corrosion potential
- Equipment compatibility
- Engine compatibility
- Consumer education



E10+ Blends – Marketer's Dilemma

- Product quality
 - Blended on site
 - Blended at a terminal
- Risk/liability mitigation
 - Compatibility
 - Misfuelling
 - Corrective action
- Consumer education

Fuels Institute Committees

- Fuels and Infrastructure Committee
 - Legacy and emerging fuel options
 - Fuel quality and specifications
 - Fueling infrastructure
- Vehicles and Mobility Committee
 - Vehicle powertrains, personal vehicle ownership, vehicle technologies and regulations, and consumer preferences
 - Car and ride sharing services, trends in travel trip data
- Global Markets Committee
 - Current and future governmental regulations affecting the fuels and vehicles markets and overall trends in market evolution

Fuels Institute - Fuel Quality Council

- Engine performance survey
 - Focused on issues relating to engine maintenance and failures, particularly fuel-related systems
- Fuel quality survey
- Product distribution best practices
 - best/recommended practices for ensuring product quality from refinery gate to nozzle
- Fuel and vehicle specification

Recent Fuels Institute Publications

- The Case of E-15 (February 2018)
 - Individual case studies of retailer experiences selling E15
- Consumers and Alternative Fuels (December 2017)
- Global Initiatives: Assessing Current & Future Global Initiatives on Fuels & Vehicles (November 2017)
 - Drivers of Air Pollution, Climate Change and Congestion Mitigation
 - Biofuels Lead Transport Policies
 - Fuel Economy Regulations Gain Traction
 - Momentum is Gaining to Mandate Changes to Powertrains
 - Improvements in Traditional Energy and Fuel Remain Critical

Fuels Research Publications in the Works

- Vehicle Sales and Fuel Prices from 2006 to 2016
 - Analysis of vehicle sales by class and powertrain considering fuel efficiency, suggested retail price, and fuel prices
 - The rise of the CUV post-recession emerges as one of the biggest market trends in recent years.
- Biofuels Compatibility: Overview of Federal Regulations for Retailing Biofuel Products
 - An overview and reference guide to major federal regulations affecting the retailer requirements for handling fuel comprised of E10 plus and B20 plus

Fuels Research Publications in the Works

- Analysis of the Potential for Increasing Octane in the U.S. Fuel Supply
 - Scalability and cost of viable fuel formulations
 - Market and regulatory implementation strategies
 - Potential consumer acceptance of a new fuel.
- Understanding the Dynamics of the Electric Vehicle Market
 - Total cost of ownership
 - Infrastructure requirements and anticipated consumer recharging behavior
 - Relationship of EVs to competing technology.