Market Feasibility of Advanced Fuels and Vehicles

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What is the Fuels Institute?

History, Mission, Structure
What is the Fuels Institute?

• Founded in 2013 by National Association of Convenience Stores
• Independent, multi-industry research organization focused on fuels and vehicles
• Goals -
  – Publish non-biased, fact-based research to answer key questions posed by stakeholders concerning market opportunities and challenges
  – Create a forum to facilitate cross-industry collaboration through development of a balanced structure promoting open discussion
# Cross-Industry Collaboration

<table>
<thead>
<tr>
<th>Marketing</th>
<th>Refining</th>
<th>Biofuels</th>
<th>Autos</th>
<th>Others</th>
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<tr>
<td>Ricker’s*</td>
<td>Phillips 66*</td>
<td>Poet Ethanol Products*</td>
<td>Toyota*</td>
<td>OPIS*</td>
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<td>ADM*</td>
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<td>Flint Hills Resources*</td>
<td>ICM*</td>
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<td>REG, Inc.*</td>
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<td>Gilbarco Veeder-Root*</td>
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Association Partners

- Alliance of Automobile Manufacturers
- American Coalition for Ethanol
- CA Fuel Cell Partnership
- Canadian Independent Petroleum Marketers Association
- Diesel Technology Forum
- Fuel Freedom Foundation
- Growth Energy
- Methanol Institute
- NACS
- NATSO
- NGV America
- Outdoor Power Equipment Institute
- PMCI/RIN Alliance
- PMAA
- Renewable Fuels Association
- SIGMA
- STI/SPFA
- Texas Food and Fuel Association
Retail Realities
Small operators dominate the retail landscape.

Source: NACS, Nielsen TDLinks
Fuel drives sales, but not profit

2015 Sales
- Fuel, 69.4%
- InStore, 30.6%

2015 Profit
- Fuel, 38.7%
- InStore, 61.3%

Source: NACS, CSX
Historically, retailers have low fuel profitability

Source: OPIS
Americans will drive more...on less.

Miles Traveled and Fuel Economy

2016-2035
Miles Driven: +17.1%
MPG: +55.8%

Source: U.S. EIA
Gasoline demand projected to drop

What replaces this traffic driver?

Source: U.S. EIA
Infrastructure is complex and expensive
Demand has to justify investment

Registered LDVs in 2016

- Gasoline, 87.6%
- FFV, 7.8%
- Diesel, 2.8%
- HEV, 1.5%
- PHEV, 0.1%
- BEV, 0.1%
- CNG, 0.0%
- FCV, 0.0%
- PAGV, 0.1%

Source: Navigant Research

96.9% LDVs on road run on gasoline.
Consumers Hold the Keys

But are they economically rationale?
Price continues to dominate choice

Which factors are important when buying gas?

Source: PSB, NACS
Consumers are economically irrational

To save 5 cpg I would…

- Pay with Cash
- Turn Left Across Busy Street
- Drive 5 Minutes
- Drive 10 Minutes
- Fuel Price

Source: PSB, NACS
Behavior triggers change with fuel price

At what retail gasoline price would you....

Change Travel Mode

Reduce Driving

Retail Gas Price

"Reduce Driving" Price

"Change Travel Mode" Price

Monthly Retail Price
Consumers seem interested in fuel efficiency...

Most important attributes when shopping for a car...

Source: Fuels Institute, May 2014
But post-purchase, consumers are not as focused on fuel economy.

<table>
<thead>
<tr>
<th>Rank of 92</th>
<th>Purchase Reason</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Overall Value for the Money</td>
<td>68%</td>
</tr>
<tr>
<td>2</td>
<td>Overall Safety of the Vehicle</td>
<td>67%</td>
</tr>
<tr>
<td>3</td>
<td>Braking</td>
<td>66%</td>
</tr>
<tr>
<td>4</td>
<td>Front Visibility</td>
<td>66%</td>
</tr>
<tr>
<td>5</td>
<td>Price/Deal Offered</td>
<td>63%</td>
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<td>...</td>
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<td>...</td>
</tr>
<tr>
<td>8</td>
<td>Overall Durability</td>
<td>61%</td>
</tr>
<tr>
<td>9</td>
<td>Overall Driving Performance</td>
<td>60%</td>
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<tr>
<td>10</td>
<td>Warranty Coverage</td>
<td>59%</td>
</tr>
<tr>
<td>11</td>
<td>Overall Impression of Reliability</td>
<td>59%</td>
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<tr>
<td>...</td>
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<td>...</td>
</tr>
<tr>
<td>14</td>
<td>Driver Seat Adjustability</td>
<td>55%</td>
</tr>
<tr>
<td>15</td>
<td>Fuel Economy/Mileage</td>
<td>54%</td>
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<tr>
<td>...</td>
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<td>...</td>
</tr>
<tr>
<td>67</td>
<td>Overall Environmental Friendliness</td>
<td>35%</td>
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Source: Strategic Vision - 2014 New Vehicle Experience Study (NVES)
Who is the new consumer?

Source: Fuels Institute
Gen-Z will dictate future course of market

**Exhibit 11: Gen-Z represents more than 20% of the U.S. Population**

Total US Population by Age and Generation*, millions

- **Gen-Z**: ~69 million (22% of Population)
- **Millennials**: ~75 million (23% of Population)
- **Gen-X**: ~66 million (21% of Population)
- **Baby Boomers**: ~75 million (24% of Population)
- **Silent Generation**: ~29 million (9% of Population)
- **Greatest Generation**: ~4 million (1% of Population)

*Note: For purposes of this report, our generational cutoffs are based on those outlined by Pew Research Center, and we acknowledge that there is no clear consensus on the cutoff date between Millennials and Gen-Z. Population data is as of July 1st, 2014, the latest available per the Census Bureau. Assuming a birthrate of roughly 4 million per year, we estimate that Gen-Z is currently approaching 75 million in size.

Source: Census Bureau, Pew Research Center, Goldman Sachs Global Investment Research.
Trends Don’t Inspire Retail Investment in New Options
What did Americans buy in 2015?

99.3% powered by liquid fuel

- Gasoline, 94.37%
- Diesel, 2.78%
- Hybrid, 2.17%
- Plug In, 0.25%
- Electric, 0.41%

Source: WardsAuto
What have they bought this year?

99.3% powered by liquid fuel

- Gasoline, 94.83%
- Hybrid, 1.84%
- Diesel, 2.63%
- Plug In, 0.35%
- Electric, 0.34%

Source: WardsAuto
Vehicle sales indicate trends

Light Duty Vehicle Sales

Source: Navigant Research, Fuels Institute
But the fleet changes slowly

Registered Light Duty Vehicles

Source: Navigant Research, Fuels Institute
For the light-duty fleet, AEO2016 projects modest inroads for alternative fuels.

Non-liquid transport energy will be less than 5% in 2040.

Source: EIA, Annual Energy Outlook 2016
So what about new forms of liquid fuel?

Would consumers select a higher octane product if available?
Performance of premium at retail

Gas Price Drops…
Premium Gallons Rise?

Premium Grew 2x Faster
Than Reg Gallons

Source: NACS CSX
Consumers don’t know what octane is.

To the best of your knowledge, what is an “octane grade” as it relates to gasoline? (Coded open-ends, Split Sample A)

Source: PSB, Fuels Institute
Only about half of fuel consumers know if their car has a recommended octane grade.

Do you know if there is a recommended octane grade for the vehicle you most commonly drive? *Showing % All*

- **Yes**: 48%
- **No**: 22%
- **Don’t Know**: 30%

**Gender**
- 62% of Men
- 33% of Women

**Age**
- 35% of 18-34
- 45% of 35-49
- 58% of 50+

Source: PSB, Fuels Institute
Most likely car buyers say they would be unlikely to consider getting a vehicle that required high-octane fuel

Among the 44% of fuel consumers that say they are likely to purchase a vehicle in the next two years: How likely are you to purchase a vehicle that requires higher octane (mid-grade or premium) gasoline?

- **14%** Very likely
- **31%** Somewhat likely
- **35%** Somewhat unlikely
- **21%** Very unlikely

**Why** do you say that? *(Coded open-ends, showing top 3)*

- Cost of gas (62%)
- Vehicles requiring high-octane are expensive (6%)
- The type of car I want takes regular (4%)

Source: PSB, Fuels Institute
When would retailers be convinced there is a market for a new fuel?
Adoption curve to hit 20% market by 2025

First year vehicle sales needed if launched in:
• 2018: 629,000
• 2020: 1.3 million
• 2022: 3.8 million

Source: Navigant Research, Fuels Institute
Must not forget...

- The “ideal” is a great place to start, but may not be market feasible
- The best vehicle and best fuel means nothing if the consumer cannot access it or does not want to pay for it
- New fuels either need to fit into the existing infrastructure or a transition strategy must be developed to accommodate the new fuel
- New fuels either need to be backwards compatible with the existing fleet or a longer-term transition period must be orchestrated
- Consumers need to be either educated and convinced to buy the new fuel, or the transition to a new fuel must be “seamless”
- There is so much more involved than finding the right technical mix.
Questions?

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