California Fuel Cell Partnership – Alternative Fuels Research

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TNS Automotive

california

fuellcell

Partnership

Driving for the Future

the sixth sense of business™
Background

- **CaFCP conducted annual public opinion surveys**
  - Administered by phone as part of an “omnibus” survey
  - Asked only about H2 and FCVs
  - Gauged knowledge

- **2008 survey to gauge opinions, attitudes and identify trends**

- **Important elements included:**
  - Larger, more diverse panel with defined demographics
  - “With station” and “Without station” groups
  - Mask the true subject to avoid “please the teacher”
  - Ask questions that help predict trends

- **Engaged TNS Automotive**
  - Online surveys by defined panelists
  - Expertise in survey design and administration
  - Very fast turn around
  - [www.mysurvey.com](http://www.mysurvey.com)
We asked ....

- **General beliefs:**
  - Are alt fuel vehicles better for the environment?
  - Do we have plenty of oil?
  - Do alt fuel vehicles fit your lifestyle?
  - Are you concerned about global warming?

- **Specific questions about:**
  - Biodiesel
  - Clean (ultra-low sulfur) diesel
  - Electricity (plug-in hybrid)
  - Ethanol (E85)
  - Hydrogen fuel cells
  - Natural gas (CNG)
Executive Summary – General Beliefs

- The majority of respondents believe California needs sustainable fuels, and that alternative fuels benefit the environment.
  - Half of respondents are concerned about global warming.
  - Except for E85, environment benefits outscored reducing reliance on petroleum.
- Consumers are expecting California’s fuel type use to change.
  - Respondents' prevailing view was that in the future most vehicles will be powered by a mix of traditional and alternative fuels.
- More than half of respondents are concerned about global warming.
  - Concern is greatest among non-car owners and college grads.
## Agreement With Key Environmental Statements

- The majority of respondents across groups believe we need sustainable fuels for energy, and that alternative fuels benefit the environment.
- Respondents near fueling areas are more likely to think that fuel efficient vehicles are more important than alternative fuels, air quality is better now than 20 yrs ago, and air pollution is caused by industry, not cars.

<table>
<thead>
<tr>
<th>Region</th>
<th>Ownership</th>
<th>Education</th>
<th>Income</th>
<th>Tech Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>Fueling</td>
<td>Non</td>
<td>Own</td>
<td>Do not</td>
</tr>
<tr>
<td></td>
<td>Area</td>
<td>Fueling</td>
<td>Car</td>
<td>Own Car</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Area</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Base: Total respondents</td>
<td>A n=816</td>
<td>B n=204</td>
<td>C n=104</td>
<td>D n=757</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Who Totally/Somewhat Agree With Statement</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- We need sustainable alternative fuels so we never run out of energy
- Alternative fuel vehicles benefit the environment
- Alternative fuels will give us energy independence
- Alternative fuels help provide national security
- Instead of alternative fuels, we need more fuel efficient gasoline and diesel vehicles
- Air quality is better today than it was 20 years ago
- Most air pollution is caused by industry, not vehicles
- Global warming is just fiction
- We have plenty of oil and don't need alternative fuels

Letters indicate value is significantly higher than comparison group at 90% confidence.
Respondents reported the greatest awareness and potential purchase consideration of electricity (plug-ins) *(top chart)*

- Ethanol had the second-highest awareness, but trailed hydrogen fuel cells in potential purchase consideration.
- Perhaps this is because E85 does not yet have the availability in California it enjoys in many Midwestern states.

**Vehicles powered by electricity (plug-ins) have been best able to bridge the gap between awareness and potential purchase consideration *(bottom chart)*

- Clean diesel fared the worst, with one fifth of those aware being potential purchasers.
Belief Statements Regarding Alternative Fuel

- The leading motivator for purchase of plug-ins, clean diesel, CNG, and hydrogen fuel cells is concern for the environment, while ethanol is most thought of as reducing petroleum dependence.
- Plug-ins also are rated highly for cost-effectiveness.

<table>
<thead>
<tr>
<th>Fuel Type</th>
<th>Biodiesel</th>
<th>Clean (ultra-low sulfur) diesel</th>
<th>Electricity (plug-in hybrid)</th>
<th>Ethanol (E85)</th>
<th>Hydrogen fuel cells</th>
<th>Natural gas (CNG)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B (n=816)</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>I care about the environment</td>
<td>26</td>
<td>33 AD</td>
<td>36 ABDEF</td>
<td>26</td>
<td>30 AD</td>
<td>32 AD</td>
</tr>
<tr>
<td>I am investing in national security</td>
<td>3</td>
<td>3 ABF</td>
<td>4 ABF</td>
<td>4 B</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>I am reducing petroleum dependence</td>
<td>19 B</td>
<td>14 ABCEF</td>
<td>28 ABCEF</td>
<td>22 B</td>
<td>22 B</td>
<td></td>
</tr>
<tr>
<td>I am saving money on fuel</td>
<td>9 B</td>
<td>7 ABDEF</td>
<td>20 ABDEF</td>
<td>9 B</td>
<td>8</td>
<td>9 B</td>
</tr>
<tr>
<td>I am the owner of a unique vehicle</td>
<td>6 BD</td>
<td>5 ABCDF</td>
<td>10 ABCDF</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>None of these</td>
<td>36 CDEF</td>
<td>39 ACDEF</td>
<td>13</td>
<td>28 C</td>
<td>26 C</td>
<td>28 C</td>
</tr>
</tbody>
</table>

Q5. If you were to purchase an alternative fuel vehicle, which of the following best represents the statement the vehicle makes about you?
Attitudes Toward Alternative Fuel

- Electric/plug-ins have a high potential to be well-received in California, where there is already general acceptance for traditional hybrid technology.
  - They rate highest on ‘good for the environment’, fuel efficient, would fit my lifestyle, and has the style/power I want.

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A n=816 %</td>
<td>B n=816 %</td>
<td>C n=816 %</td>
<td>D n=816 %</td>
<td>E n=816 %</td>
<td>F n=816 %</td>
</tr>
</tbody>
</table>

Q4. What do you believe to be true for each alternative fuel vehicle?

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Affordable</th>
<th>Fuel Efficient</th>
<th>Good for the environment</th>
<th>Has the style and power I want</th>
<th>Would fit my lifestyle</th>
<th>None of these</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affordable</td>
<td>10 BE 6 %</td>
<td>23 B 21 %</td>
<td>42 ABDEF 66 ABDEF 42 B 4</td>
<td>6 B 4 %</td>
<td>8 %</td>
<td>42 CDEF 43 CDEF</td>
</tr>
<tr>
<td>Fuel Efficient</td>
<td>15 ABEF 15 ABEF</td>
<td>45 ABDEF 27 AB 4</td>
<td>66 ABDEF 6 ABCEF 21 ABDEF 6</td>
<td>9 ABDEF 6 B 6 B</td>
<td>21 ABDEF 10 ABF 10</td>
<td>17 34 C 34 C</td>
</tr>
<tr>
<td>Good for the environment</td>
<td>15 ABEF 6</td>
<td>27 AB 29 AB</td>
<td>46 AB 52 ABDF 48 AB</td>
<td>6 B 6 B 5</td>
<td>10 ABF 12 ABF</td>
<td>33 C</td>
</tr>
<tr>
<td>Has the style and power I want</td>
<td>6 B 4</td>
<td>9 ABDEF 6 B</td>
<td>21 ABDEF 10 ABF 12</td>
<td>6 B 6 B 5</td>
<td>12 ABF 8</td>
<td>33 C</td>
</tr>
<tr>
<td>Would fit my lifestyle</td>
<td>8 %</td>
<td>7 %</td>
<td>21 ABDEF 10 ABF 12 ABF</td>
<td>6 B 6 B 5</td>
<td>6 B 6 B 5</td>
<td>10 ABF 12 ABF</td>
</tr>
<tr>
<td>None of these</td>
<td>42 CDEF 43 CDEF</td>
<td>17</td>
<td></td>
<td></td>
<td></td>
<td>34 C 34 C 33 C</td>
</tr>
</tbody>
</table>
### Development Impact for Alternative Fuel

- Auto/oil company agendas and public awareness are noted as two factors most hindering progress on alternative fuels.
  - High cost was also cited as significantly hindering plug-ins and fuel cell progress.

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<th>Ethanol (E85)</th>
<th>Hydrogen fuel cells</th>
<th>Natural gas (CNG)</th>
</tr>
</thead>
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<tr>
<td>Base: Total respondents</td>
<td>n=816</td>
<td>n=816</td>
<td>n=816</td>
<td>n=816</td>
<td>n=816</td>
<td>n=816</td>
</tr>
</tbody>
</table>

#### Q8. Which factors impact the progress of the development of alternative fuels?

- Technology not keeping pace: 12% (A), 11% (B), 19% (ABDF), 13% (B), 18% (ABDF), 12% (A)
- High cost: 15% (A), 16% (B), 29% (ABDF), 18% (AB), 28% (ABDF), 17% (A)
- Public awareness: 29% (BDE), 25% (B), 27% (ABDF), 25% (AB), 25% (ABDF), 27% (B)
- Auto or oil company agendas: 32% (B), 30% (B), 36% (ABEF), 36% (ABEF), 32% (A), 33% (B)
- Government investment: 20% (E), 18% (E), 22% (AB), 20% (B), 22% (ABD), 22% (AB)
- No impact on progress: 4% (E), 3% (E), 4% (E), 4% (E), 2% (E), 3% (E)
- Don't Know: 37% (CDEF), 39% (ACDEF), 22% (C), 32% (C), 33% (C), 35% (CDE)
Summary Findings - Hydrogen fuel cells

- About half of respondents have heard of hydrogen fuel cells.
  - College grads and high earners (over $100k) have the greatest awareness, close to 60%.
  - No differences in awareness or consideration exist between fueling station areas and non-fueling station areas.

- The majority of respondents agree they are good for the environment.
  - Only about 6% of responds believe they are affordable, and over one-forth of respondents note high cost as a roadblock for development.

- A greater percentage of respondents (10%) believe a hydrogen fuel cell vehicle is a unique vehicle, compared with other alternative fuel types.
  - Caring for the environment (~30%) and reducing dependence of petroleum (~22%) are attributes most commonly associated with fuel cells.
Summary Findings – Emissions and Production

- **Knowledge about emissions is low.**
  - For each fuel, when asked if specific emissions were zero, greater than, less than or the same as a conventional vehicle, more than half the respondents answered “don’t know.”
  - Further research can clarify the gap in knowledge.

- **Fuel production is a mystery.**
  - For each fuel, when asked if a fuel could be made from a feedstock today, in the future or not at all, 65-85% of respondents answered “don’t know.”
  - Further research can uncover if respondents are uninformed or uninterested.
Alternative Fuel Safety

- Alternative fuels are generally thought of as safer than conventional fuels, though over half of respondents need more information on biodiesel, clean diesel, and hydrogen fuel cells to make their decision.
  - Ethanol is generally though of as less unsafe than conventional gasoline (8% vs. 25%).

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<th>Ethanol (E85)</th>
<th>Hydrogen fuel cells</th>
<th>Natural gas (CNG)</th>
<th>Conventional gasoline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base: Total respondents</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>A n=816 %</td>
<td>B n=816 %</td>
<td>C n=816 %</td>
<td>D n=816 %</td>
<td>E n=816 %</td>
<td>F n=816 %</td>
<td>G n=816 %</td>
</tr>
</tbody>
</table>

Q11. Thinking about the fuel only, which statement best represents your opinion about the safety of conventional and alternative fuels?

- I am confident it is safe
- I am somewhat confident
- Unsure - need more info
- I think it is unsafe
- I know it is too unsafe to use
# Station Availability for Alternative Fuel – Hydrogen fuel cells

## Hydrogen fuel cells

<table>
<thead>
<tr>
<th>Ownership</th>
<th>Education</th>
<th>Income</th>
<th>Tech Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Own Car</td>
<td>College Grad</td>
<td>Less than $60K</td>
<td>Early Adopters</td>
</tr>
<tr>
<td>Do not Own Car</td>
<td>Not College Grad</td>
<td>$60K to $99K</td>
<td>Influencers</td>
</tr>
<tr>
<td>Non Fueling Area</td>
<td></td>
<td>$100K or More</td>
<td></td>
</tr>
<tr>
<td>Fueling Area</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Base: Total respondents**

- **Total respondents**
  - Total: n=816
  - Non Fueling Area: n=204
  - Fueling Area: n=612

**Q12. Are you aware of fuel stations near you that dispense or provide these alternative fuels?**

<table>
<thead>
<tr>
<th>Region</th>
<th>Total</th>
<th>Ownership</th>
<th>Education</th>
<th>Income</th>
<th>Tech Status</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Fueling Area</td>
<td>Non Fueling Area</td>
<td>Own Car</td>
<td>Do not Own Car</td>
</tr>
<tr>
<td></td>
<td></td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>In or near my city</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>In my state</td>
<td>6</td>
<td>8</td>
<td>4</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>In other areas of the US</td>
<td>3</td>
<td>3</td>
<td>5</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>In other countries</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Not aware of any</td>
<td>87</td>
<td>85</td>
<td>88</td>
<td>87</td>
<td>85</td>
</tr>
</tbody>
</table>

**Region:**
- A: Total
- B: Non Fueling Area
- C: Fueling Area
- D: Own Car
- E: Do not Own Car
- F: College Grad
- G: Not College Grad
- H: Less than $60K
- I: $60K to $99K
- J: $100K or More
- K: Early Adopters
- L: Influencers
Take Aways

- We’re doing OK
  - 50% awareness for a product that’s not for sale is respectable

- Environmental benefits are the hook.
  - Capitalize on the green movement, but remember that green is a trend
  - Emphasize that FCVs will fit your lifestyle: car size, refueling, range, durability
  - Change how we say things
    - Zero pollution and greenhouse gases (not emissions)
    - Produced from local resources (not diverse feedstocks)

- Narrow the target audience.
  - Reach the higher-income, more educated people.
  - Provide information in formats for busy lifestyles

- More research is necessary.
  - Where do people get their information?
  - What sources do they find credible?
  - What kinds of information do they want?