2007 DOE Hydrogen Program: Hydrogen Knowledge and Opinions Assessment

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Overview

Timeline
- Start: April 2003
- End: 2012 (currently in “Phase II”)
- Percent complete: >33%

Barriers
B. Mixed Messages
E. Regional Differences
F. Difficulty of Measuring Success

Budget
- Total project funding
  - DOE share: 100%
  - Contractor share: 0%
- Funding received in FY06: $20,000
- Funding for FY07: $100,000
- Funding for FY08: $240,000 (through March)

Partners
- Contacts with national and international organizations to obtain clarifications and data
- Opinion Research Corporation (polling and market research)
Objectives

• To measure the current level of awareness and understanding of hydrogen and fuel cell technologies in five target populations:
  – General public
  – Students
  – State and local government agencies
  – Potential end users
  – Safety and codes officials

• To compare the current level of awareness and understanding to results of the 2004 baseline

• To analyze and summarize results for use in developing strategies and tactics for the Hydrogen Education Program
## Milestones

<table>
<thead>
<tr>
<th>Month/Year</th>
<th>Milestone</th>
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<tbody>
<tr>
<td>September 2007</td>
<td>Prepare for surveys to be conducted and analyzed in 2008/2009</td>
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<tr>
<td>June 2008</td>
<td>Update literature review</td>
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<tr>
<td>September 2008</td>
<td>Plan for QA and data analysis</td>
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<td>September 2008</td>
<td>Complete all five surveys</td>
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<td>FY09</td>
<td>Analyze survey findings, compare with baseline, and publish results</td>
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Approach

- Review current literature on hydrogen or fuel cell knowledge and attitudes and publish update of previous literature review (published in 2003)
- Review and revise (if necessary) survey instruments used in the 2004 surveys and develop a survey for the safety and codes officials
- Obtain approval from the Office of Management and Budget (OMB) to conduct all five surveys
- Design and publish a plan for quality assurance and data analysis
- Conduct surveys of the five target populations
- Analyze 2008 survey results and compare with the 2004 baselines for each target population
- Summarize and publish Knowledge and Opinions Assessment Report*

*http://www1.eere.energy.gov/hydrogenandfuelcells/hydrogen_publications.html
Technical Accomplishments—Current Status

• Groundwork
  – Completed compendium of related surveys conducted since the 2003 literature review (FY07)
  – Slightly revised survey instruments for the four surveys conducted in 2004 and developed the survey instrument for the safety and codes officials (FY07)
  – Obtained OMB approval of four surveys and prepared 60-day FRN for new survey (safety and codes officials)

• 2008 General Public Survey completed
• 2008 State and Local Government Officials Survey underway
• Very preliminary analysis of General Public Survey results
Examples of Survey Questions (All Surveys)

• Technical Questions
  – Hydrogen gas is toxic (true/false)?
  – Hydrogen has a distinct odor (true/false)?
  – Rank five items…which is most important to you, personally, when selecting a fuel or power supply: safety, cost, environmental impact, convenience, performance

• Opinion Questions
  – How would you feel if your local gas station also sold hydrogen? Answers: frightened, uneasy, at ease, pleased, don’t know/no opinion.
  – Using hydrogen will reduce U.S. dependence on foreign oil—disagree, are neutral, agree, no opinion

• Information Resource and Demographic Questions
  – How often do you get energy information from different types of mass media (never, sometimes, frequently, don’t know)?: television, radio, internet, newspapers, etc.
  – Age, sex, education level, etc. (for statistical purposes)
### Response Counts and Rates (for Completed Surveys)

<table>
<thead>
<tr>
<th>Year</th>
<th>Survey Component</th>
<th>Number of Respondents</th>
<th>Response Rate</th>
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</thead>
<tbody>
<tr>
<td>2004</td>
<td>General Public</td>
<td>889</td>
<td>24.8%</td>
</tr>
<tr>
<td></td>
<td>Student</td>
<td>1,000</td>
<td>27.5%</td>
</tr>
<tr>
<td></td>
<td>State &amp; Local Government</td>
<td>236</td>
<td>95.9%</td>
</tr>
<tr>
<td></td>
<td>End User</td>
<td>99</td>
<td>29.1%</td>
</tr>
<tr>
<td>2008</td>
<td>General Public</td>
<td>1,000</td>
<td>23.0%</td>
</tr>
</tbody>
</table>

- Response rates are a challenge in all telephone surveys these days, but to some extent nonresponse bias cancels in cross-year comparisons…
Average Value Rankings*

*Note: All 2008 General Public Survey results are preliminary.

- The “|—|”s on the charts are 95% confidence intervals. The differences within years are statistically significant.
- Performance category added for 2008
- Some rankings were partial.
- Cost and safety are most important, but note the 2004-08 switch.
Hydrogen Technical Question Scores

2004

- Overall averages (% ± std. err.):
  - 2004: 35.18 ± 0.89
  - 2008: 35.19 ± 1.03

2008

- Little change in technical understanding
“How would you feel if your local gas station also sold hydrogen?” vs Technical Question Scores

- “Average” refers to scores on all eight technical questions (previous slide)
- Association of technical understanding with technology acceptance is clear (also highly significant: $p < .0001$ both years)
Using hydrogen will reduce U.S. dependence on foreign oil...

- Little change in other opinions as well.
Eleven technical questions about hydrogen, three about fuel cells in particular

- People were more familiar with hydrogen in general than fuel cells
- State & local officials were the most “aware”
- Potential end users were a distant second
Perception of Hydrogen Safety by Other Target Populations (2004 Only)

- Responses to “Hydrogen is too dangerous for everyday use by the general public” (red, percent disagree) and “Hydrogen is as safe as gasoline and diesel fuels” (blue, percent agree)

- Again note the association of technology acceptance and technical awareness (compare previous slide)
Future Work

• Conduct 2008 survey of end users, students, and state and local officials (under way)

• Obtain OMB approval for survey of safety and codes officials (may entail modifying the survey design or questionnaire)

• Conduct survey of safety and codes officials (FY08?)

• Analyze and report on survey findings (FY09)

• Prepare presentations and other publications to publicize the results of the surveys
Summary

• Nonresponse bias is a challenge, but to some extent cancels in cross-year comparisons.

• The general public is more concerned about safety and cost than the environment, but more concerned about the environment than convenience and performance.

• Hydrogen technology acceptance is strongly associated with hydrogen technical awareness.

• The general public’s hydrogen technical awareness has not improved in the last four years. Opinions about hydrogen are also about the same.

• The association between technical awareness and technology acceptance extends to the student, state & local official, and potential end user populations.

• Interpretations to be discussed in the Q&A session…