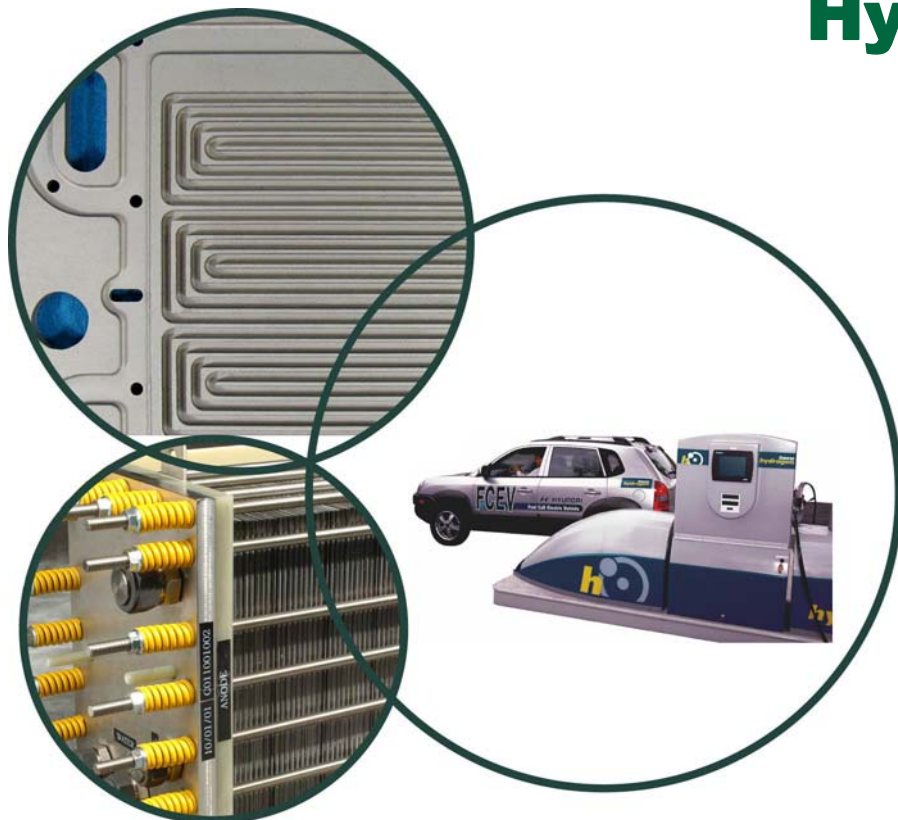




DOE Hydrogen Program

# 2007 DOE Hydrogen Program: Hydrogen Knowledge and Opinions Assessment



**Rick Schmoyer**

**Oak Ridge National Laboratory**

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**Project ID # ED1**

This presentation does not contain any proprietary, confidential, or otherwise restricted information

# Overview

## Timeline

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

## 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)**

## Barriers

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

## 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

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

# 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](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)

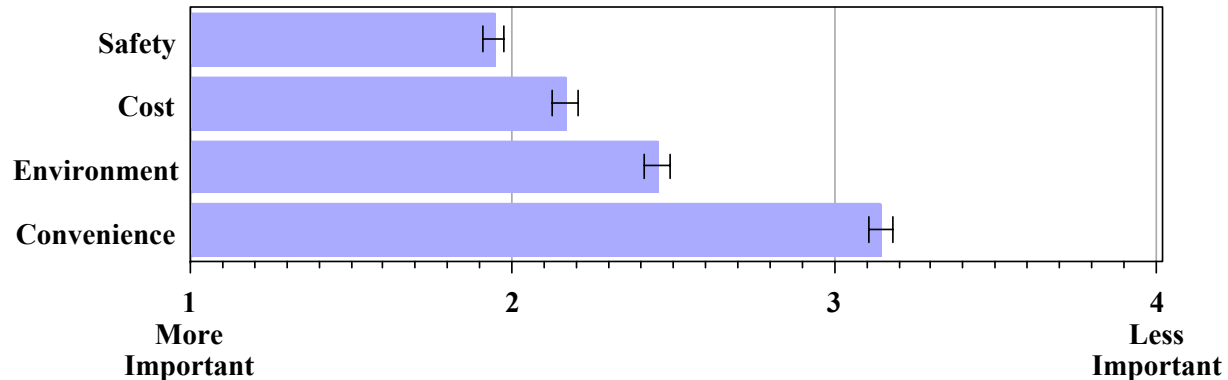
<b>Year</b>	<b>Survey Component</b>	<b>Number of Respondents</b>	<b>Response Rate</b>
<b>2004</b>	<b>General Public</b>	<b>889</b>	<b>24.8%</b>
	<b>Student</b>	<b>1,000</b>	<b>27.5%</b>
	<b>State &amp; Local Government</b>	<b>236</b>	<b>95.9%</b>
	<b>End User</b>	<b>99</b>	<b>29.1%</b>
<b>2008</b>	<b>General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

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

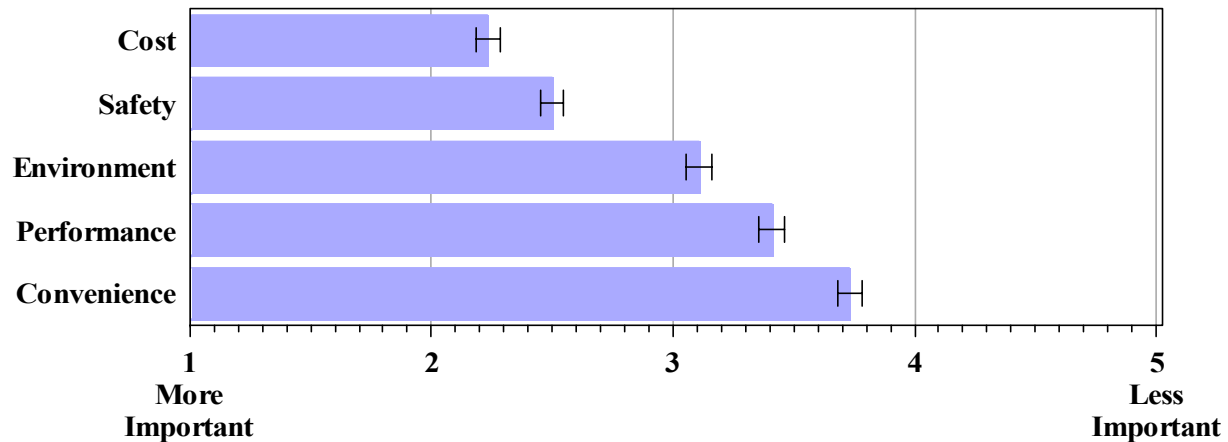


# Average Value Rankings\*

2004



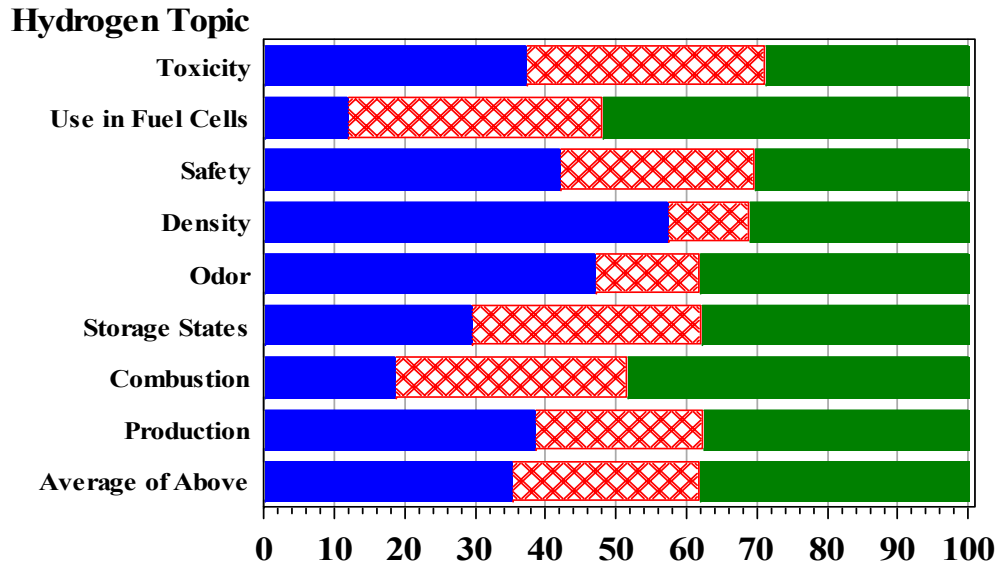
2008



- **\*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.

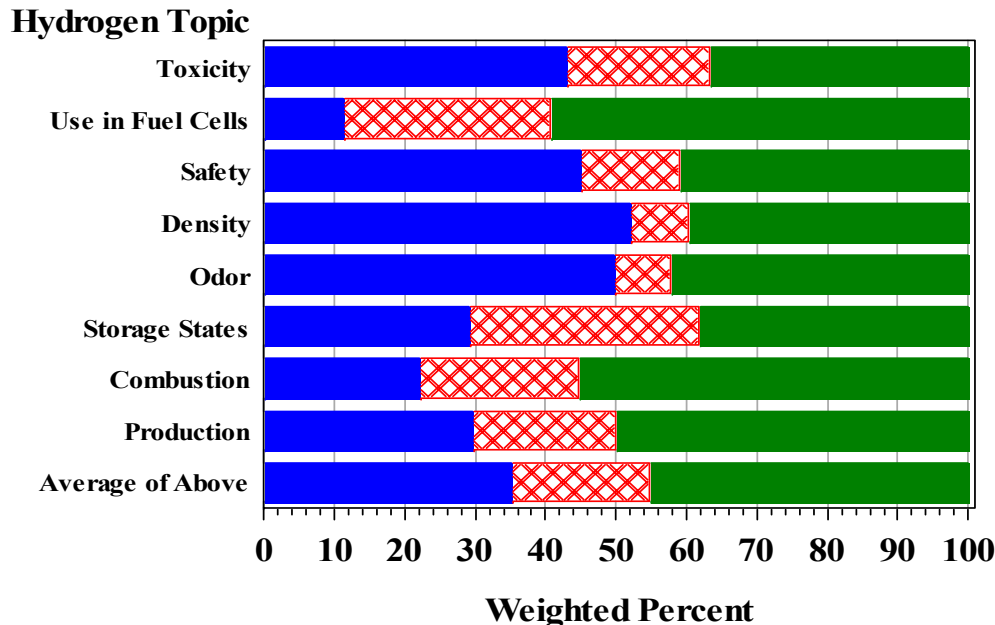
# Hydrogen Technical Question Scores

2004



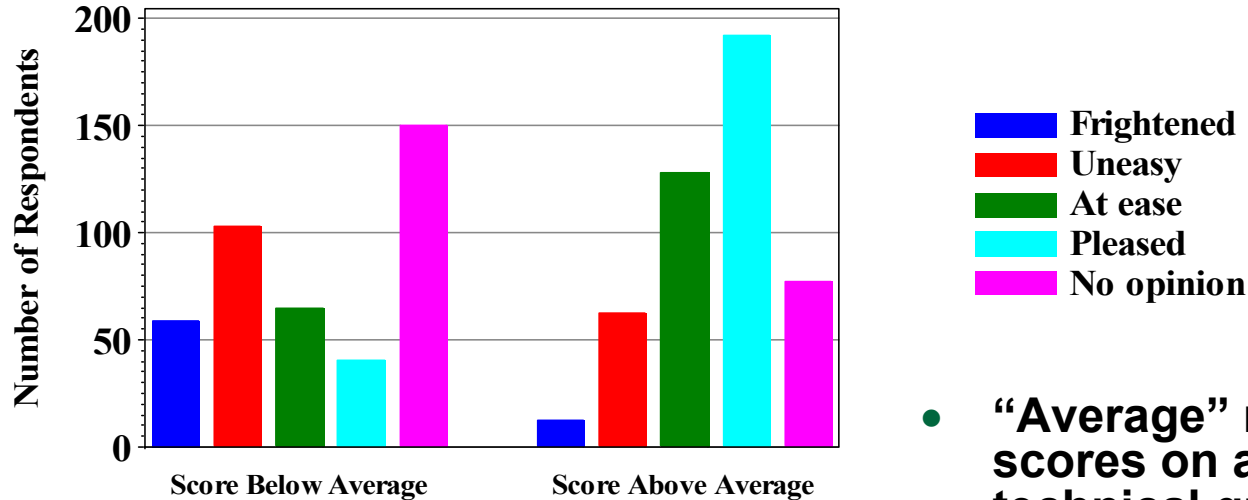
- Overall averages (% ± std. err.):
  - 2004: 35.18 ± 0.89
  - 2008: 35.19 ± 1.03
- Little change in technical understanding

2008

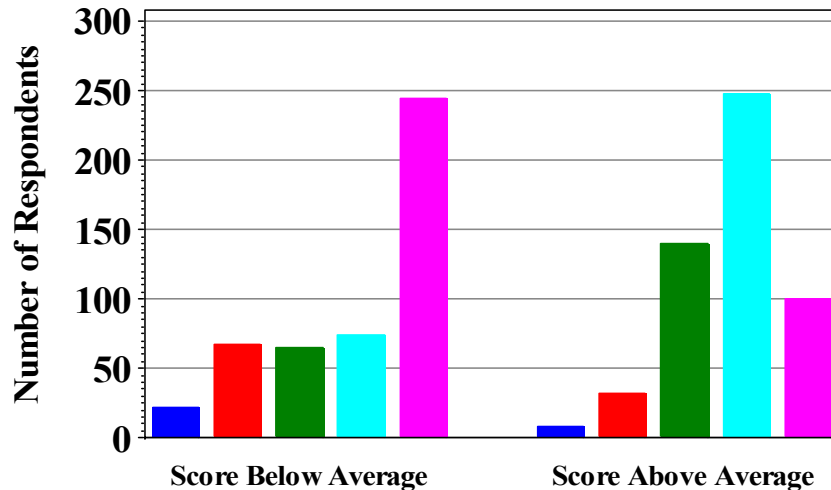


# “How would you feel if your local gas station also sold hydrogen?” vs Technical Question Scores

2004



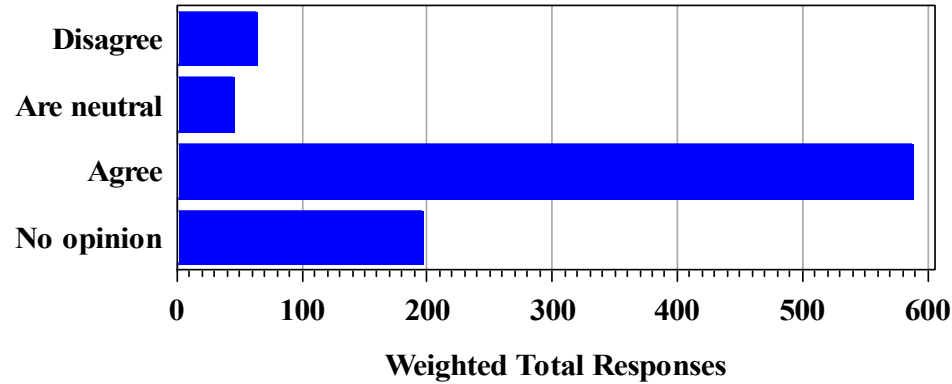
2008



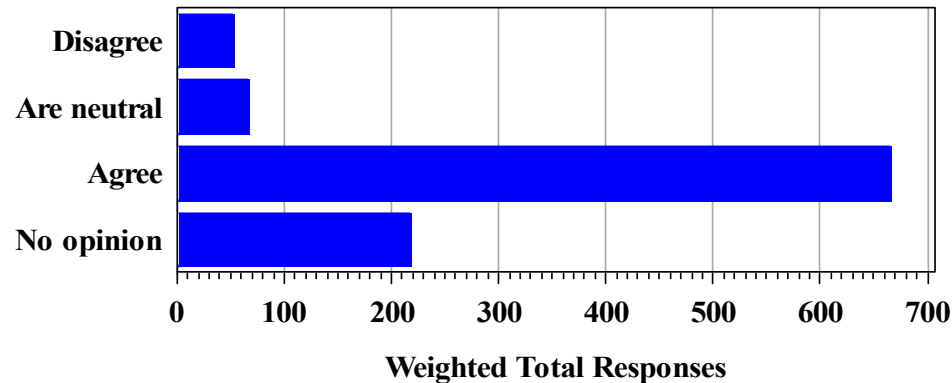
- “Average” refers to scores on all eight technical questions (previous slide)
- Association of technical understanding with technology acceptance is clear (also highly significant:  $p < .0001$  both years)

# Using hydrogen will reduce U.S. dependence on foreign oil...

2004

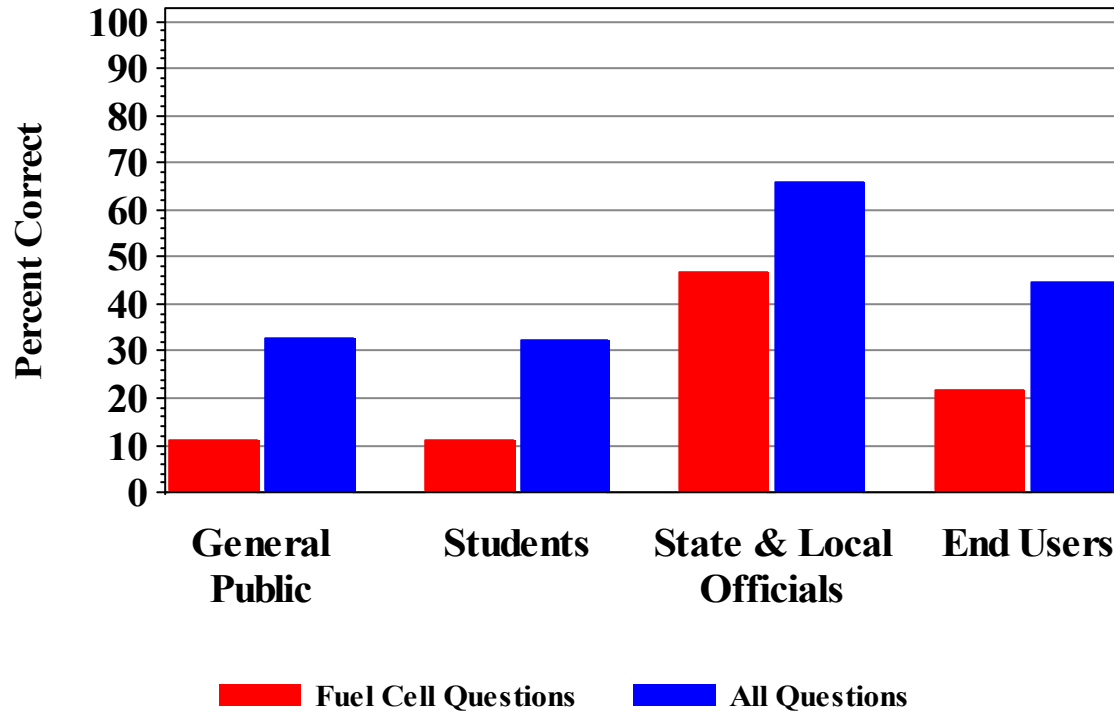


2008



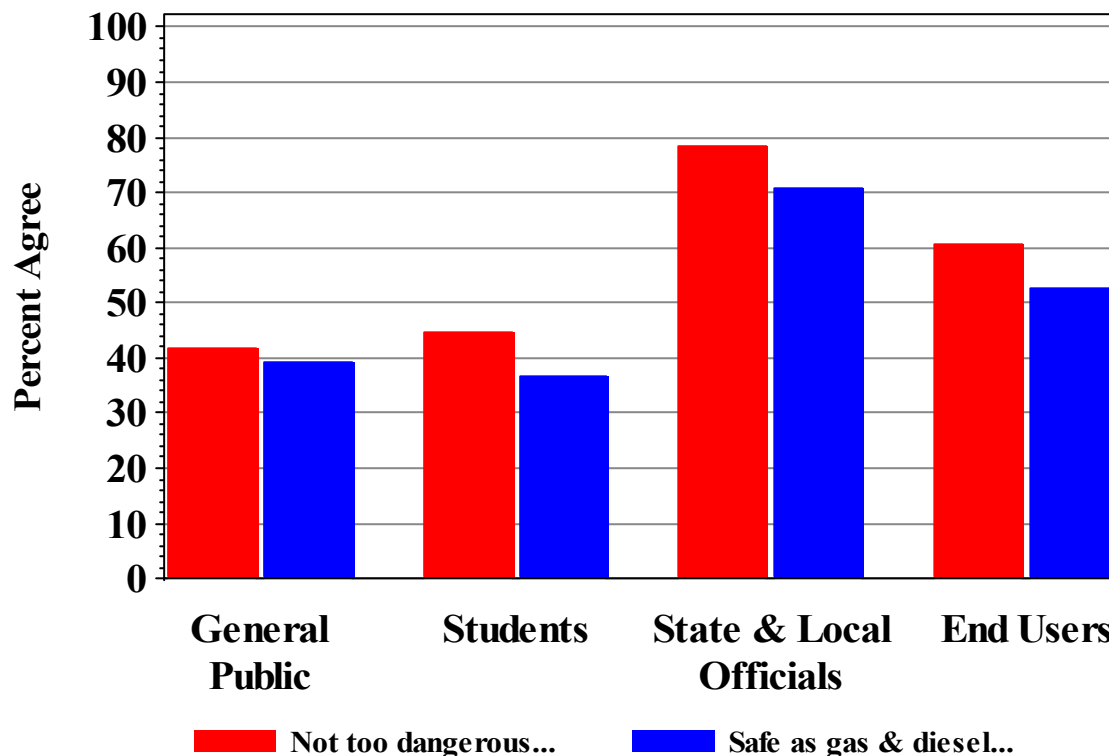
- Little change in other opinions as well.

# Technical Question Scores for Other Target Populations (2004 Only)



- **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...