8. Educational Activities and Technology Integration Activities

Introduction

The Technology Integration subprogram accelerates the adoption and use of alternative fuel and advanced technology vehicles, including fuel cell vehicles, to help meet national energy and environmental goals and accelerate dissemination of advanced vehicle technologies through demonstrations and education. This subprogram's efforts logically follow successful research by industry and government and help to accelerate the commercialization and/or widespread adoption of technologies that are developed in other VT program areas. Deployment activities linked to R&D also provide early market feedback to emerging R&D.

Subprogram functions include both regulatory and voluntary components. The regulatory elements include legislative, rulemaking, and compliance activities associated with alternative fuel requirements identified within the Energy Policy Acts of 1992 and 2005 (EPACT 1992 and EPACT 2005). Voluntary efforts include demonstration of advanced technology vehicles to verify market readiness and public information, education, outreach and technical assistance efforts.

Education aids in overcoming institutional barriers to widespread use of advanced vehicle technologies and alternative fuels. Activities such as the Advanced Vehicle Competitions and GATE encourage the interest of university student engineers and engage their participation in advanced technology development.

EcoCAR: The NeXt Challenge: EcoCAR is a three-year engineering competition sponsored by the Vehicle Technologies Program and General Motors (GM). EcoCAR, started in 2008 and ending in 2011, challenges students to reengineer a 2009 Saturn Vue. The Challenge is to engineer a system that reduces fuel consumption and lower emissions by using advanced vehicle technologies. This is state-of-the-art training and allows students to mirror the real-world development process used by GM and other auto manufacturers from around the world.

Automotive X Prize: DOE has partnered with Automotive X Prize to develop an educational outreach program aimed at engaging students (kindergarten-12) and the public in learning about advanced, energy-efficient vehicles. DOE is providing $3.5 million over 3 years for the outreach effort. The Automotive X Prize (AXP) is an open competition with the goal of inspiring a new generation of super-efficient vehicles that dramatically reduce oil dependence and greenhouse gas emissions.

Graduate Automotive Technology Education (GATE): The DOE established the GATE Program in 1998 to train a future workforce of automotive engineering professionals knowledgeable about, and experienced in, developing and commercializing advanced automotive technologies to help overcome technology barriers preventing the development and production of cost-effective, high-efficiency vehicles for the U.S. market. To that end, DOE established 10 GATE Centers of Excellence at nine U.S. universities that addressed fuel cells, hybrid electric vehicle drivetrains and control systems, lightweight materials, direct-injection engines, and advanced energy storage.

EPAct Transportation Regulatory Activities: The U.S. Department of Energy's (DOE) Vehicle Technologies Program manages several transportation-related regulatory activities established by the Energy Policy Act of 1992 (EPAct), as amended by the Energy Conservation Reauthorization Act of 1998, EPAct 2005, and the Energy Independence and Security Act of 2007 (EISA). These activities seek to reduce U.S. dependence on imported oil through the use of alternative fuels and alternative fuel vehicles (AFVs), as well as through the use of other petroleum-displacement methods. EPAct 1992 defined certain fuels as alternative fuels and directed DOE to undertake regulatory activities that focus on building an inventory of fleet AFVs in Metropolitan Statistical Areas/Consolidated Metropolitan Statistical Areas, which were selected to serve as launching pads for alternative fuels and advanced vehicle technologies.

Clean Cities Program: Clean Cities strives to advance the nation's economic, environmental, and energy security by supporting local decisions to adopt practices that contribute to the reduction of petroleum consumption. Clean Cities has a network of approximately 90 volunteer coalitions, which develop public/private partnerships to promote alternative fuels and advanced vehicles, fuel blends, fuel economy, hybrid vehicles, and idle reduction.

In this merit review activity, each reviewer was asked to respond to a series of questions, involving multiple-choice responses, expository responses where text comments were requested, and numeric score responses. In the pages that follow, the reviewer responses to each question for each project will be summarized: the multiple choice and numeric score questions will be presented in graph form for each project, and the expository text responses will be summarized in paragraph form for each question. A table presenting the average numeric score for each question for each project is presented below.

Presentation Title	Principal Investigator and Organization	Page Number	Approach	Technical Accomplishments	Collaborations	Future Research	Weighted Average
Penn State DOE Graduate Automotive Technology Education (GATE) Program for In-Vehicle, High-Power Energy Storage Systems	Joel Anstrom (Pennsylvania State University)	8-10	3.00	3.20	3.00	3.00	3.10
UC Davis Fuel Cell, Hydrogen, and Hybrid Vehicle (FCH2V) GATE Center of Excellence	Paul Erickson (University of California - Davis)	8-13	3.25	3.00	2.50	2.50	2.94
GATE Center for Advanced Automotive Propulsion	Yann Guezennec (Ohio State University)	8-16	3.50	3.75	4.00	3.25	3.66
The University of Tennessee's GATE Center for Hybrid Systems	David Irick (University of Tennessee)	8-18	2.50	2.25	2.50	2.50	2.38
University of Illinois at Urbana-Champaign's GATE Center for Advanced Automotive Bio-Fuel Combustion Engines	Chia-fon Lee (University of Illinois at Urbana-Champaign)	8-20	3.60	3.40	3.60	3.20	3.45
Center for Lightweighting Automotive Materials and Processing	P.K. Mallick (University of Michigan - Dearborn)	8-22	2.83	3.00	2.83	2.83	2.92
Clean Cities Tool Development and Demonstrations	Margo Melendez (NREL/ORNL)	8-25	3.67	4.00	3.33	3.33	3.75
GATE Center for Automotive Fuel Cell Systems at Virginia Tech	Doug Nelson (Virginia Tech)	8-27	3.17	3.33	3.17	3.17	3.25
Clean Cities Regional Support & Petroleum Displacement Awards	Michael Scarpino (National Energy Technology Laboratory (NETL))	8-30	3.00	3.25	3.25	3.50	3.22
GATE Center of Excellence at UAB in Lightweight Materials for Automotive Applications	Uday Vaidya (The University of Alabama at Birmingham)	8-33	3.00	3.20	3.00	3.00	3.10
EcoCAR the Next Challenge	Mike Wahlstrom (Argonne National Laboratory (ANL))	8-36	3.25	3.25	3.75	3.75	3.38
Automotive X PRIZE Education Program	Mark German (X PRIZE Foundation)	8-38	3.40	3.40	3.60	3.25	3.41
Merit Review: EPAct State and Alternative Fuel Provider Fleets	Dana O'Hara (U.S. Department of Energy)	8-41	3.33	3.67	3.00	3.33	3.46

Presentation Title	Principal Investigator and Organization	Page Number	Approach	Technical Accomplishments	Collaborations	Future Research	Weighted Average
OVERALL AVERAGE FOR EDUCATION-TECHNOLOGY INTEGRATION			**3.17**	**3.26**	**3.19**	**3.11**	**3.21**

NOTE: Italics denote poster presentations.

The reviewers viewing the projects dealing with hydrogen education were asked a slightly different set of questions provided by the Hydrogen Program: a summary of the results from these reviews is provided below.

Presentation Title	Principal Investigator and Organization	Page Number	Relevance	Approach	Technical Accomplishments	Collaborations	Future Research	Weighted Average
Hydrogen Safety: First Responder Education	Marylynn Placet, Pacific Northwest National Laboratory (PNNL)	8-43	3.80	3.60	2.80	3.40	3.80	3.32
Hydrogen Education for Code Officials	Melanie Caton, National Renewable Energy Laboratory (NREL)	8-45	4.00	3.50	3.25	3.50	3.25	3.48
Hydrogen and Fuel Cell Education at California State University, Los Angeles	David Blekhman, Cal State LA University Auxiliary Services, Inc.	8-47	3.00	3.20	3.00	3.60	3.00	3.10
Hydrogen Energy in Engineering Education (H2E3)	Peter Lehman, Humboldt State University Sponsored Programs Foundation	8-49	3.40	3.40	2.80	2.80	3.20	3.08
Hydrogen Education Curriculum Path at Michigan Technological University	Jason Keith, Michigan Technological University	8-51	3.00	3.40	3.20	2.60	3.20	3.14
Bachelor of Science Engineering Technology Hydrogen and Fuel Cell Education Program Concentration	A.K. Sleiti, University of Central Florida	8-53	2.80	3.00	2.60	2.00	2.25	2.63
Development of a Renewable Hydrogen Production and Fuel Cell Education Program	Michael Mann, University of North Dakota	8-55	3.20	3.20	2.20	2.80	2.80	2.72
Dedicated to the Continued Education, Training and Demonstration of PEM Fuel Cell Powered Lift Trucks In Real-World Applications	Tom Dever, Carolina Tractor & Equipment Co. Inc.	8-57	3.60	3.20	3.20	3.20	3.00	3.26

Presentation Title	Principal Investigator and Organization	Page Number	Relevance	Approach	Technical Accomplishments	Collaborations	Future Research	Weighted Average
Hydrogen Education in Texas	David Hitchcock, Houston Advanced Research Center	8-60	3.40	2.60	2.40	2.60	2.40	2.66
Development of Hydrogen Education Programs for Government Officials	Shannon Baxter-Clemmons, The South Carolina Hydrogen and Fuel Cell Alliance	8-63	3.20	2.60	2.40	3.80	2.80	2.78
VA-MD-DC Hydrogen Education for Decision Makers	Chelsea Jenkins, Commonwealth of Virginia	8-66	3.25	3.75	3.50	3.50	3.25	3.48
2009 DOE Hydrogen Program Review Presentation	Joel Rinebold, Connecticut Center for Advanced Technology, Inc.	8-68	3.60	3.40	3.60	3.40	3.20	3.50
Raising H2 and Fuel Cell Awareness in Ohio	Pat Valente, Ohio Fuel Cell Coalition	8-70	3.40	3.40	2.75	2.60	3.00	3.02
H2L3: Hydrogen Learning for Local Leaders	Patrick Serfass, Technology Transition Corporation	8-72	3.80	3.60	3.60	3.40	3.80	3.64
Hydrogen Education State Partnership Program	Charles Kubert, Clean Energy States Alliance	8-74	3.40	3.20	3.00	3.20	3.20	3.16
Hydrogen Knowledge and Opinions Assessment	*Rick Schmoyer, Oak Ridge National Laboratory (ORNL)*	*8-76*	*3.75*	*3.75*	*3.50*	*3.50*	*3.50*	*3.60*
OVERALL AVERAGE FOR HYDROGEN EDUCATION			**3.40**	**3.29**	**2.97**	**3.10**	**3.11**	**3.15**

NOTE: Italics denote poster presentations.

Overview of Clean Cities and Top Accomplishments: Dennis Smith, U.S. Department of Energy

1. Was the Sub-program area adequately covered? Were important issues and challenges identified? Was progress clearly presented in comparison to the previous year?

A reviewer stated it was a good overview of the Clean Cities Program and role of National Laboratories. Tracking and measurement of petroleum displacement is a key metric of the success of the program. DOE should continue to use and document this metric. The programs do a good job of leveraging additional funding through cost sharing. AFDC and FuelEconomy.gov provides an excellent resource of information for researchers, consumers, fleet managers. Development of interactive online tools is a new feature that has received recent focus. These tools make it more exciting for consumers and the public to get involved with fuel efficient technologies. Nice tools for tracking fuel economy, locating fueling stations. Another reviewer noted the presentation was very well delivered and coherently covered all of the critical areas of the Clean Cities program. The organization and effectiveness of the Clean Cities program have greatly improved from its early days. While the current level of petroleum displacement is well below the 2020 target it is growing at an ever increasing rate. Given the new administration and renewed focus on energy security issues, they are hopeful that the Clean Cities program will achieve greater prominence and effectiveness. One reviewer commented all program areas were identified and introduced. The presentation focused on Clean Cities and its mission and strategies were clearly discussed. Clean Cities accomplishments to date are impressive with about 100 coalitions and nearly 6,000 stakeholders resulting with 2 billion GGE displaced since 1993 and 375 million GGE in 2008. Good work with National Parks and in the development of alternative fuel corridors. There is a strong educational component. GATE, challenges, and other areas were clearly discussed. Comments from another reviewer noted Dennis clearly covered the sub-program and identified issues and challenges. He clearly presented a comparison of this year to the previous year(s). Another reviewer mentioned the Sub-program overview provided a complete overview of the program strategy, important issues and challenges. Progress towards the goals was demonstrated. One reviewer brought up the area of technology integration was covered thoroughly. Progress was clearly shown with many important accomplishments: displacement of petroleum, educating the public, and providing a new generation of engineers. Overall sub-program issues were not presented, but individual presentations addressed their issues. Another reviewer answered yes then said the Sub-program was adequately covered and issues and challenges were identified. A comparison of progress made by the Clean Cities program from the prior year was also given.

2. Are plans identified for addressing issues and challenges? Are there gaps in the project portfolio?

A reviewer stated the programs do a good job of covering the focus areas of outreach/education, infrastructure development, and coordination with EPAct fleets. Education programs like EcoCAR and GATE are very strong components and have had great success as evidenced by the number of graduates that have taken jobs at DOE, automotive manufacturers, and other companies involved with efficient transportation. They do not see apparent gaps in the programs and projects that are funded. Another reviewer commented future actions that were detailed in the presentation appeared to be correctly focused to both address the challenges of the program and to capitalize on new web based outreach tools that are becoming available. They could not identify any significant gaps in the program. One reviewer mentioned it does not appear that there are gaps in the project portfolio and DOE has clearly identified a number of plans to address continuing challenges to increasing the use of alternative fuels, alternative fuel vehicles, hybrids, plug-in hybrids, and ways to get current drivers to drive smarter. Comments from another reviewer noted they have good plans to address the challenges within their budget constraints while another reviewer stated overall sub-program issues were not presented, but individual presentations addressed their issues. Another reviewer mentioned very little was presented regarding issues, challenges, and gaps. Not much was said regarding interactions with industry technology providers to promote their products. One reviewer answered yes; there are plans in place to improve Clean Cities.

3. Does the Sub-program area appear to be focused, well-managed, and effective in addressing the DOE Vehicle Technologies Program R&D needs?

A reviewer stated the sub-program consists of a broad range of activities and appears to be well managed. Clean Cities appears to be well focused and effective. It appears that Clean Cities would be an excellent mechanism to help identify gaps in technology development and accelerate technology demonstration and deployment; however, nothing was presented regarding this potential coordination with the Vehicle Technologies R&D effort. Coordination with the R&D program is one area that could be better explained and/or promoted. Another reviewer commented a well rounded approach was taken and it seems to be effective, although, more R&D for vehicle technologies is always needed to reduce petroleum usage. One reviewer mentioned this program is well managed and focused on those challenges within their budget scope. Comments from one reviewer noted this is not so much a R&D program as a program assistance, coordination, and outreach program. As such it appears to be effective and appropriately focused and managed. Three reviewers answered yes, with one saying the program is well focused and addresses the national goals and needs to increase fuel efficiency, displace petroleum fuels and increase deployment of alternative fuels, and advanced technologies. The program focus is broad but seems to be well covered. Another reviewer who answered yes also wrote the Sub-program does appear to be focused, well-managed and effective in addressing the DOE Vehicle Technologies Program R&D needs.

4. Other comments:

A reviewer stated it was unbiased, technically reliable data. The programs do a good job at providing unbiased information. There is a need to make Clean Cities Coordinators aware of the tools that are available and making Clean Cities University a requirement for coordinators is a good idea for trying to address this problem. Another reviewer mentioned they like to see HQ staff take the lead in local Coalition activities.

Overview of Hydrogen Education: Christy Cooper, U.S. Department of Energy

1. Was the Sub-program area adequately covered? Were important issues and challenges identified? Was progress clearly presented in comparison to the previous year?

A reviewer stated accomplishments for 2008 were well-outlined in the opening presentation. Education efforts cover the major audiences well (students, safety/code officials, end users, governments). Concrete goals and objectives were presented, as well as the target audiences. The program's focus on making technology information easily understood by the lay person is very important, as they will ultimately need to be comfortable with the technology to purchase it in the future. Another reviewer commented the presentation was an efficient summary of a wide variety of education activities throughout the DOE Hydrogen Program. Challenges were clearly identified and progress was shown. One reviewer noted the issues and challenges were clearly delineated. Projects were listed according to area of focus. Comments from another reviewer stated good coverage of the topic. Progress was highlighted and challenges were discussed. Another reviewer stated this was an exceptional sub-program overview. The Technology Manager provided an in-depth overview of all aspects of the sub-program, including highlights of current projects, training activities by target audiences and numbers that have been reached to date. The same depth of information was also provided for codes & standards activities. The current and past budgets were addressed, as well as organizational changes. One reviewer noted the sub-program was well covered and important issues identified, with another reviewer commenting the overview was concise and clear. Three reviewers all answered yes; with one adding that the importance of education in furthering the hydrogen economy was detailed.

A reviewer stated the subprogram seemed to be covered rather well. They think the education area is one that still could stand some further work. In the areas of first responders training and codes training, they estimate that progress has clearly been made, but it is still lagging need. There is a need to come up with ways to better deliver this information to potential adopters of the technologies. In the state and regional awareness activities, the fall 2008 awards make it difficult to assess progress to date. Another reviewer commented they believe that a robust educational and outreach effort is critical to support the advancement of breakthrough technologies. Fuel cells generally do not have the benefit of robust outreach efforts from the industry to build public awareness of the products and their benefits, therefore it is justified for the public sector to coordinate a national effort, and the use of "clusters" to support the national effort is prudent. The use of "clusters" in the form of selecting programs in several key states is financially prudent. This reviewer thinks the program has selected the right states and the right principals within these states. They also believe the principals with a scope beyond the state level are also good selections. This reviewer urges the program to proceed with a coordinated effort to communicate jointly and frequently with these groups and, where financially justified, to support the outreach efforts of these principals at key events by sending DOE representatives to these events.

2. Are plans identified for addressing issues and challenges? Are there gaps in the project portfolio?

A reviewer stated issues and challenges were identified, but the plans to address them were not explicitly outlined (but are implicit in the summaries of projects that were done over the year). Another reviewer noted that challenges were identified; current and future approaches to overcome the challenges and ways to improve the sub-program were discussed. One reviewer commented well-organized program, with very specific products for a variety of audiences. Challenges for the variety of audiences are well-understood and appropriate tools are being used and developed. Given the wide ranging needs, this is an important aspect of the education program. Comments from another reviewer stated the plans are adequately identified - no apparent gaps with another reviewer agreeing that there were no obvious gaps detected in the portfolio. Another reviewer stated the issues and challenges were identified and addressed, with another reviewer adding plans for dealing with challenges were identified but having the key person (Ms. Cooper) on another assignment is a weakness. Two reviewers both answered yes to the question, with one reviewer adding for each of the target audiences, projects have been identified. The key target audiences in addition to the general public are identified showing a comprehensive approach to addressing education needs.

A reviewer stated the portfolio for education spans the U.S. There are efforts that have been awarded for South Carolina, Texas, Ohio, Florida, Michigan, a greater U.S. effort and coordination has occurred among those entities. Another reviewer noted they think there is opportunity to 'synthesize' material being developed in the regional and state projects. Ensure the basic materials are consistent, adequate, and clear, while placing the state and regional details on top of that 'core'. One reviewer commented that no funding next year will greatly hinder the program's portfolio. Comments from another reviewer stated they would urge the portfolio to consider state-level regulatory actions, especially renewable portfolio standards that recognize fuel cells without fuel source restrictions. Only a few states have this and most of the states that have adopted RPS impose fuel source restrictions on fuel cells. Another reviewer noted the plans were not very specific nor was there any mention of possible effects of the priorities and budget requests of the new Secretary.

3. Does the Sub-program area appear to be focused, well-managed, and effective in addressing the DOE Vehicle Technologies Program R&D needs?

A reviewer stated the additional staff resources from Vehicle Technologies are welcomed. The program is logically structured by target audiences, and reasons to reach out to each audience are well-outlined. Outreach efforts appear to be effective: the upcoming opinion survey will confirm this. It will be critical to ensure that the various programs that seem to be addressing different subsets of the same major audience groups be coordinated to the maximum extent possible: this would seem to be of benefit to DOE from a cost standpoint. Another reviewer noted the Hydrogen Education sub-program is very well managed. In addition to addressing education needs, the sub-program includes projects that increase market transformation. One reviewer commented the program has many audiences, and specific sets of tools are designed to target one or more of those audiences. The program team has done a great job of tackling the challenges of putting together age- and audience-appropriate materials. Another reviewer stated the theme of providing technically accurate information in an understandable manner to a non-technical audience is outstanding. That is exactly what needs to be done in order to promote key points about hydrogen and fuel cells and to counter much of the inaccurate information that is out there. One reviewer stated it appears to have done quite a bit on a limited budget. Comments from another reviewer mentioned the sub-program has been well coordinated and managed as activities have transferred from the HFCIT program to vehicles. One other reviewer noted the sub-program does appear to be focused and generally effective. There is no way to know from the presentations whether or not it is well managed. Five of the reviewers answered yes with one adding they think there is still a great opportunity to leverage ongoing work of federal and private sector entities to provide better content and delivery.

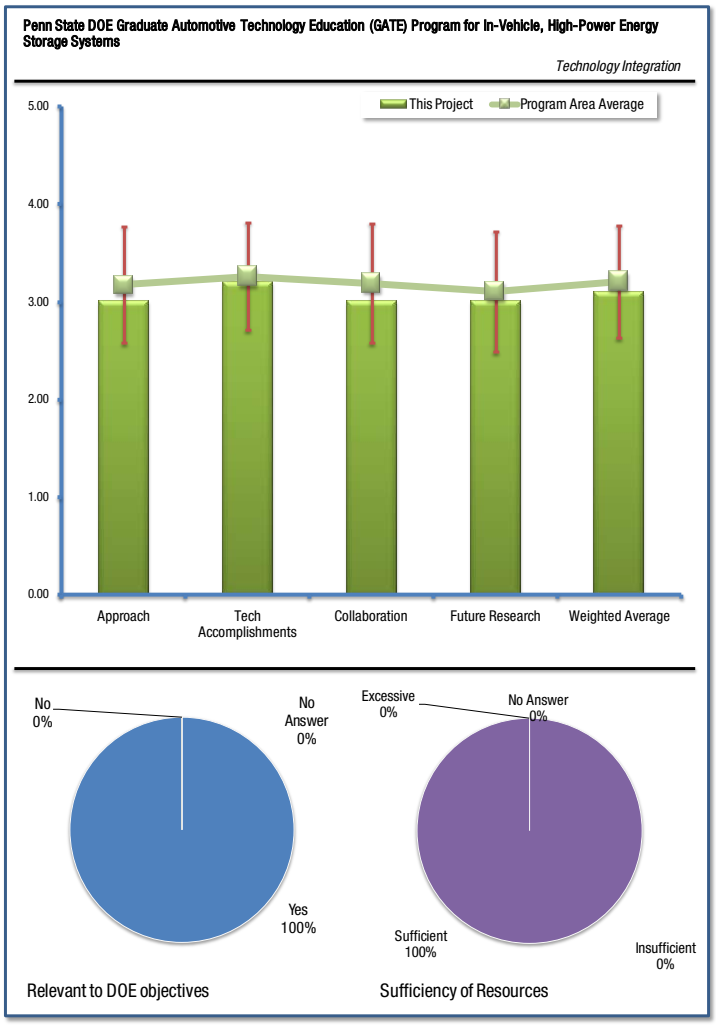
A reviewer stated the Sub-program appears to be well-managed but might be stronger if all of the teams within a focus area were organized as a unit. It seems like a waste of dollars to have each group (for instance in the education of local leaders) developing educational material. If each team were responsible for one piece, the majority of the time could be used to get the info out to those being targeted. Another reviewer commented management of the program suffers from having the key person assigned to another task.

4. Other comments:

A reviewer stated it seems that the program has done a lot of education with a small (and unsteady) budget. MySpace page is an interesting addition that will reach the most important future technology purchasers. Another reviewer noted it is important to sustain the education effort through the lean years of 2010 so as not to send the message that hydrogen and fuel cells are no longer a future clean technology that will help citizens and businesses in multiple ways. If at all possible, as strong an effort in messaging from DOE headquarters to these grass roots entities needs to be maintained, and if possible, expanded. One reviewer commented getting the baseline knowledge survey is crucial to future work and if anything it could be done more often. They applaud the DOE for taking modern approaches to education such as using tools like MySpace and other social networking tools. This should be continued since a multi-media approach is the only way to reach some audiences. An increased focus on using video is encouraged. The creation of short, education and informative videos can lead to viral sharing and therefore multiply the effectiveness of outreach. Comments from another reviewer mentioned education is a fundamental way to keep the

hydrogen program alive. The more people who understand and support hydrogen and fuel cells, the more likely they are to be vocal, thus ensuring that Congress continues to appropriate the necessary funds. This is a vital program and a good portfolio. Another reviewer talked about Christy Cooper as an excellent manager. They are glad DOE finally has some money to spend on education and outreach. We also need to learn from the Europeans. One reviewer stated this subprogram is an important component of the overall program. It should continue to receive funding in the future. Another reviewer said thanks for the opportunity to assess the projects. An additional reviewer noted they urge the program to use frequent and joint communications activities with these principals, such as webinars and conference calls, to make sure that the principals are fully informed of important events and activities. One other reviewer mentioned the speaker was personable but not too effective as a speaker with another reviewer saying the program deserves a full time manager.

Penn State DOE Graduate Automotive Technology Education (GATE) Program for In-Vehicle, High-Power Energy Storage Systems: Joel Anstrom (Pennsylvania State University)



Reviewer Sample Size

This project had a total of 5 reviewers.

Question 1: Does this project support the overall DOE objective of petroleum displacement? Why or why not?

Several reviewers saw that the Penn State GATE program's focus on high power in-vehicle energy storage devices serves to enhance the development of key facilitating technologies for electric and hybrid electric vehicles. As such this research focus is directly relevant to the DOE goals of Petroleum displacement. One reviewer stated the project facilitates education of engineers in critical technologies for advanced efficient vehicles. Another reviewer thought the project is highly relevant to petroleum displacement through the development of trained engineers in the area of energy storage, which is a key component to developing viable hybrid and electric vehicles. A reviewer is of the opinion that educated students and advancement in energy storage is needed for significant increases in fuel economy, while another reviewer cites energy storage as one of the keys to EV vehicle performance.

Question 2: What is your assessment of the approach to performing the work? To what degree are technical barriers addressed? Is the project well-designed, feasible, and integrated with other efforts?

Several reviewers positively evaluated the program's approach. A positive review noted how the program appropriately leverages DOE funds with an approximate 25% university match. Curriculum and instructors appear to adequately cover the breadth of energy storage technologies that are the focus of this program. Another reviewer commented the overall approach is sound, and the program appears to be nicely integrated into existing engineering programs. The process for recruiting and involving students appears good by allowing multiple pathways for students to be involved in the program. The focused vehicle approach appears to be a solid way to involve students at various levels. Another reviewer focused on faculty involvement, commenting that the number of faculty members in the energy storage area will make the program successful, and that the program does not overload a single faculty member. This reviewer also noted how the program has developed and employed a very good plan of developing courses, recruiting, and developing GATE projects.

A mixed review stated that while barriers focused on attracting students and industry funding, it would have been beneficial to identify specific technical barriers. Although the center is for energy storage, it has expanded to include power electronics, combustion, and hardware in the loop. Integrating these elements will provide opportunities to investigate the at performance target optimization of components in a systems integration context. On the other hand, it does diffuse the effort from energy storage. Other universities are focused on hybrid systems.

Question 3: Characterize your understanding of the technical accomplishments and progress toward overall project and DOE goals.
According to reviewers, the program is on schedule, has developed a strong curriculum, and has the majority of key elements in place. According to one reviewer, because the focus is for graduate student education, the goals have been exceeded from the amount of funded students, classes offered, and the listed publications. Another reviewer thought the coordination between GATE and AVTC was good.

A reviewer noted that the new emphasis on HIL is good, as is how the HEV lab permits students a great opportunity to compete in major challenges. Fifty-five total students have participated as GATE fellows but they are behind in planned student semesters due to prior shortfall of students. Recent progress has been made in recruiting more students into the program. The placement of students in auto industry is strong. However, this reviewer mentions that industrial sponsorship continues to be less than optimum and should be a focus of improvement.

A reviewer thought tie-in of the program with undergraduate DOE AVTC student design vehicles provides a good way to transition undergraduates to continue on in the program, and an opportunity for the grad students to develop a broader perspective of the issues and challenges of integrating such emerging technologies into the vehicle environment. However, this reviewer did not think the presenter indicated whether the lack of properly prepared domestic students was limiting the number of GATE fellowships or whether it was the lack of sponsorship funds. Furthermore, while the number of students participating seems adequate, given the instructional infrastructure put in place, it would seem that the program could handle greater student through-put. A potentially troubling aspect was that most of the research papers were from 2006 and none more recent than 2007. The comment that it is hard to get masters students to publish doesn't fully explain away the lack of more recent papers.

Question 4: What is your assessment of the level of collaboration and coordination with other institutions?
Reviewers noted the strong collaborative relationships with many organizations. A reviewer felt the program did not have partners in the GATE but strong coordination with AVTC and other agencies, including NSF, DARPA, DOT, NASA, etc. The reviewer recognized sponsorship (in-kind, and contract) from industry and national labs, and saw a good networking event linking to PSU solar home.

Another reviewer thought the coordinated outreach with NSF appears to have reached a large number of K-12 students. Furthermore, two large grants from the PA DEP on hydrogen production seemed to drift from primary focus on batteries, capacitors, and flywheels. Workshops and the 3-day EV HEV expo are good outreach programs but the number of outreach events seemed to have slowed since 2007. A reviewer made note of the many industry and academic projects completed, and that an interesting HIL project is upcoming. Another reviewer commented that while the presentation lists no other direct "partners" it appears that non-DOE and university entities are funding some GATE student work (not clear from the presentation exactly how much). It also appears that there is a fairly good degree of research and academic relationships (including international) established at this program.

Some reviewers thought collaboration with industry is less than optimal. For instance, a reviewer thought most collaborative efforts were with Penn State-related functions, and commented that no industry partners were mentioned except for ones where students were placed after the fact - with the exception of A123. However, the reviewer was unsure of the extent of that involvement.

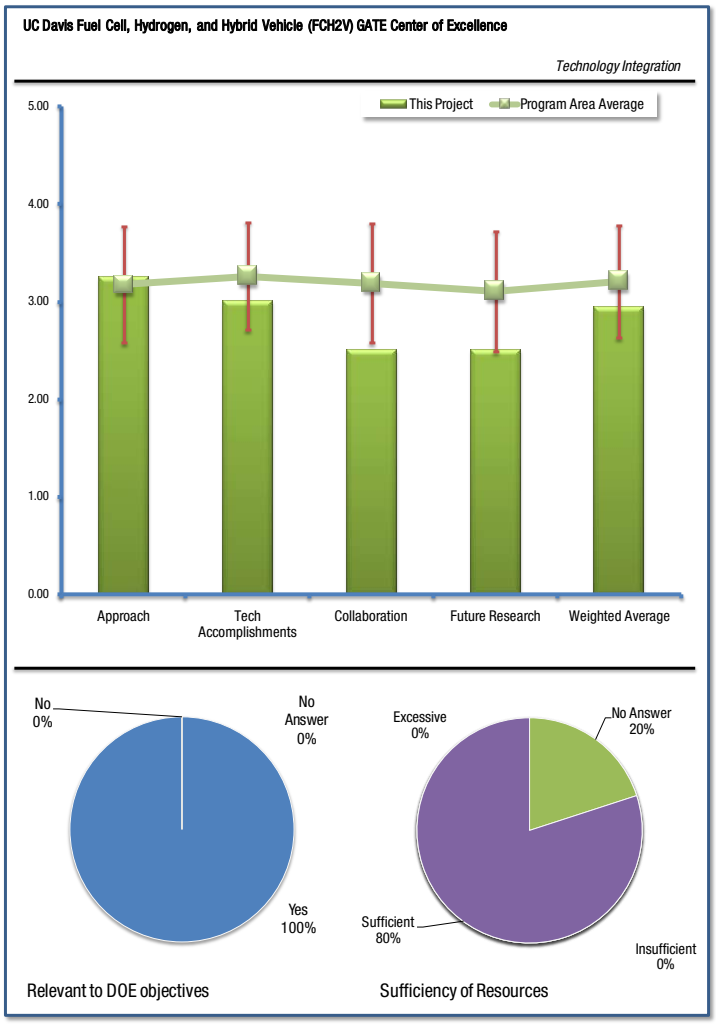
Question 5: Has the project effectively planned its future work in a logical manner by incorporating appropriate decision points, considering barriers to the realization of the proposed technology, and, when sensible, mitigating risk by providing alternate development pathways?
Among positive reviews, one thought the program appears to be pretty well established and is now focused on continuous improvement, though nothing of major significance was suggested for the final two years of the project. Another reviewer thought the program has a great plan to implement energy storage throughout their engineering program.

A reviewer thought the program seems to be working pretty well, and future work detailed in the presentation addresses key areas where growth is desired or needed. However, (not as a criticism of this program) it will be very difficult to add industry partnerships and funding in this current economic environment. Another reviewer thought that the presentation did not offer enough detail on future activities to describe how the program will improve.

Question 6: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?

Reviewers saw project funding as sufficient, or doing a lot with current funding levels. Another reviewer commented that the program appears adequately funded and supported, and as a result is on schedule. A reviewer noted how the center seems to have morphed from one focused on energy storage to hybrid systems.

UC Davis Fuel Cell, Hydrogen, and Hybrid Vehicle (FCH2V) GATE Center of Excellence: Paul Erickson (University of California - Davis)



Reviewer Sample Size

This project had a total of 5 reviewers.

Question 1: Does this project support the overall DOE objective of petroleum displacement? Why or why not?

Many of the reviewers thought the project is highly relevant to petroleum displacement. One reviewer thought this is due to the development of trained engineers in the area of fuel cells and hybrid vehicles, which are key components to enabling a reduction in the use of petroleum. Another reviewer noted that the program is centered on hydrogen and hybrid electric vehicles. A third reviewer opined that the merging of the two existing UC Davis GATE programs into the current version results in a broad focus of fuel cell and hybrid electric technologies that are directly relevant to the DOE objective of petroleum displacement.

Another reviewer noted how the project addresses educating future engineers-- "people who can navigate" in technical areas of fuel cell technology for transportation and hybrid-electric vehicles, and that the project is cross-training to enable the engineers to make the decisions that need to be made. This reviewer also noted a transition from a focus on FCV to HEVs and PHEVs.

Question 2: What is your assessment of the approach to performing the work? To what degree are technical barriers addressed? Is the project well-designed, feasible, and integrated with other efforts?

Many of the reviewers saw the project as having a sound approach. One reviewer echoed this, and noted how the program combined two existing centers to form the current FCH2V program. The program nicely leverages existing partners. The student recruitment process is rigorous and appears to be highly effective in selecting the best graduates for fellowships. The transition from hydrogen to hybrid topics for fellowships is a good response to current market forces. Another reviewer thought, while not specifically stated in the presentation, it appeared the program (given the program's performance) appropriately leverages DOE funds. Furthermore, to this reviewer curriculum appears to adequately cover the breadth of fuel cell and hybrid electric technologies that are the focus of this program. This reviewer perceives the broad program focus and emphasis on developing the knowledge for the students to be able to see the big picture as an advantage.

A reviewer made note of how two previous GATE centers, one in Fuel Cell and one in HEV, were combined into one. This reviewer also noted the synergistic focus areas: fuel cell and hybrid component level, vehicle and energy systems research, and fuel pathway analysis. The curriculum is well-organized and laboratories support the three core focus areas. There is an interdisciplinary approach, and engineering and economic side courses. Have had to address the

issue of prerequisites for courses as a result of the cross-cutting curriculum but seem to have an approach to manage this issue. Another reviewer did not feel barriers were stated in the slides, and the subsequent rating is an assumption.

Question 3: Characterize your understanding of the technical accomplishments and progress toward overall project and DOE goals.
Among positive reviews, one thought the program has developed strong interdisciplinary curriculum on both engineering and economic issues, has good student participation and currently has three graduate fellowship students. The program appears to have made some initial steps in transitioning from a fuel cell and hydrogen program to hybrid vehicles, and has successfully placed graduates with many major automotive companies. Another reviewer saw the program as being largely on-schedule and with the majority of key elements in place. According to this reviewer, the competitive nature of the program probably limits the number of students participating (quality vs. quantity). However, that said, the number of students appears to be fairly modest. Given the instructional infrastructure put in place, it would seem that the program could handle greater student through-put without sacrificing quality. However, tie-in of the program with the DOE AVTC student design vehicles provides a good way to transition undergraduates to continue on in the program as well as an opportunity for the graduate students to develop a broader perspective of the issues and challenges of integrating such emerging technologies into the vehicle environment. Hopefully, this can be used to increase both the quality and quantity of the students in this program. The quantity and diversity of recent publications by students and faculty seems to be pretty good.

Another reviewer made note of how the main focus is funding GATE fellows. The application process targets the top students. Applicants must submit a research plan. The project has had good success in recruiting and granting 3 GATE fellows. Students are undertaking highly relevant projects, and the project has admirable placement of students within the industry.

A mixed evaluation was that a reviewer did not feel technical accomplishments were stated in the slides, and the subsequent rating is an assumption.

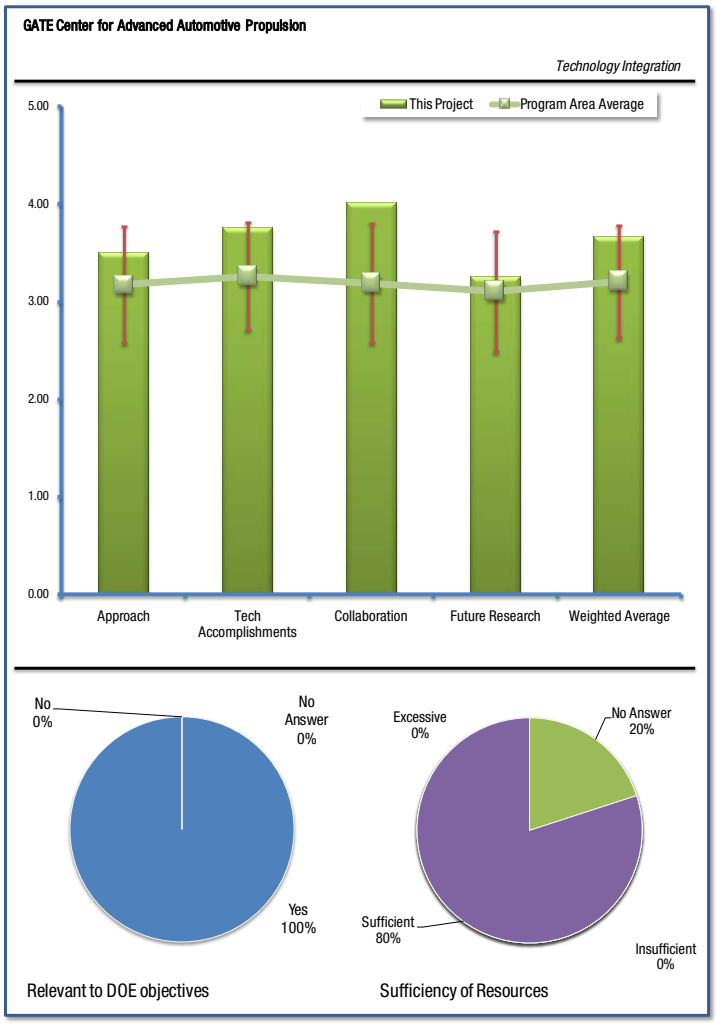
Question 4: What is your assessment of the level of collaboration and coordination with other institutions?
Several reviewers thought more external collaboration with other institutions and partners would be helpful and should be a focus. Specifically, a reviewer commented that while the programs and partnerships listed no doubt add to the program, there appears to be little direct industry sponsorship in place. The program seems to be "California Centered" with weak to non-existent relationships with national labs, non-California industry, or other universities (both in and out of the United States). If these relationships exist, they were not highlighted in the presentation. Another reviewer thought collaboration with the existing programs, and with the research and training facilities at UC Davis, was very good.

Question 5: Has the project effectively planned its future work in a logical manner by incorporating appropriate decision points, considering barriers to the realization of the proposed technology, and, when sensible, mitigating risk by providing alternate development pathways?
Many reviewers noted the lack of information describing future plans. A reviewer commented that, all in all, the program seems to be working pretty well, but the presentation did not detail specific future activities or areas where growth is desired or needed. Another reviewer stated that it was difficult to rate because barriers were not stated. A reviewer also noted how the transition to a hybrid program needs continued development.

Question 6: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?
A reviewer thought the program leverages existing programs and partners to provide extra support. The program has funded the fourth year of the GATE Program with only three years of funding from DOE through successful leveraging. The PI addressed the funding difficulties with the award process as an issue that needs to be addressed in the future with DOE. Another reviewer commented the resources appear to be sufficient. Funding issues were the focus of another reviewer. This reviewer commented that funding issues delayed the launch of this year's program

(application deadline slipped from April to May 09). Problem is probably not level of funding but timing and delivery. Hopefully, funding issues will not adversely impact the program.

GATE Center for Advanced Automotive Propulsion: Yann Guezennec (Ohio State University)



Reviewer Sample Size

This project had a total of 5 reviewers.

Question 1: Does this project support the overall DOE objective of petroleum displacement? Why or why not?

Responding reviewers see the program as highly and/or directly relevant to petroleum displacement. One reviewer saw this objective as being completed through the training of engineers in modeling, control, and system integration for advance propulsion systems. Another reviewer commented that the program addresses issues related to improving current propulsion systems and future ones. One reviewer took a broader view, stating that GATE students provide knowledgeable employees to the industry, and system integration is of vital importance as hybrid technology (lowering fuel consumption) becomes increasingly implemented. Another reviewer made similar comments, noting that the Ohio State GATE program focuses on a broad range of energy and emission technologies with an emphasis on the integration of these technologies into on the highway vehicle environment.

Question 2: What is your assessment of the approach to performing the work? To what degree are technical barriers addressed? Is the project well-designed, feasible, and integrated with other efforts?

Among positive reviews, one perceived that Ohio State GATE has developed a sound strategy focusing on training students' ability to integrate a variety of advanced automotive systems. The program has strong links to vehicle competitions and is highly leveraged, and offers a good number of courses covering a wide variety of topics. A second reviewer concurred, stating that the program has very well rounded deployment/approach: multiple projects, multi-disciplinary, and many different courses. Another reviewer noted how currently, there are four DOE funded GATE fellows and eight University or Industry funded GATE fellows as well as international visiting scholars that are not funded by GATE but work with the GATE program. As a result, the DOE funds appear to be well-leveraged. Curriculum and course offerings appear to cover adequately the breadth of advanced combustion, energy storage, fuel cell, sensing and actuation, and hybrid electric technologies that are the focus of this program. The emphasis on the integration of such technologies and systems is a strong point of this program.

A mixed review felt barriers were not addressed except the level of funding and what will become of the program after the GATE funding ends.

Question 3: Characterize your understanding of the technical accomplishments and progress toward overall project and DOE goals.

There were several positive comments, many of which focused on the curriculum and technical accomplishments. For instance, one reviewer thought the program was very successful, and noted how multiple projects (not GATE) have developed due to the GATE program. Another positive review opined that the program has developed and now offers a good number of courses covering a wide variety of topics. Short courses on specialized topics have been developed

and offered. The program currently has four DOE and eight industry supported fellows, seems to have attracted a lot of industry funding to leverage the DOE funds, has developed a highly successful International Visiting Scholar program, and has placed high in several challenges. The research has resulted in four to five patents plus other invention disclosures. The program is involved in several applications competing for funding under the American Recovery and Reinvestment Act.

Another reviewer noted how the program appears to have caught up with respect to schedule. Additionally, compared to other programs, the number of DOE funded students appears to be the same (~4 per year). However, the non DOE funded students seemed to drop significantly (~16 per year to ~8 per year). This could be due to funding problems and uncertainties as well as the tight economy. Given the instructional infrastructure put in place, it would seem that the program could handle greater student throughput. However, tie in of the program with the DOE AVTC student design vehicles, as well as other "hands on" vehicle projects, provides a good way to transition undergraduates to continue on in the program as well as an opportunity for the graduate students to develop a broader perspective of the issues and challenges of integrating such emerging technologies into the vehicle environment. Hopefully, this can be used to increase both the quality and quantity of the students in this program. Quantity and diversity of technical accomplishments, publications, and patents by students and faculty seems to be pretty good (above average for programs evaluated).

Question 4: What is your assessment of the level of collaboration and coordination with other institutions?

Several positive comments on how the program has done a good job of developing collaboration, including with many industry partners. One reviewer thought the program has attracted significant industry funding for fellowships and research. The thriving international program with visiting scholars supports diversity in the GATE program. The program is working with other GATE universities and industry to compete for stimulus funding. A reviewer made note of the many visiting scholars, multiple proposals with other university, and industry programs with GATE students. Another reviewer commented that the program seems to excel at developing strong partnerships and relationships with industry and other academic institutions both here and abroad.

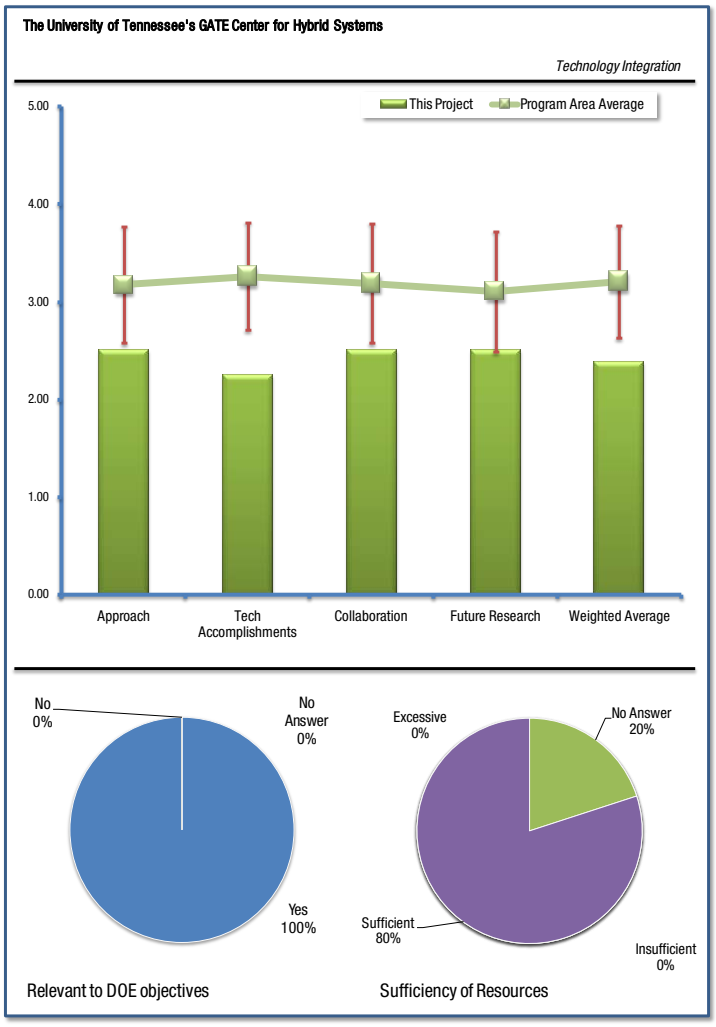
Question 5: Has the project effectively planned its future work in a logical manner by incorporating appropriate decision points, considering barriers to the realization of the proposed technology, and, when sensible, mitigating risk by providing alternate development pathways?

Many of the responding reviewers commented on how OSU has done very well with the GATE program. A reviewer commented that the program has plans for continuous improvement with existing efforts and the development of two additional courses in advanced battery and system integration. Another reviewer noted how OSU has many proposals planned or submitted which are a direct spinoff of the GATE program. A reviewer also noted how the program seems to have recovered well from past funding issues. Furthermore, future work detailed in the presentation appears to be a logical extension of the current programs strengths. However, through no fault of this program, the current economic difficulties may hamper near term progress.

Question 6: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?

A reviewer commented that OSU is doing many good things with the current funding level. A second reviewer noted that although DOE funding is a little behind, the program appears to have sufficient resources with significant contributions from industry. For a third reviewer, while past funding issues seem to have been mostly resolved, the presenters make a good point that it is very important to have steady funding sources because students are loath to commit to a program which may not be able to fully support them throughout their project.

The University of Tennessee's GATE Center for Hybrid Systems: David Irick (University of Tennessee)



Reviewer Sample Size

This project had a total of 5 reviewers.

Question 1: Does this project support the overall DOE objective of petroleum displacement? Why or why not?

Responding reviewers thought the program's focus on hybrid systems addresses DOE's petroleum reduction objectives. One reviewer commented that the program's goals are to overcome technology barriers, train engineers to enter the workforce in the areas of HEV and transportation efficiency, with a focus on advanced hybrid propulsion and control systems. Hence, this project does support the objective of petroleum reduction.

Question 2: What is your assessment of the approach to performing the work? To what degree are technical barriers addressed? Is the project well-designed, feasible, and integrated with other efforts?

Among positive responses, a reviewer thought the overall structure of the program is sound, with multiple faculty members from three departments. Another reviewer commented that relevant courses have been developed and are being taught at undergraduate, master's and Ph.D. graduate levels. Advanced vehicle competition is used as a platform for the GATE program. A reviewer noted how the program appears to be appropriately leveraging DOE funds with the University providing $250K in cost matching.

One reviewer felt that progress seems to be slow on challenges addressed last year. Based on the presentation materials it appears that there are currently only three GATE courses offered, with two more planned for the immediate future. Compared to the course offerings for the other GATE programs, this seems to be a weak area of this program.

Question 3: Characterize your understanding of the technical accomplishments and progress toward overall project and DOE goals.

One reviewer noted how the program has resulted in 14 GATE fellows and nine GATE research assistants. Moreover, the program has good placement of GATE graduates within the industry. Several students have transitioned from GATE fellowship to sponsorship on funded research projects. This is a good model for leveraging the GATE program to acquire other funded research projects and place students onto those research programs.

Another reviewer feels the program appears to be just recovering from the lab fire in 2006. As described in the presentation materials, it appears that there are only a couple of students have completed their MS or Ph.D's. There was no indication of the number of students currently enrolled in the program. This also appears to a significant weak area in this program. However, tie in of the program with the DOE AVTC student design vehicles provides a good way to transition undergraduates to continue on in the program as well as an opportunity for the graduate students to develop a broader perspective of the issues and challenges of integrating such emerging technologies into the vehicle

environment. Hopefully, this can be used to increase both the quality and quantity of the students in this program. This reviewer felt that the quantity and diversity of technical accomplishments, publications, and patents by students and faculty is underwhelming (below average for programs evaluated).

According to another reviewer, the program seems to have fallen off a bit. Currently only three courses are offered. It appears that facilities availability issues have hindered progress of program. Two recent students have graduated and are employed at ORNL but no mention was made of remaining students in the program or on the recruitment of new students. The program realized strong placement in Challenge X 2008. Aside from Challenge X 2008, outreach programs are somewhat limited. The current hydrogen fueled vehicle demonstration project is a bit adrift of primary focus area of hybrids. Another reviewer feels progress seems to be slow on challenges addressed last year.

Question 4: What is your assessment of the level of collaboration and coordination with other institutions?

Among positive reviews, one saw extensive partnerships. Another saw a focus on collaborative research and adjunct appointments with ORNL and ANL. GATE has been used to leverage $2 million in grants and contracts. The program has strong government and industry interaction, and good collaboration with Clean Cities on outreach. The program is involving ORNL in curriculum development and course offerings.

Another reviewer felt that past strong interaction with industry was noted but not much was detailed in regard to current industry participation. It was indicated that the recent poor economy has delayed collaboration with potential industry partners. Another reviewer perceived that the program currently (as detailed in the presentation) does not have the extensive collaborative relationships in place that the other programs do. While proximity to Oak Ridge is a plus, it is not obvious whether this proximity has been fully exploited. There is no evidence of international or other academic program partnering. Industry partnering also appears to be underwhelming and will likely not improve in this current economic climate.

Question 5: Has the project effectively planned its future work in a logical manner by incorporating appropriate decision points, considering barriers to the realization of the proposed technology, and, when sensible, mitigating risk by providing alternate development pathways?

A reviewer felt that continuing course development was evident, and the program will roll out several new courses in the upcoming academic year. Web site content is continued to be updated. A proposal in the works from major partnership with industry partner was affected by the downturn in the economy but they are continuing to explore the collaboration.

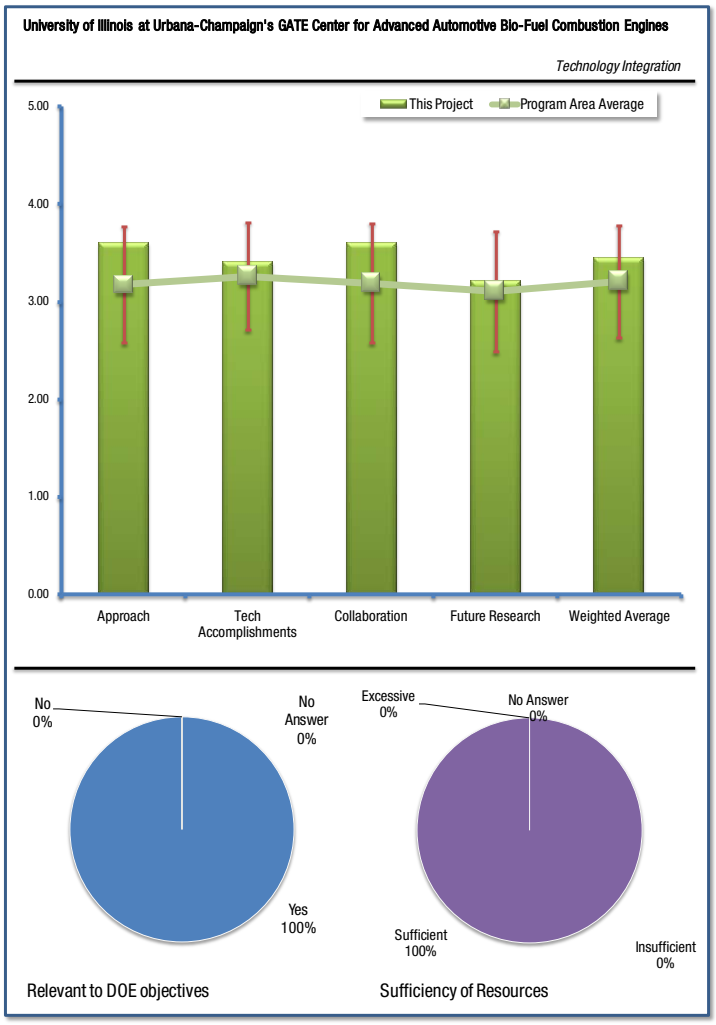
Another reviewer thought that plans to bring labs back on line soon should be a significant help to the program. Plans for the development of an additional course and the updating of another are good. Outreach and student recruitment need to be addressed. For another reviewer, while progress seems to be desired, plans stated do not seem too positive. A reviewer felt that all-in-all program seems to be struggling. Not sure if planned future activities/improvements will be able to be realized in this difficult economic environment.

Question 6: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?

Among positive reviews, one reviewer thought that resources are sufficient and leveraged to generate addition funding through externally funded research. Another reviewer commented that DOE funds are behind a bit but don't appear to be a limiting factor in the program. Industry support appears to be an issue.

For another reviewer, the presentation did not highlight any funding issues. However, this reviewer was floored when the presenter could not answer the most basic questions about program funding, which lowered the reviewer's confidence in this program even further.

University of Illinois at Urbana-Champaign's GATE Center for Advanced Automotive Bio-Fuel Combustion Engines: Chia-fon Lee (University of Illinois at Urbana-Champaign)



Reviewer Sample Size

This project had a total of 5 reviewers.

Question 1: Does this project support the overall DOE objective of petroleum displacement? Why or why not?

Because the focus of the program is on biofuels, several responding reviewers commented that the program supports or is directly relevant to DOE's objective of petroleum displacement. One reviewer noted that educating students in this area is highly important. Another reviewer commented that the University of Illinois GATE program focus on advanced automotive bio-fuel combustion engines fills a needed niche by providing students trained and research aimed at understanding the properties of bio-fuels and how these properties influence combustion and engine design/ optimization. As such this research focus is directly relevant to the DOE goals of petroleum displacement.

Question 2: What is your assessment of the approach to performing the work? To what degree are technical barriers addressed? Is the project well-designed, feasible, and integrated with other efforts?

Among several positive reviews, one saw the program possessing great focus on the barriers, including linking researchers focusing on biofuels to those focused on vehicle engineering - technology and operations. Another saw the program as having a solid approach, noting how the program involves 2 departments to develop an interdisciplinary curriculum integrating biological and mechanical aspects of biofuel technology. The program seeks to develop core competencies in the areas of auto technology, combustion, and environment. Another reviewer also commented on the multi-disciplinary approach, making note of the many research projects and papers related to the GATE program area of bio-fuel combustion engines. For a reviewer, the plan was very extensive, while another reviewer summarized how currently there are seven Ph.D. students supported by GATE scholarships as well as ~19 other students participating in the program. The University has cost matched approximately 30%, the list of partners includes a good cross section of academic and industry organizations both domestic and international, and curriculum and course offerings appear to adequately cover the breadth of advanced combustion and bio-sciences that are the focus of this program.

Question 3: Characterize your understanding of the technical accomplishments and progress toward overall project and DOE goals.

Several responding reviewers remarked how the program is making good progress. One reviewer noted that the number of students and publications were outstanding. Another reviewer commented that student participation is good with seven PhD students supported by GATE scholarships. They have started Phase II of the program and are on schedule. Research is broad-based with developing biodiesel fuel properties, in-cylinder combustion, engine performance testing with diesel and biodiesel, low-temp combustion, and electrostatically assisted atomization. The

program is looking at evaluating novel fuels. Lots of tools seem to be available to the students. A certification process for students is due to be approved.

While a reviewer noted how the program is integral to all aspects of these efforts, it does not appear that as much progress is being made on the research side. More detail on the research progress would be helpful. Another reviewer felt though the program had a good interdisciplinary curriculum, and many detailed research projects, the reviewer was not sure whether GATE students were involved or just the GATE faculty.

A reviewer stated that the program appears largely on-schedule and has the majority of key elements in place, but it seems that the program could handle greater student through-put. One element the program seems to lack is a tie in with a "hands-on" design/integration project, such as the undergraduate DOE AVTC student design series, which would provide a good way to interest undergraduates in this area and to encourage them to continue on in the program. Such student competitions provide a valuable opportunity for the graduate students to develop a broader perspective of the issues and challenges of integrating such emerging technologies into the vehicle environment. Quantity and diversity of technical accomplishments, publications, and patents by students and faculty appears to be above average.

Question 4: What is your assessment of the level of collaboration and coordination with other institutions?

Many reviewers noted how the program has several good partnerships. One reviewer specifically mentioned partnerships with Cummins, Caterpillar, John Deere, BP, and Volkswagen and unique international connections with two European universities. Moreover, internships have been established with Caterpillar. Another reviewer felt the list of partners includes a good cross section of academic and industry organizations (both domestic and international).

While another reviewer saw lots of good partnerships, slides on all published papers are not necessary but instead more detail on the anticipated activities around partnerships. A reviewer saw limited collaboration and interaction with industry and universities, but this is planned in the future. More industry related projects are needed.

Question 5: Has the project effectively planned its future work in a logical manner by incorporating appropriate decision points, considering barriers to the realization of the proposed technology, and, when sensible, mitigating risk by providing alternate development pathways?

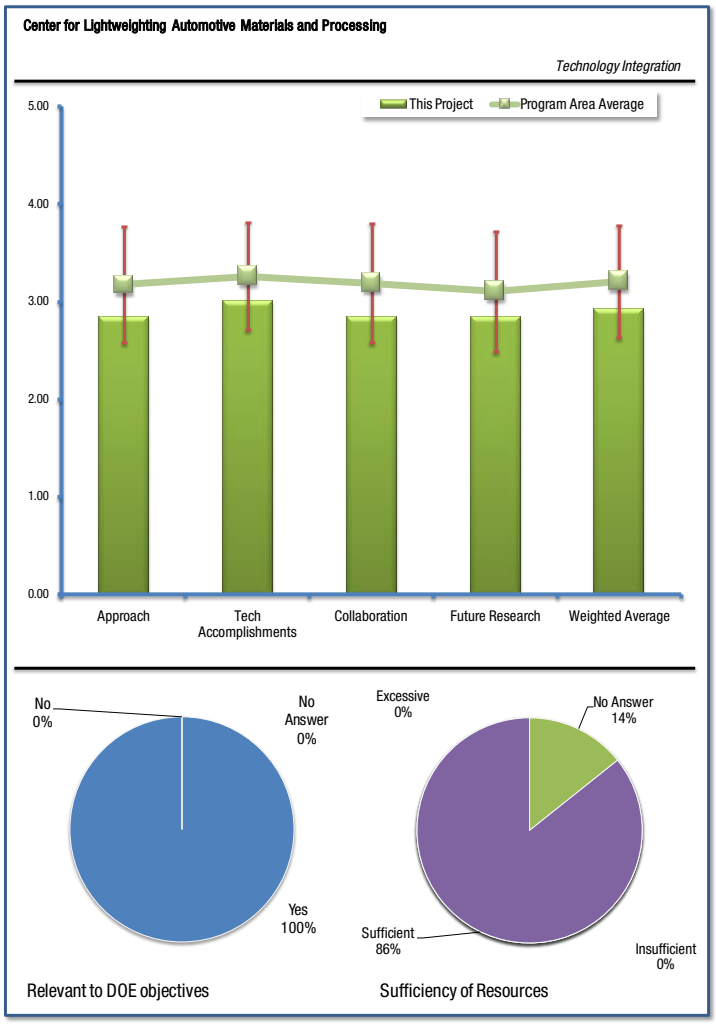
Positive reviews thought the program has good plans for the future. One reviewer noted how industry and academic collaboration is planned, more research in biofuels will be done, and how the program is integrating the GATE curriculum. Another reviewer thought, all in all, the program seems to be working pretty well. The future work detailed in the presentation addresses the key areas where growth is desired or needed.

More mixed evaluations included one reviewer who felt that information on future activities and how partnerships are included was lacking. Another reviewer felt that the program is looking to strengthen collaborative efforts with industry and further develop international collaboration. The program is looking to further develop student/faculty exchanges and integration of GATE curricula and certification. However, not much was mentioned on outreach to students through on-campus events. This could be an area of improvement.

Question 6: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?

Responding reviewers felt that the program appears adequately funded and supported and as a result appears to be on schedule. A reviewer felt that very little was presented on resources but there appears to adequate university, DOE, and industry support.

Center for Lightweighting Automotive Materials and Processing: P.K. Mallick (University of Michigan - Dearborn)



Reviewer Sample Size

This project had a total of 7 reviewers.

Question 1: Does this project support the overall DOE objective of petroleum displacement? Why or why not?

Reviewers thought the focus of the program, lightweighting, is relevant to petroleum displacement. One reviewer felt the project uses materials science applications for the automotive industry. These lightweight, advanced materials have applications for the transportation vehicles and can reduce petroleum due to associated fuel savings or fuel cell technologies which do not rely on petroleum. Another reviewer commented that the program's focus on automotive materials and processing may not be the most glamorous, but since it directly contributes to vehicle manufacturer's ability to remove weight and hence increase fuel efficiency (regardless of powertrain/fuel technology), it is an essential element supporting the DOE's petroleum displacement goals. Another reviewer concurred that lightweighting vehicle materials is relevant to improving efficiency, and commented that the project is highly relevant to DOE vehicle technology goals. Few university programs across country address materials program focused on automotive applications. This makes this particular GATE center unique.

Question 2: What is your assessment of the approach to performing the work? To what degree are technical barriers addressed? Is the project well-designed, feasible, and integrated with other efforts?

A reviewer thought that considering the number of students, good effective deployment was evident, and noted the peer reviewed publications, joint research activities with industry, and conferences supported. Another reviewer saw a well-defined strategy and goals for the center. The program's focus is to create university/industry government collaboration for education and research on automotive materials and processing for lightweight vehicles. The program emphasizes graduate education and research. The program addresses a barrier that many university curricula do not address, which is advanced materials for automotive use. Objectives include developing course on crashworthiness, upgrading materials labs, collaboration with industry on research. A reviewer noted how currently there are 10 graduate students in CLAMP research as well as ~65 other students participating in materials classes. The amount of University cost matching was not disclosed; however, the program does appear to have attracted significant industry research funding. Curriculum and course offerings appear to adequately cover the breadth of material sciences and processing.

A reviewer also thought the project is well-designed, although the technical barriers could be articulated more clearly. While a reviewer thought the approach to GATE is reasonable by establishing a materials concentration in the existing automotive systems engineering, not much detail was presented on student recruitment. Interdisciplinary

collaboration with other university programs could be targeted as an area for expanding student outreach. Another suggestion for improving student involvement would be to offer a GATE certification for program participants.

Question 3: Characterize your understanding of the technical accomplishments and progress toward overall project and DOE goals.
A reviewer noted that the program appears to be largely on schedule and has the majority of key elements in place. Number of students supported (grad and under-grad) seems adequate. However, given the instructional infrastructure put in place, it would seem that the program could handle greater student through put without sacrificing quality. One strong point for this program is its tie with the 21st Century Model T project. Such projects provide a good way to transition undergraduates to continue on in the program as well as an opportunity for the graduate students to develop a broader perspective of the issues and challenges of integrating advanced materials and manufacturing processes into the vehicle environment. Quantity and diversity of recent publications by students and faculty seems to be pretty good.

Another reviewer thought the program had developed a solid curriculum with six courses now being available covering a reasonable range of topics. The addition of a course in crash worthiness is good. They have initiated an upgrade of the mechanical testing laboratory. There seems to be good student participation in the program with 10 graduate students participating in CLAMP research. Ten research projects have been conducted (5 have been industry funded) including three metals projects with Ford. The 21st Century Model T program appears to be very successful as a teaching platform (nine students participated). They are developing a materials database but showed little evidence of progress. This could be emphasized. A reviewer noted the third-year progress included a new course on vehicle crashworthiness, and upgrading materials laboratory. This reviewer noted how the program has produced 10 graduated students, 10 research projects being conducted, 5 industry funded programs, and the program shows evidence of leveraging, total of 6 graduate courses being offered, and has a good array of research projects. A reviewer noted that the presentation listed all the research projects, but no discussion on results. The team should list where the publications can be downloaded, or if they are industry sensitive, there should be some write-up to provide some indication on scope.

Question 4: What is your assessment of the level of collaboration and coordination with other institutions?
Among positive reviews, one thought the program has developed good collaboration with Ford in several research efforts and the 21st Century Model T program. They are working on developing additional collaboration with two companies on lightweight seats and extrusion process development for magnesium. Another reviewer thought that while the presentation does not list any direct “partners” it appears that the program has obtained significant industry research project funding and collaboration. A reviewer who saw industry collaboration cited collaboration with Ford, Auto/Steel Partnership, USAMP and Asian-Pacific Fuel Cell Technologies. Additionally, this reviewer thought that five industry-funded programs show evidence of leveraging, and suggests investigating collaboration with the University of Alabama GATE Center, which also focuses on lightweight automotive materials.

A reviewer thought collaboration with other organizations was mentioned and included the automakers, but it would be helpful to see more examples, rationale, and outcomes of such partnerships. Another reviewer thought collaborations seem to be centered on Ford and a few others, but it would be good to expand the number. A reviewer thought more detail should be provided on collaboration to get an idea of scope and schedule on these collaborations.

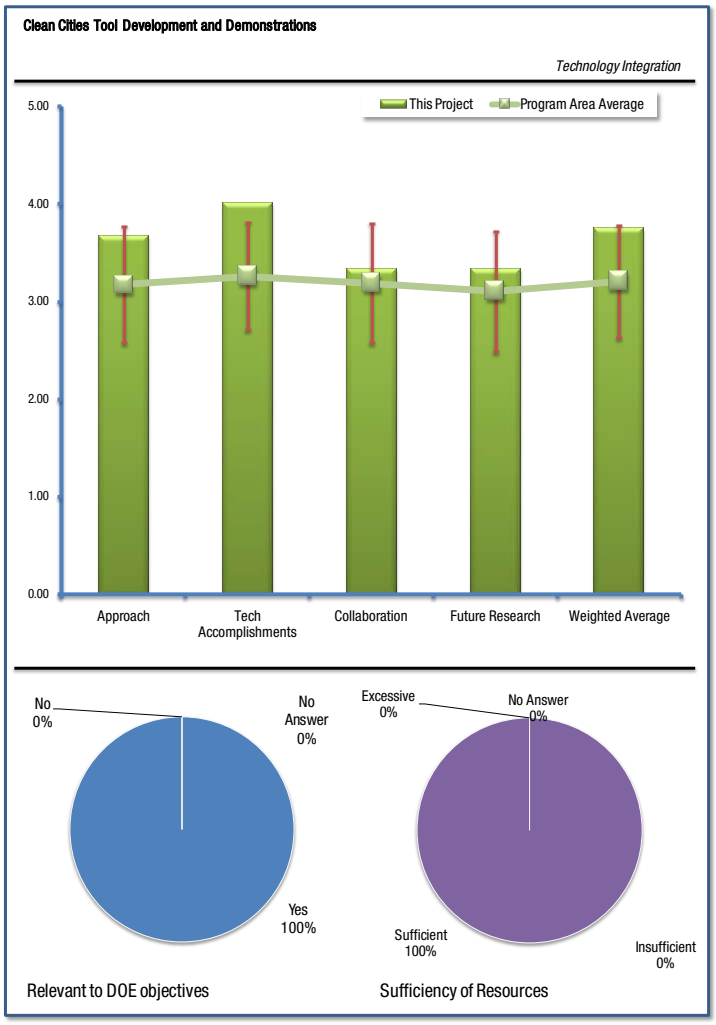
Question 5: Has the project effectively planned its future work in a logical manner by incorporating appropriate decision points, considering barriers to the realization of the proposed technology, and, when sensible, mitigating risk by providing alternate development pathways?
A reviewer perceived that, all-in-all, the program seems to be working pretty well. The future work detailed in the presentation addresses the key areas where growth is desired or needed. Another noted how the program is offering a new graduate course on Forming Process Modeling and optimization, offers two previously developed GATE courses, has performed laboratory upgrades to the Mechanical Testing Laboratory and the Metals Forming Laboratory, is

increasing collaborative research, and recruiting more full-time graduate students. Another reviewer thought the program provided pretty solid plans for the upcoming period, including upgrading laboratory facilities, development of a new course, hosting of two symposia, recruitment of more students, and expansion of industry collaborations. A reviewer was unclear what the next steps are for the demonstration vehicle.

Question 6: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?

Some reviewers commented that resources appear to be adequate. A reviewer noted that nothing was directly mentioned regarding resources but there appears to be sufficient resources. A reviewer suggested that if the university intends to evaluate crashworthiness, involvement with DOT (specifically NHTSA) is critical. This is currently missing from the program's scope.

Clean Cities Tool Development and Demonstrations: Margo Melendez (NREL/ORNL)



Reviewer Sample Size

This project had a total of 3 reviewers.

Question 1: Does this project support the overall DOE objective of petroleum displacement? Why or why not?

Responding reviewers saw value in the project, and thought it was aligned with DOE objectives. One reviewer commented this project is designed to provide consumers with valuable information on the AFDC website and fueleconomy.gov that relates to fueling stations, benefits of efficient vehicles, comparison of vehicle types and pushes information out to the public that is technically correct and unbiased. Based on the presentation, DOE is listening to consumers and updating the sites accordingly, as well as taking advantage of new and exciting mobile communication tools. Another reviewer definitely thought the project supports DOE's objective, and commented that it is a valuable tool for all sectors; public and private. A reviewer thought these are great tools for stakeholders to use. The programs, (AFDC, Fuel Economy.gov) have improved so much in the last few years that they are now very valuable resources for all stakeholders. This reviewer was very glad to hear that there are plans in place to reach out to stakeholders, especially the Clean Cities Coordinators, and educate them so that they can go out reach/teach others.

Question 2: What is your assessment of the approach to performing the work? To what degree are technical barriers addressed? Is the project well-designed, feasible, and integrated with other efforts?

A reviewer thought the website was well-developed, and the Google maps were well-designed. Other reviewers commented on integrating this project with Clean Cities efforts. Specifically, a reviewer noted that a question was raised concerning whether the Clean Cities coordinators are aware of these resources and it was acknowledged that it is somewhat of a challenge to get information to them about all the valuable info on the websites. Another reviewer commented that in the past, the National Clean Cities program has relied heavily on the local Clean Cities Coordinators to reach stakeholders including fleet managers and the general public. This reviewer liked that the national program is now taking on this role and would like to see more direction from the national program. More guidance, more training and more "here is what you do" instead of the local Coalitions taking the lead. These tools are so good you could create events around them.

Question 3: Characterize your understanding of the technical accomplishments and progress toward overall project and DOE goals.

One reviewer offered enthusiastic praise, commenting that NREL has made incredible strides and vast improvements in the advancement of these tools. This reviewer has been involved with Clean Cities since the beginning and felt it is nice to see how a "vision" over ten years ago has turned into a "reality" of tools all designed to help stakeholders.

Another reviewer stated over time, the sites continue to be updated in a timely way. A reviewer noted the new mapping tool, but wondered how often it is updated. This reviewer felt the University was a good concept.

Question 4: What is your assessment of the level of collaboration and coordination with other institutions?

A reviewer commented that the collaboration and coordination is invaluable. Another reviewer noted how a lot of the work on the AFDC and fueleconomy.gov is done through the national labs (Oak Ridge and NREL). It appears that they reach out to key stakeholders for up-to-date information for inclusion on the site and use these stakeholders to help spread the message about info on the site. A reviewer felt the project has gotten better and will continue to get better as NREL staffs up. This reviewer would like to see a quarterly meeting of industry partners to discuss opportunities for coordination (similar to the Coalition Regional Meetings.)

Question 5: Has the project effectively planned its future work in a logical manner by incorporating appropriate decision points, considering barriers to the realization of the proposed technology, and, when sensible, mitigating risk by providing alternate development pathways?

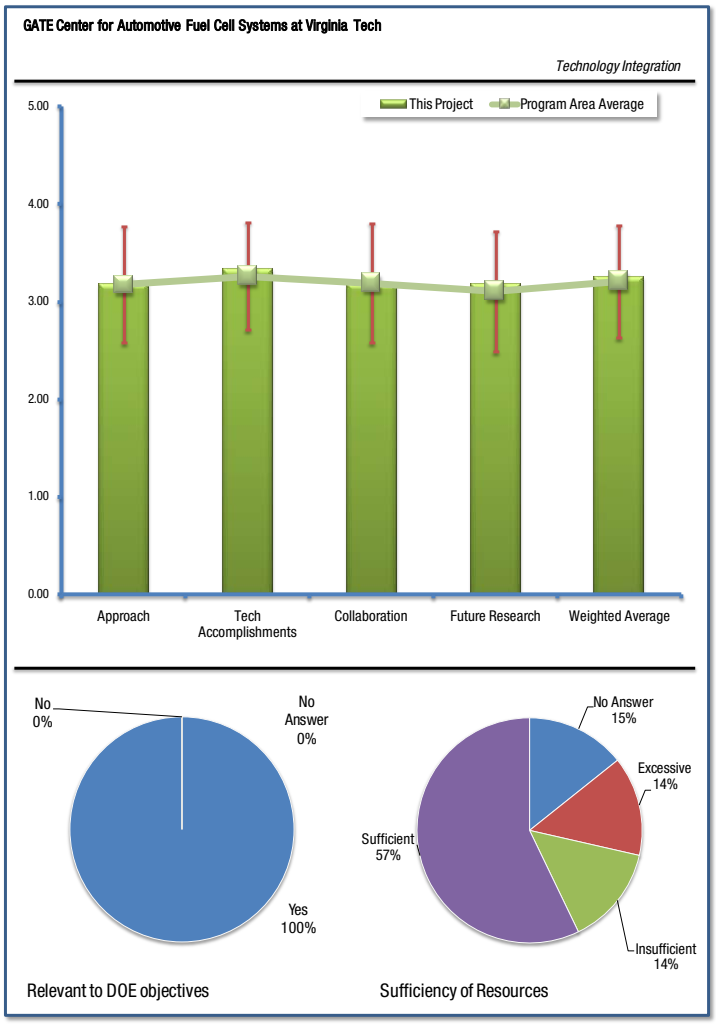
A reviewer felt that they have a plan for conducting future activities to take advantage of new mobile devices, updated fueling sites, and new regulatory and legislative actions. Another made note of the emissions map, and suggested expanding emission comparisons; wondered if there are links to affiliated groups, thought the desktop access was good, and saw help in analysis.

A reviewer described how many, many years ago the reviewer evaluated and saw a Clean Cities Road Map. The idea was this document would become a living document that would change on a regular basis. This reviewer has never seen an update of the Road Map, perhaps because they don't know where to look, but a plan needs to be in place and available for all to see and comment on. This reviewer is sure that NREL has a plan in place but would just like to see it.

Question 6: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?

Among comments, a reviewer felt that AFDC and fueleconomy.gov are being appropriated at approximately $1 million/year. Hopefully with the FY 09 proposed funding increases, they can obtain additional funds for future work. A reviewer commented that NREL and Clean Cities finally have the resources they need to make a substantial difference. Another reviewer felt that there are never enough funds for this type of program, and wondered, How many hits, and from where?

GATE Center for Automotive Fuel Cell Systems at Virginia Tech: Doug Nelson (Virginia Tech)



Reviewer Sample Size

This project had a total of 7 reviewers.

Question 1: Does this project support the overall DOE objective of petroleum displacement? Why or why not?

Some responding reviewers felt the focus on the development of new science and technology to help overcome technical barriers for hydrogen and fuel cell vehicles is directly relevant to the DOE goals of petroleum displacement. A reviewer concurred with this assessment, and added that the program's focus on fuel cells is more of a long-term solution. Another reviewer also concurred, but added that DOE does not feel fuel cells for transportation are worth funding.

A reviewer noted that the project's focus is on coursework for graduate students. Building the next generation of researchers focused on technologies to reduce petroleum is necessary to achieve any measurable progress, although this is an indirect relevance. Eco Car challenge study compared hydrogen, plug-in hybrids (electricity), and E-85 and findings were not entirely new. Another commented fuels cells have some issues relating to petroleum displacement. Virginia Tech showed some research leaning more towards vehicle systems and integration.

Question 2: What is your assessment of the approach to performing the work? To what degree are technical barriers addressed? Is the project well-designed, feasible, and integrated with other efforts?

A reviewer thought the Virginia Tech GATE program appears to appropriately leverage DOE funds with an approximate 33% university match. Based on the presentation materials it appears that there are currently only four GATE courses offered (without course descriptions). Given the overall strength of this program, these courses are probably well structured and integrated with other non-GATE prerequisite courses. However, it is hard to rate this aspect without more detail. A reviewer commented that the project showed good deployment, and involved multiple academic departments, and engaged students in some interesting research projects. A reviewer noted that there was a list of tasks around the Fuel Cell Program. The speaker mentioned barriers existed but did not go into detail. This reviewer felt it would have been nice to see the barriers identified, both research barriers and university program collaboration.

A reviewer noted how VT's approach crosscuts three departments, giving exposure to a large number of students. The approach focuses on engaging students in research. Not much was mentioned on available curriculum but it appears that only four courses are available. GATE certification for participating students was not mentioned. Laboratory facilities were not well described. Another reviewer commented that more mentoring is needed of the students who received gate support.

Question 3: Characterize your understanding of the technical accomplishments and progress toward overall project and DOE goals.
A reviewer commented the program has pretty good student participation with three current PhD students. Three recent graduates have been placed with GM. They have conducted research on durability of membranes and water transport and series PHEV. It seems like the program is migrating away from the fuel cell focus with work on hybrid vehicles. This is not necessarily a bad thing if approved by the DOE. The vehicle inertia study is interesting.

Another reviewer noted how the program presented results at National Fuel Cell Conference on fuel cell technologies. The primary study showed energy comparison of ethanol, electricity and fuel cells but results were not necessarily new based on other available research. This reviewer would have liked to see how this provided new insight. Other studies looked at hypermilers and the potential for improving fuel economy and shorter machicolation time at lower speed range. Then the program looked at HEVs and noted that you can do this for HEVs as well as conventional vehicles. This was very interesting although as was noted not very practical.

Another reviewer saw many interesting research projects on durability, water transport, etc. A reviewer noted how because their measure of success is the number of students graduated to support the vehicle companies and their suppliers, they made progress but only graduated three that were hired. The program should include sponsored internships with EPA labs, National Labs supporting the OEM's, and other organizations to broaden the students experience and base of knowledge. These institutions also have extensive interactions and partnerships with Honda, Toyota, and Daimler, which will provide more opportunities.

Another reviewer also focused on the number of graduated students. This reviewer commented that six graduate students (four Ph.D. and two MS) have received GATE support and nine other students that have completed GATE courses and/or conducted research in the GATE center facilities. While the number of students participating seems adequate, given the instructional infrastructure put in place, it would seem that the program could handle greater student through put. One element the program did not present is the degree of integration this program has with the VT undergraduate DOE AVTC student design series, which would provide a good way to interest undergraduates in this area and to encourage them to continue on in the program. Such student competitions provide a valuable opportunity for the graduate students to develop a broader perspective of the issues and challenges of integrating fuel cell technologies into the vehicle environment. This reviewer was not sure how well such potential synergies are being exploited. Quantity and diversity of technical accomplishments, publications, and patents by students and faculty appears to be above average.

Question 4: What is your assessment of the level of collaboration and coordination with other institutions?
Some responding reviewers saw great progress on published papers. One reviewer thought it was good to note 23 journal presentations since the last review. Another reviewer thought the presentation provided an excellent list of summary materials and the industry interactions. Furthermore, a reviewer thought the list of partners includes a good cross section of hydrogen and fuel cell focused industry organizations.

A reviewer thought the presentation mentioned interdepartmental collaboration but did not provide examples. Another reviewer thought the program has a good working relationship with GM, and that undergraduates have been able to obtain NSF research experience. However, further expansion of industry collaboration would benefit the program. A reviewer recognized that industry forums were attended, and saw evidence of some interactions with industry from the projects and professional development, but more interactions with other universities could be added, such as collaborative research projects. Another reviewer felt the program needs to interact with more labs performing similar research.

Question 5: Has the project effectively planned its future work in a logical manner by incorporating appropriate decision points, considering barriers to the realization of the proposed technology, and, when sensible, mitigating risk by providing alternate development pathways?

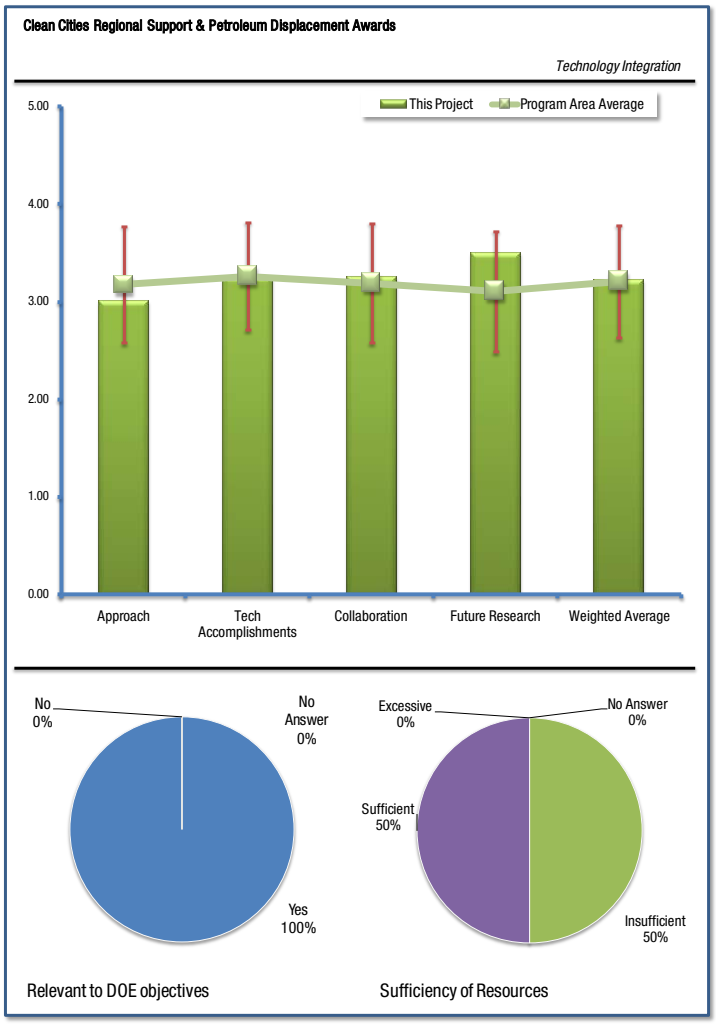
A reviewer thought a good summary slide on the upcoming activities for the curriculum and research program was presented. Another reviewer noted how the program's further plans include adding more courses, students, and industry collaboration.

A reviewer commented that nothing major is planned for the upcoming period. VT is looking to develop new Ph.D. course and recruit one or more students for GATE fellowships. They are targeting continuous improvement in the courses being offered. Curriculum expansion should be a focus. Another reviewer suggests developing an internship program with DOE labs, and foster work study at OEM's. A reviewer commented that all-in-all the program seems to be working pretty well. The future work detailed in the presentation addresses the key areas where growth is desired or needed.

Question 6: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?

Some responding reviewers commented that resources appear to be sufficient. Another reviewer felt that this is a good project that could be made even better with more interaction and collaboration. Have students work at Volpe, Sandia, ORNL on their engine stands or crash testing and EPA on their emissions modeling. Provide more opportunity to gain real life experience and make the students more valuable to a potential company. For one reviewer, because fuel cells are not being in future of transportation technology, why would grad students want to participate in a field that has no future in relative terms?

Clean Cities Regional Support & Petroleum Displacement Awards: Michael Scarpino (National Energy Technology Laboratory (NETL))



Reviewer Sample Size

This project had a total of 4 reviewers.

Question 1: Does this project support the overall DOE objective of petroleum displacement? Why or why not?

One reviewer was of the opinion the project does support DOE's objective, commenting that this project funds the Clean Cities coordinators to conduct data collection and overall Coalition activities, as well as specific grants for key infrastructure-related projects. Through the work, 198 stations have been constructed and over 10 million gallons of gasoline displaced. Furthermore, it is providing additional training resources for Clean Cities coordinators and other resources to assist them in their work. Another reviewer commented that the program provides the mechanism for community and outreach, and deployment through Clean Cities Coalitions and Solicitations. A reviewer thought the program does support DOE's objective, but it could be expanded in supporting some other activities such as R&D. This is the only fuel and vehicle deployment program in DOE.

Another reviewer explained how, ten years ago the "grass roots" concept of the local Clean Cities Coordinators made a lot of sense. Alternative fuels was a dirty word and it wasn't getting much mainstream attention so we had to work behind the scenes in order to get things done. Now, alternative fuels are trendy and the new administration is making a big push. Perhaps we need to change how Clean Cities is run. "Instead of the tail wagging the dog perhaps the head should lead?" This reviewer would like to see the national headquarters staff (HQ) develop better guidelines for regional and local implementation of all of the great programs that have been developed.

Question 2: What is your assessment of the approach to performing the work? To what degree are technical barriers addressed? Is the project well-designed, feasible, and integrated with other efforts?

One reviewer thought it appears that setting up contracts with the Clean Cities coordinators has been helpful both in acquiring annual vehicle data and also providing them additional funding for training, workshops, and other options that they want to undertake with the additional monies.

Other reviewers had suggestions on expanded outreach. For instance, a reviewer thought the Q&A following NREL's presentation suggests AFDC and FuelEconomy.gov, although successful in obtaining hits, may not be effectively used by Clean Cities Coalitions. To improve communication, outreach, and coordination, the reviewer suggests hosting regional meetings in the CC region, including ADFC and FE.gov, perhaps at the National Lab in the region if appropriate. Strengthen link between R&D and Deployment activities. Another reviewer felt the program has extensive outreach, but it could be expanded significantly. Some coordinators appear to favor one fuel over another,

and efforts should be encouraged to promote all types of fuels. This reviewer was unsure about the coordination between workshop participants and follow up.

A reviewer expressed the concern that the local Coordinators are planning events, performing education & outreach and deployment activities without a Road Map from HQ. Years ago there was a Clean Cities Road Map that was supposed to be a dynamic document that would be changed annually and provide guidance to the local Coordinators. This reviewer hasn't seen any revisions to this document since the original. This reviewer would like to see HQ lead the effort and provide guidance for activities, education and outreach and deployment initiatives to the local Clean Cities Coordinators.

Question 3: Characterize your understanding of the technical accomplishments and progress toward overall project and DOE goals.
Among positive responses, one reviewer thought progress is outstanding for the limited funds that are available for this program, and outreach is excellent. Another reviewer made note of how four specific projects were mentioned: the I-65 biofuels coordinator project; the Colorado project to increase biofuels; Kum and Go E85 retailer and the National Biodiesel Board's terminal blending. A reviewer thought accomplishments in terms of deploying alternative fuels station are significant and would be selected as Outstanding but for being localized. Additional resources would mitigate this shortcoming.

Although HQ has developed a very impressive array of tools and programs for the Coordinators to use, one reviewer was not sure all of them are taking advantage of them. Additionally, some of the Coordinators have not made many strides in adding vehicles while others are leading the way. The regional peer exchange meetings are an excellent way of comparing what works and what doesn't work and this reviewer applauded HQ's efforts in organizing these.

Question 4: What is your assessment of the level of collaboration and coordination with other institutions?
A reviewer commented that outreach is outstanding, and Program direction and Coordinators are receptive to new ideas. A reviewer also noted how this entire project is dependent on working with Clean Cities coordinators throughout the country as well as key industry stakeholders to ensure that projects are undertaken in a successful manner. Another reviewer suggests, in order to improve communication, outreach, and coordination, hosting regional meetings in the CC region, including ADFC and FE.gov, perhaps at the National Lab in the region if appropriate. Clean Cities should strengthen the link between R&D and deployment activities.

A reviewer expressed concern that although HQ always strives for fuel neutrality local Coordinators often do not. Some have developed a "pay to play" philosophy in which a fuel needs to sponsor before they can speak. Because all Coordinators are now paid, although not enough, HQ can stipulate that all fuels are represented at local meetings regardless of sponsorship.

Question 5: Has the project effectively planned its future work in a logical manner by incorporating appropriate decision points, considering barriers to the realization of the proposed technology, and, when sensible, mitigating risk by providing alternate development pathways?
Among responding reviewers, some thought that effective plans and goals were presented. For instance, one reviewer saw rational plans for addressing near-term opportunities provided by ARRA and for growth in FY09 and future budgets. Another reviewer thought the presentation addressed the FY09 Clean Cities program solicitation and how future funds will be allocated based on stimulus funding. Noted some future work plans for Clean Cities coordinators.

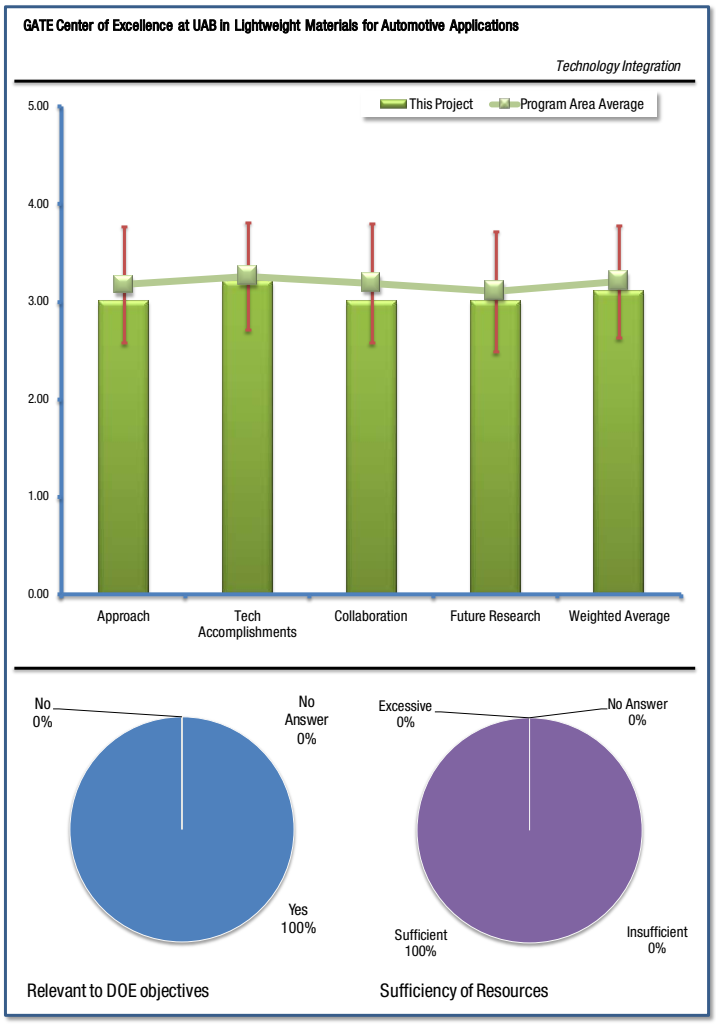
A reviewer expressed concern that the government appears to have different names for the program, and this tends to be confusing especially when researching funding levels. Another reviewer likes the additional tasks that are now required of each Coalition. This is a step in the right direction. Perhaps a national point person for the Coalitions could be identified and this person would be responsible for notifying partners of events, assuring fuel neutrality and resolving any issues that may arise. Some of the Coalition events are never even on our radar as they only reach out to certain fuel groups.

Question 6: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?

A responding reviewer has never felt that $12,500 or $20,000 is sufficient funding to support the activities of the Clean Cities coordinators. Significantly more money is required if the country is truly interested in furthering the use of alternative fuels/advanced vehicle technologies and infrastructure. Along these lines, another reviewer commented that the doubling of budget in FY09 should provide sufficient resources to execute plan. A reviewer feels the program should be encouraged to support vehicle R&D and demonstration activities, and to reference comments the reviewer made #1 and #5.

To another reviewer, current funding levels are where they have always needed to be. The reviewer noticed in the presentations that previous awards have been either CNG or Biodiesel based and fuel neutrality has not been maintained. This reviewer hoped the new level of funding will allow for an equal piece of the pie for all of the fuel groups.

GATE Center of Excellence at UAB in Lightweight Materials for Automotive Applications: Uday Vaidya (The University of Alabama at Birmingham)



Reviewer Sample Size

This project had a total of 5 reviewers.

Question 1: Does this project support the overall DOE objective of petroleum displacement? Why or why not?

Several responding reviewers commented that the focus on light-weight materials is directly related to DOE's petroleum displacement objectives. A reviewer commented that the University of Alabama GATE program's focus on lightweight materials for automotive applications may not be the most glamorous, but since it directly contributes to vehicle manufacturer's ability to remove weight and hence increase fuel efficiency (regardless of powertrain/fuel technology), it directly supports the attainment of DOE's petroleum displacement goals. Another reviewer commented that the project has a lightweighting focus in support of vehicle fuel efficiency; plastics, composites and metals. Also addresses recyclability. Focus is to train graduates in lightweight automotive materials technology and develop engineering curricula to produce specialists in the automotive materials area. Goals are aligned with national goals as well as GATE goals.

Question 2: What is your assessment of the approach to performing the work? To what degree are technical barriers addressed? Is the project well-designed, feasible, and integrated with other efforts?

A reviewer thought the curriculum and course offerings appear to adequately cover the breadth of material sciences and processing. Additionally, while not specifically stated in the presentation it appears (given the overall performance of the program) to appropriately leverage DOE funds. Another reviewer thought the program is well-designed, and elaborated that the program involves four engineering departments in which graduate and undergraduate students can obtain GATE certificates with the completion of the requisite courses. The program appears to expose students to multiple learning experiences with hands-on labs, virtual classrooms, industry tours and workshops.

A reviewer found the program's strategy to be sound and aligned with GATE goals. It might be nice to show how focus on crashworthy materials relates back to DOE goals. While it was noted that there was automotive partnerships, it was not clear if the carbon fiber, aluminum and other parts are being deployed. The program's strategy is to recruit GATE students and enable interdisciplinary research projects. Program engages high school, community and undergraduate students, and addresses some off vehicle technologies like safety barriers. Plans are to support three graduate students per year with research projects focused on automotive applications. Also supports four undergraduates each year in automotive related research. The program is planning to develop and offer six new automotive related courses having the potential to impact 20-30 students per year. Extend impact to undergraduate, high school and minority students through hands-on workshops.

Question 3: Characterize your understanding of the technical accomplishments and progress toward overall project and DOE goals.
Responding reviewers felt the program is meeting or exceeding goals. For instance, one reviewer commented that the program is meeting or exceeding goals for the number of students participating in GATE courses and the number of courses offered. A sixth course on composites (long fiber thermoplastics) will soon be deployed and new class is being developed for designs for improved protection. Course diversity is good but a course on systems integration might prove useful. Research is focused on long fiber composites and seems to provide students with good hands on experience. The carbon fiber research appears to be producing good results. The program has added laboratory units (plasticator and press) to upgrade facilities. The "virtual classroom" is a good concept. Another reviewer saw a nice focus on integrated product and process development for students so there is real-world application in the research. Also good that the student project on banana fiber, which sounds innovative, is award winning.

A reviewer felt the program appears to be largely on schedule and has the majority of key elements in place. Number of student supported (grad and under-grad) seems adequate. However, given the instructional infrastructure put in place, it would seem that the program could handle greater student through put without sacrificing quality.

One strong point for this program is its tie with the Honda entry into the One Lap of America competition. Such projects provide a good way to stimulate undergraduate interest to continue on in the program as well as an opportunity for the graduate students to develop a broader perspective of the issues and challenges of integrating advanced materials and manufacturing processes into the vehicle environment. Quantity and diversity of recent publications by students and faculty seems to be pretty good.

Another reviewer noted that the program supported three graduate students, and four undergraduates. The program has offered 6 courses over history of program, and influenced more than 30 students. Research projects are aligned well with the focus of the GATE Center.

Question 4: What is your assessment of the level of collaboration and coordination with other institutions?
One reviewer thought collaboration and training seem to be focused on applied research. The bus industry example is great. It would be good to know if the company asked for this work or how the partnership was originated - i.e., by UAB or by the transit agency. Also, it would be good to see what the potential energy or petroleum savings are for the buses. Finally, it would be good to know quantitatively if the UAB online courses are being used. Another reviewer felt the UAB GATE program has good collaboration with industry through work with the DOT on school buses, ORNL on multiple projects, and Honda on One Lap of America. UAB has held several workshops and a conference on structural composites with 300 attendees. The program has good outreach to high schools.

One reviewer thought while the programs and partnerships listed no doubt add to the program, there appears to be little direct OEM vehicle manufacturer relationships (other than the one lap across America project with Honda). One of the big challenges with lightweight materials is how to incorporate them into a high production volume vehicle manufacturing process. As such, any collaboration with such OEM manufacturers would be a real bonus to the program. Another reviewer saw good industry collaboration through projects, and suggests interaction with national labs and community colleges, and exploring more collaboration with other universities, particularly the other GATE university working in the lightweighting/automotive materials areas.

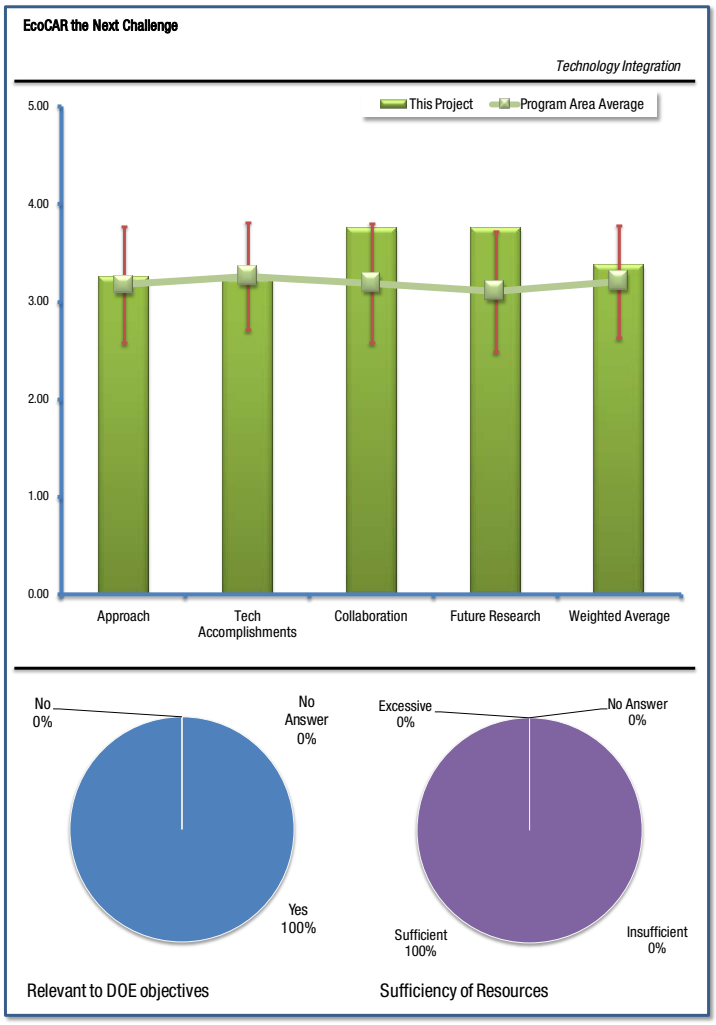
Question 5: Has the project effectively planned its future work in a logical manner by incorporating appropriate decision points, considering barriers to the realization of the proposed technology, and, when sensible, mitigating risk by providing alternate development pathways?
Among positive responses, one thought that the program is working pretty well, and that future work detailed in the presentation addresses the key areas where growth is desired or needed. Another reviewer thought that a sound plan for the next fiscal year was presented. A reviewer praised the level of detail on partnerships with other universities and what projects these might generate in terms of new research efforts, and suggests more on barriers and how they might be overcome and that sufficient detail on forthcoming activities would be helpful.

A reviewer notes that UAB plans focus on building the current program without any significant additions. They plan to expand on various technical areas including carbon fiber thermoplastic impregnation, nanostructured biocomposites, and biomechanical aspects and crashworthiness of lightweight materials.

Question 6: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?

Many reviewers commented that the program appears to be adequately funded. One reviewer also notes that because of funding and support, it appears to be on schedule. Another reviewer commented good ability to leverage funds and good efforts to attract student. Great that they work with historically black colleagues and local community colleagues.

EcoCAR the Next Challenge: Mike Wahlstrom (Argonne National Laboratory (ANL))



Reviewer Sample Size

This project had a total of 4 reviewers.

Question 1: Does this project support the overall DOE objective of petroleum displacement? Why or why not?

Reviewers felt the program supports DOE's objective of petroleum displacement. A reviewer commented that the EcoCAR Challenge is very relevant to petroleum displacement by providing students an opportunity to use a variety of approaches to develop technologies for improving vehicle efficiency and a real world environment.

Question 2: What is your assessment of the approach to performing the work? To what degree are technical barriers addressed? Is the project well-designed, feasible, and integrated with other efforts?

According to one reviewer, the program appears to have improved some of its processes over previous competitions with increased requirements for safety and practicality of design and definitization of stage deadlines. Development of all event rules early on in the program instead of on a year-by-year basis would have been beneficial to the teams. The addition of hardware in the loop systems significantly improves educational value. Another reviewer thought the strategy was very well articulated, but it would have been good to hear more about how barriers have been overcome related to design. A reviewer thought these student projects have matured over many iterations to the point where they have anticipated and addressed virtually all of the key barriers to success. That said, these are exceptionally difficult economic times for some of the program sponsors.

Question 3: Characterize your understanding of the technical accomplishments and progress toward overall project and DOE goals.

A reviewer noted how the program started in June 2008, and appears to be on schedule with the vehicle design phase being nearly completed. The program has provided rapid control prototyping systems and control interfaces to the participants. Another reviewer commented: When I was an engineering student, I participated in the SAE Baja and Formula vehicle design competitions (model for latter DOE student competitions). As such, I know firsthand the level of enthusiasm and the rapid learning that the undergraduate students obtain. In fact this was the reason that I pursued a career in the automotive industry. The same elements that fired me up as a student exist in these student competitions and results are borne out by the impressive number of them that continue on in this field (both as graduate researcher or in industry).

A reviewer felt the project is still in early stages. Another reviewer felt it would have been good to hear more about the past vehicles.

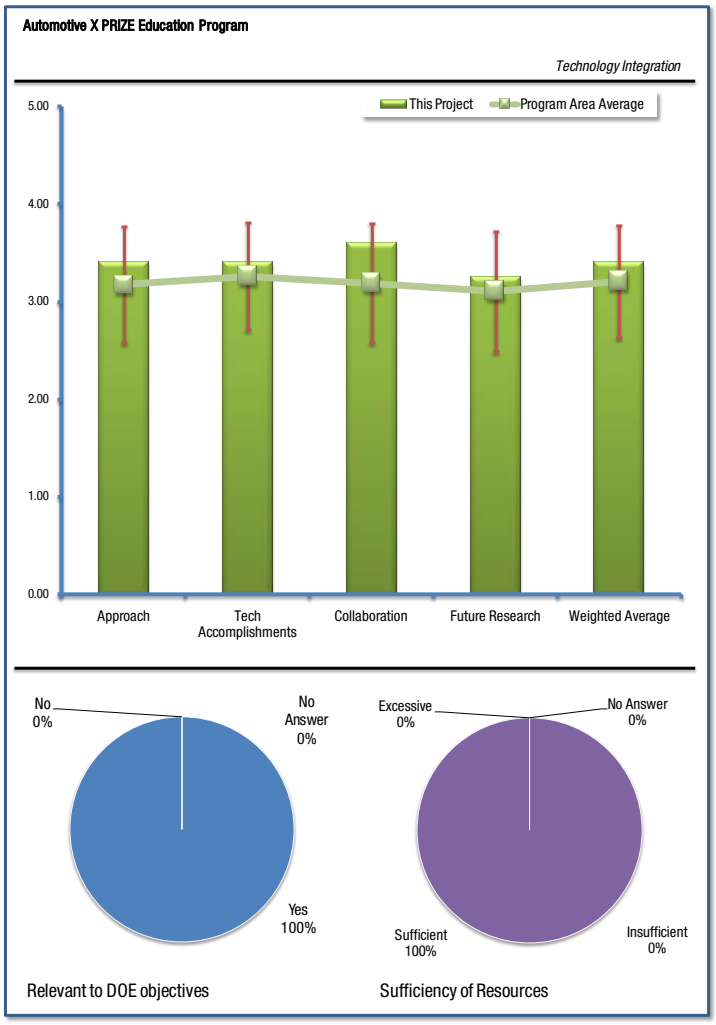
Question 4: What is your assessment of the level of collaboration and coordination with other institutions?
Reviewers cited an extensive list of partnering organizations. One reviewer noted how this list provides impressive leverage (bang-for-the-buck) for DOE funds. A reviewer commented that the program has very strong collaboration with a great multitude of governmental and industry organizations participating. Another reviewer felt that it's good that other funds are leveraged but would be good to hear more about the types of vehicles that have been developed.

Question 5: Has the project effectively planned its future work in a logical manner by incorporating appropriate decision points, considering barriers to the realization of the proposed technology, and, when sensible, mitigating risk by providing alternate development pathways?
Several responding reviewers felt that progress is well-defined, and/or that the plan clearly addresses barriers and steps to solve challenges. One reviewer also commented that speakers did a good job focusing on future activities. A reviewer commented that future plans appear to be sound in getting vehicles to students, determination of drive cycles, 2-mode and fuel cell software testing, completion of the design of all events, and finalization of year two rules.

While a reviewer recognized that the program is designed as a multi-year program with each year's activities planned out completely before it starts, an area of concern is what if anything the current economy will do to the funding and company in-kind support.

Question 6: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?
A reviewer commented that the program is highly leveraged and has sufficient resources.

Automotive X PRIZE Education Program: Mark German (X PRIZE Foundation)



Reviewer Sample Size

This project had a total of 5 reviewers.

Question 1: Does this project support the overall DOE objective of petroleum displacement? Why or why not?

Some reviewers did not address this question with comments explaining a yes or no answer, but many identified positive long-term impacts. According to one reviewer, educating our children is the best way to ensure long-term change in fueling vehicles and making a difference in what vehicles and what fuels they choose to purchase. Another reviewer thought this project is designed to educate students about advanced technology vehicles, the importance of efficiency, and to encourage them to consider careers in the transportation sector. The project includes a number of partners, including Discovery Education, Widmeyer Communications, St Louis Science Center, and C Fox Communications. A reviewer thought that students gain with Applied Education activities. A reviewer commented that this project is aimed at raising the awareness and interest of the nation's youth about vehicle energy efficiency as well as stimulating this interest through a national high school design contest. A reviewer commented that educating our children is the best way to ensure long-term change in fueling vehicles and making a difference in what vehicles and what fuels they choose to purchase.

A reviewer notes how the program addresses the outreach and education aspect of the DOE programs, and addresses the fact that there is a lack of awareness among general the public and students. Particularly for K-12, there is a lack of specific criteria for school programs and lack of age appropriate curriculum. The goal is to inspire students to pursue education and careers in efficient transportation. The reviewer saw good use of the X Prize competition for an educational effort. It gives K-12 educators and students to follow the competition and learn about efficient transportation technologies. There was nice use of projects like the smart dashboard. A strong focus on youths is apparent, particularly the high school level.

Question 2: What is your assessment of the approach to performing the work? To what degree are technical barriers addressed? Is the project well-designed, feasible, and integrated with other efforts?

A positive review stated that the project is well thought out, and has elements that will engage the general public, students, teachers, industry stakeholders and others in a creative and engaging way through competitions, national events, a creative website, design competitions, a Dashboard 2.0 design, etc. Another reviewer likes working with partners like Discovery Education and wonders if it would it be possible to get alternative fuels into the national science curriculums of elementary, middle and high schools. (The reviewer wasn't sure from Mr. German's presentation if that is in fact what they are trying to do.) A reviewer felt the program identified the barriers to educating and outreach, particularly the lack of curriculum and specifications for K-12 programs, and uses the

Automotive X-prize competition as a cornerstone for involving and educating K-12 student on fuel efficiency, vehicle design, and transportation sustainability. The reviewer saw good use of hands-on projects. However, might consider how the K-12 curriculum elements can be extended to outlive the X-Prize competition itself.

A reviewer scored the program as 'fair'; however, the reviewer is hopeful this is wrong. The reviewer elaborated, explaining that the program and design competitions just don't seem exciting enough, especially when they are competing against U.S. first and other robot competitions. Also, the high school student is very difficult to capture since school time is dominated by "no-child left behind" activities and the after school activities are dominated by sports and other programs as well as greater homework loads (my own elementary school kids have far more homework than I did in high school).

Question 3: Characterize your understanding of the technical accomplishments and progress toward overall project and DOE goals.
One reviewer thought the project had a very aggressive timetable and it appears that it was met and exceeded. Another reviewer thought progress to date seems to match the program plan. A reviewer focused on the program's partnership, explaining that by using the partners, they've looked at other curriculum resources and highlighted good content already available and aggregated it in a meaningful way. To get curriculum adopted in the schools, they looked at the national and state standards. They also reviewed existing contests that are out there and then focused this one on the high school level. They are engaging out of school time partners since high school students have limited time during school hours to work on this. In terms of measures of success, they've had 16,000 site page views. Earned media figures show great interest but need to know how this will be adopted and used in the classroom.

A reviewer noted how the launch of the Fuel our Future.com web site was a focus in this year, and how there was a launch at NSTA to introduce the K-12 curriculum, which was attended by about 40 teachers. The reviewer saw good age-appropriate projects, and that the contest focuses on High School Level. Key challenges will be use of the program within schools considering the competition from other program. Promoting this program as out of school activity will be a challenge.

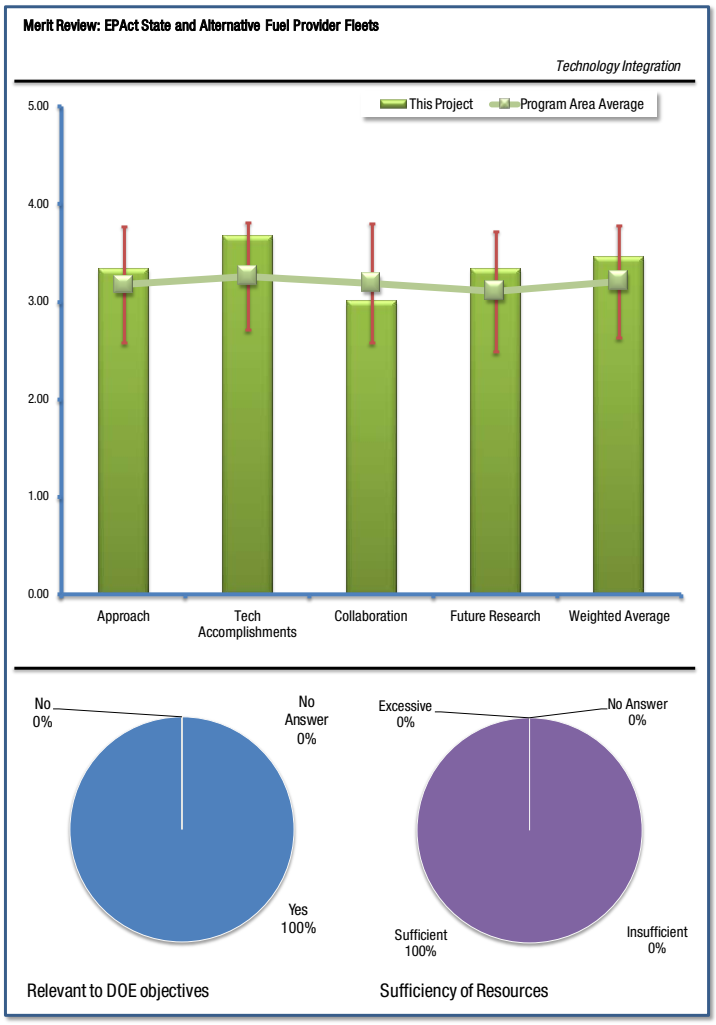
Question 4: What is your assessment of the level of collaboration and coordination with other institutions?
Reviewers saw a great deal of collaboration on this project, and strong partners. A reviewer commented that there is good collaboration with partners for education providers, science centers in K-12 - for example Discovery Education. There is also good organization of roles of partners. The program could explore more coordination with universities. While another reviewer felt the degree of collaboration and coordination appears appropriate, the reviewer is not sure how much funding leverage is in place. Presentation listed $3,504,686 as the DOE share but did not indicate how much partner funds and in-kind contributions they would be providing.

Question 5: Has the project effectively planned its future work in a logical manner by incorporating appropriate decision points, considering barriers to the realization of the proposed technology, and, when sensible, mitigating risk by providing alternate development pathways?
In comments, most reviewers felt the project is on track with milestones and deliverables. Specifically, a reviewer commented that they are well positioned for future grant deliverables, including competition host city education events. Another reviewer thought the layout of planned future activities is appropriate and well thought through. A reviewer saw a well-organized plan going forward. Another reviewer thought the future work with the NSTA should be a great starting point for this curriculum to become accepted into science classes nationwide.

Question 6: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?
Among responding reviewers, one thought resources appeared sufficient. Another reviewer commented it appears that they have been able to leverage the $3.5 million in Clean Cities funding in such a way as to make this a successful project. A reviewer saw no indication that the program is underfunded - however, the DOE funding level of 3.5 million is a lot. The reviewer really hopes this program pans out. One thing that the reviewer noticed in the

presentation was any follow-up success metrics (e.g., measures of impact/participation that are expected) that should be tracked throughout and following the program.

Merit Review: EPAct State and Alternative Fuel Provider Fleets: Dana O'Hara (U.S. Department of Energy)



Reviewer Sample Size

This project had a total of 3 reviewers.

Question 1: Does this project support the overall DOE objective of petroleum displacement? Why or why not?

One reviewer commented that the program is legislatively driven to specifically target reducing petroleum usage in automotive fleets through the use of alternative fuels and alternative fuel vehicles. Another reviewer saw that DOE displaces petroleum by having fleets comply with requirements for alternative fuel vehicles. A reviewer commented that this is a regulatory program to encourage adoption of alternative fuels. This is a vehicle acquisition program.

Question 2: What is your assessment of the approach to performing the work? To what degree are technical barriers addressed? Is the project well-designed, feasible, and integrated with other efforts?

The reviewers focused on how the program works to overcome barriers. A reviewer saw that most barriers are associated with regulatory restrictions, legal issues, and fuel availability. These barriers can be difficult to overcome. Barriers are often managed through exemptions and exclusions. Another reviewer perceived that most barriers are associated with regulatory restrictions, legal issues and fuel availability. Furthermore, the program has good knowledge of their barriers, and has developed a well-rounded program. A reviewer commented that the program has developed a strong approach to maximize compliance including the development of alternative compliance methods and direct interaction with stakeholders.

Question 3: Characterize your understanding of the technical accomplishments and progress toward overall project and DOE goals.

Several reviewers noted the high level of compliance in the program. One reviewer noted that the program appears to be quite active and has achieved a very high level of compliance in meeting legislative requirements. The program appears to be highly flexible in compliance approaches. The trend for compliance has been more and more weighted toward E85 flex fuel vehicles.

Another reviewer recognized the high level of compliance, and noted that the program dealt with many different types of policies. A reviewer also commented that the program is meeting 95%-plus compliance within affected fleets.

Question 4: What is your assessment of the level of collaboration and coordination with other institutions?

Many reviewers cited collaboration with NREL and Clean Cities. A reviewer cited this, and that good outreach and educational tools have been developed, including workshops and online toolkits. Another reviewer recognizes that the program is not really a project that can have collaboration, but they work with their stakeholders.

Question 5: Has the project effectively planned its future work in a logical manner by incorporating appropriate decision points, considering barriers to the realization of the proposed technology, and, when sensible, mitigating risk by providing alternate development pathways?

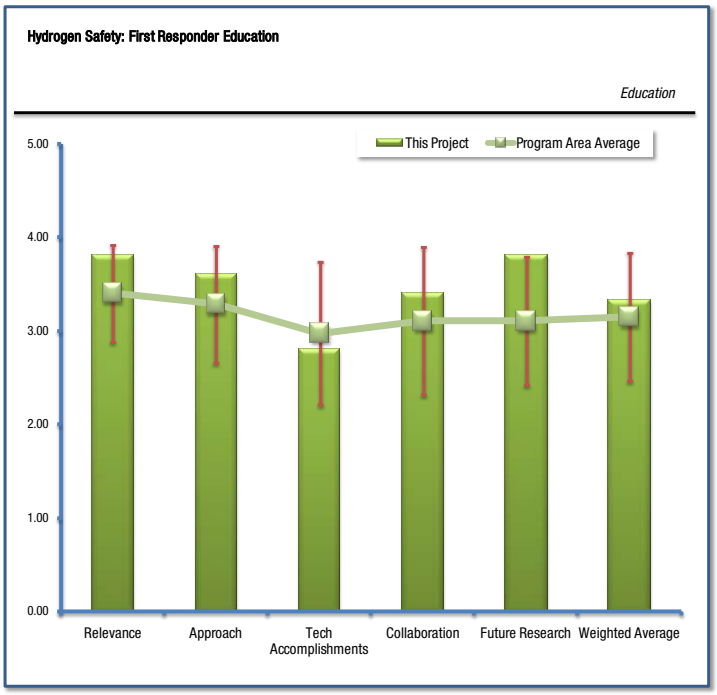
Some reviewers commented on the program's documentation. For instance, one reviewer thought the program seems to be well-organized and successful, and that documentation was mentioned as something that needs to be done for the project.

Another reviewer suggests that better documentation of the program should be pursued. While data is collected, this reviewer wonders if this data is made available to public and the alternative fuels, industry and research communities. A reviewer also thought that future plans appear to expand the resources available to fleets and to continue the refinement of program activities and reporting. The program will be analyzing other fleets to increase coverage. The program has a sound plan for going forward.

Question 6: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?

All reviewers commented that resources appear to be sufficient to meet milestones.

Hydrogen Safety: First Responder Education: Marylynn Placet, Pacific Northwest National Laboratory (PNNL)



Reviewer Sample Size

This project had a total of 5 reviewers.

Question 1: What is your assessment of the relevance to overall DOE objectives – the degree to which the project supports the goals and objectives of the Multi-Year RD&D plan?

Review comments were generally positive here. A reviewer cited the wide effort to disseminate H_2 information. Another stated that a focus on first responders is necessary. Hydrogen safety and first responder training is essential for the introduction of the technology. Experience has shown there is a fire professional education and awareness hurdle that must be overcome in almost every demonstration project. A third reviewer believed that a robust educational and outreach effort is critical to support the advancement of breakthrough technologies. Fuel cells generally do not have the benefit of robust outreach efforts from the industry, in this reviewer's opinion, to build public awareness of the products and their benefits, so public sector participation in coordinating a national effort is justified. The final reviewer stated that this sort of work is essential to the program. Proper first responder training and code enforcement official knowledge and confidence are enhanced by such training and familiarity. The course deals with stationary and vehicle incidents, which this reviewer saw as a strength.

Question 2: What is your assessment of the approach to performing the work? To what degree are technical barriers addressed? Is the project well-designed, feasible, and integrated with other efforts?

A reviewer saw this work as having a creative approach to address important barriers, and combining the use of the prop and online tools is great. This reviewer suggested taking the prop to other locations to reduce travel costs for the attendees and bring the course to others who might not take the time to travel. By obtaining feedback from technical experts and first responders, the project was improved, in another reviewer's view. Brainstorming in the classes (student centered learning) is an excellent approach and is also a strength of the program. Having a web based course, with a certificate, is an excellent way to encourage participation, and represents a third program strength.

A third reviewer said the approach appears solid, although there is a lot of funding being placed against this effort. Previous comments made about HAMMER site being hard to get to is still germane to some extent. This reviewer did say there was an excellent steering committee. The final reviewer was unsure if the scope was limited to the vehicle side of the training, but seems that this type of training must cover the infrastructure side of the equation...especially indoor refueling for forklifts. The team will probably need to revisit this given the focus on market transformation activities.

Question 3: Characterize your understanding of the technical accomplishments and progress toward overall project and DOE goals – the degree to which progress has been made, measured against performance indicators and demonstrated progress towards DOE goals.

A reviewer offered the positive comments that 300- 500 unique visits per month to the website is outstanding. This reviewer noted that courses still continue to be given, and the project team reacted to steering committee input and made changes as appropriate. This reviewer felt the hydrogen versus propane flame work is a good project.

On the other hand, a reviewer said that the May schedule date was not met and was slipped to June, while one program was canceled. This is a weakness in this reviewer's mind. Another expected the hydrogen suppliers to have been more involved in the development of the program. It is good that they were invited to a workshop, but this reviewer offered that they could have contributed much more if given a steering committee role, and the progress may have been better. A reviewer was unsure how the percent completions were derived. Was this based on work breakdown structure level measurement, or just gut feel? The final reviewer saw the project moving ahead on schedule, with its only weakness being in getting more people to take the course. Traveling with the course outside of Washington may solve that.

Question 4: What is your assessment of the level of collaboration and coordination with other institutions: the degree to which the project interacts with industry partners, universities and laboratories?

Comments on collaboration were fairly brief. One noted that collaboration with CaFCP and steering committee are both good, but there was not a lot of discussion on other collaboration partners. Another reviewer saw collaborations as good, but potential exists to bring in many of the federal agencies who have some demonstration projects underway (DOD, USPS, FAA, etc.) A reviewer said that coordination with other organizations has been comprehensive and extensive. To another, coordination efforts with fire departments and with NASA were strengths.

Question 5: Has the project effectively planned its future work in a logical?

A reviewer stated that it appears this is already fully funded. If not, they should continue their program through completion. Another offered that the plan moving forward is on target, but the team must look to relevant conferences to get the word out...potentially add NHA and FCSE to the list of events at which to present. The final reviewer said that the plan to continue the web based course and to give periodic training sessions in various locations is an excellent approach. These are both strengths.

What are the project's strengths?

A number of strengths were listed, including relevancy to early markets and facilitating market introduction, good industry representation other than hydrogen supply, coverage of vehicles, fueling stations and stationary installations, and coordination with fire departments and other experts including NASA. Further strengths involved the creative approach with the prop and online tools to reach safety officials, the intensive interaction with small to medium groups, the peer reviews of the curriculum and approach, the use of brainstorming and student centered learning, the provision of a certificate for the web based course, and the continued use of the web based program and periodic exercises around the country.

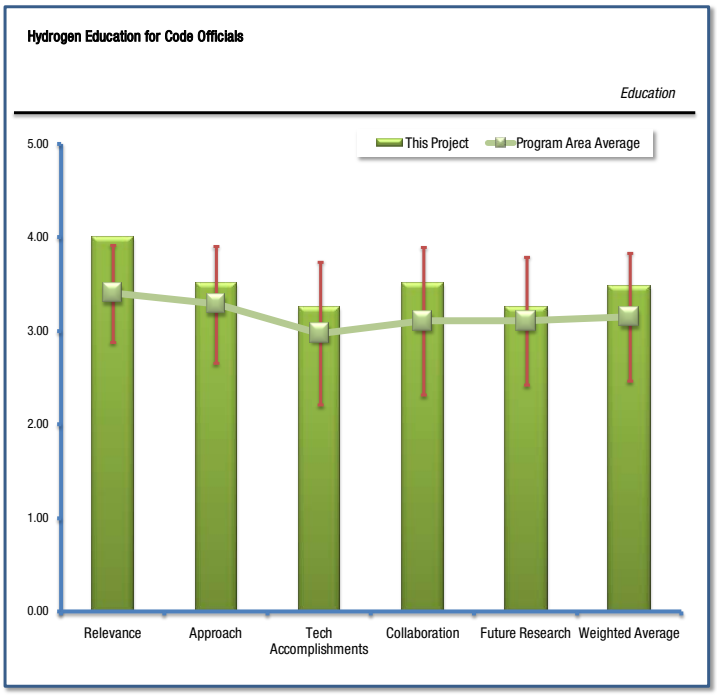
What are the project's weaknesses?

Weaknesses listed were few: the team canceled one class for 2009, and the project is limited in its current structure to reach large numbers of people (but that is fixable). Finally, a reviewer noted that per the presentation, this project seems to be focused on the FCV side: please consider other applications and in place infrastructure.

Do you have any recommendations for additions or deletions to the project scope?

Recommendations included consideration of expanding the scope to include other applications a little more specifically (since they are near market opportunities) along with infrastructure. Another suggestion was to take the prop to other locations to reduce travel costs for the attendees and bring the course to others who might not take the time to travel. The final suggestion was that more project classes with props would be an improvement.

Hydrogen Education for Code Officials: Melanie Caton, National Renewable Energy Laboratory (NREL)



Reviewer Sample Size
This project had a total of 4 reviewers.

Question 1: What is your assessment of the relevance to overall DOE objectives – the degree to which the project supports the goals and objectives of the Multi-Year RD&D plan?
Comments received for this question included the statement that educating AHJ about codes and standards is absolutely essential for market transition activity. From personal experience, this is potentially the current limiting factor for broader H_2 introduction. Also noted was that training code officials will help to make permitting easier.

Question 2: What is your assessment of the approach to performing the work? To what degree are technical barriers addressed? Is the project well-designed, feasible, and integrated with other efforts?
The first reviewer liked the e-learning method for delivery, but it often will require some personal engagement in the near term because some of the codes are under development and change. This reviewer also liked the fact we are ensuring symmetry with the awareness training from PNNL. A second reviewer noted this was an excellent step to coordinate with the national and state level organizations. Their support should greatly help facilitate the outreach to the first responders, as well as the delivery of training materials. Also, coordination with PNNL is a good step. A second reviewer said the program was well designed to begin with, and was modified according to feedback provided at the beginning. The third commenter offered extensive discussion of the approach, stating that taking feedback from the code officials helped to make the project more relevant: this is a strength. Giving a certificate helps to encourage participation. Covering both fueling stations and stationary fuel cells is a strength, but not covering parking facilities and repair facilities is a weakness. Linking the project to the permitting web site to ensure current information is used is a strength. Not having links to each individual jurisdiction's particular code and depending on the user to pick the proper source code and make the appropriate changes for his or her jurisdiction is a potential weakness. For instance, is the New York code set appropriately represented?

Question 3: Characterize your understanding of the technical accomplishments and progress toward overall project and DOE goals – the degree to which progress has been made, measured against performance indicators and demonstrated progress towards DOE goals.
Progress toward goals is the main commenting subject here. A reviewer said that progress is being made, although initial fielding was delayed from May to June of 2009. Second, a reviewer stated that so far progress has been good. This reviewer looked forward to seeing how the training is used and rolled out once it becomes public. The final reviewer said that the project appears to be on schedule, which is a strength.

Question 4: What is your assessment of the level of collaboration and coordination with other institutions: the degree to which the project interacts with industry partners, universities and laboratories?
A reviewer said that the current level of collaboration appears good. This reviewer sensed that a stronger tie to NFPA may be desirable (they were mentioned as 'other'). Additionally, it might be worthwhile to include some federal officials in the collaboration area. A second reviewer said that collaboration on the course was extensive and comprehensive, while a third said that coordination with applicable AHJs is a strength. Finally, a reviewer noted that

coordinating with the national and state level organizations was an excellent step. Their support should greatly help facilitate the outreach to the first responders, as well as the delivery of training materials.

Question 5: Has the project effectively planned its future work in a logical?

To the first reviewer, the proposed future work is good, but could be improved if the scope is expanded to include parking garages and indoor fueling for applications such as lift trucks. The plan for moving ahead is sound and well planned, offered the second reviewer, who suggested planning for the update and building out of some of the materials in the modules. The final review comment was that consolidation of resources will be helpful: this is a strength.

What are the project's strengths?

A strength was the program's relevance to the market transformation activities. Educating and delivering technical content to the AHJ is absolutely essential for demonstration projects and future fielding of the technology. Another strength was that this project addresses a key education need with a very important target audience. From what this reviewer has seen of the course, it is very well done. Another comment was that taking feedback from the code officials helped to make the project more relevant. Other stated strengths were the project's coverage of both fueling stations and stationary fuel cells, the linking of the project to the permitting web site to ensure current information, and the consolidation of resources to be done.

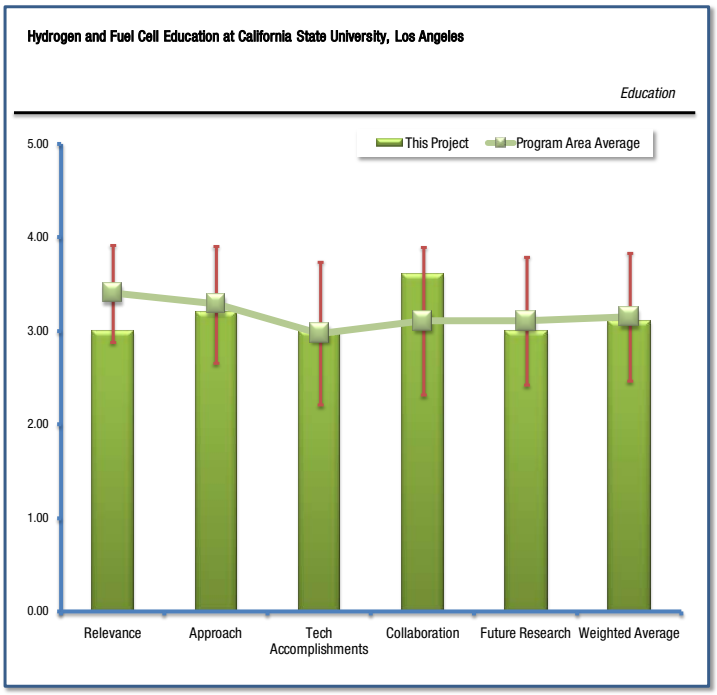
What are the project's weaknesses?

Project weaknesses were that current coverage is primarily outdoor infrastructure, and that the project does not cover parking facilities and repair facilities. The statement was made that automatic updating is good, but this reviewer anticipated issues when new code sections are added to address systems not previously addressed. There might also be confusion when sections are moved and combined, which often happens with new codes. Another comment was that not having links to each individual jurisdiction's particular code and depending on the user to pick the proper source code and make the appropriate changes for his or her jurisdiction is a potential weakness.

Do you have any recommendations for additions or deletions to the project scope?

Recommendations were that the team should consider broadening of the module 3 content to include indoor refueling, parking, and repair facilities (most applicable to near market opportunities): another suggested adding parking garages and repair facilities. Similar comments were that the proposed future work is good, but could be improved if the scope is expanded to include parking garages and indoor fueling for applications such as lift trucks. The final recommendation was for indoor refueling for forklifts, given the delay that DLS experienced at their Susquehanna facility.

Hydrogen and Fuel Cell Education at California State University, Los Angeles: David Blekhman, Cal State LA University Auxiliary Services, Inc.



Reviewer Sample Size

This project had a total of 5 reviewers.

Question 1: What is your assessment of the relevance to overall DOE objectives – the degree to which the project supports the goals and objectives of the Multi-Year RD&D plan?

A reviewer felt that the goals and objectives of this project support the aims of the Education Subprogram: a similar comment from another reviewer was that the program supports the objectives. The project was clearly relevant based on stated DOE objectives. A reviewer commented that development of college-level curricula related to hydrogen and fuel cells is critical to the development of a future hydrogen/fuel cell workforce. Similarly, curriculum development is essential to bringing well trained technical people into the industry. This could include researchers, engineers, designers, scientists and technicians. Having well trained technical professionals is essential to a growing and advancing industry.

Question 2: What is your assessment of the approach to performing the work? To what degree are technical barriers addressed? Is the project well-designed, feasible, and integrated with other efforts?

A reviewer felt the approach appears to be reasonable and consistent with the development of new, relevant courses and labs; however this reviewer said it was difficult to tell which courses are new and which already exist. Good supporting activities were shown in hydrogen and fuel cell technologies. Another commented that the curriculum is on track to set up curriculum/lab and expands on typical classroom courses by incorporating research, demonstrations and outside integration of existing hydrogen stations and cars in area. Multiple tasks are planned or underway, stated another reviewer who also noted the aggressive plan, especially considering the relatively low level of funding. This reviewer highlighted the use of other funding to supplement this effort. Good efforts in course developments, lab developments, demonstrations, and student projects, and an overall impressive effort, in a third reviewer's opinion. The final reviewer suggested that having several courses in several schools may help to get more people familiar with the technology, but having more courses in one school might help to build a higher level of expertise in a particular field of study. This is a recommendation for future work.

Question 3: Characterize your understanding of the technical accomplishments and progress toward overall project and DOE goals – the degree to which progress has been made, measured against performance indicators and demonstrated progress towards DOE goals.

Progress seems reasonable, to a reviewer. Accomplishments have been as good or better than would be expected in every area. Another said that most tasks are works in progress but seem on course to completion: the hydrogen laboratory with solar electrolysis capabilities will provide crucial data. A number of courses have been developed and are being delivered, noted the third reviewer, who added that outreach activities have involved diverse audiences. Finally, a reviewer commented that the course work has already started and further development is progressing well.

Question 4: What is your assessment of the level of collaboration and coordination with other institutions: the degree to which the project interacts with industry partners, universities and laboratories?

Good collaborations and also good outreach activities was the opinion of a reviewer. Another highlighted the collaboration with CaFCP, GM and Honda as strengths. Similar comments were that there were key partnerships with

CaFCP and local companies, and important work is ongoing with California government and utility companies. A reviewer noted that this is an interdisciplinary program with multiple funding sources and participating companies and organizations. Collaborations were characterized as very impressive, and a strength regarding the extensive partnerships was identified. Finally, a reviewer said that both conference participation and coordination with junior colleges were strengths.

Question 5: Has the project effectively planned its future work in a logical?

Future plans to complete the project were satisfactory to one reviewer's eyes. Another said that the project seems to be on track for completion, and the zero-emission fuel cell lab will be an important addition to research world. A reviewer stated that there was a good plan to expand course availability and variety. Most future work will concentrate on continuing both hardware and course/lab developments as previously planned, stated another. The final comment was that having several courses in several schools may help to get more people familiar with the technology, but having more courses in one school might help to build a higher level of expertise in a particular field of study. This is a recommendation for future work.

What are the project's strengths?

Several project strengths were highlighted by reviewers: availability of hydrogen fueling station based on renewable energy sources is an asset, noted one. Another felt a strength was the good outreach and education around project, and the participation at local shows and venues; this reviewer said the project should be able to continue on its own without DOE funding once that ends. Another spoke of the involvement of multiple participants and departments at the University. A reviewer stated there were excellent simultaneous efforts in many phases, along with good participation at Cal State and excellent collaborations. A reviewer listed conference participation, coordination with junior colleges, collaboration with CaFCP, GM and Honda, and extensive partnerships as strengths.

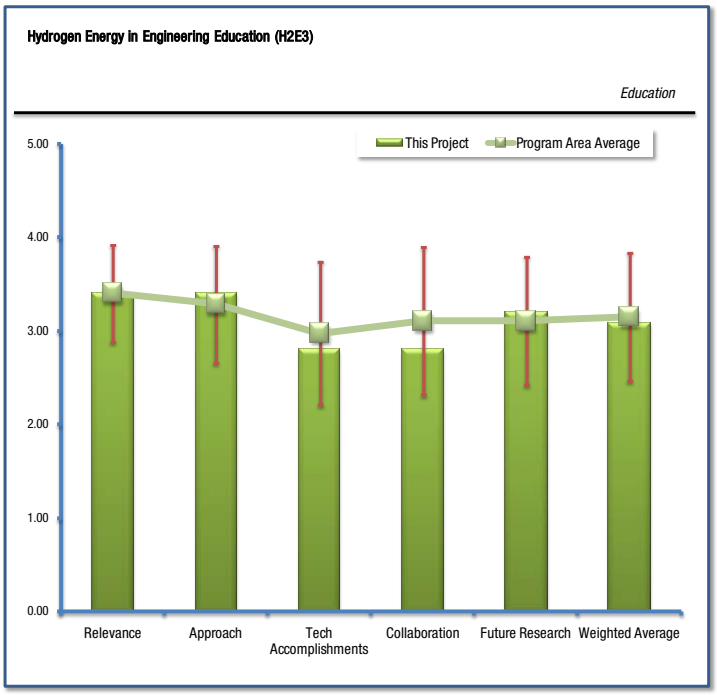
What are the project's weaknesses?

Outside feedback has not been solicited on the technical content of the courses was one stated weakness. Another said that it was not clear the Industrial Technology is the best home for the efforts. Finally, a reviewer offered that having several courses in several schools may help to get more people familiar with the technology, but having more courses in one school might help to build a higher level of expertise in a particular field of study. This is a recommendation for future work.

Do you have any recommendations for additions or deletions to the project scope?

Three recommendations were provided by reviewers: lower level courses should be developed for first or seconnd year students; continue the work as planned; and adding curriculum to Electrical Engineering.

Hydrogen Energy in Engineering Education (H2E3): Peter Lehman, Humboldt State University Sponsored Programs Foundation



Reviewer Sample Size

This project had a total of 5 reviewers.

Question 1: What is your assessment of the relevance to overall DOE objectives – the degree to which the project supports the goals and objectives of the Multi-Year RD&D plan?

A reviewer noted that the project is structured to be consistent with the subprogram goals and objectives. Another felt there was good relevance for the DOE-stated education objectives. A reviewer further stated that the project supports program objectives with hands-on fuel cell and hydrogen experience for students. A reviewer highlighted the long history of effective educational tool development and continued by saying the project is addressing long-standing concerns about hydrogen and fuel cell education gaps. The final reviewer said that the development of educated trainers is necessary for training future industry professionals. These curricula may be replicated at other universities to maximize benefits.

Question 2: What is your assessment of the approach to performing the work? To what degree are technical barriers addressed? Is the project well-designed, feasible, and integrated with other efforts?

A reviewer highlighted the broad-based approach including course development, labs and demonstration kit development. A reviewer said this offered good use of existing infrastructure and groundwork at the university. A reviewer made specific mention of modifying existing courses and developing suitable modules with an emphasis on undergraduate engineering students, as well as making use of the presence of hydrogen refueling stations in California to enhance the student experience. A reviewer noted several strengths in the approach, including developing curriculum for all levels of university students (lower division, upper division and senior level), using the California hydrogen fueling stations as part of the curriculum experience, replacing existing curricula with curricula that covers fuel cells, and building educational kits and test stations to be consistent with the curriculum. The final reviewer contrasted with these other opinions by noting that while the approach intent looks good, it is not clear that there is sufficient internal support. Chemical Engineering should also be involved.

Question 3: Characterize your understanding of the technical accomplishments and progress toward overall project and DOE goals – the degree to which progress has been made, measured against performance indicators and demonstrated progress towards DOE goals.

Progress was judged to be reasonable - project will be completed on schedule. This was echoed by another reviewer who also said the project appears to be on schedule. A reviewer emphasized that the electrolyzer had been completed and the team is making multiple kits. The reviewer also stated the team built own fuel cell stack to save money, and felt the project was on track. A reviewer said there was good progress on developing and testing curricula, test kits and fuel cell test stations. The final reviewer disagreed with the progress assessment, saying that many phases of the work seem to be well behind schedule.

Question 4: What is your assessment of the level of collaboration and coordination with other institutions: the degree to which the project interacts with industry partners, universities and laboratories?

Collaboration assessments were mixed. One said there was a good set of project participants, and similar views were offered by another who felt there was good collaboration with other schools. Planned collaborations look excellent to

another reviewer, but this person was not clear how much is actually taking place thus far. A reviewer noted the varied partnerships with fuel cell companies - different fuel cell sizes/products/markets and locations. The final reviewer was less positive in saying that some collaborations are in place, but rather limited at present.

Question 5: Has the project effectively planned its future work in a logical?

Assessments here included that there were good future plans that build on past progress and represent logical steps to move forward. A reviewer said the team was on course to complete major tasks by end of 2009. Plans for 2010 are promising, but some seem contingent on DOE and U.S. support for hydrogen (stations, infrastructure). A reviewer stated that replication to other campuses is a good goal for future work: passing this curriculum to other universities will be a big milestone, according to a similar comment. The final comment was that the team expected to continue with planned efforts.

What are the project's strengths?

Strengths related to experience were noted by several: one said this project builds on a long history of hydrogen education at the college level, while two other reviewers offered the opinion that the school has a long history of work in this area. Internships with fuel cell companies were strengths of the work, as was the ability for on-site hydrogen fueling station to provide actual operating data to students. A reviewer spoke of the project taking advantage of California's commitment to hydrogen and fuel cell development (but this was also judged a weakness - see below). Other strengths were in developing curriculum for all levels of university students (lower division, upper division and senior level); using the California hydrogen fueling stations as part of the curriculum experience; replacing existing curricula with curricula that covers fuel cells; building educational kits to be consistent with the curriculum; and building test stations to be consistent with the curriculum.

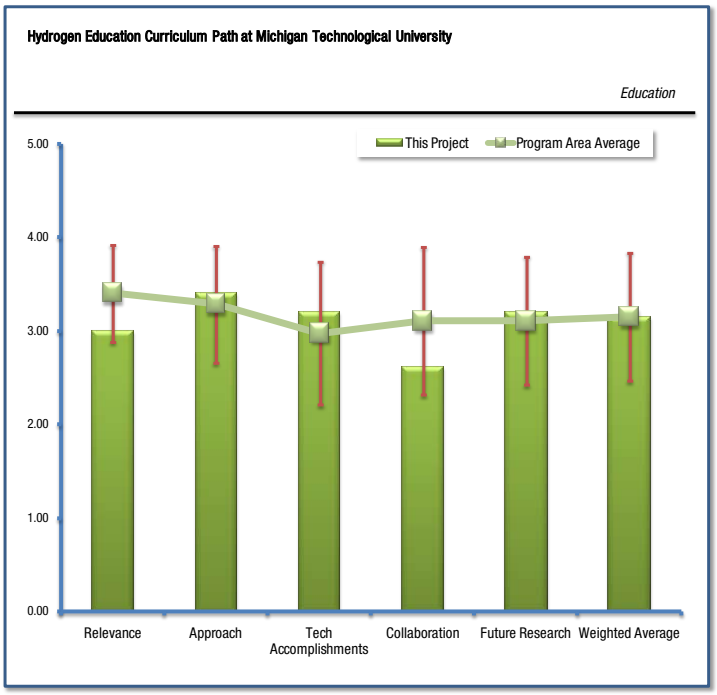
What are the project's weaknesses?

One reviewer said that no project weaknesses were identified. Others disagreed, speaking of the limited range of the program (California) and how to spread the work to other regions/areas to help boost hydrogen education in places without as many stations or support. To a third reviewer, it appears that thus far they have not put in as much effort as would have been expected.

Do you have any recommendations for additions or deletions to the project scope?

Recommendations for the work included educating other regions, universities and groups in other states or university clusters as to how to do similar programs in their area. Expanding potential collaborations to include other engineering disciplines was also suggested, as was adding graduate courses for Masters and Ph.D. work. The final comment was that the team should continue as planned if there are indications that needed efforts will be exerted.

Hydrogen Education Curriculum Path at Michigan Technological University: Jason Keith, Michigan Technological University



Reviewer Sample Size
This project had a total of 5 reviewers.

Question 1: What is your assessment of the relevance to overall DOE objectives – the degree to which the project supports the goals and objectives of the Multi-Year RD&D plan?
Comments included that the project supports goals and objectives of the subprogram by developing courses and labs in hydrogen and fuel cell technologies. Another comment was that there was good relevance based on DOE education objectives. A reviewer said the effort is designed to develop course materials and student projects, and to disseminate the materials to other institutions. The final comment was that the project is still in its infant stages but the plan seems to coincide with Hydrogen Program goals and objectives.

Question 2: What is your assessment of the approach to performing the work? To what degree are technical barriers addressed? Is the project well-designed, feasible, and integrated with other efforts?
A reviewer was positive in offering the opinion that there was a comprehensive approach to the barriers addressed. This reviewer liked the incorporation of addressing the texts commonly used and hoped this work can be incorporated into future editions of those texts. A reviewer saw a good approach and plan to disseminate the curriculum nationwide. The ease of integration of these modules and courses by other institutions is nicely done. The design of the products to allow easy integration of modules into existing courses/curricula is very good. A reviewer was specifically speaking of work to incorporate fuel cells and hydrogen into existing courses and new course material and noting a hydrogen minor proposal was approved. Other comments (less positive) were that the approach is typical and seems to address the proposed approach, and that the approach was very good but could be a little better with more involvement outside academia.

Question 3: Characterize your understanding of the technical accomplishments and progress toward overall project and DOE goals – the degree to which progress has been made, measured against performance indicators and demonstrated progress towards DOE goals.
Some disagreement was seen on the progress of this work. Progress appears to be rather slow in one stated opinion, with project really just getting started. The other reviewers were more positive, stating that the team had made very good progress and that materials have been developed and are being tested. Similar comments included that the team has accomplished much in a relatively short time and had excellent accomplishments with all phases apparently meeting or ahead of schedule. The final statement was that the proposed courses were approved, adding hydrogen to existing fuel cell courses, and the team had been working to find the places in a packed curriculum to add fuel cell/hydrogen problems and tasks.

Question 4: What is your assessment of the level of collaboration and coordination with other institutions: the degree to which the project interacts with industry partners, universities and laboratories?
A reviewer stated that the team is collaborating well with other universities across the country, presenting results and work at pertinent conferences and reaching out to industry and government to get feedback. Another stated that collaboration with universities was excellent, but collaboration with industry needs improvement to make sure that the information presented will actually help prepare students for a career in the hydrogen and fuel cell field by

addressing the technology in a practical way--not just scientific. A reviewer highlighted the good cross-discipline participation and the expansion of collaborations to include industry. To another reviewer, collaborations appear to be primarily internal to Michigan Tech; although reference was made to sharing project result with several other universities. Similarly, a reviewer offered that collaborations were excellent with other departments at MTU and other institutions. Some industrial involvement could make it better.

Question 5: Has the project effectively planned its future work in a logical?

Future plans were judged to be good. Future plans for completing the project appear to be adequate. The team is effectively building on progress and will be advancing fuel cell and hydrogen courses that were accepted and developed. Another reviewer said that there was an aggressive plan to disseminate information. Establishing contacts with publishers of standard textbooks is a good step in the effort to institutionalize this material. The final comment was that the proposed continuation work is appropriate per original plans.

What are the project's strengths?

Strengths listed for this project included its national scope/focus - putting their module/plan into other states/schools, and the flexibility and accessibility of the materials as a key feature of this work. Further, the project appears well-managed by an enthusiastic and capable P.I, and the project is moving ahead very efficiently in the short time since the project was started--impressive.

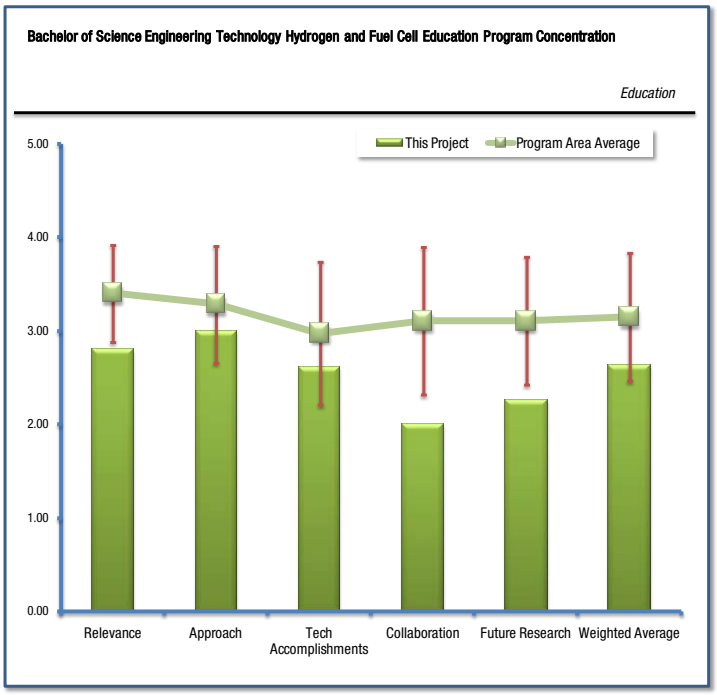
What are the project's weaknesses?

Several weaknesses were offered. Collaboration with industry needs improvement to make sure that the information presented will actually help prepare students for a career in the hydrogen and fuel cell field by addressing the technology in a practical way--not just scientific. This reviewer would suggest industrial review of course content to ensure credibility. Another suggested contacting industry associations like USFCC or NHA to find industry reviewers of project deliverables. The final comment was that slow progress needs to be accelerated in order to complete the project in a timely fashion.

Do you have any recommendations for additions or deletions to the project scope?

Two comments were made here: one suggested the project continue as planned, and the other suggested reviewing the weaknesses for scope additions.

Bachelor of Science Engineering Technology Hydrogen and Fuel Cell Education Program Concentration: A.K. Sleiti, University of Central Florida



Reviewer Sample Size

This project had a total of 5 reviewers.

Question 1: What is your assessment of the relevance to overall DOE objectives – the degree to which the project supports the goals and objectives of the Multi-Year RD&D plan?

A reviewer stated that the project has a specific task that supports overall objective for DOE. Other positive comments were that the program appears relevant and is addressing education objectives for hands-on workforce. This project is relevant to the goals and objectives of the Education Subprogram. However it is rather limited in its educational depth since it is focused on developing a bachelor-level degree program and does not address the broader intent of the Education Subprogram. The barriers that this project will address were not adequately discussed (apparently the speaker thought this meant actual barriers to successfully completing the project). A final reviewer offered that the presentation slides say that no technical barriers were addressed, but this reviewer thought that's probably not true.

Question 2: What is your assessment of the approach to performing the work? To what degree are technical barriers addressed? Is the project well-designed, feasible, and integrated with other efforts?

The approach was judged as appearing valid, seeming to be reasonable, and being based on the extensive fuel cell and hydrogen experience at CFU/FSEC. The program seems to be on track, stated another comment. A review comment noted that the team is developing course work for training of technologists. Recruiting students from community colleges is an effective approach. Offering the courses online is a good addition. The last comment was that it seems the project has been planned out well, but the presentation was very hard to follow because it moved so slowly through the slides.

Question 3: Characterize your understanding of the technical accomplishments and progress toward overall project and DOE goals – the degree to which progress has been made, measured against performance indicators and demonstrated progress towards DOE goals.

Some difficulty in judging progress was stated by the reviewers. A reviewer said that it was hard to tell if the pace of this project is slow or on schedule. There is no way to know based on the presentation, according to another reviewer who noted that the speaker never got this far. Progress appears to be adequate, but it was noted that most milestones identified were timed at, or near, the end of the project. This makes it difficult to track progress in the earlier stages of the project. A reviewer did comment that the program is on track for completion. A final statement was that the team has developed some of the proposed courses, and approval for a number of the courses is pending. This process is time-consuming for most institutions.

Question 4: What is your assessment of the level of collaboration and coordination with other institutions: the degree to which the project interacts with industry partners, universities and laboratories?

On the one hand, a reviewer noted that the team is collaborating with Florida Solar Energy Center - an expert institution in this field. Outreach to community colleges is key for education but also to recruit transfer students. Similarly a reviewer highlighted the team's work with hydrogen experts in Florida.

On the other hand, collaboration appears to be limited to internal participants, according to one reviewer. It was stated that industrial support was expected but details were not given in the presentation. Another said that collaborations were never mentioned by the speaker as he did not get this far. The final review comment was that no evidence of collaboration with others outside of the university was seen.

Question 5: Has the project effectively planned its future work in a logical?

A reviewer commented that future plans were not discussed during the presentation since the speaker exceeded the time allowed: this time limitation was also noted by another reviewer. A reviewer said further that the presenter was ineffective in being able to clearly explain this project. In addition, because so much time was taken on the first slides, the other slides were not covered. Looking at the slides now, it looks like much has been done, but since the presenter conveyed the opposite (work, but not a lot of clearly defined progress), it's very difficult to give many comments on this one.

Other comments were that the project ends in 2009. It needs to be sustainable on its own, which it seems that it will be. The university has experience with on-line courses so that is an option in future for non-lab classes, possible module for lab courses. The final comment was that completion of development and approval process is critical for the success of the curriculum.

What are the project's strengths?

Collaborations were noted as strengths, with two reviewers noting the Florida Solar Energy Center connection and one also noting the UCF College of Engineering, both excellent organizations to these reviewers. Extensive hydrogen and fuel cell experience was also a strength. Good outreach activities were also a strength, with outreach beyond scope of this program to get teachers/students interested in UCF and fuel cell/hydrogen work as a further strength. The final comment was that the program needs to sustain itself after funding/set up is done and the program seems on track to do so.

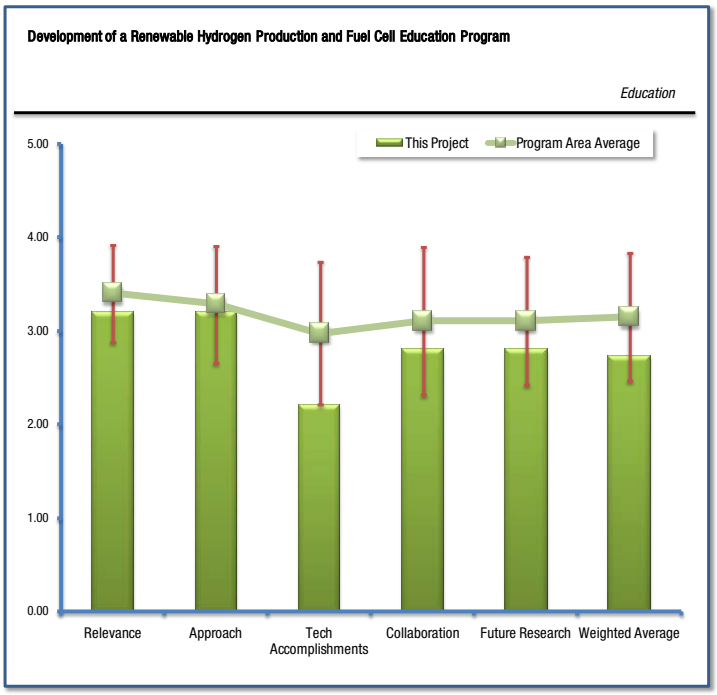
What are the project's weaknesses?

The program would probably have been better served to be associated with an engineering program instead of engineering technology.

Do you have any recommendations for additions or deletions to the project scope?

The only comment here was "appears marginal."

Development of a Renewable Hydrogen Production and Fuel Cell Education Program: Michael Mann, University of North Dakota



Reviewer Sample Size

This project had a total of 5 reviewers.

Question 1: What is your assessment of the relevance to overall DOE objectives – the degree to which the project supports the goals and objectives of the Multi-Year RD&D plan?

Relevance was judged positively for this project. A reviewer stated that this project is relevant to DOE goals and objectives. Another observed that this project appears to be relevant to the goals and objectives of the Education Subprogram. A reviewer was more specific in saying that the course content and applicability to advancing hydrogen and fuel cell education seems relevant. The final reviewer commented that the program is well-designed to be relevant. Only the small size of the school and the small number of students that will be reached limits the relevance.

Question 2: What is your assessment of the approach to performing the work? To what degree are technical barriers addressed? Is the project well-designed, feasible, and integrated with other efforts?

A reviewer felt the proposed approach is sound and includes several educational components - course development, off-site participation, internships, seminar series, etc. Another reviewer liked the incorporation of case studies and seminar series which presents exposure opportunities to a wider audience. A reviewer said there seems to be a well-balanced approach targeting students at all levels - giving general exposure to everyone, then more focused to interested/advanced students as they progress through program. The internship program is a great opportunity for students to work in a real world setting and gain valuable experience for themselves but also university. A reviewer noted that the combination of different level courses, lab experiments, teaching experiences, internships, midddle school "modules", and seminar series is a very comprehensive approach. Finally, the three level approach to reach large numbers of students with basic information and smaller numbers with more detailed information is admirable. Interactive teaching and case study use is also very good. This reviewer said it may be hard to update case studies as they age. Seminary series is good to integrate industry representatives, but it's unclear whether that will happen in practice given the low involvement by industry to date.

Question 3: Characterize your understanding of the technical accomplishments and progress toward overall project and DOE goals – the degree to which progress has been made, measured against performance indicators and demonstrated progress towards DOE goals.

Most reviewers noted that the project was just beginning, so progress was difficult to judge. A reviewer said the project seems to be just starting in terms of the development of the coursework. Similarly, a reviewer observed that the project is just beginning so not much progress to review (10% complete so far.) The project has 2 more years to go, and course development is progressing nicely. Another comment was that accomplishments have been very good although most parts of the plan are not yet complete. To another reviewer, progress has been extremely slow: it was reported that the project was only 10% complete. The team provided no convincing argument that the schedule would be accelerated. The final reviewer said it was too early to judge significant progress. Case studies should be complete and they are behind schedule. There were not enough details provided on the other tasks to fully assess project status and ability to hit scheduled milestones (several past due).

Question 4: What is your assessment of the level of collaboration and coordination with other institutions: the degree to which the project interacts with industry partners, universities and laboratories?

Collaborations were reviewed relatively positively. Several good collaborations were mentioned including review of developed course materials. A reviewer said the current work with partners appears sufficient, but appears there should be a wider audience for potential partners. A reviewer commented that there were not many partners but good ones. Another comment was that the project included partnerships with industry and NREL, but no other educational institution involvement is apparent. A reviewer offered that there was good collaboration between partners, but outside industry collaboration could be improved, especially regarding the case studies. This reviewer recognized that the case studies are largely focused on basic engineering topics, but some real applications would probably be very useful to show how the science translates to technology in use today.

Question 5: Has the project effectively planned its future work in a logical?

A reviewer commented that future plans are adequate if the schedule can be accelerated in a timely fashion. Another said that much of the work is in the future- once completed, it will be very valuable. A reviewer stated that the future work is appropriate based on original plan. Finally, plans to complete work in FY 2009 and 2010 appear to be there, but not enough work breakdown structure to fully assess status and adequacy in planning.

What are the project's strengths?

The introduction within the ChE and EE programs provide the widest possible exposure within those programs, noted the first reviewer. The program targets all levels of students, and provides real world experience via internships. There is good outreach to students both in and out of program via seminars and workshops - helps educate non-engineers about importance of technologies. The team is developing materials to middle schools. A reviewer stated the program was well-planned and there was good UND institutional involvement and support. The final comment was that the program addresses the need to prepare researchers for future careers in a systematic way.

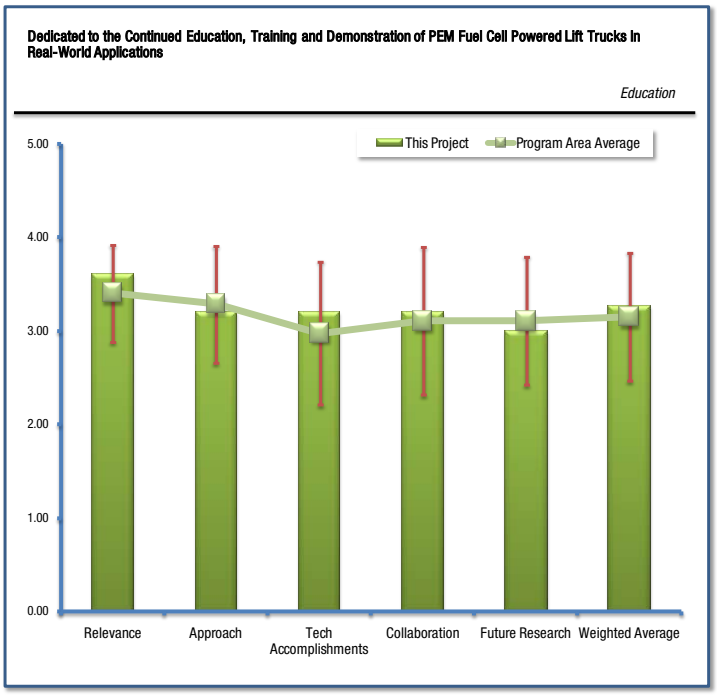
What are the project's weaknesses?

A weakness identified by a reviewer was that this is a very small program which probably will not reach many people. Similarly, a reviewer said that the current size of the ChE and EE programs at UND provide somewhat limited audience. The team might consider expansion to include the ME program as well. It has made a slow start due to outside forces. Evaluation of the results of this project includes more than just the numbers of students participating but rather include evaluation of the "quality" of the material presented. This project could use more tie-ins with industry and today's applications. This field is changing so fast, without some connection to the technologies that are making it into the marketplace, I don't think this project can realize its full potential.

Do you have any recommendations for additions or deletions to the project scope?

A reviewer recommended that the team might consider expansion to include ME program as well with the course material (especially the fuel cell applications/case studies). The other comment received was that the project should continue as planned.

Dedicated to the Continued Education, Training and Demonstration of PEM Fuel Cell Powered Lift Trucks In Real-World Applications: Tom Dever, Carolina Tractor & Equipment Co. Inc.



Reviewer Sample Size

This project had a total of 5 reviewers.

Question 1: What is your assessment of the relevance to overall DOE objectives – the degree to which the project supports the goals and objectives of the Multi-Year RD&D plan?

A reviewer stated that the project offers real time efforts at expanding the fuel cell and hydrogen markets. This technology has commercial viability in some scenarios today and this will help form the basis of developing the message and the business case surrounding broader introduction. Given recent reductions, this is an effort which must be leveraged to continue supply chain viability. The opinion of a second reviewer was that education to potential end users and customers is vital to industry, and deployment of actual units is crucial as well. A reviewer offered that the work appears to support the overall program goal of gaining experience with fuel cells in real-world deployment projects to show relevance of fuel cells to other potential near-term audiences. Work directly supports the barrier of lack of technical information (through data collection and analysis) and the barrier of mixed messages (dissemination of real-world information). The final reviewer stated that this demonstration project includes training and addresses lift trucks, one of the early markets

Question 2: What is your assessment of the approach to performing the work? To what degree are technical barriers addressed? Is the project well-designed, feasible, and integrated with other efforts?

A reviewer commented that this is a viable approach which seeks to 'introduce' the technology to potential users. The approach is limited due to duration at each site, the use of one fuel cell manufacturer and one type of lift truck. Another comment was that deployment of units for demonstration is key for commercialization of fuel cells. This reviewer also highlighted the team's work in reaching out to community colleges and other lift truck operators. A reviewer said that the approach combines education of lift truck users with strategic deployments of fuel cell lift trucks. This work builds on previous successful experience LiftOne has had with lift truck demonstrations. This addresses a key early market for fuel cells, as outlined in previous analysis documents. The final comment was that the seminars conducted at LiftOne branches are intended to educate a broad group of stakeholders. This reviewer noted the month-long deployments at UTi, Michelin Tire, Stanley Tool, Bausch and Lomb, Lowe's and Electrolux does introduce technology and infrastructure (AirProducts Siting mobile fueler at deployment facility; working with site personnel and local officials).

Question 3: Characterize your understanding of the technical accomplishments and progress toward overall project and DOE goals – the degree to which progress has been made, measured against performance indicators and demonstrated progress towards DOE goals.

A reviewer stated that the accomplishments to date seem on track, but it was rather early to gauge the impact of the demonstrations and how they will increase awareness and opportunities. A second reviewer said that the program was just starting but has already accomplished a lot. A demonstration at the NHA conference is a great way to promote technology. The team is working out kinks and potential problems that future customers will deal with – this will help avoid these problems when real sales start happening. A reviewer stated that considering the project has only been running for 6 months, progress is reasonable. They have identified some large companies for demonstrations and

education that will hopefully have favorable experiences with fuel cells that can be passed on to others. Hydrogen seminar (as described) appears to cover the appropriate bases. It would have been helpful to see samples of the 180 slides to get a feel for the content and presentation to better judge the potential success of the seminars. A reviewer observed that data analysis of equipment performance is being conducted to determine business case (number of lift trucks needed, amount of fuel used, hours of operation, etc.); this is necessary with every demonstration program. It is likely that this project will increase future sales. The final reviewer said that there was no information on data analysis provided.

Question 4: What is your assessment of the level of collaboration and coordination with other institutions: the degree to which the project interacts with industry partners, universities and laboratories?

A reviewer stated that his project team partners with numerous industry entities. This approach will encourage early market transformation. Another emphasized that the team is working with real customers and potential end users about fuel cell forklifts and hydrogen. A reviewer stated the team is working with commercial entities and Hydrogenics and Air Products, but an opportunity exists to broaden the application and the collaboration network (DLA, Army, USPS, etc). The project team is only working with two community colleges relative to collaborating with educational institutions. The final commenter stated that collaborations are good with the fuel cell manufacturer. If the companies to receive fuel cells in the deployment efforts can be defined as "collaborators" the project team has done a very good job of identifying large successful companies whose positive experiences will be very beneficial (e.g., Michelin, Stanley Tool, Bausch & Lomb, Lowes).

Question 5: Has the project effectively planned its future work in a logical?

Comments were mixed on the future work. One reviewer said that the future work plan to continue the deployment and education efforts is sensible and should be successful, but the description of how the program would be publicized beyond the fleet operators taking part in the education seminars (a key part of an educational effort) should be more clearly defined. For the activity laid out through December 2009, the future work appears on track to delivery on meeting objectives, in another's view. The question would be what follows those demonstrations. The measure of the program success should be some indicator of the elements and conditions that should exist for conversion of lift fleets to H2/FC. A reviewer suggested several items, including broadening the scope with drivers and local colleges and conducting more deployments. The team will need to share demonstration experience with others: make information public to encourage other companies to participate in demos or testing of fuel cell-forklifts. A reviewer's opinion on the future work was dependent on where the team is at the end of 2009. If they've done all the deployments, there is no point in finding hard-to-get funds. Could data analysis be done by a lab later? Would DOE own the data? The final reviewer indicated that next steps like outreach to decision makers to purchase FC lift trucks were not discussed. Is there a metric to determine the impact on market transformation (number of FC lift trucks sold)? Is the metric only number of individuals trained? What happens to the equipment after the project ends?

What are the project's strengths?

The strengths are the applicability to near market opportunities, and the great list of companies who will participate in the demonstration: major corporations with highly recognizable names. Comprehensive seminars were done to provide technical information to attendees: demonstration of the lift truck as part of the seminar is an important addition. A reviewer felt that having real users at real sites helps tremendously with education to public.

What are the project's weaknesses?

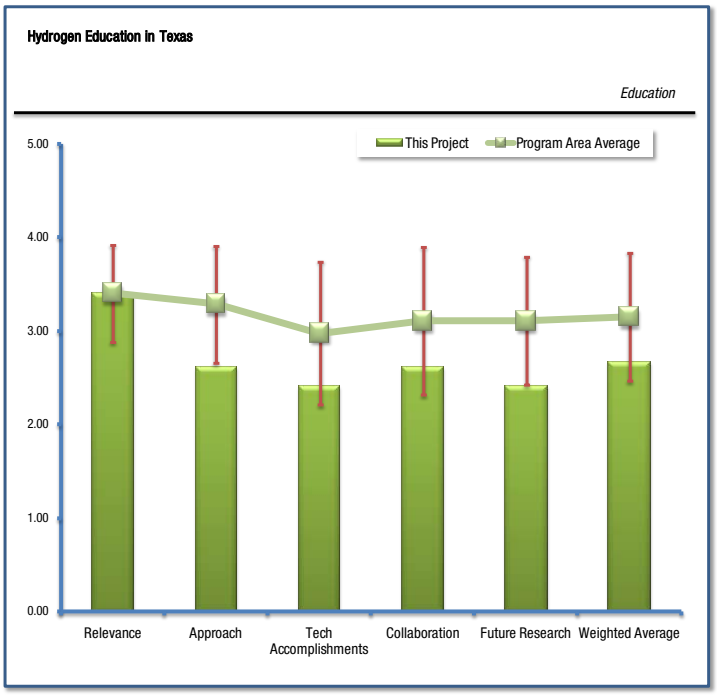
Several weaknesses were identified. One was that a reviewer was not sure what happens from January 2010 to August 2011 (it was hard to see the schedule layout. A reviewer stated that the future work to publicize the results of the program is not made clear. Another stated that the current limitations of one fuel cell provider and one make of lift has its limitations. The program does not fully demonstrate the 'drop in' battery replacement nature that may be necessary to accelerate fielding. It does not appear to aggregate the results of the several sites to come up with the generic 'conditions' that should exist for cost effective consideration of lift fleet conversion. The team might consider

broadening the collaborators on the project. The final reviewer suggested that as deployments end in 6-9 months, it would be extremely useful to continue in concert with education portion of project.

Do you have any recommendations for additions or deletions to the project scope?

The only recommendation was to require a 'final business case' that aggregates the results, or require collaboration with other entities which may be trying to define a business case (DOE, DOD, USPS, etc.)

Hydrogen Education in Texas: David Hitchcock, Houston Advanced Research Center



Reviewer Sample Size

This project had a total of 5 reviewers.

Question 1: What is your assessment of the relevance to overall DOE objectives – the degree to which the project supports the goals and objectives of the Multi-Year RD&D plan?

A reviewer said that the project does support the barriers of information dissemination and addresses regional differences in hydrogen education within Texas. State leaders are an important audience for education to ensure these stakeholders are engaged in any future initiatives. Similarly, a comment was received that education of state and local leaders is relevant, especially in a state with major hydrogen producers. The attribute of accomplishing regional outreach is laudable in another reviewer's opinion, but risks development of different content and approaches to delivery of information in different states/regions. The final statement from reviewers was that the goal/intent of the project to create a statewide plan is excellent and would support the Hydrogen Program goals and objectives.

Question 2: What is your assessment of the approach to performing the work? To what degree are technical barriers addressed? Is the project well-designed, feasible, and integrated with other efforts?

On the positive side, a reviewer said the team had very clear understanding and outlining of the target audience. Target audience is very important to success of hydrogen initiatives, and can ensure that these projects will happen. Use of existing materials ensures consistency and cost-effectiveness. Cooperation with the Clean Cities Program (another DOE initiative) will supplement their success. Another said that the webinars and workshops are good, using material already developed by others is very good. With the amount of SPAM everyone gets in their email, doubtful that many will read one more unsolicited email. A reviewer offered that the method for outlining the needs and developing course content is adequate. A reviewer did note that the team learned that the initial approach wouldn't work, and they needed to shorten up the training times.

A reviewer did offer some dissenting opinions, stating that it is not clear what the PI is actually doing. The initial strategy to develop and deliver 5 hr sessions with 100 participants changed to including information in conjunction with meetings held by other entities. Existing educational materials are being used. Partners are relied upon to identify participants. New partners include Clean Cities Coalitions, a good asset and approach. Other audiences should also be recruited. The project intends to start workshops by asking the audience what their current level of knowledge is. It would be helpful to understand the audience and their needs prior to developing the materials. Government staff is the target. This audience is already the most informed according to the Hydrogen Survey project. It is not clear what this project will accomplish. One of the barriers this project is designed to address is, "Lack of readily available, objective and technically accurate information", yet existing educational materials already developed by DOE are being used. It is not clear how this project addresses the barrier.

Question 3: Characterize your understanding of the technical accomplishments and progress toward overall project and DOE goals – the degree to which progress has been made, measured against performance indicators and demonstrated progress towards DOE goals.

The relatively short time since the project started was the subject of several comments. A reviewer said that the progress seems to be commensurate with time since the beginning of the project, while another felt it was too soon to

tell about progress. A reviewer stated that the project was relatively early in the life cycle, and hard due dates and measures of success still need some development. Considering the project is only a quarter of the way through its time period, the accomplishments are appropriate, noted another reviewer. Contact with Clean Cities Coordinators is good, and will provide a receptive audience to their message. Adjustment of the project plans based on DOE education workshop will help ensure success. The final reviewer observed that they've only had one conference booth, meetings with Clean Cities and the State Legislature. To this reviewer, that is not much outreach and communication since last August.

Question 4: What is your assessment of the level of collaboration and coordination with other institutions: the degree to which the project interacts with industry partners, universities and laboratories?

Several positive collaboration comments were received. One comment was that collaboration with the state energy office is important: communication should be maintained. Clean Cities provides vital regional contacts. The participation of the Texas H2 Coalition is also good. Another stated that the right groups seem to be involved, i.e., Texas H2 Coalition, State Energy Conservation Office and Clean Cities. It would be even better if some of the hydrogen related industries were collaborating. Third, it is good to collaborate with Clean Cities, Texas H2 Coalition, and the State legislature, but the collaboration doesn't seem very regular to this reviewer. It appeared to a reviewer that there ought to be great opportunity to collaborate with some of the other state and regional awardees under the DOE program. The final comment was that HARC is partnering with SECO and the Clean Cities coalitions. Clean Cities coalitions were not initially involved, but as the project progress coalitions were found to be invaluable in assisting with workshops. Entities outside of Texas are not involved.

Question 5: Has the project effectively planned its future work in a logical?

Future planning is good, given the current scope. This reviewer said that more indicators of due dates and measures of success would be useful. Another comment was that the proposed future work plan is appropriate. The workshops will cover the major Texas metropolitan areas. A reviewer suggested that an assessment method needs to be created and in place before starting, and a method to take a successful statewide program and replicate that success in other states should be addressed. The final comment was that the team has only received 25% of funding so far. As this is not an expensive project it will be best to see it through if 2009 funds can handle it. On the other hand, Texas is not an early market and does not have a lot of alternative energy initiatives outside of wind.

What are the project's strengths?

Strengths listed included the well-organized presentation that makes reviewing much easier, the good connection with Clean Cities to build regional connections, the good coverage of state population centers, and the important activities to reach the state decision makers. Another offered that a strength is the use of materials developed by others rather than "reinventing the wheel." One reviewer did say that no strengths were particularly noted.

What are the project's weaknesses?

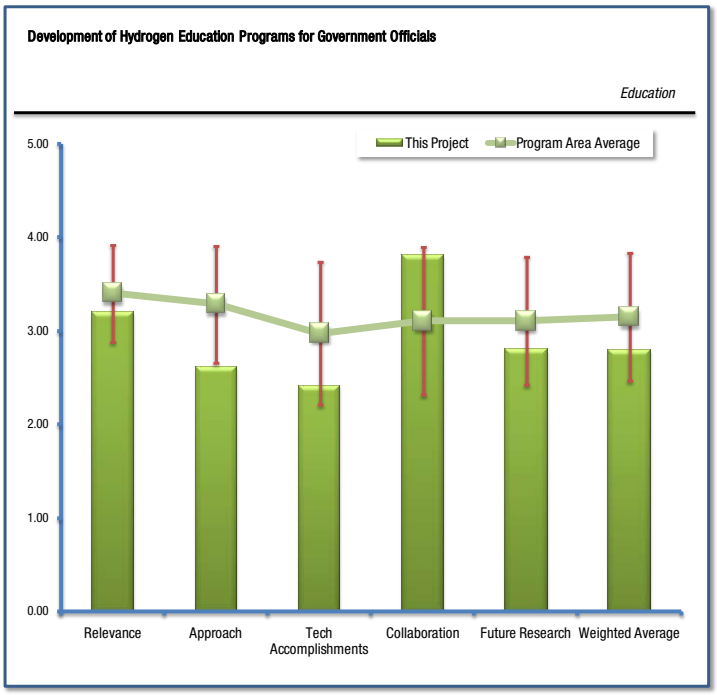
One weakness was a lack of definitive measures of success. Another was the targeting of the Texas legislature--if they only meet every two years, it doesn't seem like there would be much impact to be gained. This reviewer also highlighted success measures: there should be some kind of metric to judge the project's success. Is putting on x number of workshops a measure of success if only three people attend? The final reviewer said that no weaknesses were identified at present: will have to wait for the website and the completed meeting educational materials to determine if any weaknesses are present here.

Do you have any recommendations for additions or deletions to the project scope?

A recommendation offered was to develop measures of success (personnel contacted, projects begun, etc.) for use in gauging value from the project. Another suggestion was that DOE should look at bringing the state and regional coalitions together (if not already done) to develop a solid and consistent content which then has the regional specifics overlaid. The way it is structured now, it would appear that we might have several different packages in use

around the country. A comment was received that the general public has a huge desire to know more about hydrogen. Maybe a few public service announcements promoting the webinars and workshops so that the general public could participate would be a bonus.

Development of Hydrogen Education Programs for Government Officials: Shannon Baxter-Clemmons, The South Carolina Hydrogen and Fuel Cell Alliance



Reviewer Sample Size

This project had a total of 5 reviewers.

Question 1: What is your assessment of the relevance to overall DOE objectives – the degree to which the project supports the goals and objectives of the Multi-Year RD&D plan?

Relevance opinions were generally positive. A reviewer observed that South Carolina is a leading state for getting onboard the H2 economy. Another commented that education and outreach will need to be a focused effort in the years to come, and we must build support at the state/local level. A reviewer stated that this project addresses the need for accurate information to state and local governments, and meets DOE objectives to build hydrogen economy in the state. This project is relevant because it proposes Hydrogen 101 for state and local governments. The final reviewer noted that this effort takes the approach to provide information on hydrogen and fuel cells to trusted community members and government officials. For those that show interest, this effort will provide more information and encourage these potential advocates to learn more. Eventually a set of advocates, early adopters and opinion leaders will be developed.

Question 2: What is your assessment of the approach to performing the work? To what degree are technical barriers addressed? Is the project well-designed, feasible, and integrated with other efforts?

The first comment was that the approach was not very specific. Another commented that the approach for developing content is valid and straightforward, but not much detail was provided to currently gauge the progress. The approach shows good understanding of the concerns of the target audience: educational materials should be designed to meet these concerns. Special mention was made of learning the audience's terms of art, ensuring that the message will be clearly understood and giving the audience assurance that the educators have taken time to educate themselves before presenting information to the audience. Evaluation component is important to gauge success: provides feedback to improve the materials and processes. A reviewer offered that broad-based information sharing is expected to result in a set of interested community leaders and government officials. By continuing to give them supportive information, it is expected that they could become advocates, opinion leaders and early adopters.

This project includes some good approaches, but overall it is unclear exactly what the project focus is. Presentations will continue and the team will "work with partners" but specifics were not provided. Presentations at NHA and other hydrogen meetings will reach audiences already interested in the technologies. Other meetings/approaches/strategies need to be identified. Using the battery/fuel cell comparison experiment during the training is on target. This is an image that will stay with participants long after the training has ended. It is also an experience that will be shared with co-workers, friends, family and children. This expands the reach of the training beyond the targeted audience and plants a seed that may motivate the expanded audience to further investigate these technologies. “Learning the lingo” of the various target groups, for example, planners and economic development organizations, is an excellent approach to ensure that the information is understood by that group.

Question 3: Characterize your understanding of the technical accomplishments and progress toward overall project and DOE goals – the degree to which progress has been made, measured against performance indicators and demonstrated progress towards DOE goals.
Both positive and negative comments were received here. One noted that the team has presented (or plans to present) at several venues, including the Municipal Association of South Carolina. It would have been interesting to hear more about the evaluation procedures: this could be beneficial for several of the projects in this program area. Another reviewer said that although it is difficult to gauge success on this kind of project, the proof of success shows up late in the process and persists long after the project is complete. It may be too early to expect success, but success will come with blooming projects brought on by advocates and early adopters educated by the effort.

On the other hand, a reviewer said there was nothing in the slides except progress from others or the HFC program in general. Similarly, a reviewer said that the degree of technical accomplishments and progress is impossible to score. The PI misinterpreted the request for information. The PI addressed accomplishments in the development and deployment of the technologies; not project accomplishments. Finally, a commenter said that it was hard to gauge current accomplishments at this stage. Some engagement was seen during NHA, but the most important of engagements is yet to be accomplished.

Question 4: What is your assessment of the level of collaboration and coordination with other institutions: the degree to which the project interacts with industry partners, universities and laboratories?
Collaborations and partners were judged to be very good. One reviewer said that this was probably the most robust of the 'teams' in any of the projects this reviewer addressed. The team has government, academic and industry represented, which is a true strength. Once again, however, there might be some advantage from sharing lessons from the different states/regions performing this outreach and education. Excellent partnerships include working with the SC State Fire Marshal, SC SEO, Municipal Association of SC and SC Chapter of the American Planners Association, Primary Partners: Green Energy and SCHFCA members. Another said that the team includes the organizations most connected to local decision makers (the Municipal Association, planning associations) as well as the state energy office. The project team is co-located with the state energy office. Inclusion of an experienced team member (Greenway Energy) on hydrogen issues should provide benefits for accurate information dissemination. The next reviewer saw that there was good membership and good effort to identify community leaders and government officials. The final comment was that the team has many collaboration partners and they are influential in their own right.

Question 5: Has the project effectively planned its future work in a logical?
One commenter noted that the project plan is as solid as any of the regional plans. Another stated that work with the fire marshal's office is a unique aspect of this project: it will be interesting to see how that pans out. The concept of providing the economic case for fuel cells to help local decision makers get projects together should be beneficial. A reviewer spoke of continuing efforts with additional effort to define a project pathway.

To another reviewer it was hard to determine if they've been fully funded or not. But with a new station in SC and the Governor's PAC critiquing the state legislature on HFC investments, the education effort needs to continue. Also, if this is a 3 year proposal, this reviewer was not sure what happens in the outyears: just more of same? The final reviewer was concerned that the information provided was very general. This is a concern for a project in its first year. Specific approaches, plans, and schedules should be stated.

What are the project's strengths?
The team itself was a strength to one reviewer: the collaboration was evident in the project. Another offered strengths of the feedback loop to increase effectiveness of the educational materials, the focus on "talking the audience's language", and the inclusion of financial and business case calculations to push projects forward on a business basis. Another also noted the good membership, and also highlighted the good method of seeking new advocates and the fact that this is a focused effort that is not distracted by other technologies.

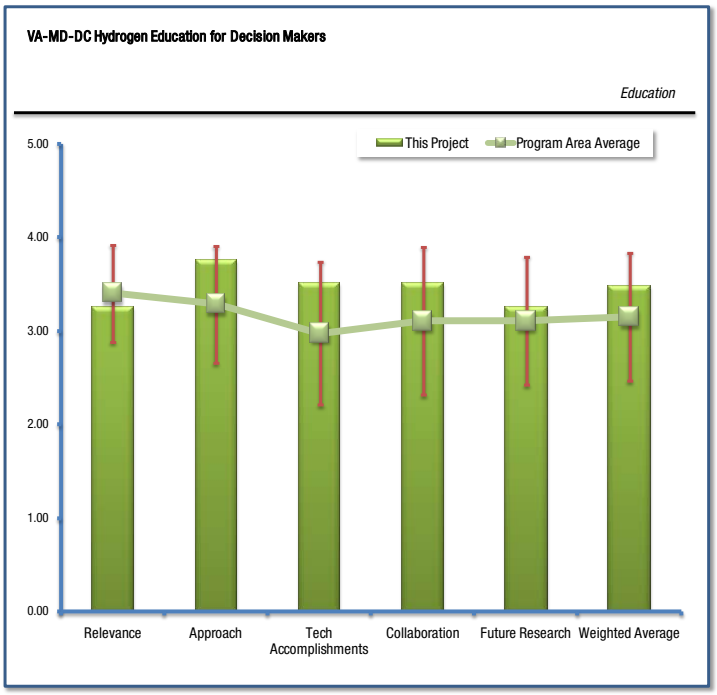
What are the project's weaknesses?

Weaknesses were that the program had a lack of measures of success, and that it was difficult to quantify early benefits.

Do you have any recommendations for additions or deletions to the project scope?

Several recommendations were offered, including the suggestion that the team develop measures of success (personnel contacted, projects begun, etc.) for use in gauging value from the project. Another suggestion was that DOE should look at bringing the state and regional coalitions together (if not already done) to develop a solid and consistent content which then has the regional specifics overlaid. The way it is structured now, it would appear that we might have several different packages in use around the country. Similarly, a reviewer said the team should ensure this project is coordinated with the Texas project approaching a similar target audience (state and local leaders).

VA-MD-DC Hydrogen Education for Decision Makers: Chelsea Jenkins, Commonwealth of Virginia



Reviewer Sample Size

This project had a total of 4 reviewers.

Question 1: What is your assessment of the relevance to overall DOE objectives – the degree to which the project supports the goals and objectives of the Multi-Year RD&D plan?

A reviewer said that the project team's work directly addresses goals of the program to build knowledge of hydrogen technology to ensure continued deployment of the technology. Another said that this project directly and efficiently addresses the goals and objectives of the MYRD&D plan and barriers listed, and the project exceeds expectations. A third reviewer observed this is another regional program which is focused on the mid-Atlantic area that will help educate and inform which is very relevant to the DOE program. The final reviewer said it was good to have an education program focused on the National Capitol Region.

Question 2: What is your assessment of the approach to performing the work? To what degree are technical barriers addressed? Is the project well-designed, feasible, and integrated with other efforts?

The approach was very well received. A reviewer said the team had a very good approach and detailed milestone schedule. Another stated that there was a solid planning approach and existence of a work breakdown structure for monitoring purposes. Several 'layers' of development is a little unique among the state/regional players that this commenter reviewed.

A reviewer said that the project will reach decision makers in a key area for early market deployment. Use of MotorWeek to produce video segments to educate the audience is a unique aspect that could benefit many of the educational efforts. The agreement by MotorWeek to broadcast portions of these segments on their weekly show will reach a wide audience as a side benefit of the work. Hardware demonstrations are a very good addition: it is unfortunate that demonstration hardware is hard to come by. Could DOE help in this regard?

The PI identified concrete, measurable deliverables including 12 workshops, magazine articles, a website, video resources, ride-n-drives, webinars, Twitter and other social networking technologies, and two 8-minute informational segments on MotorWeek. MotorWeek reaches a national audience. This is an outstanding, well thought out and thoroughly planned project with tangible deliverables. Impressive speakers have been secured for workshops. Measurable tasks are identified. The tools can be used after the period of performance ends. This is a model project that should be used to design other projects.

Question 3: Characterize your understanding of the technical accomplishments and progress toward overall project and DOE goals – the degree to which progress has been made, measured against performance indicators and demonstrated progress towards DOE goals.

A reviewer said that the project is on schedule in spite of original partners who have not participated as stated. Another said that the accomplishments since September are very impressive (several seminars, production of year 1 Motorweek segments, two magazine articles, website). The team should keep working on its collaboration with DC, as this will be an important audience to reach. A reviewer observed that the web site is up, two articles have been written, four seminars conducted, and a video shoot completed. This reviewer noted that no demonstrations have

been done as the team is apparently having problem getting demo's. Have they contacted Christy Cooper? The final reviewer said that some progress is being made...a little behind on schedule, but it is relatively early in the project.

Question 4: What is your assessment of the level of collaboration and coordination with other institutions: the degree to which the project interacts with industry partners, universities and laboratories?

Collaborations were also good: a reviewer said there was a good list of partners that combines some academic and government entities. Motorweek offers opportunity to hit a much larger audience. Similar comments were that the project is led by the Virginia Division of Energy: includes local universities and Clean Cities. Inclusion of Motorweek is a unique aspect. Another said that the partnerships include a remarkable and broad array of collaborators that is telling of the PI's ability to bring groups with a shared goal together. Universities, public television, fleet and public stakeholders, respected educational entities, and Clean Cities Coalitions from two states and DC are included. The last comment was that the team is following up on surveys, but is having trouble with partners in DC and Maryland.

Question 5: Has the project effectively planned its future work in a logical?

A reviewer observed that the team has done a lot with only $21K of DOE funds so far (out of $282K). That progress warrants more 2009 funding. Also, a lot of things are in progress (video shoot) and additional funding will allow them to follow through on that. Another comment was that there was aggressive content for future work with the number of seminars and the articles and segments to be developed. This reviewer liked the indication of follow-up surveys as one measure of success. Seems that future success is being linked to demonstration tools for use during seminars...may want to see how webinars can deliver that content. A reviewer further offered that the future work keeps up the good output of this team. The team appears to be doing more seminars than other teams had planned. Evaluation learnings will be critical to gauge success (some of this has already been done). The final commenter said that this project has been planned at the utmost professional level. Specific, tangible deliverables are scheduled and will no doubt be completed on or ahead of schedule.

What are the project's strengths?

Motorweek was one of the project strengths: one reviewer noted the use of Motorweek for video segments could have broad appeal and utilization, while another commented on the Motorweek exposure and TV-quality video materials. Other strengths include the ambitious schedule of seminars that should cover the bases well, and the activities conducted to prove the increases in knowledge.

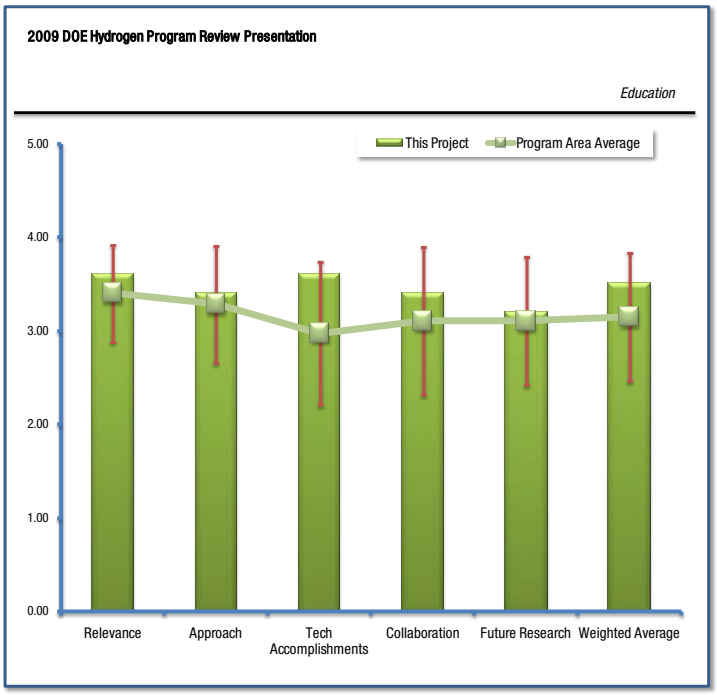
What are the project's weaknesses?

One weakness identified was a lack of measures of success to know when we have achieved what we need to. Another weakness was the need to involve the decision makers in DC: the team should keep working on that.

Do you have any recommendations for additions or deletions to the project scope?

A recommendation from a reviewer was to develop measures of success (personnel contacted, projects begun, etc.) for use in gauging value from the project. Another recommendation was that DOE should look at bringing the state and regional coalitions together (if not already done) to develop a solid and consistent content which then has the regional specifics overlaid. The way it is structured now, it would appear that we might have several different packages in use around the country. The final statement was that this project should be coordinated with the others tackling the local decision maker audience: perhaps the sharing of information can improve results for all?

2009 DOE Hydrogen Program Review Presentation: Joel Rinebold, Connecticut Center for Advanced Technology, Inc.



Reviewer Sample Size

This project had a total of 5 reviewers.

Question 1: What is your assessment of the relevance to overall DOE objectives – the degree to which the project supports the goals and objectives of the Multi-Year RD&D plan?

A reviewer said that this project is very relevant to approaching hydrogen projects in any state and offers a methodic approach. Another positive comment was that this project is realistic and well managed. They have asked all the right questions and taken the time to listen for the right answer. A reviewer stated that this project meets DOE objectives of educating local government decision makers, and supports early market deployment for fuel cells. It has a comprehensive outreach strategy at all levels of government. This is an outstanding project that fully supports the goals and objectives of the MY RD&D Plan. The project includes integrating state and local energy plans with federal objectives. This project could be used as a model for other states. A reviewer did comment that education of key stakeholders is important but wondered how the partnerships are being strengthened.

Question 2: What is your assessment of the approach to performing the work? To what degree are technical barriers addressed? Is the project well-designed, feasible, and integrated with other efforts?

Positive comments were that the approach includes a major component to map the state to locate telecommunications infrastructure, state and local government facilities, and other locations that could be ideal for early market deployment of fuel cells. The team has also developed criteria for assessing potential stationary power and transportation fuel cell applications. Approach is very practical and analysis-driven. Another comment was that this excellent approach includes partnering with stakeholders, developing resources, tools and models for the specific audience, educating local and state officials, identifying funding opportunities for projects, and posting project results on the PI's website. A reviewer highlighted the grassroots deployment of hydrogen fuel cell technology with a good implementation strategy. The project is limited to Connecticut but this model could be used for other states. Component 2 is a good example for other states to approach the same deployment model. A reviewer noted the focus on both stationary and transportation opportunities. The final reviewer did say the program seems to lack concrete goals. The team has identified potential sites for stationary power and transportation applications, but how is this educating someone?

Question 3: Characterize your understanding of the technical accomplishments and progress toward overall project and DOE goals – the degree to which progress has been made, measured against performance indicators and demonstrated progress towards DOE goals.

A reviewer noted that stakeholders have been identified, the website has been launched, and criteria for sites have been developed. A commenter said that stakeholders have been identified, analysis tools for potential deployment sites have been developed (good use of mapping tools), and education levels have been identified among the stakeholders. These are significant accomplishments given the time frame since the project start. Connection with local energy plans and Federal objectives is important.

A reviewer said that the team has developed an excellent data base of existing resources for all potential sites. They have keep a good perspective on the realism of their project. This reviewer liked the way the PI has digitized the outcomes and kept them relevant to project developers and educators. There was a good analysis of survey results. All five components are well thought out and comprehensive. Good website results with 20,000 hits per year.

A reviewer observed that the deployment based modeling is at a high level of sophistication in terms of identifying potential customers and needs for electricity and thermal power. A model of job creation potential has been presented to DOE HFCIT program management and federal agency management. Financial models and emissions benefits models have been reviewed by NREL for potential incorporation into NREL models.

A reviewer stated that defining some performance indicators would make it easier to judge progress.

Question 4: What is your assessment of the level of collaboration and coordination with other institutions: the degree to which the project interacts with industry partners, universities and laboratories?

A reviewer observed that this project brings together local, state, regional, federal, and utility partners that are key to the success of this project. Working sessions are planned with partners identify opportunities. Another noted that the utilities provide a good sense of realism. The project team has knocked on every door in the state. This is a very comprehensive approach. The notion of holding workshops for State and local interaction is a great idea. A reviewer further added that the partners appear to be appropriate for the target audience to be reached. Utility partners will be a good addition. A reviewer noted that the team makes full use of strong industry presence within state and is conducting strong outreach to municipalities in terms of development clean energy plans through workshops. A reviewer suggested that if local partners are Mayors, First Selectmen and Public Works Officials and these are key project participants, the PI should specify "mayors from the x largest cities have met with PI and..." Otherwise, the collaboration statement is too vague.

Question 5: Has the project effectively planned its future work in a logical?

A reviewer said that not a lot of information about the future work plans, but they appear to be appropriate. Another observed that a general schedule for future activity was presented, but specific information and tasks would be useful. A reviewer asked how the decision makers and key stakeholders are going to be educated.

What are the project's strengths?

Strengths listed for this project included the good management: the team used surveys and good investigation techniques. Another set of strengths included the extensive analysis-driven planning for identifying appropriate sites for fuel cell demonstrations and the practical educational focus areas (return on investment, energy and environmental value provided for dollars expended). A reviewer believes that this model could be used by other states.

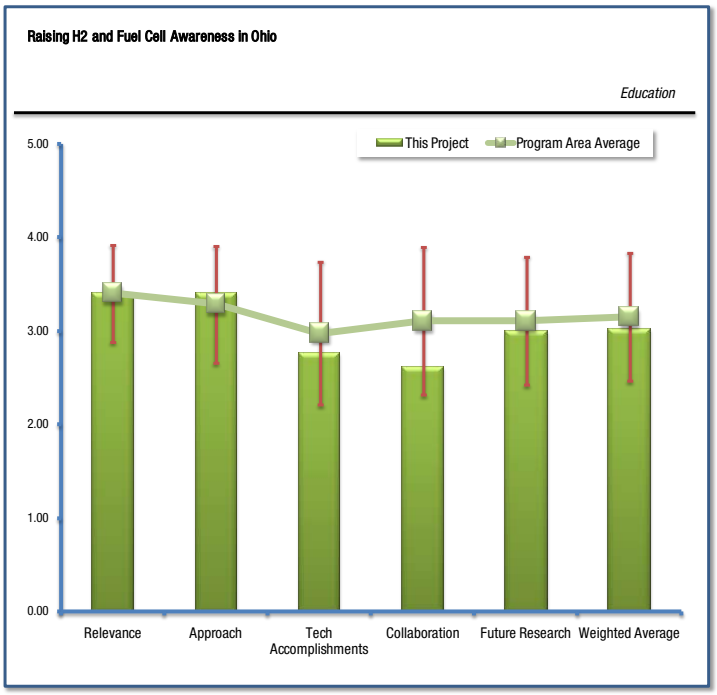
What are the project's weaknesses?

The only weakness identified was that goals, definitions, etc. were not clearly spelled out.

Do you have any recommendations for additions or deletions to the project scope?

A reviewer recommended that the PI coordinate with other projects that are addressing similar decision maker audiences. The other suggestion was that the CT program be a model for other state outreach programs.

Raising H2 and Fuel Cell Awareness in Ohio: Pat Valente, Ohio Fuel Cell Coalition



Reviewer Sample Size

This project had a total of 5 reviewers.

Question 1: What is your assessment of the relevance to overall DOE objectives – the degree to which the project supports the goals and objectives of the Multi-Year RD&D plan?

The first reviewer believed this project does address DOE objectives of reaching local decision makers. A reviewer offered that Ohio investment in fuel cell industry should provide a good story in terms of jobs impact, which should be a key message in a depressed state. A reviewer said this work addresses important issues. The final reviewer said that the proposed project intends to increase the awareness of hydrogen and fuel cell technologies if state and local officials. Specific metrics are stated.

Question 2: What is your assessment of the approach to performing the work? To what degree are technical barriers addressed? Is the project well-designed, feasible, and integrated with other efforts?

A reviewer stated that the project had well-defined objectives with measurable goals. Another felt that addressing the employment issue (retaining or increasing employment) will be important for the Ohio audience. Target audience drivers have been clearly identified. Measurement of improvements in education levels will be critical. A reviewer said that the approach is correct, but this reviewer would like to think that the awareness goal is conservative. While the public awareness level of hydrogen and fuel cells is low at this time, the success of early market products, like forklifts, should provide opportunities for increasing public awareness levels above the goals shown by this project. A reviewer noted that the team plans to hold forums around the state in different regions, and provide fuel cell 101 training and education for state and local officials. This reviewer believed the team is putting “a lot of eggs in the annual Ohio Fuel Cell Symposium basket.”

A final reviewer stated that the approach is unusual; rather than provide information and training on the hydrogen and fuel cell technologies, the training will provide "information about fuel cell companies, research entities and community colleges concerning fuel cell activities and give examples of early market deployment and manufacturing operations." This novel approach for the nine forums could reach more of the intended audience than more traditional approaches. The team has full understanding of the barriers to be addressed. The bi-annual newsletter is good way to continue raising awareness.

Question 3: Characterize your understanding of the technical accomplishments and progress toward overall project and DOE goals – the degree to which progress has been made, measured against performance indicators and demonstrated progress towards DOE goals.

The fact that the project had just begun was noted by several reviewers. One stated that there were not many accomplishments, but the project has just started (March). It will be easier to judge this next year. Another noted this was a new project that had barely begun, while a third said progress was not yet applicable because the project started in March. A reviewer offered the opinion that it took too long to launch the effort, but, now launched, it should be able to make good progress. The final reviewer highlighted the nice package they will give out during the forum, and observed that the target audience includes elected officials.

Question 4: What is your assessment of the level of collaboration and coordination with other institutions: the degree to which the project interacts with industry partners, universities and laboratories?

A reviewer observed that the stakeholders include: Ohio Dept of Development, Edison Materials Technology Center (EMTEC), but wondered if they have approached other collaborators. They have good technical support-- why can't they get them as collaborators? A second reviewer said the partner list could be stronger: can some of the Ohio-located fuel cell related companies (Rolls-Royce, Battelle, others) be included? A reviewer said that the team has named specific partners and are reviewing and compiling educational materials with these partners. A reviewer commented that it is not clear which of the two partners are responsible for which tasks. Additional partners are not identified.

Question 5: Has the project effectively planned its future work in a logical?

Future work appears appropriate to one reviewer to achieve the objectives of the project. Another stated it was well planned with solid dates for conducting forums. It is a good plan for a newsletter to use as follow up. A reviewer said the plan seems robust now that launch has been achieved. However, this reviewer thought the awareness goal should be higher. A commenter noted the project will draw audience to annual Ohio Fuel Cell Symposium, matchmaking, and deployment of fuel cells. The final reviewer stated that a date and location for the first forum is provided. No information was provided regarding the locations, dates, estimated participants, etc.

What are the project's strengths?

The forums were a strength to one reviewer. Another reviewer felt the strength was in the focus on economic development and jobs growth in a depressed state. However, given Ohio has already invested $79 million on fuel cell economic development, this reviewer urged the project to better develop its jobs growth message. There should be a good story to tell, given the level of investment. Ohio and CT should be models for jobs growth; however, Ohio doesn't seem to have developed as good a story as CT has done in terms of jobs. A reviewer highlighted the publication of a newsletter that will keep the hydrogen message in front of the target audience and the clear identification of target audiences and approach to address their main drivers for adopting fuel cell technology. The final reviewer said the project was well thought out and well defined, and it was easy to measure the success.

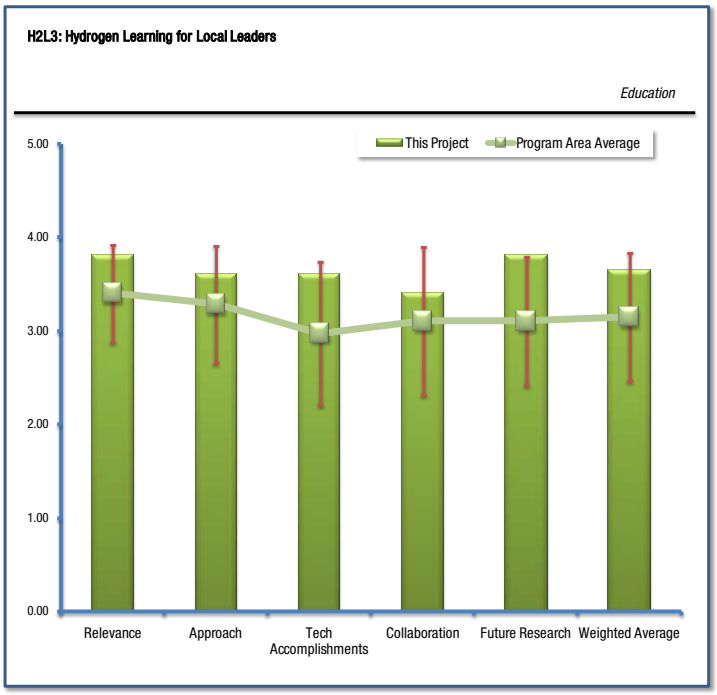
What are the project's weaknesses?

Partnerships with other agencies (state energy offices, associations of counties, other forums) could be stronger, stated one reviewer. Weaknesses in reliance on "ad hoc" collaborators and in having little emphasis on web-based information dissemination were also identified. A reviewer stated that the team needs to polish and better define the jobs messaging -- this should be a strength, as indicated above.

Do you have any recommendations for additions or deletions to the project scope?

A reviewer suggested that the team should coordinate with other projects to reach state and local governments. Connecticut should be able to help Ohio in terms of developing a jobs story.

H2L3: Hydrogen Learning for Local Leaders: Patrick Serfass, Technology Transition Corporation



Reviewer Sample Size
This project had a total of 5 reviewers.

Question 1: What is your assessment of the relevance to overall DOE objectives – the degree to which the project supports the goals and objectives of the Multi-Year RD&D plan?
A reviewer said this was well aligned with the goals of DOE. NASEO is a great organization to utilize. A reviewer observed that relevance to DOE objectives was clearly stated: project addresses curriculum development, pathways to disseminate information, and conducting of national-level educational workshops. This project directly addresses DOE objectives of increasing hydrogen education levels. A reviewer said this is an outstanding project designed to work with the national associations of state and local officials to educate state and local officials.

Question 2: What is your assessment of the approach to performing the work? To what degree are technical barriers addressed? Is the project well-designed, feasible, and integrated with other efforts?
The approach was generally felt to be good. A reviewer stated that the team is working with the appropriate national-level organizations to reach state and local officials. It is Important to reach out to key stakeholders like NASEO, but this reviewer would like to see more outreach to more groups, like NCSL and CSG, as effort develops. A reviewer said that "working with" instead of "talking at" state and local officials is a good plan that should increase success. A reviewer stated that there is good practical outreach through workshops. Core curriculum was used based on an existing curriculum. A final comment was that the approach is effective because the PI works with NASEO and PTI, not only to identify participants, but to obtain guidance on the type of information that best suits the needs of state and local officials. Peer presenters are included to present case studies, excellent approach. The PI uses established communcation networks to increase their reach.

Question 3: Characterize your understanding of the technical accomplishments and progress toward overall project and DOE goals – the degree to which progress has been made, measured against performance indicators and demonstrated progress towards DOE goals.
In a short period of time, since October 2008, a significant number of tasks have been completed, according to the first reviewer. These tasks include curriculum development, advisory committees have been assembled, peers have presented to audiences, and two Hydrogen 101 workshops have been held. Another stated that the team has completed the basic curriculum, forged partnerships with NASEO, and conducted the first of the Hydrogen 101 workshops. Progress is good considering the relatively short time since the project start. The third reviewer observed that a curriculum was developed using an advisory committee that includes local and state officials--excellent approach. The last reviewer liked how the team piggybacked on the NASEO annual meeting and trained officials using the Hydrogen 101 Workshop.

Question 4: What is your assessment of the level of collaboration and coordination with other institutions: the degree to which the project interacts with industry partners, universities and laboratories?
Collaborations were also strong for this project. Collaborations appear reasonable to one reviewer: NASEO is the correct organization to be a partner for this work. TTC is connected to several major hydrogen associations.

Curriculum developer is technically capable. The PI and team are working in close collaboration with NASEO. Schatz Energy Research Center is a good partner. A reviewer felt that the most important collaboration is with the local and state officials but the team members also have some strong partners. The final reviewer strongly suggested interaction and coordination with the state groups.

Question 5: Has the project effectively planned its future work in a logical?

The "train-the-trainer" aspect was highlighted by several reviewers: one observed that the train-the-trainer effort will improve the reach of this educational effort. Another said that train-the-trainer workshops are planned. This approach will expand the number of trainers throughout the nation, and has the potential to greatly increase the number of individuals that receive training. The third reviewer said the future work was well defined with a good approach in the train-the-trainer workshops. The final reviewer stated that webinars are a good way to go.

What are the project's strengths?

Strengths listed were: using cutting edge reach out techniques like webinars; having realistic expectations; having connection with national-level organizations (NHA, NASEO); having a national-level focus for education; and creating a good organization with goals that will be easy to measure for success.

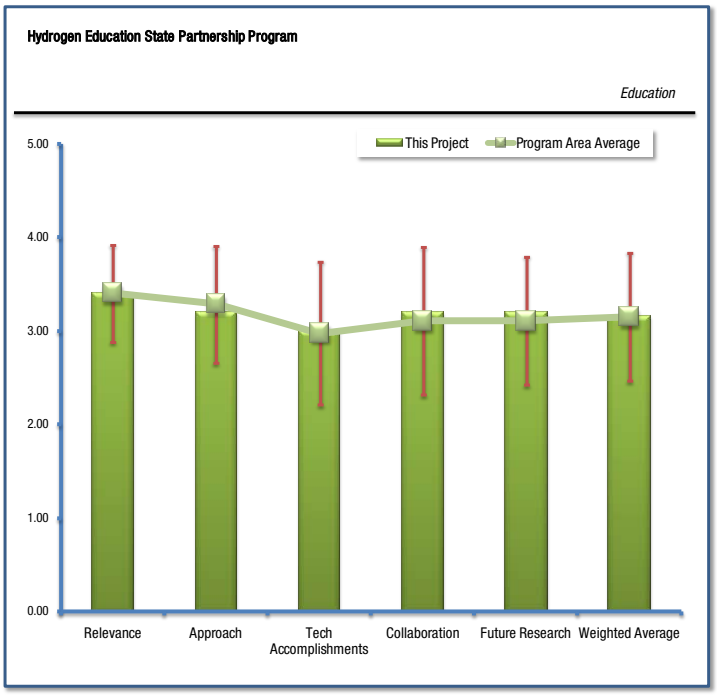
What are the project's weaknesses?

No weaknesses were identified.

Do you have any recommendations for additions or deletions to the project scope?

As with the other decision-maker focused projects, coordination among the projects is important. This project could provide guidance from the top level to the other state-level projects. Similarly, a reviewer offered that the team should work with other projects funded in this program to increase their chances of success.

Hydrogen Education State Partnership Program: Charles Kubert, Clean Energy States Alliance



Reviewer Sample Size

This project had a total of 5 reviewers.

Question 1: What is your assessment of the relevance to overall DOE objectives – the degree to which the project supports the goals and objectives of the Multi-Year RD&D plan?

The project will educate state-level officials, and fits well with DOE objectives, in the opinions of two reviewers. Another stated that the project addresses need for education among state-level officials and meets DOE goals for educational efforts. The final comment was that this is an excellent project that supports the goals and objectives of the Hydrogen Program by collecting and assessing state hydrogen programs, providing target specific tools and working with the National Conference of State Legislators.

Question 2: What is your assessment of the approach to performing the work? To what degree are technical barriers addressed? Is the project well-designed, feasible, and integrated with other efforts?

A reviewer said that preparing and providing technical overviews for policy makers is a valuable approach. A reviewer observed that the focus on state-level activities is unique among these projects. Identification of best practices will be useful to many of these programs. Building state partnerships will be important. A second reviewer also noted the approach to identify state hydrogen program best practices and policies, provide information and technical assistance to state policy leaders and state renewable energy programs to foster the development of effective hydrogen fuel cell programs, and promote strategic opportunities for states and DOE to advance hydrogen technology deployment through partnerships, collaboration, and targeted activities. A reviewer stated that the team will need a lot of reinforcement at state level in order to compete with solar and wind interests. This reviewer was not certain that adequate resources exist in many key states. Also, this reviewer believed this group should expand its focus beyond systems benefits charges and look to overall state level policies that can help the development of the fuel cells. Policy areas to consider are renewable portfolio standards, grid interconnectivity standards, and net metering. In terms of RPS, only six states include fuel cells without fuel source restrictions -- and two of these states (Minnesota and NY) are considering revisions that would impose fuel source restrictions. A final reviewer observed that the approach is multi layered. It focuses on the specific barriers that need to be addressed by state officials. The approach also includes tools, resources and workshops the audience can use to overcome the barriers. The approach is effective in building partnerships.

Question 3: Characterize your understanding of the technical accomplishments and progress toward overall project and DOE goals – the degree to which progress has been made, measured against performance indicators and demonstrated progress towards DOE goals.

Some reviewers felt the program accomplishments were appropriate for the time spent. One said that accomplishments are good given the short time since the project inception. Limited response to the state fuel cell survey was disappointing: the team needs to examine ways to improve response to their inquiries. Technical overview documents will be useful for many of these educational programs. Another said that much has been accomplished in a short period of time. Since November 2008 the project team has conducted a survey of state hydrogen programs, launched a state hydrogen website, conducted on-going state and regional calls, held workshops and started technical research. Similarly, a reviewer said that the project is relatively new but have completed a survey and launched a

website. A reviewer said the potential to collaborate with NHA, DOE and TTC is great: this reviewer hoped there will be good coordination. The final reviewer simply stated that it seems like the project has taken a long time to launch.

Question 4: What is your assessment of the level of collaboration and coordination with other institutions: the degree to which the project interacts with industry partners, universities and laboratories?

A reviewer said that the team includes the National Conference of State Legislators. This organization has a built-in means of communicating the target audience. Additionally, the bi-monthly calls are held in partnership with NHA. The steering committee is comprised of state energy offices, hydrogen organizations, and hydrogen grant awardees. The breadth of partnerships is more than adequate for this project. Another highlighted the collaboration monthly calls with DOE and NHA that are good: this reviewer said it is essential to work with NASEO. Another encouraged the potential to work with NHA and the state groups. A reviewer stated the opinion that collaborations were not clearly shown, but appear to be acceptable (NHA is involved, and project is led by a coalition of state clean energy programs). The final reviewer questioned what NCSL's role was in the team. Is the organization just available for dispensing the information to policy makers or do they have an actual role on the team?

Question 5: Has the project effectively planned its future work in a logical?

A reviewer said that the future work was not as well defined as some other projects: no metrics were given to determine success of project. Similar observations were that a general overview of upcoming work is provided. This work will assist DOE in meeting the goals and objectives. Additional details on the upcoming work would be helpful. A reviewer said that future plans appear to be appropriate for the work to be accomplished. Participation in NCSL annual meeting will be useful. Good ideas contained in the future work were the webinars with NCSL and the publishing of articles. The final reviewer strongly recommended the group address regulatory barriers, as highlighted above.

What are the project's strengths?

The tight focus on state-level requirements and the development of technical resources for hydrogen education that can benefit many educational programs were highlighted as strengths. Another reviewer observed that bi-monthly conference calls with DOE and NHA should improve project focus. The final reviewer said the project's strength was that it realizes the potential opportunity.

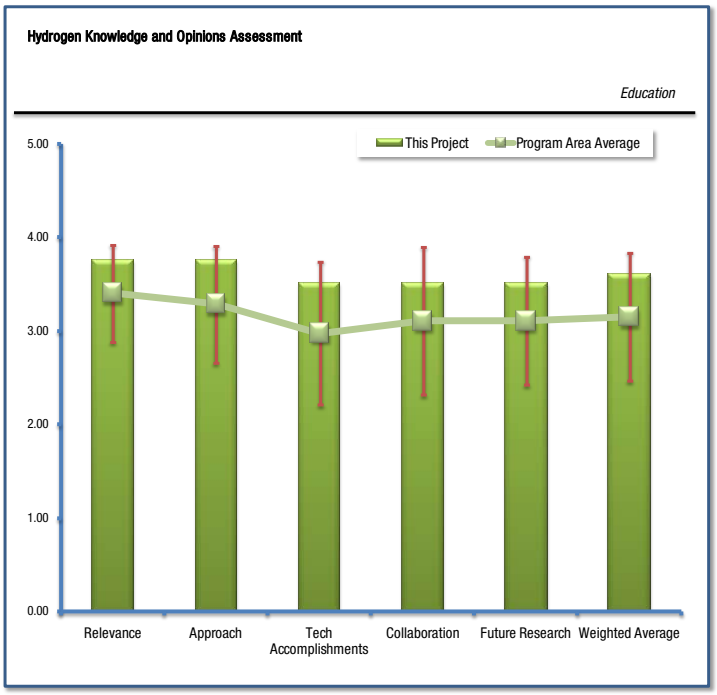
What are the project's weaknesses?

The only weakness was that a reviewer was not sure if, given the resources, this effort can compete effectively with the generally well funded efforts by other renewable technologies. This reviewer believed the scope of messaging should increase to include important state-level regulatory actions, especially RPS.

Do you have any recommendations for additions or deletions to the project scope?

Several recommendations were offered. This needs to be coordinated with the other education projects, especially the TTC (Serfass) project working with state officials. The team should seek out potential partners, such as CHP and other DG-focused groups, to leverage message. This reviewer believed the scope of messaging should increase to include important state-level regulatory actions, especially RPS. The team should identify key states for a more robust effort. Perhaps taking on a small number of states with a lot of effort is better than spreading the resources over a larger number of states.

Hydrogen Knowledge and Opinions Assessment: Rick Schmoyer, Oak Ridge National Laboratory (ORNL) - POSTER



Reviewer Sample Size
This project had a total of 4 reviewers.

Question 1: What is your assessment of the relevance to overall DOE objectives – the degree to which the project supports the goals and objectives of the Multi-Year RD&D plan?
A reviewer characterized this as an essential project. Another disagreed, stating this is a useful, although not critical, activity. To be most useful, plans must be developed to impact results. In support of the first reviewer, a third reviewer said it is critical to utilize some type of survey instrument/quiz to gage the effectiveness of training, education and outreach programs. The thought process of measuring success in several of the ED programs was lacking the statistical rigor contained in this effort. A final comment was that this is a key project that measures the general public's, and specific target audiences', knowledge of hydrogen and fuel cell technologies over almost a decade. The survey findings assist in determining training needs: the survey is one means to measuring the impact of the sub-program's efforts.

Question 2: What is your assessment of the approach to performing the work? To what degree are technical barriers addressed? Is the project well-designed, feasible, and integrated with other efforts?
A reviewer characterized this work as having a good and well thought out plan, with barriers that are acknowledged and addressed. Another stated that by all appearances, the methods and approach to the work is statistically sound and measures progress over time. The challenge comes in the addition of populations or details as the work progresses. A third opinion was that it is vitally important to have these data on general opinions to show what people think about these new technologies. Approach should be continued exactly as planned and executed so far. The final reviewer stated that this is a well designed approach other than reliance on phone interviews. The PI reports that telephone survey response rates are low and that this may be due to the fact that many households use a cell phone as their only phone. These individuals may be more technology forward. Without their input the data may be skewed. Additional survey approaches were not offered.

Question 3: Characterize your understanding of the technical accomplishments and progress toward overall project and DOE goals – the degree to which progress has been made, measured against performance indicators and demonstrated progress towards DOE goals.
A commenter said that the data appears to be of good quality and well analyzed. Another noted that the team completed the very detailed 2008 data collection, analyzed the data and reported their findings. The third reviewer observed that technically speaking it is sound and relevant in the results and progress shown to date. The delays on surveying the codes and standards officials are all that is currently lacking on the project. The final reviewer offered that we could use this information more often and that the procedure to get this information is onerous due to bureaucracy. If there was a way to hold these surveys more often, it should be done.

Question 4: What is your assessment of the level of collaboration and coordination with other institutions: the degree to which the project interacts with industry partners, universities and laboratories?
A reviewer observed a good collaboration, but feels there is more opportunity to collaborate with some early adopters and demonstrators to form a more specific idea of learning and growth and general awareness. Another offered that

the team has collaborated extensively with industry and other experts. Going forward, this reviewer felt it is important to continue to collaborate with communications professionals who know the right wording to use--not engineers. A last comment was that the team partners with an array of national and international organizations to clarify data, hydrogen and fuel cell associations, and the Opinion Research Corporation.

Question 5: Has the project effectively planned its future work in a logical?

A reviewer said the work is sharply focused but more future work could be done to get more data more often from the surveys. The planned work for the completion of the project is described, according to a reviewer. The final product will provide DOE with a detailed examination of how the Education sub-program has increased the nation's awareness of hydrogen and fuel cell technologies. A reviewer offered that the approach makes sense to test again in 4 years. The final comment was that given current status, the proposed plan is good, as funding and resourcing is a little unknown at this point.

What are the project's strengths?

Strengths were in the well thought out plan and good slate of questions that address the issues. Another strength was in the statistical rigor and demonstration for changes from 2004 to 2008. A reviewer noted that the team has comparable data year to year: no one else is doing this. The final strength was that the survey approach is technically sound and OMB approved. The project spans almost a decade providing a means to determine the impact of the sub-program's efforts.

What are the project's weaknesses?

A reviewer observed that the weaknesses are the same as those addressed by the report, such as non-response bias. Another comment was that a reviewer did not note any relationship to this knowledge and opinions research and any of the current ED programs underway. A reviewer said that audiences should be surveyed more often. A final reviewer said that for other than government agencies, response rates from key target audiences are less than 30%. Challenges with telephone interviews are stated. Other survey approaches could be employed to improve response rates. In FY09 safe and codes officials are added as an additional target audience. It is unclear why this important audience, one that needs training before other audiences, was not included in the initial survey.

Do you have any recommendations for additions or deletions to the project scope?

A reviewer suggested that the team look for opportunities to link the state/regional/national level ED programs to providing input to this dataset maintained at ORNL. For instance, DOD/DLA is looking to survey the workforce at one of the distribution centers before and after training and initial operations. The team should look to feed that information into the ORNL body of work and see if it helps inform and redirect focus. Another suggestion was to conduct surveys more often. The final reviewer noted that households served only by cell phones are not surveyed. These residents may be more likely to be early users of new technologies. They may also be more knowledgeable about new technologies. Again, perhaps other survey approaches, for example, web-based surveys would improve response rates.