10. Fuels Technologies

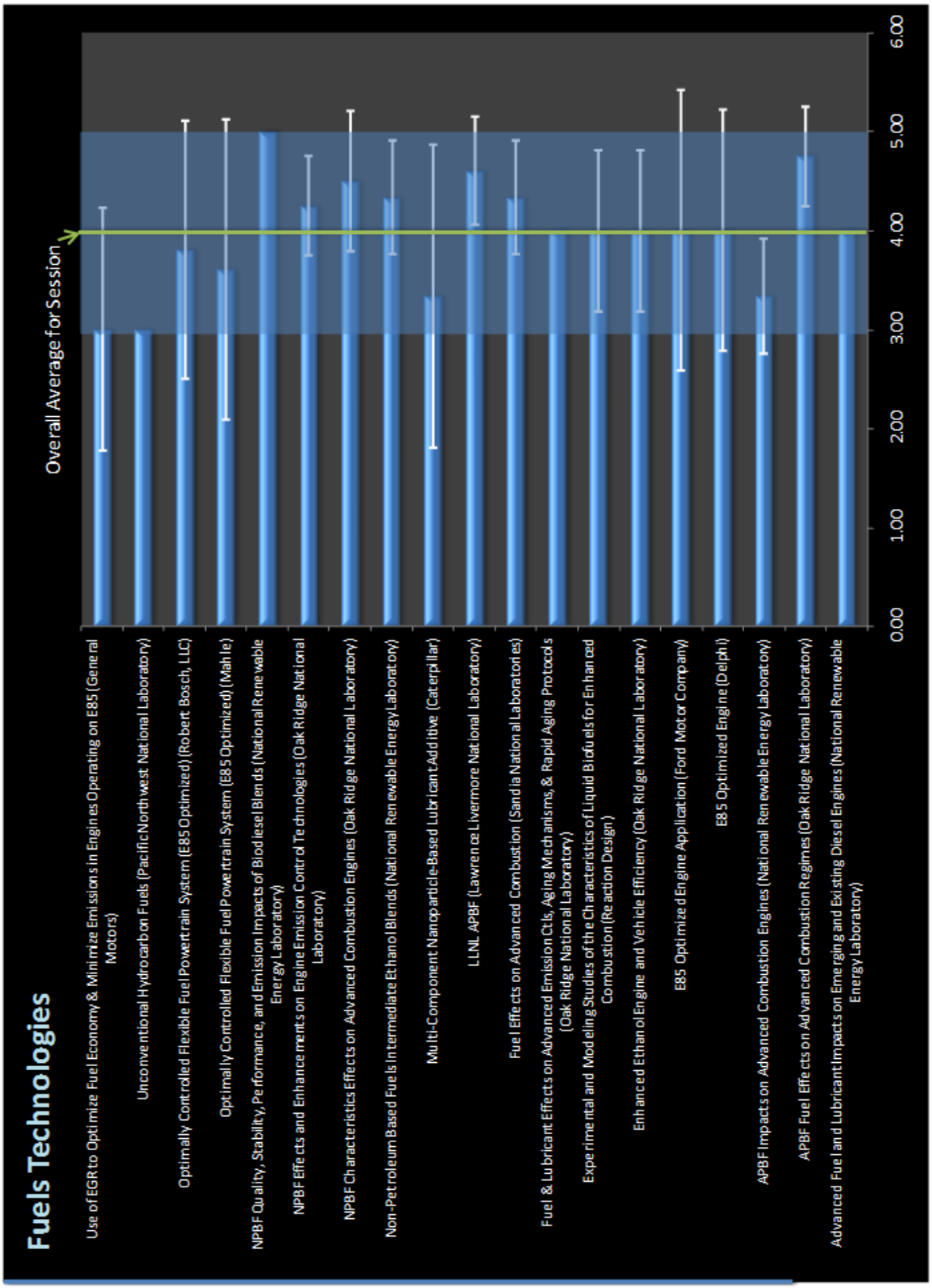
Introduction

The fuels and lubricants effort supports research and development to provide vehicle users with fuel options that are cost-competitive, enable high fuel economy, deliver lower emissions, and contribute to petroleum displacement. Activities aim to identify advanced petroleum- and non-petroleum-based fuels and lubricants for more energy-efficient and environmentally friendly highway transportation vehicles. A major focus of the Advanced Petroleum-Based Fuels and Non-Petroleum-Based Fuels activities is determining the impacts of fuel and lubricant properties on the efficiency, performance, and emissions of advanced internal combustion engines. This new breed of engines uses advanced combustion regimes that are expected to become more prevalent in the marketplace because of their high efficiency and continually improving emissions performance. Researchers are also studying the impacts of new fuels on the environment as part of the New Fuels Technology Impacts activity.

In this merit review activity, each reviewer was asked to respond to a series of six questions, involving multiple-choice responses, expository responses where text comments were requested, and one numeric score response. 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 pictorial form in eight graphs as the last page of each project, and the expository text responses will be summarized in paragraph form for each question. A table and graph presenting the average and standard deviation for each project relative to the overall average and standard deviation for this session is presented below.

Page	Project Title and Principal Investigator	Project Average Score	Project Score Standard Deviation
10-4	Advanced Fuel and Lubricant Impacts on Emerging and Existing Diesel Engines (Matt Ratcliff, National Renewable Energy Laboratory)	4.00	
10-6	APBF Fuel Effects on Advanced Combustion Regimes (Bruce Bunting, Oak Ridge National Laboratory)	4.75	0.50
10-9	APBF Impacts on Advanced Combustion Engines (Matt Ratcliff, National Renewable Energy Laboratory)	3.33	0.58
10-11	E85 Optimized Engine (Keith Confer, Delphi)	4.00	1.22
10-14	E85 Optimized Engine Application (Apoory Agarwal, Ford Motor Company)	4.00	1.41
10-17	Enhanced Ethanol Engine and Vehicle Efficiency (Brian West, Oak Ridge National Laboratory)	4.00	0.82
10-20	Experimental and Modeling Studies of the Characteristics of Liquid Biofuels for Enhanced Combustion (Ellen Meeks, Reaction Design)	4.00	0.82
10-23	Fuel & Lubricant Effects on Advanced Emission Controls, Aging Mechanisms, & Rapid Aging Protocols (Bruce Bunting, Oak Ridge National Laboratory)	4.00	0.00
10-25	Fuel Effects on Advanced Combustion (Chuck Mueller, Sandia National Laboratories)	4.33	0.58
10-28	LLNL APBF (Salvador Aceves, Lawrence Livermore National Laboratory)	4.60	0.55

Page	Project Title and Principal Investigator	Project Average Score	Project Score Standard Deviation
10-31	Multi-Component Nanoparticle-Based Lubricant Additive (Atanu Adhvaryu Caterpillar)	3.33	1.53
10-34	Non-Petroleum Based Fuels Intermediate Ethanol Blends (Wendy Clark, National Renewable Energy Laboratory)	4.33	0.58
10-37	NPBF Characteristics Effects on Advanced Combustion Engines (Jim Szybist, Oak Ridge National Laboratory)	4.50	0.71
10-39	NPBF Effects and Enhancements on Engine Emission Control Technologies (Scott Sluder, Oak Ridge National Laboratory)	4.25	0.50
10-42	NPBF Quality, Stability, Performance, and Emission Impacts of Biodiesel Blends (Robert McCormick, National Renewable Energy Laboratory)	5.00	0.00
10-45	Optimally Controlled Flexible Fuel Powertrain System (E85 Optimized) (Hakan Yilmaz, Robert Bosch, LLC)	3.80	1.30
10-48	Optimally Controlled Flexible Fuel Powertrain System (E85 Optimized) (Bruce Woodrow, Mahle)	3.60	1.52
10-51	Unconventional Hydrocarbon Fuels (Tom Gallant, Pacific Northwest National Laboratory)	3.00	0.00
10-53	Use of EGR to Optimize Fuel Economy & Minimize Emissions in Engines Operating on E85 (Ko-Jen Wu, General Motors)	3.00	1.22
	Overall Session Average and Standard Deviation	**3.97**	**1.01**


Fuels Technologies
Overall Average for Session
0.00
1.00
2.00
3.00
4.00
5.00
6.00
Use of EGR to Optimize Fuel Economy & Minimize Emissions in Engines Operating on E85 (General Motors)
Unconventional Hydrocarbon Fuels (Pacific Northwest National Laboratory)
Optimally Controlled Flexible Fuel Powertrain System (E85 Optimized) (Robert Bosch, LLC)
Optimally Controlled Flexible Fuel Powertrain System (E85 Optimized) (Mahle)
NPBF Quality, Stability, Performance, and Emission Impacts of Biodiesel Blends (National Renewable Energy Laboratory)
NPBF Effects and Enhancements on Engine Emission Control Technologies (Oak Ridge National Laboratory)
NPBF Characteristics Effects on Advanced Combustion Engines (Oak Ridge National Laboratory)
Non-Petroleum Based Fuels Intermediate Ethanol Blends (National Renewable Energy Laboratory)
Multi-Component Nanoparticle-Based Lubricant Additive (Caterpillar)
LLNL APBF (Lawrence Livermore National Laboratory)
Fuel Effects on Advanced Combustion (Sandia National Laboratories)
Fuel & Lubricant Effects on Advanced Emission Ctls, Aging Mechanisms, & Rapid Aging Protocols (Oak Ridge National Laboratory)
Experimental and Modeling Studies of the Characteristics of Liquid Biofuels for Enhanced Combustion (Reaction Design)
Enhanced Ethanol Engine and Vehicle Efficiency (Oak Ridge National Laboratory)
E85 Optimized Engine Application (Ford Motor Company)
E85 Optimized Engine (Delphi)
APBF Impacts on Advanced Combustion Engines (National Renewable Energy Laboratory)
APBF Fuel Effects on Advanced Combustion Regimes (Oak Ridge National Laboratory)
Advanced Fuel and Lubricant Impacts on Emerging and Existing Diesel Engines (National Renewable Energy Laboratory)

Advanced Fuel and Lubricant Impacts on Emerging and Existing Diesel Engines (Matt Ratcliff, of National Renewable Energy Laboratory)

Reviewer Sample Size
This project had a total of 2 reviewers.

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
The lone respondent stated that the work promotes advanced combustion through the support of the FACE program, and thereby promotes efficiency improvements and a reduction in petroleum use. The researchers are also considering GTL fuels, which are non-petroleum and can displace petroleum.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
The lone respondent commented that close collaborations through MOUs, CRADAs, and partnerships enable the transfer and deployment of the results. The project is developing essential knowledge on fuel chemistry, and thereby will contribute to overcoming fuel composition challenges to advanced combustion. In the ethanol vehicle studies, the detection and understanding of ethylnitrite can remove what may be a serious downside of alcohol-fueled vehicles on air quality.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.
The lone respondent stated that work through FACE in the IQT is providing important insights into the elementary ignition process of APBF and NPBF. This understanding is essential to gaining control over advanced combustion through the application of fuel chemistry understanding. The reviewer adds that very good fuel chemistry insights are being generated, and the examination of exhaust constituents (unregulated) helps to understand the overall reaction pathways for the fuels in the text matrix.

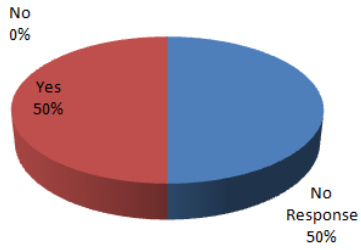
Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.
The lone respondent commented that the fundamental knowledge and linkage to industry and other labs through FACE provides the means to transfer and promote implementation of the fuel chemistry knowledge that is being generated. There are lots of collaborations in place and more are being added.

Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?
The lone respondent stated that, within the budget constraints, the budget appears to be reasonable and should be a worthwhile investment of program funds.

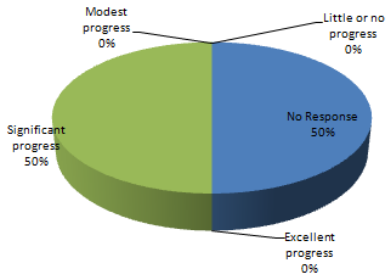
Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: Advanced Fuel and Lubricant Impacts on Emerging and Existing Diesel Engines

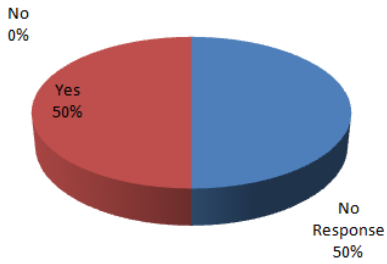
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



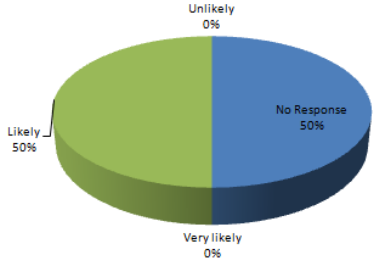
Question 3: Characterize the technical accomplishments and progress toward goals.



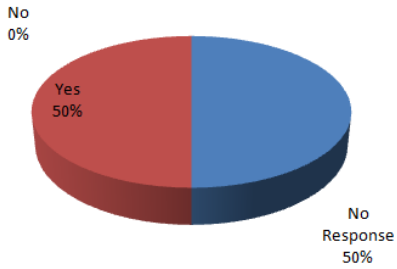
Question 2a: Are the goals of the project technically achievable?



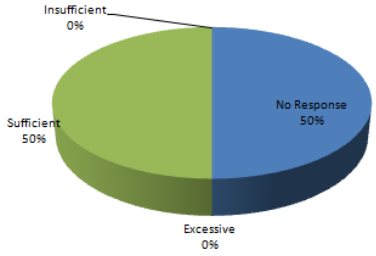
Question 4: How likely is the project team to move technologies into the marketplace?



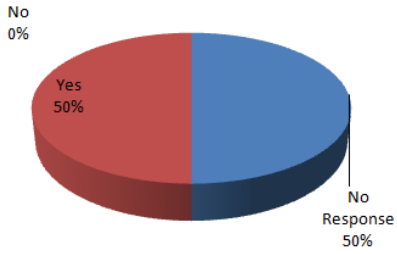
Question 2b: Have the technical barriers been identified and addressed?



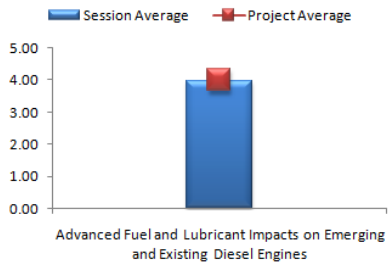
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



APBF Fuel Effects on Advanced Combustion Regimes (Bruce Bunting, of Oak Ridge National Laboratory)

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

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
One person indicated this program promotes the development and eventual deployment of advanced combustion engines, which will reduce petroleum consumption by promoting efficiency. This reviewer added that this is essential work to promote higher fuel economy and reduced emissions. One person commented that this program indeed focuses on identifying advanced petroleum-based fuel property requirements for advanced IC engines.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
One reviewer commented that this is very important work, lifting alternative fuels to the scientific level. Another stated that there is a good strategy of testing model and real petroleum and oil sands derived fuels in a single cylinder engine and in 2 production engines (GM and Mercedes). This includes looking at emerging engine control strategies such as variable compression ratio and the use of additives to try to expand the range of HCCI operation.

One final reviewer stated the program is considering various platforms (gasoline and diesel) and considers real world fuel effects, both of which contribute to flexibility and broad application potential for the results from the program. An essential element is the linkage of fuel chemistry and advanced combustion. By combining the fundamental and the practical, real progress can be made in promoting deployment of these technologies.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.
The first reviewer stated this project is taking a scientific approach to biofuels. This will make them a natural part in advanced engine development. Another person commented that the group has demonstrated an engine control strategy (variable compression ratio) that can potentially enable a wider range of HCCI operation. One other reviewer noted that they have demonstrated the potential for using variable valve timing in HCCI control with gasolines of different RON. They have demonstrated optimal performance in advanced combustion modes. By combining real and surrogate fuels, the group is showing the overlap and linkage between different fuel property variables and performance (ISFC, NOx etc). They have a CRADA in place with Reaction Engineering to gain access to fundamental modeling, and are showing the importance of fuel chemistry.

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.
The first reviewer stated that, by the collaborations and frequent presentation of results from this program, the knowledge gained can be and is being effectively disseminated. For example, the involvement with the FACE program provides broad linkage to the fuels and engines/vehicles industry. Additionally, this reviewer comments, CRADA and MOU involvement provides for a rapid sharing of results.

One other person commented that at this point it isn't clear whether full-time HCCI using "realistic" fuels will be technically feasible or not. This work helps to understand and advance the technology towards that goal.

Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?

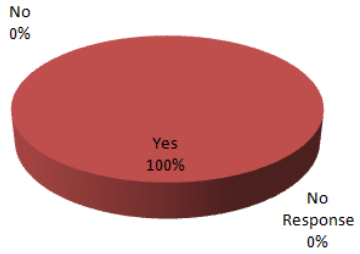
One reviewer stated that the project seems to be making good progress using a variety of engines, so it seems that resources are reasonable. The other respondent commented that certainly more funding would always help, but given the constraints of the overall budget, this project seems to have an appropriate level of funding. This reviewer added that this project looks like it can provide real benefits to industry in the near term, and therefore should provide a good return on investment.

Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.

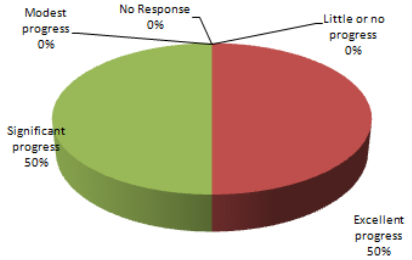
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: APBF Fuel Effects on Advanced Combustion Regimes

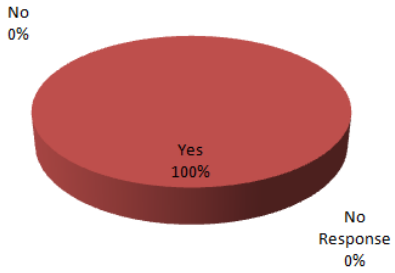
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



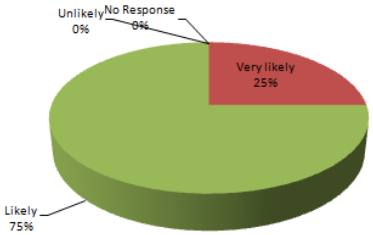
Question 3: Characterize the technical accomplishments and progress toward goals.



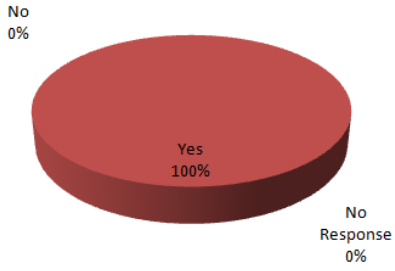
Question 2a: Are the goals of the project technically achievable?



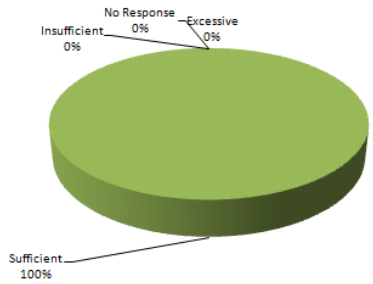
Question 4: How likely is the project team to move technologies into the marketplace?



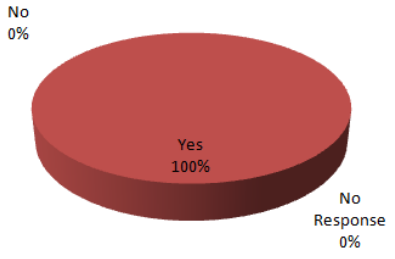
Question 2b: Have the technical barriers been identified and addressed?



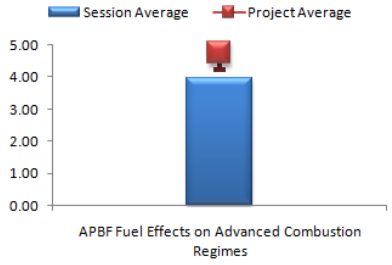
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



APBF Impacts on Advanced Combustion Engines (Matt Ratcliff, of National Renewable Energy Laboratory)

Reviewer Sample Size
This project had a total of 3 reviewers.

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
The lone respondent stated that trying to determine what fuels/properties (including biodiesel) will work in advanced combustion engines which have improved fuel efficiency fits with DOE goals.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
One reviewer commented that the strategy of using tools such as IQT to try to determine the suitability of fuels for advanced combustion is good. The other respondent commented that they support the use of IQT but would like to see IQT results correlated to engine performance. This reviewer is somewhat worried about IQT NOx work because mixing in IQT is not complete, so he or she would expect a correlation between NOx and ignition delay that would not mimic engine impacts.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.
There were no responses to this prompt.

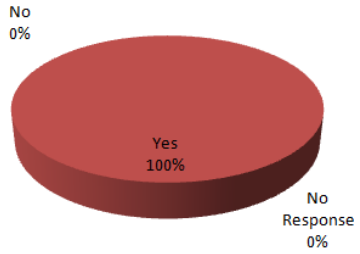
Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.
The lone respondent stated that, between the various projects, it is likely that the work will help move one or more of these technologies into the marketplace.

Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?
The lone respondent indicated that they had a separate comment regarding ethanol work. Understanding ethanol emission impacts is important, but it is not clear how to evaluate ethyl nitrate results. They need to compare to detailed speciation from gasoline vehicles, they need data from more than one vehicle, and they need an air quality assessment to full understand the overall impact here.

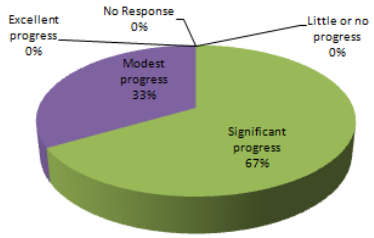
Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: APBF Impacts on Advanced Combustion Engines

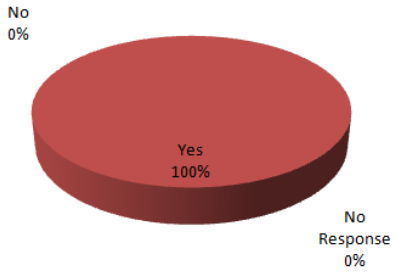
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



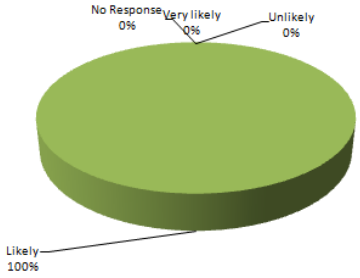
Question 3: Characterize the technical accomplishments and progress toward goals.



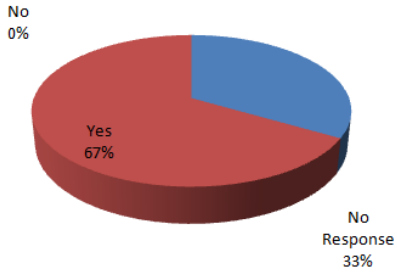
Question 2a: Are the goals of the project technically achievable?



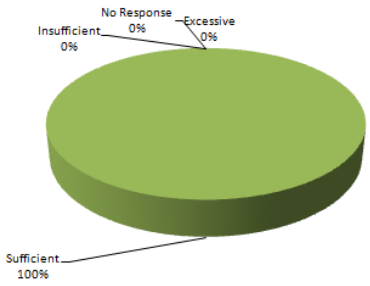
Question 4: How likely is the project team to move technologies into the marketplace?



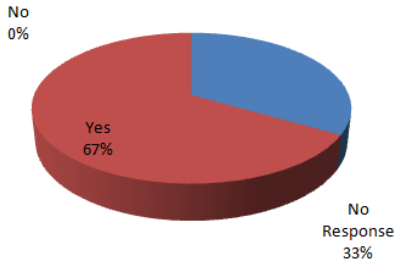
Question 2b: Have the technical barriers been identified and addressed?



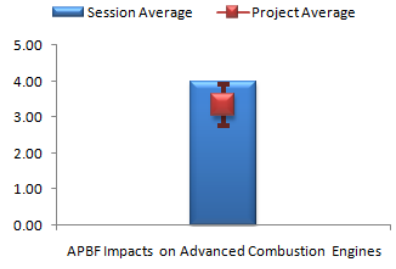
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



E85 Optimized Engine (Keith Confer, of Delphi)

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

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
One reviewer stated that finding ways to improve fuel economy of E85 vehicles would increase their market appeal/acceptability to the public and thus reduce the amount of petroleum used. Another remarked that ethanol has unique properties that could improve efficiency. Improving efficiency of gasoline/ethanol blends can provide significant benefits. One other response stated that, by focusing on improving the performance of an E85 vehicle, this project addresses petroleum displacement in two ways: displacing petroleum directly with ethanol use and improving efficiency so less fuel (ethanol and gasoline) is needed. This project is exceptionally well suited to meeting DOE goals because it can remove the real and significant barriers to petroleum displacement represented by shortcomings in E85 production vehicles.

One reviewer commented that optimizing an engine for E85 operation assumes minimal operation at E0 or E10. This reviewer noted that it would be interesting to see what the degradation on performance, fuel economy, and emissions will be when an optimized engine is operated on conventional gasoline.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
The first respondent stated that the use of a production-viable engine is commendable. Another person remarked that the strategy of focusing on approaches that are cost-effective, production viable, take advantage of ethanol's favorable properties, and are capable of running on any ethanol/gasoline blend is very good. One reviewer noted that, by addressing durability when using high levels of ethanol and minimizing the economy penalty of using E85, this project removes barriers to customer acceptance of E85. This will enhance the potential for the deployment of E85 vehicles and enable the planned petroleum displacement through increased ethanol usage. The reviewer likes the approach of using practically realizable compression ratio variation (varying lift duration and phasing) to allow optimization for E85 and prevention of knock when operating on gasoline.

One reviewer commented that deployment is fast paced. This reviewer asked if confirmation of the ethanol sensor accuracy is a critical path. What will the project do if the ethanol sensor is more lab quality instead of commercial quality?

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.
The first reviewer commented that the project is new so progress is expected to be modest, but nonetheless the means of optimizing E85 performance while maintaining knock resistance on gasoline via valve lift changes shows great promise to meet a major objective. So, the progress looks very promising for such a new project.

Another individual commented that they did not rate this aspect since the project is very new and hasn't generated as many results to date as other, more established programs. However, the plans sound good. Another also commented that this is still early into the project but the basic approach appears very practical. One reviewer stated that this is a new project, so it is difficult to define progress at this point.

One reviewer stated that a 10% improvement is not sufficient.

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.

One reviewer remarked that, if successful, the accomplishments should improve fuel efficiency, improve performance of ethanol-blended gasoline, and increase customer demand for the vehicles and fuel. The claims that the products could be brought to market as early as 2011 suggest a commitment to quickly move from R&D to commercialization. One person said, since the lead in this project is Delphi and involves engine optimization, the outcomes from the project will definitely find their way into the marketplace. And success in the project will help ensure successful deployment of E85 vehicles.

Another reviewer stated this is the obvious choice of technology. One other individual was not sure how this will impact OEM programs. Since the group is using a production-type system, this should be easily transferable to commercial systems.

Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?

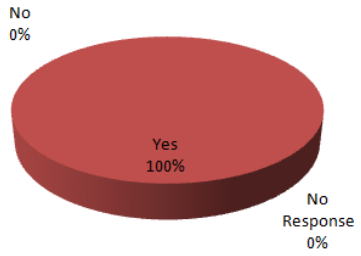
The first response stated that the use of an OEM supplier is a plus in developing a system that can be commercialized. Another remarked that the funding level is low, but since this is an industry-led project, cost sharing and leveraging of industrial resources are enabling the project. One person wrote there are no indications that the resources are insufficient or excessive.

Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.

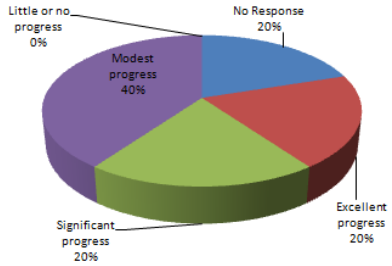
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: E85 Optimized Engine

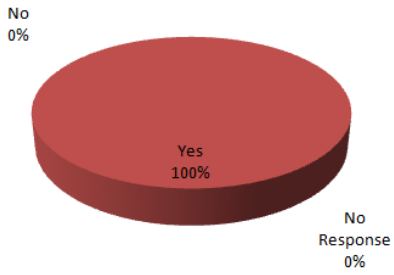
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



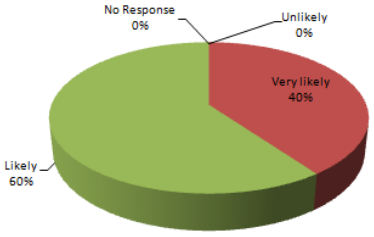
Question 3: Characterize the technical accomplishments and progress toward goals.



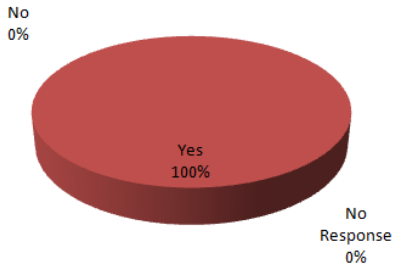
Question 2a: Are the goals of the project technically achievable?



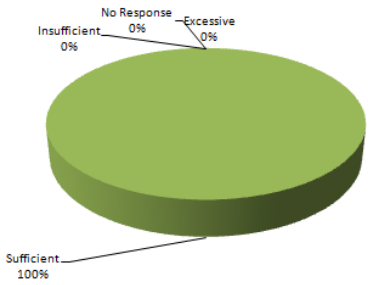
Question 4: How likely is the project team to move technologies into the marketplace?



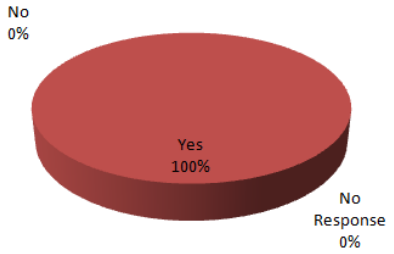
Question 2b: Have the technical barriers been identified and addressed?



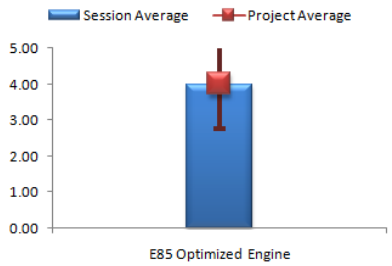
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



E85 Optimized Engine Application (Apoory Agarwal, of Ford Motor Company)

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

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
One reviewer stated that improving fuel economy while meeting emission regulations for E85 fueled vehicles is consistent with DOE objectives. Another reviewer added that, by focusing on improving the performance of an E85 vehicle, this project addresses petroleum displacement in two ways: displacing petroleum directly with ethanol use and improving efficiency so that less fuel (ethanol and gasoline) is needed. This project is exceptionally well suited to meeting DOE goals because it can remove the real and significant barriers to petroleum displacement represented by shortcomings in E85 production vehicles. One person stated that this project was similar to other E-85 projects, but using EBS is a novel concept that could provide additional benefits.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
The first reviewer noted that this is a new technology with great potential. It overcomes the problem of too expensive ethanol. The 70% torque increase is a very good idea that will make the vehicle very attractive. It will give the vehicle a diesel-like character that will appeal to the typical light truck and SUV buyer. The reviewer added that two fuels are not a major problem since the vehicle needs very little ethanol and can run without ethanol.

Another reviewer commented that the researchers are targeting 15-20% energy efficiency improvement over current gasoline engines for a Ford F-150 truck. The intent is to utilize the unique characteristics of ethanol (knock resistance, etc.) in a downsized, boosted high compression ratio V8 engine. So, the project targets a key barrier (fuel economy) in the deployment of ethanol in a large sales volume vehicle. This is a highly innovative strategy for utilizing the benefits of E85. But, the "EBS" strategy requires filling two fuel tanks which may impair customer acceptance. One person added that this requirement of two fuels/fuel tanks for the Ethanol Boosting System may not be readily acceptable to the public.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.
One reviewer commented that this overcomes the ethanol price issue, while another stated that it is an interesting conceptual design. The dual-fuel optimization may overcome some of the E85 performance issues. One person indicated that modest progress was made in the first quarter of FY08 on the project. The researchers defined engine configuration and completed 1-D modeling of the boosting system, project vehicle efficiency, and performance (diesel-like performance at full load). The performance projections are very impressive. While there is a potential show-stopping customer acceptance problem with the EBS strategy, the level of innovation in this project makes it stand out among the similar DOE supported projects. This is a great project and has great potential. This is also an excellent example of effective industry-government partnership, in that the DOE support is enabling some substantial "out of the box" R&D.

One other reviewer did not provide a rating since the project is relatively new, although it looks like there is good progress on modeling/design work.

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.

The first response stated that this will give the vehicle a diesel-like character that will appeal to the typical light truck and SUV buyer. Two fuels is not a major problem since the vehicle needs very little ethanol and can also run without ethanol. Another person commented that the target is a high sales volume vehicle platform, which ensures that successful completion of the project objectives will see implementation in commercial vehicles. To contrast, one reviewer stated that, even if technically successful, nontechnical barriers of the requirement of two fuels/fuel tanks (gasoline & E85) and E85 availability may not be readily overcome.

Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?

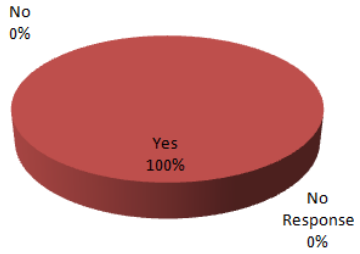
One reviewer stated that the project funding is modest, but there is clearly substantial leveraging of industry resources. Another person stated that there is no indication that resources are not appropriate or sufficient. One final respondent stated that it is still early in the program, making it difficult to assess progress.

Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.

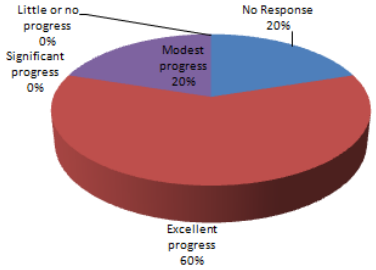
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: E85 Optimized Engine Application

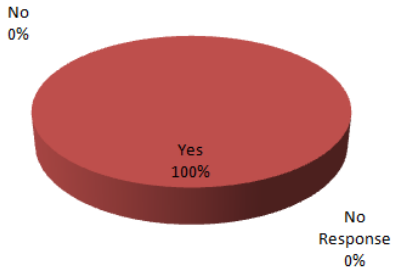
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



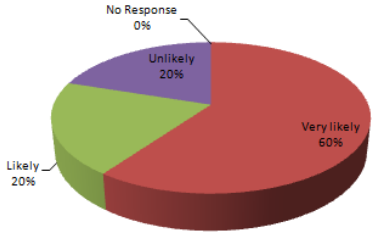
Question 3: Characterize the technical accomplishments and progress toward goals.



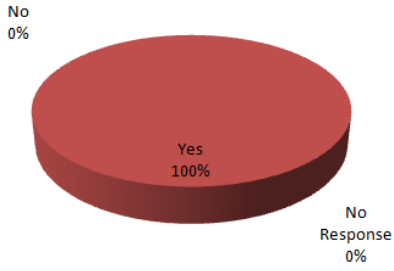
Question 2a: Are the goals of the project technically achievable?



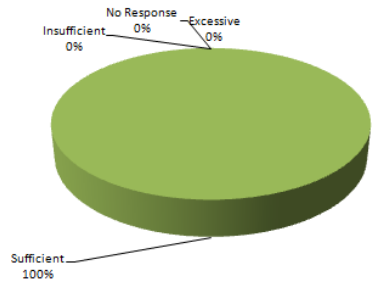
Question 4: How likely is the project team to move technologies into the marketplace?



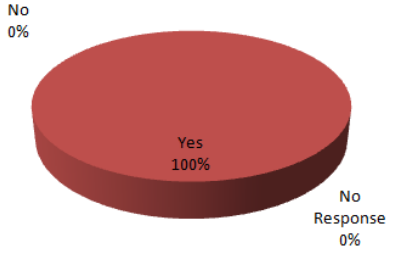
Question 2b: Have the technical barriers been identified and addressed?



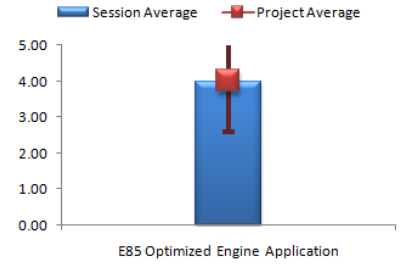
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



Enhanced Ethanol Engine and Vehicle Efficiency (Brian West, of Oak Ridge National Laboratory)

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

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
Responses to this prompt were positive overall. One reviewer stated that the research is finding ways to improve the fuel economy of E85-fueled vehicles, which is consistent with DOE objectives to displace petroleum-derived fuels. Another person commented that improving the fuel efficiency of gasoline/ethanol blends is important. Technologies that can be applied broadly in gasoline engine fleets would provide the biggest benefit. One final reviewer commented that, by focusing on improving the performance of ethanol engines, this project addresses petroleum displacement in two ways: displacing petroleum directly with ethanol use, and improving efficiency so less fuel (ethanol and gasoline) is needed. This project is exceptionally well suited to meeting DOE goals because it can remove the real and significant barriers to petroleum displacement represented by shortcomings in ethanol-fueled vehicles.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
The first respondent stated that the project targets both laboratory engine studies and FFV studies to understand and overcome barriers to more efficient ethanol engines and vehicles. In particular, the thrust on lean-burn ethanol-optimized FFV systems shows great promise to make a readily deployed advanced ethanol vehicle. Another reviewer felt that the strategy of running in lean mode to improve efficiency coupled with a better NOx catalyst that uses ethanol as a reductant seems reasonable. This reviewer added that it is also good that "real" engines are being used.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.
One reviewer noted the progress made on engine, vehicle and after-treatment studies, adding that this work continues to show great promise. Another person stated that the researchers have demonstrated some modest improvements in fuel economy and have ideas (spark/combustion timing control) to improve it further. One final reviewer expressed some concerns about emissions control if ethanol is not available.

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.
The first respondent stated that there are good partnerships and connections to industry to deploy the knowledge. The other reviewer indicated that, if developments are technically successful and cost-effective, they will likely be commercialized, particularly if E85 becomes more widely available.

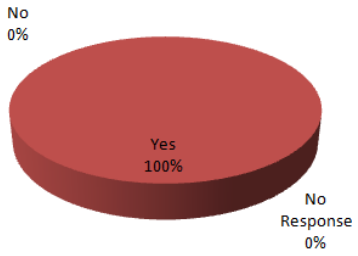
Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?
One reviewer stated that the resources seem appropriate given funding constraints, while the other stated that the good progress of the group suggests that resources are sufficient.

Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.

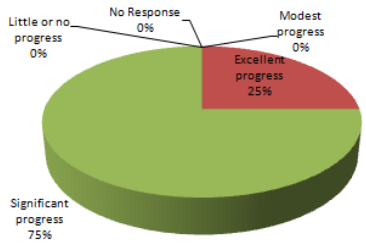
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: Enhanced Ethanol Engine and Vehicle Efficiency

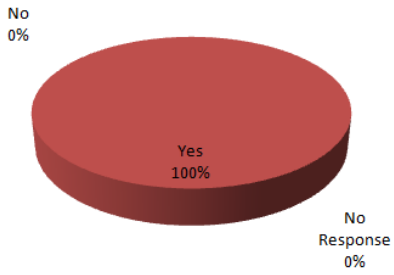
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



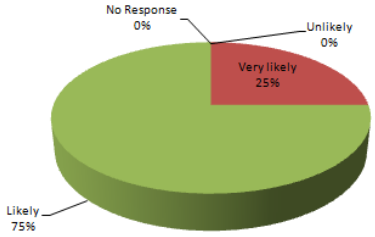
Question 3: Characterize the technical accomplishments and progress toward goals.



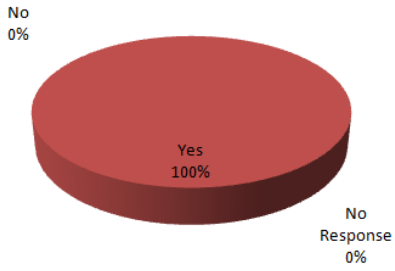
Question 2a: Are the goals of the project technically achievable?



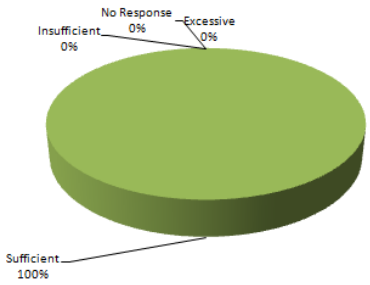
Question 4: How likely is the project team to move technologies into the marketplace?



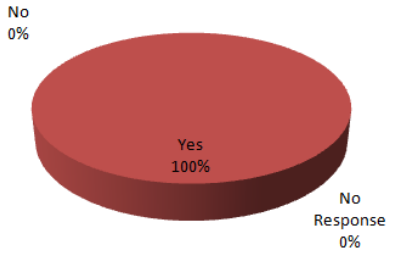
Question 2b: Have the technical barriers been identified and addressed?



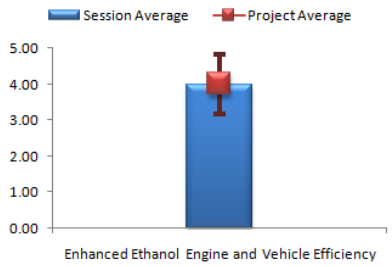
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



Experimental and Modeling Studies of the Characteristics of Liquid Biofuels for Enhanced Combustion (Ellen Meeks, of Reaction Design)

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

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
One reviewer stated that the group is conducting basic research on biofuels to enhance understanding of how they behave in practical systems, and knowledge of how they burn at the kinetic level of description is needed to design both effective fuels and systems to use those fuels.

The other respondent stated that improved models are key to improving engine efficiency, but he or she expects overall benefits from this program to be small due to the limited supply of VO and the similar behavior of diesel and biodiesel in standard diesel engines.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
The first respondent stated that kinetic models for biofuels are a necessity. The other reviewer responding to this question stated that this project concerns developing a more complete fundamental understanding of the behavior of biofuels. The deployment impacts are that it enables industry, the national labs, and academia collaboration to develop advanced combustion engines and fuels for those engines. In short, this reviewer feels that this work is essential to promoting understanding and effective design.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.
One reviewer commented that this was very nice work, while another stated that the work appears to be progressing at a good rate. Another person commented on the new models presented. One final respondent noted that the various efforts in model validation and kinetic model development are ongoing. The group has completed modeling of flame data from USC. The results look very promising in capturing laminar flame speed behavior.

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.
One reviewer noted a close connection with OEM/energy mechanism users. The other person responding to this prompt commented that extension collaborations are in place with the national labs and academia and, through the various MOUs (model fuels consortium, etc.), industry. Given the need for the information generated by this project, the data will certainly be incorporated in engine technology development activities.

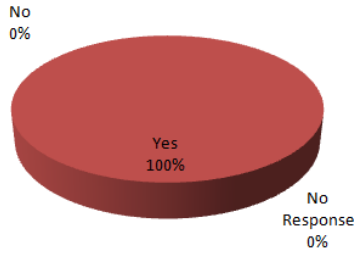
Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?
One reviewer commented that no budget information was provided in the summary sheet. The other respondent asked whether DOE funding was applied to Phase 1 work.

Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.

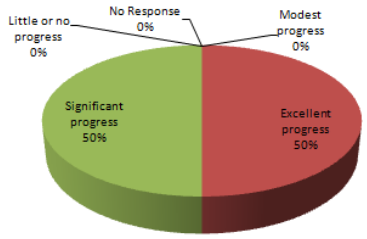
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: Experimental and Modeling Studies of the Characteristics of Liquid Biofuels for Enhanced Combustion

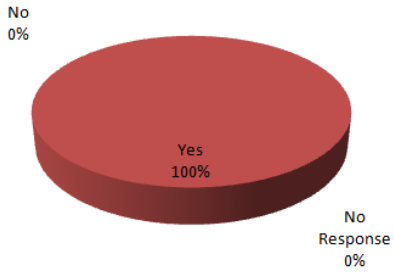
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



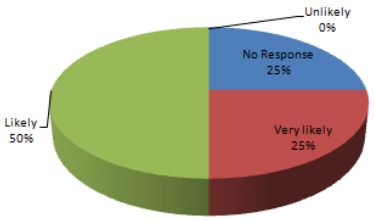
Question 3: Characterize the technical accomplishments and progress toward goals.



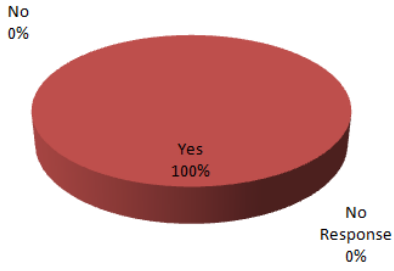
Question 2a: Are the goals of the project technically achievable?



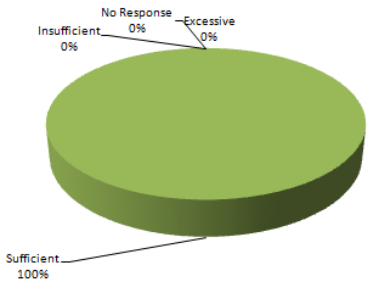
Question 4: How likely is the project team to move technologies into the marketplace?



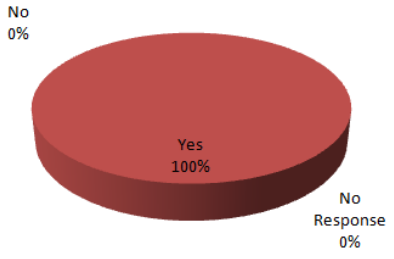
Question 2b: Have the technical barriers been identified and addressed?



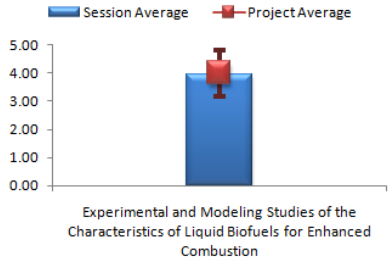
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



Fuel & Lubricant Effects on Advanced Emission Controls, Aging Mechanisms, & Rapid Aging Protocols (Bruce Bunting, of Oak Ridge National Laboratory)

Reviewer Sample Size
This project had a total of 2 reviewers.

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
The lone respondent stated that the intent of this project is to improve aftertreatment systems and thereby reduce the fuel economy penalties. In so doing, the project allows clean diesel technology to be deployed, which will provide efficiency improvements, and the project specifically will maximize those efficiency gains and thereby maximize petroleum displacement from dieselization.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
The lone respondent stated that tighter emissions regulations and greater durability requirements combine to threaten vehicle efficiency. Overcoming these barriers to improved efficiency will recover efficiency.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.
The lone respondent noted that the group has made progress on DOC, LNT, DPF and combined systems. Specifically, they found that soot masking of DOC is as significant as P poisoning and showed that LNT excursions above 850°C are particularly detrimental. They performed ash-loading studies in DPF and showed the differences in backpressure impacts for different DPF substrates and precious metal loadings. For LNTs, they have characterized degradation mechanisms (e.g., finding that sintering had little performance effect). For SCR combined systems, they examined thermal aging in the SCR caused by the high temperature regeneration of the DPF. The project has a great combination of the practical (hardware, operating conditions, poison exposures, etc.) and the fundamental (elementary characterization of materials, bench and practical scale specimens).

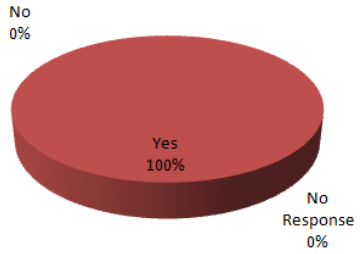
Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.
The lone respondent indicated that industry involvement is strong. He or she added that the new collaboration with MIT will generate more fundamental understanding of DOC behavior, and thereby may influence design. Mixing the practical and fundamental will generate useful knowledge and enable the industry to use this knowledge.

Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?
The lone respondent stated that funding appears to be appropriate given the constraints in program funds.

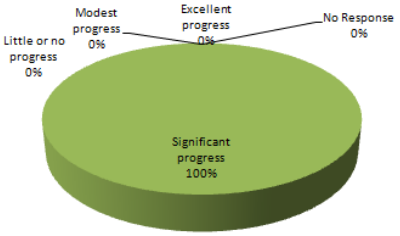
Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: Fuel & Lubricant Effects on Advanced Emission Ctls, Aging Mechanisms, & Rapid Aging Protocols

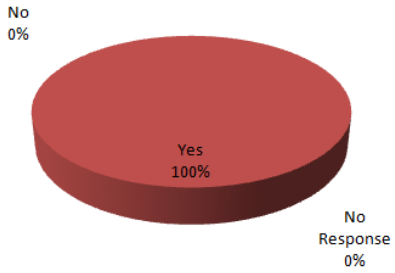
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



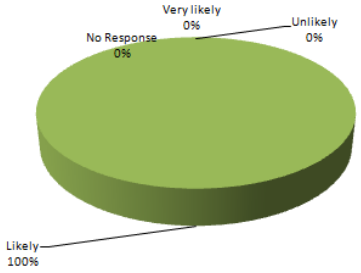
Question 3: Characterize the technical accomplishments and progress toward goals.



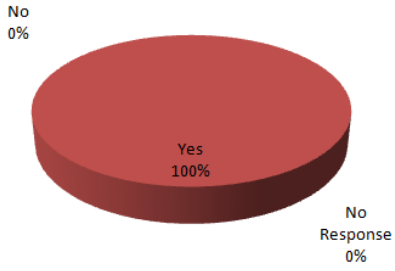
Question 2a: Are the goals of the project technically achievable?



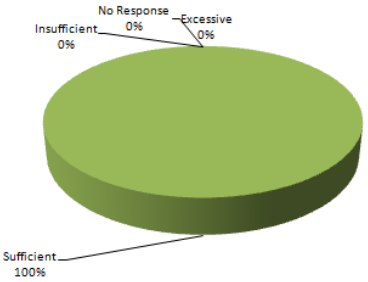
Question 4: How likely is the project team to move technologies into the marketplace?



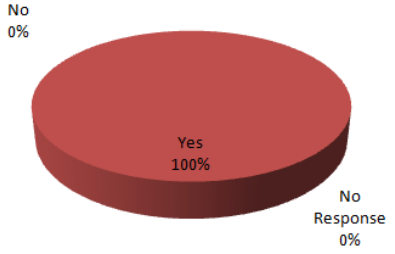
Question 2b: Have the technical barriers been identified and addressed?



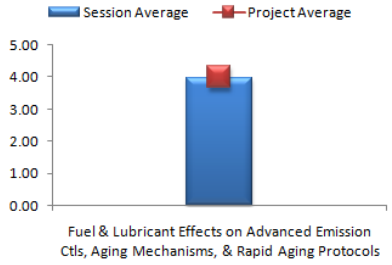
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



Fuel Effects on Advanced Combustion (Chuck Mueller, of Sandia National Laboratories)

Reviewer Sample Size
This project had a total of 3 reviewers.

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
The first reviewer commented that the goals of the program – facilitating the use of non-petroleum based diesel fuels (i.e biodiesel), developing strategies for more fuel-efficient HECC engines, and establishing fundamentals of fuel properties on combustion – all support DOE objectives.

One other person commented that the potential of 0.5 - 3 3 MMBPD reduction by overcoming barriers to implementing HECC, plus another potential 1 MMBPD potential through a better understanding of fundamentals of fuel effects (thus increasing efficiency and reducing aftertreatment fuel usage) sound reasonable and are significant targets that seem to be achievable. The reviewer adds it is good to see this stated as a stretch target in the presentation. The work on pool fire impact on soot and NOx formation is interesting.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
The lone respondent stated that these studies should provide good fundamental information to advance the technology in each of the work areas. The reviewer feels that the strategy of studying these phenomena in an optical engine to see what is happening in the combustion process is a good approach.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.
The first reviewer stated that there was very good progress in advancing the understanding of why NOx emissions are higher for biodiesel, why soot and NOx are higher for early injection DI HECC engines, and also for generating ideas on how to mitigate these. One other response indicated that identifying that the NOx increase is larger in HECC mode for biodiesel fuels is a significant accomplishment. This should be investigated more. Also, the information on pool fires impacting soot and NOx formation is interesting.

One final reviewer felt that an explanation for the increased NOx with RME was needed. The reviewer added that flame lift-off effects are very important for diffusion combustion and the key to high power density.

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.
The lone respondent said that these studies should provide good fundamental information to advance the technology toward commercialization in each of the work areas.

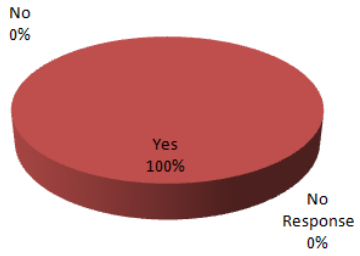
Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?
The lone respondent stated that the very good progress and accomplishments suggest that current resources are sufficient and being used effectively.

Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.

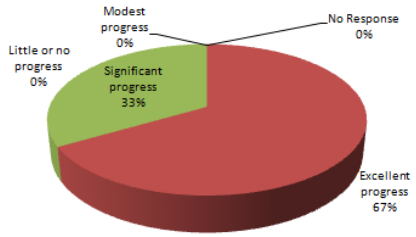
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: Fuel Effects on Advanced Combustion

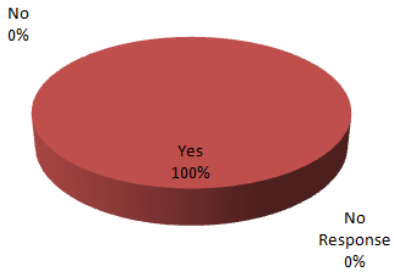
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



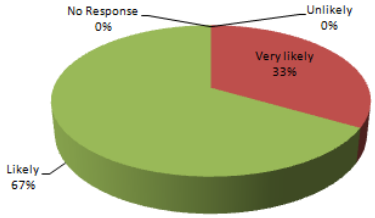
Question 3: Characterize the technical accomplishments and progress toward goals.



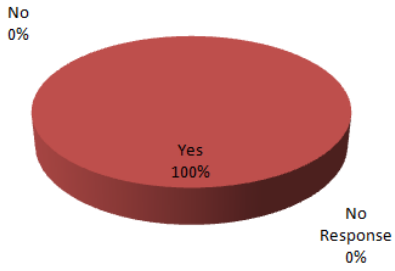
Question 2a: Are the goals of the project technically achievable?



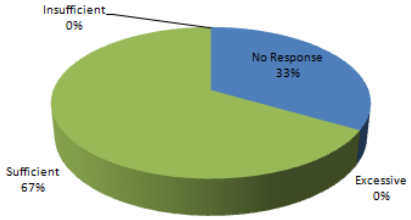
Question 4: How likely is the project team to move technologies into the marketplace?



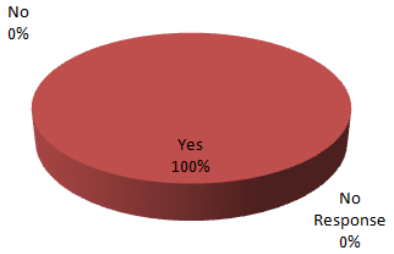
Question 2b: Have the technical barriers been identified and addressed?



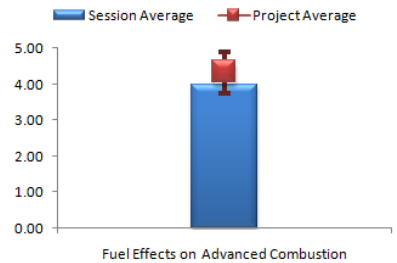
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



LLNL APBF (Salvador Aceves, of Lawrence Livermore National Laboratory)

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

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
One reviewer simply stated that the improved models have value, while another expanded on this, stating that the development of kinetic models and high fidelity engine simulation tools are essential to the development of advanced combustion engines and thereby petroleum use reduction by improving efficiency. One other person stated that the goal of enabling efficient combustion of fuels through improved combustion and emissions modeling tools helps to improve fuel combustion efficiency and reduce the amount of petroleum used.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
One reviewer commented that the group is doing important basic modeling work. Another person wrote that the improvement of tools for predicting the combustion of fuels and emissions is a good strategy. Also, comparing results of model predictions vs. engine results for a gasoline surrogate is a good approach. Another reviewer stated that the continuing development of kinetic models will help overcome the technical barriers to deploying advanced combustion engines, by furthering the ability to do numerically based design of combustion systems. It may also help overcome the shortcomings of some alternative fuels by providing a better understanding of their unique behavior.

One other individual stated that the deployment strategy is difficult to rate since progress in developing detailed chemical kinetic models is slow.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.
The first reviewer stated that this is important fundamental modeling work, while another added that validating model fidelity between numerical calculation and experimental work on surrogates is a significant accomplishment. Another reviewer stated that there is very good progress in advancing the modeling for both gasoline and biodiesel. Also, there are apparently very good interactions between LLNL and others such as Sandia to enable comparisons of modeling results with actual engine results. One other person commented on the fact that the group had published a methyl decanoate kinetic model with substantial validation, adding that that is one part of the continuing development and dissemination of kinetic models of surrogates to represent practical fuels. These kinetic models benefit the entire combustion community, academia, other national labs and industry.

One reviewer felt this was difficult to evaluate without timelines. He or she would like to see more a representative diesel surrogate that would include aromatics and naphthenes.

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.
One reviewer stated that the development of the kinetic models and simulation tools will help support the development and deployment of advanced combustion engines. This work is an essential component of the overall drive to efficient and clean engines. The other reviewer responding to this prompt stated that this work is definitely advancing the fundamental understanding of fuels combustion, which should lead to fuel and engine improvements for advanced combustion.

Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?

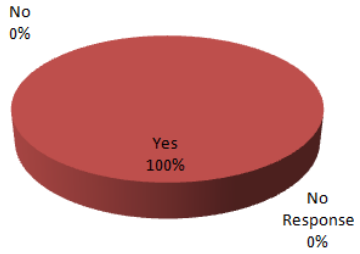
The first reviewer stated that there is very good progress, so resources seem sufficient. The other respondent commented that, within budget constraints, the budget for this program seems appropriate but perhaps is a bit lower (relatively) than the impact this program has. So, if more funds would become available, this would be the first program that this reviewer would provide with supplemental funds.

Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.

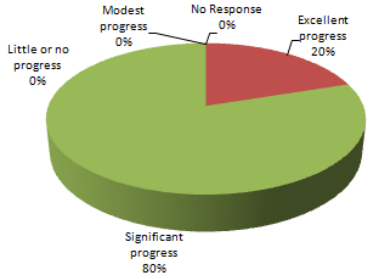
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: LLNL APBF

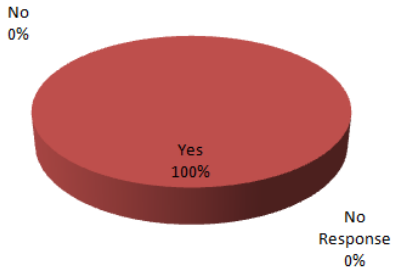
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



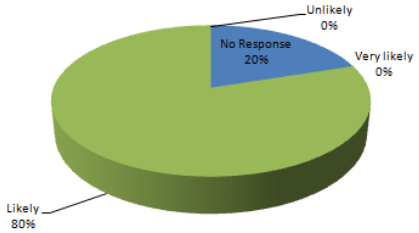
Question 3: Characterize the technical accomplishments and progress toward goals.



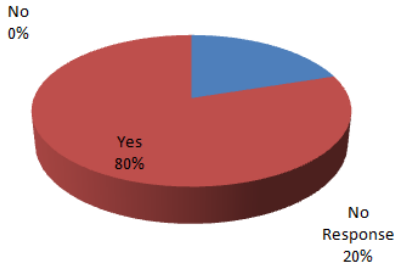
Question 2a: Are the goals of the project technically achievable?



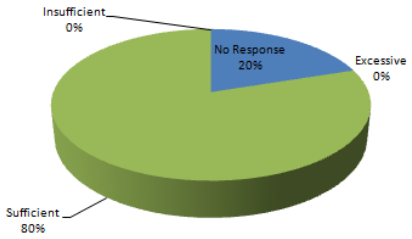
Question 4: How likely is the project team to move technologies into the marketplace?



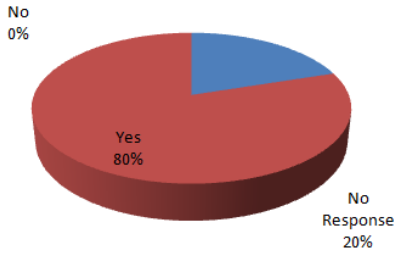
Question 2b: Have the technical barriers been identified and addressed?



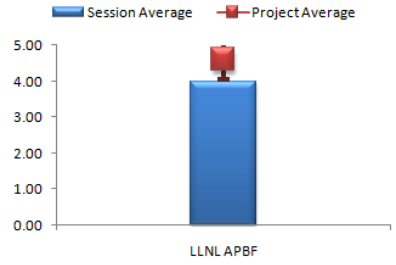
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



Multi-Component Nanoparticle-Based Lubricant Additive (Atanu Adhvaryu, of Caterpillar)

Reviewer Sample Size
This project had a total of 3 reviewers.

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
One individual stated that, by promoting engine efficiency and durability, the project has the potential to reduce fuel consumption and thereby displace/prevent petroleum usage. The other respondent commented that this area is a nice compliment to other DOE fuel activities. This reviewer would like to see a quantification of potential benefits.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
One individual stated that it was too early to evaluate thoroughly. The other reviewer began by commenting that, by providing nanoparticulate enhancers for lubricant performance, the effectiveness of boundary lubrication will be improved. There is ample information in the literature indicating that, with an appropriate nanoparticle design, the lubricant performance can be improved. An example is solid film lubricants (e.g., MoSx) which can be combined with conventional mineral oil and synthetic lubricants. So, this project targets an achievable goal and can be successful with appropriate nanomaterial development and matching with the lubricant formulation.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.
The first reviewer stated that there was good progress in a limited period of time. Another person also indicated that the project just started, but added that analyses of the necessary processes for material production and material characteristics are underway. They have already demonstrated the need to "stabilize" nanoparticles to keep them dispersed in the lubricant, and have demonstrated reduced friction and wear with preliminary formulations.

One reviewer felt that it was difficult to assess technical accomplishments because of a lack of a lubricants expertise. Next year, it would be nice to get this presentation ahead of time to have a lube chemist or engineer from reviewer companies to review and comment on.

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.
One person suggested that, if the team is successful in achieving the project objectives, then it is very likely that the lead organization, Caterpillar, will put these materials into the marketplace, either directly or through partners. Another person commented that this research is longer-term in nature.

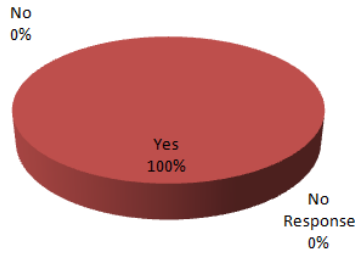
Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?
One reviewer stated that the funding is modest but should be adequate to achieve the project objectives if the nanomaterial design and lubricant formulation are effective. However, this reviewer adds that commercialization will require substantial additional resources to put the candidate materials through the necessary test engine protocols to achieve certification. Another reviewer noted that this is a new project, making it difficult to assess progress.

Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.

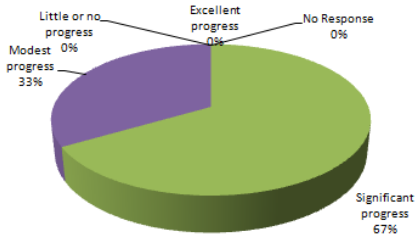
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: Multi-Component Nanoparticle-Based Lubricant Additive

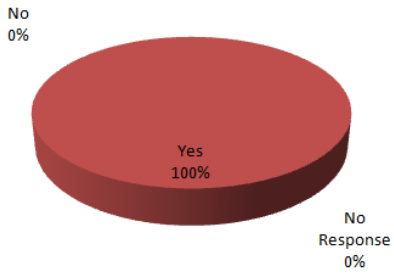
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



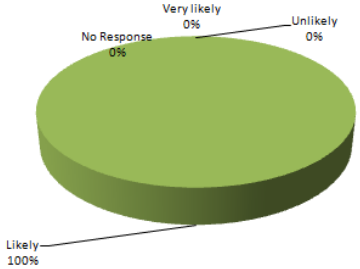
Question 3: Characterize the technical accomplishments and progress toward goals.



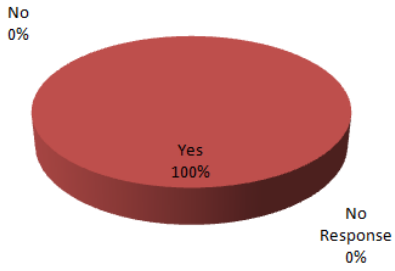
Question 2a: Are the goals of the project technically achievable?



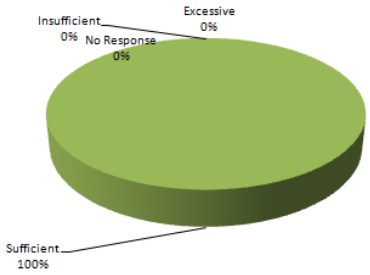
Question 4: How likely is the project team to move technologies into the marketplace?



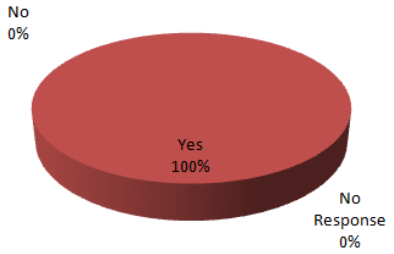
Question 2b: Have the technical barriers been identified and addressed?



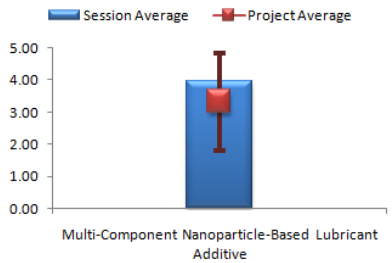
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



Non-Petroleum Based Fuels Intermediate Ethanol Blends (Wendy Clark, of National Renewable Energy Laboratory)

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

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
Responses were generally positive to this prompt. One reviewer indicated that the use of ethanol directly displaces petroleum usage, albeit with many side effects and side concerns (efficiency, land usage, etc.). Also, consideration of intermediate level blends (e.g., E20) may provide a much more effective means of using ethanol than E85. Another person stated that the focus is on the use of intermediate amounts of ethanol in gasoline, which would increase the amount of ethanol used and displace petroleum-derived gasoline. One final reviewer commented that it is very important to determine the best near-term utilization of ethanol. To be most useful, there need to be technical results as soon as possible, since current legislation requires a rapid increase in ethanol production.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
One reviewer commented that they are deploying ethanol at intermediate levels (>E10), while the other respondent stated that there is a good strategy for investigating the impact of intermediate amounts of ethanol on existing "conventional" vehicles and small engines to determine whether this is feasible or catastrophic.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.
One response commented that this work appears to be relatively new and few results were presented, but a number of good studies have been initiated. Another reviewer added that the primary accomplishments were in planning, so substantial work was not completed but was put in motion. Considering vehicles, small engines and other equipment, the group is working with CRC and other entities to gain input and guidance. Much will be done by the end of CY 2008, since promising progress was made towards the organization of the project. This reviewer suggests that the program includes a pathway to a larger vehicle field study so that definitive recommendations on E20+ fuels can be produced.

One final reviewer stated that the progress in program design has been excellent as has been leveraged with other programs. This reviewer's only concern is whether the program is comprehensive enough.

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.
One reviewer stated that the results will definitely help to influence decisions of whether intermediate levels of ethanol in gasoline can be used successfully/safely in conventional vehicles and small engines. Another person added that this work seems to be essential to circumvent the looming barrier for ethanol deployment at the levels requested by the Bush administration. This reviewer adds that looking at a broad range of equipment and vehicles is a good strategy and may pave the way for E20 and other intermediate blends. Another strongly endorsed close working relationships with CRC, EPA and other groups.

Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?

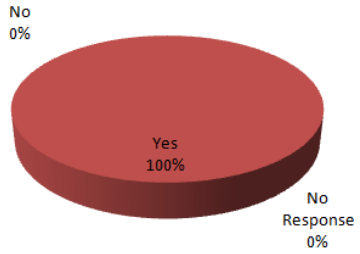
One reviewer commented that, given budget constraints, the funding for this program seems appropriate. But, if this program shows promise for the practical use of E20 (or other intermediate blends), then it may be necessary to expand this program substantially to validate on a much larger scale the use of E20. One other respondent added that the program may need more resources to fully resolve all of the issues across the range of engine/vehicles. One issue to consider is the impact on durability of evaporative control systems. This reviewer notes that CRC is considering work in this area.

Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.

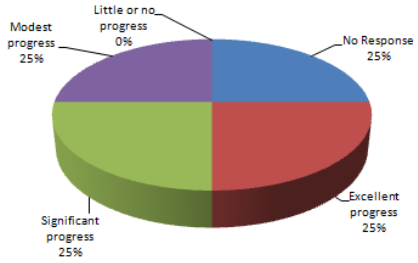
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: Non-Petroleum Based Fuels Intermediate Ethanol Blends

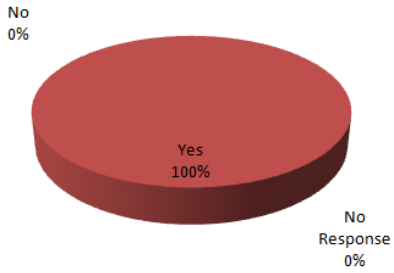
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



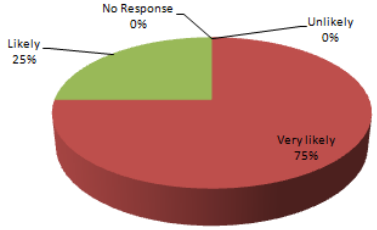
Question 3: Characterize the technical accomplishments and progress toward goals.



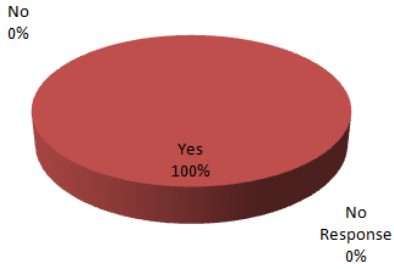
Question 2a: Are the goals of the project technically achievable?



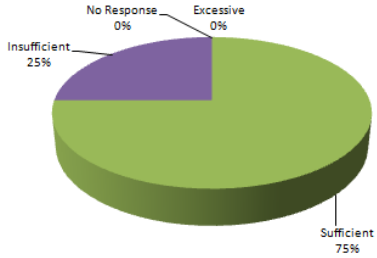
Question 4: How likely is the project team to move technologies into the marketplace?



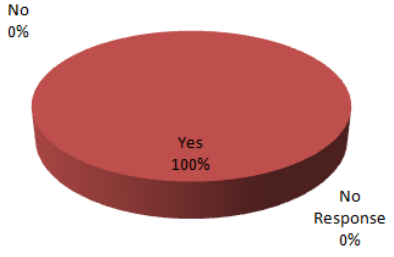
Question 2b: Have the technical barriers been identified and addressed?



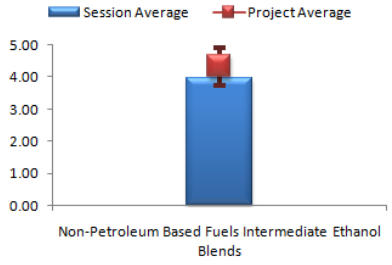
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



NPBF Characteristics Effects on Advanced Combustion Engines (Jim Szybist, of Oak Ridge National Laboratory)

Reviewer Sample Size
This project had a total of 2 reviewers.

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
The lone respondent commented that improving efficiency in gasoline/ethanol blends can have the biggest impact on petroleum use. In the near term, there will be much more ethanol than biodiesel. Work on tar sands and diesel is also useful.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
There were no responses to this prompt.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.
One reviewer stated that the quality of work is very high. This reviewer is unsure of the commercial penetration of HCCI and some of the fuels studied. The other respondent said that information on fuel properties that can improve fuel efficiency/economy by delaying combustion phasing is important work, adding that the oil sands data sounds interesting.

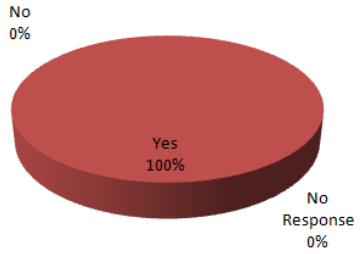
Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.
There were no responses to this prompt.

Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?
There were no responses to this prompt.

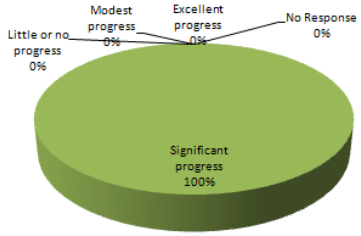
Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: NPBF Characteristics Effects on Advanced Combustion Engines

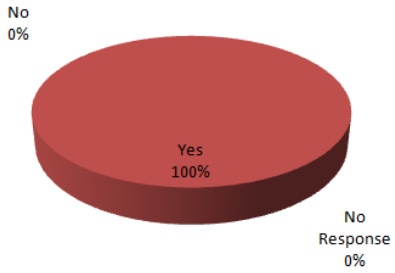
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



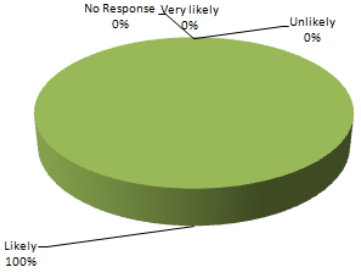
Question 3: Characterize the technical accomplishments and progress toward goals.



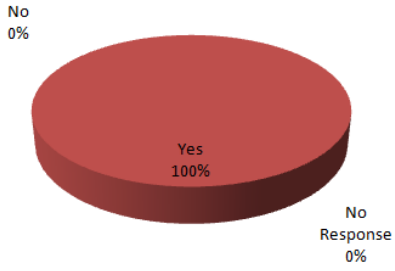
Question 2a: Are the goals of the project technically achievable?



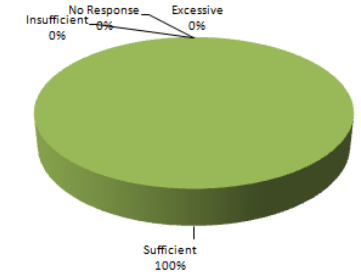
Question 4: How likely is the project team to move technologies into the marketplace?



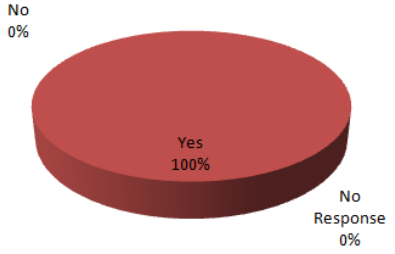
Question 2b: Have the technical barriers been identified and addressed?



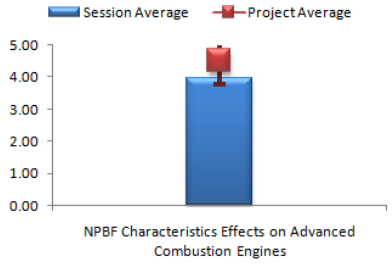
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



NPBF Effects and Enhancements on Engine Emission Control Technologies (Scott Sluder, of Oak Ridge National Laboratory)

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

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
One reviewer said that the NPBF programs can directly influence petroleum displacement and the DOE program since it considers emission controls and can enable clean diesel technology compatibility with NPBFs. Thus, this program is enabling the use of NBPFs. Another person commented that the focus on improving an understanding of the impact of NPBF's on emissions systems is important for enhancing the feasibility of their commercial use. One final reviewer stated that it is important to understand the potential biodiesel impacts on current and near-term vehicle technologies.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
The first reviewer stated that this is a good approach in performing tests in real systems. The other respondent commented that this program addresses the lack of information and predictive tools regarding how NPBFs will influence emissions controls for clean diesel vehicles. This can help anticipate problems from a greater penetration of NPBFs.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.
One reviewer noted the group demonstrated that PM reactivity is related to surface oxygen content (which seems, in turn, to be related to biodiesel level). They also demonstrated that EGR cooler fouling is not different for biodiesel blends vs. conventional diesel. One other person commented that the PM oxidation project showed the surface oxygen content effect on soot ignition temperature (although this has been demonstrated and explained by others already). This reviewer added that the EGR cooler fouling work is very important because it addresses a significant potential roadblock for clean diesel technology. Some of the soot/DPF analyses are repetitive of published work, and it was not clear in some cases where the uniqueness in the present work lies, although thorough characterization of PM from low blend levels (like B5) appears to be new. This reviewer felt that the impact of biodiesel on deposit formation in the cooler-related experiments and the characterization of the nature of the deposit layers are very valuable and interesting work.

One other person endorsed looking at higher HC conditions for EGR cooler impact. This reviewer asked whether the cold-start would be the worst case. One final reviewer stated that the coolant fouling data is interesting, adding that B5 anomalies in both PM oxidation and EGR fouling is intriguing.

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.
One response stated that the results will provide direction regarding which issues need to be addressed for NPBF's and which do not. The other respondent commented that an emphasis on sophisticated analyses of emissions, materials, and combustion with practical engines and practical fuels is an excellent use of the national labs' unique skills to address practical near-term and long-term

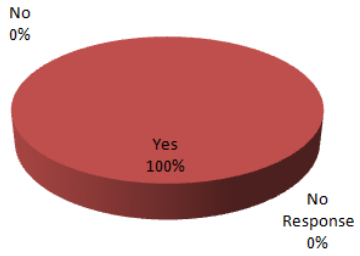
challenges. The strategy in this work and collaborations provide an excellent means for the knowledge gained to be deployed in the field.

Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?
One reviewer stated that the budget levels seem appropriate given the program's funding constraints, while another felt that the good progress suggests that resources are sufficient.

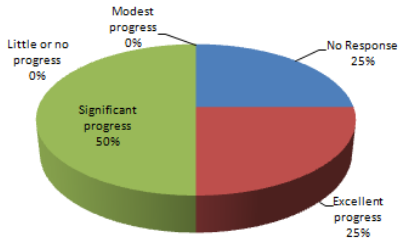
Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: NPBF Effects and Enhancements on Engine Emission Control Technologies

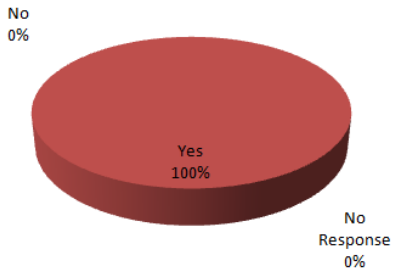
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



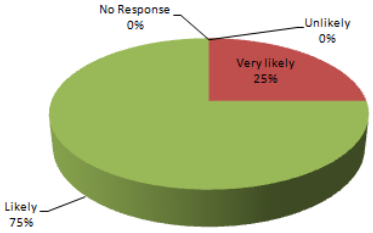
Question 3: Characterize the technical accomplishments and progress toward goals.



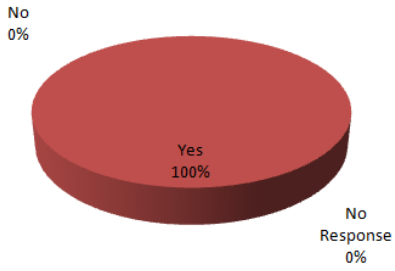
Question 2a: Are the goals of the project technically achievable?



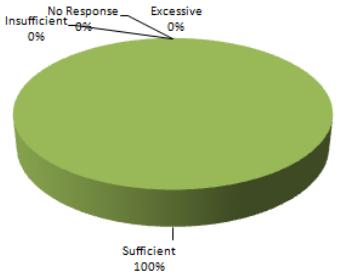
Question 4: How likely is the project team to move technologies into the marketplace?



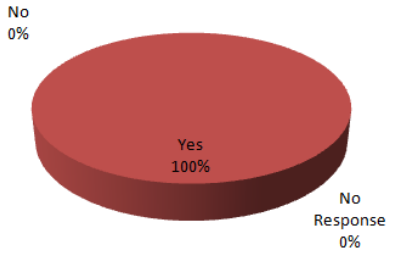
Question 2b: Have the technical barriers been identified and addressed?



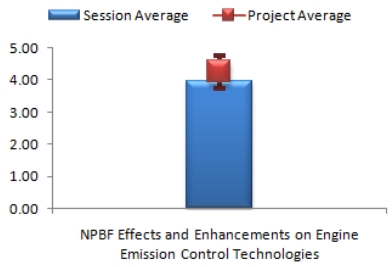
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



NPBF Quality, Stability, Performance, and Emission Impacts of Biodiesel Blends (Robert McCormick, of National Renewable Energy Laboratory)

Reviewer Sample Size
This project had a total of 3 reviewers.

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
The first reviewer stated that this project is addressing technical issues related to biodiesel, while another added that this work has very high near-term commercial relevance due to the many technical issues resulting from increased biodiesel use. One other reviewer said that characterizing properties of alternative fuels in the market to identify areas of compliance/concern is critical for consumer acceptance as sales volumes ramp up.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
One reviewer commented that the approaches of surveying the quality of the biodiesel marketplace, working with ASTM to develop appropriate biodiesel specifications and tests, and testing biodiesel blends' effects on aftertreatment systems are very important to ensure biodiesel being sold in the market is "fit for purpose" and doesn't damage the public perception of biodiesel. The other respondent commented on the PM regeneration rate data, which shows the PM from BD rate is faster than from ULSD. This is interesting, but how would this be implemented by an OEM to reduce fuel consumption on regeneration?

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.
The first reviewer identified good progress in identifying the number and types of biodiesel quality issues in the market, developing biodiesel tests and specifications, and testing the impact of biodiesel on emissions aftertreatment systems. Another person noted that proper ASTM standards are critical for commercial use, adding that the PM trap work is also critical. This reviewer recommends addressing the engine oil dilution issue in US vehicles, since this is a major issue in Europe.

One final reviewer stated that the survey of market-available alternative fuels is important. Reporting BD survey data by production volume was a good tool for getting a handle on where the quality issues are coming from. This reviewer asks whether this information is available in geographical format as well.

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.
One reviewer commented that this work helps to identify issues with the use of biodiesel that need to be addressed for widespread use/acceptance of biodiesel. The other response stated that the data generated has been very important in ASTM and to the industry, and has facilitated the use of biodiesel. The main negative of the approach is the relatively limited VO feedstock supply.

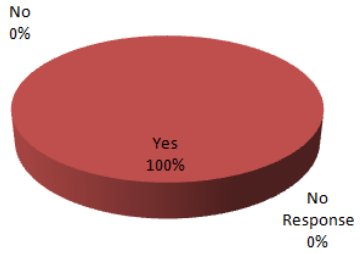
Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?
The lone respondent stated that the good progress suggests that the resources are sufficient.

Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.

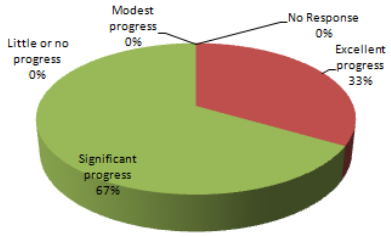
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: NPBF Quality, Stability, Performance, and Emission Impacts of Biodiesel Blends

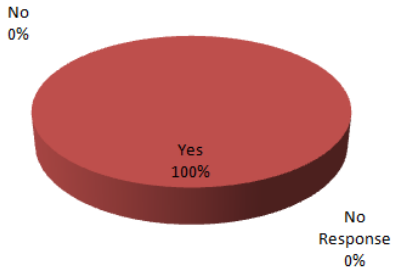
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



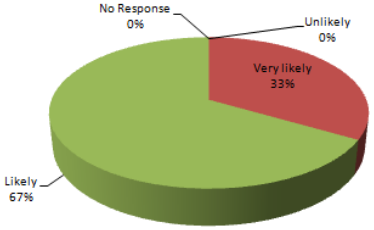
Question 3: Characterize the technical accomplishments and progress toward goals.



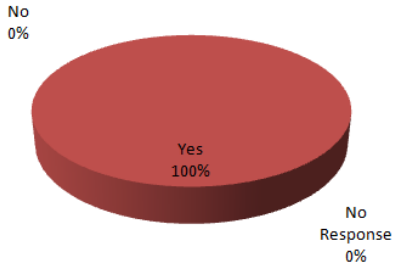
Question 2a: Are the goals of the project technically achievable?



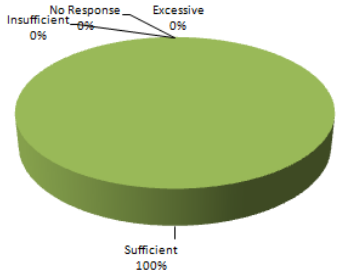
Question 4: How likely is the project team to move technologies into the marketplace?



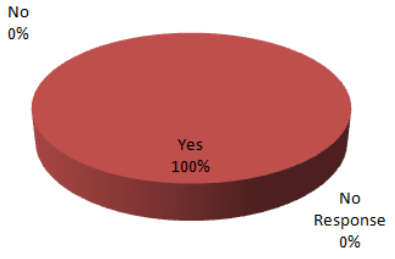
Question 2b: Have the technical barriers been identified and addressed?



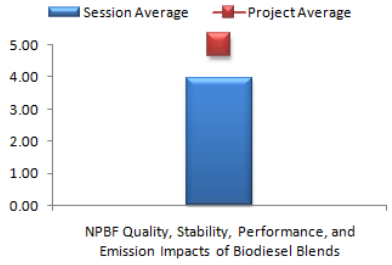
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



Optimally Controlled Flexible Fuel Powertrain System (E85 Optimized) (Hakan Yilmaz, of Robert Bosch, LLC)

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

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
One reviewer indicated that improving fuel economy and emissions of E85 vehicles is consistent with DOE objectives, while another commented that improving gasoline/ethanol blend vehicle performance would provide significant benefits. One other person added that, by focusing on improving the performance of an E85 vehicle, this project addresses petroleum displacement in two ways: displacing petroleum directly with ethanol use and improving efficiency so that less fuel (ethanol and gasoline) is needed. This project is exceptionally well suited to meeting DOE goals because it can remove the real and significant barriers to petroleum displacement represented by shortcomings in E85 production vehicles.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
The first response commented that the strategy of improving performance of E85 vehicles at minimal additional cost and hardware is a good strategy. One person noted that the project uses available technology. Another individual indicated that the investigators have identified performance and fuel economy as the key barriers to overcome. These are certainly major barriers to the success of E85 and the partnership in this project appears effective to overcome these barriers given their expertise in fuel system development and engine development. The lead for the project has already examined strategies to overcome cold start, injector flow restrictions, and other aspects of system design.

One person stated that there was not enough improvement.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.
One reviewer commented that it was still early, while another didn't rate this section since the presentation mainly talked about plans, and not many results, which suggested that this is a relatively new program. One reviewer stated that, with the extensive experience the team already has with ethanol fueling challenges and opportunities, the team has technologies available to it already to incorporate into their design and to find optimal combinations to exploit synergies. Much hardware and analysis progress has been made already despite this being a new project. The targets are aggressive and this is highly desirable. Ethanol brings many drawbacks from a life cycle perspective in efficiency and CO_2 emissions. Thus, aggressive efficiency targets are advisable.

As above, one person commented simply that there is not enough improvement.

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.
The first reviewer stated that this is an obvious technology choice, while another person commented that, if successful, the probability is high that Bosch will commercialize the technology since they are a commercial producer of engine components. One person said, since the lead for the project is one of the major fuel system developers, the likelihood of deploying developed technologies is great. The

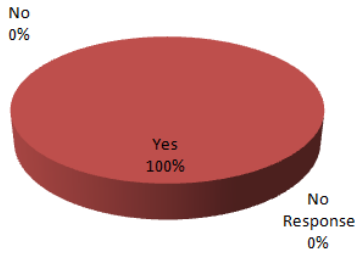
group can leverage past experience to find synergies between engine system technologies to achieve the project objectives.

Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?
One reviewer commented that the budget appears reasonable, provided that internal industry resources are being leveraged. Another stated that there was no evidence that the current resources are excessive or insufficient.

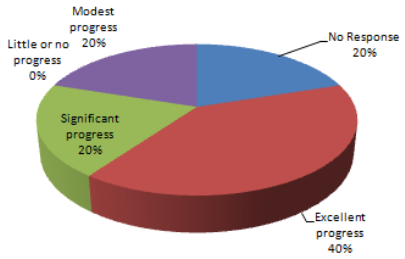
Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: Optimally Controlled Flexible Fuel Powertrain System (E85 Optimized)

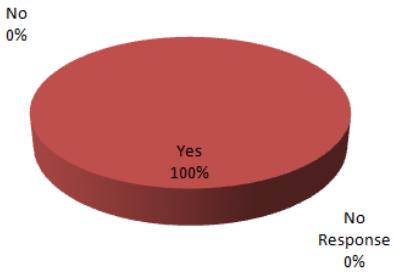
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



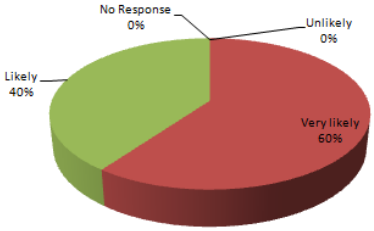
Question 3: Characterize the technical accomplishments and progress toward goals.



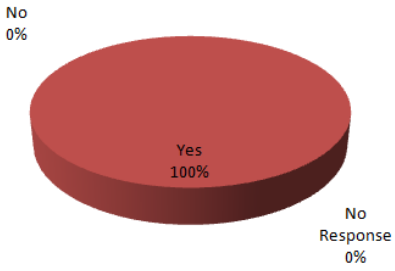
Question 2a: Are the goals of the project technically achievable?



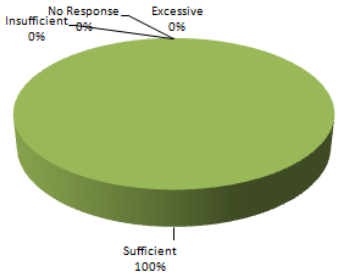
Question 4: How likely is the project team to move technologies into the marketplace?



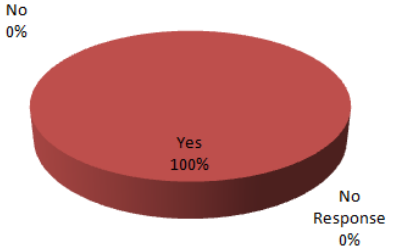
Question 2b: Have the technical barriers been identified and addressed?



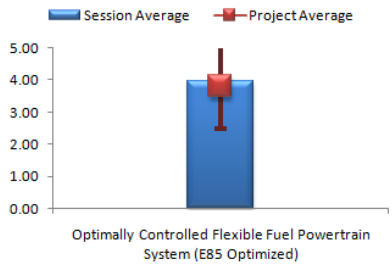
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



Optimally Controlled Flexible Fuel Powertrain System (E85 Optimized) (Bruce Woodrow, of Mahle)

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

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
One reviewer commented that improving fuel economy and minimizing the emissions of engines running on ethanol blends is consistent with DOE objectives. Another wrote that, by focusing on improving the performance of an E85 vehicle, this project addresses petroleum displacement in two ways: displacing petroleum directly with ethanol use and improving efficiency so less fuel (ethanol and gasoline) is needed. One other individual stated that this is similar to other E85 projects.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
The first reviewer stated that there is good work, aggressive targets, and an aggressive choice of technology, while another person commented that the strategy of improving performance not only for E85 fueled vehicles, but also those fueled with lower ethanol content blends is good. One reviewer noted that they intend to develop a new engine that is fully optimized for E85, no emissions penalty and minimum fuel economy penalty. In addition, the researchers intend to demonstrate improved performance with E85 and higher fuel economy on E10 than on base gasoline. They are looking at a compromise between compression ratios and boost pressure, while keeping peak cylinder pressure within limits. They are also looking at how to achieve high cooled EGR rates. One other reviewer, as above, stated that this is similar to other E85 projects.

Another person commented that a social impact study, using GREET model, was mentioned. The reviewer asks, will this be a well-to-wheels analysis which includes the carbon footprint cost of the additional hardware to upgrade the FFV, or just a well-to-tank comparison of E85 with conventional gasoline? Will inputs for ethanol production include capital investments for infrastructure, fertilizer, irrigation and other production costs? What will the source of ethanol be (e.g. will E85 be produced by wet mill, dry mill, switch grass, or import of ethanol from a cheaper source)? Or will default GREET inputs be used whenever possible? The reviewer notes this can become a very complex analysis.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.
One reviewer stated that there is good work, aggressive targets, and an aggressive choice of technology. Another stated that being able to run at any ethanol level is a good goal.

One person didn't rate, since the program is relatively new and few results were presented.

Another reviewer commented that it appears that very little progress has been made thus far, although the project is just getting started at this point. Another wrote, as above, that it is similar to other E-85 projects.

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.

The first reviewer stated that, in order to sell ethanol engines, there need to be aggressive fuel consumption reductions. The fuel is too expensive for low-efficiency engines. The reviewer added that this engine is based on genuinely good engineering inspired by diesel engines. Another person wrote that, since Mahle is a commercial engine/component manufacturer, the probability is high that if the technology is successful and cost-effective, then Mahle will move to commercialize it.

One reviewer noted that the team includes a major component supplier, but added that it is unclear how the engine design and development process will lead to implementation of the engines in commercial vehicles. For instance, where is the market for this 1.2L, 3-cylinder engine in the US marketplace?

Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?

One reviewer suggested that there should be increased resources for this promising technology. Another reviewer noted that the project activities seem very broad given the modest resources provided for this project. This reviewer added that a source of co-funding from an energy company is currently being pursued.

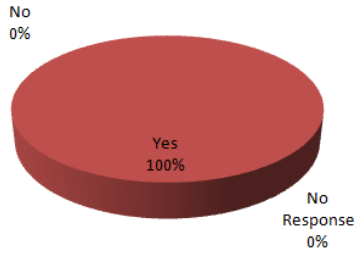
One person stated that there is no evidence that the current resources are insufficient or excessive. Another reviewer commented it is early in the program, such that it is difficult to assess progress.

Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.

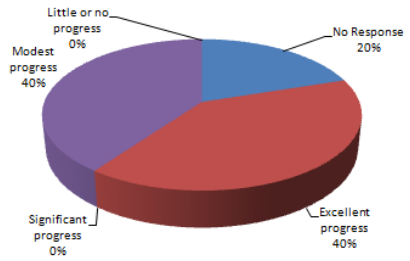
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: Optimally Controlled Flexible Fuel Powertrain System (E85 Optimized)

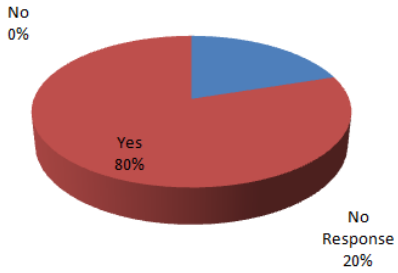
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



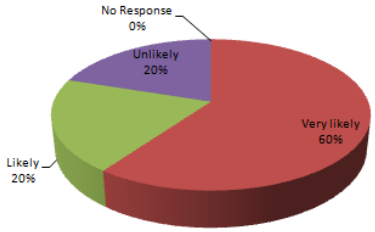
Question 3: Characterize the technical accomplishments and progress toward goals.



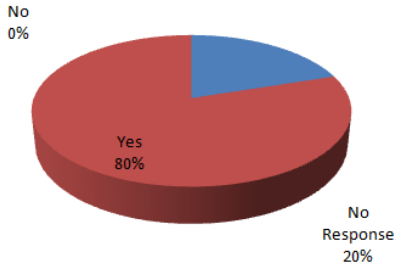
Question 2a: Are the goals of the project technically achievable?



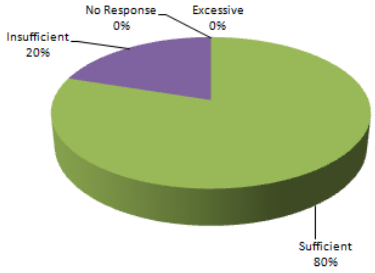
Question 4: How likely is the project team to move technologies into the marketplace?



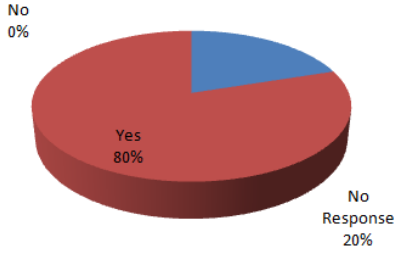
Question 2b: Have the technical barriers been identified and addressed?



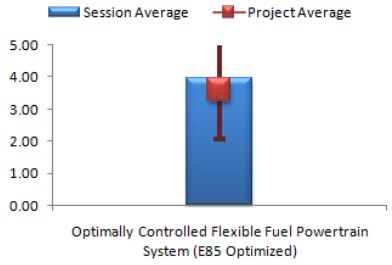
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



Unconventional Hydrocarbon Fuels (Tom Gallant, of Pacific Northwest National Laboratory)

Reviewer Sample Size
This project had a total of 3 reviewers.

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
One reviewer stated that unconventional fuels will directly displace petroleum. Another person commented that, as we replace more petroleum imports with unconventional hydrocarbons, analytical tools to collect physical property data of oil sands and other alternative blendstocks will become more and more critical.

One other respondent noted that heavy oils have been utilized commercially for 15+ years. This reviewer added that it is not clear what new information this project provides.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
The first reviewer stated that oil sands derived fuels are a growing part of the fuel supply in the US and they are fundamentally different from conventional crude oils. So, a better understanding of the syncrude and its impacts on fuel processing and fuel properties will be needed to incorporate more oil sands fuels in the US system.

One other person said that it is not clear that there are any barriers to expanded use.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.
The lone respondent commented that the investigators have completed chemical analyses of various unconventional hydrocarbon process streams and are coordinating and disseminating information and samples to linked projects on oil sands fuels. The challenges of analyzing the oil sands fuels seem to be significantly exaggerated. Many labs focused on fundamental fuel chemistry (e.g., organic geochemistry of coal and coal liquids) face far more significant analytical challenges than those found in analyzing oil sands fuels. This project does provide value in being a clearinghouse for information on the oil sands fuels, whether finished fuels or process streams.

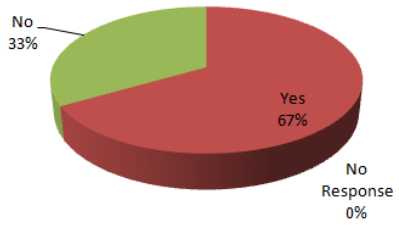
Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.
One reviewer stated that the partnerships and collaborations in the project ensure that information is getting to users and refiners to account for oils sands impacts. Another person stated that analytical techniques and fuel streams are already available.

Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?
The lone respondent indicated that funding is modest but seems appropriate for the level of effort, given program funding constraints.

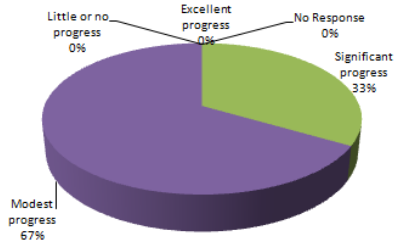
Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: Unconventional Hydrocarbon Fuels

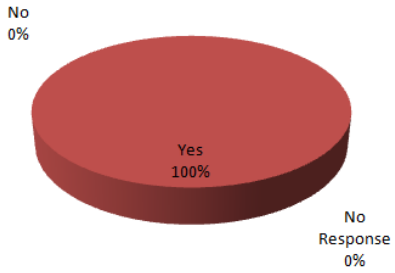
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



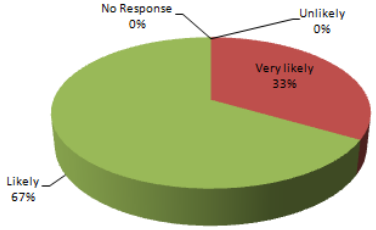
Question 3: Characterize the technical accomplishments and progress toward goals.



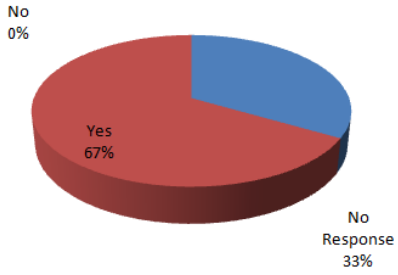
Question 2a: Are the goals of the project technically achievable?



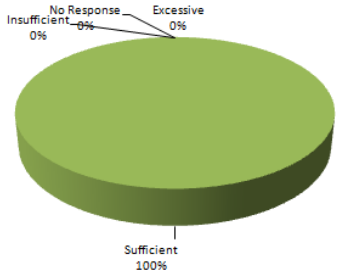
Question 4: How likely is the project team to move technologies into the marketplace?



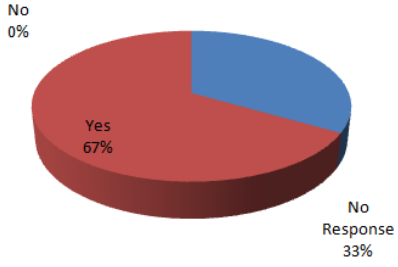
Question 2b: Have the technical barriers been identified and addressed?



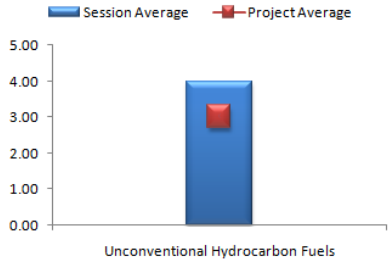
Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating



Use of EGR to Optimize Fuel Economy & Minimize Emissions in Engines Operating on E85 (Ko-Jen Wu, of General Motors)

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

Question 1: Does this activity support the overall DOE objectives of petroleum displacement? Why or why not?
One reviewer stated that improving fuel efficiency and reducing emissions of E85 fueled vehicles is consistent with DOE's objectives, while another agreed, stating that improving the fuel efficiency of gasoline ethanol blends can have large impact. The technology described can also reduce fuel consumption significantly in gasoline engines. One other person stated that, by focusing on improving the performance of an E85 vehicle, this project addresses petroleum displacement in two ways: displacing petroleum directly with ethanol use and improving efficiency so less fuel (ethanol and gasoline) is needed. By including the consideration of emissions, the project also can prevent adverse impacts from ethanol use and prevent a potential public concern about the use of ethanol. This last point is a real problem, given the growing public concern over CO_2 equivalent emissions and air quality problems that surround ethanol production. This project is exceptionally well suited to meeting DOE goals because it can remove the real and significant barriers to petroleum displacement represented by shortcomings in E85 production vehicles.

Question 2: Are the goals of the project technically achievable? Have the technical barriers been identified and addressed? Is the project likely to overcome those technical barriers? Please comment on the project's strategy for deployment of technologies.
The first reviewer stated that the strategy of focusing on turbocharging and EGR system and on transients seems good, while another noted that the use of an OEM improves the likelihood of commercial use. One respondent commented that the project seeks to improve E85 vehicle FTP fuel economy by 15% through the use of cooled EGR and air induction optimization. The participants have targeted an engine that is part of GM's future engine lines, so the outcomes from the project can be directly implemented in future vehicle products. Thus, if successful, the technologies developed can be readily implemented. The barriers of the project have been clearly identified. The project directly addresses these barriers: loss of economy and performance with E85, and the consequent adverse response from customers. But, the targeted fuel economy improvement seems modest. Will 15% better E85 performance remove the public concerns over reduced tank mileage with E85? Following this, one reviewer felt there was not enough improvement.

Question 3: Characterize your understanding of the technical accomplishments and progress toward DOE goals: please state the reasons for your assessment.
The first reviewer commented that, since this is a new project, there has not been much time for progress to be made. The project will combine engine dynamometer experiments and simulation that will be validated with data and used to project hardware configurations to meet the targets. The investigators have completed simulation configurations and are moving toward engine selection and configuration. Despite the brief time the project has been in place, good progress has already been made.

Another person noted that the project is relatively new, so there are not as many results to date as other programs, but this reviewer wouldn't characterize progress as slow. Another indicated that it is still early in the program. One individual stated that downsizing the engine by optimizing for E85 is an interesting concept. This person asks, how much of the 15% fuel economy would be achieved with the hardware changes on a conventional engine running on conventional fuel?

One reviewer, as above, felt there was not enough improvement.

Question 4: What is the likelihood that the project team will move the technologies toward or into the marketplace? Please state the reasons for your selection.

One reviewer stated that this is an obvious technology choice, while another cited the OEM participation. One person commented that, since the lead is a manufacturer of flex fuel vehicles, successful completion of project objectives should provide a direct path to implementing the outcomes in the vehicle fleet. However, there is dependence on outside vendors to achieve a number of the project tasks, which may impede the rate of progress and potential commercialization. One final reviewer noted that, as a producer and marketer of vehicles, GM has a strong driver to commercialize developments. One question is whether developments will be restricted to use in GM vehicles only. Another is where will all the ethanol come from for widespread use of E85?

Question 5: How sufficient are the resources for the project to achieve the stated milestones in a timely fashion?

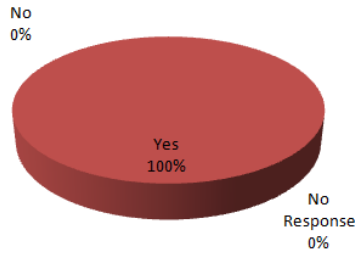
The first response stated that the budget seems reasonable for the project, especially since this is industry led and is directly relevant to existing commercial products. Another felt that there was no evidence that resources are excessive or insufficient. One final reviewer stated that progress appears to have been slow, and it is unclear what quantity/complexity of modeling work was done or needed to be done to develop this concept.

Question 6: Summary rating: when scoring this project, consider the relevance of the work to DOE's objectives, potential impacts on DOE/VT goals, project accomplishments, likelihood of technology transfer, and sufficiency of project resources.

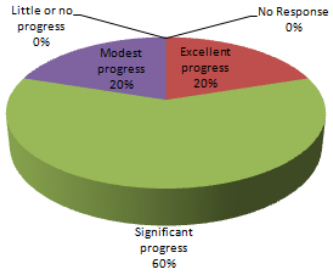
There were no expository comments for this question: refer to the graphic on the next page for this project's summary score.

Project: Use of EGR to Optimize Fuel Economy & Minimize Emissions in Engines Operating on E85

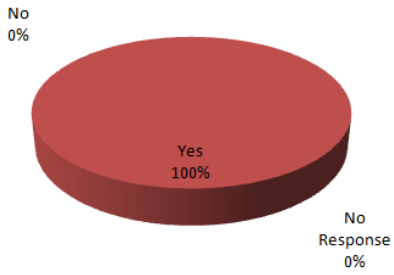
Question 1: Does this project support the overall DOE objectives of petroleum displacement?



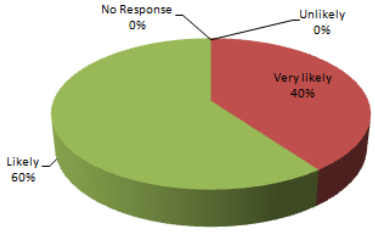
Question 3: Characterize the technical accomplishments and progress toward goals.



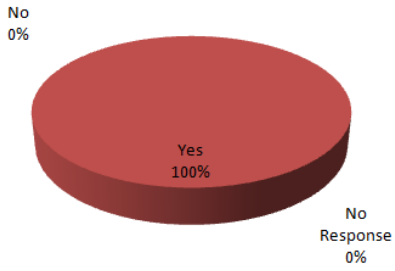
Question 2a: Are the goals of the project technically achievable?



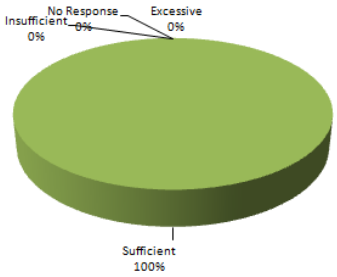
Question 4: How likely is the project team to move technologies into the marketplace?



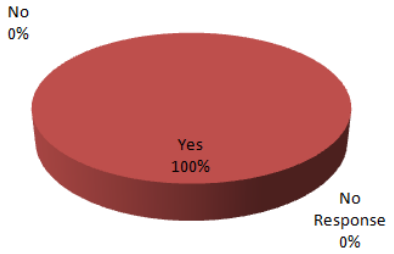
Question 2b: Have the technical barriers been identified and addressed?



Question 5: Characterize the resources available for this project to achieve the stated milestones in a timely fashion.



Question 2c: Is the proposed work likely to overcome technical barriers?



Question 6: Overall Rating