U.S. Department of Energy
Advanced Research Projects Agency – Energy

Request for Information (RFI)
DE-FOA-0000937
Regarding
Support for Crowdsourcing Vehicle Design Competitions

Objective: ARPA-E seeks input from parties capable of administering crowdsourcing innovation challenges, with the goal of aiding in the identification of novel approaches for light-weight automotive vehicle design and construction. The information you provide may be used by ARPA-E in support of identifying capabilities for managing potential crowdsourced competition activities within the agency. THIS IS A REQUEST FOR INFORMATION ONLY. THIS NOTICE DOES NOT CONSTITUTE A FUNDING OPPORTUNITY ANNOUNCEMENT (FOA). NO FOA EXISTS AT THIS TIME.

Background: The US transportation sector represents the single largest demand for petroleum in the world. In 2011, 94% of U.S. transportation energy came from petroleum,[1] and light duty vehicles (i.e. passenger vehicles) rank as the largest single consumer, accounting for 68% of all petroleum used for transportation.[2] Currently, more than one billion metric tons of CO_2 are emitted per year from passenger vehicles,[1] accounting for more than 10% of the total US greenhouse gas emission.[3] Wide adoption of fuel-efficient vehicles, including those at reduced weights, can help ARPA-E to fulfill its mission in reducing energy imports, reducing emissions, and improving energy efficiency. It is estimated that for every 10% of vehicle weight reduction, a 6-8% of fuel consumption decrease is possible[4].

Despite the clear benefits of vehicle light weighting in improving fuel economy, the average total weight of light duty vehicles has actually increased more than 20% since the 1980s. [4] This trend has been attributed to consumer demand for larger vehicles and increased safety and environmental concerns. In a recent Department of Transportation report, a legitimate safety concern remains with the collision of vehicles of unequal masses.[5]

Driven by concerns for sustainability and the need to meet future Corporate Average Fuel Economy (CAFE) standards, vehicle manufacturers and the R&D community are actively pursuing vehicle light weighting strategies. Most of these research efforts are directed towards substituting individual vehicle parts made of lightweight materials such as fiber reinforced

[1] U.S. Energy Information Administration. *Annual Energy Review 2013*. April 2013.
[2] Transportation Energy Book, Volume 31, Tables 1.17, .
[3] U.S. Energy Information Administration, EPA.gov,
[4] Duleep, K. G. "Analysis of Light Duty Vehicle Weight Reduction Potential" July 2007
[5] Kahane, C.J. 2012. Relationships between fatality risk, mass, and footprint in model year 2000-2007 passenger cars and LTVs – final report. Report No. DOT-HS-811-665. Washington, DC: National Highway Traffic Safety Administration.

composites and advanced alloys (Mg and Al in particular). However, this practice of part substitution has been met with reluctance for adoption due to the large capital expenditures required to either validate new parts and/or retool traditional automotive manufacturing plants.[6] A more aggressive and potentially more fruitful approach is to develop entirely new vehicle platforms that make optimum use of the new materials by performing system optimization. However, this approach requires even greater capital investment and presents significant financial risks to the automotive companies. New concepts and approaches are needed to enable the automotive industry to overcome these cost of manufacturing barriers and produce ultra high-fuel efficiency vehicles at a price that can be adopted by the mass market. One possible solution is to develop materials and manufacturing technologies that are particularly amenable to low volume manufacturing. To enable this new paradigm, vehicle materials and architectures need to be identified that can lead to dramatic reduction in capital investment and increase in manufacturing efficiency at low volumes. These cost competitive low volume manufacturing approaches will facilitate the introduction of lightweight vehicles into the market place.

To address these challenges, ARPA-E is considering a prize based design competition 1) to produce conceptual designs of vehicles and 2) to propose cost effective pathways for the production and the assembly of future lightweight vehicles, especially those that require both low capital and operational costs for low volume manufacturing. Goals of the competition would include identifying optimal vehicle design possibilities and critical candidate technologies for future research investments by ARPA-E and other government agencies, and by industry and academia.

Through this RFI ARPA-E seeks to identify organizations capable of working with ARPA-E to leverage a crowdsourcing community for a vehicle design challenge. It is expected that capable organizations will have the requisite infrastructure & resources needed to collaborate with ARPA-E in carrying out such community administration activities as: technical brief development to the community, correspondence from the community, tracking projects within the community, judging submissions, IP management, and providing expert analysis of the challenge's competitive developments. It is also expected that capable organizations will have demonstrated abilities in advertising and disseminating challenges of this nature and executing with ARPA-E under tight time constraints. It is anticipated that capable organizations will be able to leverage community expertise for an automotive design challenge and a final analysis that aids in the identification of innovative trends. It is highly desirable that the organization will possess in-depth technological knowledge of the competition's subject matter.

Purpose and Need for Information: The purpose of this RFI is solely to solicit input for ARPA-E's consideration to inform the possible formulation of future vehicle design challenge and determine commercial capabilities for this type of "crowdsourcing" activity. Information obtained may be used by ARPA-E on a non-attribution basis. This RFI provides the broad

[6] U.S. Environmental Protection Agency, Light-Duty Vehicle Mass Reduction and Cost Analysis —Midsize Crossover Utility Vehicle, August 2012.

crowdsourcing & vehicle engineering communities with an opportunity to contribute views and opinions regarding administering vehicle challenges. Based on the result of this RFI and other considerations, ARPA-E may decide to issue a formal competitive announcement of opportunity with the intent that ARPA-E will substantially participate in planning, implementation, and execution of the challenge. A determination by ARPA-E not to compete this proposed effort on a full and open basis is solely within the discretion of the Government.

REQUEST FOR INFORMATION GUIDELINES: Comments in response to this RFI should be submitted in PDF format to the email address ARPA-E-RFI-Challenge@hq.doe.gov by **8:00 PM Eastern Time on July 5th, 2013.** ARPA-E will not review or consider comments submitted by other means. Emails should conform to the following guidelines:

- Please insert "Responses for RFI for FOA DE-FOA-0000937" in the subject line of your email, and include your name, organization, email address, and telephone number in the body of your email.
- Respondents are requested to include the following information as part of the response to this RFI:
    - Company/Institution name;
    - Individual contact name and title;
    - Mailing address;
    - Phone number;
    - Email address;
    - Type of company/institution (e.g.. university, non-governmental organization, small business, large business, federally funded research and development center (FFRDC), government-owned/government-operated (GOGO)); and
    - Area of expertise.
- ENCOURAGED SUBMISSION CONTENT: ARPA-E encourages responses that address any subset of the following questions of relevance to the respondent.
    1. Indicate your organization's abilities to conduct "crowdsourcing" challenges and highlight those abilities which are unique to your company. Include details of relevant past performance.
    2. Describe pathways you envision for advertising and for disseminating a challenge activity of this nature. Identify abilities to optimize community engagement prior to start of competition, including innovative ways of encouraging teaming formation.
    3. Identify the community or communities that will be leveraged for the challenge. Describe the relevance associated with your selected community or communities. Specify any demonstrated abilities to expand the online community to include expertise beyond vehicle designs such as economical analysis.
    4. Indicate any unique dynamics associated with your crowdsourcing structure such as community building, teaming, outreach to other intellectual capital resources, community available resource tools and Intellectual Property retention.
    5. Describe the main set of activities that you expect will take place from start to finish of the outlined competition. Please indicate any value-add and/or unique

aspects associated with your proposed challenge management perspective. Please clearly identify points within the challenge development and execution stages when client created content will be injected into the challenge.

6. Identify the requisite infrastructural aspects and/or resources your organization maintains or can leverage to facilitate a successful outcome to the crowdsourced community challenge you described in item #5.
7. Please identify a rough order of magnitude cost structure for your organization's proposed challenge strategy, to include labor, materials, contracting, and any other expected expenses.

- Responses to this RFI are limited to no more than 10 pages in length (12 point font size).
- **Responders are strongly encouraged to include preliminary results from previous administered challenges, data, and figures that describe their potential methodologies.**
- Respondents should not include any information in the response to this RFI that might be considered proprietary or confidential.

ARPA-E will not pay for information provided under this RFI, and there is no guarantee that an applicant will be supported as a result of this RFI. This RFI is not a solicitation, and ARPA-E is not accepting applications under this RFI. Responses to the RFI will not be viewed as any commitment for the respondent to develop or pursue the project or ideas discussed.

No material submitted for review will be returned and there will be no formal or informal debriefing concerning the review of any submitted material. ARPA-E reserves the right to contact a respondent to request clarification or other information relevant to this request. All feedback provided will be taken into consideration, but ARPA-E will not respond to individual submissions or publish publicly a compendium of responses.