

Complete Set of Question and Answers from Storage FOA Workshop Held on 5/14/2013

Process Related Questions:

1. Can an entity be a lead in one proposal and a sub on another in the same topic area?
Yes.
2. If a team includes a national lab, will the entire project require 20% cost share?
For Topic 1, 20% cost share is required for all applicants including national labs. For Topics 2 and 3, the national lab portion of the budget will not require cost share although 20% cost share will still be required from for-profit entities for their portion of the proposed project budget if a for-profit entity is proposed as part of the team (pending a cost share waiver for national labs, non-profits, and universities for Topics 2 and 3, otherwise 20% cost share will be required for all projects).
3. Is cost-share required for university-business partnerships?
For Topic 1, 20% cost share is required for all applicants including universities. For Topics 2 and 3, the university portion of the budget will not require cost share although 20% cost share will still be required from for-profit entities for their portion of the proposed project budget if a for-profit entity is proposed as part of the team (pending a cost share waiver for national labs, non-profits, and universities for Topics 2 and 3, otherwise 20% cost share will be required for all projects).
4. Can you propose cost share above the minimum requirements?
Yes. A Program Policy Factor related to cost share above the minimum will be included in this Funding Opportunity Announcement (FOA). As a result, an application proposing cost share above the minimum requirement could be selected over a comparably-ranked application proposing only the minimum cost share.
5. Can cost-share be in-kind and what percentage?
Topic 1 requires 20% cost share while Topics 2 and 3 require 20% cost-share only from “for-profit” entities (pending a cost share waiver for national labs, non-profits, and universities for Topics 2 and 3, otherwise 20% cost share will be required for all projects). Both in-kind cost share and/or cash is acceptable as cost-share assuming they are allowable forms of cost share (further information on allowable forms of cost share will be included in the FOA).
6. Do for-profit entities cover the cost-share for non-profits, universities, and government labs?
For Topic 1 where cost share will be required for all applicants, one potential option to cover the cost share requirements of non-profits, universities, and government labs is for that cost share to be provided by for-profit entities.
7. Can you submit multiple applications for the same topic? Different topics?
Yes, you can submit multiple applications covering the same topic and you can submit multiple applications covering different topics. However, you cannot submit one application that covers multiple topics.
8. What if a project fits under two topics?

You must select one topic. An application cannot span two topics. However, you can submit more than one application, each addressing a different topic.

9. When will you know the details of the foreign entities? End of May?
We will know before the FOA is released. Most likely, a foreign entity without a U.S. subsidy or a proposal that plans to do work outside the U.S. will require submission and approval of a waiver, but please carefully read the clauses on foreign entity participation and “performance of work in the US” for the final rules once the FOA is posted.
10. If a foreign entity is providing cost-share but not receiving federal funding, is a waiver still required?
This is still to be determined. Please read the FOA carefully when it comes out as it will clarify information on foreign entity participation.
11. Is a 100% subsidy of the foreign entity eligible (if located in the United States)?
This is still to be determined. Please read the FOA carefully when it comes out as it will clarify information on foreign entity participation.
12. Can you please confirm that Topic 3 is \$400K/year for a total of \$1.2M over three years?
Yes, the maximum funding for Topic 3 is estimated to be \$1.2M total (DOE funding) over 3 years at \$400K/year.
13. When are full applications due?
The actual due date for full applications is tentatively scheduled for Mid-September, but please refer to the FOA once it is posted for official due dates.
14. Would it be encouraged to have three phases instead of two?
Projects will be tentatively limited to a maximum of 3 years with Phase 1 limited to a maximum of 1 year (and therefore a minimum of 2 phases for the project). The length and number of phases for the remainder of the project should be appropriate for the proposed effort. However since the new EERE FOA standard is still being finalized, please carefully follow the requirements included in the FOA once it is posted.
15. Would smaller grants (\$100-200K/year) be discouraged?
No.
16. How is the proposal review panel selected?
The details of the merit review panel selection process cannot be discussed, but we can say that we use highly qualified reviewers and part of the review process is to ensure that the reviewers have no conflicts of interest. Reviewers are also required to sign non-disclosure agreements covering the applications and concepts they are provided to review.
17. Has there been a shift in targets towards volumetric?
The official stance of the DOE Hydrogen Storage Program has always been that all of the hydrogen targets must be met simultaneously. Gravimetric capacity was emphasized as important and remains so. However it is important to remember that volumetric capacity is also a key target, as evidenced by the Engineering Center presentations given at the AMR.

18. Is there going to be any feedback available at the encourage/discourage phase?
No. You will only get an email encouraging or discouraging you from submitting a full application. You can still submit a full application even if you received a discourage email. However, the point of the concept papers and the encourage /discourage review is to prevent applicants from spending time preparing a full application for submission if DOE is not interested in the concept.
19. Will the slides from this workshop be posted?
Yes, they will be posted and we will send out that information and other important links in the notice of intent.
20. Why only two days for rebuttal?
The 2 day rebuttal period and the overall FOA schedule is the new EERE standard, so the Storage Team has no control over either the length or timeline for the FOA process. However, there will be a rebuttal process in place unlike previous FOAs for which there was no rebuttal process.
21. Are there specific early market applications that need development efforts?
Yes, material handling and portable power are the specific early market areas we are including in this planned FOA and where we have developed DOE targets, see Topic 3, Approach 2.
22. If a partnership relationship is contingent on receipt of the DOE award, how can you demonstrate the partnership or characterize that relationship on the proposal? How about concept papers?
For full applications, a letter of commitment describing the role and function of all team partners, including any cost share support, will be required. For concept papers, the proposed team members should be identified (although subrecipients or partners can be changed between submission of the concept paper and the full application).
23. Is it possible to submit a full application without the concept paper?
No. You must submit a concept paper to be eligible to submit a full application.
24. What are the page limits on the full proposal?
This is still to be determined, but it will probably be between 15-25 pages. Please read the FOA carefully when it comes out for the official page limit requirements.
25. Can a project be proposed for the maximum DOE funding level, but for less than a 3 year duration?
Yes, as long as the objectives and work plan requirements laid out in the FOA can be met, the project can be proposed for less than 3 years. The project lengths provided (3 years total with 1 year Phase 1 and 2 year Phase 2) are maximums. Proposed projects can be shorter in length with the same total DOE funding. Also note that Phase 1 budget amounts will still be limited to \$667K for Topic 1 and \$400K for Topics 2 & 3 regardless of the overall project length.
26. How much of the FY14/FY15 storage funding is intended toward this FOA vs. AOP (Annual Operating Plans) work (i.e., will there continue to be storage AOP work in the next two years)?
National Laboratory projects competitively selected through this planned FOA will be funded through AOPs (as has always been the process). There is no pre-determined breakout of AOP

(national labs) vs. non-AOP (financial assistance) funding. Yes, there may still be Hydrogen Storage work funded through AOPs separate from this planned FOA, but the goal is to have the majority of the projects within the hydrogen storage portfolio competitively selected through FOAs.

27. Is a separate FY15 FOA anticipated?

At this time a final decision on issuing a FOA for FY2015 has not been made. Highly ranked proposals from this FOA will be selected for funding in FY2014. If more high quality proposals are received than can be funded in FY2014, then those not selected for funding may be selected as “alternates.” Alternates may be selected for funding in FY2015. A decision on issuing a FOA in FY2015 may be partially dependent on the number of quality proposals received through this FOA. The decision of issuing FOAs and making awards to projects for funding is subject to appropriations.

Topic 1 Related Questions – Reducing the Cost of Compressed H₂ Storage Systems:

1. Is there consideration for projects to validate or better characterize current issues with seals and components?

No, the objective is to identify materials that may lead to lower cost, lighter weight, and better performing components as opposed to characterizing and validating current materials/components.

2. Are 250 bar compressed gas solutions acceptable due to common usage with CNG?

No, 250 bar ambient compressed hydrogen storage systems are not being pursued by automotive OEMs. Their focus is on 700 bar ambient compressed hydrogen systems. However for proposals focused on operating conditions other than ambient, where lower pressures can achieve the volumetric targets, lower pressure systems will be considered.

3. Does one need to design new balance-of-plant components to qualify as a system? Can one propose just a tank or just a component?

Topic 1 proposals are for new/novel approaches to “full systems.” However, proposals can focus on specific components, such as lower cost, improved pressure vessels using the “standard” balance-of-plant components and configurations.

4. How do I decide if I should propose under Topic 1 or Topic 2?

The focus of Topic 1 is complete systems while for Topic 2 it is materials for lower cost, lighter weight composites and balance-of-plant components. If the proposal includes the tank design, how it is manufactured or how it is operated, it should be proposed under Topic 1. If the proposal is for improved composites or materials for balance-of-plant where all the work can be carried out without needing to design or fabricate a pressure vessel, it should be proposed under Topic 2.

Topic 2 Related Questions – Lower Cost Carbon Fiber Composites and BOP Materials:

1. Are there considerations for coatings or similar treatments to improve performance of current systems?
If proposals may lead to improved performance and thus lower costs, they will be considered.
2. Is carbon fiber from foreign sources eligible?
Yes, although to maintain US competitiveness, domestic sources would be encouraged and such proposals will be preferred over one utilizing a foreign source. Also note that the topic is for the development of lower cost materials and processing, simply using a low cost foreign source would not be adequate.
3. Why are we not looking to improve greatly the inter-phase properties of carbon fiber resin without an overdoing of the surface treatment of the carbon fiber?
Any approach that can lead to improved composite performance and therefore lead to lower cost systems will be considered.
4. Could you more precisely define the components that comprise “Balance-of-Plant” and a complete list of their requirements? Which are most critical?
We will attempt to post a list of BOP components prior to issuing the FOA; note that included in the pre-solicitation meeting presentation there is a schematic showing the current system BOP. However it should also be noted that the topic is for identification of materials that can lower the cost and weight of the BOP and not to design and develop whole components.
5. In the Approach 2 description, there is a statement, “Proposals are not sought for the design and construction of complete BOP components.” However, for the target of reduced weight and cost for metallic components, significant progress toward these goals could be attained by demonstrating material performance at higher stresses. Thus, there can be a connection between component design, applied stress in the material, and material performance. How can material performance be de-coupled from component design?
While complete development of BOP components is not of interest for this FOA, structure-function relationships directly related to certain BOP components that can be modeled/demonstrated that enable reduced mass and improved perform are of interest.

Topic 3 Related Questions – New Materials Discovery:

1. The FOA says to pick two properties and provide evidence that your system can meet them. Is there a preference for which two?
The objective should be on developing materials capable of being able to meet all of the system level targets, therefore the focus cannot be on a single property. While the draft topics mentioned addressing at least two properties as part of the phase I go/no-go decision metric, the point is to have the proposers address the key properties required for the material to function as an effective hydrogen storage material and the final topic language may be revised accordingly.
1. Waste heat for low-temperature PEMFC is ~80°C. However, there is an effort to develop high temperature PEMFCs operating at ~180°C. Will this be accounted for in the targets?
At this time there are no plans to revise the targets in regards to the operating temperature of fuel cells. Proposals must consider the quality of the waste available versus any additional heat that would need to be provided. For automotive applications, for instance, fuel cell

targets have a max operating temperature of 120°C and most current automotive PEM fuel cells operate at approximately 80°C.

2. Are only solid state materials of interest? Or are liquid-based systems also of interest?
No, solid state materials are not the only materials of interest. For instance, liquid organic carriers where the material remains in liquid phase before and after release of hydrogen are currently being funded through the program and are still of interest. However DOE made a no-go decision for onboard fuel processing
[\[http://www1.eere.energy.gov/hydrogenandfuelcells/pdfs/committee_report.pdf\]](http://www1.eere.energy.gov/hydrogenandfuelcells/pdfs/committee_report.pdf), so hydrocarbon fuels that are reformed onboard to produce hydrogen and carbon dioxide are no longer of interest.
3. Where can we find information on technology readiness level (TRL) definitions?
A definition of TRL levels used by EERE's Advanced Manufacturing Office can be found at this link: <http://www1.eere.energy.gov/manufacturing/financial/trls.html>.
4. Where can we find information about what material properties will be sufficient for the specific performance targets (which are based on the system)?
Some material property requirements for metal hydrides were included in the Argonne National Laboratory 2013 AMR presentation by Rajesh Ahluwalia (ST-001), the pre-solicitation meeting presentation, and the draft FOA Topic document. For other types of materials (sorbents and chemical hydrogen materials), DOE plans to have some of this information presented by members of the Hydrogen Storage Engineering Center of Excellence in a webinar, planned for late June; further information on the planned webinar will be forthcoming. Also, additional material-based performance criteria will be provided in the planned FOA.
5. Can you list previously funded materials already discontinued?
Yes, these links have already been provided in draft FOA topic document and they will be included in the planned FOA.
6. How strongly is it encouraged for Topic 3, Approach 2 proposals to have a completed system as a product of the grant (i.e. real or simulated system)?
Proposals for Topic 3, Approach 2 need to include a complete system. The system can be developed as part of the proposed work or it can be an already developed system where the proposed work addresses existing challenges, such as the cost of producing the hydrogen storage material.
7. What storage temperatures are we operating at – room temperature or low temperature?
The Office is technology neutral so the temperature may be dependent on the material you are working with, for example, sub-ambient temperatures for sorbents or elevated temperatures of chemical hydrogen storage materials. Thus, the focus needs to be on the material and operating conditions with the best chance to meet all the hydrogen storage targets simultaneously while paying special attention to cost and efficiency implications.
8. It was stated that impacts for system properties will be important, beyond weight and volume targets. For example, heat dumping during refueling. Are there or will there be targets or metrics provided for this?

There are no plans to issue any metrics related to heat dumping. However, these properties are indirectly covered by our fill time and fuel cost targets. For instance, if significant heat dumping off-board a vehicle during refueling is required for a material, it would be expected to increase the time required to refuel and/or the fuel cost due to the off-board heat exchangers needed.

9. Is there a webpage or “master document” similar to St001-Ahluwalia-2013_o.pdf, which allows proposers to assess whether a targeted/proposed material (other than metal hydride) performance meets criteria established as minimum by the Hydrogen Storage Engineering Center of Excellence?

DOE plans to have some of the information on required performance for hydrogen sorbents and chemical hydrogen storage materials presented by members of the Hydrogen Storage Engineering Center of Excellence in a webinar, planned for late June; further information on the planned webinar will be forthcoming. Also, additional material-based performance criteria will be provided in the planned FOA.

10. Are there any selection/funding preferences for “onboard reversible” versus “off-board reversible” materials?

No, however a pathway to meet all targets must be considered, including fuel costs and both onboard and “well-to-powerplant” efficiencies for all materials proposed.

11. Any material classes out of play? Any class of interest, so long as the materials has not been “discontinued” by a Center of Excellence?

Yes, any material that has the potential to meet the DOE hydrogen storage targets is of interest. Proposers are encouraged to review prior work carried out through the program so as not to propose materials already thoroughly investigated; Annual Progress Reports and Proceedings of the Annual Merit Reviews can be found on the FCTO website [http://www1.eere.energy.gov/hydrogenandfuelcells/annual_reports.html and http://www1.eere.energy.gov/hydrogenandfuelcells/annual_review.html]. Please note the “discontinued” decision on materials from the material Centers of Excellence are not official DOE no-go decisions. The only official DOE no-go decisions have been made for hydrolysis of sodium borohydride and non-doped single walled nanotubes for automotive applications [<http://www1.eere.energy.gov/hydrogenandfuelcells/pdfs/42220.pdf> & http://www.hydrogen.energy.gov/pdfs/go_no_go_nanotubes.pdf].

12. Given the emphasis on cost and efficiency on page 3 of the updated Multi-Year Research, Development and Demonstration Plan, will new material proposals require a high level/preliminary cost or efficiency assessment to show that ultimate DOE targets can be met? **Cost and efficiency assessments will not necessarily be a requirement of the proposal, but these sorts of preliminary analysis could potentially strengthen a proposal. However, for chemical hydrogen storage materials, regeneration efficiency should be addressed since this is a known barrier for these types of materials.**

13. What is the Technology Readiness Level (TRL) for Topic 3?

A definition of TRL levels used by EERE’s Advanced Manufacturing Office can be found at this link: <http://www1.eere.energy.gov/manufacturing/financial/trls.html>. Applications submitting to Topic 3, Approach 1 (automotive) will most likely fall within TRL 2-3, and TRL 2-4 for Topic 3, Approach 2 (non-automotive).

14. The draft FOA Topic document says synthesis must be included in Phase 1. Can Phase 1 focus on modeling and Phase 2 focus on synthesis, if the concept is novel enough to require significant modeling but still supported strongly with preliminary data?
The Office is strongly interested in actual material properties. A strong modeling effort run concurrently with experimental efforts would be encouraged.
15. For more novel projects, is it recommended to begin with a smaller project to establish and prove the concepts before applying for a larger grant?
The size (both length and value) of proposals submitted is the choice of the applicant (as long as it fits within the specified limits stated in the FOA). However, part of the reason that a Go/No-Go decision point will be required early on within the project (1-year Phase 1) is to evaluate the viability of novel concepts. If the novel concept proves viable in Phase 1, this helps ensure continued funding for up to an additional 2 years to further develop the concept.
16. Does approach 2 only include materials development or will systems and/or components that enable the performance targets be considered? In other words, can we propose a novel system concept that enables a common metal hydride material to meet the performance targets?
Yes approach 2 requires either development and incorporation of a material into a system, or development of a material for which a system exists. Novel systems with potential to meet the performance targets are encouraged, regardless if it is based on a “common metal hydride” or newly synthesized material. Since approach 2 is for non-automotive applications, materials that are no longer considered for onboard automotive, but are applicable for the non-automotive applications, will be considered.
17. Would an approach that shows how to improve kinetics and thermodynamics for a metal hydride be acceptable if the metal hydride can't meet 11 wt. %? The point being that the approach might also be applicable to improve performance of other systems with higher wt. %.
Proposals should consider performance against the performance targets and existing technologies. Approaches that have the potential to exceed current state-of-the-art performance will be considered if strong justification is provided.
18. For Topic 3, Approach 2 can the portable power be for 10-50kW? The FOA should consider this, as there is a market pull for this, and you would be producing CO₂ emissions (as opposed to displacing battery power)
Currently, for hydrogen storage technology development, DOE is only considering applications for portable power systems under 250W as defined in our Storage MYRD&D.
19. The FOA draft is unclear with regard to “portable power.” The Technical Plan defined portable power to include portable generator sets, presumably >5kW. The draft FOA for Approach 2, Topic 3 is unclear, but the portable power targets seem to only go up to 250W. Please clarify.
High power systems may be emerging as an area of interest but for hydrogen storage technology development, the Office is currently interested only in addressing man portable power (under 250W) as defined in our Storage MYRD&D.
20. For Topic 3, Approach 2, does there need to be system development to meet the targets? Is it possible to work on materials that can be put in a system that already exists? Or is it possible to design a novel system that can utilize a standard material?

Yes approach 2 requires either development and incorporation of a material into a system, or development of a material for which a system exists. Either approach is fine as long as all the targets can be met.

21. Please clarify whether materials need to be on-board or off-board reversible in materials-based advanced hydrogen storage technologies for portable power systems. Does the FCT support the development of a disposable cartridge for such applications?

For portable power applications, there are targets included for both “single-use” and “rechargeable” systems. Systems which are recharged onboard the device or removed to be recharged separately are both acceptable. Also if “single-use” systems can be recycled, with the spent material efficiently rehydrogenated, that is encouraged. It is expected that as markets develop and production volumes increase, rechargeable systems and “single-use” systems that can be recycled/regenerated will be required.

22. For Topic 3, Approach 2, can other types of fuel storage be proposed (beyond hydrogen storage) with the potential to work with other types of non-PEM (Proton Exchange Membrane) based fuel cells?

The DOE Hydrogen Storage Program is only interested and will only be accepting proposals for development of hydrogen storage technologies where hydrogen is utilized as the fuel source.