U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

DOE Hydrogen and Fuel Cell Technologies Office
Request for Information # DE-FOA-0002379

DATE: August 10, 2020

SUBJECT: Request for Information (RFI)

RESPONSES DUE: September 15, 2020 by 5:00 p.m. ET

Purpose:

The U.S. Department of Energy's (DOE's) Hydrogen and Fuel Cell Technologies Office (HFTO) within the Office of Energy Efficiency and Renewable Energy (EERE) solicits feedback from industry, academia, research laboratories, government agencies, and other stakeholders through this RFI. This is solely a request for information and not a Funding Opportunity Announcement (FOA). EERE is not accepting applications.

Description:

HFTO is issuing a Request for Information to obtain public input on its efforts to accelerate research, development, demonstration, commercialization, and adoption of hydrogen and fuel cell technologies.

This RFI is issued to understand how hydrogen and fuel cell research priorities and goals can address evolving technology needs and to inform related research, development and demonstration (RD&D) activities that may be undertaken by DOE. The information being sought under this RFI is intended to assist HFTO in further defining the scope and priorities of its RD&D initiatives as well as its consortia that were established to address its priorities.

The information collected may be used for internal HFTO planning and decision-making purposes, including but not limited to determining potential new areas of focus, funding opportunities, analyses, and organizational frameworks for national lab-based consortia.

Background:

For over two decades, the DOE's HFTO[1] has led RD&D activities to enable the commercial viability and adoption of hydrogen and fuel cell technologies that would benefit multiple applications across sectors. HFTO funding has led to over 1,000 U.S. patents and more than 30 technologies that were commercialized, ranging from components such as membranes, to complete systems such as electrolyzers and storage tanks. Cross-cutting efforts at HFTO, such as manufacturing RD&D, technology validation, safety, codes and standards, education, and market transformation, have allowed the private sector to develop, commercialize and deploy thousands of fuel cells to date. This includes fuel cells for use in niche applications such as forklifts and

[1] Note that the Office name changed from Hydrogen, Fuel Cells and Infrastructure Technologies (HFCIT) to Fuel Cell Technologies Office (FCTO) and subsequently to Hydrogen and Fuel Cell Technologies Office (HFTO) to be consistent with its congressional budget chapter name.

backup power units, as well as transportation applications such as light duty vehicles (LDVs), buses, and the emerging infrastructure needed to support them. However for widespread availability, competitiveness and adoption of hydrogen and fuel cell technologies, a number of challenges still remain including cost, reliability, and performance, particularly related to hydrogen infrastructure.

Given the potential value of hydrogen and fuel cells beyond LDVs, HFTO has been shifting RD&D focus to explore other opportunities, expanding to heavy duty applications (particularly using polymer electrolyte membrane (PEM) fuel cells) as well as industrial uses, energy storage, and grid integration.

The Program's[2] mission and vision are aligned with DOE and national priorities and reflect input from diverse stakeholders including the private sector engaged in relevant applications across various sectors of the economy – transportation, stationary power, and industry. The HFTO mission is: ***Research, development and innovation to enable the adoption of hydrogen and fuel cell technologies across applications and sectors at scale.*** This mission supports the vision of DOE's H2@Scale Initiative (described below): ***Affordable, reliable, clean, and secure energy across sectors, enabled by hydrogen.***

Recent global priorities include heavy and medium duty trucks as well as maritime, rail, prime and backup power, including data center applications, and industrial uses such as steel manufacturing using hydrogen instead of coal. Development of an affordable and reliable hydrogen infrastructure to fuel all these applications is increasingly critical. The next section details specific areas of interest that will form the basis of the focus of HFTO.

The Office requests feedback on the following specific areas of interest:

SPECIFIC AREAS OF INTEREST:

Category	Background Information	Related RFI Questions
H2@Scale Initiative	page 3	page 5
HFTO Strategy and Multiyear Plan	page 6	page 7
Priority Application Focus Areas	page 8	page 9
Funding Mechanisms and Opportunities (including consortia models)	page 9	page 13

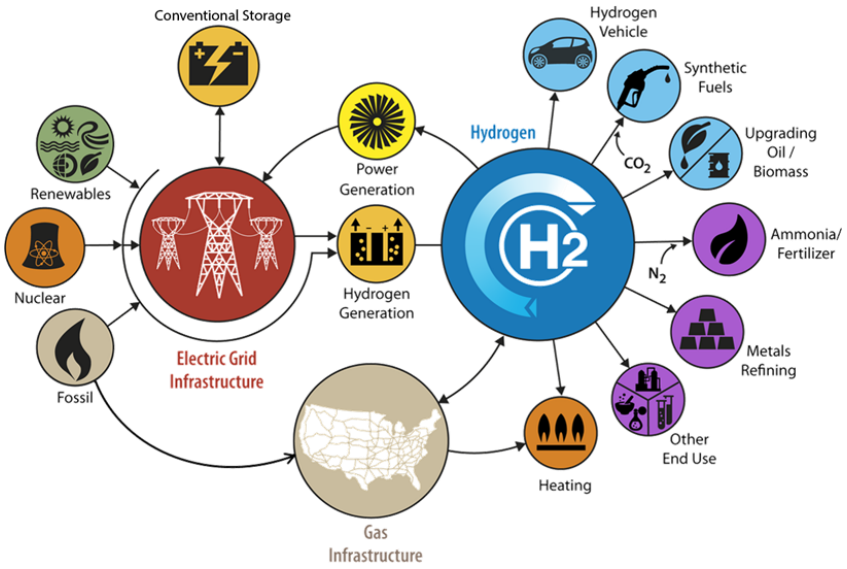
[2] For the purpose of this RFI, the term Office (i.e., HFTO) and Program are used interchangeably. Subprograms are activities such as Hydrogen Technologies, Fuel Cell Technologies, Technology Acceleration, etc.

H2@Scale Initiative

H2@Scale is a DOE initiative that supports innovations to produce, store, transport, and use hydrogen across multiple sectors. The overall vision of H2@Scale recognizes hydrogen's versatility as a flexible energy carrier. The intent of H2@Scale is for hydrogen to enable—rather than compete with—energy pathways across applications and sectors.

Figure 1 illustrates the overall vision of H2@Scale. Primary energy sources – fossil fuels, nuclear, and renewables – are shown on the left, and these sources are used to provide energy for the conventional electric grid, shown in red. One can use electricity, either directly from the grid, or through dispatchable resources to produce hydrogen, or one can use resources such as fossil fuels and biomass to generate hydrogen directly, bypassing the electric grid. Once hydrogen is produced, one can store that hydrogen and then use it in a fuel cell or turbine to feed it back to the grid or to power other applications. In recent years, the fuel cell industry has delivered thousands of fuel cells across the U.S. for use in stationary and transportation applications. Today, an expansion of the market to heavy-duty applications includes trucks, marine vessels, rail, data centers, and the expanded industrial use of hydrogen. Hydrogen is also emerging as an option for large-scale energy storage, enabling renewable or other baseload energy sources. In some cases, hydrogen or chemical hydrogen carriers can be used to transport energy instead of building new electric transmission lines.

Key challenges in scale-up of hydrogen include the affordability, durability, and reliability of hydrogen production, storage, and utilization technologies, as well as infrastructure. These challenges must be addressed to introduce new markets across heavy-duty applications, new industrial uses, and grid integration.



This is a Request for Information (RFI) only. EERE will not pay for information provided under this RFI and no project will be supported as a result of this RFI. This RFI is not accepting applications for financial assistance or financial incentives. EERE may or may not issue a Funding Opportunity Announcement (FOA) based on consideration of the input received from this RFI.

Figure 1: The H2@Scale vision: hydrogen can be produced from diverse domestic resources and is a central input to many important end uses in the industrial, chemical, and transportation sectors

Recent H2@Scale Funding Opportunity Announcements

The H2@Scale Funding Opportunity Announcement (FOA), released by EERE in FY19, focused on a number of topics to enable H2@Scale including first-of-kind pilot demonstrations of integrated systems with on-site nuclear power and multiple renewable energy sources. In addition, HFTO included topics for heavy duty transportation (fuel cells and materials for hydrogen storage) in the joint EERE transportation sector FY19 FOA.

The key to continued advancement of H2@Scale is scaling up affordable hydrogen and fuel cell technology options for expanded supply and demand, enabled in part by continued RD&D.

HFTO released a FOA for $64 million in FY20 with the following topics:

- Electrolyzer Manufacturing R&D[3] (focused on PEM)
- Advanced Carbon Fiber for Compressed Hydrogen and Natural Gas Storage Tanks[4]
- Fuel Cell RD&D for Heavy-Duty Applications (includes membranes as well as standardized, modular fuel cell stacks)
- H2@Scale New Markets R&D—HySteel (enabling hydrogen use in iron reduction for the steelmaking sector)
- H2@Scale New Markets Demonstrations (marine applications and data centers)
- Training and Workforce Development for Emerging Hydrogen Technologies

Hydrogen for new markets, including industrial uses

With increasing interest in hydrogen for industrial uses, information is solicited on areas of interest in which DOE may be able to enable progress.

Steel

An emerging industrial application for hydrogen is steelmaking, an essential segment of the U.S. economy accounting for ~6% of delivered energy in U.S. industry. Traditional iron ore reduction uses a chemical reaction between iron oxide and carbon monoxide sourced from heating coke fuel in a blast furnace. Coke is a hard, porous, nearly pure carbon product made by heating coal in the absence of air (in coke ovens). Coke acts as both a fuel and reducing agent in the blast furnace, forming carbon monoxide when burned, and reacts with the iron oxide to produce molten pig iron and carbon dioxide. New production processes are exploring the use of hydrogen gas instead of coke. Hydrogen reacts with iron oxide in a similar fashion to carbon monoxide, but instead of producing carbon dioxide, the only byproduct is water vapor. When hydrogen used in this process is derived from renewable or decarbonized sources itself, the steel making process can become carbon-dioxide emissions free. Large scale use of hydrogen stimulates hydrogen demand, aligned with the H2@Scale vision.

[3] In collaboration with EERE's Advanced Manufacturing Office (AMO)
[4] In collaboration with AMO and EERE's Vehicle Technologies Office (VTO)

Other Industrial Processes, e.g., Cement, Ammonia, Refining, Synfuels

There is growing interest in using hydrogen for other industrial processes and both DOE as well as its international counterparts have initiated RD&D activities in some of these areas. Responses to the questions below will help determine if DOE should provide further investments that are not duplicative to private sector activities and can advance the H2@Scale concept.

Questions related to H2@Scale:

1) **Based on existing and prior focus areas as described above, what areas require further RD&D and what additional areas should be considered to accelerate progress in achieving the H2@Scale vision?** Please be as specific as possible.

2) **What specific topics in the area of fuel cells (including heavy duty applications such as trucks, marine, rail and stationary applications such as data centers) should HFTO consider?** Please be as specific as possible.

3) **What specific topics in the area of hydrogen (including production, infrastructure, and storage) should HFTO consider?** Given the intent of H2@Scale to accelerate the scaling up of hydrogen production, distribution, storage, and utilization, what specific topics beyond the FY20 FOA (see above) should be considered, particularly for infrastructure? Please be as specific as possible.

4) **Beyond the FY20 FOA topic (see above), what additional RD&D efforts should DOE undertake on hydrogen for steel?** Are there specific areas of interest? What value would there be for a demonstration and at what scale? Are there specific geographical regions of interest where both production and end use may be more easily co-located to reduce costs? What other information would be of value as DOE determines future plans?

5) **For other industrial uses, such as cement manufacturing, ammonia, other synfuels, refining, etc., what are specific areas of interest where DOE may provide value?** What are the RD&D needs? Are there specific regions and entities interested in conducting RD&D activities and in what specific areas? What other information would be of value as DOE determines future plans?

6) **What specific topics in systems development and integration such as hybrid systems that use both intermittent renewables and baseload power (e.g., nuclear) should be funded across the spectrum of RD&D to de-risk technologies and to demonstrate a value proposition?** Are there national lab assets or capabilities that would be of value to demonstrate scaling up of systems? At what scale and for what technologies? Please be as specific as possible.

7) **What areas may not be of interest or most appropriate for hydrogen and fuel cell technology, and could be de-emphasized in the HFTO portfolio?**

HFTO Strategy and Multiyear Plan

DOE's HFTO has been leading and coordinating hydrogen and fuel cell activities across DOE and coordinating with federal and international counterparts for over two decades. This section offers an opportunity for stakeholders to provide feedback as HFTO conducts its regular updates to its strategy and multiyear plan. The current emphasis is on opportunities across markets and sectors as envisioned through H2@Scale. To address the RD&D aspects of H2@Scale, HFTO developed the following focus research areas as part of its overall strategy, which forms the basis of its multiyear plan starting in 2020. Each area has a two pronged approach: 1) focus for the next five years to enable near-term tangible impact on the market, and 2) a longer term, high-risk, high-impact potential strategy to enable innovations in a decade and beyond.

Hydrogen Technologies

- Production
  - Affordable, efficient and durable multi-MW-scale electrolyzers
  - Innovative approaches to H_2 production, beyond electrolysis
- Infrastructure
  - Affordable and reliable components and systems for H_2 transport and dispensing in heavy-duty applications
  - Materials and components for advanced H_2 liquefaction and carrier distribution concepts
- Storage
  - Low-cost carbon fiber reinforced storage tanks for high-pressure gaseous H_2 storage
  - Innovative H_2 storage materials for high-density, low-pressure storage

Fuel Cell Technologies

- Efficient, durable and cost-competitive fuel cells for heavy-duty applications
- New materials and components for next-generation fuel cells and reversible fuel cells

Technology Acceleration

(includes systems development and integration as well as safety, codes, standards, and workforce development)

- Grid-integrated systems, including renewables, nuclear and H_2/natural gas blending, demonstrating H2@Scale
- Heavy-duty transportation and new market demonstrations (e.g., steel, cement, data centers)
- RD&D and tools to facilitate the development and harmonization of codes & standards
- Training and workforce development

Important priorities within these research areas include:

- Identifying hydrogen applications and system configurations that can provide more affordable and more reliable clean energy
- Identifying the technical criteria required to enable commercialization
- Bridging the gaps between component-level RD&D and industry's role in commercialization, by integrating technologies into functional systems, reducing costs, and overcoming other barriers to deployment.

HFTO continues to identify and pursue new applications as the technologies evolve and new opportunities emerge; however, based on current technology status and market opportunities, the three top-priority application categories include:

- Integrated energy systems (including grid-integration, hybrid energy systems, and power generation)
- Heavy-duty transportation
- Chemical and industrial applications

The HFTO two-pronged approach in these focus areas includes both early-stage research to enable longer-term transformational technologies, as well as RD&D partnerships with the private sector, states and other entities to accelerate the transition of research advances into the market in the near term. Through such collaborations, HFTO aims to achieve life-cycle cost parity of hydrogen and fuel cell technologies with incumbent and emerging systems through activities in systems integration, verification, and validation, as well as manufacturing and supply chain improvements. Demonstrations conducted during verification and validation activities provide valuable data that feeds back to the Program's other RD&D efforts. Those data is also used in assessments of various market scenarios to provide essential information regarding market-readiness to manufacturers, investors, and potential end-users.

Questions related to HFTO Strategy and Multiyear Plan:

8) **Based on the strategy and multiyear plan focus areas above, what areas should be emphasized?**

9) **Are there any additional areas that should be included or areas that should be de-emphasized or excluded?**

10) **Please provide any comments that may be valuable as DOE further refines its strategies and multiyear plans.**

Priority Application Focus Areas

In addition to requests for information strategy and plans highlighted above, HFTO seeks input on the techno-economic status, challenges, and opportunities in these specific priority application areas:

Integrated energy systems:

1. Large-scale systems for grid energy storage to validate renewable hydrogen-based grid management systems, including electrolyzer and hydrogen storage systems
2. Hybrid nuclear hydrogen production system demonstrating low and high temperature electrolyzers
3. Hydrogen combustion turbines operating under wide variety of hydrogen/natural gas blend concentrations
4. Resilient prime and backup distributed power generation systems (e.g., data centers) and other critical infrastructure, including large scale performance validation in real world operations
5. Other examples of integrated energy systems that should be de-risked or that need early-stage research to accelerate private sector engagement, particularly those that could be demonstrated at national labs. Capabilities and facilities that may be needed to de-risk such technologies

Heavy-duty transportation applications:

1. Class 8 long-haul vehicles and refueling stations
2. Hydrogen fuel and on-board power systems for maritime vessels, marine refueling facilities, and essential portside infrastructure
3. Locomotive power systems and hydrogen fuel storage for freight and passenger trains and refueling facilities
4. Small aircraft and drone power systems and on-board fuel storage for aviation
5. Mining and construction equipment
6. Other heavy or medium duty applications that would benefit from hydrogen and fuel cell technologies

Industrial and chemical applications:

1. Systems for production, storage, and use of renewable hydrogen, for emerging applications including iron reduction for commercially competitive steelmaking
2. Other specific applications including ammonia, synfuels, cement, refining, or other applications
3. Systems, configurations and business cases that utilize the oxygen from electrolyzers in addition to the hydrogen

Questions related to Priority Application Focus Areas:

11) **Based on the details in the above key areas, what topics should be emphasized and why?** Please provide any comments that may be valuable as DOE develops potential plans such as FOAs and lab work in the above areas.

12) **Are there any additional areas that should be included or areas that should be excluded or de-emphasized?**

13) **Are there specific ideas that may stimulate the market/the hydrogen and fuel cell industry that would be appropriate for potential economic recovery/stimulus packages?** If so, please provide details.

Funding Mechanisms and Opportunities

In addition to FOAs (such as the recent H2@Scale FOAs), HFTO issues national laboratory calls for proposals to leverage unique, core capabilities offered by the DOE national lab complex, aligned with Office mission. These laboratory calls typically focus on consortia models where national labs can partner with industry and universities to avoid duplication and provide capabilities and expertise that can be used by all partners to accelerate progress. In addition, HFTO uses calls for the private sector to partner with national labs through calls for Cooperative Research and Development Agreements (CRADAs). The CRADAs are typically for later stage RD&D where private sector engagement and cost share is more appropriate than early-stage research.

General Consortia Model Frameworks

HFTO's consortium models comprise funding to DOE national laboratories that are coupled with FOA activities for a steady influx of innovative ideas by universities and industry partners through competitively selected projects. The specific research-area-focused consortia bring together a number of national laboratories with demonstrated leadership in the topic area, creating a high-functioning team to advance both fundamental understanding and applied research, leading to improved designs and better performing hydrogen and fuel cell technologies. HFTO funds the consortia using annual appropriations as well as the competitively selected FOA projects (FOA projects would be fully funded, based on available appropriations) to cover RD&D objectives.

Continuing HFTO Consortia

The current HFTO Lab Call includes topics to continue operations of the HydroGEN Consortium[5] on advanced water splitting materials and the ElectroCat Consortium[6] on materials discovery of platinum group metal-free catalysts. In the new phases of these consortia, they are being refocused at a reduced funding level with emphasis on the most promising materials for the long term that are higher risk but with potentially high pay off.

New HFTO Consortia

The current HFTO Lab Call also includes topics establishing two new research consortia that will have a near term (five year) focus:

[5] https://www.h2awsm.org/
[6] https://www.electrocat.org/

1) Heavy Duty Consortium for Fuel Cell RD&D: Million Mile Fuel Cell Truck Consortium: M_2FCT

The M_2FCT is a large-scale, comprehensive effort to enable widespread commercialization of fuel cells for heavy duty applications. M_2FCT will involve national laboratories, industry, and academia through a cohesive HFTO strategy of FOAs & Lab Calls. Based on industry input, HFTO has set 2030 system targets at 68% efficiency, 25,000 hour durability (1 million miles for long-haul trucks), and \$80/kW_{net} system cost at 100,000 units/year.[7] The HFTO Lab Call will focus on concrete targets for 2025 that will enable progress towards the 2030 targets.

Building off of the success of HFTO's Fuel Cell Performance and Durability (FC-PAD) Consortium that was launched in FY16, HFTO seeks to leverage existing and developing RD&D fuel cell capabilities at national laboratories by creating the M_2FCT, funded at up to \$50 million over the next 5 years, dedicated to significantly improving efficiency and durability while reducing cost. The M_2FCT will be a new, multi-institution, cross-disciplinary fuel cell RD&D consortium that will be focused on achieving an aggressive target for fuel cell membrane electrode assemblies (MEAs) that combines efficiency, durability, and cost in a single metric.

M_2FCT 2025 Target
Achieve 2.5 kW/g_{PGM} power (1.07 A/cm^2 current density) at 0.7 V after 25,000 hour-equivalent accelerated durability test.[8]

- ***Efficiency****:* the target addresses high-power operating conditions where the most fuel is consumed for Class 8 long haul trucks and is a likely operating point for other heavy duty applications
- ***Durability***: targeted performance must be achieved after 25,000 hour-equivalent accelerated stress testing.
- ***Cost:*** increased performance enables system cost reduction across all components at a specified platinum group metal (PGM) loading.

This target was developed based on stakeholder input and assumptions relevant to heavy duty truck operating conditions (e.g., voltage, current density, drive cycle, loads, etc.). One of the first tasks of the new consortium will be vetting of this preliminary target and coordinating with HFTO on any potential updates. It is expected that this metric will be widely disseminated once finalized to help focus the entire community on a specific, concrete target to achieve within five years that can make significant impact in enabling commercially viable systems.

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[7] U.S. Department of Energy. "Hydrogen Class 8 Long Haul Truck Targets". DOE Hydrogen and Fuel Cell Technologies Program Record. December 12, 2019: https://www.hydrogen.energy.gov/pdfs/19006_hydrogen_class8_long_haul_truck_targets.pdf

[8] Target is for MEA-level performance with total PGM loading constrained to 0.3 mg/cm^2. Performance is measured after a heavy duty accelerated stress test equivalent to 25,000 hours. MEA test conditions: 88°C, 2.5 atm, SR: 1.5 cathode/2 anode, 40% relative humidity, integral cell conditions.

M2FCT will be advised by an external advisory board (EAB), chosen by the Consortium Director with input from the Deputy Directors. The EAB will provide feedback directly to the consortium. The EAB should consist of at least five members, primarily from organizations such as USCAR and the 21st Century Truck Partnership, as well as distinguished emeritus or retired experts in the field. The EAB will provide feedback directly to the consortium.

2) Electrolyzer RD&D Consortium (H2NEW)- includes component RD&D, materials integration RD&D and development of accelerated stress testing (AST) protocols

The large-scale production of hydrogen by splitting water into hydrogen and oxygen via electrolysis is seen as a key enabler of the H2@Scale vision. Commercial low-temperature polymer electrolyte membrane (PEM) electrolyzer systems are available today but they are fabricated at low manufacturing volumes (~10 MW/yr) and are still not sufficiently affordable, durable or efficient. High-temperature electrolyzers (HTE) are still under development and far less mature than low-temperature electrolyzers (LTE) but offer significant benefits such as low electricity requirements and opportunity to couple with heat from nuclear, solar and other sources. Both LTE and HTE will have roles in enabling the efficient and affordable production of hydrogen in a future clean energy economy and both require more RD&D.

The current HFTO Lab Call marks the official launch of the 'H2NEW' Consortium, a comprehensive, concerted effort focused on overcoming technical barriers to enable affordable, reliable and efficient electrolyzers. H2NEW will involve multiple national laboratories, industry, and academia through a cohesive HFTO strategy of FOAs and Lab Calls over a five year period, subject to appropriations. At $50 million over 5 years, the focus is not on new materials development but on addressing components, materials integration and manufacturing RD&D to enable manufacturable electrolyzers that meet required cost, durability, and performance targets, simultaneously, to enable $2/kg hydrogen**.**

To complement HFTO's materials-focused consortia that emphasize accelerated materials discovery and innovation across multiple pathways, H2NEW is meant to be highly metrics focused, with a concrete deliverable in five years that can truly 'move the needle' for the global electrolyzer industry. Based on stakeholder input and independent analyses, HFTO has set specific metrics that must be met by the consortium in five years:

LTE PEM Electrolyzer Stack Goals by 2025[9]	
Capital Cost	$100/kW
Electrical Efficiency (LHV)	70% at 3 A/cm^2
Lifetime	80,000 hr

[9] The first task of the H2NEW Consortium, within the first month, will be to conduct rigorous benchmarking and peer review to either confirm the above metrics or provide justification to HFTO for a change in metrics.

The H2NEW Consortium will be tasked with defining suitable component-level metrics and deliverables that would result in a stack that meets the above targets.[10]

Although the focus of H2NEW is on LTE, synergies that enable progress in HTE will also be included. For completeness, the HTE metrics are shown below:

HTE Electrolyzer Stack Goals by 2025[11]	
Capital Cost	$100/kW
Electrical Efficiency (LHV)	98% at 1.5 A/cm^2
Lifetime	60,000 hr

The consortium will also include the development and validation of ASTs for both LTE and HTE, and will involve national lab, industry and university partners

FY2020 CRADA Call

To complement the FOAs and Lab Calls, HFTO's FY2020 CRADA Call incudes two topics to provide national lab capabilities and expertise to private sector partners to move the needle in the following areas:

1) *Fueling Components for Heavy-Duty Vehicles*
   The deployment of MD/HD fuel cell electric vehicles will require development of technologies and methods capable of up to 5x faster hydrogen fueling rates compared to light duty vehicles. Development of such high-throughput technologies requires innovation to ensure that they are durable, safe and cost-competitive at scale. In this topic, RD&D proposals are sought to advance high-throughput hydrogen fueling technologies to enable their use in MD/HD applications.

2) *HyBlend*
   This topic is seeking RD&D to accelerate the potential for hydrogen blending into natural gas pipelines. RD&D priorities include materials compatibility, pipeline compressors, compatibility of natural gas reservoirs with blends, performance of building appliances in blend service, and associated techno-economic and life cycle analysis. Materials compatibility refers to the impact that hydrogen has on the strength and life of materials (e.g., metals, polymers). Applicants proposing research on materials compatibility in this area are strongly encouraged to leverage DOE's H-Mat Consortium of national laboratories.

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[10] Labs would work with companies already manufacturing electrolyzers to determine what these metrics should be and what can 'move the needle' compared to what industry is already pursuing.
[11] For the HTE metrics, the lab partners with expertise in HTE will conduct rigorous benchmarking and peer review to either confirm the above metrics or provide justification to HFTO for a change in metrics within the first 6 months of the consortium.

Questions related to Funding Mechanisms and Opportunities:

14) **Please provide any input on the continuing consortia *(HydroGEN at https://www.h2awsm.org/ and ElectroCat at https://www.electrocat.org)*.** What should be the focus in the next three years? What more should be included or excluded and how best to transition materials discovery to the next step? How can the lab consortia framework and/or organizational structure be improved?

15) **Please provide any input on how best to organize the two new consortia (*M_2FCT and H2NEW)*.** What organizational and funding framework is best used for national labs, industry, universities and any other entities to work most effectively and cohesively to deliver the desired outcome in 5 years? How should intellectual property, data sharing and other issues be handled? What are the best processes and mechanisms to include relevant resources without duplication (e.g., manufacturing methods, etc. and not only traditional lab research capabilities)? Are there streamlined approaches that may be implemented (such as HFTO's previous standard CRADA agreements)? How best to include supply chain organizations as well as potential competitors? How can appropriate industry members best provide feedback to guide work and avoid conflicts of interest?

16) **Please provide any examples of consortia or other organizational frameworks that may be of value as HFTO continues to refine its consortia models.** For example, using national lab unique core capabilities and bringing in universities, industry, and other national labs through FOA projects on an annual/biannual basis (e.g., see the DOE Energy Materials Network consortia framework at: https://www.energy.gov/eere/energy-materials-network/energy-materials-network)

17) **Please provide input on the current CRADA Call topics as well as mechanisms to encourage collaboration and coordination.** Are there other topics that should be included? Please provide any details.

18) **In addition, HFTO requests that stakeholders suggest potential topics for future FOAs, Lab Calls and CRADA Calls.** Please provide details and justification (e.g., market/technology impact and appropriateness of role for federal government funding).

19) **For all HFTO activities, safety is considered a high priority.** Please also provide input on how stakeholders and HFTO can continue to work together to ensure the safety of hydrogen RD&D activities, such as use of the Hydrogen Safety Panel and dissemination of resources including the Center for Hydrogen Safety.[12]

20) **What topics in the area of Safety, Codes & Standards, including harmonization to enable a competitive, global supply chain, should HFTO consider?** Please be as specific as possible.

[12] www.aiche.org/chs

SUPPORTING DOCUMENTS:

Supporting documents for this RFI can be found on EERE Exchange at https://eere-Exchange.energy.gov/. Input is greatly desired from stakeholders across the hydrogen and fuel cell community and other relevant sectors. We anticipate that future RFIs will focus on more detailed research roadmaps for the HFTO.

DISCLAIMER AND IMPORTANT NOTES:

This RFI is not a FOA; therefore, EERE is not accepting applications at this time. EERE may issue a FOA in the future based on or related to the content and responses to this RFI; however, EERE may also elect not to issue a FOA. There is no guarantee that a FOA will be issued as a result of this RFI. Responding to this RFI does not provide any advantage or disadvantage to potential applicants if EERE chooses to issue a FOA regarding the subject matter. Final details, including the anticipated award size, quantity, and timing of EERE funded awards, will be subject to Congressional appropriations and direction.

Any information obtained as a result of this RFI is intended to be used by the Government on a non-attribution basis for planning and strategy development; this RFI does not constitute a formal solicitation for proposals or abstracts. Your response to this notice will be treated as information only. EERE will review and consider all responses in its formulation of program strategies for the identified materials of interest that are the subject of this request. EERE will not provide reimbursement for costs incurred in responding to this RFI. Respondents are advised that EERE is under no obligation to acknowledge receipt of the information received or provide feedback to respondents with respect to any information submitted under this RFI. Responses to this RFI do not bind EERE to any further actions related to this topic.

PROPRIETARY INFORMATION:

Because information received in response to this RFI may be used to structure future programs and FOAs and/or otherwise be made available to the public, **respondents are strongly advised NOT to include any information in their responses that might be considered business sensitive, proprietary, or otherwise confidential.** If, however, a respondent chooses to submit business sensitive, proprietary, or otherwise confidential information, it must be clearly and conspicuously marked as such in the response.

Responses containing confidential, proprietary, or privileged information must be conspicuously marked as described below. Failure to comply with these marking requirements may result in the disclosure of the unmarked information under the Freedom of Information Act or otherwise. The U.S. Federal Government is not liable for the disclosure or use of unmarked information, and may use or disclose such information for any purpose.

If your response contains confidential, proprietary, or privileged information, you must include a cover sheet marked as follows identifying the specific pages containing confidential, proprietary, or privileged information:

Notice of Restriction on Disclosure and Use of Data:
Pages [*list applicable pages*] of this response may contain confidential, proprietary, or privileged information that is exempt from public disclosure. Such information shall be used or disclosed only for the purposes described in this RFI #DE-FOA-0002379. The Government may use or disclose any information that is not appropriately marked or otherwise restricted, regardless of source.

In addition, (1) the header and footer of every page that contains confidential, proprietary, or privileged information must be marked as follows: "Contains Confidential, Proprietary, or Privileged Information Exempt from Public Disclosure" and (2) every line and paragraph containing proprietary, privileged, or trade secret information must be clearly marked with [[double brackets]] or highlighting.

EVALUATION AND ADMINISTRATION BY FEDERAL AND NON-FEDERAL PERSONNEL:

Federal employees are subject to the non-disclosure requirements of a criminal statute, the Trade Secrets Act, 18 USC 1905. The Government may seek the advice of qualified non-Federal personnel. The Government may also use non-Federal personnel to conduct routine, nondiscretionary administrative activities. The respondents, by submitting their response, consent to the Office providing their response to non-Federal parties. Non-Federal parties given access to responses must be subject to an appropriate obligation of confidentiality prior to being given the access. Submissions may be reviewed by support contractors and private consultants.

REQUEST FOR INFORMATION:

Please respond with strategic and technical feedback to the new topics mentioned above in whichever format you find most appropriate.

REQUEST FOR INFORMATION RESPONSE GUIDELINES:

Responses to this RFI must be submitted electronically to HFTORFI@ee.doe.gov no later than **5:00 p.m. (ET) on September 15, 2020**. Responses must be provided as attachments to an email. It is recommended that attachments with file sizes exceeding 25 MB be compressed (i.e., zipped) to ensure message delivery. Responses must be provided as a Microsoft Word (*.docx) or Adobe Acrobat (*.pdf) attachment to the email, 12 point font, 1 inch margins. Only electronic responses will be accepted.

EERE will not respond to individual submissions or publicly publish a compendium of responses. A response to this RFI will not be viewed as a binding commitment to develop or pursue the project or ideas discussed.

Respondents are requested to provide the following information at the start of their response to this RFI:

- Company/institution name
- Company/institution contact
- Contact's address, phone number, and e-mail address.