



U.S. DEPARTMENT OF ENERGY

Notice of Intent No.: DE-FOA-0002768

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This is a Notice of Intent to issue:

Funding Opportunity Announcement No.: DE-FOA-0002779

Bipartisan Infrastructure Law: Additional Clean Hydrogen Programs (Section 40314): Regional Clean Hydrogen Hubs

The Department of Energy (DOE) Office of Clean Energy Demonstrations (OCED) intends to issue a Funding Opportunity Announcement (FOA) entitled “Regional Clean Hydrogen Hubs” (H2Hubs) in collaboration with the Energy Efficiency and Renewable Energy’s (EERE) Hydrogen and Fuel Cell Technologies Office (HFTO) and the DOE Hydrogen Program, which includes multiple offices engaged in hydrogen related technologies across DOE.¹ OCED anticipates issuing the FOA in the September/October 2022 timeframe, and the FOA will be funded by the Infrastructure Investment and Jobs Act (IIJA), also known as the Bipartisan Infrastructure Law (BIL).

The mission of the OCED is to deliver clean energy and industrial decarbonization demonstration projects at scale in partnership with the private sector, labor unions, and other stakeholders and communities, to launch or accelerate market adoption and deployment of technologies, as part of an equitable transition to a decarbonized energy system and economy. OCED was established in December 2021 and first authorized and funded through the BIL. The founding of OCED builds on the DOE’s expertise in clean energy research and development and expands DOE’s scope to fill a critical gap on the path to net-zero emissions by 2050.

BACKGROUND

On November 15, 2021, President Joseph R. Biden, Jr. signed the Infrastructure Investment and Jobs Act (Public Law 117-58), also known as the Bipartisan Infrastructure Law (BIL).² The BIL is a once-in-a-generation investment in infrastructure, which provides the backbone for a more sustainable, resilient, and equitable economy through enhancing U.S. competitiveness, diversifying regional economies to include supply chain and manufacturing industries, creating good union jobs, and ensuring stronger access to economic and other benefits for underserved communities. The BIL appropriates more than \$62 billion to DOE to ensure the clean energy future delivers true economic prosperity to the American people by:

¹ <https://www.hydrogen.energy.gov/pdfs/hydrogen-program-plan-2020.pdf> ² <https://www.congress.gov/117/plaws/publ58/PLAW-117publ58.pdf>

This is a Notice of Intent (NOI) only. DOE may issue a FOA as described herein, may issue a FOA that is significantly different than FOA described herein, or DOE may not issue a FOA at all.

- Investing in American manufacturing and workers, including supporting high-paying jobs with the free and fair choice to join a union, and effective workforce development to upskill incumbent, underrepresented, and dislocated workers.
- Expanding access to energy efficiency and clean energy for families, communities, and businesses.
- Delivering reliable, clean, and affordable power to more Americans.
- Building the technologies of tomorrow through clean energy demonstrations.

Investment in building out the hydrogen (H₂) economy is a significant portion of the BIL funding at DOE. The BIL authorizes and appropriates \$8.0 billion over the five-year period encompassing fiscal years 2022 through 2026 to support the development of at least four H₂Hubs that:

- Demonstrably aid achievement of the clean hydrogen production standard³ developed under section 822(a) of Energy Policy Act of 2005 (EPAc 2005);
- Demonstrate the production, processing, delivery, storage, and end use of clean hydrogen; and
- Can be developed into a national clean hydrogen network to facilitate a clean hydrogen economy.

The specific provisions for regional clean hydrogen hubs are set forth in Section 40314 of the BIL, which amends Title VIII EPAc 2005 by adding a new “Section 813 – Regional Clean Hydrogen Hubs.” Section 813(a) defines the term “regional clean hydrogen hub” as “a network of clean hydrogen producers, potential clean hydrogen consumers, and connective infrastructure located in close proximity.”² The FOA will also incorporate a range of equity considerations including energy and environmental justice, labor and community engagement, consent-based siting, quality jobs, and inclusive workforce development to support the Biden Administration’s decarbonization goals of a 50-52% reduction in greenhouse gas (GHG) emissions from 2005 levels by 2030, a carbon-pollution-free power sector by 2035, and a net-zero GHG emissions economy by 2050.³ The H₂Hubs will be a key part of the National Clean Hydrogen Strategy and Roadmap, also required in the BIL,⁷ and will be instrumental in meeting national decarbonization goals, including the development and deployment of clean hydrogen technologies.

The H₂Hubs will form the foundation of a national clean hydrogen network that will contribute substantially to decarbonizing multiple sectors of the economy while also enabling regional and community benefits. Hydrogen can serve as a key enabler due to its versatility and potential to complement other clean technologies in multiple energy and emissions intensive sectors, such as industry, transportation, and electricity generation, as well as providing energy storage for a clean grid. Consistent with domestic and global analyses, DOE recognizes that a robust clean hydrogen network will complement other decarbonization solutions such as electrification. Matching the scale-up of clean hydrogen production to a growing regional demand will be key to achieving large-scale, commercially viable hydrogen ecosystems and avoiding stranded assets and surrounding stranded communities. H₂Hubs can enable this pathway by

¹ 42 U.S.C. § 16161a

² 42 U.S.C. § 16161a(a)

³ FACT SHEET: President Biden sets 2030 Greenhouse Gas Pollution Reduction Target Aimed at Creating Good-paying Union Jobs and Securing U.S. Leadership on Clean Energy Technologies, <https://www.whitehouse.gov/briefingroom/statements-releases/2021/04/22/fact-sheet-president-biden-sets-2030-greenhouse-gas-pollution-reduction-targetaimed-at-creating-good-paying-union-jobs-and-securing-u-s-leadership-on-clean-energy-technologies/> ⁷ 42 U.S.C § 16161b

74 locating supply and demand in close proximity. At the same time, the H2Hubs will provide specific
75 examples of low-GHG intensity, economically viable, and community-supported hydrogen-based energy
76 solutions that can replace existing carbon-intensive processes. The H2Hubs are intended to accelerate the
77 deployment of these technologies, attract greater investments from the private sector, and promote
78 substantial U.S. manufacturing of hydrogen related technologies.

79 DOE anticipates providing awards to H2Hub teams that are **led by a single entity** and may include numerous
80 key partners or sub-recipients that will bring together diverse technologies with the ability to produce and
81 utilize large amounts of hydrogen. Interested parties are encouraged to visit H2 Matchmaker,⁴ a voluntary
82 online tool created to foster partnerships among key stakeholders by allowing potential partners to
83 self-identify. The H2 Matchmaker tool is intended to help foster partnerships and increase the long-term
84 sustainability of the H2Hubs by aligning potential assets, stakeholders, and needs in specific regions of the
85 United States.

86 Each H2Hub will demonstrate balanced hydrogen supply and demand, connective infrastructure, and a plan
87 to be financially viable after the DOE funding has ended. H2Hubs will also include substantial engagement
88 with key local and regional stakeholders to ensure these projects generate local, regional, and national
89 benefits while mitigating significant environmental or community impacts. Labor and community
90 engagement will be a central component to successful implementation across the entire H2Hub project
91 duration. For example, the impacts of proposed H2Hubs should be evaluated early in the planning process
92 and information about the effects, costs and benefits should be provided to stakeholders in advance of
93 community engagement. Teams are encouraged to maximize meaningful, early engagement with
94 stakeholders, including disadvantaged communities, Tribal communities, and labor unions to address
95 environmental justice and workforce or other economic concerns and opportunities, including through the
96 use of Community Benefits Agreements⁵ or similar structured partnerships.

97 Principles of equity and justice will guide BIL implementation, consistent with the Biden Administration's
98 commitments to ensure that overburdened, underserved, and underrepresented individuals and communities
99 have access to federal resources.⁶ **Under the Justice40 Initiative implementation efforts will support**
100 **40% of the overall benefits flowing to disadvantaged communities** and not exacerbate existing inequities,
101 including disproportionate exposure to environmental hazards and harms.¹¹ Moreover, the BIL
102 implementation process should advance equity for all, including people of color and others who have been
103 historically underserved, marginalized, and adversely affected by persistent poverty and inequality.

104 Strengthening economic prosperity by expanding high-paying, secure and safe **union jobs** that are accessible
105 to all workers and supporting job growth through investments in supply chains and domestic manufacturing
106 is a key goal set by President Biden.⁷ BIL implementation requires a stable, skilled, and trained workforce in

⁴ <https://www.energy.gov/eere/fuelcells/h2-matchmaker>; Note: DOE will not give preference of any kind to entities for use of the tool as it is completely voluntary.

⁵ <https://www.energy.gov/diversity/community-benefit-agreement-cba-toolkit>

⁶ EO 13985, Advancing Racial Equity and Support for Underserved Communities; EO 14020, Establishment of the White House Gender Policy Council; and EO 14008, Tackling the Climate Crisis at Home and Abroad ¹¹ The Justice40 initiative, established by E.O. 14008, states that 40% of the overall benefits of certain federal investments should flow to disadvantaged communities (DACs). The J40 Interim Guidance defines benefits as direct and indirect investments (program outcomes) that positively impact DACs and provides examples starting on page 4: <https://www.whitehouse.gov/wp-content/uploads/2021/07/M-21-28.pdf> ; DOE's definition of DACs, which should be used to determine benefits calculations, is available at: <https://www.energy.gov/diversity/office-economic-impact-and-diversity>.

⁷ EO 14005, *Ensuring the Future Is Made in All of America by All of America's Workers*; EO 14008, *Tackling the Climate Crisis at Home and Abroad* (EO 14008); EO 14017 *America's Supply Chains*, EO 14025, *Worker Organizing and*

both the construction and operations phases. High-quality jobs, healthy and safe workplaces, workforce education and training, and honoring workers' free and fair choice to join a union are necessary for efficient and effective BIL implementation.

DOE will require projects funded under the FOA to track and report on several outcomes and outputs, including those related to energy and environmental justice; consent-based siting; labor and community engagement; diversity, equity, inclusion and access; job quality, labor standards, workforce development; emissions intensity, including non-GHG air quality data; as well as magnitude of hydrogen production, transportation, and use. Guidance on specific application and reporting requirements will be included in the FOA.

TECHNICAL OBJECTIVES

The anticipated FOA is expected to result in the selection of at least four clean H2Hubs in different regions of the U.S. The BIL H2Hub statutory provisions⁸ require that to the maximum extent practicable DOE select proposals that cover the following characteristics:

- Feedstock Diversity: at least one H2Hub shall demonstrate the production of clean hydrogen from fossil fuels, one H2Hub from renewable energy, and one H2Hub from nuclear energy.¹⁴
- End-Use Diversity: at least one H2Hub shall demonstrate the end-use of clean hydrogen in the electric power generation sector, one in the industrial sector, one in the residential and commercial heating sector, and one in the transportation sector.⁹
- Geographic Diversity: each H2Hub will be located in a different region of the United States and leverage energy resources abundant to that region, including at least two H2Hubs in regions with abundant natural gas resources.¹⁰¹¹
- Employment: DOE shall give priority to regional clean hydrogen hubs that are likely to create opportunities for skilled training and long-term employment to the greatest number of residents in the region.¹⁷

As discussed above, the recipients of funding under this prospective FOA will need to demonstrably aid achievement of the clean hydrogen production standard developed under section 822(a) of EPAct 2005. The BIL amended EPAct 2005 to add Section 822 – Clean Hydrogen Production Qualifications, requiring the Secretary of Energy, in consultation with the Administrator of the Environmental Protection Agency, to develop an initial standard for the carbon intensity of clean hydrogen production. Section 822 defines “clean hydrogen” to mean “hydrogen produced with a carbon intensity equal to or less than 2 kilograms of carbon dioxide-equivalent produced at the site of production per kilogram of hydrogen produced” (2 kg CO₂e/kg H₂).¹² While all projects will be required to meet the minimum clean hydrogen production standard, DOE intends to also evaluate full lifecycle emissions for each application and will give preference to applications that reduce GHG emissions across the full project lifecycle, inclusive of hydrogen production, compared to current industry standards.

Empowerment; EO 14036 Promoting Competition in the American Economy, and EO 14052 Implementing the Infrastructure Investment and Jobs Act

⁸ Infrastructure Investment and Jobs Act, Public Law 117-58 (November 15, 2021), Subtitle B – Hydrogen Research and Development, Section 40314 – Additional clean hydrogen programs.

<https://www.congress.gov/bill/117thcongress/house-bill/3684> ¹⁴ 42 U.S.C. § 16161a(c)(3)(A)

⁹ 42 U.S.C. § 16161a(c)(3)(B)

¹⁰ 42 U.S.C. § 16161a(c)(3)(C)-(D)

¹¹ U.S.C. § 16161a(c)(3)(E)

¹² Section 40315 of the IJJA 42 U.S.C. § 16166(b)(1)(B)

Clean hydrogen and related technologies, such as electrolyzers, fuel cells, and low NOx turbines, can play a key role in decarbonizing many sectors, including medium- and heavy-duty transportation, industries such as ammonia and steel, heating applications, and power generation, including enabling long duration energy storage. Locating large-scale clean hydrogen production in close proximity with multiple end-uses can foster the development of low-cost hydrogen and the necessary supporting infrastructure to jumpstart the hydrogen economy in various market segments, create both near-term and long-term jobs, generate sustainable tax revenues for regional economies, and realize emissions reduction benefits. Hydrogen and fuel cells can also offer reduction in criteria pollutants¹³ and can offer resiliency through reliable power, particularly in remote or rural communities. It is envisioned that each H2Hub will quantitatively estimate and measure lifecycle social and environmental impacts of the H2Hub on the region.

The H2Hubs will contribute to achieving DOE's goals for the H2@Scale[®] initiative,¹⁴ which provides an overarching vision for how clean hydrogen can enable energy pathways across applications and sectors in an increasingly interconnected energy system, as shown in Figure 1. In addition to meeting or exceeding the clean hydrogen production standard, H2Hubs will also contribute to achieving or exceeding the clean hydrogen production cost targets for electrolyzers called for in the BIL (less than \$2 per kilogram of hydrogen by 2026)¹⁵, and support achieving DOE's Hydrogen Shot[™]¹⁶ goal of \$1 per 1 kilogram of clean hydrogen in 1 decade ("1 1 1").

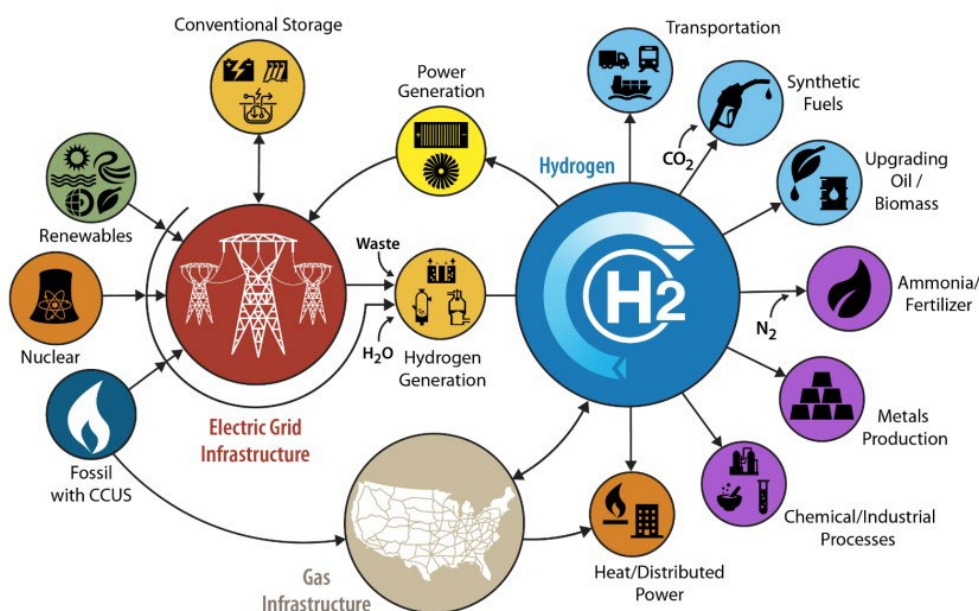


Figure 1. The H2@Scale[®] initiative is based on hydrogen's potential to meet existing and emerging market demands across multiple sectors. It envisions how innovations to produce, store, transport, and utilize hydrogen can help realize that potential and achieve scale.

¹³ "Criteria air pollutants" refer to six common air pollutants for which the Clean Air Act requires EPA regulation: <https://www.epa.gov/criteria-air-pollutants>

¹⁴ U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Hydrogen and Fuel Cell Technologies Office H2@Scale Initiative: <https://www.energy.gov/eere/fuelcells/h2scale>

¹⁵ 42 U.S.C. § 16161d(c)(1)

¹⁶ <https://www.energy.gov/eere/fuelcells/articles/hydrogen-shot-introduction>

REGIONAL CLEAN HYDROGEN HUBS IMPLEMENTATION APPROACH

This Notice of Intent (NOI) provides a high-level draft plan for DOE's current vision to meet the BIL requirements for the H2Hubs program. Please note this is a preliminary plan that will likely be refined and evolve during the FOA development process. A Regional Clean Hydrogen Hubs FOA will be issued to solicit applications that cover all four of the following phases:

- Phase 1 – Detailed Project Planning
- Phase 2 – Project Development, Permitting, and Financing
- Phase 3 – Installation, Integration, and Construction
- Phase 4 – Ramp-Up and Sustained Operations

An example of activities and deliverables likely expected to be completed in each phase is shown in Figure 2. The items listed under the "Application" phase are indicative of the type and scope of materials DOE expects to require applicants to submit for consideration of Phase 1 funding. Items listed under Phases 1, 2, 3, and 4 are examples of the type and scope of activities applicants should plan to execute in each phase if selected for that phase of funding. DOE will review and evaluate progress and deliverables in each phase which will inform Go/No-Go decisions that occur between or within Phases.

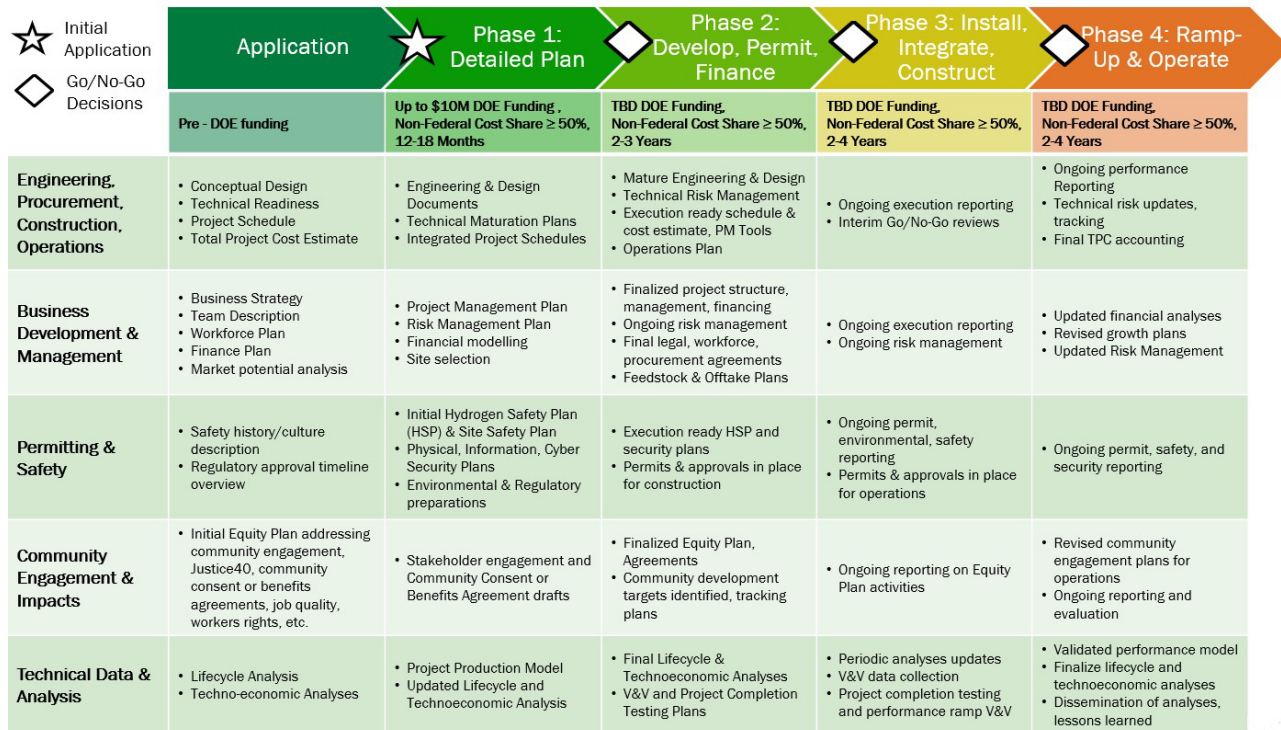


Figure 1. H2Hub project phases, including examples of likely activities and deliverables in each phase, subject to change prior to the FOA release.

Over the course of several years and across multiple potential launches,¹⁷ the FOA is expected to make available up to a total of approximately \$8 billion of Federal funds for cost-shared H2Hubs and related supportive activities. For this initial FOA launch, DOE envisions selecting between 6-10 H2Hubs at a total of \$6-7 billion, subject to the number, quality, and funding needs of applications received. The remaining \$1-2

¹⁷ DOE may issue a second launch of the FOA to solicit and select additional H2Hubs beyond those selected in the initial launch, as well as additional launches of the FOA to supplement the H2Hubs formed through the initial launch(es) with new technologies, capabilities, end-uses, or partners.

billion may be reserved for future H2Hub launches or other supporting activities. DOE is still evaluating the funding range, which will be finalized in the FOA. DOE anticipates a minimum range of \$400-\$500 million and a maximum range of \$1-1.25 billion DOE share for each H2Hub plus a minimum of 50% non-federal cost share (50% of the total project cost, including both DOE share and recipient cost share), which will be executed over approximately 8-12 years, depending on the size and complexity of the H2Hub. Cost share may be provided in the form of cash, cash equivalents, or in-kind contributions. Cost share must come from non-federal sources (unless otherwise allowed by law) such as project participants, state or local governments or other third-party financing. Federal financing, such as DOE Loan Guarantees, cannot be leveraged by applicants to provide the required H2Hub cost share or to otherwise cover the same scope that is proposed for a related H2Hub project.

To ensure regional impact and scale, DOE expects that hydrogen production technologies integrated into H2Hubs will be capable of producing impactful quantities of clean hydrogen at a minimum rate of at least 50 to 100 metric tons (MT) per day, and in-line with proposed project budget. H2Hubs that request higher funding levels are expected to include higher hydrogen production rates. While feedstock sources or hardware may affect the upper limit of how much hydrogen can realistically be produced as part of a H2Hub, DOE will give preference to H2Hubs that will produce larger quantities of clean hydrogen (exceeding this minimum requirement). In rare circumstances, DOE may consider smaller H2Hubs that may have geographic or other size limitations preventing them from reaching the minimum production rate, but significant justification must be provided. Each H2Hub should leverage regional resources as appropriate, including water, renewable energy, nuclear energy, and fossil fuels (particularly natural gas with carbon capture and storage). H2Hubs may feature hydrogen produced using one or more energy resources.

Specific project structure details for each awardee will be negotiated on a project-by-project basis to produce the best possible balance between project outcomes and DOE risk exposure. Examples of factors that may be considered as part of such negotiations include project and risk management processes and team capabilities, cost share amounts, financial contingencies, and engagement of independent monitors such as an Independent Engineer representing DOE interests. DOE expects to require access to project performance data necessary to track progress against a project baseline (or similar). As these projects are pre-commercial deployments, to the greatest extent possible, project progress and information will be shared with interested stakeholders.

If funded through all four phases, it is envisioned that the H2Hubs will reach technical and financial commercial viability under the FOA and will continue to operate beyond the financial assistance project period (well beyond DOE funding). Achieving OCED's and DOE's broad end goals may necessitate review and evaluation of proposed project characteristics that include cost, schedule, and scope; technology; business; market; financial; management; community support or other factors. The suggested phased approach described above and in Figure 2 is designed to guide projects through the project development process incrementally. Each subsequent phase will be structured to ensure that each H2Hub meets a standard level of maturity, employs a robust execution approach, and that technical and non-technical project risk is adequately and appropriately managed throughout DOE's engagement.

To facilitate long term project planning (such as securing potential strategic partners or commercial thirdparty financing), DOE currently envisions that the FOA will solicit applications that cover all four phases of the project. While only Phase 1 of selected applicants will be funded initially, additional funding for subsequent phases will be released based on successful completion of Go/No-Go decision criteria at the end of each phase, subject to the availability of funds. In such an approach, each project would be evaluated against expected project progress (Go/No-Go criteria) at the end of each phase to evaluate the readiness of the H2Hub to move to the next phase. Specific Go/No-Go criteria will be defined further in the FOA and will

be negotiated with each selected H2Hub project. H2Hub projects may be discontinued during or at the end of any phase if the Go/No-Go criteria, project, or program requirements are not met.

The FOA will likely request that concept papers¹⁸ be submitted 6-8 weeks after the FOA is released, followed by DOE notification encouraging or discouraging submittal of full applications approximately four weeks later. Comments may or may not be provided with this feedback. Full applications will likely be requested approximately four months following such notification. Due to the expected number and complexity of the applications as well as related BIL award requirements, DOE may require several months to review applications and select awardees. Applicants must submit a concept paper to be eligible to submit a full application.

DOE may issue a second launch of the FOA to solicit and select additional H2Hubs beyond those selected in the initial launch, as well as additional launches of the FOA to supplement the H2Hubs formed through the initial launch(es) with new technologies, capabilities, end-uses, or partners. DOE may also consider other funding mechanisms outside of the FOA to incentivize markets or fund cross-cutting activities.

DOE will not accept questions at this time regarding issuance of the potential FOA. Details on how to submit questions and comments will be provided in the FOA, when issued.

SUBMISSION AND REGISTRATION REQUIREMENTS FOR FULL APPLICATION

OCED envisions awarding multiple financial assistance awards in the form of cooperative agreements. The estimated period of performance for each Phase 1 award will be approximately 12-18 months, with a total period of performance of 8-12 years for all four phases.

This NOI is issued so that interested parties are aware of OCED's intention to issue the FOA in the near term. All of the information contained in this NOI is subject to change. Neither OCED nor HFTO will respond to questions concerning this NOI. Once the FOA has been released, OCED will provide an avenue for potential Applicants to submit questions.

OCED plans to issue the FOA in the September/October 2022 timeframe in collaboration with HFTO via the new OCED Exchange website (<https://oced-exchange.energy.gov>). When the FOA is released, applications will be accepted only through the OCED Exchange.

In anticipation of the FOA being released, Applicants are advised to complete the following steps, which are required for application submission:

- Register and create an account in OCED Exchange at <https://oced-exchange.energy.gov/>. This account will allow the user to register for any open OCED FOAs that are currently in OCED Exchange. It is recommended that each organization or business unit, whether acting as a team or a single entity, use only one account as the contact point for each submission.

Questions related to the registration process and use of the OCED Exchange website should be submitted to: OCED-ExchangeSupport@hq.doe.gov

- Register with the System for Award Management (SAM) at <https://www.sam.gov>. Designating an Electronic Business Point of Contact (EBiz POC) and obtaining a special password called an MPIN

¹⁸ Concept papers are project summaries submitted by applicants that describe the proposed project and are used to evaluate if an application would likely meet the objectives of the FOA.

are important steps in SAM registration. Please update your SAM registration annually. Upon registration, SAM will automatically assign a Unique Entity ID (UEI).

- Register in FedConnect at <https://www.fedconnect.net>. To create an organization account, your organization's SAM MPIN is required. For more information about the SAM MPIN or other registration requirements, review the FedConnect Ready, Set, Go! Guide at:

https://www.fedconnect.net/FedConnect/Marketing/Documents/FedConnect_Ready_Set_Go.pdf

- Register in Grants.gov to receive automatic updates when Amendments to a FOA are posted.

However, please note that applications will not be accepted through Grants.gov (<http://www.grants.gov/>).

All applications must be submitted through the OCED Exchange system.