**GFO-23-307**

**Large-Scale Centralized Hydrogen Production (H2CENTRAL)**

**Addendum 1**

**May 2024**

The purpose of this addendum is to notify potential applicants of substantive changes that have been made to GFO-23-307. The addendum includes the following revisions to the Solicitation Manual, Application Screening Form, Budget Forms, and Project Performance Metrics attachments. Added language appears in **bold underline**, and deleted language appears in ~~strikethrough~~ and within [square brackets].

**Attachment 00 - Solicitation Manual**

1. **Cover Page**

[~~March~~] **May 2024**

1. **Page 3, Section I.A.**

This solicitation will support large-scale ([~~AN~~] **an** annualized average of at least 5 metric tons per day), centralized hydrogen production by co-locating renewable energy production, clean hydrogen production, delivery networks, and storage facilities.

1. **Page 8, Section I.C.**

Projects must avoid any benefit to **oil refineries or** facilities associated with fossil fuels [~~such as oil refineries~~], **including but not limited to, selling end-use products to, or having projects located at, such facilities**. **Offtakers must not be oil refineries.**

1. **Page 10, Section I.C.**

Use **non-potable** water not otherwise intended for human consumption (e.g., project uses purified reclaimed, recycled, or repurposed wastewater for water consumption).

1. **Page 10, Section I.C.**

Help reduce sector-wide emissions (e.g., from a project’s designated hard-to-electrify end-use sector such as industrial facilities, heavy-duty transportation, or back-up electricity generation) and avoid any benefit to facilities associated with fossil fuels, such as oil refineries. **Hydrogen injected into natural gas pipelines must not be an end use.**

1. **Page 9, Section I.C.**

Additionally, offtakers must not be located on the same site as the production facility.12

12 For the purposes of this solicitation, a production facility may not be located on the same or [~~geographically]~~ contiguous **parcels, which may be divided by public or private right-of-way,** [~~property]~~ as the hydrogen offtaker. **Noncontiguous parcels owned by the same entity and connected by a right-of-way that entity controls are also considered on-site property.**

1. **Page 9, Section I.C.1.**

Emit less than 0.45 kilograms carbon dioxide equivalent (CO2e) per kilogram of hydrogen produced, using a well-to-gate boundary for the lifecycle emissions assessment.13

**13 Applicants can use Argonne National Laboratory’s 45V Greenhouse gases, Regulated Emissions, and Energy use in Technologies (45VH2-GREET) Model or another publicly available methodology to evaluate criteria air pollutants and greenhouse gases using a well-to-gate system boundary. For projects with predetermined transportation end uses, the U.S. EPA’s Moter Vehicle Emission Simulator (MOVES) modeling system may be used to estimate criteria air pollutants and greenhouse gases. For more information, please visit** [**https://www.energy.gov/eere/greet**](https://www.energy.gov/eere/greet) **and** [**https://www.epa.gov/moves**](https://www.epa.gov/moves)**.**

1. **Page 10, Section I.C.1**

g) Use 100 percent renewable energy resources onsite, a PPA with bundled RECs, grid power with bundled RECs, or a combination of these to source renewable energy in California.14

**14 Applicants can refer to the requirements and definitions for a Portfolio Content Category 1 REC found in the Public Utilities Code Section 299.16 and RPS Enforcement Regulations for Publicly Owned Utilities. For more information, please visit California Public Utilities Code Section 399.16 available at** [**https://california.public.law/codes/ca\_pub\_util\_code\_section\_399.16**](https://california.public.law/codes/ca_pub_util_code_section_399.16)**, and RPS Enforcement Regulations for Publicly Owned Utilities available on the CEC website at** [**https://www.energy.ca.gov/programs-and-topics/programs/renewables-portfolio-standard/rps-enforcement-regulations-publicly**](https://www.energy.ca.gov/programs-and-topics/programs/renewables-portfolio-standard/rps-enforcement-regulations-publicly)**.**

1. **Page 10, Section I.C.1.**

If renewable electricity is acquired through a PPA or the California electric grid, associated RECs must be purchased.

RECs must be retired in the Western Renewable Energy Generation Information System (WREGIS) for the production of hydrogen in the proposed system.15

**15 Further information about WREGIS can be found at:** [**www.wecc.biz/WREGIS.**](http://www.wecc.biz/WREGIS. )

1. **Page 10, Section I.C.1**

Demonstrate the system for a minimum of 10 cumulative months.16

**16 The system should include hydrogen production (annualized average of at least 5 metric tons per day), storage, and delivery.**

1. **Page 12, Section I.C.1.**

process design assumptions and cost analysis methodology17

**17 Applicants can use National Renewable Energy Laboratory’s Hydrogen Analysis (H2A) hydrogen production models or another publicly available methodology to report process design assumptions and cost analysis methodology. For more information, please visit** [**https://www.nrel.gov/hydrogen/h2a-production-models.html**](https://www.nrel.gov/hydrogen/h2a-production-models.html)**.**

1. **Page 12, Section I.C.1.**

Describe tangible benefits to local communities (i.e., workforce development, jobs created or retained, community investments, and local health impacts) in accordance with Community Engagement, Benefits, and Impacts Reference (Attachment 14). Applicants are also encouraged to consider and align with guidelines provided by ARCHES18 and DOE.19

**18 ARCHES Community Benefits Plan. Alliance for Renewable Clean Hydrogen Energy Systems (ARCHES).** [**https://archesh2.org/wp-content/uploads/2023/11/ARCHES\_CB\_PROPOSAL\_for-release.pdf**](https://archesh2.org/wp-content/uploads/2023/11/ARCHES_CB_PROPOSAL_for-release.pdf)**.**

**19 Community Benefits Plan. U.S. Department of Energy.** [**https://www.energy.gov/infrastructure/about-community-benefits-plans**](https://www.energy.gov/infrastructure/about-community-benefits-plans)**.**

1. **Page 13, Section I.C.1.**

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| --- | --- |
| **Metric** | **Target** |
| Water Consumption | 9 - 13.5 kilogram water per kilogram of hydrogen produced |
| Hydrogen Purity | >99.00% (for all projects)  >99.99% (fuel cell end use) |
| Carbon Intensity | 0 kilogram CO2e per kilogram H2 well-to-gate lifecycle emissions |
| Hydrogen Production Costs | <$2 per kilogram of hydrogen by 2029 at point of production |
| Hydrogen Leakage | Less than or equal to 0.03% loss during production, 1% loss during compression and gaseous delivery, 2% loss during liquification and liquid delivery, 0.7% loss during pipeline delivery, and 2% loss during subsequent storage20 |

**20 Arrigoni, Alessandro and Laura Bravo Diaz. 2022. Hydrogen emissions from a hydrogen economy and their potential global warming impact. EUR 31188 EN, Publications Office of the European Union.** [**https://publications.jrc.ec.europa.eu/repository/handle/JRC130362**](https://publications.jrc.ec.europa.eu/repository/handle/JRC130362)**.**

1. **Page 40, Section III.C.9.2**

ARCHES DOE Hub project partners must submit a support letter from ARCHES to reflect confirmation of DOE Hub status **and indicate Tier status (Tier I or Tier II)**.

**Attachment 01 - Application Screening Form**

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| --- |
| **ARCHES DOE Hub Project Partner** (Check one)  ***\*An ARCHES Support Letter should be included in the Commitment and Support Letters Form (Attachment 10) to reflect confirmation of ARCHES DOE Hub status.*** |
| ☐Yes  ☐ No  **If yes, indicate Tier I or Tier II designation as assigned by ARCHES:**  ☐ **Tier I**  ☐ **Tier II** |

**Attachment 07 – Budget Forms**

Please note: the budget form (Attachment 7) has been updated to reflect the ECAMS budget template. Notable changes include:

1. Workbook instructions,
2. “Subrecipients” language has replaced “subcontractors,” and
3. Directions for ECAMS support, if needed.

**Attachment 11 – Project Performance Metrics**

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| --- | --- | --- | --- | --- | --- | --- |
| *Ex. 3) Carbon intensity* | *0 kg of carbon dioxide-equivalent per kg of hydrogen produced* | *1 kg of carbon dioxide-equivalent per kg of hydrogen produced* | *0 kg of carbon dioxide-equivalent per kg of hydrogen produced* | *0.45 kg of carbon dioxide-equivalent per kg of hydrogen produced* | *[~~Internal tracking of completed and screened applications]~~*  *Argonne National Laboratory’s 45VH2 Greenhouse gases, Regulated Emissions, and Energy use in Technologies (45VH2-GREET) Model* | *Hydrogen produced with low carbon emissions can act as a replacement for fossil fuels.* |