**PROJECT TITLE**

Lead Organization (City, State), Principal Investigator Name,

Total Project Cost

Project Duration

**EXECUTIVE SUMMARY**

Summarize the objective(s) and technical approach of the proposed effort at a technical level appropriate for scientific and engineering peers**.**

**INSTRUCTIONS for Cover Page and Executive Summary Section:**

1. The Project Title should be brief and descriptive of the proposed technology.
2. Enter the estimated Total Project Cost in U.S. dollars and percentage cost share in parentheses.
3. Enter the Project Duration in months.
4. The Executive Summary shall not exceed 1 page in length.
5. The Executive Summary may contain graphics, figures, or tables as needed to summarize the technical concept.

NOTICE OF RESTRICTION ON DISCLOSURE AND USE OF DATA

*Pages [1 through\_\_] of this document may contain trade secrets or commercial or financial information that is privileged or confidential and exempt from public disclosure. Such information shall be used or disclosed only for evaluation purposes or in accordance with a financial assistance or loan agreement between the submitter and the Government. The Government may use or disclose any information that is not appropriately marked or otherwise restricted, regardless of source.*

**INSTRUCTIONS FOR SECTIONS 1-5:**

**The cumulative length of Sections 1-5 shall not exceed 25 pages.**

**1. TEAM CAPABILITIES**

Describe your team’s capabilities, experience, and assets (i.e., equipment and property) relevant to support design, construction and commissioning of a skid-mounted integrated ammonia synthesis unit with production capacity of 1 ton/day new test site and ability to secure and operate a field test site powered by renewable electricity.

**1.1 Team Capabilities and Experience**

* Describe the team members, their anticipated roles in the project, and their relevant experience, including in construction of skid-mounted chemical plants of relevant scale.
* Explain the objective(s) and performance characteristics of the proposed effort.

**1.2 Assets**

* Describe equipment and property that the team has access to – either through direct ownership, or potential partnerships and relationships.

**INSTRUCTIONS for the Team Capabilities Section:**

1. The Team Capabilities Section may include figures, tables, and graphics.
2. The suggested length of the Team Capabilities Section is 5 pages.

**2. TECHNICAL APPROACH**

Describe your overarching technical approach to integrate multiple technologies relevant to ammonia synthesis into a skid-mounted unit producing 1 ton ammonia per day via design, construction and commissioning the unit and support operation of a field test site (or sites) – including, if necessary, preparation and commissioning of a new test site, or alteration of an existing test site that can test REFUEL+IT-funded technologies under real-world conditions.

**2.1 Approach.**

* Describe the overall technical approach, and discuss key design criteria given the range of technologies in the REFUEL+IT portfolio—i.e. ammonia synthesis catalysts, ammonia separation methods, reactor operation algorithms, etc.
* Describe key aspects and any risks for constructing the integrated ammonia synthesis unit
* Describe your approach to site commissioning of the test site(s) including functional/shake down testing, calibration, and personnel training.
* Describe your approach to operating the test site.
* Identify critical expanded test criteria (beyond the scope of the REFUEL+IT program goals) and describe your approach to evaluating these criteria.
* Provide a description of how site data acquisition, storage, and analysis will be managed, and how test data will be managed. The description should include protocols and procedures for maintaining data confidentiality.

**INSTRUCTIONS for the Technical Approach Section:**

1. The Technical Approach Section may include figures, tables, and graphics.
2. The suggested length of the Technical Approach Section is 10 pages.

xxxx-xxxx

**3. TEST SITE**

Describe and discuss the proposed test site(s).

**3.1 Notional Test Site**

* Include a diagram of a notional test site (or sites) including ammonia storage. Describe the factors, considerations, and reasoning for your proposed design.

**3.2 Geographic Location**

* Indicate a geographic location for field testing.
* Discuss any access or ownership issues pertaining to the site and/or assets.
* Discuss any advantages or constraints of this location with respect to the variety of locations in which REFUEL+IT-funded technologies may be deployed.
* Include a map of the location and note nearby commercial airports.

**INSTRUCTIONS for the Test Site Section:**

1. This Section may include figures, tables, and graphics.
2. The suggested length of the Test Site Section is 5 pages.

**4. TECHNOLOGY TO MARKET**

The significant impact sought by ARPA-E depends upon successful projects finding a path to large-scale adoption. ARPA-E projects are not required to achieve commercial deployment by the end of the project period, but the agency asks the Applicant to define a reasonable path for the proposed technology toward commercial adoption.

**4.1 Technology to Market Strategy.**

Describe how the proposed technology is expected to transition from the proposed integrated unit to commercial deployment, including a description of the eventual product, potential near- and long-term market entries, likely commercialization approach (e.g. license), specific organizations expected to be involved in the transition (partners, customers, etc.), and the commercialization timeline.

Discuss manufacturing, cost, and scalability risks associated with the technology.

Describe anticipated resource needs for the next phase of development following the end of the ARPA-E project.

Explain why the proposed research is not being pursued by industry today.

Discuss the anticipated roles for the proposed research team in the commercialization of the technology.

**4.2 Intellectual Property.**

Describe existing intellectual property, if any, that will be used to develop the new intellectual property; and

Discuss new intellectual property and data that is anticipated to be created as part of this effort, if any.

Describe proposed IP agreement strategy and management.

**INSTRUCTIONS for the Technology to Market Section:**

1. The Technology to Market Section may include figures, tables, and graphics.
2. The suggested length of the Technology to Market Section is 4 pages.

**5. BUDGET**

Indicate the budget, in US dollars, and provide a high-level budget summary, demonstrating that the budget is reasonable and appropriate for the proposed effort.

**5.1 Budget Breakdown.**

Provide in tabular form following the template give below, a breakdown of the project budget by entity and major task in US dollars.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Task Name** | **[Prime]** | **[Sub #1]** | **[Sub #2]** | **[Sub #3]** | **[Sub #4]** | **Total** |
| [Task #1] |  |  |  |  |  |  |
| [Task #2] |  |  |  |  |  |  |
| [Task #3] |  |  |  |  |  |  |
| [Task #4] |  |  |  |  |  |  |
| **Total** |  |  |  |  |  |  |

Replace “Prime” with name of the primary (lead) entity and “Sub #n” with the name of the sub-recipient or sub-contractor entities, if applicable. Task names should clearly correspond to major tasks listed in Section 2.4. Expand or contract the table as needed to add/subtract entities (columns) or tasks (rows).

**5.2 Budget Summary.**

Provide a high-level summary for the project by major budget category, including at least these three:

* Key Personnel and technical staff to be utilized (e.g., scientists, engineers, technicians, postdocs, graduate students, etc.)
* Equipment
* Materials and Supplies

**5.3 Cost Share.**

Provide a description of the cost share by value of the contribution (in dollars) and percentage of the Total Project Cost (TPC):

* List each source of cost share, the type of contribution (cash or in-kind), the value of the contribution (in dollars), and the value as a percentage of TPC.
* For all in-kind contributions, provide a detailed description of the contribution and its relevance to the project objectives

**INSTRUCTIONS for the Budget Section:**

1. The Budget Section may include figures, tables, and graphics.
2. The suggested length of the Budget Section is 5 pages.

**6. BIBLIOGRAPHIC REFRENCES**

Provide a list of references appropriate to Sections 1-5.

**INSTRUCTIONS for the Bibliographic References Section:**

1. Only bibliographic information may be contained in the references. No additional text or commentary is allowed.
2. There is no page limit for the Bibliographic References Section, which is outside of the overall 25-page limit for Sections 1-5.

**7. PERSONAL QUALIFICATION SUMMARIES**

A Personal Qualification Summary (PQS) is required for the PI and all other Key Personnel. Each PQS must include a description of the following only:

* Education and training
* Employment history
* Awards and honors
* A list of no more than 10 peer-reviewed publications related to the proposed project
* A list of no more than 10 other peer-reviewed publications and patents demonstrating capabilities in the related field

**INSTRUCTIONS for the Personal Qualification Summaries Section:**

1. Each Personal Qualification Summary is limited to 3 pages in length and there is no page limit for this Section, which is outside of the 25 page limit for Sections 1-5.
2. **Curriculum Vitae should not be submitted**.

**TECHNICAL VOLUME TEMPLATE**

**INSTRUCTIONS**

**CONTENT REQUIREMENTS (See Section IV.C of the FOA for Content Requirements):**

1. The Technical Volume template may be used to prepare Technical Volumes for Full Applications.
2. Applicants should ensure the accuracy of their Technical Volume by reviewing and/or printing prior to the Full Application submission.
3. ARPA-E may not review or consider noncompliant and/or nonresponsive Full Applications (see Section III.C of the FOA).
4. Each Full Application should be limited to a single concept or technology. Unrelated concepts and technologies should not be consolidated into a single Full Application.
5. Confidential, proprietary, or privileged information should be indicated by including in the header and footer of every page the following language: “Contains Confidential, Proprietary, or Privileged Information Exempt from Public Disclosure.” In addition, the cover sheet of the Technical Volume must also include the disclaimer provided in Section VIII.I of the FOA, and every line and paragraph containing proprietary, privileged, or trade secret information must be clearly marked with double brackets or highlighting. See Section VIII.I of the FOA for additional information on marking confidential information.
6. Applicants must provide sufficient citations and references to the primary research literature to justify the claims and approaches made in the Technical Volume. ARPA-E and reviewers may review primary research literature in order to evaluate applications. However, ARPA-E and reviewers are under no obligation to review cited sources (e.g., Internet websites)
7. Delete these template instructions and delete the prompts in each of the section above prior to submitting Full Applications.

**FORMAT REQUIREMENTS (See Section IV.C of the FOA for Format Requirements):**

1. Technical Volumes must be submitted in Adobe PDF format, be written in English, use black 12 point or larger Times New Roman font (except in figures and tables), use 8.5 inch by 11 inch paper, be single-spaced, and have margins no less than 1 inch on every side.
2. Technical Volumes must not exceed the maximum page lengths specified for each section of the Technical Volume, if any, in Section IV.C of the FOA. If applicants exceed the maximum page length, ARPA-E will review only the authorized number of pages and disregard any additional pages.
3. The ARPA-E assigned Control Number, Lead Organization Name, and Principal Investigator’s (PI’s) Last Name must be in the upper right hand corner of the header of every page. Page numbers must be included in the footer of every page.