



Naval Postgraduate School Energy Academic Group

833 Dyer Road (SP-536), Monterey, CA 93943



Battery Workforce Development Full Proposal

CAGE Code: 1Y7P3

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Total \$ Amount being Proposed: \$6.5M

Government/Contractor Share: \$0

(NPS is not a member of the Defense Manufacturing Community Support Program)



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I – Naval Postgraduate School Points of Contact

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II – Detailed Technical Approach and Proposed Statement of Work

A. TECHNICAL APPROACH

This proposal addresses the major technical objectives of the “National Imperative for Industrial Skills” Statement of Objective (SOO) initiatives. These two major technical objectives are:

- 3.2.1 Create or Improve Education/Training Centers; and
- 3.2.2 Improve Education/Training Functional Activity.

Under 3.2.1, the proposal seeks to create new or improve existing capacity at centers of education through partnerships, advisory groups, and agreements that move forward the objectives as they enhance national interests.

As sub-elements of objective 3.2.2, and as part of this work, the following sub-elements of the National Imperative for Industrial Skills Initiative: Background and Acquisition Operational Concept, Attachment 3, are addressed by this proposal, and may be considered as significant objectives:

2.6.2.1. Marketing and/or recruiting mechanisms. Marketing or recruiting campaigns focused on raising awareness of the benefits of manufacturing and careers in the associated industrial skills and helping to channel increased numbers and percentages of prospective workers into associated manufacturing sectors and careers.

2.6.2.2. Industrial or manufacturing skills challenges and competition programs. These programs might be supported by collaborative public-private partnerships of companies, academic institutions or government organizations, with the objective to help inspire students, hone skills, drive greater awareness of career opportunities in manufacturing and industrial skills, identify facilities, equipment, process and system shortfalls, enhance collaboration and interaction, and help catalyze the build-out of the industrial skills workforce development ecosystem in other ways.



2.6.2.3. Improvements to labor/skills competency models and skills credentialing functions and programs. The traditional ways of indicating achievement may no longer be as meaningful to today's younger workforce. If they are a part of the target population, then new means of credentialing should be considered, along with new competency models that more accurately reflect the full spectrum of the academe-to-industry ecosystem of the strategic mineral and battery life cycles.

2.6.2.4. Curricula development, refinement and standardization (the latter where appropriate). Where curricula do not yet exist, or are inadequate, the consortia will work to develop means and materials to fill the need for reliable, consistent, clear, accurate, and up-to-date information on the strategic mineral mining and battery life cycles.

2.6.2.5. Apprenticeship and internship models and programs. These models afford professionals and students alike the opportunity to receive real-world, hands-on training in target fields such as the strategic mineral mining life cycle. Presidential Executive Order 13801, Expanding Apprenticeships in America, provides current administration guidance.

2.6.2.6. Upskilling, re-skilling and career transition models and programs. Upskilling enhances a worker's performance in his/her current role, potentially advancing the employee along the current career path into a leadership position. Employee reskilling involves learning new skills outside of the worker's existing skillset. These skills are often closely adjacent to the current function but may sometimes be geared toward a different path entirely. Either way, they can move the workforce toward closing a knowledge gap such as that which may exist around strategic minerals and/or the battery industry.

2.6.2.7. Train-the-trainer models and programs. A motivated and well-trained workforce is an essential component of any enterprise that wishes to thrive and succeed, which is precisely where the concept of the train-the-trainer model comes into play. It serves as an internal training program that can help ensure that employees are learning and acquiring all of the skills, knowledge, and insight they need to perform their jobs well. This comes about by making employees into subject matter experts who can teach their colleagues what they need to know to ensure attainment of strategic national imperatives regarding both the strategic minerals and battery life cycles.

2.6.2.10. Other functions or activities proposed by the Offeror in support of the Government's interest in catalyzing the rapid development and long-term maturation of the industrial skills workforce development ecosystem.



B. PROPOSED STATEMENT OF WORK

1. BACKGROUND

As the United States pursues a carbon-free infrastructure, the importance of energy storage technologies, or batteries, has gained traction. Batteries require a large volume of minerals, frequently rare earth, or strategic minerals, that must be extracted from sub-surface mines or repositories. There is a lack of expertise within the United States, which has been years in the making and extends throughout the battery value chain. This systemic deficiency in understanding ranges from mining to refining to the final application in the field and even through to the recycling of waste products of both production and end use. Each one of these gaps, as well as the aggregated deficiencies, has the potential to become a national security vulnerability.

This proposal covers both new and continuing thrusts within NPS' ongoing efforts in research, outreach, curriculum development, and training programs within the broader DoD energy security field. This proposal also expands these efforts beyond NPS to support the continuation of ongoing energy related research and the delivery of professional, technical or vocational, and research-based, institutionally accredited instruction. The work will seek to identify areas where targeted teaching and degree programs, as well as just-in-time education and workforce development can further energy capabilities and capacities, as well as U.S. national interests.

2. SUMMARY OF RELEVANCE

The Naval Postgraduate School (NPS) is a public graduate school operated by the United States Navy and located in Monterey, California. It offers master's and doctoral degrees in more than 70 fields of study to the U.S. Armed Forces, DoD civilians and international partners. Operating on the NPS campus and online, the Energy Academic Group (EAG) provides energy-focused graduate education, research, and outreach at the Naval Postgraduate School. As an interdisciplinary group of highly diverse faculty, the EAG maintains NPS as a Navy center of excellence for energy graduate education and research. EAG's efforts focus on solving the Navy, Marine Corps, and DoD's most critical energy problems through graduate education and research. To that end, EAG employs a collaborative, multidisciplinary approach using the basic sciences, engineering, operations and analysis, and business methods.

The EAG has an established record of building coalitions and workforce development that is relevant to this proposal. The Navy Enterprise Energy Education and Training (NE3T) program has developed energy specific



general military training, graduate level stackable certificates, and early stage content for undergraduate level training.

Our experience in coalition development includes:

- a. Naval Power and Energy workforce development program sponsored by the Office of Naval Research (ONR).
- b. Platform Decarbonization Consortium comprised of subject matter experts from Government, academia and industry.
- c. Energy Education and Training Working Group (EETWG), an all-DoD Energy consortium for Office of the Secretary of Defense (OSD).
- d. EAG's Curricula Development Team, supported by key members of EAG and NPS as needed.
- e. NATO Science and Technology Organization's Systems Analysis and Studies.

3. GOALS AND OBJECTIVES

- a. To conduct a thorough gap analysis that encompasses; battery education and training availability and adequacy; strategic mineral supply chain training and implementation from discovery through recycling; workforce development.
- b. To organize a Battery Workforce Advisory Group of subject matter experts from Government, academia, and industry.
- c. To create a plan that enhances national battery and strategic mineral educational and industrial readiness.

4. SCOPE OF WORK - This work will be executed in two main phases, with the first phase having two parts.

- a. Phase I(a)
 - 1) Phase I(a) will begin immediately upon approval of this proposal.
 - 2) This phase will consist of a preliminary evaluation of the problem, to include a summary of existing efforts and available resources.
 - 3) As concurrent and complementary but potentially duplicative efforts by other organizations may be underway during the period of performance of this proposal, Phase I(a) will result in a summary of ongoing efforts and activities in this area, within and outside the reach of the NPS team, and will result in an execution plan which more specifically defines the remaining tasks and deliverables to be provided. This Phase I(a) briefing will help "course correct" and align the remainder of Phase I execution with existing activities.



b. Phase I(b)

1) Phase I(b) will more specifically define the remaining tasks and deliverables to be provided, based on the results of Phase I(a). Likely outcomes of that work include:

- The creation of a **Battery Workforce Advisory Group**, or “Advisory Group,” to determine industry education content and employer needs. This Advisory Group will draw on Government, higher education, training, and education consortia and industry resources around the country to create a team of experts who can identify gaps throughout the workforce, including industry education content, and have the means, will, and wherewithal to work toward filling the gaps between available education and training, and employer need.
- A multi-year guideline or “**Strategic Roadmap**” for a workforce development program. This roadmap will be comprehensive and dynamic, and will utilize a whole of sector approach. It will identify:
 - Key stakeholder groups within the Government, commercial battery industry, and academia,
 - Key targets within each stakeholder group
 - Desired outcomes by stakeholder group
 - Relevant components of the upstream, midstream and downstream sectors
 - Success metrics
 - Program timeline
- The NPS Research Team will consult with the Advisory Group to complete a study that provides a high level of granularity in Phase I, to include an assessment of technical, vocational, and academic gaps that address resource needs across the educational spectrum and responds to the nation’s need to build its capacity throughout the battery and strategic mineral value chain and life cycle.
- This work will result in several program solution alternatives that require high, medium, and low levels of financial outlay. The alternatives will impact the comprehensive nature of the outcome and reflect in overall quality but, will also allow forward progress at varying levels of financial commitment. This should enable progress independent of variable resources.
- The project will build upon and leverage ongoing activities in (though not limited to):



Department of Energy's Li Bridge Report

Federal Consortium on Advanced Batteries (FCAB)

Relevant initiatives from the Departments of Energy and Labor

Society of Automotive Engineers (SAE)

Curriculum development in coordination with the Advisory Group

c. Phase II

During this phase, the coalition created during Phase I will continue engagement with each of the components and begin to implement the items noted in the Roadmap. This will include beta testing initial student awareness and engagement campaigns. There will be multiple streams of defining activity, directed at filling identified gaps:

- **Stream #1: Academics** – Academic programs will be developed in a cooperative manner by NPS and other members of the consortium:

Short courses – Courses designed as technical/vocational or academic refreshers with continuing education units for engaged individuals with prior knowledge.

Certificates – Courses are developed and combined into certificates for just-in-time knowledge for those not requiring a full degree. Certificates may be combined into a degree. These “stackable” certificates may result in either undergraduate or graduate level degrees.

Undergraduate curricula – 4-year programs to include general education.

Graduate curricula – 2-year+ programs for advanced, specialized knowledge.

- **Stream #2: Bridge** – The Advisory Group established in Phase I will develop enduring partnerships between industry and academia for rapid deployment within the workforce. NPS will connect universities with geographically convenient industry partners to foster smoother transition into the workforce and ensure education is relevant to industry needs. NPS will utilize universities to influence curricula by way of case studies, internship opportunities, and team hacking industry challenges.
- **Stream #3: Industry** – Develop an employer/industry specific “*Employment Consultation Committee*” for required skill base and



employment opportunities at the completion of education. NPS will utilize existing Government/DoD educational programs such as VTEC, which assist transitioning veterans into educational programs and into careers. NPS will influence VTEC students into advanced battery workforce programs and coordinate with industry to develop structured internship programs to attract students to the battery industry.

5. DELIVERABLES

a. Phase I

- 1) Phase I(a) will produce a summary of ongoing efforts and activities that will inform the plan for Phase I(b).
- 2) Phase I(b) will produce a **Strategic Roadmap** that will identify the key steps to achieving gap mitigation.

b. Phase II will produce a **Plan of Action and Milestones (POA&M)** leading to the systematic resolution and fulfillment of discovered gaps in battery and strategic mineral education and industry.

c. **Final Report** to include documentation of lessons learned throughout the process.

6. MILESTONES

a. Phase I

- 1) Commencement – Apr 2023
- 2) Phase I(a) Summary – Jul 2023
- 3) Phase I(b) Mid-Cycle Review – Nov 2023
- 4) Completion of Strategic Roadmap – Mar 2024
- 5) Final Report and Outbrief – Apr 2024

b. Phase II

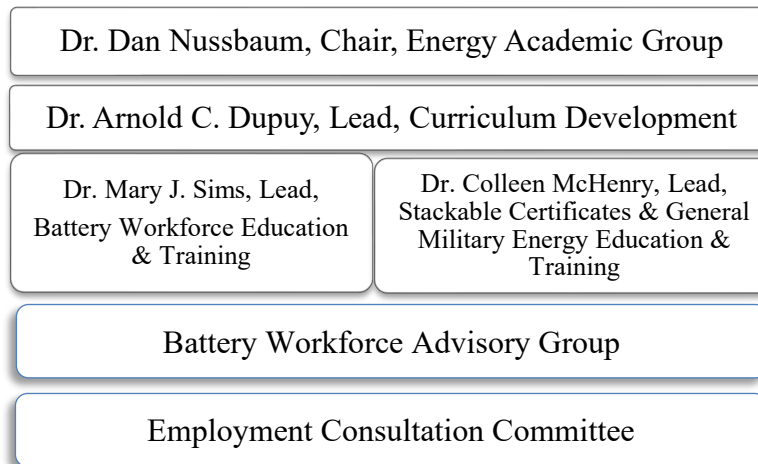
- 1) Stream #1 - Academics
 - a. Major period of implementation Apr 2024 – Jun 2025
 - b. Mid-Cycle Review – Nov 2024
 - c. Final Report and Stream #1 Briefing – July 2025
- 2) Stream #2 – Bridge
 - a. Major period of implementation Apr 2024 – Feb 2026
 - b. Mid-Cycle Review #1 – Oct 2024
 - c. Mid-Cycle Review #2 – Apr 2025
 - d. Mid-Cycle Review #3 – Oct 2025
 - e. Final Report and Stream #2 Briefing – Mar 2026



- 3) Stream #3 - Industry
 - a. Major period of implementation Jan 2025 – Jan 2027
 - b. Mid-Cycle Review #1 – Jun 2025
 - c. Mid Cycle Review #2 – Jan 2026
 - d. Mid-Cycle Review #3 – Jun 2026
 - e. Final Report and Stream #3 Briefing – Jan 2027
 - 4) Completion and Submission of Plan of Action and Milestones (POA&M) – Apr 2027
 - 5) Final Report Completion and Submission of Lessons Learned – Jun 2027
7. PERIOD OF PERFORMANCE – The work will begin immediately upon approval.
- a. Phase I(a) – 3 months, Apr 2023 – Jul 2023.
 - b. Phase I(b) – 9 months, Aug 2023 – Apr 2024.
 - c. Phase II – 3 years, Apr 2024 through Jun 2027.
8. COMPLETION CRITERIA
- a. The project’s culminating output, a POA&M, will be a plan for closing the skills and knowledge gap surrounding the life cycle of strategic minerals and the battery industry, that addresses workforce innovation and opportunities.
 - b. The POA&M will be submitted to the IBAS COR for review by Apr 2027 in accordance with the schedule indicated in paragraph B6 above. IBAS will have thirty days to review the POA&M for sufficiency and completion, and to return accepted or with comments.
 - c. Upon receipt, the NPS team will have thirty days to respond to any concerns, and resubmit, thereby completing the project.
 - d. If any part of the project cannot be completed within the timeline described above, due to the comprehensive nature of the feedback received, then the project should be closed out and a separate negotiation should be considered.
9. MEASURES OF SUCCESS
- a. Adherence to proposed schedule of milestones
 - b. First cohort completion prior to project culmination
 - c. Creation of enduring Advisory Group
 - d. Completion of first series of courses under Stream #1



10. ORGANIZATIONAL STRUCTURE



11. FULL PROPOSAL PRICE

PHASE	ACTIVITY	DURATION	COST	NOTES
I (a)	Summary of Ongoing Effort	3 months	\$300 K	2 FTE + Travel
I (b)	Sector Analysis & Roadmap	9 months	\$1.2 M	4 FTE + Travel
II	Stream Administration	3 years	\$5 M	8 FTE + Travel
		TOTAL	\$6.5 M	

- a. The Phase I pricing model is built on a presumption that the project will be supported by NPS personnel as indicated in the organizational structure in paragraph B10 above. Most of the travel will be:
 - In support of Advisory Group coordination
 - Research and coordination visits to academic institutions
 - Stakeholder engagement with industry
- b. The Phase II pricing model presumes that the core NPS team will be supplemented by additional FTEs whose efforts will support this project. Additionally, year 1 funding in Phase II will be largely devoted to the development of curricula within Stream #1. Concurrently, the Bridge will be established in Stream # 2 through partnerships that will require a travel and per diem budget. As Streams #1 and #2 become established, Stream #3, will also require a travel and per diem budget in support of regular meetings and research. This detailed budget will be developed upon the completion of Phase I.