



LDES NATIONAL CONSORTIUM

Project Charter

The National Consortium for the
Advancement of Long Duration Energy
Storage (LDES) Technologies



OCED
Office of Clean Energy Demonstrations



OTT
Office of Technology Transitions

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This project is funded by the Infrastructure Investment and Jobs Act, also known as the Bipartisan Infrastructure Law (BIL), as part of the DOE Technology Commercialization Fund (TCF), administered by the Office of Technology Transitions in collaboration with the Office of Clean Energy Demonstrations.

Project Charter

About

Long-duration energy storage (LDES) technologies can play a pivotal role in achieving US energy goals: supporting energy abundance; strengthening grid security and resilience; reducing energy costs for American families and businesses; and demonstrating our nation's leadership in scientific and technological innovation. The opportunities to contribute to the US energy are abundant, largely due to the fact that LDES represents a broad technology class with a range of potential system types, including electrochemical, mechanical, chemical, and thermal energy storage. This is a positive characteristic with enormous potential benefits for the industry as it is very likely that the future energy needs of the US will require a range of technologies with varying performance characteristics that can serve different applications for different end-users.

However, despite a growing realization of the need for LDES technologies that will continue to accelerate over the next decade, multiple challenges continue to impede a smooth pathway toward widespread commercialization and deployment. These challenges include a persistent gap of policy levers at the federal and state level defining where and how LDES technologies can be utilized to support the electric grid; valuation metrics that define how this support should be compensated; supply chain deficiencies that impede technology development; and a pervasive risk aversion among investors whose funding contributions are essential to enable LDES technologies to flourish. Furthermore, along with policy gaps and supply chain deficiencies, a concentrated effort on developing technologies to be ready for deployment within the next decade has not garnered the momentum that will be necessary to implement the commercialization objectives for new and emerging LDES technologies.

While multiple efforts to address these challenges led by various public and private entities are currently in effect, up to now these efforts have been conducted independently and oftentimes disconnected without a common forum that enables collaboration, knowledge sharing, and the consensus-based development of commercialization pathways.

The National Consortium for the Advancement of LDES Technologies (referred to as, 'LDES National Consortium') was formed by Sandia National Laboratories (Sandia) and its five National Laboratory partners (Argonne National Laboratory (ANL), Idaho National Laboratory (INL), National Renewable Energy Laboratory (NREL), Oak Ridge National Laboratory (ORNL), and Pacific Northwest National Laboratory (PNNL) in October 2023.

This Project Charter establishes the LDES National Consortium’s mission to create a centralized forum through which stakeholders across the LDES ecosystem will convene to identify barriers, determine potential synergies, and collaboratively develop and implement recommended strategies necessary to achieve the commercialization of a wide range of LDES technologies within the next decade.

OUR FOCUS: The LDES National Consortium will have a clear focus on developing commercialization strategies for a full range of varying LDES technologies. Collectively, these strategies will enable different suppliers to introduce a greater number of LDES technologies, products, and applications to a wider range of markets, faster than has previously been possible. Moreover, we understand that commercialization for LDES technologies, if it is to be achieved over the next decade, will require significant improvements in technology design and testing, supply chain development and cost reductions; defining adoption and commercialization pathways for specific LDES technologies; and developing recommendations to enhance regulatory support for LDES in both wholesale and retail markets including frameworks to properly assess and compensate the value of LDES applications. All of these components are needed to create a self-sustaining market that can continue to successfully operate with the support of private capital investments.

One of the most significant outcomes of the LDES National Consortium will be a set of actionable industry recommendations intended to frame multiple pathways to achieve LDES commercialization over the next decade that address topics such as technology development, use-case applications, projects development, economics, financing, and enabling regulation.

VALUE: The LDES National Consortium will provide a number of value streams to LDES stakeholders, including but not limited to:

- Creating and maintaining a centralized, independent forum through which stakeholders across the LDES ecosystem can work together to identify barriers presently facing LDES technologies and collaboratively develop and implement recommended strategies necessary to achieve the commercialization of a diverse range of LDES technologies within the next decade.
- Assembling key energy stakeholder organizations that represent technology developers, manufacturers and suppliers; financial investors; market planners; end-use customers; regulators and state governmental offices; universities and academic researchers; and community-based organizations to collaboratively identify current data availability, gaps, and needs; system infrastructure requirements, and planning objectives specific to LDES technologies.
- Assisting policymakers and developers in both wholesale and retail markets with how to prioritize LDES commercialization pathways, and how to incorporate emerging LDES technologies into their policies and regulations.
- Building, with stakeholder input, a decision support model in a systems-dynamic modeling setting that allows users to experiment with different future LDES configurations and to



develop preferred scenarios for LDES siting, use case application, and overall market development.

- Assisting in the development of guidance materials on how to expedite approvals of LDES projects with minimal environmental impacts to ensure reliability of the electric grid as it increasingly incorporates these technologies.
- Informing markets on measures that improve LDES customer project compensation mechanisms to both reduce investor risk and ensure that LDES applications are appropriately valued for the benefits they provide to the electric grid.

SCOPE: All LDES technologies are within the scope of this project, but a particular focus will be given to those technologies deemed to have a reasonable pathway to commercialization in the short- and medium-term (i.e., within five to ten years). While there are various types of LDES technologies that have typically been associated with established energy storage categories—mechanical, thermal, electrochemical, and chemical—an ever-increasing number of new technologies will be developed in the coming years and must be identified and evaluated. Candidate LDES technologies that have emerged include advanced (non-lithium) batteries (including flow, lead-acid, sodium, and zinc batteries); compressed air; thermal energy storage (including molten salt, solid media, pumped, and bidirectional electricity); gravitational energy storage, and variations on pumped hydro storage. However, development of new technologies remains fluid and thus a continual update of LDES technologies that need to be evaluated is critically important.

In addition, the project scope will consider commercialization recommendations inclusive of both wholesale and retail electricity markets. Commercialization activities outside of the US are not within scope for this project.

DURATION AND FUNDING: The LDES National Consortium has been provided with three years of funding through the Bipartisan Infrastructure Law (BIL) Technology Commercialization Fund (TCF). This project is funded by the DOE Office of Technology Transitions (DOE-OTT) in collaboration with the Office of Clean Energy Demonstrations (DOE-OCED).

Leadership

The LDES National Consortium Leadership Team, comprising 14 individuals, will have responsibility for leading this effort and completing tasks and deliverables that are defined in the project's Statement of Work (SOW). A central role for the Leadership Team is to review and finalize recommendations produced by individual Tiger Teams and mediate resolutions in those instances when consensus cannot be reached within a Tiger Team. The Leadership Team will meet bi-weekly, as needed, hosted by Sandia National Laboratories. There will be agenda items and notes for each Leadership Team meeting. The Leadership Team will make decisions via voting with majority ruling – voting will occur via email and during meetings, on a case-by-case basis.



Included among the 14 Leadership Team positions are six National Laboratory Partner representatives (aka “Lab Partners”) who will remain on the Leadership Team for the duration of the funded project. The six Lab Partners will assume the lead roles on Tiger Teams described below, select Industry Advisors for one-year terms for the Tiger Teams they are leading, schedule and facilitate monthly meetings for their Tiger Teams, and oversee the completion of Tiger Team assignments in accordance with the project schedule. The Lab Partners will be also responsible for providing input that will be included in the regular reports delivered to the DOE by Sandia in its lead role. In addition, the Lab Partners will continue to promote the LDES National Consortium to new Teaming Partners through their own networking channels and will assist the Business Development Partner in facilitating in-person meetings as needed.

The following Leadership Team members from the six Lab Partners will continue for the duration of the three-year funded project. At the end of the project, when the LDES National Consortium is transitioned to industry leadership for continuation, a new leadership framework may be established.

- **Sandia National Laboratories (SNL) – Principal Lead:** Will McNamara, jwmcnam@sandia.gov
- **Argonne National Laboratory (ANL):** Patrick Balducci, pbalducci@anl.gov
- **Idaho National Laboratory (INL):** Torrey Lyons, Torrey.Lyons@inl.gov
- **National Renewable Energy Laboratory (NREL):** Zhiwen Ma, Zhiwen.Ma@nrel.gov
- **Oak Ridge National Laboratory (ORNL):** Hope Corsair, corsairhj@ornl.gov
- **Pacific Northwest National Laboratory (PNNL):** Jeremy Twitchell, jeremy.twitchell@pnnl.gov

Also included among the 14 Leadership Team positions are seven Teaming Partner Leadership positions who will be nominated for one-year tenures, of which two positions will be designated for small businesses (one <500 employees, and one <150 employees). An individual cannot serve on the Leadership Team more than one term, The six Teaming Partner positions on the Leadership Team will be determined through a nomination process open to the entire population of official Teaming Partners (nominations to be held yearly). These Leadership Team members will assist the National Laboratories leads in making decisions on behalf of the LDES National Consortium, reviewing Tiger Team deliverables, and assisting in the networking and partnership development for the LDES National Consortium.

The Leadership Team will work with the seven Teaming Partner representative positions throughout the project to develop an ongoing leadership plan to remain in place once the project has been completed.

The seven Teaming Partner positions on the Leadership Team will be determined through a nomination process open to the entire population of official Teaming Partners (nominations to be held yearly). The nomination will include the following questions:

- Name
- Organization
- Years of relevant experience
- Brief statement of expertise you will bring to this role
- Key issues that the LDES National Consortium should address
- I can commit to attending recurring meetings during my one-year tenure on the leadership team (Y/N)

As the seven Teaming Partner positions on the Leadership Team are appointed, their names will be added here:

- **YEAR 1 (11/2023 – 09/2024)**
 - **Cummins, Inc.:** Gaurav Argade
 - **Form Energy:** Rachel Wilson
 - **GTA, Inc.:** Elias Greenbaum
 - **Holtec Government Services:** Indresh Rampell
 - **Largo Clean Energy:** Mike Perry
 - **NextGen Energy Partners:** Kimberly Johnson
 - **Visibility Marketing, Inc.:** Todd Adams
- **YEAR 2 (10/2024 – 09/2025)**
 - **Edison Electric Institute (EEI):** Huiyi Jackson
 - **Mainspring Energy, Inc.:** Joseph Ferrari
 - **National Grid:** Fouad Dagher
 - **PWRJOULE:** Bret Raymis
 - **Quanta:** Ralph Masiello
 - **RWE Clean Energy:** Seyi Fabode
 - **Vrinda, Inc.:** Navneet Trivedi
- **YEAR 3 (10/2025 – 09/2026)**
 - **Organization Name:** Name
 - **Organization Name:** Name
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 - **Organization Name:** Name

Also included among the 14 Leadership Team positions is an advisory role for the LDES National Consortium - Business Development Partner. This individual will maintain their role for the duration of the funded project.

The Business Development Partner will report directly to the Leadership Team and will be positioned to aid in recruiting and communicating with industry members; collaborate with relevant professionals to produce communication materials; support outreach events; and provide expertise in facilitation, group decision-making, meeting execution, commercialization best practices, and strategy development. The Business Development Partner will coordinate the Stakeholder Engagement Group Team.

- **Business Development Partner:** Kailey Fascitelli, Sandia National Laboratories, kwulfer@sandia.gov



Figure 1. LDES National Consortium membership framework.

If necessary, leadership personnel can be removed at any time at the discretion of Sandia National Laboratories and/or the Laboratory Leadership Team. The Teaming Partner will be notified in writing via email if they have been removed.

Teaming Partners

Any organization that has a stakeholder interest in the commercialization of LDES technologies in the US and meets eligibility requirements is welcome to join the LDES National Consortium as a “Teaming Partner.”

ROLE: Teaming Partners will elect to participate in specific “Tiger Teams.” The Tiger Teams will be assigned to identify and evaluate challenges in specific focus areas impacting LDES and then develop public recommendations for these specific focus areas. The Tiger Teams will be populated with representatives from across the LDES ecosystem to ensure that the recommendations produced are comprehensive.

BENEFITS: The benefits being offered to a Teaming Partner are primarily derived from having a direct role in developing consensus-based recommendations to address commercialization challenges of LDES technologies. Through their direct participation in Tiger Teams, Teaming Partners will have an opportunity to share perspectives and insights that will influence these recommendations. Furthermore, the LDES National Consortium offers an unprecedented forum through which Teaming Partners will have increased opportunities to network with other organizations and identify potential teaming partners.

ELIGIBILITY: Consistent with the fact that the creation and development of the LDES National Consortium is funded through the US Department of Energy, the focus of this effort is on the commercialization of LDES technologies in US markets. Accordingly, organizations must be a US organization or have an existing US incorporated entity/domestic subsidiary in order to be eligible to participate as a Teaming Partner. Only organizations will be accepted and recognized as a Teaming Partners. Individuals must be affiliated with an organization in order to participate in Tiger Teams.

If necessary, Teaming Partners can be removed at any time at the discretion of Sandia National Laboratories and/or the Laboratory Leadership Team. The Teaming Partner will be notified in writing via email if they have been removed.

HOW TO JOIN: Official participation as a Teaming Partner is confirmed through the submission of a Letter of Commitment (LOC) and certification by the LDES National Consortium Principal Lead or Business Partner. Interested organizations are to contact the LDES National Consortium's Business Development Partner, Kailey Fascitelli (kwulfer@sandia.gov) to provide information and receive the LOC template.

The LOC requests that each Teaming Partner provide an estimated in-kind cost sharing contribution. The rationale behind this is that the federal funding supporting the development of the LDES National Consortium is subject to Section 988(b)(3) of EPAct0555 regarding cost-share, which requires 50% cost share for demonstration and commercialization activities. The in-kind cost share contribution should be based on the average hourly rate of each individual representing their Teaming Partner organization who will devote <8 hours/month over the course of the three-year project lifespan. Use of facilities for meetings can be factored into this estimated in-kind cost share contribution. This can certainly be a rough estimate and it is not a binding obligation. Rather, it helps us to develop a total estimate of Cost Sharing that Sandia National Laboratories as the lead lab for the LDES National Consortium must report to the DOE.

Teaming Partners will not receive funding, nor will cash donations from Teaming Partners be accepted. Contributions are based on an in-kind, volunteer basis representing the time commitment contributed by individuals in representation of their Teaming Partner organization.

Tiger Teams

Tiger Teams are break-out groups assigned to identify and evaluate challenges in the specific focus areas impacting LDES and then develop public stakeholder recommendations and complete other tasks as outlined in the project SOW. The Tiger Teams will be populated with representatives from across the LDES ecosystem, (i.e., the Teaming Partners population) to ensure that the recommendations produced are comprehensive. At this time, the following Tiger Teams have been established, but this list could be changed:

- 1) Customer Adoption
- 2) Demonstrations & Deployments
- 3) Economics & Valuation
- 4) Electricity Market Design and Participation
- 5) Grid Infrastructure
- 6) Interconnection, Standards & Permitting
- 7) Investor Confidence / Financing
- 8) Policy & Regulations
- 9) Reliability & Resilience
- 10) Safety & Grid Security
- 11) Supply Chain & Manufacturing Efficiencies
- 12) Technology Development, Evaluation & Testing
- 13) Use Case Development
- 14) Utility Resource Planning

TIGER TEAM LEADERSHIP: Each Tiger Team will be led by two leadership positions: one Lab Partner Lead and one Teaming Partner Industry Advisor. Tiger Team Lab Partner Leads will maintain their roles for the duration of the DOE-funded project, whereas Industry Advisors will have a one-year tenure. An individual cannot serve as the Industry Advisor for a given Tiger Team more than one term (unless authorized by the Leadership Team). Tiger Team Lab Leads are selected by the Leadership Team. The Tiger Team Lab Leads will meet on a bi-weekly basis to provide updates on Team activities, discuss topics that may carry over from one Team to another, and identify and resolve any instances of redundancy or inconsistencies across the industry recommendations being developed by the Teams.

The Industry Advisors for each of the Tiger Teams will be determined through a nomination process open to the entire population of official Teaming Partners (nominations to be held yearly). The nomination may include the following questions, and facilitated by the Tiger Team Lab Partner Leads in coordination with the Leadership Team:

- Name
- Organization
- Years of relevant experience
- Brief statement of expertise you will bring to this role
- Key issues that the Tiger Team should address

- I can commit to attending recurring meetings during my one-year tenure on the leadership team (Y/N)
- And any other questions deemed necessary by the Lab Partner Lead

PROCEDURES: Each Tiger Team will be given assignments that are relevant to its designated focus area. As one example, many of the Tiger Teams will receive immediate assignments to examine commercialization challenges facing LDES technologies that were previously identified in the *Pathways to Commercial Liftoff: Long Duration Energy Storage* report published in March 2023 and prepare recommendations to address these challenges that can be made public and submitted to appropriate entities for implementation.

Recommendations prepared by each Tiger Team will be developed through a consensus-based process (i.e., all participants within a Tiger Team will be given ample opportunity to review and comment on recommendations before they are finalized). The designated Lab Lead and Industry Advisor for each Tiger Team will be responsible for approving output produced by participants within a Tiger Team and submitting final work products to the Leadership Team for delivery to the DOE. In those instances when consensus cannot be reached on a specific recommendation being developed, the Lab Lead will have the responsibility to resolve any disagreements with the input, involvement and ultimate decision-making authority of the full Leadership Team.

Each Tiger Team will be expected to develop its own independent mission statement, meeting schedule and expectations for reporting recommendations to the Leadership Team. These meetings will be essential for developing motivating analytical questions; applying questions to specific commercialization pathways; prioritizing key input and output variables; identifying data and data gaps; and ensuring that Tiger Team participants have ownership over the commercialization recommendations development process. Each meeting will be required to complete a pre-determined meeting intake form that will capture minutes and attendance of the meeting. The meeting notes will be kept as a record for existing and new members as well as providing a record for cost-share calculation. Tiger Teams will complete activities, as described in the “deliverables” section of the charter. Tiger Team leadership is responsible for keeping order in meetings, as well as facilitating conversation through which all voices are being heard. If a Teaming Partner feels there is bias occurring in the Tiger Team, they are encouraged to contact the LDES National Consortium lead, Will McNamara.

HOW TO JOIN: Once an organization submits a Letter of Commitment and is acknowledged as an official Teaming Partner within the LDES National Consortium, the designated primary point of contact for that Teaming Partner will have the opportunity to identify individuals from their organization to participate in specific Tiger Teams. Multiple individuals from the same Teaming Partner may join the same Tiger Team, and there is no restriction placed on the number of Tiger Teams in which a Teaming Partner may choose to participate.

Disclosure: Only public, non-proprietary information is to be shared during Tiger Team meetings, in reports, during webinars, etc. It is the responsibility of the Teaming Partners not to share proprietary or sensitive information. All findings of the LDES National Consortium will be made publicly available.

Working Group

In addition to the Tiger Teams, Teaming Partners can participate in the Stakeholder Engagement Group.

The Stakeholder Engagement Group will be responsible for outreach to Teaming Partners and assisting in the dissemination of information through the Community of Knowledge and Best Practices Website. The Stakeholder Engagement Group will be led by the Business Development Partner, Kailey Fascitelli. The Business Development Partner, in partnership with the Stakeholder Engagement Group, will create an outreach plan to continue growing the Consortium and bringing in new Teaming Partners.

Expected Deliverables

The first phase of the LDES National Consortium is the three-year period during which it will be supported by the federal funding received, which is 10/1/2023 through 9/30/2026. During this timeframe, the main project deliverables produced by the LDES National Consortium include, but are not limited or bound to:

- Community of Knowledge and Best Practices Website.
- Comprehensive set of commercialization recommendations addressing challenges facing LDES technologies that can be submitted to appropriate external entities for requested implementation.
- A unique implementation metric will be created for each recommendation that can be used to evaluate whether or not the submitted recommendation has been implemented by the appropriate external entity. A summary of these findings will be included in final reports prepared by the LDES National Consortium and submitted to the DOE sponsors.
- LDES Demonstrations & Deployments Tracking System.
- LDES Technology Maturity Evaluation Framework (Technology-specific).
- Yearly workshops and outreach activities.
- Plan for transfer of ownership of the LDES National Consortium to private industry partners.
- Others to be determined by the Leadership, as needs arise.

The second phase of the LDES National Consortium will extend beyond this federally funded period, at which point ownership will be transferred to a private entity that will continue to operate the LDES National Consortium without relying on public funding support.

Communications

COMMUNICATION GUIDELINES: All information shared and findings of the LDES National Consortium will be publicly available.

Disclosure: Only public, non-proprietary information is to be shared during the meetings, in reports, during webinars, etc. It is the responsibility of the Teaming Partners not to share proprietary or sensitive information. All findings of the LDES National Consortium will be made publicly available.

All information to be shared externally of the LDES National Consortium must be approved by the Leadership Team. This process will be facilitated by emailing project PI, Will McNamara.

All email communications of the LDES National Consortium should utilize blind carbon copy (BCC), unless previously agreed upon from the recipients that they do not required BCC.

BRANDING CONSISTENCY: The official name is “The National Consortium for the Advancement of Long Duration Energy Storage Technologies.” The abbreviated name is “LDES National Consortium.” Any formal documentation for the LDES National Consortium should follow this nomenclature. The branding elements (logo, document templates, color scheme, etc.) should be used on all documentation for the LDES National Consortium. These elements are not to be used for purposes other than official documentation of the consortium.

WEBSITE: The “Community of Knowledge and Best Practices” is the official name for the LDES National Consortium’s public facing website. The website will be the primary repository for the output of the LDES National Consortium, along with knowledge-sharing information that seeks to enhance the public’s understanding of LDES and the role it will play in the energy future of the US. It is anticipated that the Website will include, but is not limited to:

- A list of participating Teaming Partners that includes organization name, URL, primary point of contact name and title, and contact information (after approval from the Teaming Partner organization).
- Commercialization recommendations developed by Tiger Teams.
- A glossary of “LDES common terminology” with suggestions on how key terms should be defined.
- A library of previously published LDES materials developed by our national Lab Partners and DOE offices.

WEBINARS/WORKSHOPS: All events on behalf of the LDES National Consortium will run in accordance with the policy and procedures required at Sandia National Laboratories. All workshops or events should be held in partnership with the consortium’s Business Development Partner, Kailey Fascitelli. Kailey will guide the membership through the proper procedures.

For any online meeting/webinar, LDES Consortium Leaders should check guests lists to ensure all participants are eligible Teaming Partners and clear any bots/unauthorized individuals. It should also be announced at the beginning of meetings that “bots/unauthorized individuals should leave the meeting.” If the meeting is to be recorded, then it should be announced at the beginning of the meeting/webinar, “this meeting will be recorded,” to allow participants to leave if they are not comfortable with being recorded. Further, any AI bots for recording/note taking added to any

LDES Consortium meeting will be immediately removed by the meeting organizer or other representative of the LDES Consortium Leadership Team in attendance as the use of these recording devices violates Sandia policy.

MEDIA/PRESS RELEASES: All media/press release interests should contact the Business Development Partner, Kailey Fascitelli.

FEEDBACK LOOPS: The LDES National Consortium will accept feedback on any documents publicly released. The feedback loop from Teaming Partners, community members, and the LDES industry are appreciated to ensure our findings are accurate and helpful.

Transition to Industry Leadership

The LDES National Consortium will transition from Laboratory-supported/DOE-funded to industry-owned and operated after the first three years of establishment. This section will detail the process to be followed once the official process has been determined by the Leadership team.

Other

The LDES National Consortium will not be involved with any lobbying activities, additionally Teaming Partners cannot lobby on behalf of the LDES National Consortium. This is in accordance with 18 U.S. Code 1913, 13 U.S. Code 1352, 10 CFR 601.



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