



# **CUSTOMER ADOPTION TIGER TEAM**

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# Objectives of Customer Adoption Tiger Team

- ✓ Assess and define utility needs for LDES and help establish stakeholder and community interaction channels to identify various customer needs. The commercialization channels and understanding of customer needs provide information and resources intended to support LDES commercialization activities by assessing LDES technology suitability and economic impact to end users.
- ✓ Develop plans for Customer Adoption of LDES and key objectives and goals, infrastructure requirements. The tiger team will involve utilities to consider LDES in their future integrated resource planning (IRPs) or other long-term plans. We pull information generated from other tiger teams to facilitate knowledge to facilitate utilities on how to assess their future needs for LDES.
- ✓ Assemble Industry responses, implementation, and adoption of LDES and generate report/recommendations on how industry has responded, implemented or otherwise adopted the full suite of commercialization pathway. The assessment will include a measurement of impacts based on quantifiable metrics established in the recommended action plan for customer adoption of LDES.



# Challenge #11 Recommendations:

11.1 The Federal Power Act (FPA) provides states with many of the policy levers to influence, if not dictate, the power generation mix. Congress has provided tax credits, loans and grants to encourage the deployment of low or non-emitting resources, but states have set mandates to achieve the transition.

11.2. In conjunction with federal support on demonstrating varieties of economic LDES technologies beyond the Li-ion batteries to improve technology maturity and investment confidence. It is recommended that a tax break or loan guarantee be established for deploying LDES facilities as a power generation resource to complement retiring base-load generation.

11.3. Several barriers to LDES deployment and policymaking were identified. Two key themes are: 1) the limited role in which regulators can participate in policymaking, and 2) the cost (LCOS and capital investment) of LDES. As one participant said when discussing actions that state regulators can take to support LDES adoption, “Everything that has to do with money should be at the top.”

## Liftoff Identified Challenge #11:

State-level policymaking specific to LDES is not developing at an acceptable level. Much of this may be due to lack of knowledge among state regulators regarding actions that can be taken, such as modifying state RPS requirements; tax breaks or other incentives to attract early deployment or manufacturing hubs; new IRP requirements; clarifying ownership policies.





# **USE CASE DEVELOPMENT TIGER TEAM**

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# Objectives of Use Case Development Tiger Team

- ✓ Within the context of this Tiger Team, “Use Case Development” can refer to current or future interests in using a wide range of LDES technologies for a variety of applications.
- ✓ The Use Case Development Tiger Team is actively assessing utility uses of a broad range of LDES technologies and developing consensus-based recommendations to define the use-case-focused pathways and timing of commercialization so that overall use case development for LDES is enhanced:
  - Define and assess use cases relevance to LDES and key performance metrics (BP1).
  - Study utility use cases and conduct geographical readiness assessments (BP2).
  - Conduct LDES Projects Workshop & Release Stakeholder Recommendations (BP3) contribute to finalize & release commercialization pathway recommendations.



# Challenge #2 Recommendations:

**2.1:** The question is vague about what types of technologies, so we got sparse responses on recommendations. However, storage roundtrip efficiency (RTE) is listed as the third most important factor affecting customer concerns behind cost of storage and technology maturity. To compete with Li-ion batteries in a range of 80–90% RTE by achieving 7–15% improvement in storage efficiency, it means that the RTE of a storage technology needs to be above 50% at least, which also provides an acceptable cost of storage. It is a target performance parameter in evaluating storage technologies or performing technoeconomic analysis.

**2.2:** Use cases for LDES are numerous, but some are leading contenders for early adoption. The tiger team has identified several (> 10) distinct use cases for LDES technologies. A subset is provided below (in no particular order of importance): 1. Capacity firming; 2. Storage strategies for disadvantaged communities; 3. Avoid or delay transmission line investments; 3. Arbitrage; 4. Baseload capacity replacement; 5. Fast frequency response; 5. Electric vehicle charging during off peak hours; 6. Black start; 7. Resiliency; 8. 24/7 PPAs for C&I customers (e.g., data centers); 8. Transmission deferring and congestion relieve

## Liftoff Identified Challenge #2:

LDES technologies must achieve 7-15% improvement in roundtrip efficiency in order to compete with Li-ion storage and hydrogen. Redefine as basis points, percentage, or other? It may also be more instructive to rephrase this as LCOS instead of % increase in eff.



# Challenge #3 Recommendations:

**3.1:** Developing a technology evaluation tool based on competitive factors on various energy storage technologies is necessary in supporting use case development. Participants of Use Case Development Tiger Team ranked LCOS as a top factor concerning use case deployment. Secondly, technology maturity still hinders the confidence of LDES technology adoption. Other factors are more application specific in developing use cases.

**3.2:** Different use cases can prioritize different attributes. These attributes include levelized cost of storage (LCOS), capital costs, operation and maintenance costs, round-trip efficiency, lifetime, self-discharge rate, ramp rate and/or response time, supply chain, safety, and footprint. Across use cases, there is uniform agreement that LCOS (or similar cost metric) is the single most important attribute.

## Liftoff Identified Challenge #3:

Presently, there is no publicly available evaluation of LDES technologies against six primary competitive factors.



# Challenge #8 Recommendations:

**8.1:** Develop guidance for VRE ratio on utility power generation relevant to grid security and energy storage needs with diminishing base-load coal, gas, and nuclear plants for resources adequacy and the impact of adverse climate events on grid demand. Develop guidelines in evaluating LDES systems to substitute flexible coal and gas peaking plants with increased renewable generation on grid that likely will make maintaining and operating flexible and gas peaking plants less economic and retire more coal and gas plants.

**8.2:** Firming PPAs and industrial loads (e.g., data centers) might be some of the first movers due to wealthy corporations' sustainability goals, high risk tolerance, and behind-the-meter (BTM) application. Often, Teaming Partners see front-of-the-meter (FTM) as the largest market and could be where early adopters target deployment due to the large capital investment. However, the group agrees that BTM applications are easier to get deployed quickly due to less regulatory requirements and timelines. Therefore, firming PPAs and industrial loads bring together BTM applications benefits while still having enough capital and risk tolerance.

## Liftoff Identified Challenge #8:

LDES is not included in most utility grid firming plans or integrated resource plans (IRP).

