DEMONSTRATIONS AND DEPLOYMENTS

HENK LAUBSCHER

Main Themes

- Different applications, scenarios
- R&D VS revenue generating
- TRL requirements for Demonstrations VS Deployments
- Capital Investment required
- Regulatory, permitting and grid interconnect differences
- Project lifetime
- Risk appetite for the owner/operator
- Scale
- Supply chain and infrastructure

Challenges Identified

- **Identified Challenge #5**: A comprehensive assessment of necessary supply chain improvements specific to LDES technologies does not presently exist.
- **Identified Challenge #7**: Presently, there is no publicly available evaluation of LDES technologies against primary competitive factors.
- **Additional Challenges #1D&D**: Presently, there is a lack of understanding of the practical/technical and economic scalability of novel LDES technologies, for the application of supporting a national/large scale electricity grid. This is a common challenge among many stakeholders that are incentivized to transition to clean energy technologies is a given timeframe.
- **Additional Challenges #2D&D**: Develop a tool (map) to assist end users and technology developers with locations of resources suitable for specific energy storage technologies.
- **Additional Challenges #3D&D**: There is a need for a set of rules/guidelines and a framework for technology differentiation and optimizing technology selection for specific applications and use-cases.

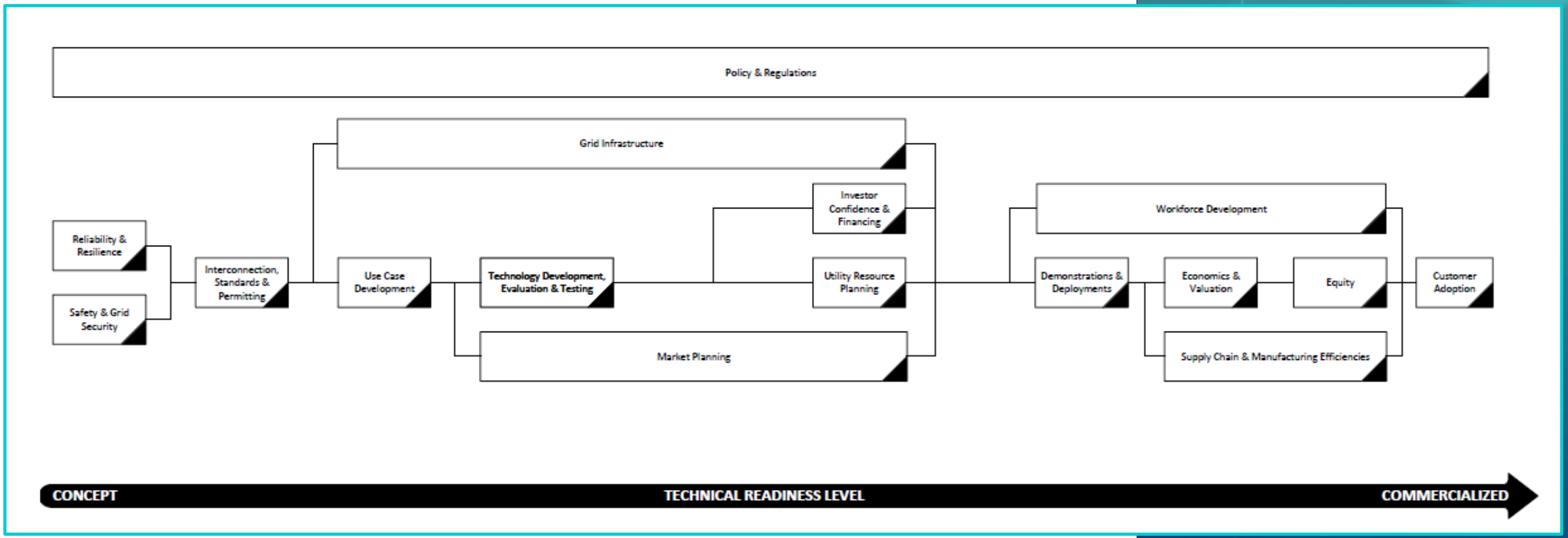
Recommendations

- **Recommendations for Challenge #5**:
  a) The technology maturity requirements and maturation process
  b) Assumptions and environmental conditions
  c) Technical and administrative challenges
  d) grid services requirements. These are generalized for a wide range of LDES technologies.
- **Recommendations for Challenge #7**:
  a) Round trip efficiency
  b) Compatibility with existing grid infrastructure
  c) Revenue generation model, based on PPA/ offtake contract and the capacity factor equivalent of a LDES system
  d) CAPEX
  e) OPEX
  f) Estimated lifetime
  g) Total LCA cost estimate that is based on realistic numbers (including decommissioning)
  h) Environmental impact factor (this is hard to define). These primary competitive factors should be weighted according to their relevance and hierarchy in the overall competitive matrix.

Projects Tracking Database

- Categorization criteria
  - Power rating
  - Energy rating
  - Ramp-up time
- Outreach effort to various entities
  - LDES Council
  - EPRI
  - Technology providers
  - Industry network and stakeholders
- Focus on US-based projects only
- Wide range of technologies
- Work in progress

Team Roles – Technology Development



Acknowledgments

Sandia National Laboratories is a multimission laboratory managed and operated by National Technology & Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525.