

DOE microgrid program strategy

Overview

- **Vision:** “By 2035, microgrids are envisioned to be essential building blocks of the future electricity delivery system to support resilience, decarbonization, and affordability.”
- Papers include recommendations for funding and priorities over 10 years with specific action steps
- Written by teams of national labs and university members, reviewed by industry advisory panel
- National labs include Sandia, NREL, PNNL, Argonne, Oak Ridge, Lawrence Livermore, LBL, and Los Alamos

The seven papers

1. [Program Vision, Objectives, and R&D Targets in 5 and 10 years](#)
2. [T&D Co-simulation of Microgrid Impacts and Benefits](#)
3. [Building Blocks for Microgrids](#)
4. [Microgrids as a Building Block for Future Grids](#)
5. [Advanced Microgrid Control and Protection](#)
6. [Integrated Models and Tools for Microgrid Planning and Designs with Operations](#)
7. [Enabling Regulatory and Business Models for Broad Microgrid Deployment](#)

Microgrid trends

DERs are growing

- By 2050, 30 to 50% of U.S. generation capacity will be DERs

Microgrids are growing

- Over 200 annual installations 2016-2019, 65% growth over 2013-2016
- Global capacity to grow from 3,500 MW in 2019 to 20,000 MW by 2028 (Navigant)
- U.S. microgrid capacity expected to double by 2025 (still less than 1% of grid capacity)

Microgrids are getting micro-er

- Average microgrid under 5MW in 2019
- Due to declining costs and growing interest

Microgrids are getting cleaner

- Microgrid capacity from fossil fuels declined from 89% in 2019 to 16% in 2021

Microgrids enable greater DER deployment

- Today, small penetrations of unmanaged DERs (<15% per feeder) are possible
- CA CEC study indicates up to 100% is possible with managed DERs
 - Today, this is complicated and expensive to manage as most approaches are centralized
 - Distributed controls tech is in development
- Microgrids enable DERs with hierarchical controls and provide a stepping-stone

Summary of goals and vision

- Goals
 - “Promote microgrids as a core solution for increasing the resilience and reliability of the EDS [grid], supporting critical infrastructure, and reducing social burdens”
 - “Ensure that microgrids serve as a driver of decarbonization for the US EDS by acting as a point of aggregation for larger number of DERs, with 50% of new installed DER capacity within microgrids coming from carbon-free energy sources by 2030.”
 - “Decrease microgrid capital costs by 15% by 2031, while reducing project development, construction, and commissioning times by 20%.”
- Broad focus areas
 - Near-term: Stand-alone and single-owner microgrids
 - 5-10 years: Networked and multi-owner microgrids
- Gaps in knowledge
 - Barriers to cost effective microgrids across life cycle
 - State energy storage policy overviews and analysis
 - Standards gap analysis and standards development
 - Resilience benefit and value of microgrids
 - Impacts of microgrids on energy equity and community resilience
- Needs
 - Benchmarking studies, stakeholder engagement, tech transfer, workforce development
 - Tools to assess multi-dimensional value of resiliency
 - Multi-property microgrid regulatory framework and model interconnection procedures
 - Validation of emerging technologies, tools, and approaches

Future opportunities to get involved

Specific research questions

- Black start of commercial building systems – how to control load ramp up after outages?
- How to transition existing microgrids from fossil fuels to DERs?
- How to define and value resilience from a community perspective?

Specific funding recommendations

- “Regulatory Sandbox” Microgrid Pilots
 - Partnership between utilities, regulators, and local governments
 - Implement multi-user microgrids in a framework for addressing regulatory challenges and testing solutions.
 - Focus on high-visibility, replicable projects to serve as living laboratories.
- Model Interconnection Procedures for Multi-property Microgrids
 - IREC DER interconnection procedures identified as a template.