

DOE MICROGRID INSTALLATION DATABASE

Industrial Efficiency & Decarbonization Office

PI: Mahabir Bhandari, Oak Ridge National Laboratory; Presenter: David Jones, ICF

Project Period: 2020-Present

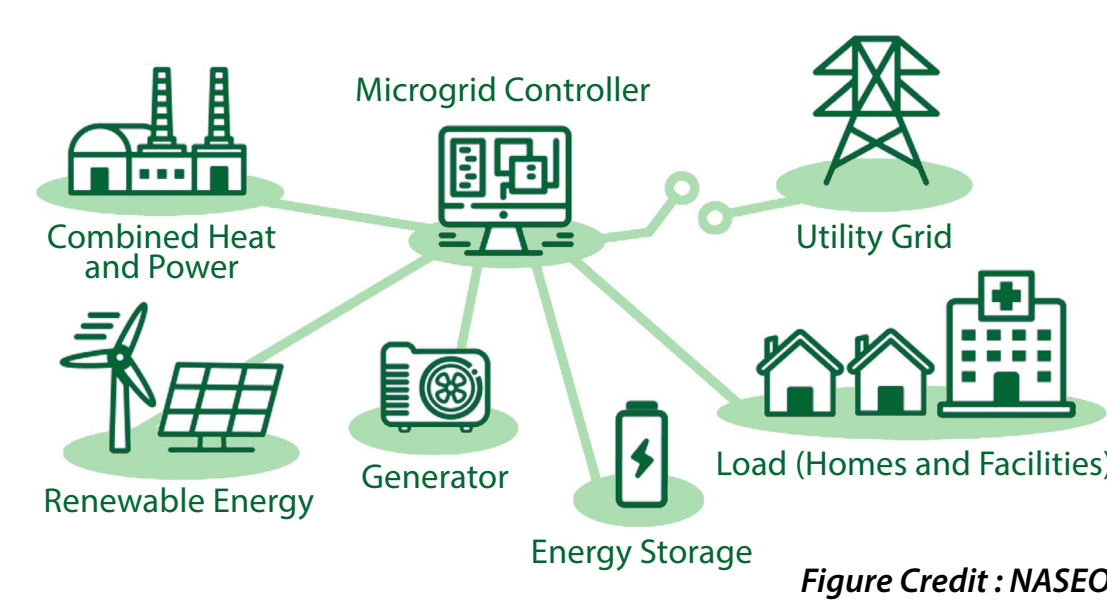
This poster does not contain any proprietary, confidential, or otherwise restricted information

ABSTRACT

- With support from DOE and ORNL, ICF developed a Microgrid Installation Database to track the development of microgrids and the use of combined heat and power (CHP) and other on-site energy technologies for resiliency, efficiency, and reduced carbon emissions.
- The database was released in 2021 as a companion to the successful CHP Installation Database.
- The Microgrid Installation Database includes information on active microgrid installations across the United States, all using distributed energy resources (DERs) to provide resilience to host facilities.**
- As of April 2023, the online database contains **685 microgrids** with over **4.3 GW** in capacity.

WHAT IS A MICROGRID?

The U.S. Department of Energy's Microgrid Initiative defines Microgrid as **"a group of interconnected loads and DERs within clearly defined electrical boundaries that acts as a single controllable entity with respect to the grid."**



PROJECT OVERVIEW

Project Objectives: Share information on clean and resilient onsite energy options within microgrid installations across the United States, **through the use of a publicly available database.**

The developed database includes operating microgrids in the United States, with detailed information on the facilities, location, application, and DER technologies. It also helps in identifying **market trends.**

Project Partners: Oak Ridge National Laboratory, ICF, U.S. Department of Energy

Timeline:

2019: ICF developed initial Microgrid Installation Database

2021: Microgrid Installation Database website launched

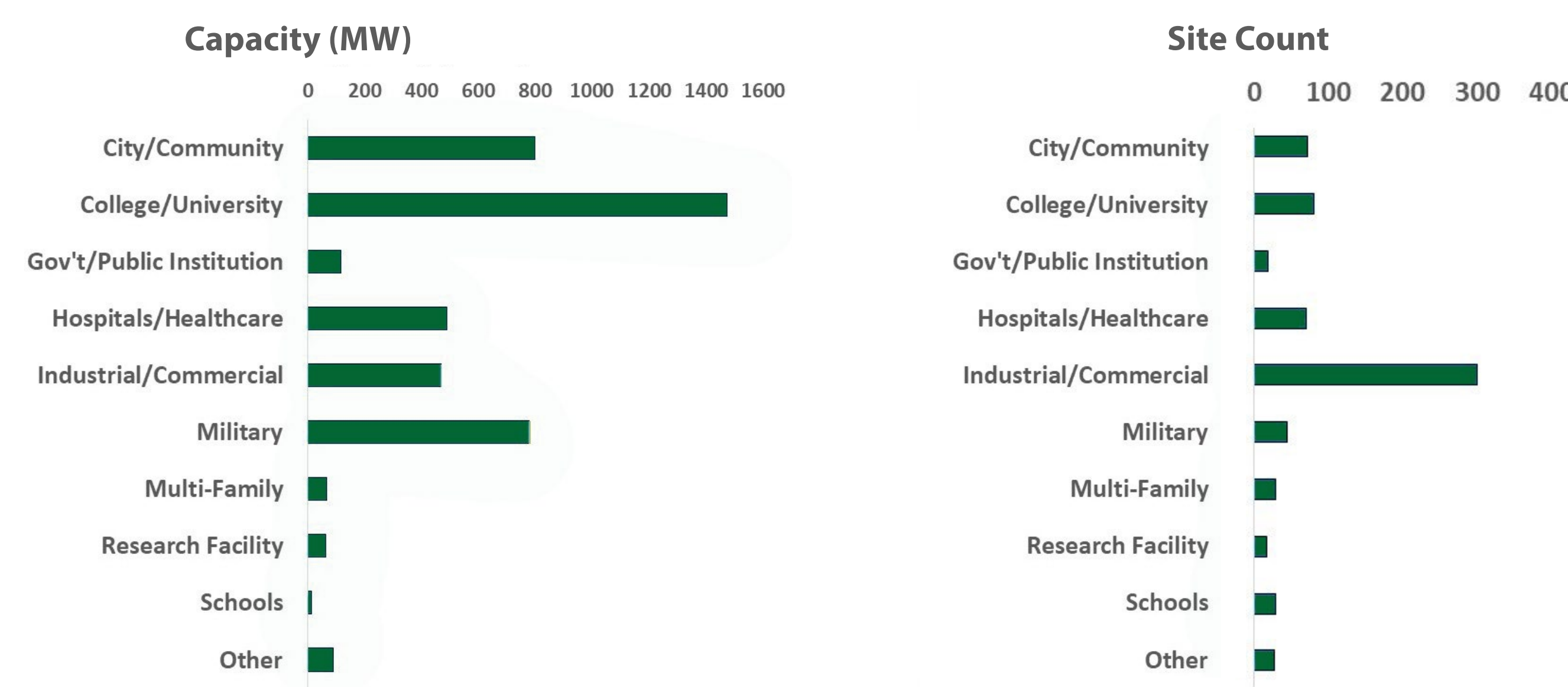
ALIGNMENT WITH OFFICE MISSION

The Microgrid Installation Database supports IEDO's goals of deploying energy efficiency and decarbonization technologies. Encouraging the growth of microgrids at industrial sites and other applications increases opportunities to introduce innovative onsite energy technologies and supports IEDO's net-zero greenhouse gas emissions goal by 2050.

BACKGROUND

- Following the success of the CHP Installation Database that tracks and characterizes CHP installations across the United States, the microgrid database was developed to monitor the growing interest in resilient microgrids using a variety of onsite energy resources including CHP.
- Microgrids are commonly found at campuses such as colleges & universities, hospitals, and military bases, or industrial sites with high energy demands. **Microgrids offer energy reliability, resilience, improved efficiency, and decarbonization** compared to conventional power options.

Operational Microgrids by Application



- Microgrids can be configured to connect multiple onsite energy technologies including CHP, solar PV, and battery storage.
- Facilities with microgrids can maintain critical operations during extended grid outages
- Microgrids are particularly valuable in regions that are at-risk from natural disasters, sites that serve vulnerable populations, and facilities that serve critical community functions.



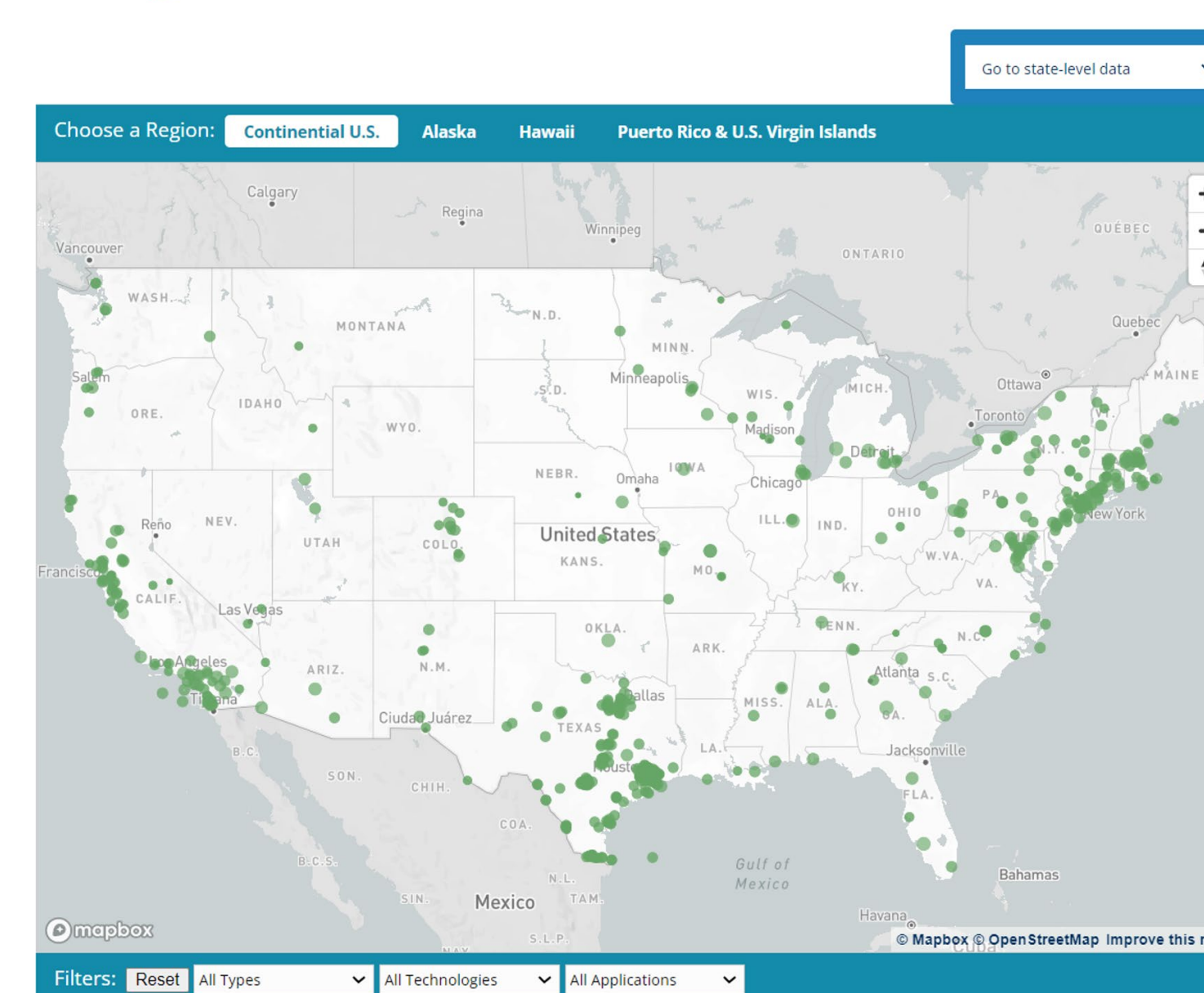
Microgrid installed (2020) at the Montgomery County Public Safety Headquarters in Gaithersburg, MD. The project includes 2 MW of solar PV and an 800 kW CHP system (Credit: Montgomery County, MD)

THE ONLINE DATABASE

- A comprehensive **web-based tool** that serves as a reliable source of information on U.S. microgrids
- The platform provides **downloadable detailed data** and **summary tables** on operating microgrids for independent analysis
- Users can also suggest edits and additions, ensuring all information is current and all new systems are included



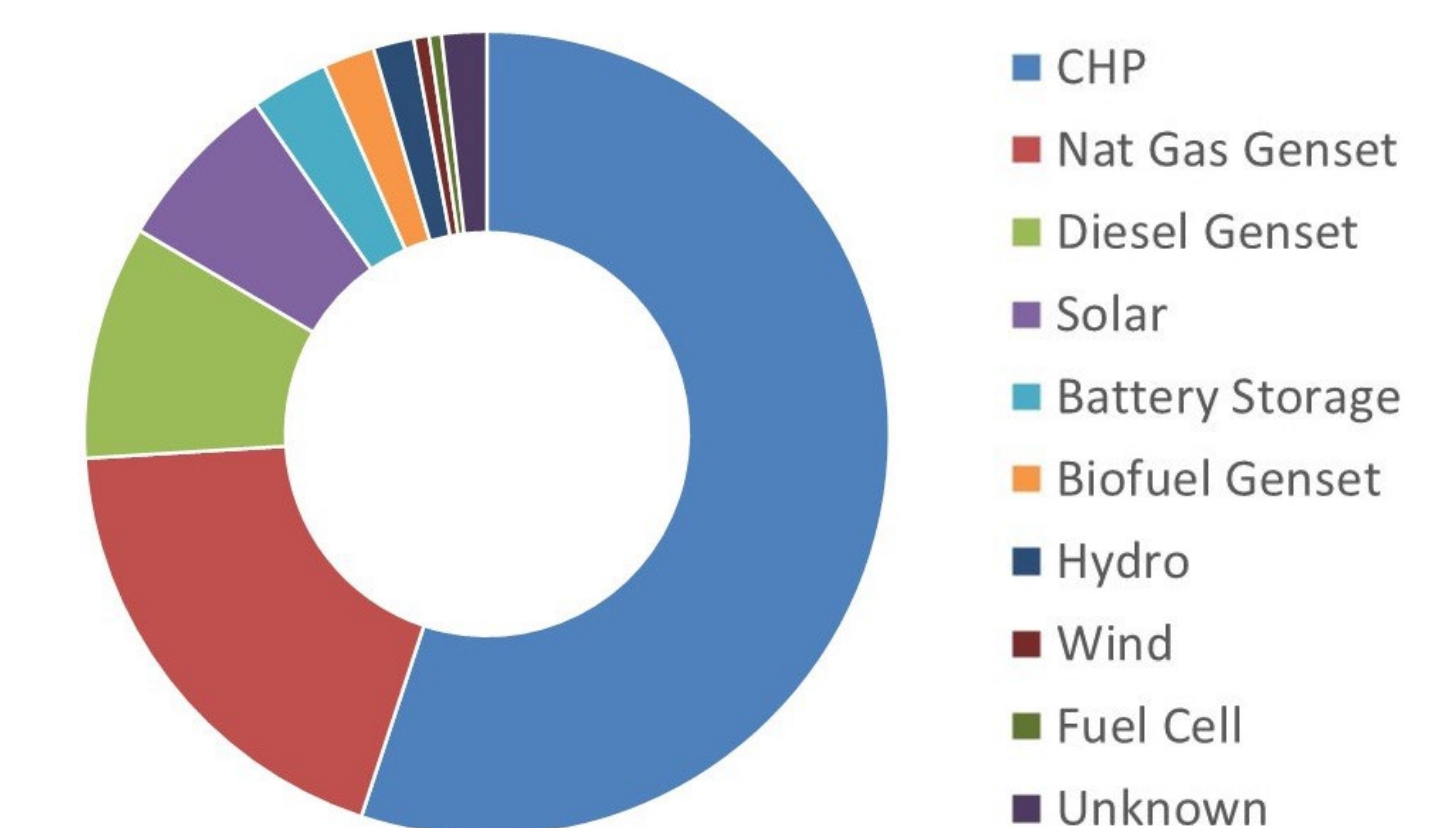
Microgrid Installations



MICROGRID TECHNOLOGY TRENDS

- CHP is a key technology, used in one third of microgrids (208 sites) with over half of the total electric capacity in the database.
- Solar PV, battery storage, and diesel generators are the technologies most commonly paired with CHP.
- CHP provides dispatchable on-site power and thermal energy for long duration resilience and operational reliability

Total Capacity of Operational Microgrids by Technology



CHALLENGES AND IMPACT

Challenges: Tracking and verifying microgrid installations with different technologies across multiple states and applications

Impact: The Microgrid Installation Database is a **publicly available resource** showing how microgrids offer resilient onsite power generation, with real world examples.

The Microgrid Installation Database will **increase awareness** of microgrids and **accessible data**, encouraging future deployments and enabling trend analysis.

Microgrids enable critical facilities to operate during storms and grid outages

DOE demonstrates microgrids used across the U.S. with public database

Market understanding and acceptance; encouraging microgrid deployments

The online database is a unique resource for providing key data on U.S. microgrids. The Microgrid Installation Database is now **the most comprehensive public source of information on microgrids in the United States.**

FUTURE WORK

- Monitor the microgrid market for planned projects and recent installations
- Update the Microgrid Installation Database website on a regular basis
- DOE will use data and trends to inform strategies for the Onsite Energy and CHP Deployment Program, and the upcoming **Onsite Energy TAPs.**