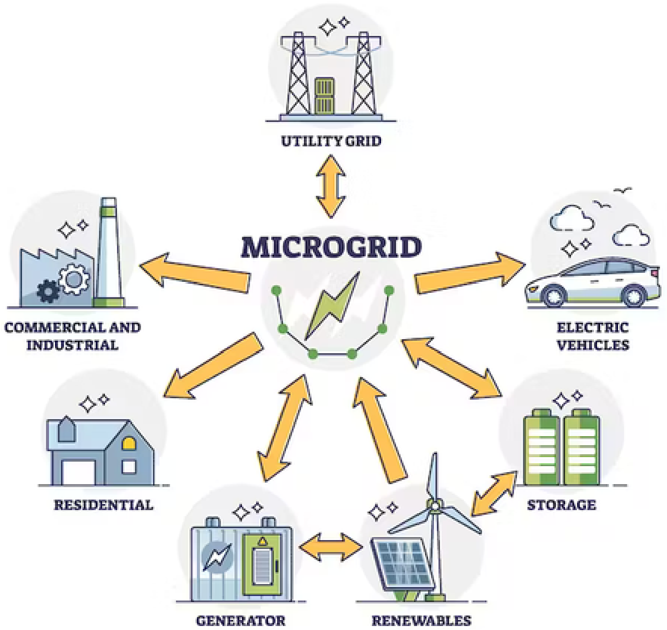
MICROGRIDS FOR ENERGY RESILIENCE

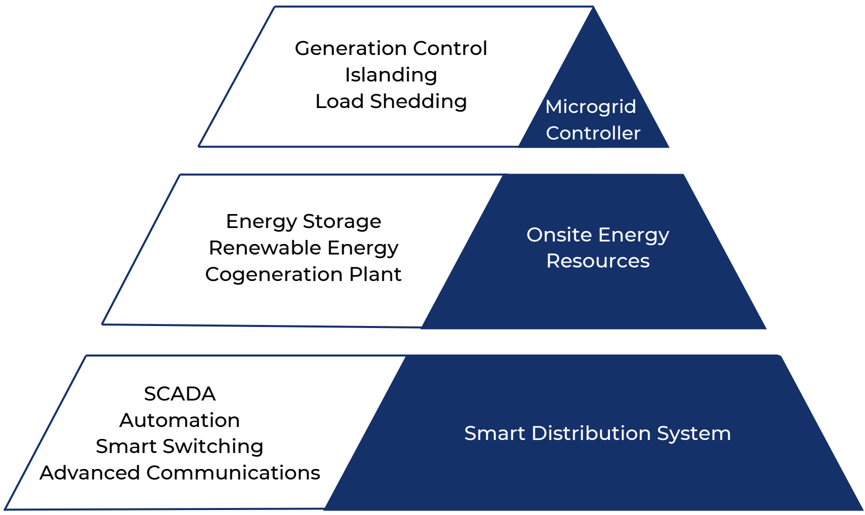
Let's talk about your project.
Contact:
Ajay Sitaula
aps@clpinc.com
303.495.0651

As the energy industry transitions from fossil fuel-based energy supplies to more renewable energy resources, localized and distributed renewable energy resources are expected to grow rapidly. Utility distribution systems are also going through a major grid modernization effort where smart grid technologies, distribution SCADA, and advanced distribution management systems (ADMS) are becoming mainstream. On the other hand, extreme weather, climate change, natural disaster, cyber threats, and capable adversaries are threatening the reliability of the greater electrical grid, especially for critical infrastructure and remote communities. As a result, microgrids are becoming more relevant than ever. Advancement in energy storage technologies enables formation and operation of microgrid systems using renewable energy resources making them economical, which was not feasible in the past.



WHAT IS A MICROGRID?

A microgrid is a small, self-sufficient, and localized electrical grid that can operate autonomously in absence of a larger electric grid. Three main components of microgrids are – onsite energy resources, smart grids with controllable loads, and microgrid control systems. Microgrid sizes can vary from a few kilowatts (kW) to tens of megawatts (MW) depending on applications. Some of the key technical challenges in implementing a microgrid include black-start, inrush, grid stability, load imbalance, protective device coordination, system grounding, load-shedding, and power quality. Other challenges include ownership, operations, maintenance, and safety related issues. Careful and diligent planning and design are keys to successful implementation and operations of a microgrid.



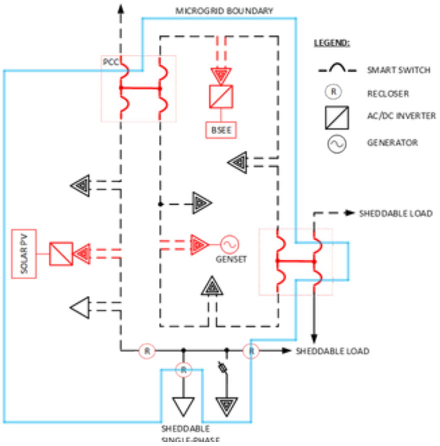
CLP ENGINEERING AND MICROGRIDS

CLP Engineering (CLPE) has more than a decade of experience in studies, planning, design, and implementation of microgrid systems. Unlike technology providers or traditional consultants, our team has a full spectrum of microgrid planning and design experience from initial feasibility studies to final commissioning and operations support. CLPE has successfully implemented several microgrids to date. In recent years, we have completed feasibility studies and utility interconnection studies for many microgrids with sizes ranging between 1.5MW to 10MW.

Currently, the CLPE team is heavily involved in the design and implementation of the following microgrids:

1. Pitkin County AABC Microgrid – 1.5MW/8MWh battery energy storage (BESS), 5MW existing ground-mount solar PV, 100kW existing rooftop solar, 100kW new carport solar PV, and 300kW new rooftop solar PV.
2. Fort Campbell CAAF Microgrid – 6MW natural gas generation.
3. Fort Riley Microgrid – 7.5MW natural gas generation.
4. Joint Base Lewis McChord (JBLM) DESHQ Microgrid – 6MW natural gas generation, 4.5MW/4.5MWh BESS, and 150kW ground mount solar PV.
5. JBLM GAAF Microgrid – 3.2MW natural gas generation and 4MW/4MWh BESS.

CLPE'S APPROACH



Microgrid technologies and design practices are still evolving, and industry standards have not fully caught up with the requirements and guidelines. Choosing an experienced technical team that understands all aspects of microgrid components is key to a successful implementation. CLPE has expertise and capabilities to support microgrid planning, design, and implementation. We can provide turn-key solutions or help with specific tasks to supplement your technical team's capabilities. Over the last decade, we have accumulated many lessons learned examples and developed streamlined planning processes.

Below are CLPE's 12-step microgrid planning processes:

1. Understand the true as-built layout of the existing electrical system
2. Define overall microgrid objectives and functional requirements
3. Create microgrid boundary
4. Conduct microgrid load analysis
5. Size generation and storage capacities
6. Define communications architecture, protocols, and cyber security requirements
7. Identify step-loading requirements for black start
8. Define load-shedding plan
9. Define microgrid controller functional requirements
10. Develop major material technical specifications
11. Establish ownership, operation, and maintenance model
12. Establish sequence of operations (SOP) procedures