



## Microgrid consulting and design capabilities

### Is a microgrid right for you?



In the aftermath of recent natural disasters, and the increasing cyber threats, many states are beginning to offer grants to install infrastructure to address the need for power reliability and grid resiliency. Further, in other parts of the world, over one billion people still lack access to electricity. Microgrids provide an excellent platform to keep the power on and operate critical assets over long periods of time, isolated from a damaged grid as well as to bring electricity to developing parts of the world. But what configuration and components are optimal for your specific power needs? Do you need prime generation or standby distributed generation assets and what types? What is the most economical way to power your microgrid while keeping it resilient?

### Feasibility study: The process

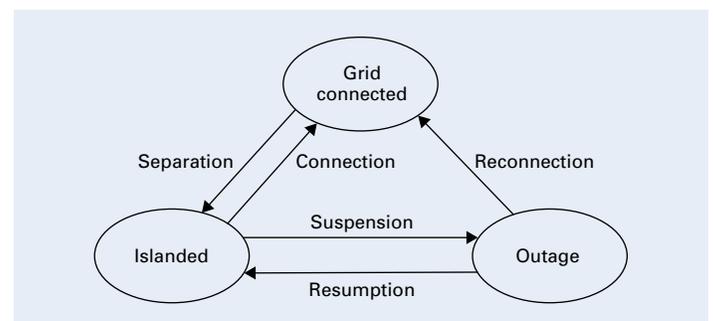
#### Determining the need

The technology is available today to allow microgrids to function with both prime or standby distributed generation assets during times when the grid is healthy and operating properly, while also having the capability to physically disconnect from the grid and operate in an islanding mode for extended periods of time powering critical infrastructure.

Each circumstance and set of requirements is unique and must be considered carefully when developing the strategy and execution plan to provide energy reliability. For that reason, it is important that a careful analysis of risks and needs specific to each situation is fully reviewed and understood.

#### Developing the plan

From that analysis, a comprehensive and tailored energy reliability plan can be developed. Specific contingencies should be examined and addressed in the resulting action plan. Eaton works with you to identify each critical asset (facilities and applications) addressed in the study in terms of energy needs and the criticality of each identified asset. Based on your identified power-critical assets, load sizes and profiles, location of supply and storage infrastructure necessary to adequately support critical assets will be identified and designed into the proposed system. Renewable energy assets, if desired, can also be incorporated into the microgrid design. Additionally, the type and availability of the fuel to power other distributed generation assets is evaluated under the foreseeable contingencies and environmental rules.



Microgrid system operating modes

## Feasibility study: Aspects

Our team of experienced engineers will provide a cost-effective feasibility study for building a system to maximize uptime and reliability, while also addressing financial factors. Our approach investigates and provides all or some of the following:

- Analysis of the current electrical power system infrastructure, existing generation sources and available utility incoming sources
- Identification of microgrid configuration and point(s) of interconnection with utility grid
- Review and evaluate existing and future distributed energy resources (DERs) such as solar, wind, combined heat and power (CHP), fuel cells and energy storage
- Plant site visual audit of electrical equipment types, ratings and operating conditions
- Development of scenarios to address options for short-term and long-term microgrid system configurations, which could include:
  - Critical load uptime and black-start capabilities
  - Extended outage capabilities: 1-hour vs. 1-day vs. 1-week
  - Harmonics and power quality issues and transient response and system restoration
  - Microgrid conceptual design—preliminary sizing and siting of DERs and energy storage, and preliminary electrical one-lines and control system architecture

## Feasibility study: Potential recommendations

Recommendations from Eaton's microgrid study and consultation could include:

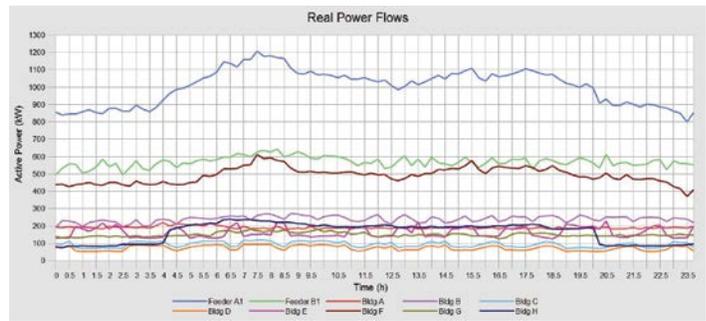
- Short-term reliability improvement recommendations
- Preliminary recommendations for future long-term design criteria
- Cost-benefit analysis of various DERs and energy storage options including optimal sizing for minimized levelized cost of electricity, in view of available incentives
- Financial pay-back options: peak-shaving, load shifting and/or shedding, net metering (power export), ancillary services
- Selection of suitable energy storage technology and applications assessment
- Microgrid options and benefits resulting from the various DERs such as solar, wind, CHP, fuel cell and in-house fossil fuel generation
- Recommended modes of operation and switching sequences
- Go-forward recommendations
- End-user presentation and review of consultative work

## Why choose Eaton?

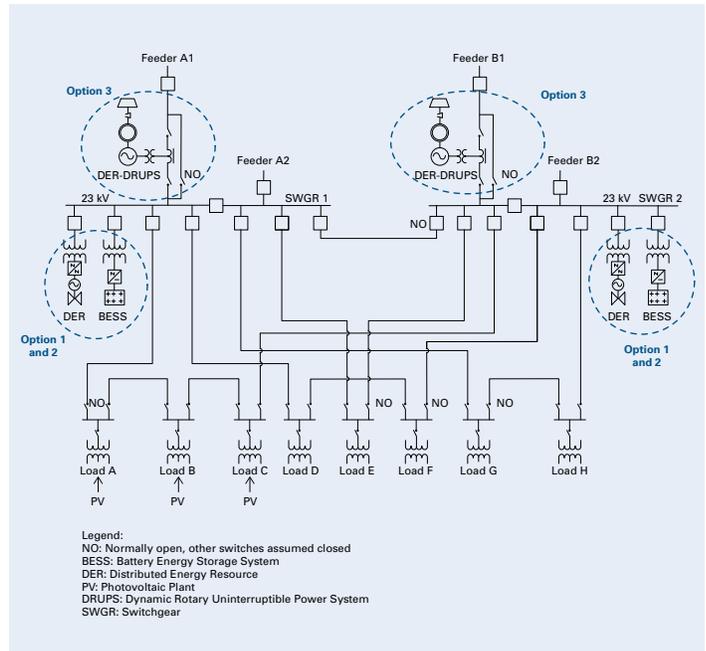
Eaton's Electrical Engineering Services & Systems team is one of the largest and dispersed group of experienced engineers and technicians. We offer extensive experience in electrical power distribution systems design, feasibility studies, installation, startup, commissioning, maintenance, troubleshooting, life-extension and ongoing monitoring of operating parameters as well as failure indicators.

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Sample microgrid simulation result



Sample of proposed microgrid configuration options

For more information or if you have any questions or requests, please visit

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[Eaton.com/microgrid](http://Eaton.com/microgrid)

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