OnGrid *Options*

RESILIENT COMMUNITY GRIDS

Creating An Affordable and Resilient Energy Transition

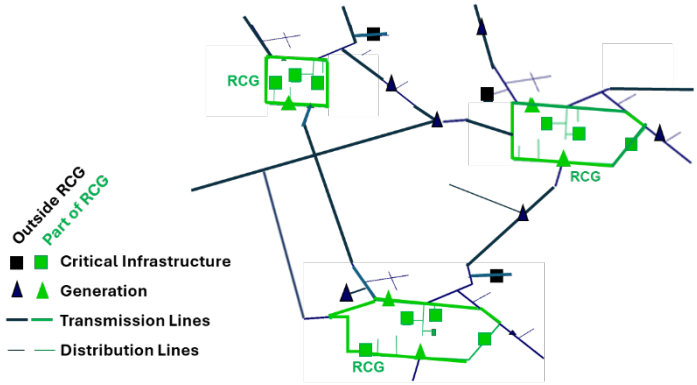
The electric power sector faces the unprecedented challenge of simultaneously achieving three goals: increasing resilience, decarbonizing, and facilitating electrification. All three goals must be accomplished as the electric grid undergoes its most profound transition in over a century. Renewable and distributed energy resources are increasingly being deployed; grid technologies are changing and becoming digital; and consumers are gaining greater control. All this poses further challenges to electric sector resilience.

Current methods of improving grid resilience—hardening, recovery plans, collaboration among utilities, and microgrids—all help, but are often expensive, cover only limited infrastructure and threats, and provides only one defense. The most effective approach must be affordable, address infrastructure interdependence, and be equitable. Resilient Community Grids can provide all these benefits by taking advantage of existing facilities and sharing costs among interdependent critical infrastructure. They also provide better platforms for renewable and distributed energy resources.

What Are Resilient Community Grids (RCG)? An RCG consists of a local section of an electric transmission and distribution (T&D) network containing both power generation and interdependent critical infrastructure facilities that can be temporarily "islanded" to operate independently during regional outages. Unlike microgrids, RCGs are intrinsic parts of the T&D grid and serve multiple facilities under different ownership at different locations. RCGs have independent control and cybersecurity systems that do not operate and are not visible under normal conditions. RCGs cost-effectively protect grid sections serving critical infrastructure from multiple threats and reduce risks from infrastructure interdependence. RCGs add value to renewables and Distributed Energy Resources (DER) by enabling those resources to provide a new, vital community resilience service.

RCGs enable the most important and often interdependent critical infrastructure serving a community and the nation to be protected using existing grid infrastructure. RCGs can be created where a community's critical infrastructure and electric generation and storage resources cluster within the T&D grid. This is not everywhere, but it is common.

Clustering of Resources and Community Critical Infrastructure Creates RCG Opportunities



RCGs uniquely protect communities and their interdependent critical infrastructure. They operate at a community scale—larger than a facility or campus microgrid, but smaller than a regional grid. RCGs include pre-selected conventional T&D assets and may include central-station and distributed generation, as well as demand-response, energy storage, and even microgrids. RCGs use their resources to assure electricity for critical infrastructure. They can also assist in the restoration of the broader T&D grid after a regional outage.

RCGs provide a missing intermediate scale to the grid. Many resilience concerns are about "black swan" events triggered by extreme and unexpected events. The large scale of the electric grid provides many economic and reliability advantages but does not help and may even exacerbate such threats. Microgrids typically protect one facility at a relatively small scale. Against such threats, the best defense is not large or small scale, but diversity of resources, reduced interdependence, redundancy, strategic hardening, layered defense, independent operability, and focus on what is critical. That focus is vital because everything cannot be defended from every threat all the time. An RCG cost-effectively provides both scale economies and strong protection of communities.

Resilient Community Grids Have Many Advantages

Resilience

- ✓ Protects critical infrastructure
- ✓ Reduces infrastructure interdependence
- ✓ Uses independent cybersecurity
- ✓ Has fewer points of vulnerability
- ✓ Creates system diversity and redundancy
- ✓ Helps restart the wider grid if needed

Economic and Regulatory

- ✓ Creates economic development advantage
- ✓ Uses existing T&D and generation assets
- ✓ Enables scale economies and cost sharing
- ✓ Helps meet regulatory mandates
- ✓ Creates new utility business models
- ✓ Provides explainable costs and benefits

Renewables and DER

- ✓ Maximizes value of renewables and DER
- ✓ Operates DER to benefit both owners and the grid during outages
- ✓ Enables optimal siting of renewables including near critical assets

Institutional and Facility Flexibility

- ✓ Serves facilities with different ownership
- ✓ Uses central station and DER assets
- ✓ Tailors services cost-effectively to needs
- ✓ Expands incrementally as needed
- ✓ Improves utility-customer relationships

RCGs provide a better platform for renewable and distributed energy resources. DER such as distributed solar and energy storage, electric vehicles, and demand response are ideally suited to be resources for an RCG designed to power through a long-term electric outage. As part of an RCG, DER can provide significant value to the community, especially when sited at facilities such as schools, government buildings, and fire and police stations.

Renewable resources and DER may have a higher value where they can be used to improve the resilience of both critical infrastructure and their host utilities during emergencies. Compared to conventional microgrids, RCGs broaden the locations where solar energy and energy storage can be developed. These resources need not be located at or near the consumer's site in an RCG. This can enable better sites to be selected to achieve economies of scale and realize locational advantages such as proximity to substations. This lowers costs, maximizes benefits, eases grid integration, and enables a broader range of ownership and financing options.

By powering the distribution lines and feeders with DER during an outage, RCGs can use those DER to benefit the community and its critical infrastructure. RCGs can also be more responsive to the variability of renewables at a more granular level than the regional electric grid and thus improve grid stability. Similarly, smaller amounts of energy storage can have a greater benefit balancing renewable variability within an RCG, thus creating a more reliable and resilient community electric grid.

For More Information: Jeff Price, President, **OnGrid *Options*, LLC**
1-703-448-3400 jeffprice@gridoptions.com