FRAMING THE ISSUE

A microgrid is a local energy system capable of balancing captive supply and demand resources to maintain stable service within a defined boundary. Microgrids are not defined by their size, but by their function. They may either be isolated (not connected to the local utility); islandable (fully interconnected, but also able to maintain some level of service during a utility outage); or non-synchronized (capable of consuming power from the grid, but not supplying it). In effect, a microgrid is an energy management system, coordinating electricity storage and demand response/efficiency of distributed generation sources. Microgrids can also be tied into district heating management. Almost every form of energy supply can produce power distributed in a microgrid.

The military has already identified several key applications of microgrids and has begun to test them. Their applications include:

- Integration of multiple facilities for reliability purposes
- Reliability and ability to continue functioning at time of interruption of utility service – including increasingly common disruptive weather conditions
- Enhancing feasibility of the use of renewable energy resources
- Providing forward operating base independence and “self-healing” characteristics

Each of these applications ultimately relates back in some measure to a key national priority issue – protection of critical electrical power assets. The nation’s hardened electric transmission and related communications infrastructure rests on a fragile foundation. The National Academy of Sciences indicated last year that physical damage by terrorists to large transformers could disrupt power to large regions, take months to repair, and be carried out with little risk of detection. Advanced microgrids represent critical infrastructure to deal with several facets of this dilemma: need for local autonomy, local feedstocks, and supporting community assets for strategic assets. Military customers represent a large segment of the potential microgrid market to meet requirements for command control communications, computers, intelligence, surveillance, and reconnaissance.

The fundamental problems for development of such microgrid-related arrangements by Department of Defense (DoD) components seem to be:

- The armed services cannot pay more for power than the conventional market permits;
- Legal and institutional issues in self-implementation frequently arise out of existing and interface issues.

These very different considerations have some common roots in the evolving structure of the utility industry and DoD’s efforts to come to terms with these changes.

MICROGRIDS AND UTILITY INDUSTRY STRUCTURE AND OPERATIONS

Microgrids are progressively proving attractive to the private sector and have been earmarked as one of the fastest growing non-fuel power market sectors (although there is some “hype”).
There have been a variety of motivating factors:

- Climate disasters have led states to begin sponsoring support for microgrids for public service assurance.
- The perceived high need to assure performance of functions in manufacturing and service industries.
- The broadening recognition by hospitals, datacenters, and universities of the necessity to develop their own microgrids to assure ongoing needed reliability.
- The continued, strong public support for use of renewable energy systems which may raise utility system load balancing issues.
- Expanded public policy recognition of the value of microgrids in the promotion of energy efficiency through systems management.

More broadly, the practical appeal of distributed generation for the above and other factors has increased, and with it the appeal of future microgrid use. These reasons principally include the systems. Consequently, there is eroding support for and interest in the traditional utility model: central stations, long distance transmission, the linkage of utility duty to serve, and rate-based economics.

Consequently, there is increasing pressure on many utilities to preserve the current system of regulation, based on their well-established economic models. Simply put, the danger of loss of load due to the potential incursions of distributed generation, with the resulting possibility of stranded assets, has increased some utilities’ resistance to the third-party independent development of assets, such as microgrids, which could contribute to that result. These utility concerns are not directly the concern of DoD in fulfilling its missions. But, the resulting areas of dispute in the civilian sphere have collateral impact on the unfolding DoD effort to adopt microgrids: jurisdiction/ownership; allocations of costs; size and scope of projects; and regulation of operation within the utility regulatory framework.

DoD is still in the process of fully formulating its programs for its microgrid initiatives. For many years, its overall policy has been to seek institutional management of electric facilities by experienced utility advisors rather than other contract managers. DoD reform initiative directives have fostered efforts to influence competitive procedures and economic analysis to effect utility provision of these services. While, in theory, DoD could find that the necessary standard of service has not been met by utility providers, this is an unlikely scenario. Meanwhile, Defense Logistics Agency (DLA) procurements for utility privatization have continued.

DoD approaches to problem solving by enhancing the scope and reliability of utility service has been subject to criticism by the National Association of Regulated Utility Commissioners (NARUC). For example, NARUC has criticized DoD efforts to deploy grid peak onsite energy as resulting in stranded generation and transmission investment, thereby causing increased rates for stranded customers. Business Executives for National Security (BENS), which is otherwise sympathetic to the value of microgrids to DoD, therefore has encouraged DoD “to coordinate” with utilities and state regulators. Potential problems highlighted by BENS involving lack of satisfactory coordination between DoD and local utilities are: entanglement of DoD operations with utility operations, interference with utility duty to serve, possibility of multi-jurisdictional authority over facilities, and possible rate base incorporation of DoD assets.

In a similar vein, BENS also opposes the collaborative use of microgrids beyond military installation perimeter lines with adjacent communities, citing the “inherent utility functions” that would be entangled with facility operations; the possibility of multiple governmental jurisdictions having authority; and the issue of incorporating on-base assets into the rate base. It further bolsters these arguments in the invocation of non-interference with the “inherently governmental” functions of locales. (There are, nevertheless, examples of different forms of hybrid service arrangements at the Robins
and Tinker Air Force Bases, involving excess on-base power being made available to local communities. The potential for the creation of a variety of other innovative formats is still being explored by DoD.)

**NOT JUST ANOTHER JURISDICTIONAL SQUABBLE**

While fallout from the regulatory debate over the scope of and jurisdiction over distributed energy continues, and as DoD seeks to accommodate its operations to the vagaries of its requirements, the seriousness of the impacts on cyber-security and vulnerability of the grid to natural or hostile events (and the potential of microgrids to alleviate them) hangs over their resolution. Utilities are certainly not unaware of this issue.

The clear vision of one utility on its security-related issues is instructive. It recognized that where security is concerned, the utility’s fragmented organizational structure of the past, based on various compliance jurisdictions, was not designed for modern threats. So it undertook a cyber-security reorganization that removed and replaced all responsibilities of other executives, and placed them under a single vice president of business infrastructure and technology. The utility believes that with the right internal coordination and reporting structures in place, it can remain vigilant and adaptable in the face of this ever-changing challenge.

The same should hold true on the national level as well. The unifying principle guiding the convergence of national security (as it relates to microgrids), and the present business model of the utility industry should be one of public/private cooperation, because it serves the national interest in energy system security much better than balkanized management of each domain by a separate party. While the mechanics of structuring public-private partnerships to achieve this goal are clearly not simple, they can be achieved if explicit recognition is given to two basic principles:

- Acknowledgment and follow through on the need for cash flow to support infrastructure, as well as power production, to best serve the interest of reliability and attendant security for both private suppliers and government purchasers.
- The procurement process can be a means to foster the potential for innovative financing/technology applications, if it is calibrated to recognize private sector needs for firm cash flow.

The net result can be, as BENS termed it in a moment of crystalline clarity, the availability of a “clean line of sight for private capital availability” to provide DoD with the full range of benefits it hopes to obtain from the utilization of microgrids.

**ABOUT THE AUTHOR**

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