Military Microgrids: Finance Follows Function

Energy Planning for Resilient Military Installations
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Resiliency

The ability to preserve critical infrastructure for communities and customers, adapt the grid rapidly to disruptions, and promptly restore service that is lost.

Microgrid Resources Coalition

(This definition is abstracted from Enhancing the Resilience of the Nation’s Electricity Grid, a report of the National Academy of Science, Engineering and Medicine)
The Microgrid

A microgrid is a local electric system (a local control area) or combined electric and thermal system:

• that includes retail load and the ability to provide energy and energy management services needed to meet a significant proportion of the included load on a non-emergency basis

• that is capable of operating either in parallel or in isolation from the electrical grid

• that, when operating in parallel, is capable of providing energy, capacity or related services to the grid

Microgrid Resources Coalition
Microgrid Resources

Resources

- Energy efficiency and demand response
- Renewables – solar, wind, biomass, biogas
- Co-generation – meets thermal and electric load
- Storage – thermal and electric (including buildings)
- Electric vehicle fueling stations – act as storage
- Black start

Integrated management

- Comprehensive system controls
- Grid interface management
Microgrid Capabilities

- Provides resiliency
  - Acts as a control area when isolated from the grid
  - Multiple regularly used resources (backups fail)
  - Intelligent load shedding
  - Can provide resiliency to the local community

- Provides savings and revenues
  - Cogeneration efficiency beats the grid 80 to 35%
  - Ability to optimize fuel use, time of use and manage load shape against import costs and tariff design
    - Avoid transmission and distribution charges
  - Can provide sophisticated services to the grid
Princeton Load Shape

Grid demand

Princeton Demand = 0
Credit Engineering

• Capacity and compliance
  • Must be permitted under federal law and comply with state energy regulation

• Financial Sustainability
  • Revenues/savings must cover the debt service

• Collateral
  • In a project financing all the assets and all the contracts that allow profitable operation are pledged

• Financial optimization
  • Use financing techniques suited to the assets involved
  • Sophisticated strategies require sophisticated agreements
Sources of Authority

Energy Savings Performance Contracts 42 USC 8287
- 25 year contracts
- Relaxed procurement rules
- Must guarantee savings greater then finance cost (shared savings model)
- Private contractor must maintain and repair as a condition of guarantee

Power Purchase Agreements 10 USC 2922a
- 30 year contracts
- For geothermal resources on military land
- “for the provision and operation of energy production facilities on real property under the Secretary’s jurisdiction or on private property and the purchase of energy from such facilities”

Enhanced-Use Leases 10 USC 2667
- 5 years unless special findings made
- Consideration can be construction of facilities

Easements
- Power and telecommunication lines 10 USC 2668 (Rights of way and substations)
- Generic 40 USC 1314 (Does not include rights of way)
Limitations

40 USC 591 – Federal department or agency may not use appropriations to purchase electricity in a manner inconsistent with state law governing provision of electric utility service including:

- State utility commission rulings
- Electric utility franchises and service territories

Does not apply to:

- Energy facility contracts under 10 USC 2922a
- Energy savings performance contracts under 42 USC 8287
- Power and energy management for the base is permitted

Limitation effects

- Net metering
- Third party sales
- Ancillary services
State Regulatory Barriers

• Is the Microgrid a utility?
• Self Generation is usually permitted
  • Most states allow a third party supplier on site
• Some states exempt multiple local customers
  • New York Qualified Facility exemption
  • Not “holding oneself out to serve the public”
• Other regulatory options
  • Retail electric supplier
  • Utility/Private Partnership
RTO Wholesale Markets

- Federal Energy Regulatory Commission allows wholesale services from behind the meter in Regional Transmission Organizations
  - Order 745 - Demand response
  - Order 755 - Regulation
  - Order 784 - Storage
  - Order 819 - Frequency
- EPSA v. FERC has given FERC clear authority
  - Wholesale market is not an intrusion on the retail price
RTOs

Financing Strategies

Public Private Partnership
- Private developer: technology, expertise, guarantees
- End user – long term demand, credit strength, partial prepayment
- Tax investors

Project Finance
- Finance an asset on its own revenues/savings
- Makes money independent of market volatility
- Performance guarantees from builder/operator

Tax incentives
- Renewable energy tax credits
- Energy efficiency tax deduction
- Tax-exempt bonds (Waste fuel, district heating and cooling)

Environmental markets
- Renewable energy credits (RECs) and REC swaps
- Carbon credits
Takeaways

• The flexibility, redundancy and control that gives you resiliency, also creates savings
  • Against the tariffs for energy, transmission and distribution
  • By arbitrage of fuel, technology and imports

• That flexibility permits sales of multiple services
  • In RTO markets
  • To distribution companies

• You have opportunities to extend resiliency to your community
Questions?

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