Developing and Financing Microgrids

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Overview – Microgrid Development

DEVELOPING A MICROGRID

• Who are the developers and sponsors of microgrids?
• What drives development of a microgrid?
• What impedes development of a microgrid?
Overview

Financing Microgrids

• Who provides financing?
• What financing tools and incentives are available?
Developing a Microgrid

Who are the Developers and Sponsors?

- Economically motivated Sponsors include owners of campus-type real estate complexes:
  
  • universities
  
  • large health care facilities
  
  • large public institutions (housing authorities, military, municipalities, convention centers)
Who are the Developers and Sponsors?

Who is developing microgrid projects?

- Integrated developers of energy projects: Today’s case study presenters are NRG, Constellation and Clark

- Energy efficiency system providers: Honeywell, Johnson Controls, Siemens, Ameresco

- Specialized microgrid providers
What Drives Development and Motivates Sponsors?

- **Economics**: reducing the cost of energy for a large facility or community
- **Reliability of power supply**: hardening against future crises
- **National security**: military bases are in the forefront
What Drives Development and Motivates Sponsors?

- Sometimes the economic motive is buttressed by “sustainability” motives for green energy and waste reduction.

- Another economic motive is modernization of old infrastructure and building stock on an aging campus: windows, HVAC, even roofs.

- “Political” sponsors are the state programs and agencies charged with encouraging the “hardening” of the electric power system (reaction to Superstorm Sandy)

- Compliance with environmental regulations – Bob McKinstry will discuss this
What Impedes Microgrid Development?

• Some technology is unfamiliar even if it is not brand new (e.g., microturbines)

• Regulatory frameworks vary from state to state – Howard Shaffermon will talk about New Jersey and Pennsylvania

• Interface with the local utility: demand charges when off the grid; cost of interconnection.

• BUT …. Some regions reward demand reduction as an energy product that has value just like power generation.
Financing Microgrids

What are we financing?

• Power and energy generation systems – equipment and operating costs
  
  = electricity or steam production

• Energy efficiency retrofits and upgrades / can include building upgrades and modernization
  
  = reducing energy usage

• Distribution systems and connections
  
  = demand management, optimizing load” throughout the microgrid, in the buildings, storage, etc.
Financing Generation Systems

Generally financeable on a “project” basis off of guaranteed or highly predictable revenue streams

- Energy sales
- Ancillary services

Many owners have tax-driven motives

- Tax credits for renewable energy like solar and wind
- Tax credits for cogeneration, fuel cells and microturbines

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Energy Incentives

Energy Bonding Options
- QECBs (qualified energy conservation bonds)
- Taxable bonds
- Tax-exempt bonds (energy efficiency tax-exempt lease)

Tax Deductions
- Commercial energy efficiency deduction on capital costs
- Accelerated depreciation on capital cost of energy projects
- Sales / Property Tax Exemption from Taxable Basis

Tax Credits
- Investment tax credit (“ITC” - capital cost for solar, wind, biomass, co-gen, geothermal)
- Production tax credit (“PTC” - large scale wind, biomass, etc.)

Credit Enhancements
- Dept. of Energy Loan Guarantees
- USDA Loan Guarantees

Direct Cash Payments
- 1603 Cash Grant in Lieu of ITC (mostly expired)
- REC Payments / Rebates
- Other federal / local grants or incentives
## Summary of Federal Energy Tax Credits

<table>
<thead>
<tr>
<th>Property</th>
<th>Credit Amount (% of installed cost)</th>
<th>PTC Amount (per kW/hr)</th>
<th>Expiration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qualified Fuel Cell</td>
<td>30% (ITC or Grant)</td>
<td>NA</td>
<td>12/31/16</td>
</tr>
<tr>
<td>Solar (Electricity and Fiber Optic)</td>
<td>30% (ITC or Grant)</td>
<td>NA</td>
<td>12/31/16</td>
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<tr>
<td>Small Wind</td>
<td>30% (ITC or Grant)</td>
<td>NA</td>
<td>12/31/16</td>
</tr>
<tr>
<td>Wind</td>
<td>30% (ITC election / Grant)</td>
<td>2.3¢</td>
<td>12/31/13*</td>
</tr>
<tr>
<td>Open Loop Biomass</td>
<td>30% (ITC election / Grant)</td>
<td>1.1¢</td>
<td>12/31/13*</td>
</tr>
<tr>
<td>Closed Loop Biomass</td>
<td>30% (ITC election / Grant)</td>
<td>2.3¢</td>
<td>12/31/13*</td>
</tr>
<tr>
<td>Geothermal</td>
<td>10% ITC 30% ITC Election / Grant</td>
<td>2.3¢</td>
<td>12/31/16 ITC 12/31/13* PTC/election/grant</td>
</tr>
<tr>
<td>Qualified Microturbine</td>
<td>10% (ITC or Grant)</td>
<td>NA</td>
<td>12/31/16</td>
</tr>
<tr>
<td>Combined Heat &amp; Power Systems</td>
<td>10% (ITC or Grant)</td>
<td>NA</td>
<td>12/31/16</td>
</tr>
<tr>
<td>Thermal Pump Systems</td>
<td>10% (ITC or grant)</td>
<td>NA</td>
<td>12/31/16</td>
</tr>
<tr>
<td>Municipal Solid Waste (Trash / Landfill Gas)</td>
<td>30% (ITC election / Grant)</td>
<td>1.1¢</td>
<td>12/31/13*</td>
</tr>
<tr>
<td>Hydropower</td>
<td>30% (ITC election / Grant)</td>
<td>1.1¢</td>
<td>12/31/13*</td>
</tr>
<tr>
<td>Marine &amp; Hydrokinetic</td>
<td>30% (ITC election / Grant)</td>
<td>1.1¢</td>
<td>12/31/13*</td>
</tr>
</tbody>
</table>

*Note: The 12/31/13 deadlines are generally the date by which construction must commence. 12/31/16 deadlines are the date by which the projects must be placed in service.
Financing Energy Efficiency Retrofits and Upgrades

- Financed on energy savings the host/sponsor experiences

- “Shared Savings” has two types of deal:
  - The Sponsor can put up the capital and share more of the savings OR
  - The Developer puts up the capital and shares more of the savings

- Many utilities offer demand-side and efficiency incentive rebate and reward programs, as Howard will discuss
Financing the Whole Nine Yards

• Developers see a business opportunity in providing a total finance package that has to include:
  - Appetite for tax credits (of no use to non-profits)
  - Appetite to invest capital in a core business
  - Sophisticated interface with utility programs, ability to optimize demand-side management
  - Savvy use of government programs
  - Incorporating integrated project finance structures

It is a lot to pull together if you don’t do it every day! Fortunately, our case study presenters are ready to help.
Questions?