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Microgrid Regulations in Honduras

Designing a Tariff for a Microgrid

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About RAP – U.S.

• RAP provides technical and policy support at the federal, state, and regional levels, advising utility and air regulators and their staffs, legislators, governors, other officials and national organizations.

• We help states achieve ambitious energy efficiency and renewable energy targets and we provide tailored analysis and recommendations on topics such as ratemaking, smart grid, decoupling, and clean energy resources. RAP publishes papers on emerging regulatory issues and we conduct state-by-state research that tracks policy implementation.

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About Your Presenter – Janine Migden-Ostrander

- Janine L. Migden-Ostrander advises regulators and advocates on energy efficiency, renewable energy, demand response, distributed generation, and integrated resource planning. Recent projects include working closely with the Puerto Rico Energy Bureau establishing orders and regulations on integrated resource planning and microgrids, assisting the Arkansas Public Service Commission on energy efficiency as part of the Clean Energy Ministerial for the U.S. Department of Energy (DOE), facilitating the Mid-Atlantic Distributed Resources Initiative (MADRI), and providing workshops on energy efficiency policies as part of the SEE Action initiative for DOE. Her projects are predominantly in the U.S., but also overseas.

- Ms. Migden-Ostrander has worked in public utility law for approximately 35 years, most recently as the Ohio Consumers’ Counsel, where she oversaw the state agency that represents the interests of Ohio’s 4.5 million residential households with their investor-owned electric, natural gas, telephone, and water companies.
Topics to be Covered

- Overview of rate issues
- Rates charged to microgrid customers from microgrid owner
- Rates charged by the utility for supplemental or standby power
- Rates paid by the utility for services to grid
Overview of Rates
The Traditional Approach to Cost Allocation

1. **Revenue Requirement**
   - Accounting data categories

2. **Functionalization**
   - Assign cost to appropriate utility function

3. **Classification**
   - Classify functionalized costs to demand, energy, customer

4. **Allocation**
   - Assign cost responsibility among customer classes
Functionalization of Grid Costs
Classification of Grid Costs

- **Generation**
  - Energy kWh (by time period?)
  - Usage
  - System Coincident Peak

- **Transmission**
  - Demand kW (Various measures)
  - Peak Loads
  - Equipment Peaks

- **Distribution**

- **Customer**
  - Customer-Related
  - Number, Size & Type of Customers and Connections
  - Customer Maximum Demand
Allocation of Costs by Customer

Residential

Commercial

Industrial
How is this different?
Rates Charged to Microgrid Customers by Microgrid Owner

Source: RECO
Critical Issue Driving Rates

• Balancing two competing interests:
  o Ensuring rates are sufficient to cover debt, operating costs - and where appropriate – a return on investment
  o Ensuring that rates are affordable and that customers are not paying above regulated or market prices for their region
Categories of Owners: Co-ops

- Rates and Charges can be set by the owners by agreement based on the co-op’s bylaws and procedures
  - Rates should be sufficient to at a minimum cover debt and operating costs (including fuel)
  - Rates should be nondiscriminatory within the customer class
Categories of Owners: Municipalities

- Rates are set by the municipality, usually by ordinance
  - Rates should be sufficient to at a minimum cover debt and operating costs (including fuel)
  - Rates should be nondiscriminatory within the customer class
Categories of Owners – Third Party

- Rates are set by **Contract or a Regulator**
  - Rates should be sufficient to cover debt, operating costs (including fuel costs) and a *return on investment*
  - Rates should be nondiscriminatory within a customer class
Issues to Consider in Rates set by Contract

- Contract length
- Minimum stay
- Mutual assignment
- Exit fees
- Escalators for increased fuel and operating costs and other costs beyond microgrid owner’s control
- Fair and reasonable rates
- Default by Microgrid Owner
Categories of Owners – Utilities

• Article 14: prohibits distribution companies from owning generation facilities, except in case of isolated systems, which may have their own generation plants. If a distribution company has its own generation, but is connected to the national grid, they must set up two different companies to operate the distribution and generation

• Thus focus is on utility as supplemental and standby power provider
Utility’s Costs for Microgrid

- Engineering studies
- Distribution system upgrades
  - Switching gear
  - Operational controls
  - Communications/IT
- DERs owned by utility (if any)
Utility Rates

- Should be subject to regulation based on cost of service
- Rates should be just and reasonable and nondiscriminatory
- Customers receiving supplemental power from a utility should pay the same rates as other customers in their customer class
Elements Appearing in Some Tariffs

- capacity levels and demand ratchets
- scheduled versus unscheduled use of power
- time-varying rates
- metering and billing
- minimum monthly charges
- DG compensation for generation & ancillary services to grid
- generator types or size provisions
- liability and insurance requirements
- dispute resolution
- provisions specific to wires-only companies
Power Provided by the Utility

- **Supplemental Power** – Supplements power provided to customer when customer generation is insufficient to meet load or is unavailable
  - Can apply to all sizes of microgrids
- **Standby Power** – Applies to large microgrids where utility has to have sufficient capacity to meet load due to unusual circumstances such as an outage or unanticipated high customer demand
Supplemental Power

- Small customers - Supplemental power should be provided at tariffed rate for that customer class
- Large customers – Supplemental power is provided under contract when microgrid/customer generation is insufficient to cover load
  - Typically will contain minimum and maximum load requirements
  - Attention to minimum is key – Want to avoid curtailing generation to meet minimum – can become a *de facto* take or pay situation
Rate Design Options Applicable to All Customers

Includes Microgrid, Distributed Generation, and Non-DG Customers
Goals for Microgrid Rate Design

• Assure financial integrity of the owner
• Fairly compensate the microgrid for net value of its contribution to the grid
• Ensure that rates and bills remain fair and affordable for non-DG/microgrid customers and provide proper price signals to minimize long-term costs
Principle #1

A customer should be allowed to connect to the grid for no more than the cost of connecting to the grid.
Principle #2

Customers should pay for the grid in proportion to how much they use the grid, and when they use the grid.
Principle #2

Customers should pay for the grid in proportion to how much they use the grid, and when they use the grid.
Principle #3

Customers delivering power to the grid should receive full and fair value—no more and no less.
Sound Decision Making Benefits All

- For consumers: Keep more money, quality
- For utilities: Corporate health, purpose
- For investors: Safety, value, expectations
- For employees: Safety and welfare, pride
- For the regulatory process: Confidence
- For society: Key role for power in society
- A process that promotes shifting risk rather than managing risk is inherently unstable
Designing Tariffs Well – Twelve Points

1. Value is a two-way (or more) street
2. Consider all relevant sources of benefit and cost over long term
3. Select & implement a valuation method
4. Cross-subsidies may flow either way
Designing Tariffs Well – Twelve Points

5. Extrapolating from extreme situations is misleading

6. Infant industry subsidy tradition

7. Rules matter (e.g., interconnection)

8. No more complicated than necessary
Designing Tariffs Well – Twelve Points

9. Support innovative power sector models
10. Keep incentive decision separate from rate design
11. Keep decoupling decision separate from rate design
12. Consider mechanisms for “have-nots”
Microgrid Services Tariff

A microgrid tariff must benefit all customers and not only those who participate.
Rate Designs Currently in Use

- **Flat energy rates**
  - Rates do not vary by time or wholesale market cost and include an insurance premium to protect customers from volatility (supplier bears price risk in absence of FAC)

- **Tiered rates (inclining or declining blocks)**
  - Cost per unit of electricity increases/decreases at defined consumption thresholds
  - Inclining Rates – rate increases with each block of usage
  - Declining Rates – highest rate is in first block and cost per kwh decreases in each subsequent block
Rate Designs Currently in Use

• **Time of use (TOU) rates (time of day, seasonal).**
  - Divides period (day) into time periods and provides a schedule of rates for each period (e.g., peak, off-peak, shoulder)

• **Critical peak pricing (CPP)**
  - Typically an overlay on TOU pricing. During times of system stress or high cost (i.e., critical peak [CP] events), price rises to a very high level (either administratively set or market-determined) to reflect very high but short-term cost of generating or purchasing electricity at times of shortage or peak demand. Customers are notified in advance of a CP event and number of events per year is typically capped.
Rate Designs Currently in Use

• Demand Charges
  • Demand charges apply based on a customer’s maximum usage of the system usually over a billing cycle (1 month)

• Peak-time rebate (PTR)
  • Participants are paid for load reductions (relative to what they would have otherwise used) during critical peak events
  • Voluntary
Net-Metering

Net-metering is a mechanism under which the utility nets the electricity produced from a customer’s system with the electricity the customer purchases from the utility with compensation set at the full retail rate.

Very commonly used with DG
Programs for Low-Income Customers

• Percentage of Income – Customer payment based on income
  • Further reduction for conservation based on previous years’ usage normalized for weather
• Low usage rate
• Energy Efficiency programs – home weatherization
• Participation in demand response programs – peak time rebates, etc.
Smart Rate Design Examples

- Fixed charges should be limited

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<th>Rate Element</th>
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<th>Illustrative Rate</th>
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<tbody>
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<td>Customer charge</td>
<td>Service drop, billing and collection only</td>
<td>$4.00/month</td>
</tr>
<tr>
<td>Transformer charge</td>
<td>Final line transformer</td>
<td>$1/kVA/month</td>
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<td>Off-peak energy</td>
<td>Baseload resources + transmission and distribution</td>
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<td>Critical peak energy (or PTR)</td>
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Smart Rate Design Examples

- Time-of-use rates should reflect time-varying system value

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# Smart Rate Design Examples

- Critical peak price should reflect system value of obviating stress conditions

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## Bi-directional Rate

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<th>Amount</th>
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<td>Costs to Connect to the Grid</td>
<td></td>
</tr>
<tr>
<td>Billing and Collection</td>
<td>$4.00/month</td>
</tr>
<tr>
<td>Transformer Demand Charge</td>
<td>$1.00/kVA/month</td>
</tr>
<tr>
<td><strong>Power Supply and Distribution (both directions)</strong></td>
<td></td>
</tr>
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<td>Off-Peak</td>
<td>$.07/kWh</td>
</tr>
<tr>
<td>Mid-Peak</td>
<td>$.10/kWh</td>
</tr>
<tr>
<td>On-Peak</td>
<td>$.15/kWh</td>
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<tr>
<td>Critical Periods</td>
<td>$.75/kWh</td>
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Rates Paid by Utility to Microgrid for Grid Services
Distribution Credits

Compensate customer for providing support to the grid when DG is less costly than the infrastructure upgrade the utility would otherwise invest in.
Other Mechanisms of Compensation

• Rates based on valuation of the microgrid in terms of services offered, location, and time of day
• Simple net-metering for small microgrids
• Rates for grid services from microgrid should be fair, just and reasonable and should be value-based to avoid cross-subsidies from utility customers to microgrid and vice-versa
Rates Charged by the Utility for Supplemental or Standby Power
Traditional Utility Perspective on Rate Design for Self-Generators

- Obligation to serve means standing ready to provide full requirements (backup power) when generator is not producing.
- Utility maintains generation reserves and T&D facilities to do that, at a cost.
- Failure to recover these costs from customer-generators results in a subsidy by other customers (or loss to utility).
Components of Standby Service

- **Backup power** during an unplanned generator outage
- **Maintenance power** during scheduled generator service
- **Economic replacement power** when it costs less than on-site generation
- **Supplemental power** when on-site generation does not meet all of customers’ needs
- **Delivery service**
Illustration of a Self-Generator’s Purchase Requirements

- **Forced Outage**: Backup Power
- **Planned Outage**: Coinciding with plant shutdown
- **Planned Outage**: Maintenance Power

- **Plant Requirement**: Generation
- **Supplemental Power**:
- **Standby Power**:

Regulatory Assistance Project (RAP)®
Discussion Questions: Rate Design

- How can standby rates be designed that:
  - Incentivize low forced outage rates?
  - Encourage scheduled outages during off-peak periods?
  - Recognize the possibility of shared capacity?
Other Regulatory Options

- Revenue decoupling
- Cost-of-service studies
- Performance-based regulation
Rate design should make the choices the customer makes to optimize their own bill consistent with the choices they would make to minimize system costs.
Resources

- Smart Rate Design for a Smart Future
- Appendix A - Dividing the Pie: Cost Allocation, the First Step in the Rate Design Process
- Smart Non-Residential Rate Design
- Standby Rates for Combined Heat and Power Systems
- raponline.org
About RAP

The Regulatory Assistance Project (RAP)® is an independent, non-partisan, non-governmental organization dedicated to accelerating the transition to a clean, reliable, and efficient energy future.

Learn more about our work at raponline.org