Rate Design:
Options for addressing NEM impacts

Utah NEM Workgroup 4

July 8, 2015

Melissa Whited

Synapse Energy Economics

Results of BCA & Rate Impact Analysis

Using the Results of the BCA and Rate Impact Analysis

- First step is to identify whether the NEM program results in any significant undesirable impacts
- If BCA indicates disproportionate NEM impacts, PSC may consider “new or existing tariffs” that are just and reasonable
- The solution should be designed to address the issue at hand

Rate Design Principles & Procedures

Rate design for which customers?

- If making rate design changes, should they apply to all customers, or just to NEM customers?
- Changes to rates for all customers introduces more complexity, but provides a more durable and flexible solution
  - Can ensure a minimum of revenues collected from all customers
  - Can be designed to encourage all customers to consume/produce energy more efficiently (e.g., by sending time-of-day price signals)
  - Can help utilities cope with many challenges and incentivize efficient investments
- Revisions just to the NEM tariff may address problems specific to NEM, but won't address these other issues

Utah rate design principles

- Overarching goals of "just, reasonable, and adequate rates" are defined by Utah statute (54-4a-6) to:
  - Maintain the financial integrity of public utilities by assuring a sufficient and fair rate of return
  - Protect the long-range interest of consumers in obtaining continued quality and adequate levels of service at the lowest cost…
  - Provide for fair apportionment of the total cost of service among customer categories and individual customers and prevent undue discrimination in rate relationships
  - Protect against wasteful use of public utility services

Bonbright's Principles

- Utah's principles in statute align well with the widely-accepted principles, most clearly articulated by James Bonbright in 1961:
  - Simplicity, understandability, public acceptability, and feasibility
  - Freedom from controversies as to proper interpretation
  - Effectiveness in yielding total revenue requirements
  - Revenue stability from year to year
  - Stability of the rates themselves, with minimum of unexpected changes seriously adverse to existing customers
  - Fairness of the specific rates in the appointment of total costs of service among the different customers
  - Avoidance of "undue discrimination" in rate relationships
  - Efficiency of the rate classes and rate blocks in discouraging wasteful use of service

Price Signals and Long-Run Marginal Costs

"…as setting a general basis of minimum public utility rates and of rate relationships, the more significant marginal or incremental costs are those of a relatively long-run variety – of a variety which treats even capital costs or "capacity costs" as variable costs."

- James Bonbright, Principles of Public Utility Rates, 1961, p. 33

Key steps in rate design

1. Revenue Requirement Determined
2. Cost of Service Study (COSS) performed
   - Costs are classified as:
     - Demand-related
     - Energy-related
     - Customer-related
   - The COSS then allocates historical (embedded) costs to customer classes based on the cost to serve each class
   - COSS is ***one*** input into the rate design process
3. Price signals and policy goals are also considered
   - Price signals that reflect long-run marginal costs
   - Policy goals related to solar may include desire to comply with environmental regulations, improve resiliency, encourage clean energy jobs, etc.

Customer, Demand, and Energy

- Cost of Service Study can help inform how charges are collected

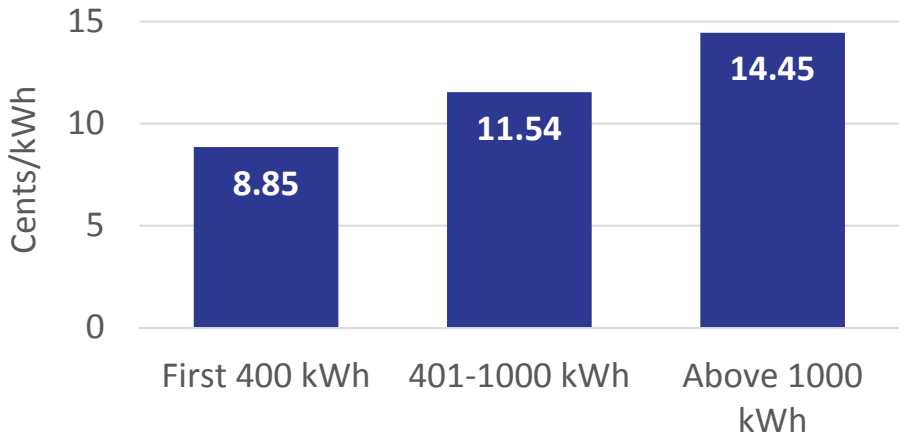
Costs from Cost of Service Study	Rate Component
Customer-related costs (costs of meters, service drops, meter reading, and billing and collecting)	Customer charge
Demand-related costs (associated with customer's maximum demands on system)	Demand charge
Energy-related costs (costs that vary with energy usage)	Energy charge

- Residential and small commercial (<15 kW) classes recover both demand- and energy-related costs through the energy charge (¢/kWh)

Current rates and incentives*

1. Tiered energy rates

- Recovers both energy- and demand-related costs
- Most of bill is driven by energy usage:
  - Discourages wasteful usage
  - Empowers customers to manage their bill by reducing consumption



- More strongly incentivizes customers to reduce their high usage
- No price signal related to what time of day usage/generation occurs
  - Relevant for solar costs and benefits, as well as costs all customers impose, since electricity produced during peak is more expensive.

**Small commercial customers are also relevant, but have a more complex rate structure*

Current rates and incentives (continued)

1. Tiered rates

2. Customer charge

- $6 for residential single phase: recovers customer-related costs (billing, meter, etc.)

3. Minimum bill

- $8 for residential single phase: helps reduce revenue volatility for utilities

NEM Customers

4. Generation Credits

- Credits received at applicable retail rate, rolled over monthly until end of annual billing cycle, when they expire
  - Expiration of credits discourages customers from building solar systems larger than their consumption

Alternative Rate Structures

Option 1. Higher fixed charges

- Higher fixed charges increase the amount a customer pays each month regardless of usage
- Reduces volumetric (energy) charge, and thus payment to NEM customers

Benefits	Drawbacks
Simple to administer and understand.	Reduces customer control over bills.
Reduces utility's revenue recovery risks.	Penalizes low-usage customers, may disproportionately impact low-income users.
Ensures a certain amount of revenue recovery from each customer	Does not send accurate price signals regarding long-term marginal costs or temporal aspect of costs and benefits of electricity consumption or production.
	Reduces incentive to invest in DG and energy efficiency, potentially leading to higher costs of electricity and environmental compliance in the long-term.

Option 2. Higher minimum bills

- Does **not** reduce volumetric (energy) charge, but increases bills for NEM customers who offset most or all of their consumption from the grid.

Benefits	Drawbacks
Simple to administer and understand.	Does not recognize the temporal aspect of costs and benefits related to electricity consumption or production.
Reduces utility's revenue recovery risks.	Low-usage customers (often low-income) may see their bills increase
Ensures that all customers pay for a minimum amount of system costs.	
Largely preserves customer control over bills.	
Largely preserves price signals to encourage conservation and DG relative to a high fixed charge.	

Option 3. Demand charges

- Imposes a monthly charge based on customer's maximum demand.
- Energy charge is reduced commensurately.
- May increase or decrease bills for NEM customers, depending upon timing of customer demand, PV generation, and system peak.

Benefits	Drawbacks
More accurately reflects costs imposed on system by customer relative to only having a customer charge and an energy charge.	Does not recognize the temporal aspect of costs and benefits related to energy consumption or production.
Reduces utility's revenue recovery risks.	Must be implemented with significant customer education and customer protection measures for vulnerable groups;
Largely preserves price signals to encourage conservation and DG relative to a high fixed charge.	Without enabling technology, can be difficult for residential customers to respond.
	Requires specialized meters that residential customers may not have.

Option 4. Time-of-use rates

- Could increase or decrease bills for NEM customers, depending on alignment of generation with value to system.

Benefits	Drawbacks
More accurately reflects the use of system: Compensates PV more for generation during peak hours and less during off-peak hours. Encourages all customers to shift load to off-peak periods.	Does not fully recognize the demand component of cost causation.
Reasonably easy to understand, depending on design. Pre-determined off-peak and peak periods with set prices for each.	Must be implemented with significant customer education and customer protection measures for vulnerable groups.
Largely preserves customer control over bills and price signals to encourage conservation and DG relative to a high fixed charge.	Requires specialized meters that residential customers may not have.
Can be modified over time to reflect changes in system costs and peak demand periods.	May be difficult and contentious to determine timing of peak periods and price differentials

Simplified summary of alignment with rate design principles (as compared to current rates)

Features:	Fixed Charges	Min Bills	Demand Charges	TOU
Simplicity, understandability	Same as current rates	Same as current rates	Worse	Worse
Effectiveness in yielding revenue requirements	Better	Better	Better	Better
Enhances customer control over bill	Worse	Same as current rates	Worse	Better
Protects against wasteful usage encourages procurement of low cost resources	Worse	Same as current rates	Unclear	Better
Fairness: Recognizes demand component of cost causation	Same as current rates	Same as current rates	Better	Unclear
Fairness: Recognizes temporal aspects of energy costs	Same as current rates	Same as current rates	Same as current rates	Better
Feasibility: Metering requirements	Same as current rates	Same as current rates	Worse	Worse

Circle back to BCA and Rate Impact Analysis

- The rate design is an input into the BCA.
  - How does the new rate structure impact the results of the BCA?
  - What are the impacts on different types of customers?
    - NEM customers
    - Low-income customers
- Will the new rates help achieve (or at least not undermine) other regulatory goals?
  - Will it help achieve lower electricity costs over the long-term?
  - Will it help achieve the goals of the NEM Act?
  - Are low-income customers protected?
  - Other goals?

Contact

Melissa Whited
Synapse Energy Economics

617-661-3248
mwhited@synapse-energy.com
www.synapse-energy.com

Additional Slides

Embedded Costs and Marginal Costs

- Rates must be designed to collect embedded (historical) costs
- But to be efficient, rates should provide some approximation of long-run marginal costs
- Embedded costs ≠ marginal costs, except by coincidence
- Both James Bonbright and Alfred Kahn have argued that long-run marginal costs are more appropriate for ratemaking than short-run marginal costs.

Long-Run Marginal Costs

"What we are trying to measure is how costs will differ, after a span of time sufficiently long for the system planners to adapt the supplying system to the change, by virtue of taking on some specified incremental block of sales on a continuing basis, as compared with not taking it on. …[W]hat we are likely to have… is a measure of the average, full additional costs, for all additional sales undertaken on a continuing basis, over whatever is the reasonable planning period for additions to capacity – possibly on the order of ten to twelve years for electricity… ."

- Alfred Kahn, "Efficient Rate Design: The Transition from Theory to Practice," Feb 1975, p 39

Principles for Design of Alternative Rate Structures

- Should still adhere to Utah rate design objectives
- Avoid undue discrimination in rates
  - Do not treat customers with DG differently than customers that reduce consumption through other means
- Consider how rate design will impact other customers
  - Most efficient rate designs will encourage **all** customers to consume or produce energy more efficiently
- If BCA and rate impact analysis indicate that the NEM program results in significant impacts, one of the following rate designs could help address this