Smart Rate Design for Distributed Energy Resources

Presentation to Michigan Senate Committee on Energy and Technology

Mark LeBel
Associate
+802 498 0732
mlebel@raponline.org
Section 2: Background and Regulatory Context
Electricity market structure and utility regulation in Michigan

- MPSC has jurisdiction over seven investor-owned electric utilities, with core authority over:
  - Generation resource adequacy
  - Retail rates
- MISO oversees wholesale generation markets and transmission
DER compensation and rate design in Michigan

- Net metering policies first established by statute in 2008
  - “True” and “modified” net metering
- 2016 statute provided for reforms, which led to inflow/outflow framework
  - Key implementation steps from 2018 to 2020
- Core residential rate design is moving towards TOU rates
Traditional electric system

Electric system of the future

Overall resource mix matters!

Section 3: Ratemaking Practices and Perspectives on Costs and Benefits
Ratemaking process

Simplified rate-making process

1. Net rate base
   (Plant in service – depreciation reserve)

2. Rate of return

3. Depreciation expense
   (Plant in service x depreciation rate)

4. Operating expense
   (Fuel + purchased power + labor + labor overheads + supplies + services + income taxes)

5. Other taxes

6. $ millions

Allocate costs among customer classes

Design retail rates

Residential
- Dollars per month
- Cents per kWh peak

Commercial
- Dollars per month
- Cents per kWh peak

Industrial
- Dollars per month
- Cents per kWh peak

Street lighting
- Dollars per kW monthly
- Dollars per light per month
Key principles and policy goals

• Key ratemaking principles
  • Effectiveness in yielding total revenue requirements
  • Customer understanding and acceptance
  • Equitable allocation of costs and avoidance of undue discrimination
  • Efficient price signals that encourage optimal customer behavior

• Policy goals of utility regulation
  • Competition within the electricity system and across fuels
  • Provision of reliable service
  • Societal equity
  • Administrative feasibility
  • Clean energy and DER-focused employment
  • Public health and environmental protection
Illustration of load diversity
Cost causation

- Shared electric system costs are driven by collective patterns of customer usage
- Lower load diversity at customer end of distribution system
  - E.g., service drops, secondary lines and line transformers
- Billing and customer service costs may vary by type of customer
- Administrative and general costs are driven by size of the business
- Public policy programs reflect a mix of motivations
  - Electric system benefits
  - Broader societal goals
Benefit-cost analyses

Cost allocation frameworks

- Embedded cost allocation techniques date back to early 20th century in many cases
- Marginal cost allocation techniques developed in 1970s and 1980s
- Pros and cons to both frameworks
  - Embedded is often simpler mechanically, but forces square pegs into round holes
  - Marginal is theoretically better but has many practical difficulties
What is a cost shift?

• Embedded cost definitions focus on changes in cost allocation determinants and rate levels from rate case to rate case
• Marginal cost definitions compare the value of the resource with the compensation levels
• Residual cost definitions look at additional customer contributions to utility revenue after considering a particular marginal value for a resource or customer action
Section 4: Overarching Program Parameters
Metering and billing frameworks

- Customer netting options
  - Monthly netting
  - Instantaneous netting (inflow/outflow)
  - Time of use netting
  - Granular netting options with advanced metering
- Other structures
  - Buy-all/credit-all
  - Stand-alone distributed generation and virtual crediting
  - Options that require advanced inverter functionality
Other program features and processes

- Program features
  - Programs and tariffs may vary by size, capabilities, customer type and control
  - Renewable energy credit treatment
  - Recovery of non-bypassable charges
- Implementing changes over time
  - Treatment of pre-existing DG customers
  - Process and administrative innovations
  - Pilot programs and tariffs
Section 5: Designing Rates and Credits
Fixed charge options

• Monthly customer charge
• System access charges
• Minimum bills
Energy charge options

- Volumetric rates
- Time-of-use rates
- More granular time-varying rates
  - Critical peak pricing
  - Peak-time rebates,
  - Variable peak pricing
  - Real-time pricing
- Bidirectional kWh charge/distribution flow charge
Demand charge options

- Traditional NCP demand charges
- “Peak window” demand charges
- Contract demand charges
- Daily demand charges
- Standby charges
Credit design options

- Volumetric versus monetary crediting
  - Trend is toward monetary crediting
- Monetary export credit options
  - Retail rate linked options
  - Value-based options
  - Comparative resource option (AZ)
  - Market price options
- Credit application and rollover
NY VDER tariff

• VDER credit is the sum of:
  • An hourly wholesale energy rate
  • A generation capacity value
    • Pricing structure depends on technology
  • An avoided delivery cost credit
    • General value and location-specific value
  • An environmental value credit
    • Only for eligible technologies in exchange for RECs
  • Community credit for community DG
• Applies to larger C&I projects and community DG
Section 6: Reforms to Consider and Evaluation of Potential Residential Pathways
Key evaluation criteria

- Fair cost allocation
  - Do customers contribute to system and program costs that they use and benefit them?
- Efficient customer price signals
  - Does customer behavior help lower future system costs?
- Customer understanding and acceptance
  - Can customers manage their bill?
  - Can they understand why they are paying a different amount than their neighbor?
- Administrative feasibility
  - What are the incremental costs for new analysis, new proceedings, and new education efforts?
Data collection, customer classes and cost allocation reforms

• Data collection is foundational and getting the right data can enable further reforms
• Potential to define new technology-neutral customer distinctions, but comes with challenges
• New data and analytical tools enable significant reforms to traditional embedded cost allocation methods
Gradual evolution pathway

- New DG customers, and any new storage/V2G customers who wish to export, are placed on year-round time-of-use rates by default
- Inflow/outflow framework is maintained, as well as export credits defined by supply rate
- Rate design reforms
  - Default TOU rate design for new DG customers includes supply and distribution
  - Tiered customer charge adders for site infrastructure costs for all residential customers
- Pros
  - Modest improvements to pricing efficiency and cost allocation
  - Little new administrative burden
- Cons
  - Improvements are modest
  - Potential data collection issues for tiered customer charge adders
Advanced DER rate design pathway

- Move broad subset of residential customers to more efficient and granular time-varying kWh charges and credits to use as resource and lower system costs
  - Customers with DG, EVs, storage, and/or high usage
- Inflow/outflow mechanism would be replaced by demand charge for site infrastructure and distribution flow charge

- Pros
  - Major leap forward in customer pricing efficiency
- Cons
  - Increased complexity for customers and implementation
Customer options and stability pathway

- Two choices for new DG customers
  - Choice A: buy-all/credit-all with value-based credits
  - Choice B: monthly netting with value-based credits for net excess generation, with grid access charge
- Rate and credit design
  - Flat kWh credit values for solar PV and other nondispatchable technologies are set administratively every two years based on an estimated long-term value of the resource.
    - Customers can elect to lock in credit value or have it updated
    - Environmental value for eligible technologies requires transfer of RECs
  - Under Choice B, grid access charge ($/kW installed capacity) is designed to recover equitable share of distribution and nonbypassable costs
- Pros
  - Easy to understand for customers, while providing choices that are fair to all parties
- Cons
  - Significant new effort to determine and administer credit values
  - Some practical details, such as integration of storage, would need to be worked out
Key Takeaways
Key takeaways

• Electricity system of the future will be different than the past and regulatory innovations will be necessary to achieve optimal results

• DER rate design will inevitably involve tradeoffs between key ratemaking principles and policy goals

• Understanding tradeoffs to manage them intentionally is important to policy design and implementation
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

Mark LeBel
Associate
+802 498 0732
mlebel@raponline.org