Rate Design Alternatives for Customers

MADRI Working Group Meeting #33

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Discussion Goal and Topics

Discussion Goal:

Discuss several Rate Design Alternatives for residential Distributed Energy Resources (DER)

Topics:

- Background: Net Metering in Maryland
  - BGE Net Metering Statistics
- Alternative pricing for DER
  - Alternative Pricing Structures
    - Fixed Cost Recovery
      - Full Customer Charge plus Energy Charge
      - Three part rate (Customer, Demand and Energy Charges)
    - Minimum Bill
    - Dual Rate
      - Separate Meters
        - Value of Solar Tariffs
        - Feed In Tariffs
- Recent Developments in Valuing Solar

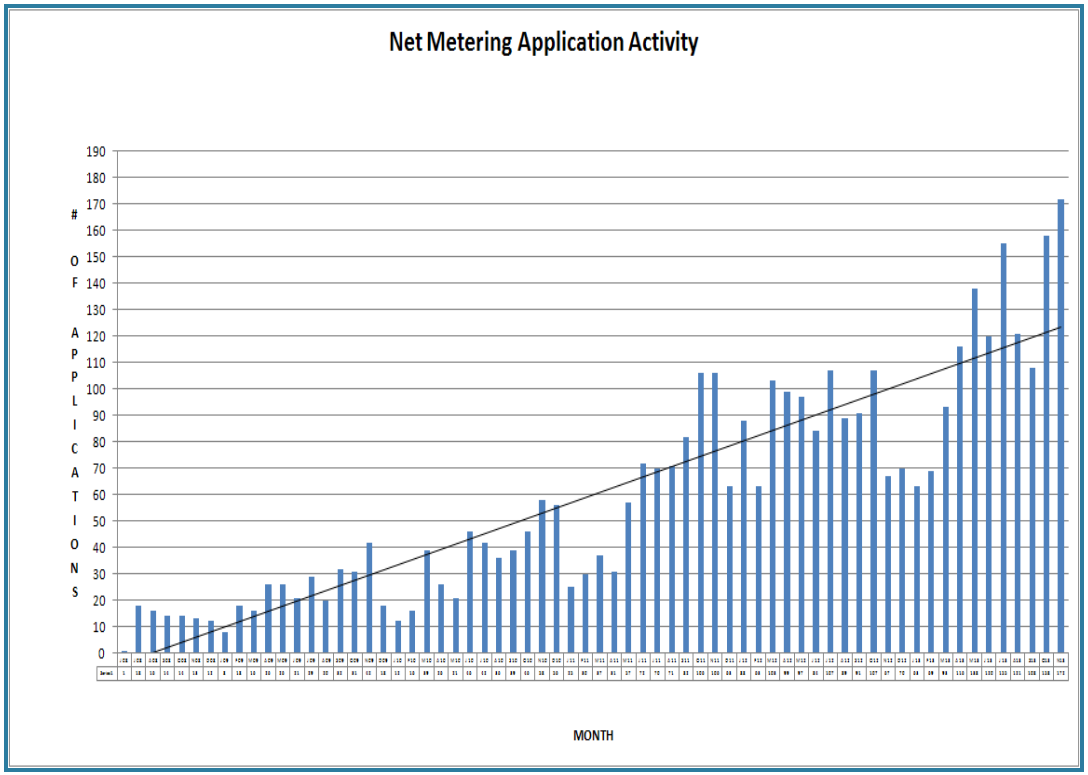
Net Metering in Maryland

- Maryland is one of most aggressive states at advocating net metering
  - Customers with solar, wind, fuel cell, biomass, or closed conduit hydro electrical generation facilities not exceeding 2 megawatts (MW) or micro combined heat and power electrical generating facilities not exceeding 30 kilowatts (kW), are eligible for net metering
  - DER can be sized up to 200% of customer's load
  - Available on a first-come, first-serve basis until customer operated generators in the State of Maryland reaches 1,500 MW

- Customers who have installed qualifying renewable generation can have the utility recognize the energy they produce to offset non-fixed charges
  - Receive credits to offset the total cost of energy (kWh) the customer would take from the distribution system (meters spin backwards)
  - Excess generation is carried-over to apply to energy the customer takes from the system at times when they are not generating enough to fully meet their use
  - Excess balance is carried from month to month and is "trued-up" at least annually, and at times when customer terminates account or changes suppliers.
    - Excess balance is zeroed out, customer compensated at the value of generation (SOS generation or supplier rate)
  - Net metering aggregation is permitted for agriculture, not-for-profit and municipal customers

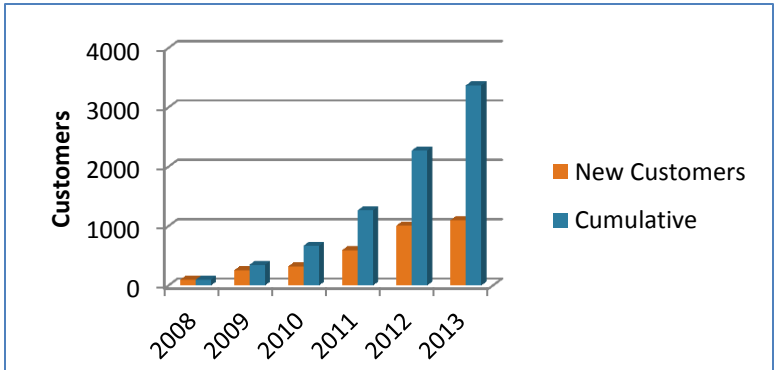
BGE Net Meter Activity Trends (2008 – 2013)

Applications



Averaged 120 applications per month in 2013 with over 170 applications in November.

Completions

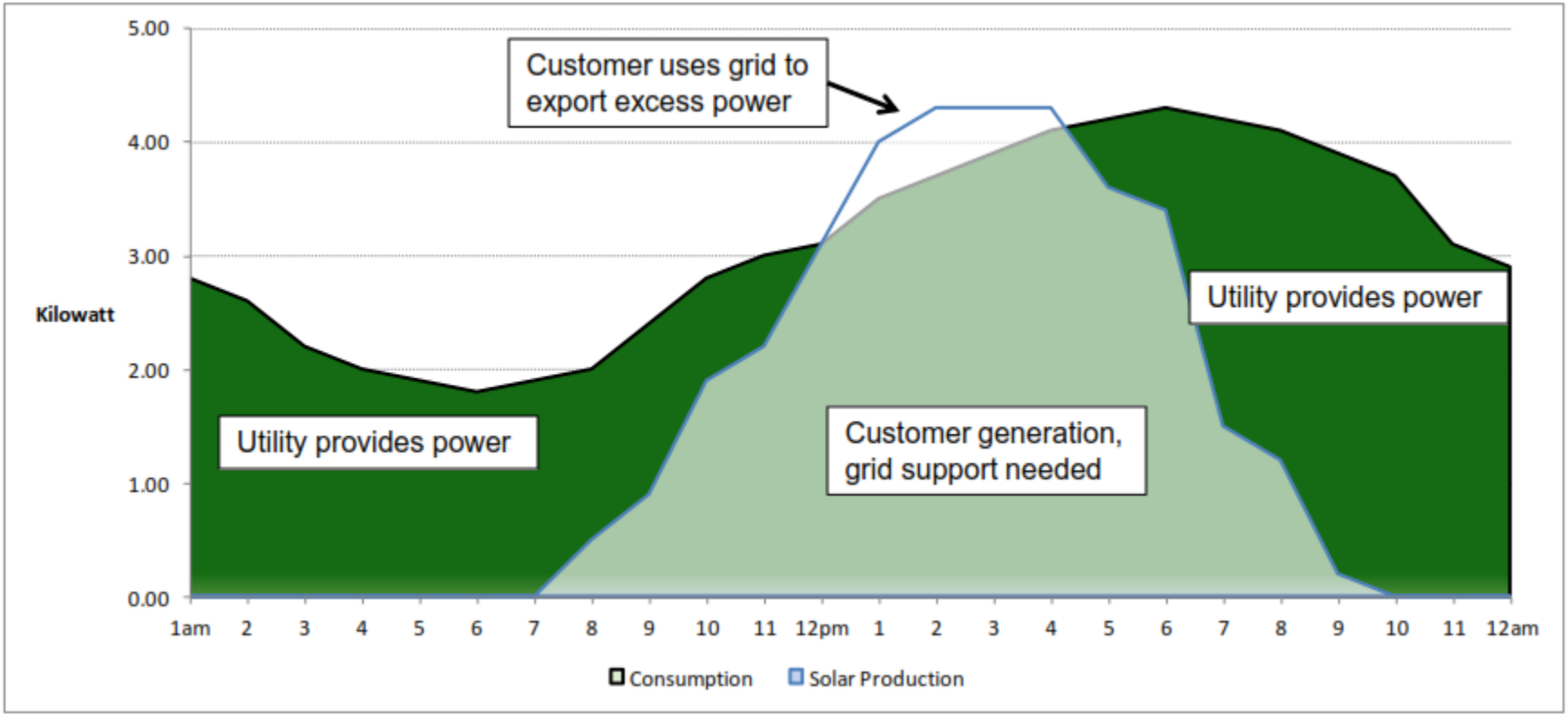


Net Metered Accounts by Year

Year	New Customers	Cumulative
2008	94	94
2009	255	349
2010	320	669
2011	595	1,264
2012	1008	2,272
2013	1098	3,370

Value of Grid to Solar – Solar Customers Use Grid 24 Hours a Day

Typical CA Summer Grid Interaction with Rooftop Solar



Source: Value of the Grid to DG Customers. IEE Issue Brief. Updated October 2013.

Three Key Questions for Pricing DER

- How much should DER (Distributed Energy Resource) customers pay for the benefits they receive from using the grid?
- How much should DER customers be compensated, for the energy and other benefits they provide to the grid?
- Are we equitably pricing all DER participants?

How Much Should All Customers Pay for Grid Services?

- Full Customer Charge plus Energy Charge
  - Some costs do not vary at all based on the volume or peak demand. These include costs associated with the meter, meter pan, service extension, meter reading, billing and credit and collections. Every customer connected to the grid should pay a fully allocated fixed rate to cover these costs. If some customers are paying less than this amount, other customers must pay higher bills to make up the difference.
  - Current BGE residential Customer Charges
    - Non-TOU = $7.50/month + about $0.032/kWh
    - TOU = $10/month + about $0.032/kWh
    - Full Customer Costs = $25+/month + about $0.013/kWh*

* example

Full Distribution Customer Charge Model

- Cons
  - Could lower incentive to conserve energy
  - Low income customers may be adversely impacted (under the assumption they tend to use less energy)
- Pros
  - Better tracks costs thereby reducing economic and intra-class rate distortions. If some customers are not paying their allocated share of grid fixed costs, due to low Customer Charges, other customers in the class must pay more than their share.
  - The majority of the bill, for supply services and the variable portion of T&D costs, is still billed on a volumetric basis (Average BGE residential bill is about $140/month, and only $25 or 18% would be fixed in my example)
  - Reduces customer bill impacts due to extreme weather conditions since the distribution energy charge is lower
  - Low income does not necessarily correlate to low energy usage. For the 12 months ended 2/13, the average monthly weather normalized usage was:
    - All Schedule R customers - 926 kWh
    - All LIHEAP customers - 979 kWh
    - 0 – 75% of poverty level - 1,075 kWh

Distribution Three Part Pricing Model

- In this model, there is a Customer, a Demand (per kW) and an Energy Charge (per kWh)
- For BGE, all C&I customers with demands of 60 kW or more have had a demand component of their bills for decades
- Prior to AMI, demand billing was impractical for smaller customers due to the extra cost of demand recording meters. Today, all of BGE's AMI meters record demands
- Different models for determining the demand level
  - Highest demand each month
  - Highest demand during an on-peak period each month
  - Ratcheted demand - highest demand over some period (e.g. prior 12 months)

Distribution Three Part Pricing Model

- Cons
  - Some utilities do not have demand meters on smaller customers
  - May be challenging to explain Demand Charges to mass market customers

- Pros
  - Better track costs (e.g. the local distribution transformer and other infrastructure is sized based on the local peak demand)
  - Customers that have higher load factors and tend to use less on-peak, will have lower bills than customers with poorer load factors that are using more energy on-peak

Net Metering DER Payment Model

- A bi-directional meter is used to net the load of a customer with their behind the meter generation
- The behind the meter generation is thus being compensated at the full retail rate as the meter spins backwards
- Some states allow any excess generation over load to be banked for use in a subsequent month. The grid is thus acting as a virtual battery to store this energy and provide it back to the customer at a later time.
- In CA, Solar City recently announced that their residential solar customers could lease 10 kWh batteries (described as the size of a large suitcase) for $150/month to store any excess solar generation.

Net Metering DER Payment Model

- Cons
  - Net metered customers may not be paying their share of the fixed distribution costs if Customer/Demand Charges are set below costs
    - Creates revenue shortfall for a utility that is not decoupled
    - May shift costs from customers with DER to customers w/o DER
      - As of 3/14, BGE had 3,281 net metered residential customers only 15 of which are LIHEAP customers. We have 50,149 LIHEAP customers
      - Howard County, MD which is one of the wealthiest counties in the US, has twice the % of roof top solar customers as compared to other counties in our service territory
  - Net metered customers are paid more for their generation than all other generation sources, which are not behind the meter
  - DSM investments such as insulation, EnergyStar appliances and DR have a consistent energy reduction pattern whereas much DER is intermittent
  - Is unsustainable as % of DER grows
- Pros (by advocates)
  - Promotes DER
  - Easy for small DER customers to understand
  - Similar compensation as DSM investments (e.g. lower kWh usage)
  - Serves as a rough "proxy" for benefits provided by DER customers

Dual Rate DER Payment Model

Dual Rate

Separately Metered Solar – A meter for solar generation and a separate meter for residential energy consumption from utility's distribution system

- Cost of energy from utility distribution is offset by separately metered and valued solar generation
  - **Feed-in Tariff** – Predetermined, fixed market rate in long term contracts applied to separately metered solar generation
  - **Value of Solar Tariff** – Contains approved methodology for calculating a total value of solar energy, and may include multiple indices for recognizing the broader social impact of solar generation

DER Uneven Compensation in Maryland

- Residential – Net metering values intermittent solar at full residential retail rate for generation, transmission and distribution or about $0.14/kWh.
- Lower cost "utility scale" solar with higher outputs due to optimal solar tracking will be paid the normal grid supply rate of 5 – 8 cents/kWh
- Wind is paid the off peak supply rate, plus a small capacity payment, plus the PTC ($0.023/kWh)
- Grid located fuel cells and output from grid storage devices are paid the normal supply rate of 5 - 8 cents/kWh

If the objective is more solar at the lowest cost, should utility scale solar be setting the price for all solar?

Attachments

Recent Developments in Solar Valuation

- Minnesota Utilities to use Commission approved methodology for calculating the value of solar power generation
  - As a replacement to net metering, the approved Value of Solar (VOS) Tariff establishes a dynamic and adaptable framework to calculate the broad value of distributed solar energy for all utilities in Minnesota

Five Components:

1. **Energy** – The value of energy PV displaces, energy produced by the marginal unit in real time, including cost of long-term price risk
2. **Capacity** – PV's hourly kW contribution to grid reliability multiplied by capital cost of installing and maintaining a new marginal generation facility over the full life of the PV resource – assumed 25 years
3. **Environmental –** Based on Minnesota (non-CO_2) and EPA (CO_2) externality values
4. **Transmission and Distribution** – Represents deferred T&D capital investments
5. **Loss Savings –** PV generation at or near the point of energy consumption savings on T&D losses associated with the remotely generated energy it displaces

"VOS is *not* an incentive for distributed PV, nor is it intended to eliminate or prevent future incentive programs" – MN Department of Energy

"VOS provides a rigorous [clear and specific] analytical foundation for valuing distributed solar energy that can be updated and adjusted over time [to incorporate best available practices]" – MN Department of Energy

Recent Developments in Solar Valuation

- Net Metering Fee – Arizona Corporate Commission imposed a 70 cents per kilowatt of installed solar fixed charge, which would equate to about $5 per month in a typical household in response to subsidy concerns

- California Public Utilities Commission extended California Assembly Bill 920 for Net Metering and Net Surplus Compensation (NSC) for additional 20 years
  - Excess production is credited at total retail rate, cash-outs are valued at NSC
  - NSC is calculated as the simple rolling average of each utility's Default Load Aggregation Point (DLAP) price from 7 a.m. to 5 p.m. (wholesale rate)
  - Net Energy Metering credits are calculated on a monthly basis and applied to eligible customers with a true-up period in the following month for 12-month energy surplus period
    - Customer may choose to roll forward NSC credits at retail valuation or cash-out at NSC valuation