Distributed Energy Resource Options and The Importance of The Electric Power Grid

David K. Owens
Executive Vice President
Edison Electric Institute

National Conference of State Legislatures Webinar on Net Metering
May 1, 2014
The Electric Distribution System Is In Transition

- Customers are gaining new distributed energy resource (DER) options, including distributed generation (DG).
- The structure and operation of distribution systems will change as “smart” infrastructures are built out and new DER technologies are deployed.
  - Ultimately, power will flow in 2 directions across distribution systems.
  - Supporting a safe and reliable grid infrastructure is critical to the deployment of new technologies.
What is Distributed Generation (DG)?

DG systems are small-scale, on-site power generation located at or near customers’ homes or business. Some common examples include solar panels, energy storage devices, fuel cells, microturbines, small wind turbines, and combined heat and power systems.
Utilities with Net Metering: All utilities bound by the requirements ... utility still charges for the full costs of providing service to a customer.

State policies
Voluntary utility programs

Public Policies Are Spurring DER Adoption

State Renewable Policies

State Net Metering Policies

Source: EIA

State policy
Voluntary utility programs

DER Adoption
Other Factors Contributing To The Transition

- Declining cost of PV and new leasing models
- Customer preference for “choice” or “self-supply”
- Evolution of “smart” infrastructure technologies
- Outage concerns – storms; cyber and physical security
- Department of Defense policy to expand renewables, “islanding”
Growing New Markets

Utilities lead PV installations … … And solar integration

Source: GTM Research, Solar Market Insight, 2012
Typical Energy Production and Consumption for a Small Customer with Solar PV

Source: *Value of the Grid to DG Customers*, Institute for Electric Innovation, October 2013
Current Rate Designs Work Poorly for DG

- **What’s the Problem?** Most rates recover a large share of fixed costs through variable use charges.
- DG customers continue to rely on the grid and increase grid costs, most of which are fixed.
- Under most rate designs, rates to customers with DG fail to recover right amount of fixed grid costs.
- Net metering makes the cost-recovery problem worse, shifting fixed costs to non-DG customers.
# Value of the Grid to DG

## Average Residential Customer:
**Non-Energy Charges as Percent of Typical Monthly Bill**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Monthly Usage (kWh)*</td>
<td>1000</td>
</tr>
<tr>
<td>Average Monthly Bill ($) *</td>
<td>$110</td>
</tr>
</tbody>
</table>

## Typical Monthly Fixed Charges

<table>
<thead>
<tr>
<th>Service Type</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ancillary/Balancing Services</td>
<td>$ 1</td>
</tr>
<tr>
<td>Transmission Systems</td>
<td>$ 10</td>
</tr>
<tr>
<td>Distribution Services</td>
<td>$ 30</td>
</tr>
<tr>
<td>Generation Capacity ^</td>
<td>$ 19</td>
</tr>
<tr>
<td>Total Fixed Charges for Customer</td>
<td>$ 60</td>
</tr>
</tbody>
</table>

## Fixed Charges as Percent of Monthly Bill

- **55%**

---

* Based on Energy Information Administration (EIA) data, 2011  
^ The charge for capacity varies depending upon location. This is just an estimate.

Source: Value of the Grid to DG Customers. IEE Issue Brief. Updated October 2013. Available at www.edisonfoundation.net/IEE
Reform net metering policies.

Adopt new approaches to designing rates for DG so that all users of the grid contribute to grid infrastructure.
Distributed Generation
How Is It Priced Under Alternative Methods?

- Customer Load
  - (Displaced) Utility Supply
  - Customer DG Used Onsite
    - Full Retail Rate (Net Metering, Net Metering with Special Rate for Exports)
    - Separate Rate (Bidirectional Net Metering, Buy/Sell Tariffs, Contract Energy Purchases)
  - Excess DG Sold to Utility
    - Full Retail Rate (Net Metering)
    - Separate Rate (Net Metering with Special Rate for Exports, Bidirectional Net Metering, Buy/Sell Tariffs, Contract Energy Purchases)

Only conventional net metering would pay the customer the full retail rate for all energy produced from DG.
The fact that customers receive a retail offset is the same economically as if the customers had sold their power back to the utility at the full retail rate. Thus, they do not pay their share of fixed transmission, distribution and other Commission-approved costs.

In other words, they pay nothing to the utility for fixed grid costs when they generate for themselves or sell surplus power back to the utility.

This raises the cost for other customers.
Net Metering Does Not Align with Ratemaking Principles

- Prices to customers should be based upon the actual wholesale cost to provide them electricity, and the fixed costs of delivery, power quality and related services.

- Any subsidies (additional costs borne by some classes of ratepayers to benefit others) should be transparent.

- Net metering at retail rates creates a hidden subsidy benefiting distributed generation owners at the expense of other electricity ratepayers that is being defended on the basis of the “societal benefits” that it provides.
Net Metering Is Not a Simple Rate Issue

- Highly politicized

- The general public does not understand:
  - Net metering, or any utility ratemaking technicality
  - Difference between utility/community-scale and DG solar
  - How much a solar rooftop still uses the grid
ACC Decision on Nov. 14, 2013

- Interim charge supported by Residential Utility Consumer Office and some members of the solar industry
- 70 cents/installed kW = about $5/month for standard system
- Effective Jan 1, 2014, through next APS rate case
- Grandfathering:
  - Existing customers through 12/31/13
  - New customers Jan. 1, 2014, through next rate case
- Affidavit for all new customers
- Solar adoption data filed quarterly with ACC
What is the Best Rate Approach for DG? 
Straight Fixed/Variable Pricing (SFV)

- **Fixed costs of service** (transmission, distribution, metering, customer support, taxes, interest expense) should be recovered in **fixed monthly charges** (customer charges and/or demand charges).

- Much of these fixed costs are currently recovered in **volumetric (per kWh)** charges.

- A **straight fixed/variable (SFV)** rate design recovers fixed costs through fixed charges, and variable costs (fuel, purchased power) through per kWh charges.

- Distributed generation customers on an SFV rate will continue to **fully compensate** the utility for fixed costs of service, even if they are no longer taking electricity from the utility.
What if Straight Fixed/Variable Pricing Is Not An Option? Alternative Rate Designs for Distributed Generation

<table>
<thead>
<tr>
<th></th>
<th>Standard Net Metering</th>
<th>Net Metering with Special Rate for Exports</th>
<th>Net Metering with Bidirectional Meters</th>
<th>Buy/Sell Tariffs</th>
<th>Contract Energy Purchases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bidirectional Meter Required?</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Separate Rate for Net Energy Sales?</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Separate Rate for All Energy Sales?</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Special Tariff for Energy Purchases?</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Contract for Backup Power Required?</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Lessons Learned from Germany (and other OECD countries)

Subsidies were too generous
(Level of subsidies was too high for the market, did not follow technology cost reductions, particularly in solar power)

Growth of renewables was too rapid
(Grid and markets cannot adjust quickly enough to the rapid deployment of renewables, particularly wind and solar)

Impacts

- **Reduction in wholesale prices** adversely impacts *generators* and the reliability of the *grid*
- **Increase in retail electricity prices** adversely impacts *consumers* and *competitiveness*
- **Multiple redesigns** of the incentive programs adversely impacts the *renewable industry*
- **Additional investment needs** in the T&D networks will further raise costs
Shaping the Future Is Transformational

New Opportunities

- A changing customer model
- A changing utility business model
- A changing regulatory model
Conclusion

- The U.S. electric grid delivers a valuable product essential to all Americans.

- The electric power industry is leading the transformation to make the grid more flexible and more resilient to meet the growing demands of our digital society.

- Everyone who uses the grid should share equitably in the costs of maintaining it and keeping it operating reliably.

- It is vital for our nation to have a diverse supply of safe and reliable electricity, and electric rates should be fair and affordable for all customers.