# Observations on Evaluating Net Metering in Michigan

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October 18, 2017

# Overview

- NEM in Michigan
- Basic concepts & key principles
- Cost/Benefit analyses of demand-side resources
- Cost-of-service Inflow/Outflow analyses
- Outcomes

# NEM in Michigan: Public Acts 341 and 342

- Legislative direction to the Commission:
  - "…conduct a study on an appropriate tariff reflecting equitable cost of service for utility revenue requirements for customers who participate in a net metering program or distributed generation program."
- Conceptual tariff to be complete by April 2018
- Actual rates implemented in subsequent GRCs
- 10 years of grandfathering for existing DG customers

# Basic Concepts: DG is a long-term resource. NEM is a billing arrangement for DG exports.

- Roots of NEM: customers who install renewable DG have certain rights under federal law (PURPA)
  - To interconnect with the grid
  - To offset their own load
  - To receive an avoided cost price for exports to the grid
- Much of the output of net-metered PV systems never touches the grid.
  - Typically, for residential solar customers, from 40% to 60% of PV output serves the on-site load, before power is exported to the grid.
- "Running the meter backward" is the essence of NEM.
  - Exports to the grid are credited at the retail rate.
  - Does the retail rate credit accurately capture the lower cost of service that results from the benefits (avoided costs) of adding DG?

# Key Principles: Equity and Cost Causation

- DG facilities are long-term investments by customers in new clean energy infrastructure.
- As with any other new resource, the task is to capture the long-term impacts of DG on the utility's cost of service.
  - Benefits: future costs of service that the utility can avoid
  - Costs: increased costs for the system or for other ratepayers
- Consider a comprehensive list of benefits and costs.
  - In the long-run, few costs are fixed.
  - Recognize where DG is located: avoided T&D.
- DG exports are:
  - A service (generation) which the DG customer provides to the utility at the DG customer's meter.
  - Delivered by the utility to neighboring customers, who pay the utility for that delivery service.
- Costs to serve DG customers must consider their different load profile. They may be less expensive to serve.

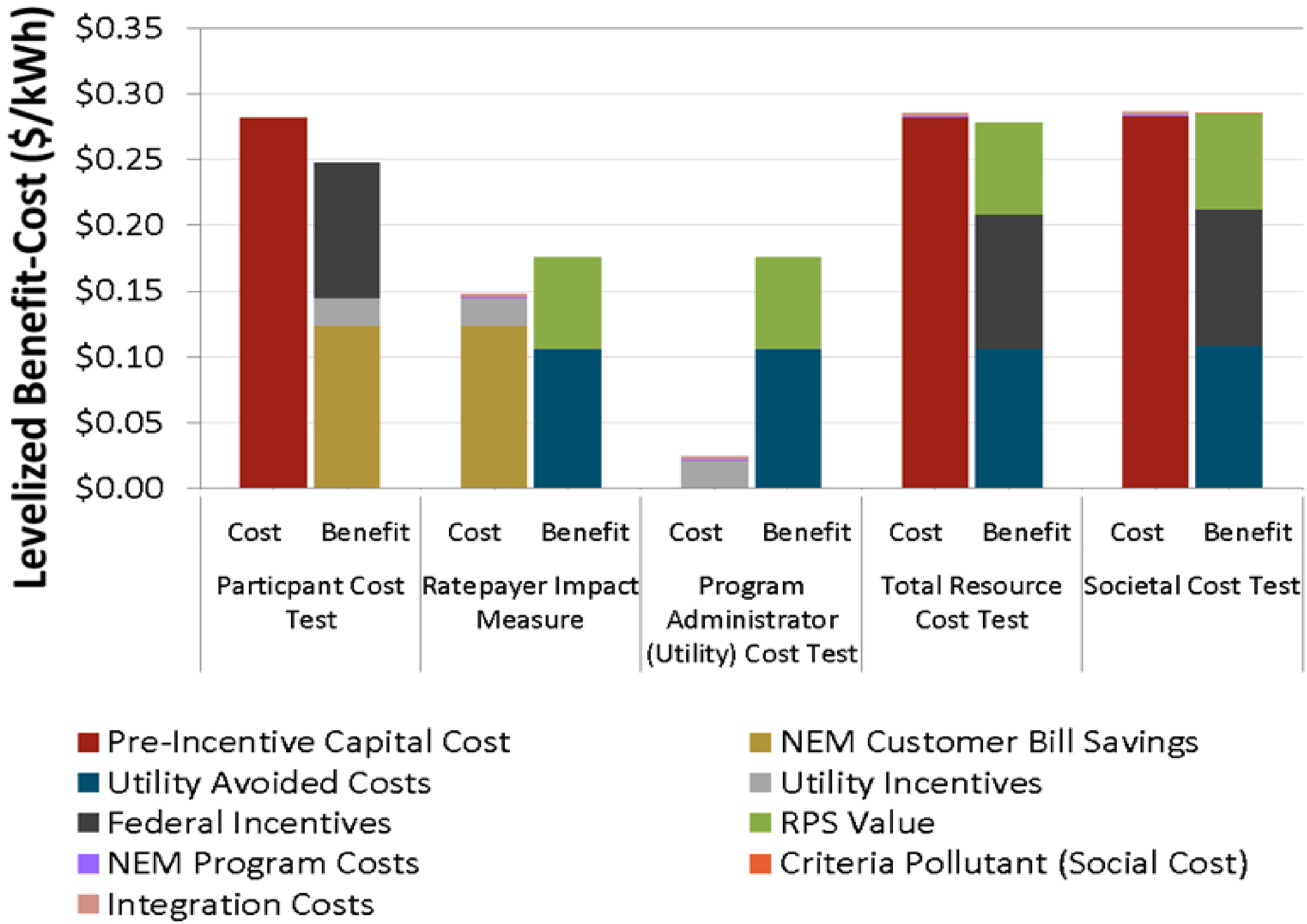
# We've been down this road before…

- …with other demand-side resources that depend on customer adoption.
  - EE/DR have been incorporated as a standard resources in utility planning & regulation.
  - Cost/benefit tests per the *Standard Practice Manual*
  - Well-accepted, widely used for EE/DR, including in Michigan
  - Cost/benefit analyses of DG have been done for many states: AR, AZ, CA, CO, MS, NC, NV, NH, and VT
- Why reinvent the wheel?

# Benefit (+) / Cost (-) Tests for Demand-side Programs, including DG

| Category | Total Resource Cost (TRC) | Ratepayer Impact (RIM) | Program Administrator - Utility (PAC) | Participant (PCT) |
|---|---|---|---|---|
| Capital and O&M Costs of the DG Resource | — | | | — |
| Utility Lost Revenues (same as Customer Bill Savings) | | — | | + |
| Utility Costs for Incentives and Program Administration | — | — | — | + |
| Avoided Costs<br>-- Energy<br>-- Generation Capacity<br>-- T&D, including losses<br>-- Risk / Hedging / Market<br>-- Environmental<br>-- RPS<br>-- Societal | + | + | + | |
| Federal Tax Benefits | + | | | + |

# Example from Nevada NEM Study (released by PUCN in July 2014)



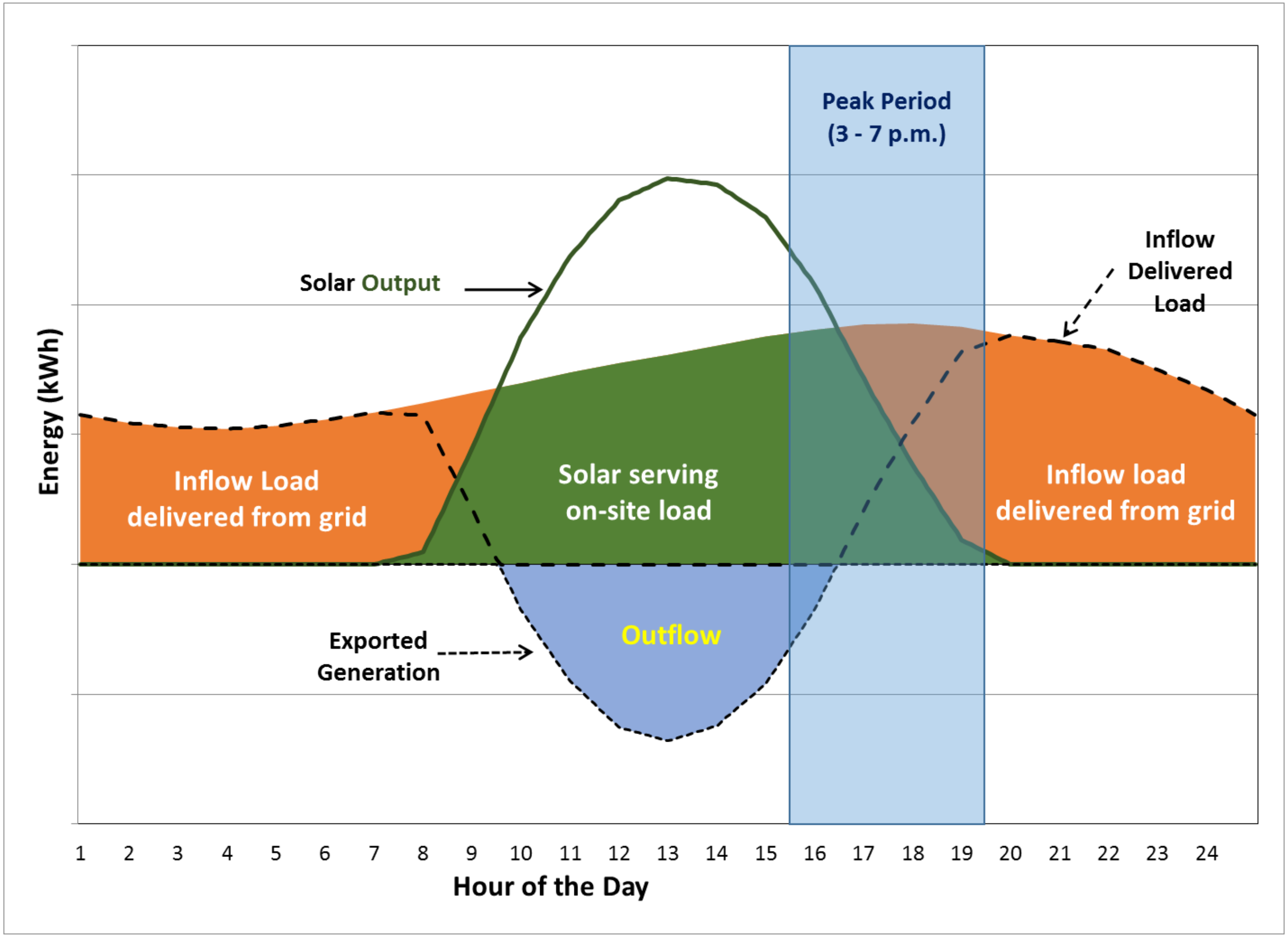
# Limitations of a cost-of-service analysis of NEM

- COS is the basis for rates, one factor in analyzing NEM.
- Limited to a single test year of historical costs or a short-term forecast of costs based on the existing system.
- COS fails to reflect the long-term resource alternatives to DG.
  - COS allocators (4 CP / 12 CP / NCP) divide TY costs among customer classes.
  - The benefits of DG are counterfactual avoided costs - i.e. costs <u>not</u> incurred.
    - COS does not capture the long-term marginal costs of new DG resources.
    - Avoided energy & capacity costs can be greater, or less, than embedded costs.
- COS does not include or quantify important benefits:
  - Reduced fuel price uncertainty
  - Market price mitigation
  - Avoided environmental compliance costs
  - Lower RPS costs
- Set technology-neutral, cost-based rates for all similar customers
  - A distinct rate for each new demand-side technology may be unworkable.

# Customer Issues with Inflow/Outflow

- Requires AMI
- Complex for the customer compared to NEM
  - Inflow or outflow depends on:
    - Netting interval (monthly, hourly, 15-minute, instantaneous)
      - Hourly to instantaneous for APS residential: outflow share +7%
    - Size of customer vs. size of DG
    - Customer load profile vs. DG output profile
- If inflow and outflow rates are very different, customer can face perverse incentives.
  - Shift load to peak if inflow rate >> outflow rate.
  - In contrast, NEM preserves existing rate design signals.
- Less certainty for the DG customer if both inflow and outflow rates are regularly revised.

# Schematic of Inflow/Outflow for Solar DG



# States with Some Form of Inflow/Outflow

- AZ, CA, HI, NH, and NV
  - All have significant solar penetration.
  - All used standard NEM until DG was well-established.
  - Inflow and outflow rates are similar, except in HI.

| State | Netting | Inflow Rate | Outflow Rate |
|---|---|---|---|
| AZ | Instantaneous | Retail TOU rate, plus small fixed Grid Access charge | Utility-scale solar costs plus T&D. Similar to retail now, -10% per year. |
| CA | Hourly (residential) | Retail TOU rate, with a $10/month minimum bill. | Retail rate minus public purpose program costs (< 10% of rate) |
| NH | Monthly | Retail rate (flat or TOU) | Retail rate minus 75% of distribution costs (~3 c/kWh). |
| NV | Monthly | Retail rate (flat or TOU) | 95% of retail, declines 7% for every 80 MW of new DG. |

- HI is a special case, "a postcard from the future"
  - 15% - 20% of customers have solar
  - Self-supply only, working on a "smart export" rate

# If a Test Year COS analysis is used…

- … DG customers may be less expensive to serve.
  - Staff presentation of August 15, 2017 using DTE data:
    - DG production costs are 16% less than for an average residential customer.
    - DG customer incurs 66% of the average residential 4 CP capacity costs.
  - 5 Lakes Energy August 15, 2017 presentation with CE data:
    - DG solar results in a lower COS for residential customers.
- Experience in other states with COS studies of solar DG
  - AR: Ongoing. Compensation at COS inflow/outflow rates may exceed NEM.
  - AZ: Approved APS settlement established the same volumetric TOU rate for all residential customers, with and without DG, even though DG customers are a separate class in AZ.

# If a Test Year COS analysis is used… [continued]

- Key issues:
  - Representative, granular load research data for solar customers
  - Consider COS differences for inflow service, pre- vs. post-solar
  - No double-dipping by the utility in recovering distribution costs
    - DG exports are a service which DG customers provide to the utility.
    - Title to DG exports transfers at the DG customer's meter.
    - Nearby customers compensate the utility for delivering DG exports to them.
  - Export compensation, including avoided upstream T&D costs
  - Valuation of long-term benefits not captured by COS
    - Long-term avoided costs beyond the test year
    - Reduced fuel price uncertainty
    - Market price mitigation
    - Avoided environmental compliance costs
    - Lower RPS costs

# Outcomes

- Different rates for DG customers
  - Complex and contentious
  - Further complicated as rate design becomes more complex
    - Time-dependent rates
    - Grandfathered rates
  - May be lower than rates for comparable non-DG customers
- Maintain NEM
  - A simple, equitable balance understood by customers
  - Allows work on more cost-based rates (e.g. TOU) as the market develops.
    - Enable other distributed energy technologies.
    - Storage will alter the equation.