Acadia Center

Advancing the Clean Energy Future

Leveling the Playing Field for Distributed Energy Resources

Envisioning Our Energy Future

February 24, 2015

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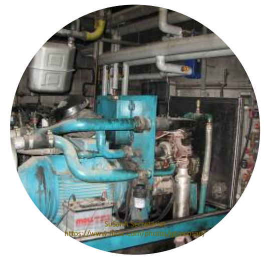
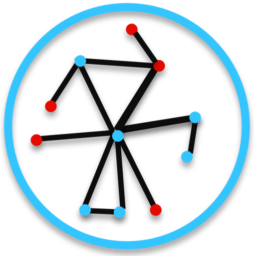
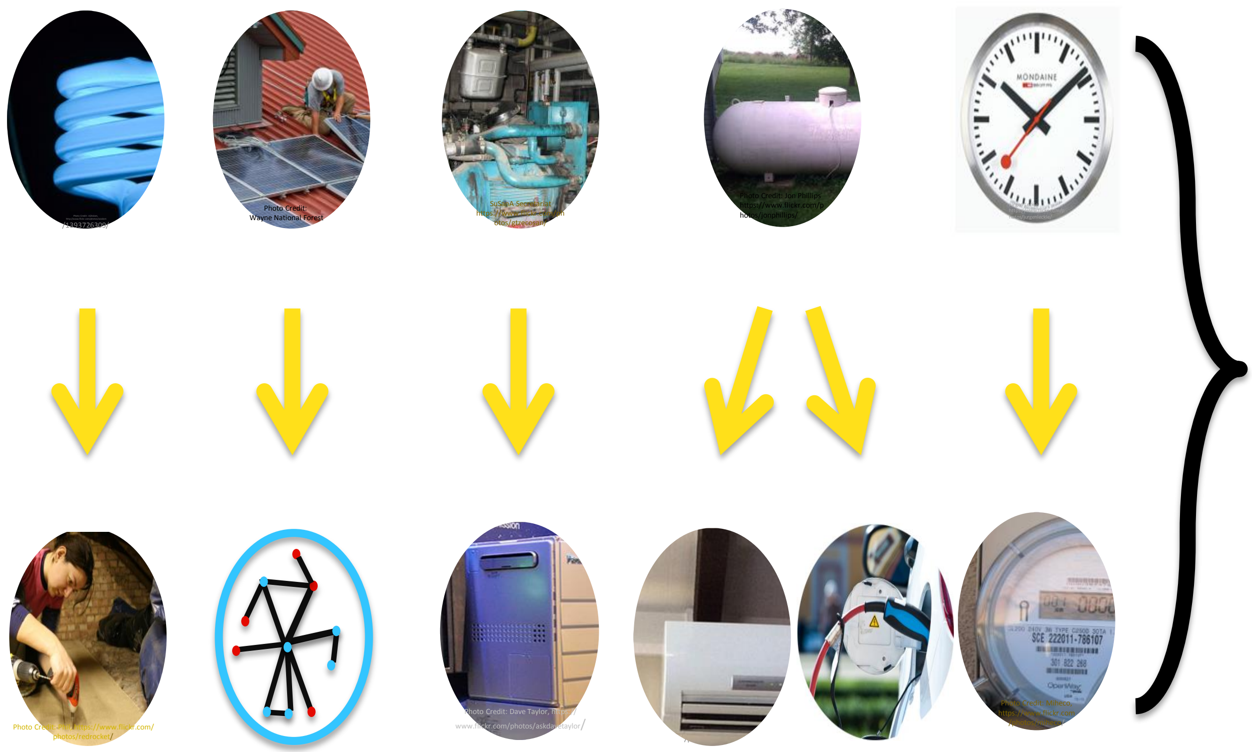
Introduction

Maturing Distributed Resources





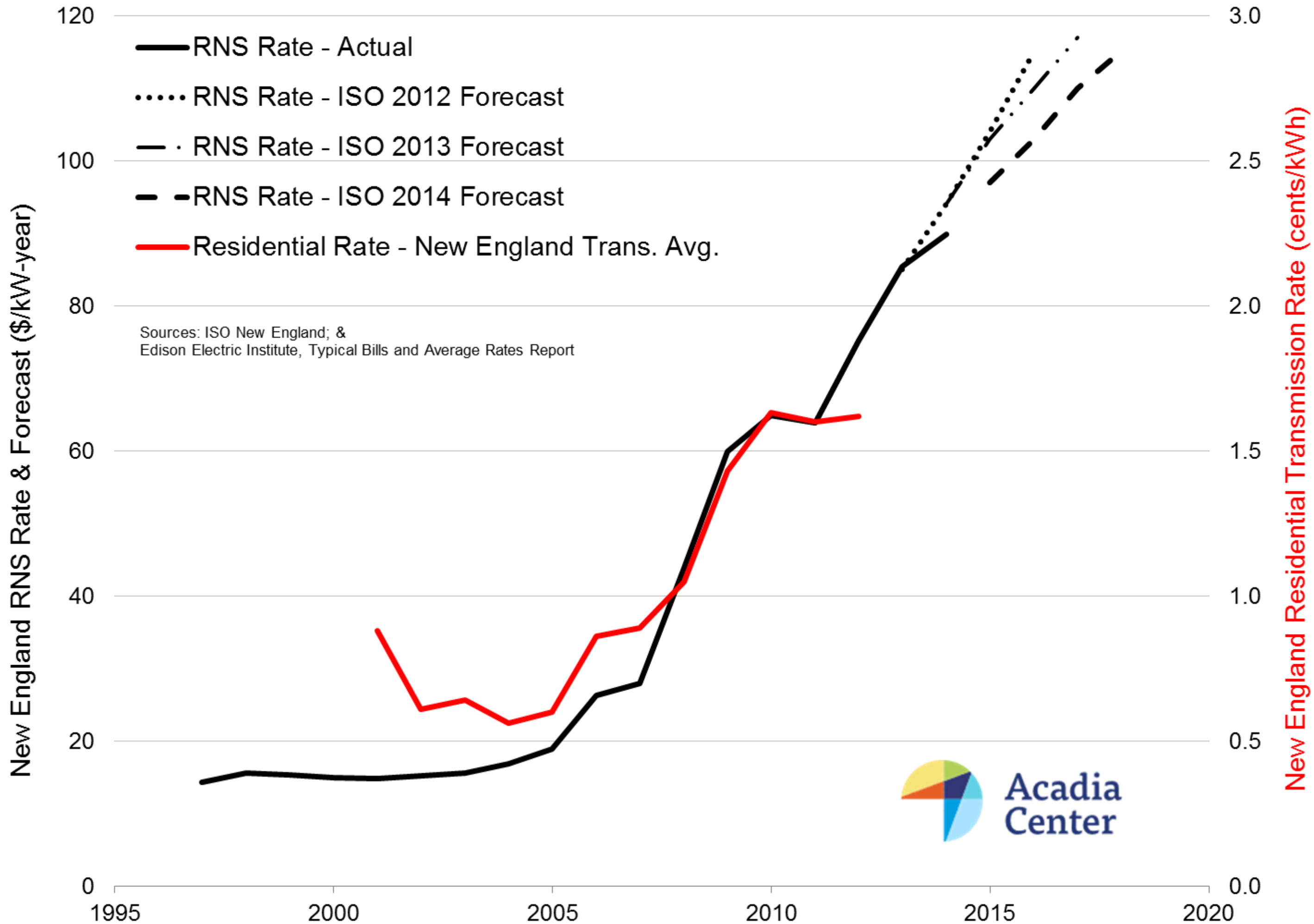
Maturing Distributed Resources



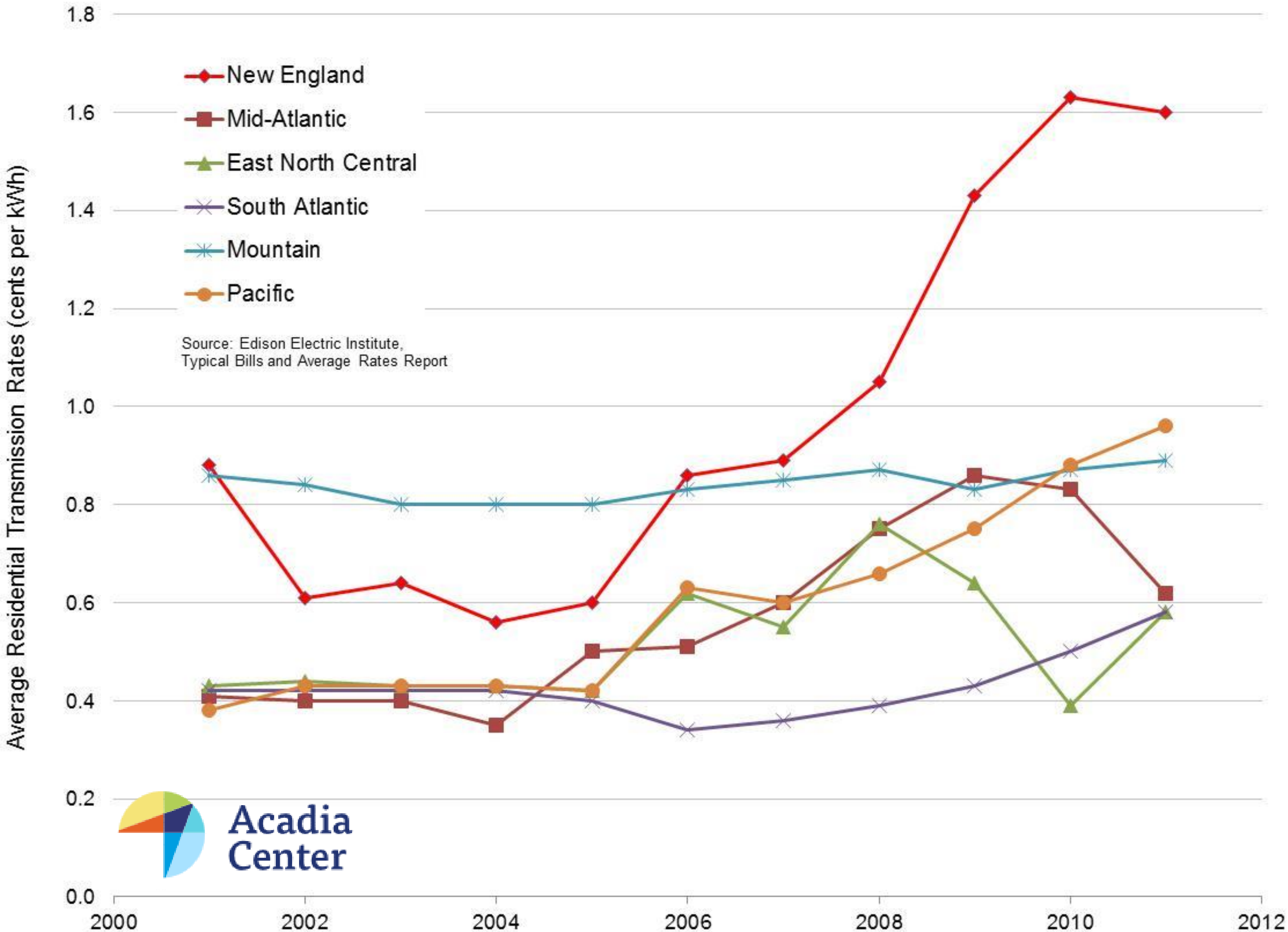
- Least Cost Procurement
- Support of Customers
- Changing Markets
- Energy Justice
- Inventing Infrastructure
- Constructing a New Grid

What’s The Issue?

Skyrocketing Transmission Costs in NE



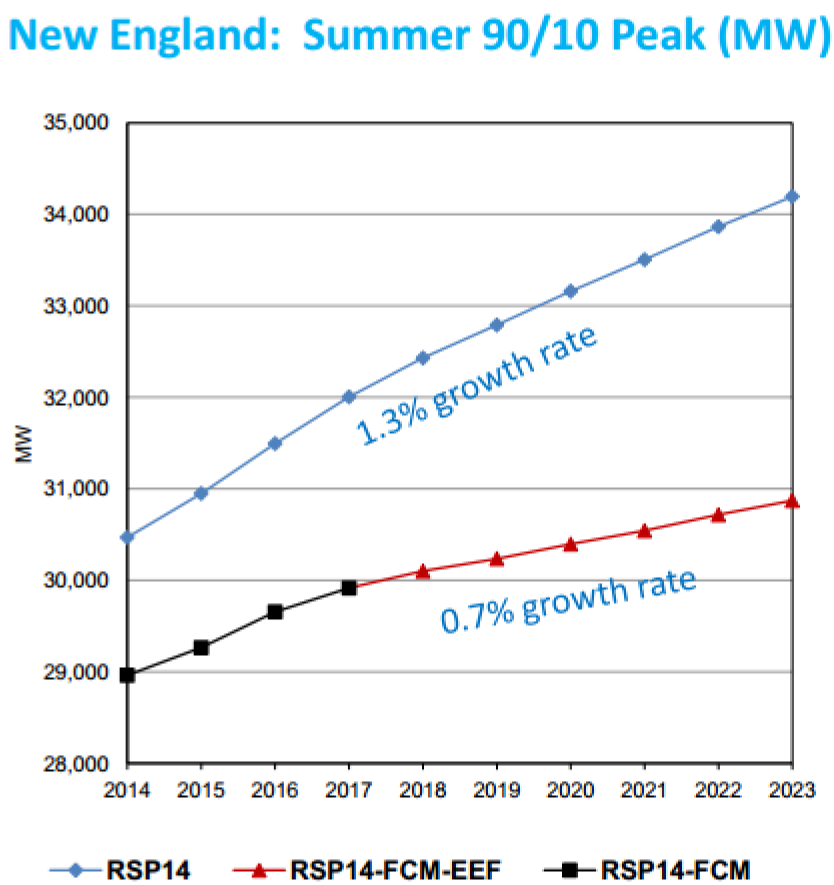
Costs in New England vs. Rest of U.S. Since 2000

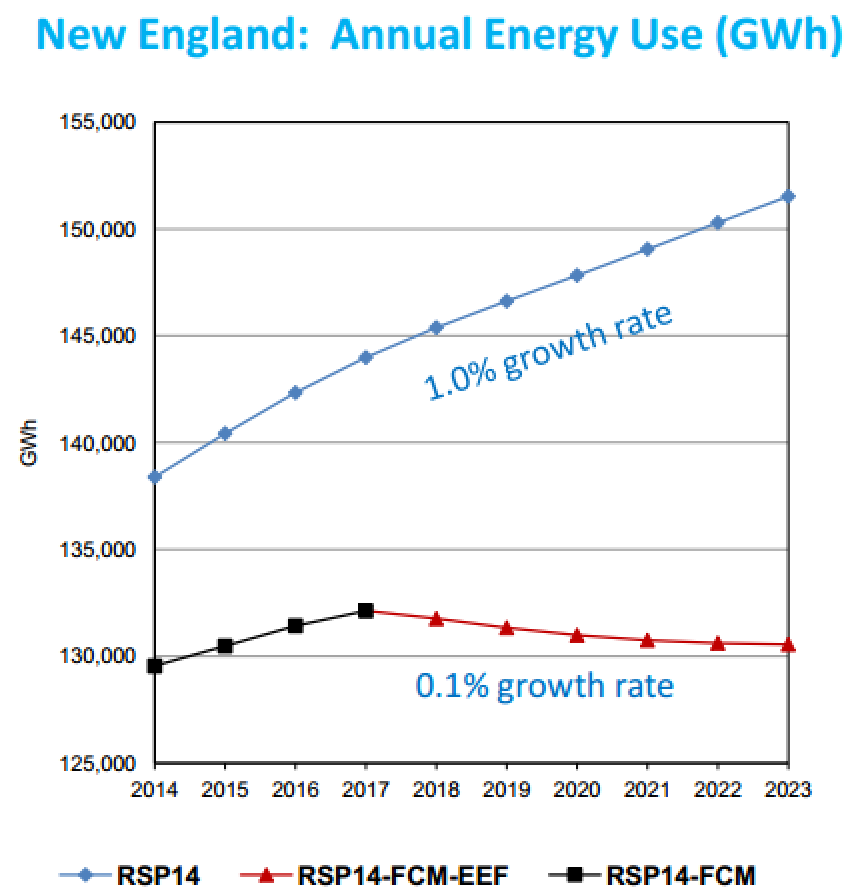


Hurdles to Effective Use of NWAs

1) Reliability Need Problem
2) Knowledge Problem
3) Incentive Problem
4) Timing Problem
5) Funding Problem

Reliability Need Problem

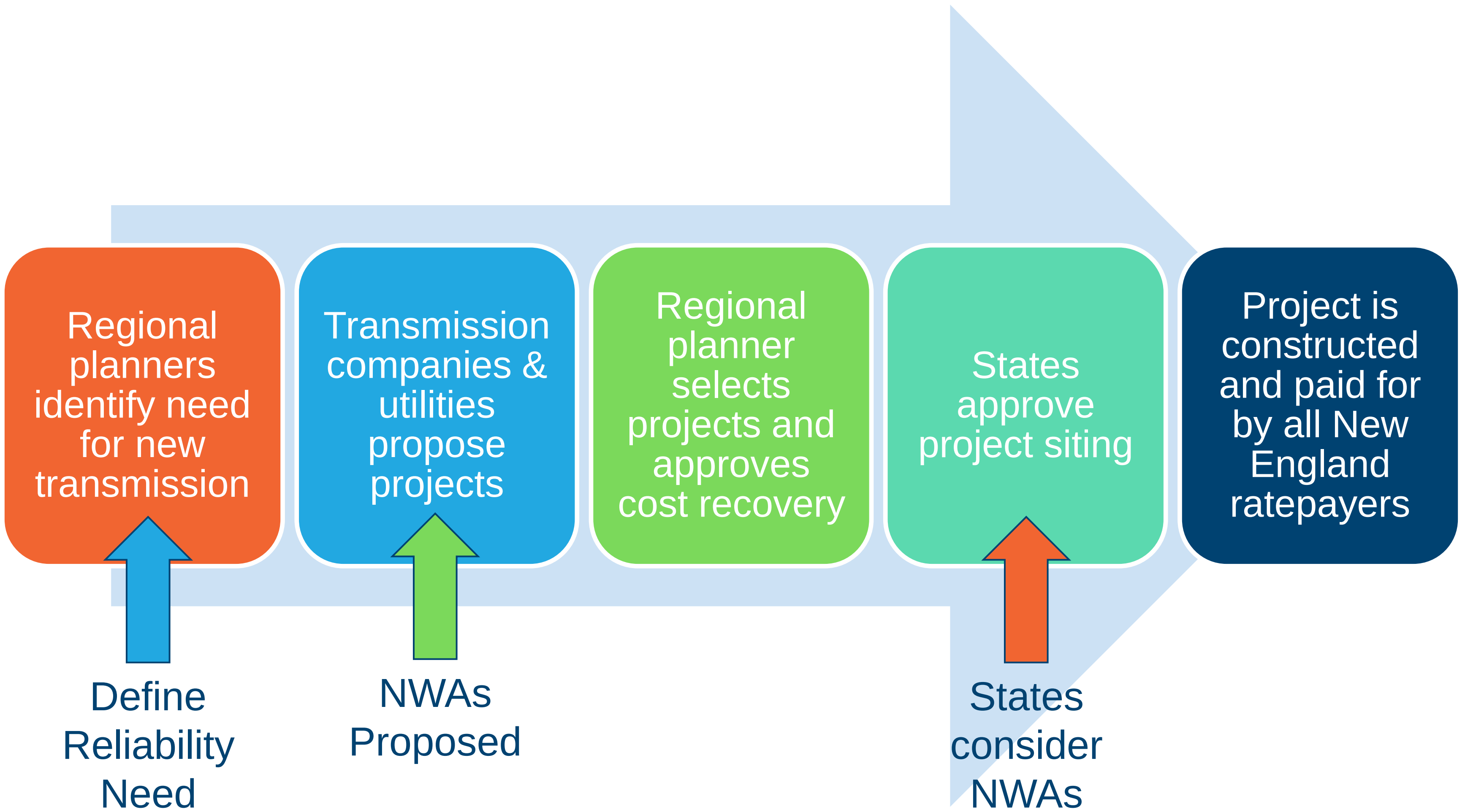




Source: Final ISO New England EE Forecast for 2018-2023 (April 28, 2014)

ISO-NE RSP 2014 Presentation

Timing Problem: Consider NWAs Earlier

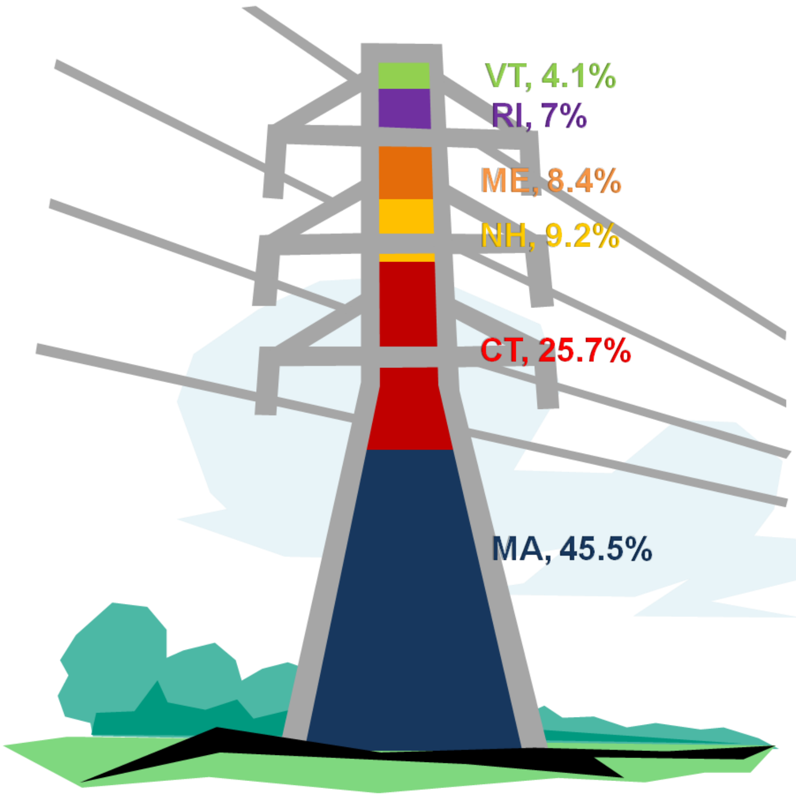


Funding Problem: Regional Socialization

Transmission Line Costs vs. Non-Wires Alternative

Most Paid for by All States

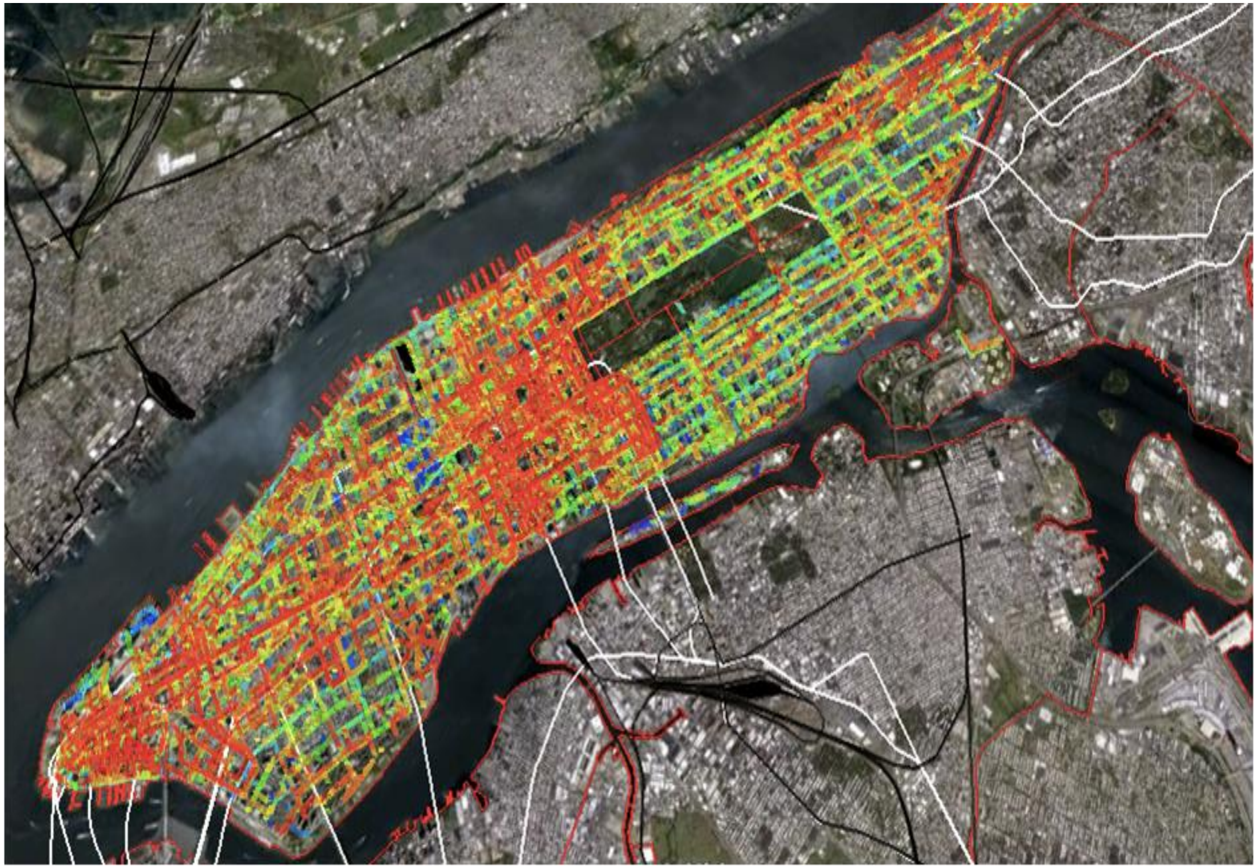
Costs Borne Entirely by One State



Case Study: New York

New York- Con Ed Landscape

- 660 sq. miles
- 133,000 miles T&D cable
  - (70% underground)
- 13,825 people/sq. mile
- 3.3 million electric accounts
- 58 billion kWh sales



New York- Con Ed Landscape

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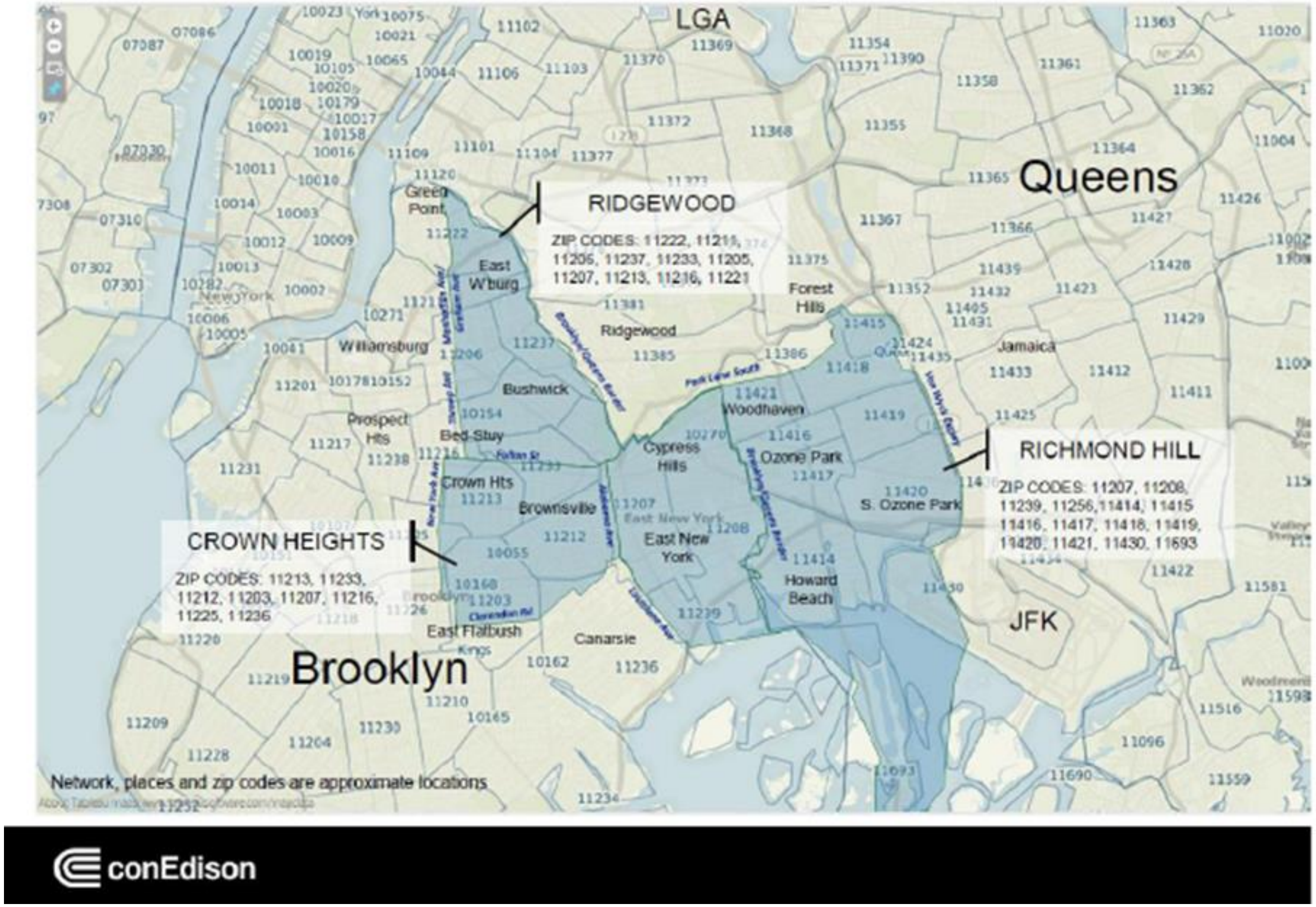
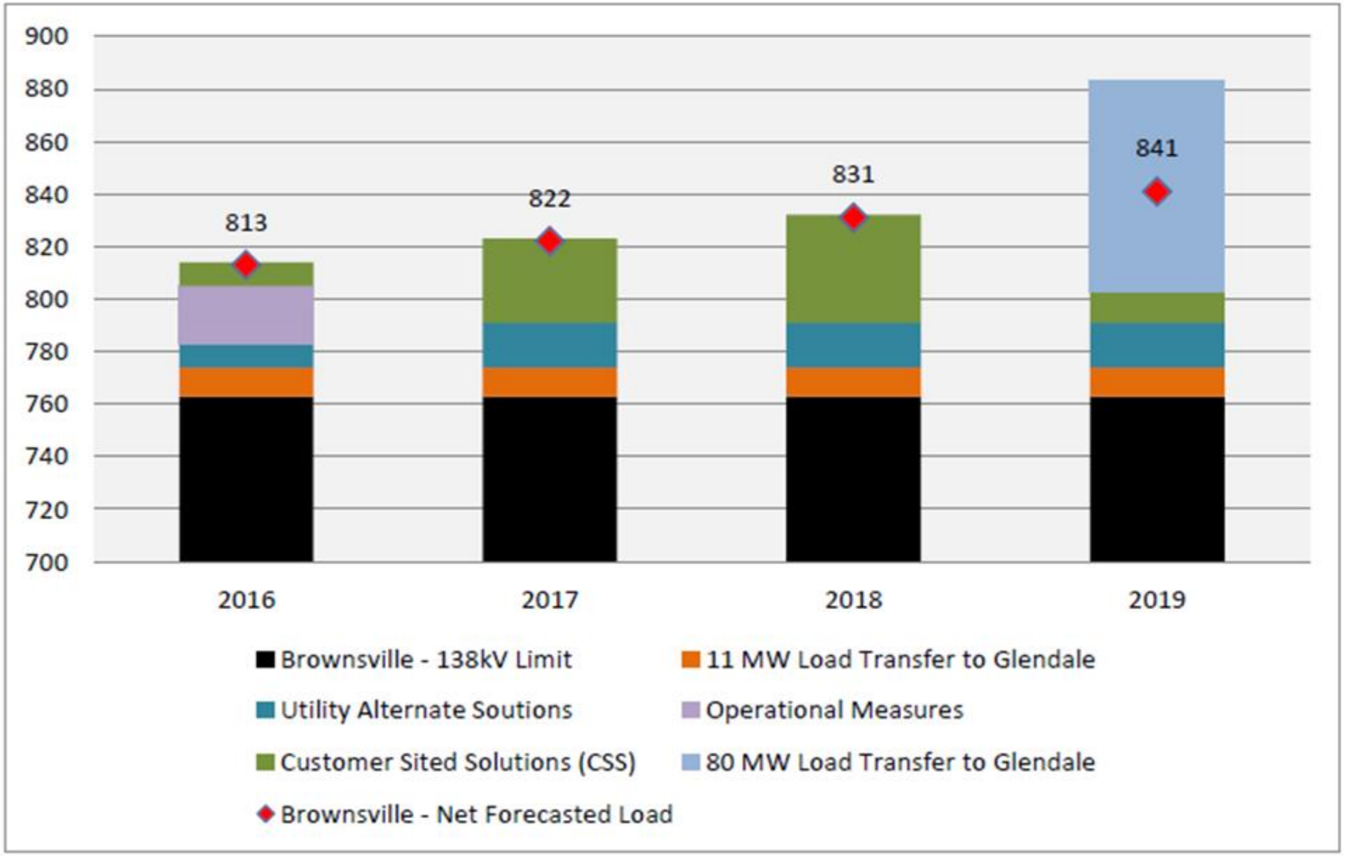
Brooklyn-Queens



Brooklyn-Queens



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Case Study: Rhode Island

Solar PV for Distribution Grid Support:

The Rhode Island System Reliability Procurement
Solar Distributed Generation Pilot Project

The Rhode Island Office of Energy Resources (OER) and National Grid established a pilot to understand the extent to which distributed solar could provide 250 kW of relief to the grid at times of peak demand in two towns, Tiverton and Little Compton, to allow National Grid to defer an investment in a new cable, which would otherwise be needed to handle load growth in the area.

Project Team:

Peregrine Energy Group, Inc.

2 Oliver Street, Boston MA 02109

Francis Cummings, Project Manager

with

Charles P. Salamone, PE, Cape Power Systems

Mark Farber

Matching data for each hour of 3-year period (2011–2013) on feeder load vs. PV output

- The capability of PV to generate power in the Pilot area is essentially known for each hour of the day during the summer under optimal conditions.
- The main factors subject to uncertainty for distribution planning are:
  - the time of day at which the relevant load will reach its highest peak of the summer, and
  - the reduction in PV output that can be expected at that time, primarily due to cloud cover.
- This study therefore analyzed the hourly load on feeder 4 for each hour of the 3-year period for which hourly load data was available: 2011 through 2013.
- For each of these hours we matched the load with the solar output that would have been achieved given historical conditions.
- Based on this historical data, we developed a method to calculate the *Distribution Contribution Percentage* or "*DCP*" of solar PV, to determine the level of solar capacity that can be expected in order to meet the deferral need for the few highest-load summer hours when it is actually required on this feeder.
- We used these DCP values to determine how much solar penetration to target, and to develop payments for small PV owners on this feeder to cover some or all of the reduction in annual energy compared with a southern orientation.
- These additional rebates vary based on:
  - the effect of each site's shading on distribution value during late summer afternoons, and
  - The solar azimuth and tilt angles of each solar project.

Three years of hourly peak loads on Feeder 4 in the SRP Pilot area

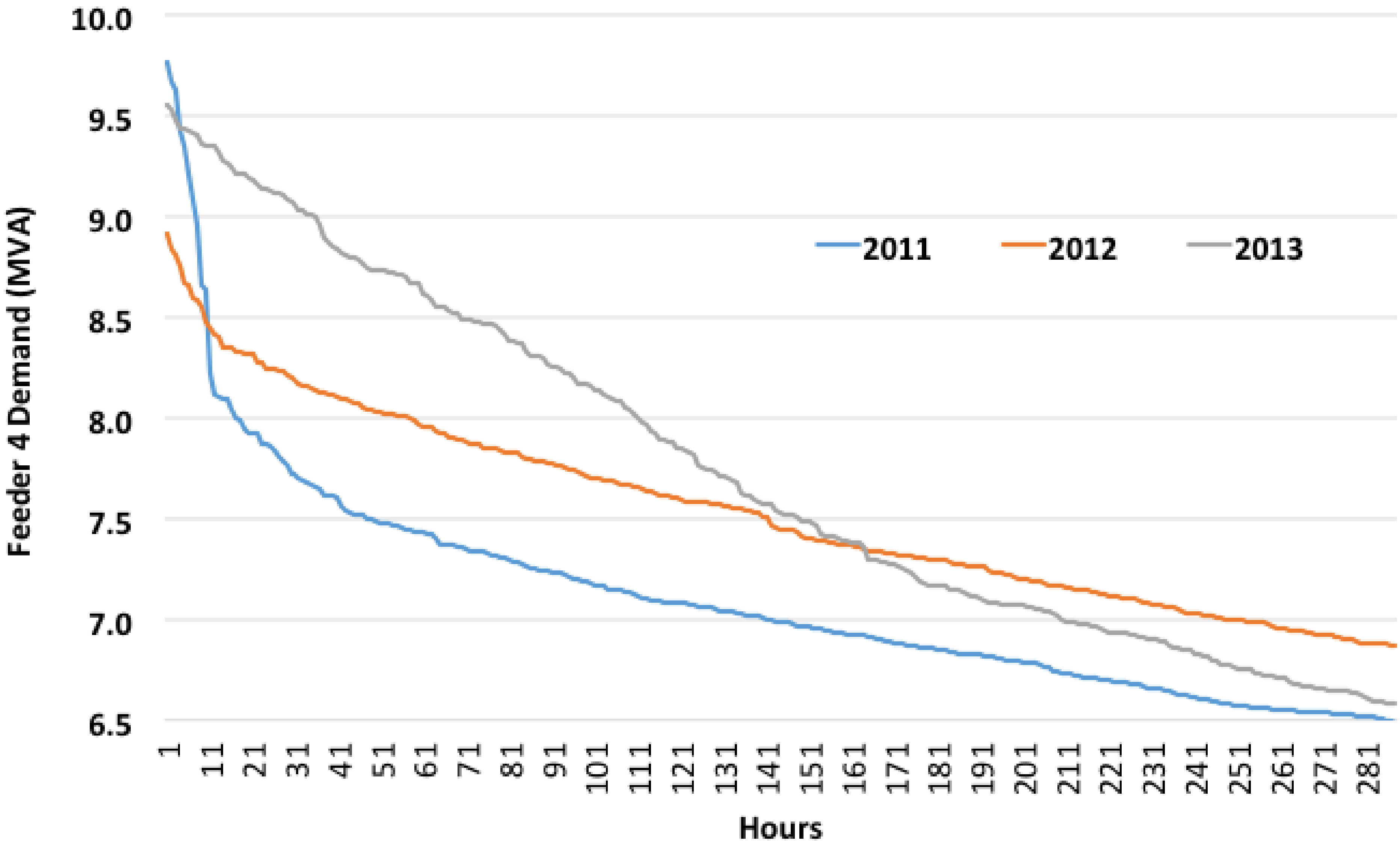

Figure 2: Feeder 4 Load for Top 10% of Summer Hours

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On the peak day in 2011, solar PV output would have been at these levels:

~25% to ~55% in the peak hour from 5 to 6 pm, depending on PV configuration

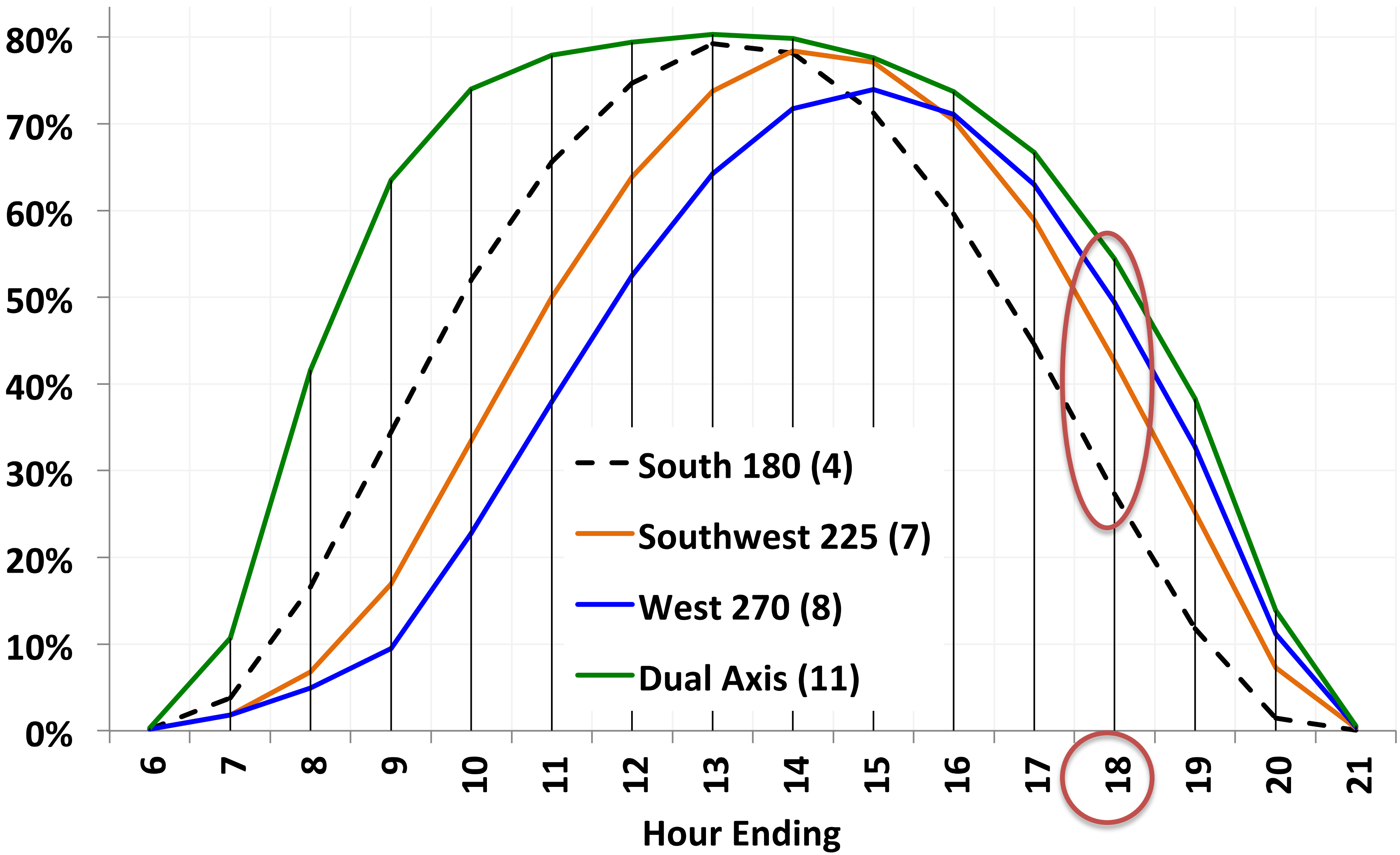

Figure 4: Output of Solar Configurations on July 22, 2011

By matching hourly data on feeder load vs. PV output, distribution planners can estimate how much PV capacity would have to be installed to reduce load by the amount needed at the peak hour (250 kW in this case) on this feeder

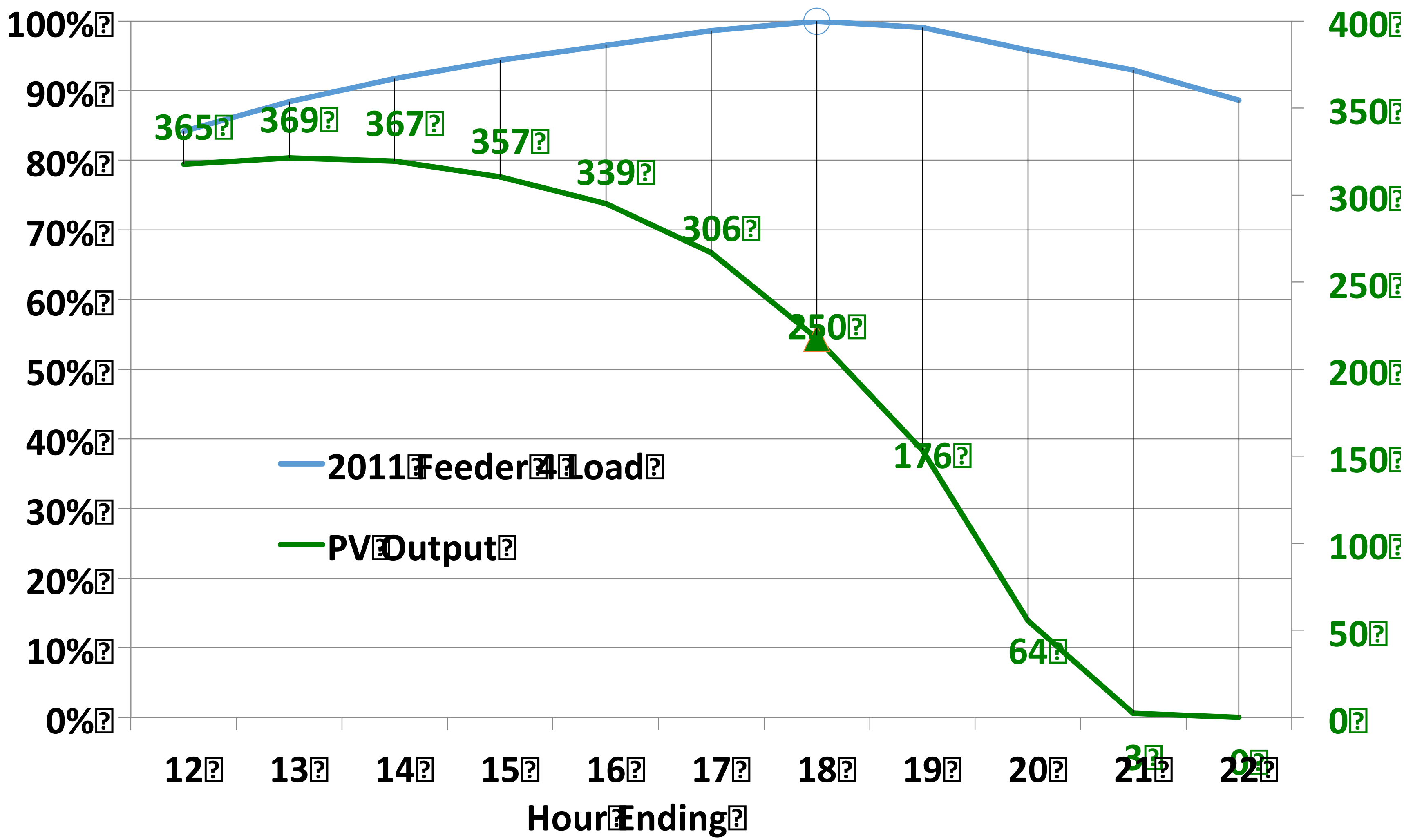

Figure 6: PV required on July 22, 2011 peak day to provide 250 kW load relief

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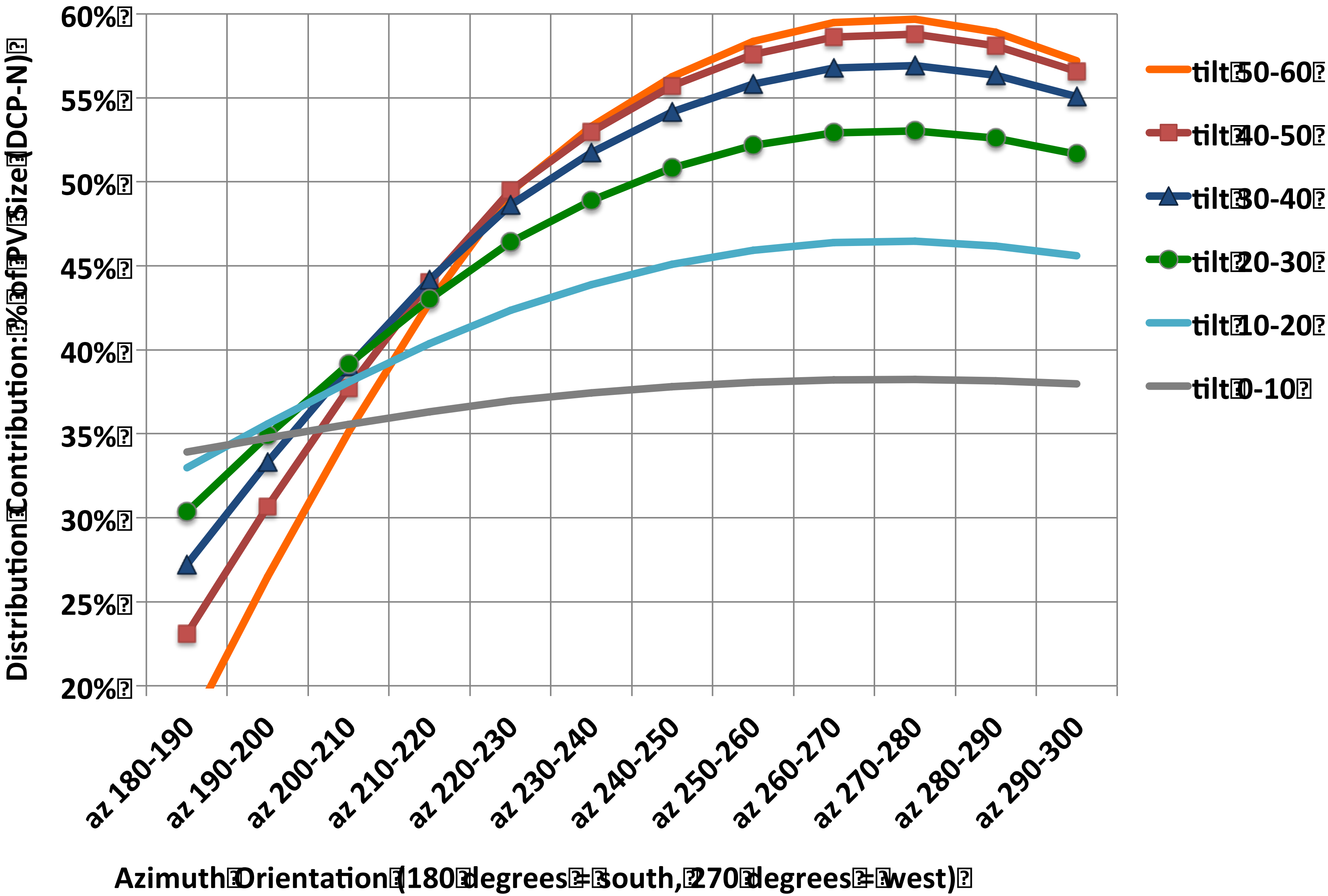
Distribution Contribution Percentage (DCP) depends on PV configuration



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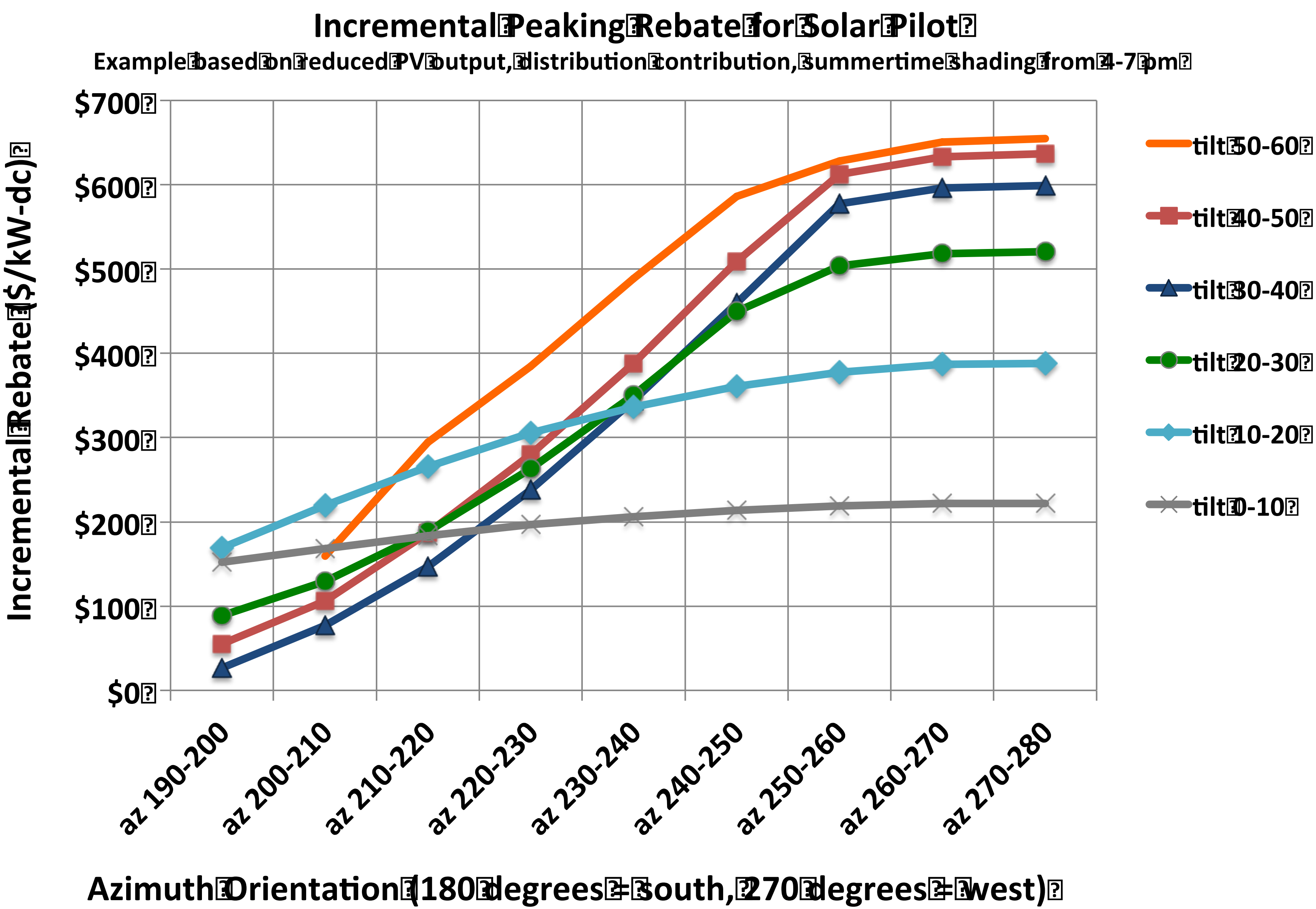
For *fixed* solar arrays (not trackers), increasing the distribution contribution (DCP) results in lower annual generation. Incremental rebates could compensate and incent PV owners.



Example of Incremental Rebates for Residential Fixed Arrays ($/kW-dc)

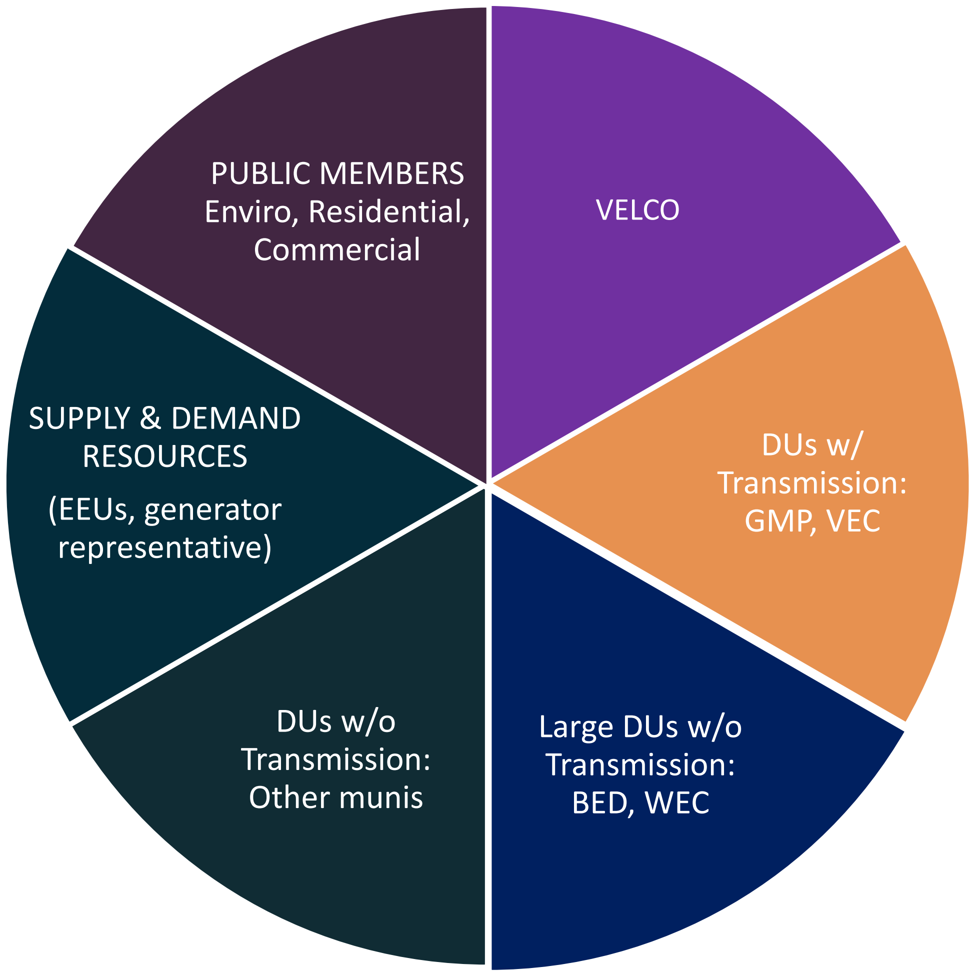
Case Study: Vermont

2010-2013 VT deferred ~$400 million T investment through NTA resources; all but 4% is savings to region

- $157 million Central VT upgrade is an example of formal NTA process
  - Strong in-state collaboration among stakeholders
  - Provision of reliability benefit information to developers based on location
  - Development of sensitive analytical tools
    - Resource screening template
    - ARC tool (location, size & shape factors)
    - Desktop analysis of EE potential & cost

- Progress underway reflecting growing NTA resources (DG, EE, DR) in regional planning
  - Long-term EE now considered
  - DG Forecast Working Group recognizing DG impact across region—not perfect, but a good start
  - Uncertainty of DR increased by Federal court ruling

Vermont System Planning Committee structure



Six sectors with equally weighted votes

Advisory votes on…

- Affected utilities
- Solution selection
- Cost allocation
- Implementation strategy

Binding votes: (where utilities disagree)

- System level (bulk vs sub)
- Lead utility assignment

Observations about VT example

- EE plays a big role but fills the gap *in combination* with other resources, which are growing rapidly
- Integrated look at DG & EE is critical: no one element caused the result
- Project need is based on *forecasts which are increasingly volatile*
- Robust stakeholder involvement lowers cost, adds reliability
- Biggest policy issue: no level playing field for NTA vs transmission funding
- Recommendation: Fully implement NESCOE/LaCapra NTA proposal in all states and integrate into ISO-NE's planning process

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