Energy solutions for a changing world

ICT+Dynamic Pricing

New Devices and Lots of Data to Solutions

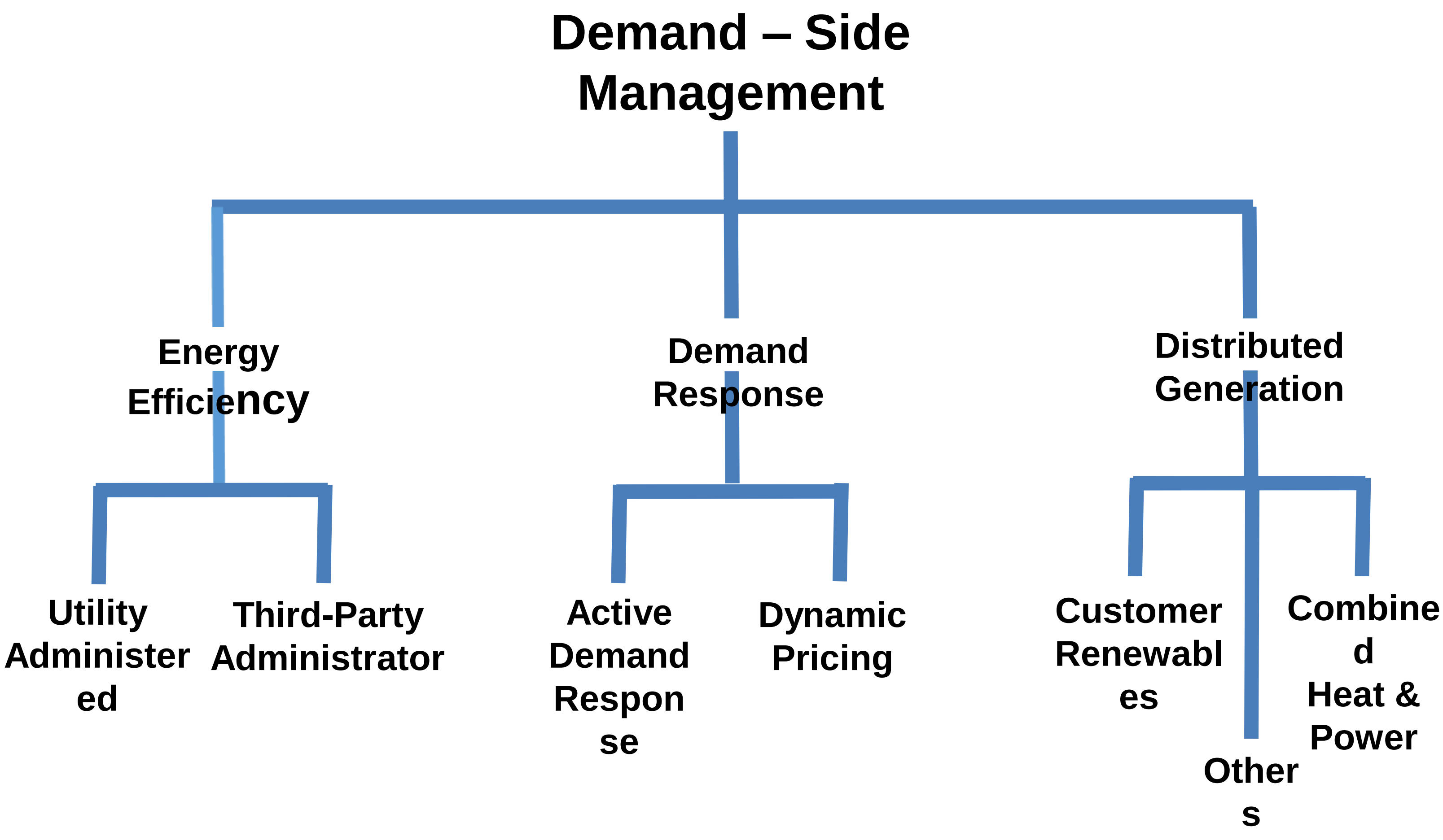
Presented by David Littell

December 7, 2015

The Regulatory Assistance Project (RAP)®

RAP – the Regulatory Assistance Project

RAP is a non-profit organization providing technical and educational assistance to government officials on energy and environmental issues. RAP staff have extensive utility regulatory experience. RAP technical assistance to states is supported by US DOE, US EPA and foundations.

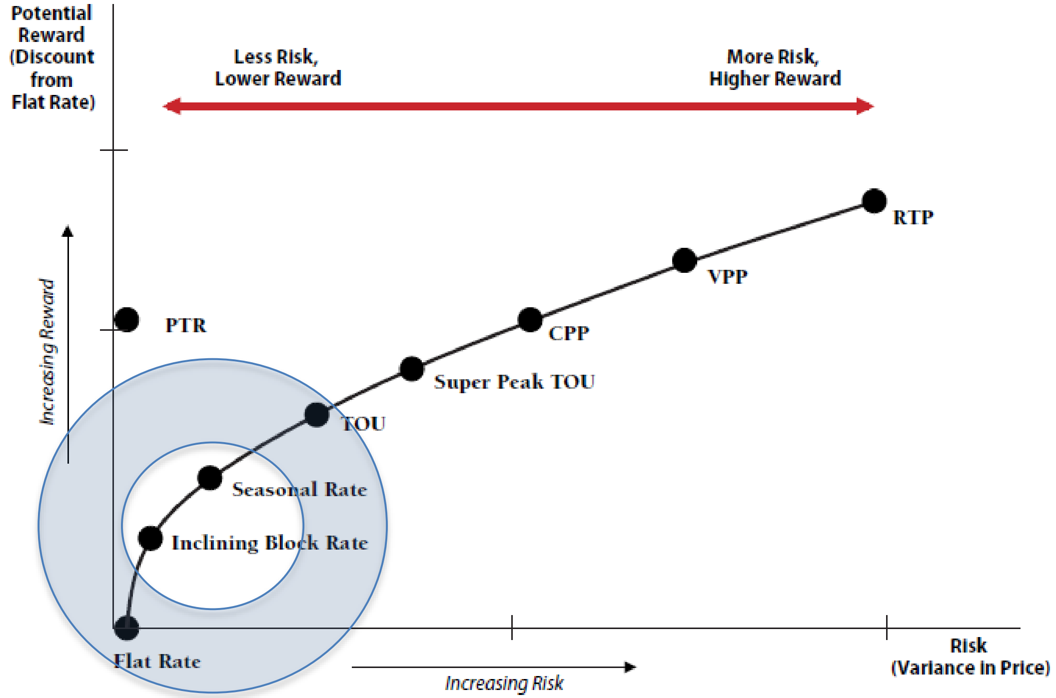


Demand – Side Management
Energy Efficiency
Demand Response
Distributed Generation
Utility Administered
Third-Party Administrator
Active Demand Response
Dynamic Pricing
Customer Renewables
Combined Heat & Power
Others

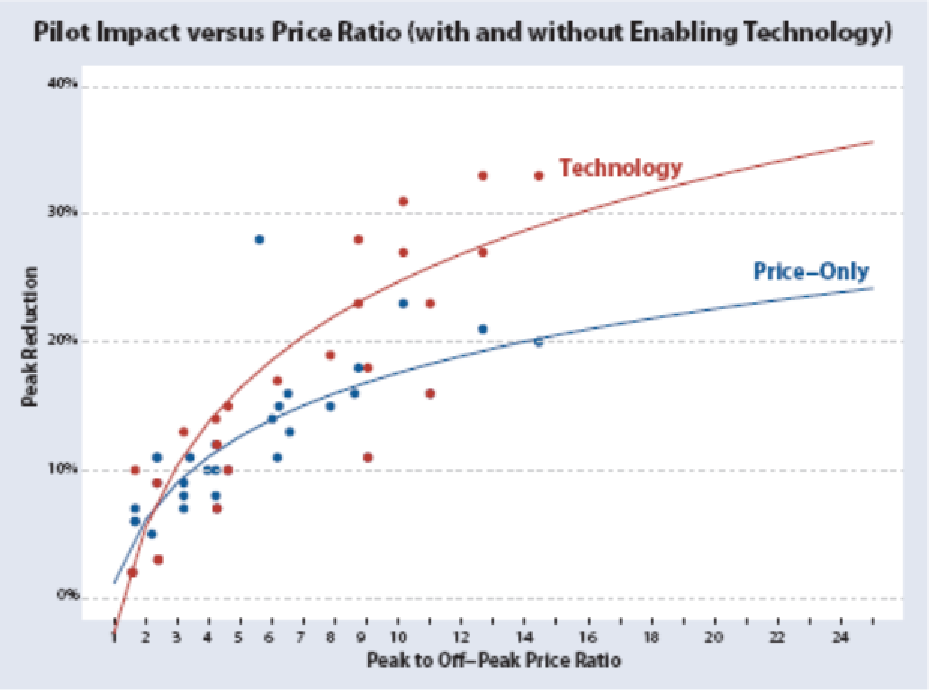
Forms of Demand Response

- Demand Response consists of:
  - Active Demand Response Programs include load control programs operated by the utility or third party vendor in which customers respond to a specific event through agreement to have their load curtailed.
  - Dynamic Pricing Programs are designed to shave the system peaks through price signals to customers.

Peak Load Benefits of Different Residential Rate Designs



Enabling Technology Improves Price Response



Contrasting Direct Demand Response and Dynamic Pricing

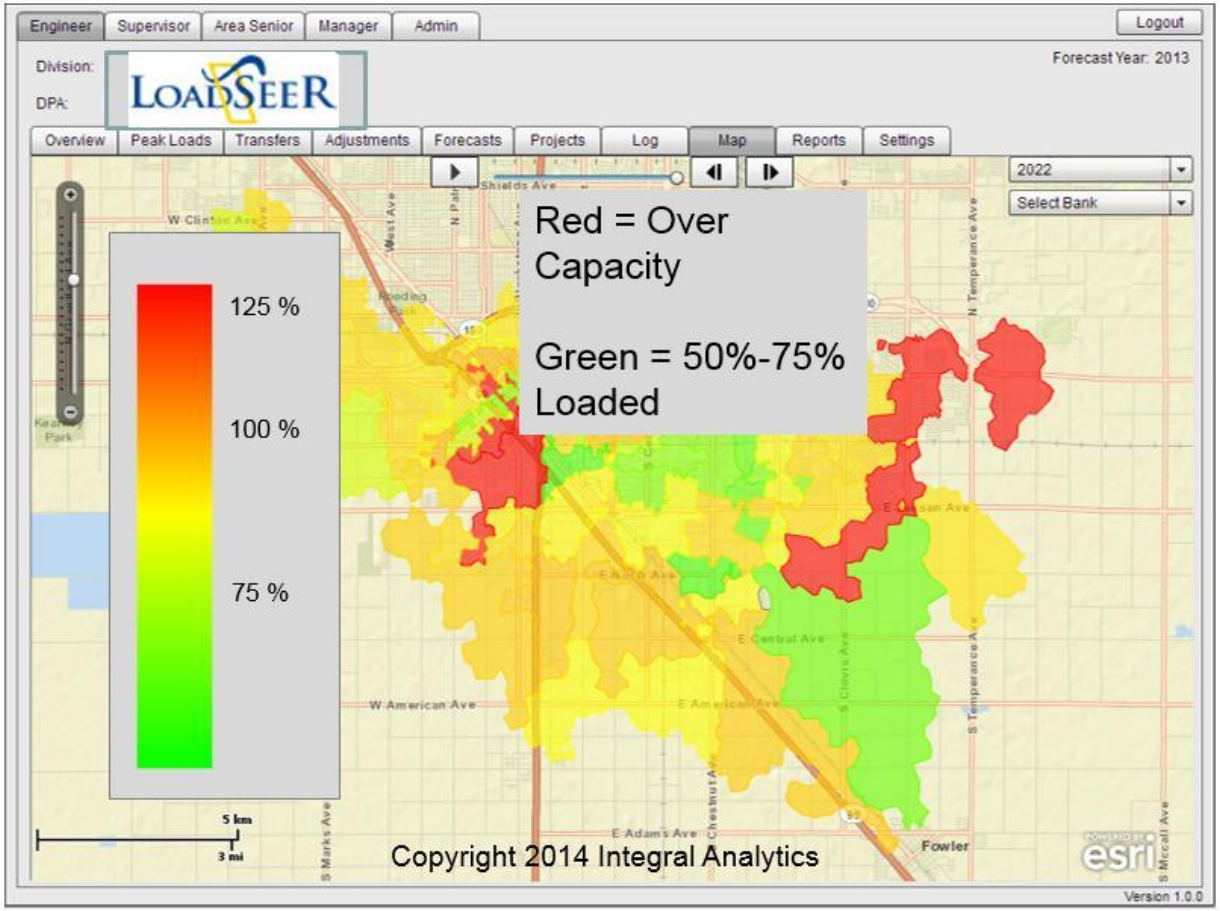
- Dynamic pricing can result in a steady fairly reliable reduction in peak demand, thereby altering the daily load curve, but it can not impact the need to reduce demand as a result of a specific event.

- Active Load Control can be employed to respond to specific emergency events to maintain reliability.

Contrasting Direct Demand Response and Dynamic Pricing

In determining whether to use a dynamic pricing rate design or a direct demand response program, the question is whether you want to lower the peak demand curve and shift load in which case changes are incorporated through the rate design **or** whether you want to create a product that can be used to reduce demand when system peaks are getting too high.

Better Load Data and Projection is Enabling Technology for DR and Dynamic Pricing



Source: Integral Analytics LoadSEER Tool, NEEP, EE as T&D Resource (Jan. 2015), p. 46.

Contrasting Direct Demand Response and Dynamic Pricing

- With dynamic pricing, concerns regarding a baseline are not in play as rates are based on the price of energy and not on reductions from a baseline.

- Demand response requires the development of a baseline based on reductions in historical usage.

Contrasting Direct Demand Response and Dynamic Pricing

- Dynamic Pricing established through ratemaking either in a regulatory setting or an offering by a competitive supplier. (Here there are issues of whether the LDC has appropriate metering and billing technology to accommodate).
- Demand Response is set through the market price in most cases (exception- industrial curtailment contracts that may be Commission-approved).

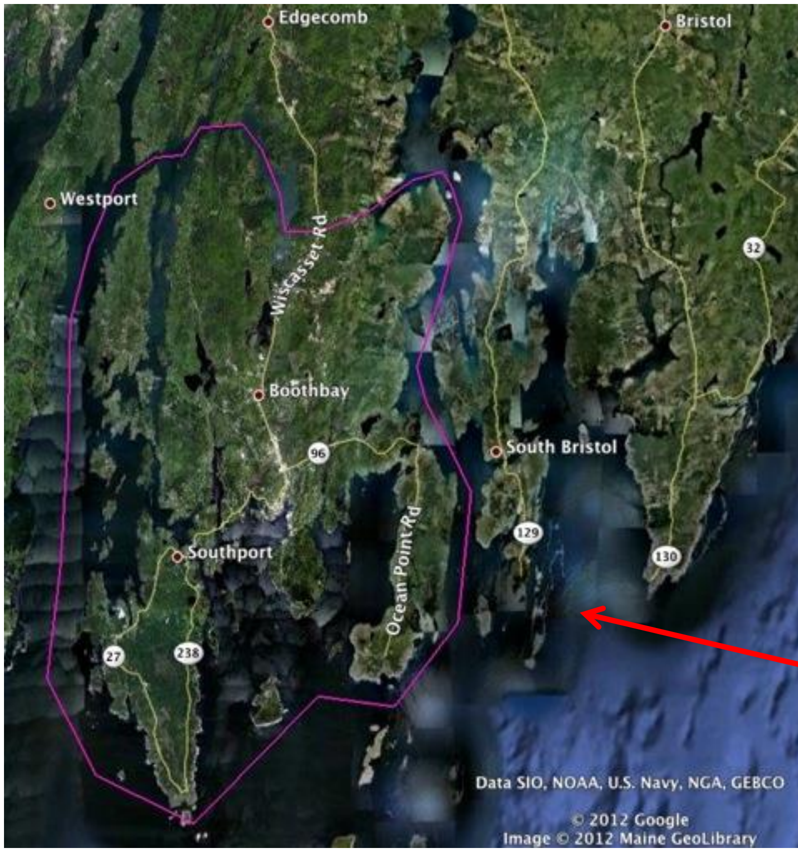
Contrasting Direct Demand Response and Dynamic Pricing

Consider Technology/Metering Needs:

- Some dynamic pricing can be accomplished without AMI, while others will require it

- Some simple load control programs where the Company is controlling the customer meter can be accomplished with traditional metering whereas two-way communication involving customer action requires AMI for other demand response programs.

Boothbay Pilot - Peak Shaving



Radial nature of electric service and local distribution circuits on the Boothbay peninsula defines the electrical region for the Pilot Project – Total Peak load – Approx. 30 MW.

Source: GridSolar NRRI Presentation

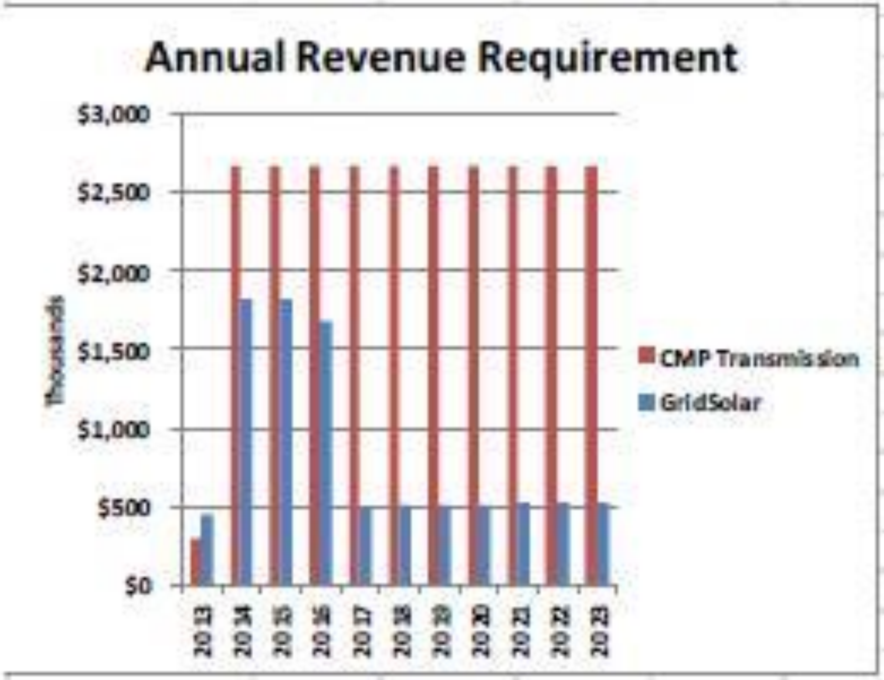
Boothbay Maine NTA Pilot Resource Mix

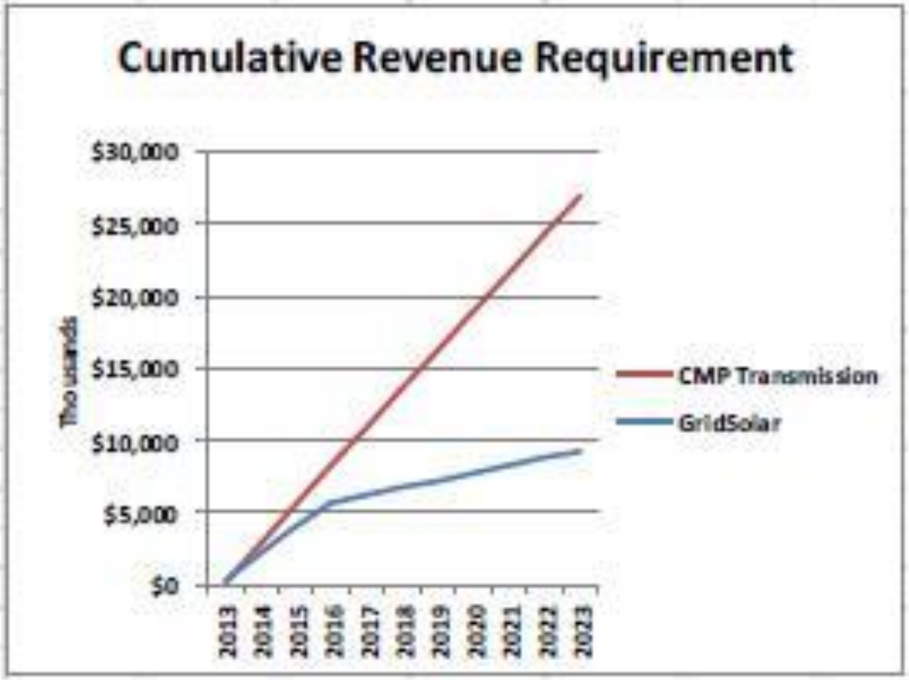
	RFP I*	RFP II	Totals	Pct.	Units	Weighted 3 Year Price	10 Yr. (Levelized) Price
Efficiency	237.00	111.25	348.25	19%	7	$23.51	$10.47
Solar	168.83	106.77	275.60	15%	14	$46.05	$13.19
BUG (same)	500.00	500.00	500.00	27%	1	$17.42	$20.63
Demand Response	0.00	250.00	250.00	13%	1	$110.00	$57.65
Battery	0.00	500.00	500.00	27%	1	$163.70	$75.99
Total	905.83	1468.02	1873.85		24		

* RFP I excludes Maine Micro Grid project; Efficiency increased to reflect EMT contract option.

Source: NEEP, EE as T&D Resource (Jan. 2015), p. 38.

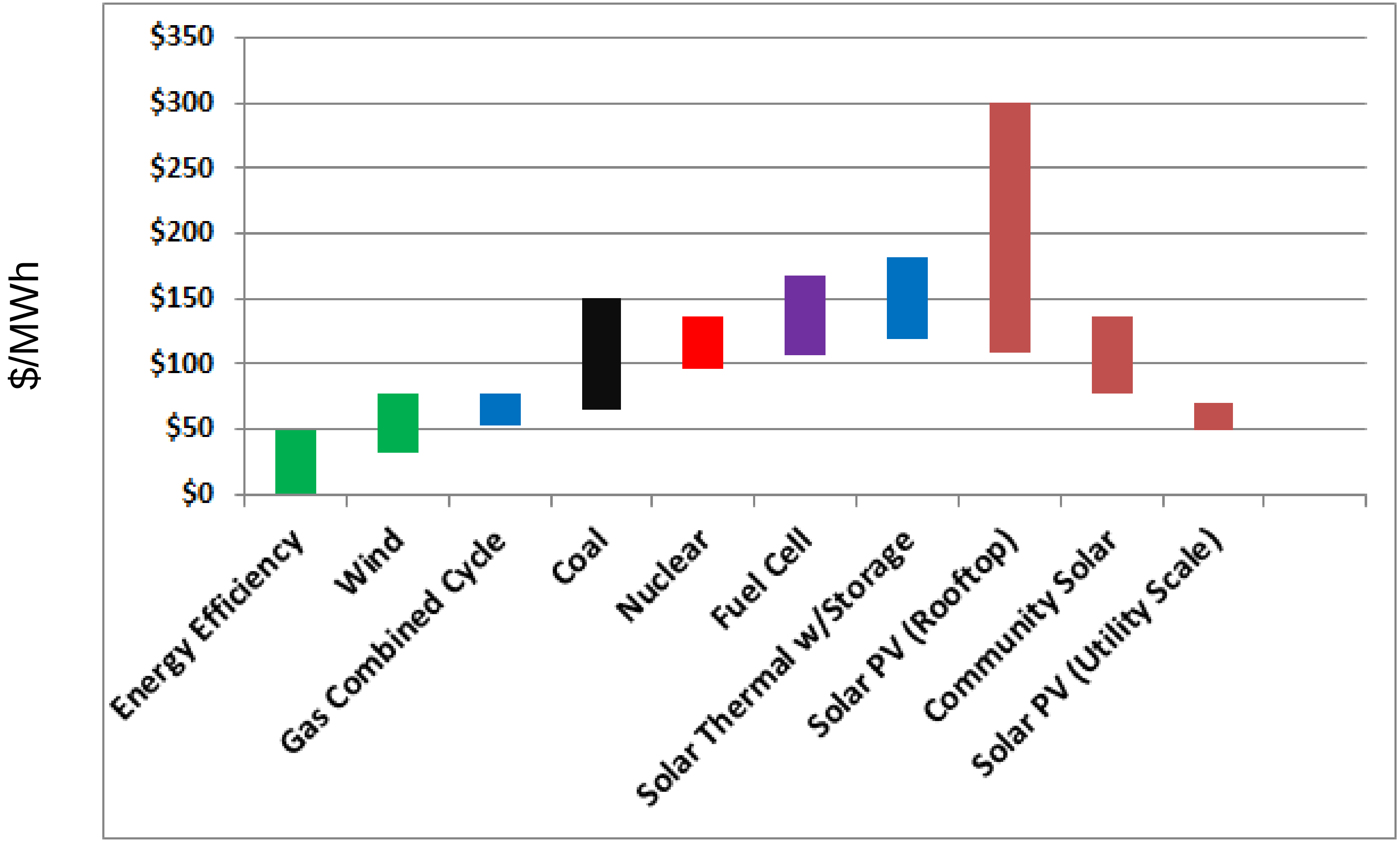
Boothbay Maine NTA Pilot
Cost Comparison of NTA v. Transmission





Source: NEEP, EE as T&D Resource (Jan. 2015), p. 41.

Energy Efficiency Is the Lowest Cost Resource



Source: Lazard, 2015

Contrasting Direct Demand Response and Dynamic Pricing

- Demand reductions from Demand Response programs can be bid into the competitive market and can be used to create a source of revenue for the utility and the participating customers.

- Demand response programs can create flexibility to respond quickly to the grid system's needs.

- Demand response that is consistently employed can reduce the need to add peaking capacity.

Contrasting Direct Demand Response and Dynamic Pricing

- Predictable reductions in peak demand from dynamic pricing tariffs can impact utility planning by reducing/deferring the need to add peaking capacity

- Can lower system costs since the bulk of generation costs are incurred during peak hours and system built to serve peak load.

- Can eliminate interclass subsidies by pricing power more closely with actual costs

Grid (or Utility)-Centered Data

1. **Distribution infrastructure data,** particularly data pertaining to distribution feeder characteristics.

2. **Transmission infrastructure data**

3. **Aggregated consumer behavior data**

4. **Aggregated customer energy data**

Source: “Knowledge is Power, How Improved Energy Data Access Can Bolster Clean Energy Technologies & Save Money,” Bank of America, Berkeley Law, the Emmet Inst. And UCLA Law School (Jan. 2015).

Customer-Centered Data

1. Utility meter data, at intervals of _minutes or hourly levels going back _ months.

2. Energy audit data generated by auditors, ESCOs, others

3. "Internet" data from internet-enabled home devices, such as high-tech "smart" thermostats and appliances

4. Utility tariff data, to allow customers and third parties to access and analyze costs and benefits for various measures without the cost of manually decrypting the tariffs.

5. Energy efficiency policy data.

6. Customer segmentation for each utility across usage and zones, would to inform third parties about market potential and lower customer acquisition costs for all sectors

Source: *Id.*

Primary Barriers to Accessing Data

1) Lack of incentives for utilities to collect and share data;

2) Lack of funding for aggregating and making that data accessible – expense of data management and standardization;

3) Concerns about compromising customer privacy;

4) Difficulties with Customer Adopt-In and

5) Fear of cybersecurity breaches.

Source: *Id.*

About RAP

The Regulatory Assistance Project (RAP) is a global, non-profit team of experts that focuses on the long-term economic and environmental sustainability of the power sector. RAP has deep expertise in regulatory and market policies that:

- Promote economic efficiency
- Protect the environment
- Ensure system reliability
- Allocate system benefits fairly among all consumers

Learn more about RAP at www.raponline.org

David Littell
DLittell@raponline.org