RAP Energy solutions for a changing world

ENERGY SECTOR REFORM

The Puerto Rico Chamber of Commerce, 2015 Energy Forum: Challenges in the Energy Industry

Presented by Janine Migden-Ostrander

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The Regulatory Assistance Project (RAP)

We are a global, non-profit team of experts focused on the long-term economic and environmental sustainability of the power and natural gas sectors. We provide assistance to government officials on a broad range of energy and environmental issues.

About RAP – US

RAP provides technical and policy support at the federal, state and regional levels, advising utility and air regulators and their staffs, legislators, governors, other officials and national organizations.

We help states achieve ambitious energy efficiency and renewable energy targets and we provide tailored analysis and recommendations on topics such as ratemaking, smart grid, decoupling and clean energy resources. RAP publishes papers on emerging regulatory issues and we conduct state-by-state research that tracks policy implementation.

Energy Sector Reform

- Discussion of the Regulatory Conundrum
- Pricing Electricity
- The Vision of the Future
- Description of what is happening in the States
- Performance Based Regulation
- Decoupling

Discussion of

The Regulatory Conundrum

What's On the Horizon?

Convergence of multiple events:

- Customer empowerment
- New Technologies and Competitive Service Offerings

This leads to (in absence of any policy or structural response):

- Reduction in utility sales and hence revenues
- Potential rate responsibility shifts and equity questions

This is pitted against:

- Public interest in low carbon energy solutions
- While grid resilience becomes increasingly important in the wake of *severe climate*

The Regulatory Conundrum

For Utilities

- Assuring adequate revenues as customer sales drop due to customer engagement in energy efficiency, demand response & distributed generation

For Distributed Generation (DG) Customers

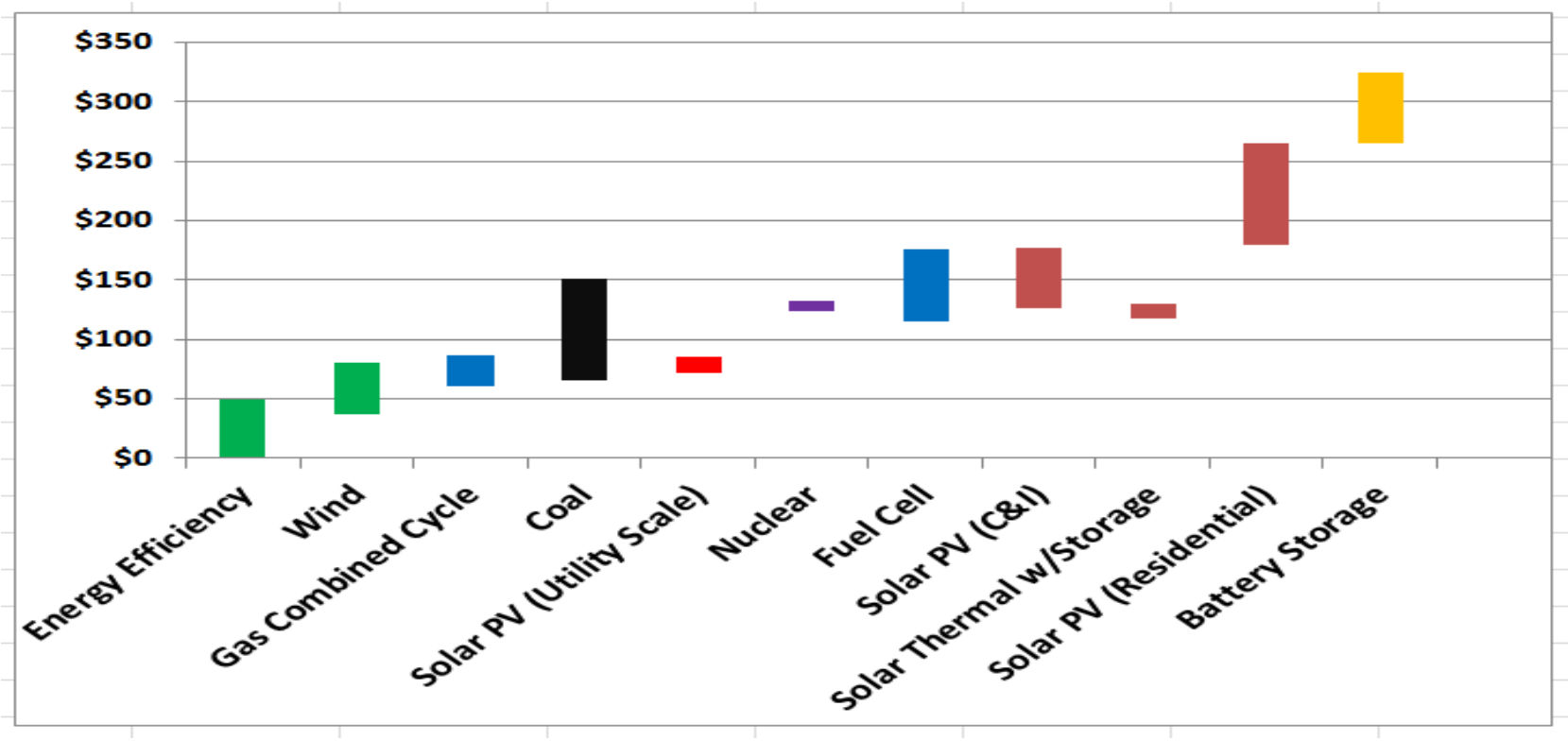
- Obtaining the full value for the energy sold into the grid
- Charges and prices that can negatively impact the economics of DG

For Non-DG, Full-Service Customer

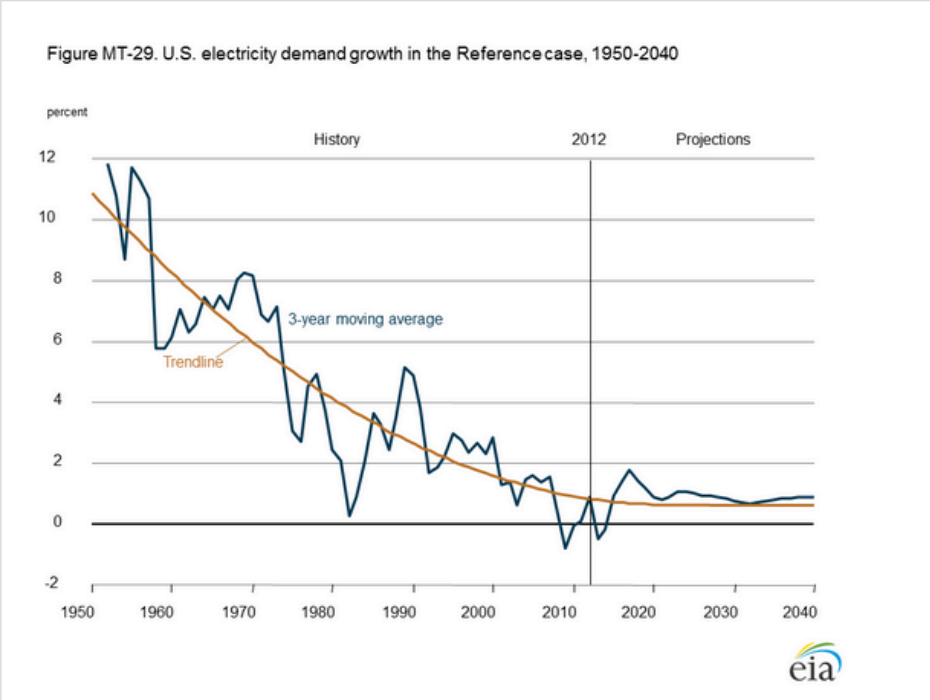
- Concerned about potential rate increases to compensate for utility revenue shortfall
- Do not want to subsidize DG customers

Long Run Cost of Energy

Lazard (2014)

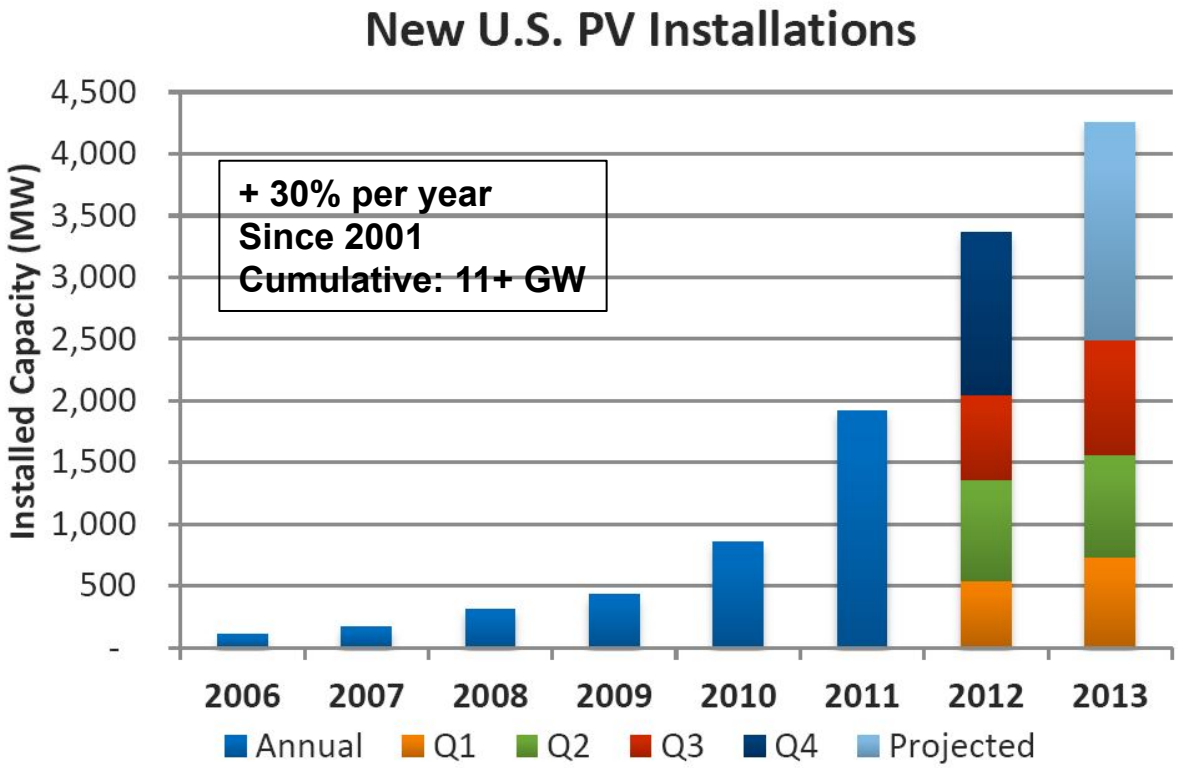


US Electric Growth Rates
Historic, Forecasted 1950-2040

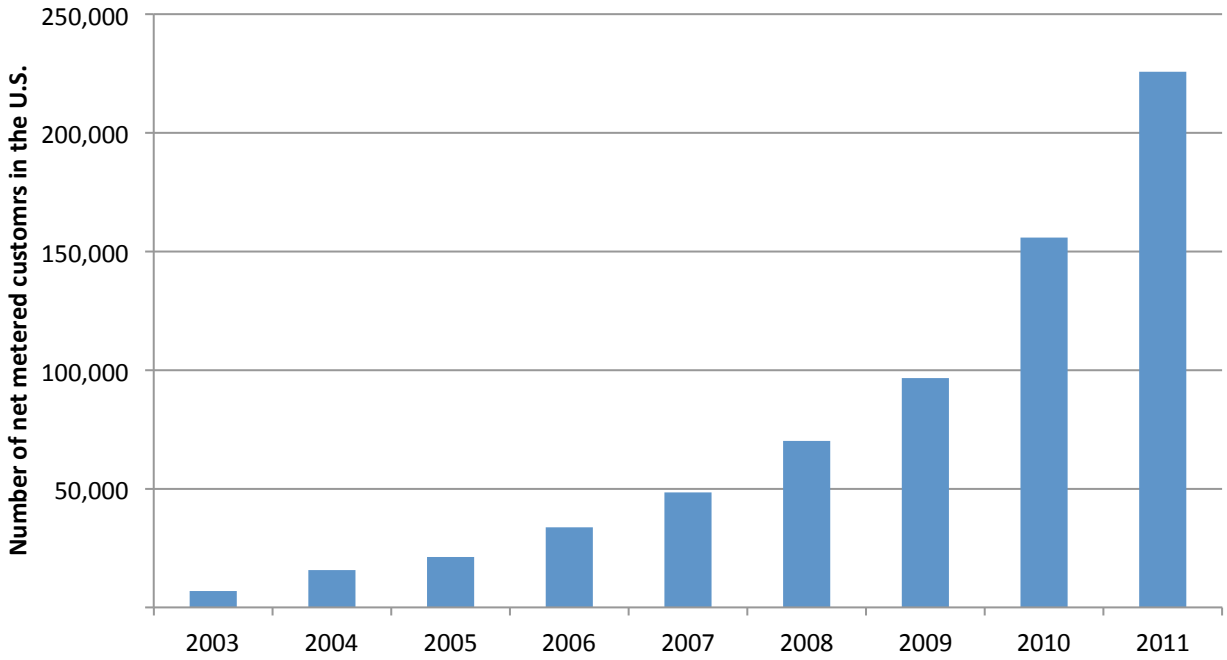


With upside potential for DG, many consider this forecast on the high side of likely

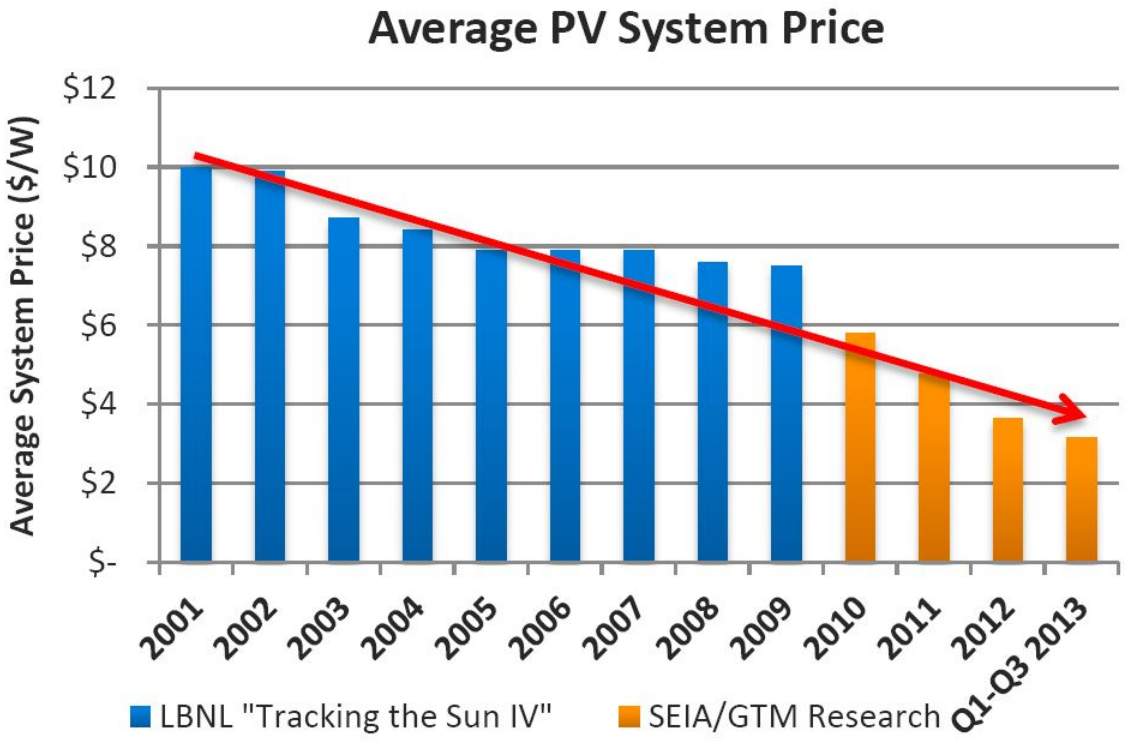
Distributed Generation is Growing



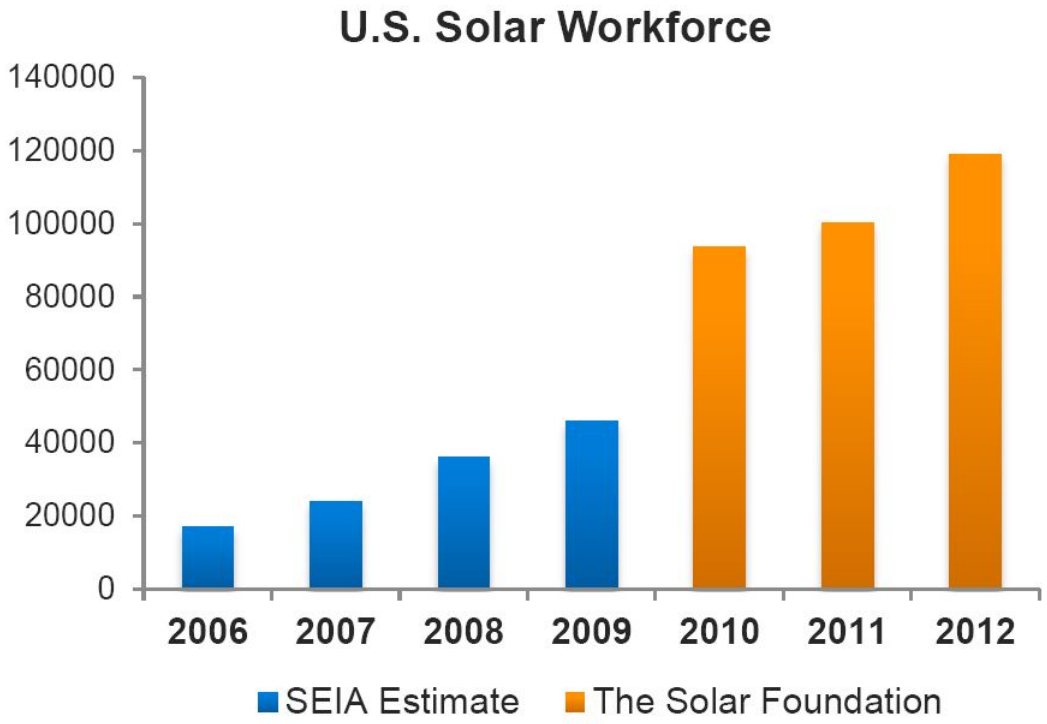
Net Metering Growth



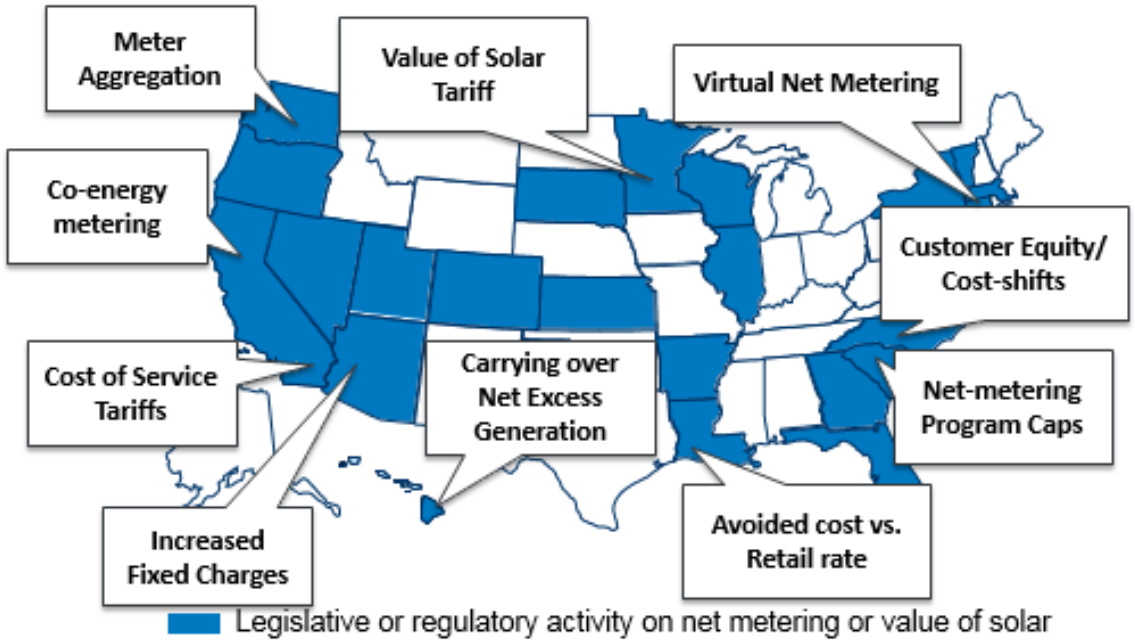
Costs Continue to Decline



Solar Has Become a Big Business



A Variety of Discussion Topics



Source: NREL

Energy Sector Reform

Pricing Electricity

Why Pricing and Demand Response Matter

- Peak load can represent 20- 30 % of a business customer's bill. Reducing that load can produce significant savings.
- Demand response can act as a good complement to variable renewable resources - When renewables are unable to meet demand at peak hours, automated demand response could potentially shave that demand.
- Peaking capacity is needed for roughly 350 hours/year (4% of the time) and there is about a $42/MWh price differential between the top 350 hours ($103.47/MWh) and the remaining 8310 hours of the year ($61.65/MWh) for the ISO-NE, as an example.

A Variety of Discussion Topics

Cost-shifts / Lost Revenue

- Is there a cost-shift from solar to non-solar customers? How large? How to address? Or is the system value of DER positive?
- What is the impact of distributed PV on utility revenues?
- Should fixed charges be increased to cover infrastructure costs? Should they apply to only self-generators or to all customers, with corresponding reduction in volumetric rates?
- What other rate designs can address the cost-shift and lost revenue issue?

Value of Solar Tariff

- What value categories should be included in a value of solar tariff?
- What value should each cost and benefit be assigned?
- How should a value of solar program be designed?

Source: NREL

Potential Cross-Subsidies

If value of PV < volumetric charges:

- Other customers subsidize PV customers
- Under-recovery of utility's fixed costs
- Upward pressure on rates (cross subsidy)
- Reduced utility shareholder returns

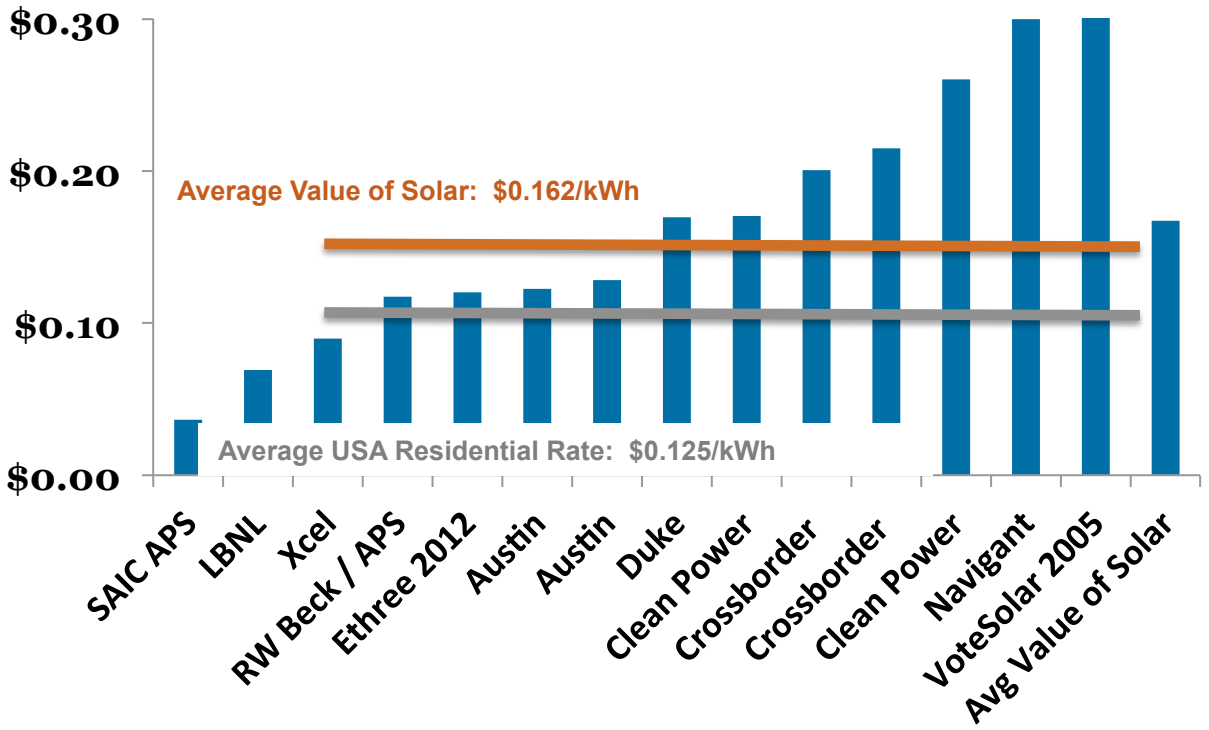
If value of PV > volumetric charges:

PV customers subsidize other customers

Suppresses PV deployment from societal value

Utility effects may still require attention

Value of Solar Tariff – RMI Study

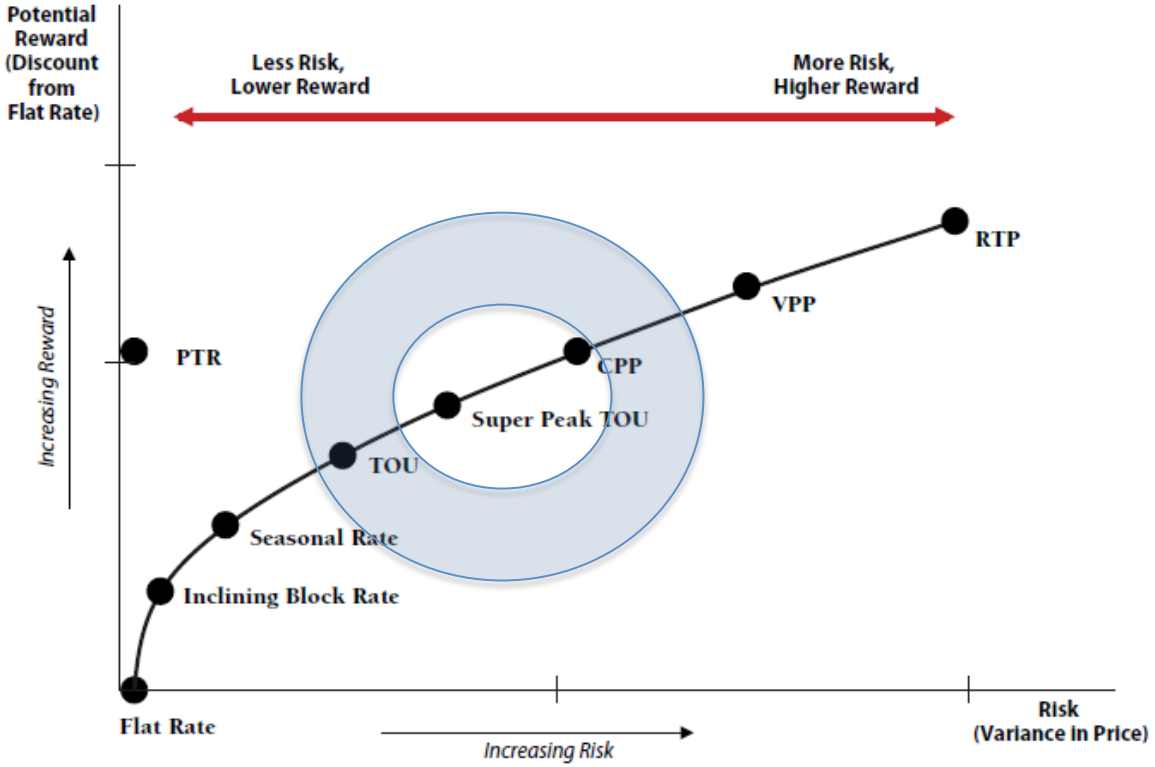


Directional Pricing

Directional Pricing Example		
Customer Charge	Billing and Collection	$5.00/month
Distribution Charge	All Delivery Costs	$0.05/kWh
Power Supply (either direction)		
• On-Peak	Peak and Baseload	$0.15/kWh
• Off-Peak	Baseload Only	$0.08/kWh

May be appropriate for high-cost utilities, where current rate is > value of solar.

Dynamic Pricing



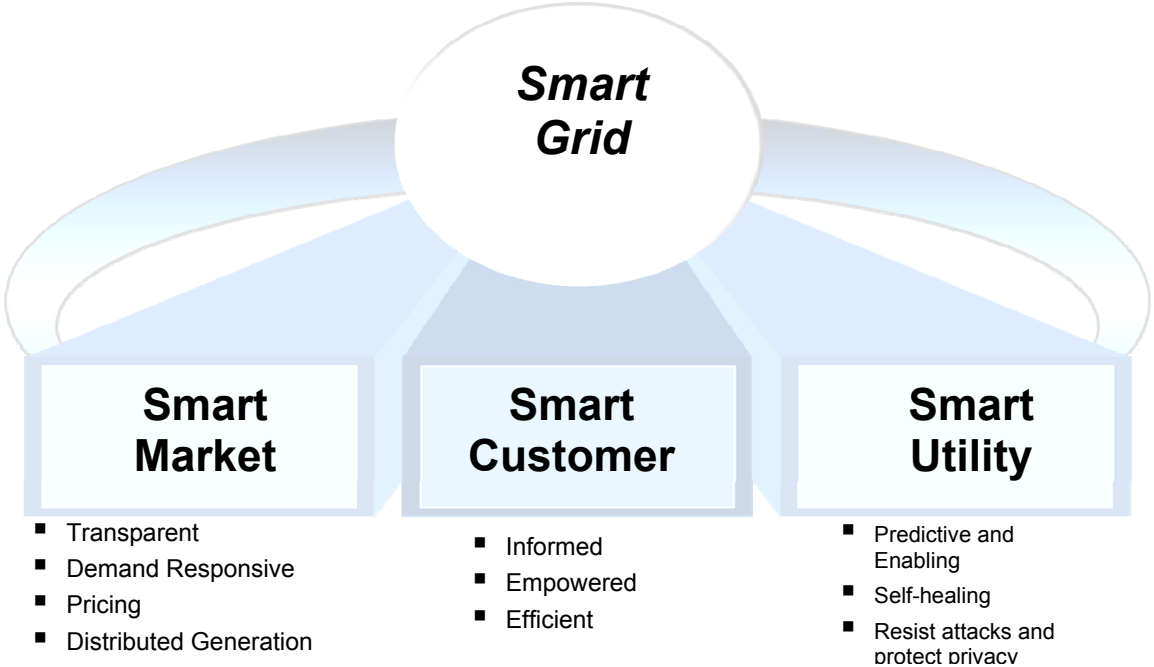
Guiding Principles for Fair PV Tariffs

- PV customer should pay utility fair value for services provided by grid connection
- Utility should pay PV customer fair value for services provided by PV
- Rate design should be no more complicated than necessary
- Address any desired incentives and the impact of lost revenues separately
- Account for low income customer impacts

Energy Sector Reform

The Vision of the Future

Vision


Smart Grid
Smart Market
Transparent
Demand Responsive
Pricing
Distributed Generation
Smart Customer
Informed
Empowered
Efficient
Smart Utility
Predictive and Enabling
Self-healing
Resist attacks and protect privacy

A Variety of Discussion Topics

What can the utility do?

- Look for further economies in its operations to reduce revenue requirements
- Look for ways to use DG and other technologies to its advantage
  - DG strategically located in an area to relieve congestion or need for system upgrades
  - Using Demand Response (DR) to reduce need for peaking capacity
  - Using Energy Efficiency (EE) to reduce the need for additional supply-side resources
  - Quantify and value customer-sited solar and its contribution to resource sufficiency
- Examine new rate design
  - Properly align rates with costs
  - Send price signals to customers to conserve and respond to daily and seasonal peak prices

At-a-Glance

Con Ed will pay customers $150 million to save $1.1 billion

Jul 9, 2014 Talk Back Free Alerts More On This Topic SHARE

Quick Take: *You already know that demand is flat or even falling in some parts of the United States. But you may not know that some utilities want it that way. So badly that they will pay their customers to use less electricity.* – ***Jesse Berst***

Consolidated Edison is seeking regulatory approval to give customers incentives to use less power. The programs would delay or defer the need for a new substation to handle growth – a substation that would cost an estimated $1.1 billion.

Gentrification is spurring growth in Brooklyn and Queens, consuming the capacity of existing substations. Con Ed determined it would cost $1.1 billion to build a substation to keep up with that population growth.

Instead, it will spend $100-$150 million to delay construction of the substation until at least 2024. It hopes to expand existing energy efficiency programs such as controlling home air-conditioners. And to add new initiatives, most of which have yet to be determined.

The utility will issue a request for information (RFI) for 52 MW of power production or reduction. Up to 10 MW of that amount must come online no later than June 2016.

"This is a very big step in a very different direction," said Robert Schimmenti, vice president of engineering and planning **as quoted by Bloomberg**.

Data, and Availability

- Markets work when participants have information
- Utility consumers have not been given quality and actionable information from their utility
- Technology, “big data” will make it easier for customers and vendors
  - New business opportunities

Data Issues

- *Can* market actors get data about customers?
- Ownership
- Privacy
- Cybersecurity
- *How* will market actors get data about customers?

Toward a Service-Oriented Industry

- Value
  - All this innovation is important if it reveals value to society, to the grid, to people
  - More information from the utility to consumers
  - Requires better planning and system operation
  - Wholesale system also needs improvement prompted by state advocacy
- Bypass
  - How big of a threat is customers exiting?
  - Why should government care?

Description of

What is happening in the States

Energy Sector Reform

Energy Sector Reform has many dimensions

- Multiple Stakeholders each with their own vision
- Multiple Complex Issues

Energy Sector Reform is a process – Not an event

- It will take time to get it right
- It will be an iterative process

Energy Sector Reform requires being open to change

- Creative/ Solution oriented thinking
- Flexibility is paramount

Energy Sector Reform

Some states have begun to re-examine their traditional utility models and to consider regulatory changes that address the intersection of customer options and new the emergence of new technologies and choices.

- New York – Reforming the Energy Vision (REV)
- California – New Docket on distribution planning, solar emphasis
- Hawaii – Fast deployment of distributed generation, faster than regulatory response
- Other States – Adopted or considering decoupling, energy efficiency standards, new tariff designs, Distributed Generation policies

Distribution Utility as a Distribution System Operator

- Utility grid used as the highway for delivery of services
- Distribution Utility functions as the master conductor for services from independent service provider to the customer
- Distribution utility collects tolls for the use of its system in bi-directional or one-directional transactions

Distribution Utility as Competitive Service Provider

Distribution Utility competes with independent companies to provide a variety of services:

- Energy Efficiency
- Distributed Generation
- Demand Response Services
- Advanced Energy Management through data and metering
- Rate options for load management
- Other?

  - Integration of Electric and Communications system delivery

New York: Reforming the Energy Vision (REV)

Goal: Reorienting electric industry and ratemaking towards a consumer-centered approach that harnesses technology and markets:

- Enhanced customer knowledge and tools to support effective management of the total energy bill;
- Market animation and leverage of customer contributions;
- System wide efficiency;
- System reliability and resiliency; and
- Reduction of carbon

NYPSC, Order 14-M-0101, Feb. 26, 2015, p.4

New York: Reforming the Energy Vision (REV)

Redefining the role of the Electric Distribution Utility as Distribution System Platform Provider (DSP):

The DSP is an intelligent network platform that will provide safe, reliable and efficient electric services by integrating diverse resources to meet customers' and society's evolving needs. The DSP fosters broad market activity that monetizes system and social values, by enabling active customer and third party engagement that is aligned with the wholesale market and bulk power system.

NYPSC, Order 14-M-0101, Feb. 26, 2015, p. 31

Energy Sector of the Future:

Performance-Based Regulation

Or

How do we get the utility's interests to align with the public interest?

Consideration of the Role of Regulation: Performance Based Regulation

All regulation is incentive regulation. An important skill for regulators is to understand what incentives are created by any particular regulatory scheme and to design a scheme that best serves the desired objectives.

Alternative Ratemaking: Performance Based Regulation

- Shift from a strictly investment-plus return on capital framework to one that encourages behavioral changes.
- Create metrics that measure and reward desired performance that motives management to innovate, control costs, or otherwise improve outcomes.
- Performance incentives can flow through to employee compensation plans, as corporate incentives do now, as an example of a mechanism to make performance incentives meaningful.
- Provides more rational allocation between risks and rewards.
- Performance goals and associated metrics could be structured over a period of time and include milestones toward the achievement of certain longer-term objectives

Alternative Ratemaking: Performance Based Regulation

Dimensions of Performance (metrics) include:

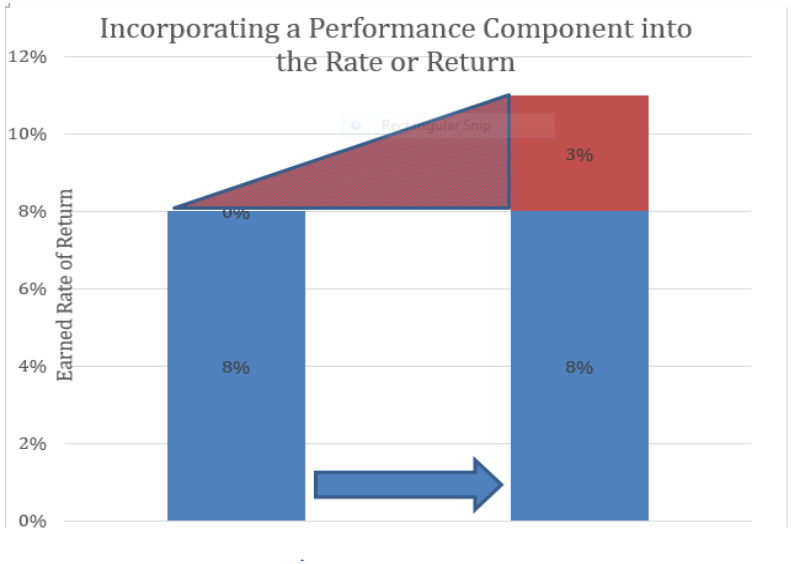
- Reliability
- Safety
- Customer Satisfaction
- Financial Health
- Cost Containment – economic efficiencies
- Plant Performance
- Innovation
- Asset Management
- Encouraging Investment in Distributed Generation and Energy Efficiency

A regulatory proceeding with public participation can develop the dimensions most applicable to the timeframe and circumstances

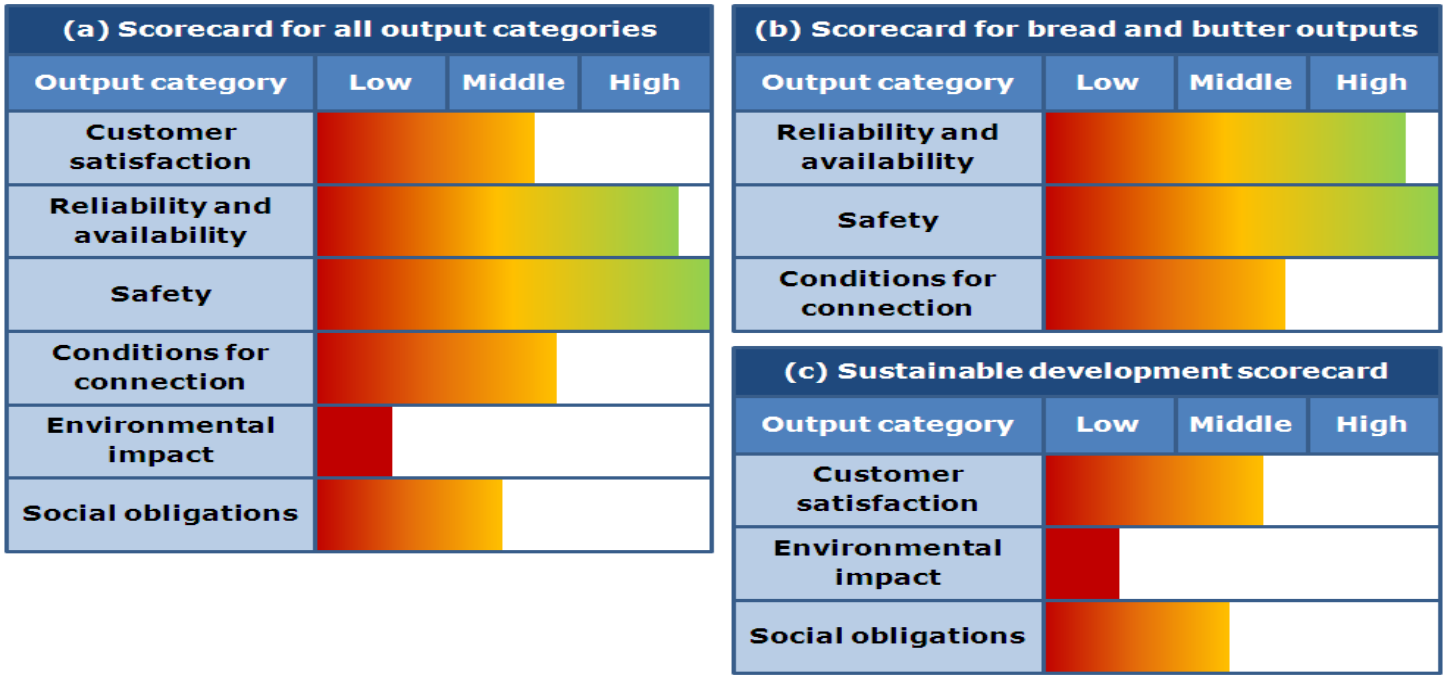
Alternative Ratemaking: Performance Based Regulation

One idea for a financial model

- A zero-based approach
- Normally allowed return consistent with compliance-based performance
- Higher return available for increasing, exemplary level of measured performance



UK Performance Regulation Scorecard



Energy Sector of the Future:

Decoupling

Decoupling as a Regulatory Tool

Decoupling can accomplish the following:

- Eliminate the throughput incentive so that the utility is indifferent to reductions in sales
- Provides a method of adjusting utility rates (prices) between rate cases to account for changes in sales volumes. Most decoupling mechanisms contain a method to update allowed revenues for customer growth and/or attrition factors
- Allows utility to focus on performance which can provide additional incentives
- Useful foundation for other reforms

Decoupling

- Decoupling is designed to address the throughput incentive by breaking the link between utility sales and revenue.
- The Commission in a rate case proceeding determines the distribution revenue requirements which become the basis for determining the revenue the utility will receive in rates.
- Decoupling enables a rate design that continues to send forward looking price signals through volumetric charges and does not burden rate design with the challenge of producing adequate revenue.

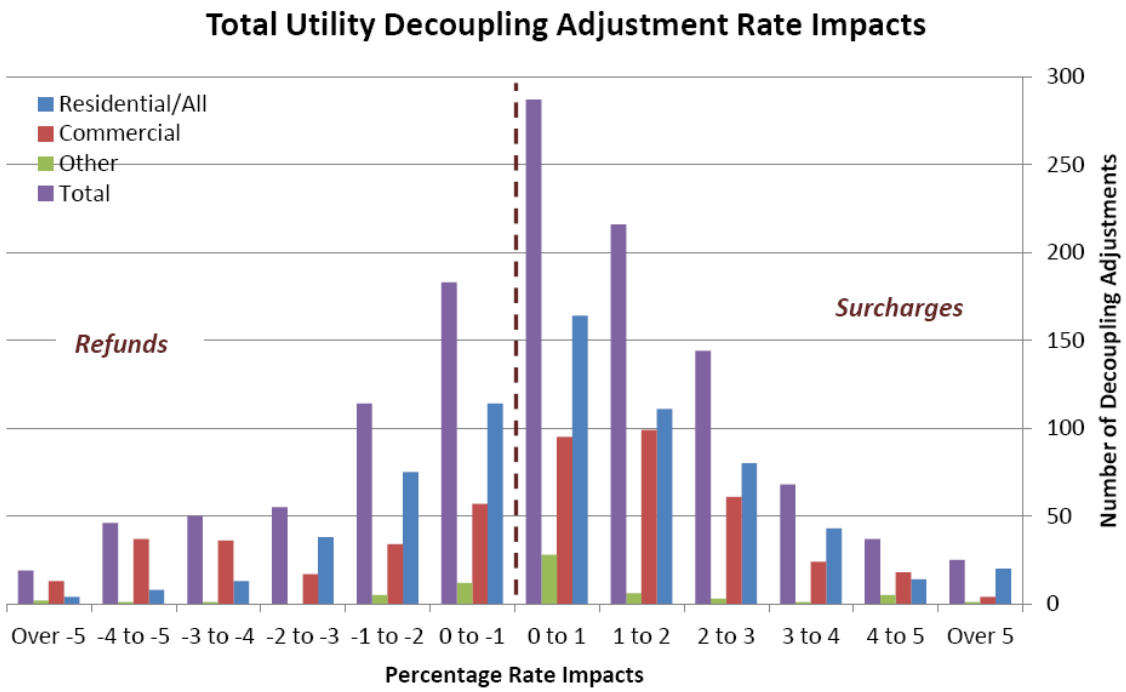
Decoupling

- Periodically, the utility's authorized revenue requirements are measured against actual revenues
- Rates are then reconciled to allow the utility to recover (positive or negative) the difference between revenues authorized and revenues received
- Other forecasted revenue changes can be recognized and included in the mechanism

How Decoupling Works

Periodic Decoupling Calculation	
From the Rate Case	
Target Revenues	$10,000,000
Test Year Unit Sales	100,000,000
Price	$0.10000
Post Rate Case Calculation	
Actual Unit Sales	99,500,000
Required Total Price	$0.1005025
Decoupling Price "Adjustment"	$0.0005025

Decoupling Rate Adjustments Have Generally Been Very Small



Conclusion

- Puerto Rico is embarking on a new era of regulatory reform
- Lots of opportunities to adopt emerging best practices to lower future costs, provide more customer participation and reduce carbon
- Tools that Puerto Rico can adopt include:
  - ✓ Emphasis on energy efficiency
  - ✓ More distributed generation – Residential and Commercial PV
  - ✓ Customer price signals through demand response and new pricing mechanism
  - ✓ Performance based regulation to provide incentives for all of the above
  - ✓ Decoupling to remove throughput incentive (to reverse the utility incentive to sell energy to boost revenues)

Related RAP Publications

- **Regulatory Considerations Associated with the Expanded Adoption of Distributed Solar** (2013) http://www.raponline.org/document/download/id/6891
- **Energy Efficiency Cost-Effectiveness Screening** (2012) www.raponline.org/document/download/id/6149
- **US Experience with Efficiency As a Transmission and Distribution System Resource,** (2012) www.raponline.org/document/download/id/XXXX
- **Preparing for EPA Regulations** (2011) www.raponline.org/document/download/id/919
- **Incorporating Environmental Costs in Electric Rates** (2011) www.raponline.org/document/download/id/4670
- **Clean First: Aligning Power Sector Regulation With Environmental and Climate Goals** www.raponline.org/document/download/id/12
- **Integrating Energy and Environmental Policy** (2013) www.raponline.org/document/download/id/6352

Valuation Resources

- RAP, *Full Value of Energy Efficiency*, Lazar & Colburn (September 2013)
  - http://www.raponline.org/document/download/id/6739
- Rocky Mountain Institute (RMI), *A Review of Solar PV Benefit & Cost Studies, 2nd Edition* (September 2013)
  - http://www.rmi.org/Knowledge-Center/Library/2013-13_eLab - DER Benefit Cost Deck_2nd Edition_130903
- Interstate Renewable Energy Council (IREC), *A Regulator's Guidebook: Calculating the Benefits and Costs of Distributed Solar Generation* (October 2013)
  - http://www.irecusa.org/wp-content/uploads/2013/10/IREC_Rabago_Regulators-Guidebook-to-Assessing-Benefits-and-Costs-of-DSG.pdf

About RAP

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

Learn more about RAP at www.raponline.org

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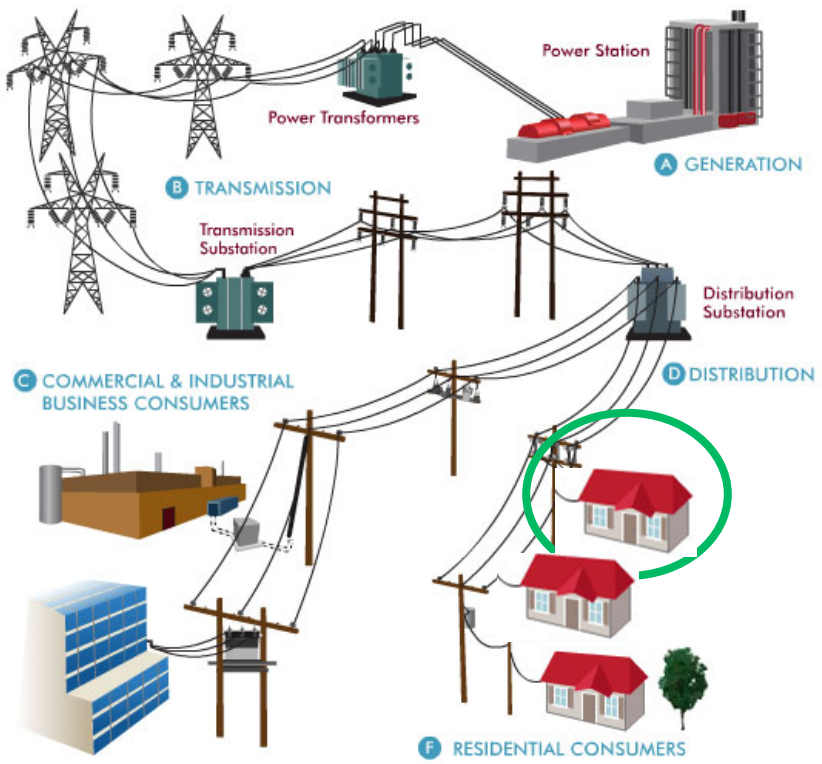
Recovery of Local Distribution Costs
What Belongs in the Fixed Charge?



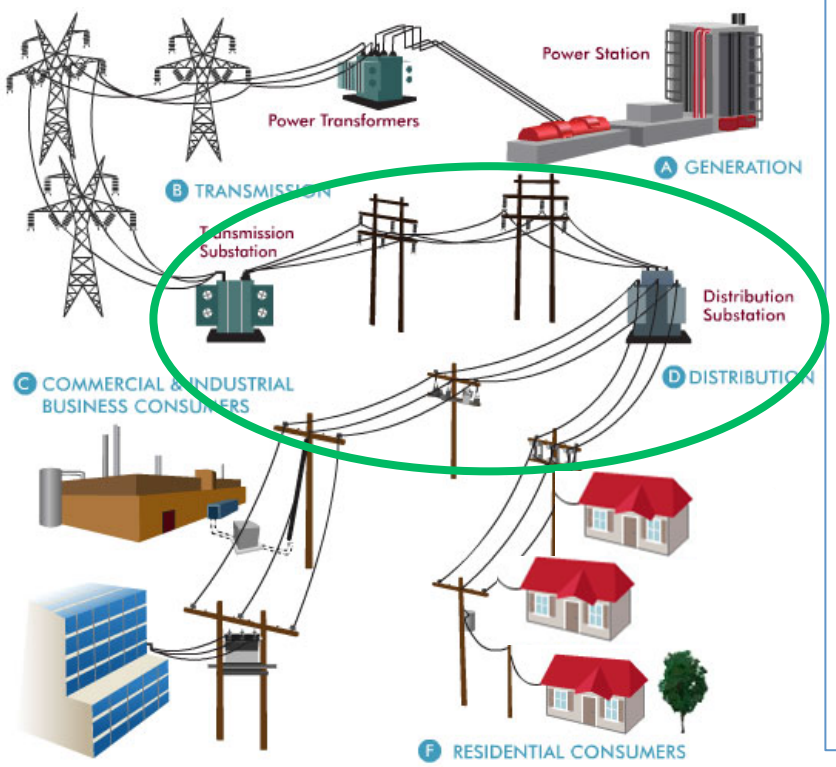
The only distribution costs that are attributable to any particular customer are the meter and service drop, and billing costs.

A fixed charge that covers more than this diverges from long regulatory traditions.

The transformer must be sized to the combined load of a few customers.

The rest is sized to the combined load of many customers.

How Should Poles and Wires Costs Be Recovered?



The distribution infrastructure is sized to the combined loads of all customers.

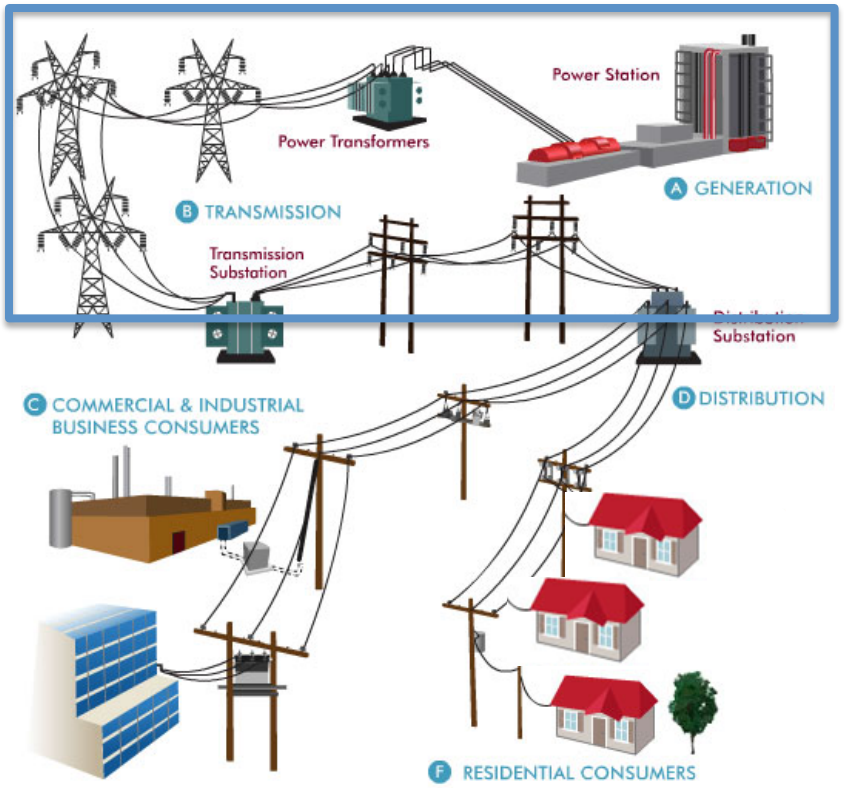
Adding (or losing) a customer does not change these costs.

They are built to deliver electricity (kWh). All customers using them should share in the cost.

If combined peak demand changes, the system design would change.

Bi-directional kWh or a kW charge is appropriate.

Recovery of Bulk Power Costs?



Capacity requirements are driven by peak demand.

Baseload resources are built for energy.

Transmission is mostly associated with remote (baseload and renewable) generating plant.

TOU Energy Charge best follows the cost causation.