RAP Energy solutions for a changing world

"Designing Distributed Generation Tariffs Well"

RAP Webinar
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Today's Agenda

- Context: Fair Compensation in the Transition toward N-way Transactions
- Designing DG Tariffs Well: 12 Points
- Rate Design Examples and Lessons
- Questions

The Transition toward N-way Transactions

- Technology is making customer resources less expensive
- Technology is enabling customer resource participation
- Power sector institutions are evolving
- What constitutes fair compensation in a time of transition?

Sound Decision-Making Benefits All

- For consumers: Keep more $$, quality
- For utilities: Corporate health, purpose
- For investors: Safety, value, expectations
- For employees: Safety and welfare, pride
- For the regulatory process: Confidence
- For society: Key role for power in society

A process that promotes shifting risk rather than managing risk is inherently unstable

Designing DG Tariffs Well: Twelve Points

1. Value is a two (or more) way street
2. Consider all relevant sources of benefit and cost over the long term
3. Select & implement a valuation method
4. Cross-subsidies may flow either way

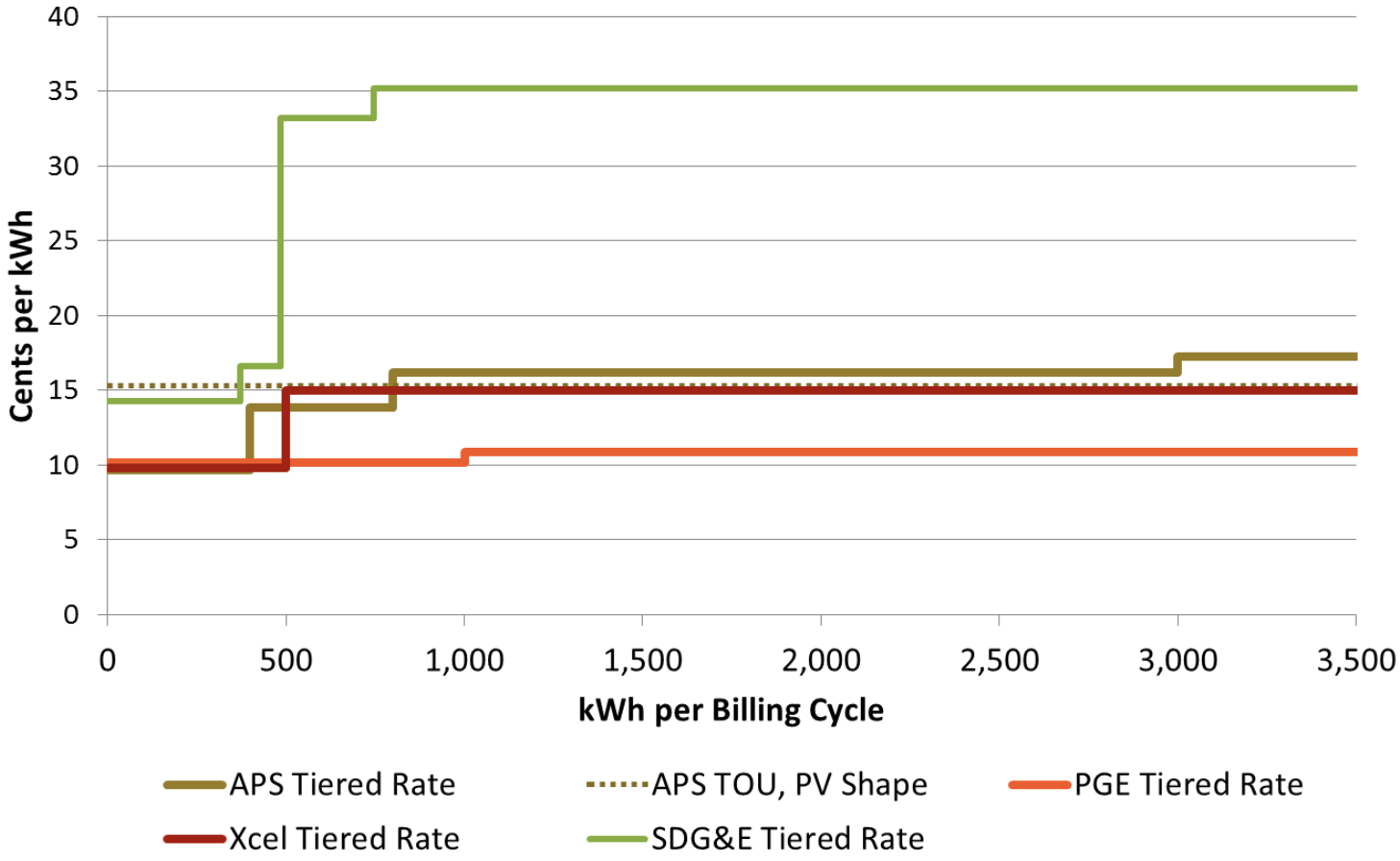
Consider: Cross-Subsidies Run Both Ways

- If value of PV < compensation:
  - 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 > compensation:
  - PV customers subsidize other customers
  - Suppresses PV deployment

Twelve Points …

5. Extrapolating from extreme situations is misleading
6. Infant industry subsidy tradition
7. Rules matter (e.g. interconnection)
8. No more complicated than necessary

Consider: Don't Extrapolate from Extremes
Tail Block Rates Vary (E3, 2013)



Twelve Points

9. Support innovative power sector models
10. Keep incentive decision separate from rate design
11. Keep decoupling decision separate from rate design
12. Consider mechanisms for “have-nots”

Rate Design Matters Due to Price Response: Up to a 15% "Swing" In Projected Usage

Three Basic Rate Designs

Rate Designs	Flat Rate	Inclining Block Rate	Straight Fixed/ Variable Rate
Customer Charge $/month	$5.00	$5.00	$30.00
First 500 kWh/month	$0.085	$0.070	$0.060
Next 500 kWh/month	$0.085	$0.100	$0.060
Over 1000 kWh/month	$0.085	$0.140	$0.060
Estimated Change In Usage		**-7%**	**+8%**

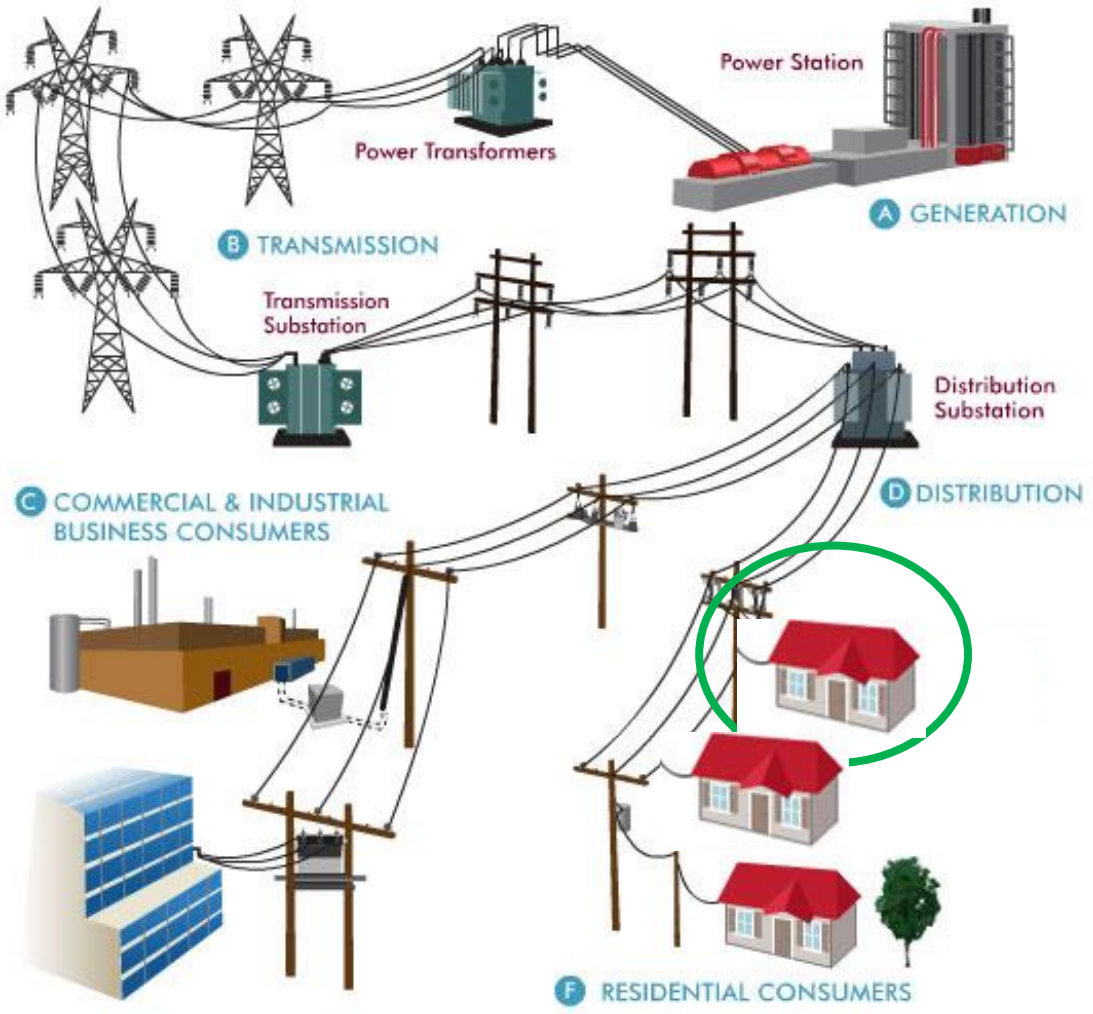
Rate Design Concerns for Residential Distributed Generation Customers

- Cost recovery for utility costs;
- Compensation for the DG provider
- Concern about “haves” and “have-nots”

Consider: Many Possible Alternative or Supplemental Tariff Policies

- **Fixed charges**
- **Demand charges**
- **Bi-directional distribution rates**
- **Time-based rates**
- Minimum monthly bills
- Stand-by rates
- **Value of Solar Tariff (VOST)**
- Separate PV customer class

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



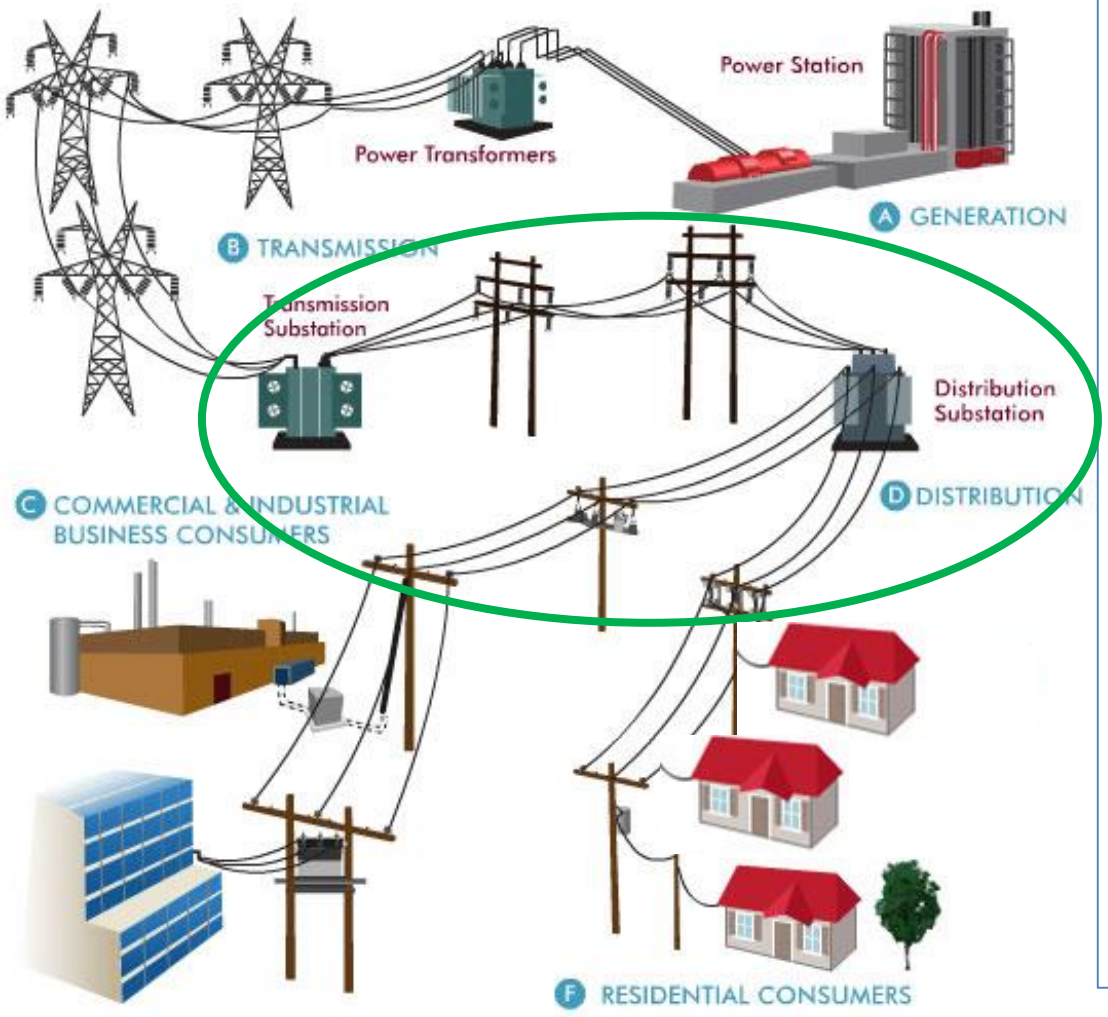
The only distribution costs that are attributable to any particular customer are the meter and service drop, and billing costs.

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.

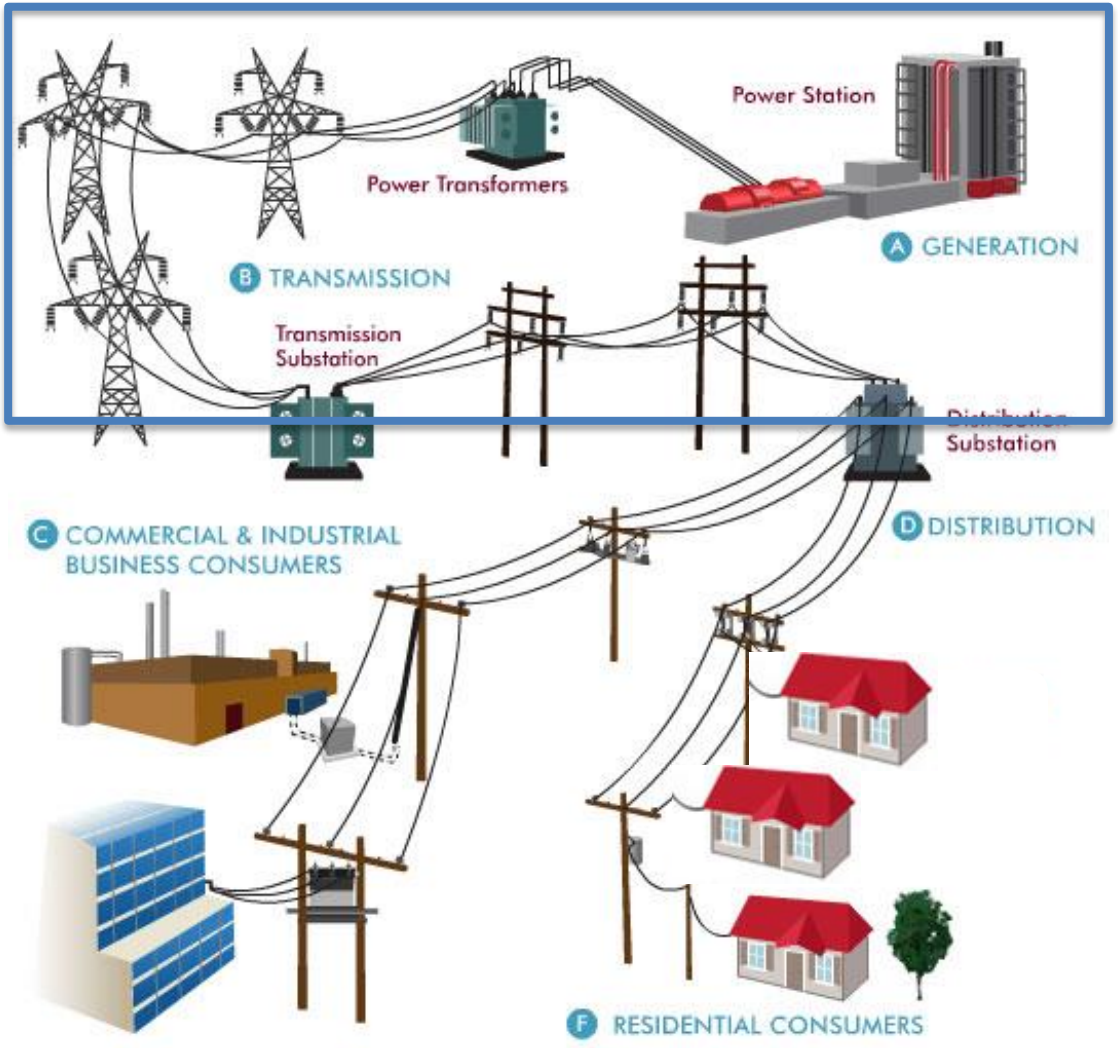
Adding (or losing) a customer does not change these costs.

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.

Illustration of Alternative Rate Designs for Net-Metering

Type of Charge	Unit / Usage	Typical Current Residential Tariff	Option 1 Fixed Monthly Charge	Option 2: Demand Charge	Option 3: Bidirectional Distribution Charge
Monthly Fixed Charge:	$/Month	$ 5.00	$ 35.00	$ 5.00	$ 5.00
Demand Charge	$/kW/Month		$ -	$ 3.00	$ -
Distribution Charge	$/kWh		$ -	$ -	$ 0.03
Off-Peak Energy	$/kWh	$ 0.145	$ 0.08	$ 0.08	$ 0.08
On-Peak Energy	$/kWh	$ 0.145	$ 0.15	$ 0.15	$ 0.15
Average Customer Bill					
Fixed Charge	Per Customer	$ 5.00	$ 35.00	$ 5.00	$ 5.00
Demand Charge	10 kW Demand	$ -	$ -	$ 30.00	$ -
Distribution Charge	1,000 kwh total energy	$ -	$ -	$ -	$ 30.00
Off-Peak Energy	500 kWh on-peak	$ 72.50	$ 40.00	$ 40.00	$ 40.00
On-Peak Energy	500 kWh off-peak	$ 72.50	$ 75.00	$ 75.00	$ 75.00
		$ 150.00	$ 150.00	$ 150.00	$ 150.00

Each alternative produces $150/month from a customer using 1,000 kWh/month

Residential
Fixed/Variable Rate Design

- All distribution costs are recovered in the monthly fixed charge, regardless of usage level.
- Only the energy charge is subject to net-metering.

Type of Charge	High Fixed Charge
Monthly Fixed Charge	**$ 35.00**
Demand Charge	$ -
Distribution Charge	$ -
Off-Peak Energy	$ 0.08
On-Peak Energy	$ 0.15

Residential Demand Charge

- Similar to typical commercial rates.
- Demand charge based on highest demand for the month.
- Only the energy charge is subject to net-metering.

Type of Charge		Demand Charge
Monthly Fixed Charge:	$	5.00
Demand Charge	**$**	**3.00**
Distribution Charge	$	-
Off-Peak Energy	$	0.08
On-Peak Energy	$	0.15

Bi-Directional Rate Concept

When PV customer receives power from the grid, the grid operator is compensated.

When PV customer delivers power to the grid, the grid operator is compensated.

The power flows in both directions at the same TOU values.

Requires bi-directional metering.

Type of Charge	Bidirectional Distribution Charge
Monthly Fixed Charge:	$ 5.00
Demand Charge	$ -
Distribution Charge	**$ 0.03**
Off-Peak Energy	$ 0.08
On-Peak Energy	$ 0.15

Breakdown of Hypothetical PV Customer Bill

Rate Element	Typical Current Residential Tariff	Option 1 Fixed Monthly Charge	Option 2: Demand Charge	Option 3: Bidirectional Distribution Charge
Fixed Charge	$ 5.00	$ 35.00	$ 5.00	$ 5.00
Demand Charge	$ -	$ -	$ 30.00	$ -
Distribution Charge	$ -	$ -	$ -	$ 30.00
Off-Peak Energy	$ 72.50	$ 40.00	$ 40.00	$ 40.00
On-Peak Energy	$ (72.50)	$ (75.00)	$ (75.00)	$ (75.00)
Total Bill:	**$ 5.00**	**$0.00**	**$0.00**	**$0.00**
Total Distribution Service:	$ 5.00	$ 35.00	$ 35.00	$ 35.00

Assumptions: 10 kW maximum demand; 1,000 kWh total consumption, 50% on-peak; 1,000 kWh total on-site production. 500 kWh imported from grid off-peak; 500 kwh exported to grid on-peak

Fixed Charges Disproportionately Affect Low Volume Customers

Type of Charge	Unit / Usage	Typical Current Residential Tariff	High Fixed Charge	Demand Charge	Bidirectional Distribution Charge
Monthly Fixed Charge:	$/Month	$ 5.00	$ 35.00	$ 5.00	$ 5.00
Demand Charge	$/kW/Month		$ -	$ 3.00	$ -
Distribution Charge	$/kWh		$ -	$ -	$ 0.03
Off-Peak Energy	$/kWh	$ 0.145	$ 0.08	$ 0.08	$ 0.08
On-Peak Energy	$/kWh	$ 0.145	$ 0.15	$ 0.15	$ 0.15

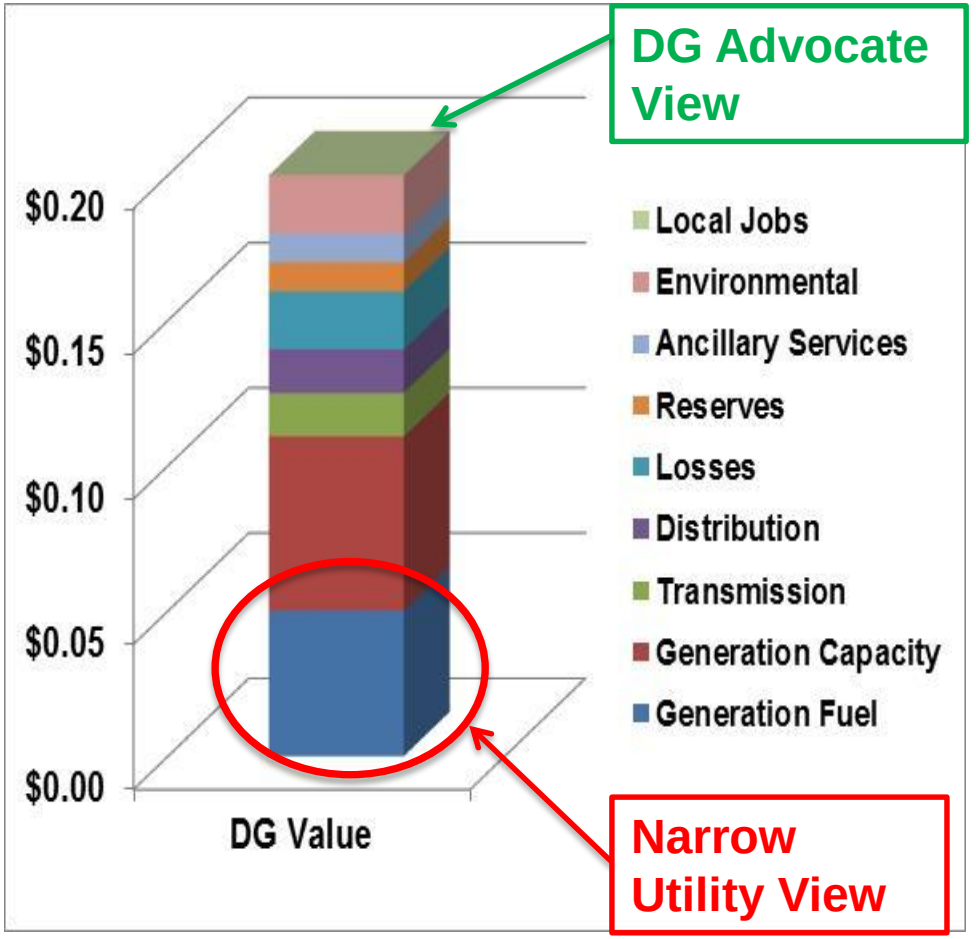
Impact on Customer Average Bills	Average User (1,000 kWh)	$ 150.00	$ 150.00	$ 150.00	$ 150.00
	Small Use (500 kWh) Bill:	$ 77.50	$ 92.50	$ 77.50	$ 77.50
	PV Customer Total Bill	$ 5.00	$ -	$ -	$ -
	PV Customer Distribution	$ 5.00	$ 35.00	$ 35.00	$ 35.00

Value of Solar Tariff (VOST)

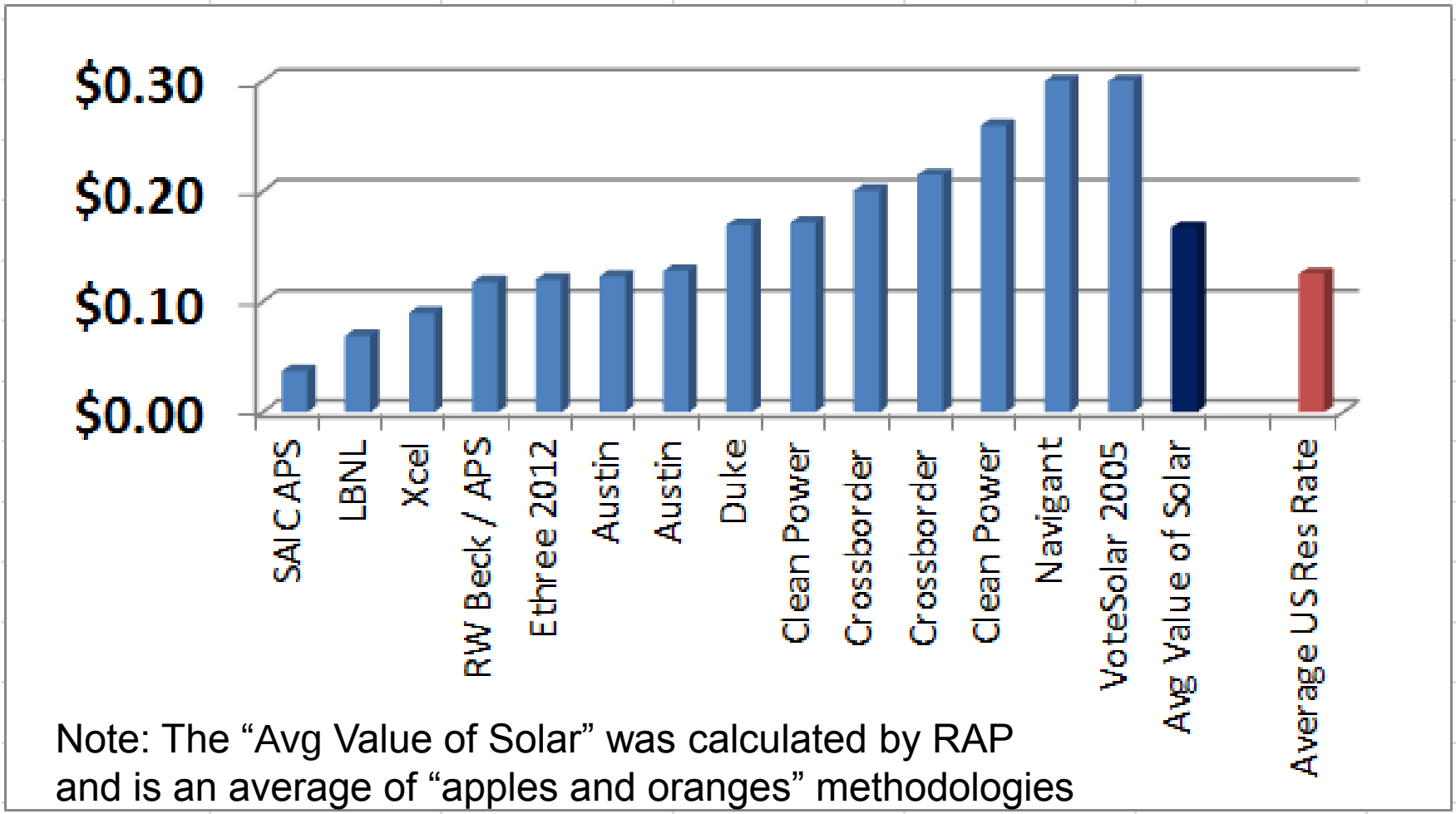
A Form of Feed-In Tariff

Customer receives "value" for energy, capacity, and other services solar provides.

Consumer buys all power at normal retail rate.



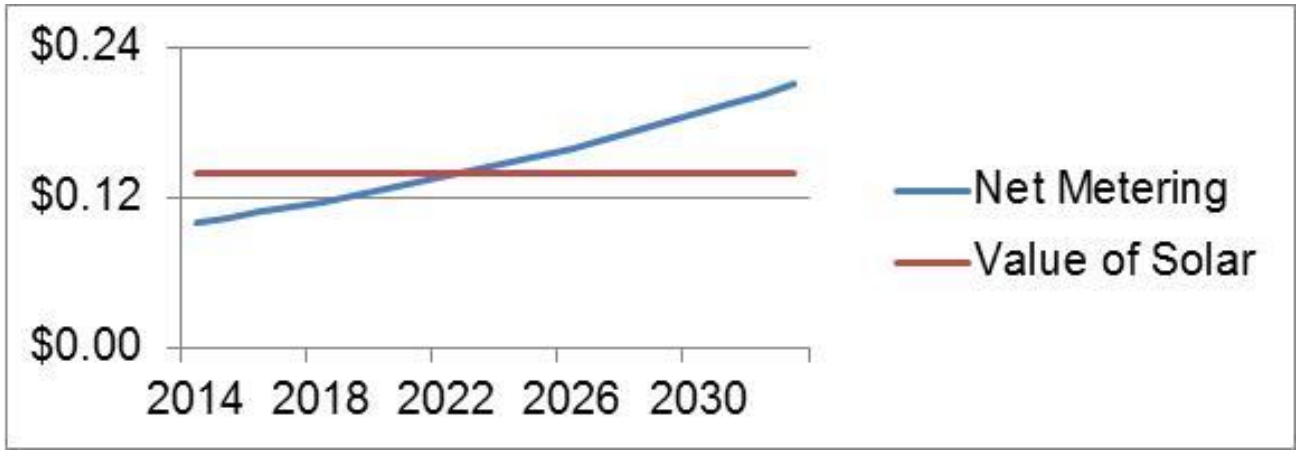
RMI Survey Of Multiple VOST Studies: Simple Average: $.1672/kWh



Note: The "Avg Value of Solar" was calculated by RAP and is an average of "apples and oranges" methodologies

Value of Solar Tariff

- Typically a Buy/Sell Arrangement
- Utility "buys" solar output at **levelized** price of a new **renewable** resource.
- Customer pays "normal" residential tariff, (which likely rises over time).



Conclusions on Tariff Design

- Align valuation with the public interest
- The “grid” is important to all customers and these costs should be fairly recovered from all
- A DG customer provides value to all customers and that value should be compensated fairly
- NEM, FIT and VOS FIT tariffs can each be designed well to provide fair compensation

Conclusions

- “Rates” are based on average embedded costs, new resources are paid based on marginal costs so the “rate” may be >,< or = “price” paid to an incremental resource
- Creative rate design can provide for fair compensation w/o harming small users
- Administrative simplicity matters

Questions?

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 and natural gas sectors. 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

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Designing DG Tariffs Well:
http://www.raponline.org/document/download/id/6898

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