

# BUILDING A WORLD OF DIFFERENCE

## GUAM POWER AUTHORITY NET ENERGY METERING TARIFF REVIEW

PREPARED BY:

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Building a world of difference.

# AGENDA

1. Background Perspectives
2. Avoided Energy Costs
3. Delivery Charge Differences
4. GPA's Cost of Service Studies
5. Recommendations

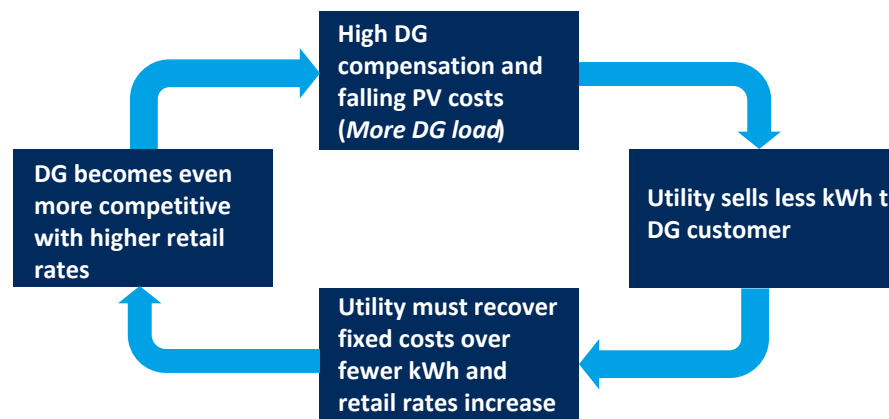
# SECTION 1 BACKGROUND PERSPECTIVES

# NET ENERGY METERING: A GROWING RATEMAKING AND REGULATORY CONTROVERSY

- NEM is inextricably tied to the utility's underlying rate design.
- As a utility's retail rates change, the compensation to the customer for DG under the NEM tariff changes.
  - If utility rates increase, the compensation for DG increases which can be a perverse incentive if DG is a declining cost energy resource.
- Utilities argue that NEM allows the DG customer to avoid paying its fair share of fixed costs for the distribution grid.
  - Recovery of fixed costs are shifted to other customers.
- DG advocates respond that the value of DG to the utility exceeds the fixed costs associated with serving DG customers.

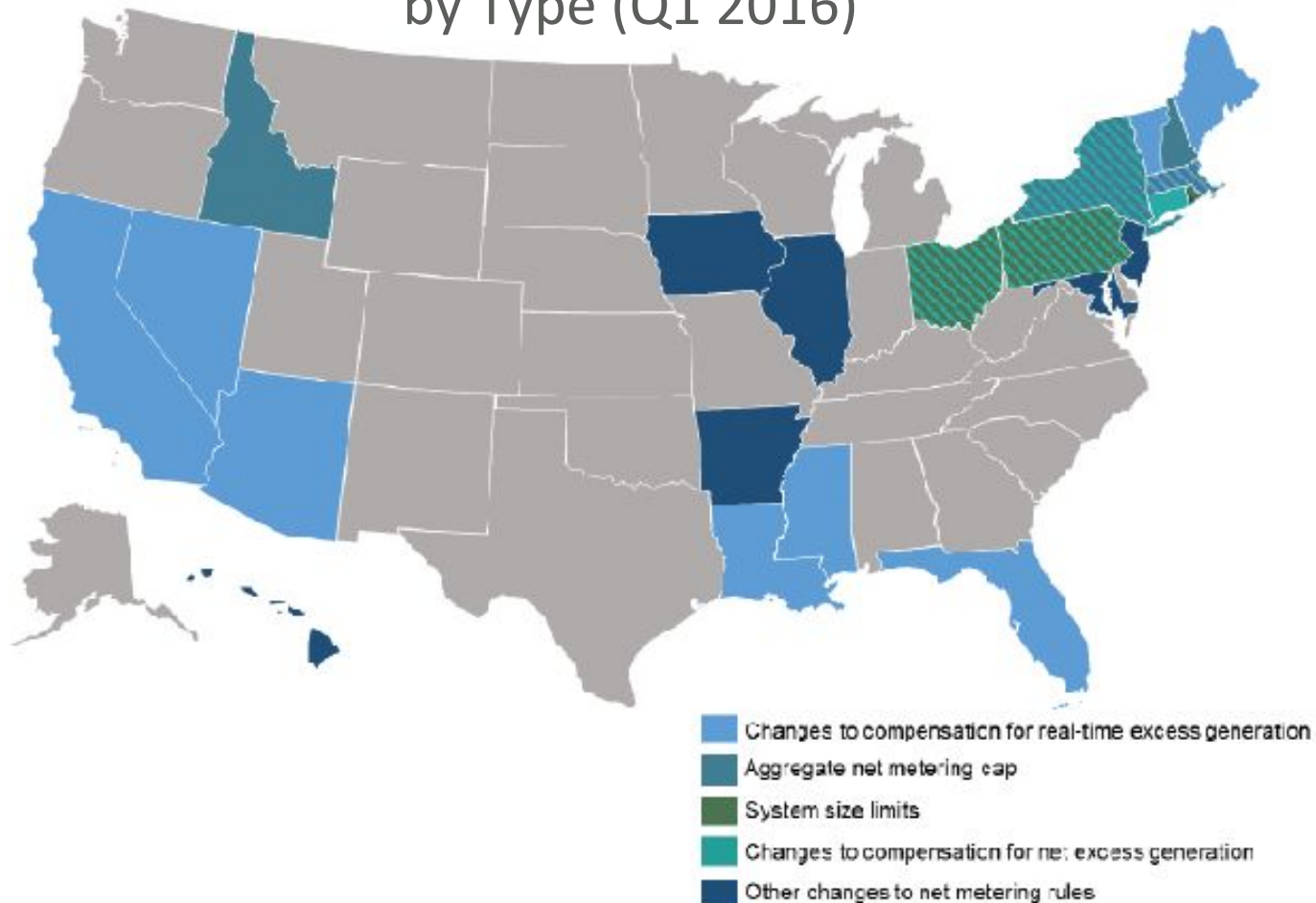
# NET ENERGY METERING: WHAT'S FUELING THE DEBATE TODAY?

- The solar industry is experiencing strong growth and increased customer penetration levels.
- The cost of solar is continuing to fall with increased demand and production levels.
- Rising utility retail rates with low energy sales growth and increasing infrastructure investments.
- Some utilities are concerned about the potential “*death spiral*.”



# RECENT REGULATORY ACTIVITY REGARDING NET METERING POLICIES

Proposed and Enacted Changes to Net Metering Policies  
by Type (Q1 2016)



Source: North Carolina Clean Energy Technology Center, *The 50 States of Solar: Q1 2016 Quarterly Report*, April 2016.

# RECENT REGULATORY ACTIVITY REGARDING NET METERING RATE ISSUES

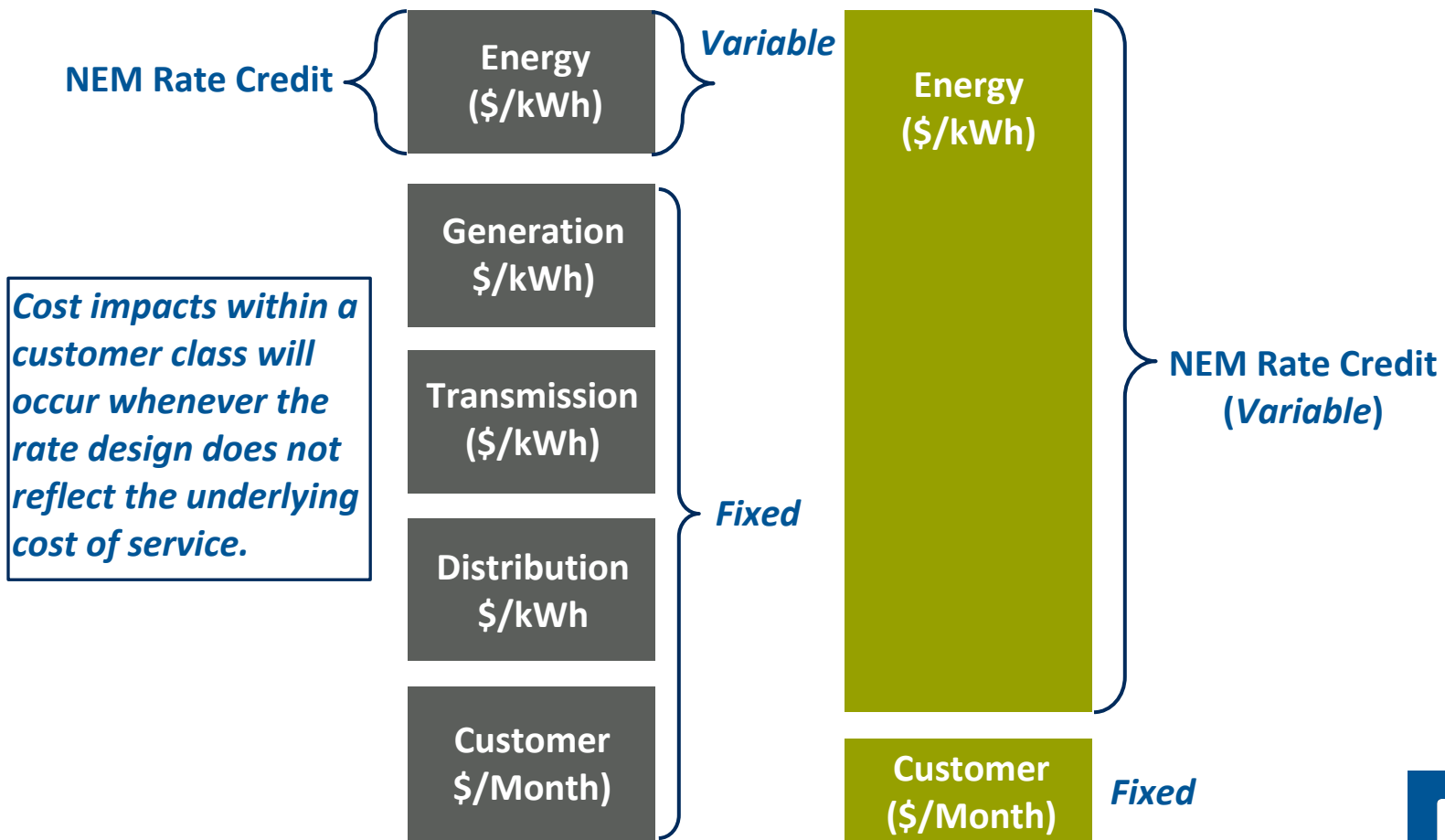
- Hawaii PUC issued order ending net metering in October 2015.
- California PUC issued an decision maintaining net metering with some modifications in January 2016.
- Generic proceedings/Investigations initiated by regulators on NEM and/or DER (AZ, NH, CT)
- Legislative actions addressing net metering rules and alternatives initiated in ME and MS
- Utility proposals to replace net metering by avoided cost rates in FL and LA

**This issue is being actively debated across the U.S.**



# RETAIL RATE DESIGN - NOT NET ENERGY METERING – IS THE REAL ISSUE

## *Cost-Based Rate      Traditional Rate*





# RATE REFORM OPTIONS FOR DER CUSTOMERS

Rate Design Option	Explanatory Comments
Demand Charge	A charge based on a customer's maximum kW demand over a pre-specified time period (maximum demand across all hours of the month or during peak hours only)
Fixed Monthly Charge	A flat charge per month assessed to each customer irrespective of the customer's load characteristics
Capacity Charge	An additional charge to DG customer's based on its installed capacity, with the size of the charge based on the customer's generation capability
DG Output Fee	An additional charge to DG customers based on the total amount of electricity they produce from DG resources
Connection Fee	A one-time fee assessed to DG customers to reflect the cost of the utility's distribution grid not recovered due to the current NEM rate design
Buy-Sell/"Value of Solar" Structure	DG customers pays for all electricity consumed at the utility's full retail rate; separately compensated for electricity generated at the "value" of the electricity
Time Varying Rates	The variable charges of the utility's existing rate structure are time-differentiated to reflect the identified variation in costs

# CROSS-SUBSIDIES UNDER UTILITY RATE DESIGN WITH DG CUSTOMERS

Value of DG < Rate Compensation
Other utility customers subsidize DG customers
Under-recovery of utility's fixed costs <sup>(1)</sup>
Upward pressure on utility retail rates
Reduced cash earnings <sup>(1)</sup>

<sup>(1)</sup> Unless utility is made whole through revenue decoupling

## CURRENT SERVICE: SCHEDULE “C” NET METERING - INTERIM

- Effective December 29, 2008.
- To remain in effect until 1,000 installations are reached (*reached as of July 2016*).
- 12 Months of Banking.
- Single residential customer service location shall not exceed 25kW and 100kW for non-residential.
- Full energy credit (Distribution + LEAC) based on both real time consumption and banking for periods when solar production is inadequate, including high cost evening hours.

**The provisions of Schedule C are to be reviewed by the PUC once 1,000 installations are reached.**

# GUIDING PRINCIPLES

- **Public Utility Regulatory Policies Act (PURPA)  
Section 111, Standard 11**
- **Part 292— regulations Under Sections 201 And 210  
Of The Public Utility Regulatory Policies Act Of 1978  
With Regard To Small Power Production And  
Cogeneration**
- **Public Law 27-132**
- **Adherence to cost-based ratemaking concepts for  
utilities**

**Note that PURPA is not specifically applicable to  
Guam. However, it provides sound guidelines.**

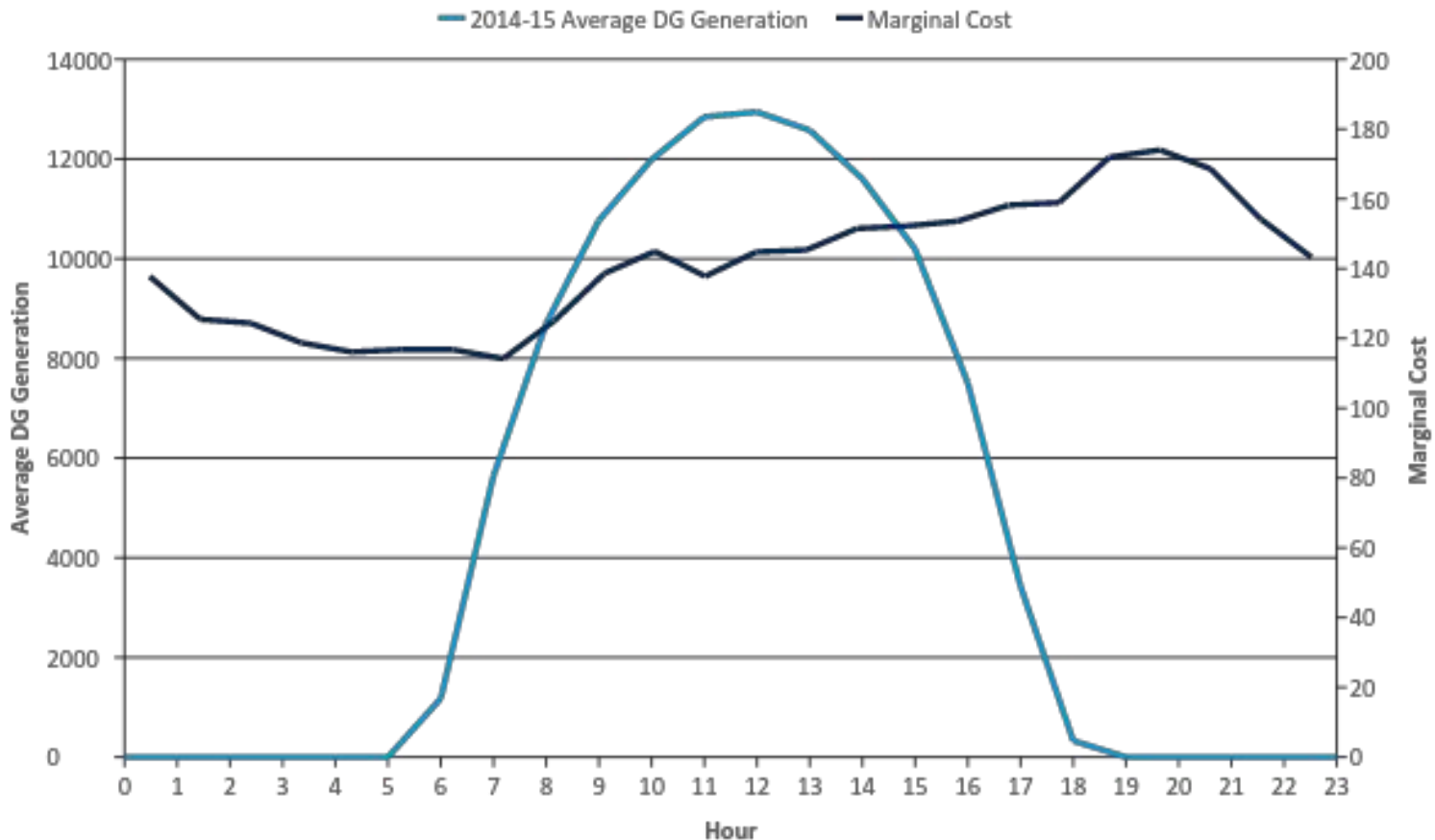
# SECTION 2

# AVOIDED ENERGY

# COSTS

# AVOIDED ENERGY COSTS

## Hourly DG Generation and Marginal Cost of Electricity



**Largest output of solar energy is produced in GPA's lower cost hours**

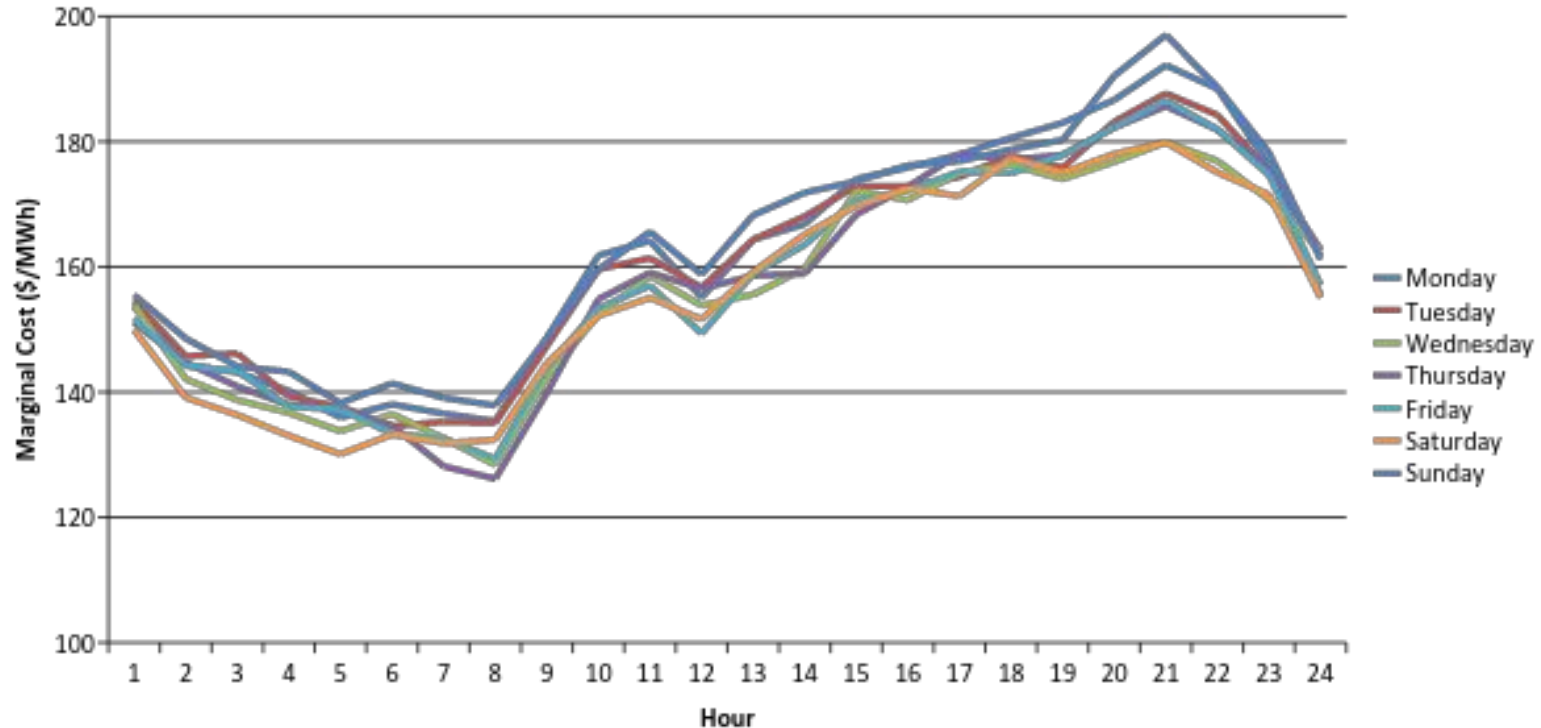
## AVOIDED ENERGY COSTS (CONTINUED)

- GPA's marginal avoided cost of energy at the time solar DG customers are producing energy is lower than the cost of energy delivered to the DG customers when no solar energy is produced
- GPA's avoided energy cost should also account for higher spinning reserve and ramp rates
- It should also be adjusted for losses

Description	Marginal Cost (\$/kWh)
kWh Delivered to Residential DG Customers	\$0.1564
kWh Received from Residential DG Customers	\$0.1471
kWh Produced by Solar DG Customers	\$0.1538

# GPA'S DAILY MARGINAL COSTS

Weekly Marginal Energy Costs (\$/MWh in 2017)



- GPA's highest average cost hour occurs late in the evening (Between 8PM to 9PM).
- Morning hours reflect the lowest costs.



# SECTION 3

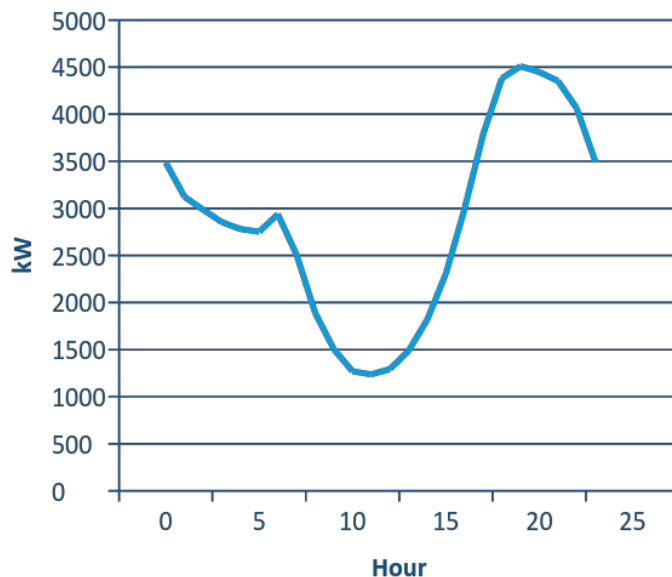
# DELIVERY CHARGE

# DIFFERENCES

# LOAD CHARACTERISTICS OF FULL AND PARTIAL REQUIREMENTS SERVICE

- Load characteristics of partial requirements solar DG customers are very different compared to a full requirements customer

**"Duck Curve" – Load Shape for GPA's Solar DG Customer**



MEASURES	FULL REQUIREMENTS	PARTIAL REQUIREMENTS
Customer Maximum Demand	5 kW	5 kW
Annual Energy Consumption	17,520 kWh	17,520 kWh
Annual Billed kWh	17,520 kWh	7,503 kWh*
Annual Load Factor	40 %	17.1%

**\* Based on 17,520 kWh less the energy produced by a 5 kW Solar PV system operating at a 22.87% annual capacity factor.**

# DELIVERY CHARGE DIFFERENCES

BILLING DETERMINANTS	LOCAL DELIVERY	FULL REQUIREMENTS	PARTIAL REQUIREMENTS
Customer Charge	12	\$180.00	\$180.00
0-500 kWh	6,000	\$417.30	\$417.30
Over 500 kWh			
Full Requirements	11,520	\$1,000.74	
Partial Requirements	1,503		\$130.57
Total Bill		\$1,598.04	\$727.87
Difference		\$870.17	

- As shown in the table above, there is a \$174 per kW (\$870 divided by 5kW) delivery charge difference under GPA's current rates.
- The total combined difference from GPA's base rate and the LEAC is over \$177 per kW, and about \$888 per year for the average 5 kW solar DG facility.

**Low use and non-DG customers pay for the fixed costs of DG customers that are not avoided.**

# SECTION 4

# GPA'S COST OF

# SERVICE STUDIES

# GPA'S COST OF SERVICE STUDIES (COSS)

Base Study	Counterfactual Study	Solar Class Study
<ul style="list-style-type: none"> <li>Treats solar customers as part of the applicable residential/non-residential rate schedule.</li> <li>NEM customers are allocated costs in an identical manner to that of the residential and commercial classes based on the actual load characteristics of the respective classes.</li> </ul>	<ul style="list-style-type: none"> <li>Assumes that the solar customers did not adopt DG, but rather were full requirements customers.</li> <li>Allocates costs in the same way as with the residential and commercial classes.</li> </ul>	<ul style="list-style-type: none"> <li>Treats DG customers as a separate class</li> <li>Allocates costs based on the unique load characteristics of solar DG customers.</li> </ul>

**COSS from GPA's 2012 Rate Case was used as a starting point for these cost studies.**

# HOW IS THE COUNTERFACTUAL LOAD CALCULATED?

	Data Point	Source/Calculation
	Load delivered to solar DG customers	Hourly load measurements provided by GPA
Plus:	Solar DG Production	Calculated based on installed capacity and production profile of a 20MW solar installation
Less:	Load received by GPA from solar DG customers	Hourly load measurements provided by GPA
Equals	Full Requirements (Counterfactual) Load for DG customers	

**Solar class load at any hour is the highest load provided to or received from solar DG customers**

# SUMMARY RESULTS OF GPA'S COSS

	BASE STUDY		COUNTERFACTUAL STUDY		SOLAR CLASS STUDY	
	Res-Solar	Small General Demand - Solar	Res-Solar	Small General Demand - Solar	Res-Solar	Small General Demand - Solar
Procurement Demand	2,390,921	250,207	2,455,148	260,092	2,365,198	250,124
Procurement Energy	132,164	12,750	181,546	23,795	56,168	11,343
34KV Trans Demand	555,572	57,582	602,963	68,101	564,128	58,563
34KV Dist Demand	187,369	17,551	310,251	48,143	237,834	21,172
Secondary Customer	334,114	35,159	337,951	35,308	328,209	35,141
Onsite Customer	132,161	3,221	133,508	3,273	130,089	3,214
<b>Total</b>	<b>3,732,300</b>	<b>376,469</b>	<b>4,021,366</b>	<b>438,712</b>	<b>3,681,625</b>	<b>379,557</b>

- Residential solar customers transfer about \$289,066 from when they were full requirements customers to current customers in the COSS.
- Solar DG customers increase the cost of delivery service, but save some energy costs on a cost of service basis.

# GPA'S COSS - CONCLUSIONS

The conclusions related to GPA's COSS results are as follows:

- Solar DG customers must be treated as a separate class of service in GPA's COSS.
- GPA's current two-part rate with net metering is unable to produce an equitable treatment of full requirements customers and solar DG customers (partial requirements customers) who have different demand profiles and load factors.
- Banking adds to the subsidies that result under GPA's current rates and a COSS that reflects time differentiation of energy costs.
- Rate design must be unbundled so that each utility service is priced separately
  - GPA has made a good start on unbundled rates by identifying delivery services in base rates and recovering all fuel and variable generating costs under the LEAC
- The rate design must be a multi-part rate to meet the principles of cost causation and the matching of revenues and costs.



# SECTION 5 RECOMMENDATIONS

# RECOMMENDATIONS

- A “buy-all/sell-all” approach should be adopted for all of GPA’s solar DG customers
- Buying all energy from GPA assures that the customer does not avoid paying delivery costs that it imposes on the utility and that GPA’s payment for solar-produced energy reflects avoided energy costs
- A three-part rate should be mandatory for all of GPA’s solar DG customers.
- Unitized revenue requirements from the Solar Class Study indicated below should be used as a guideline for rate design (Note that actual rates would be lower based on current class contributions to capital costs).

	Base Study		Counterfactual Study		Solar Class Study	
Unit Cost Component	Residential	Res-Solar	Residential	Res-Solar	Residential	Res-Solar
Demand (\$/kW-month)	\$49.25	\$48.37	\$49.61	\$46.28	\$49.45	\$46.49
Demand (\$/MWh)	\$98.90	\$106.11	\$100.90	\$83.12	\$95.13	\$252.45
Energy (\$/MWwh)	\$4.47	\$4.47	\$4.47	\$4.47	\$4.47	\$4.47
Customer (\$/month)	\$44.98	\$45.93	\$44.97	\$46.44	\$45.00	\$45.14

## RECOMMENDATIONS (CONTINUED)

- Rate design for new Solar DG customers will be based on the same customer charge as the current end-use class (General Service or Residential).
- The delivery charge will be calculated as an annual demand charge per kW of installed solar DG capacity payable in 12 monthly installments.
- The delivery charge will be based on the solar class study results for delivery service.
- Rate = Customer Charge + Delivery Demand Charge + Energy LEAC Charge – kWh \* avoided energy costs payment
- Appendix A illustrates how to calculate delivery demand charge.

# PROPOSED RATE ROADMAP FOR GPA

- New customers beyond the 1,000 installation threshold should automatically be placed on the new rate design and “buy-all/sell-all” option.
- DG customers added before the 1,000 installation threshold was reached should be gradually moved from the existing rate structure to the new demand-based rate structure under a five year phase-in plan.
- The new rate should be made effective as soon as it is approved by the PUC.

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# APPENDIX A: ILLUSTRATION OF DELIVERY CHARGE CALCULATION

Row	Description	Amount/Quantity
1	Solar Class Revenue Requirement	\$3,700,000
2	Res Revenue to Cost Ratio	65%
3=1*2	Solar Class Revenue	\$2,405,000
4	Customers-Months	10,200
5	Customer Charge	\$15.00
6=4*5	Customer Charge Revenue	\$153,000
7=3-6	Distribution Charges to be collected	\$2,252,000
8	Installed Solar Capacity (kW-Months)	88,200
9 =7/8	Distribution Charge per installed kW	\$25.53

**Please Submit Written  
Testimonies via email to  
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Communication Manager  
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or via Fax at (671) 648-3290**