Overview of Compliance Filing

Docket No. 14-035-114

Technical Conference

January 23, 2017





ROCKY MOUNTAIN POWER

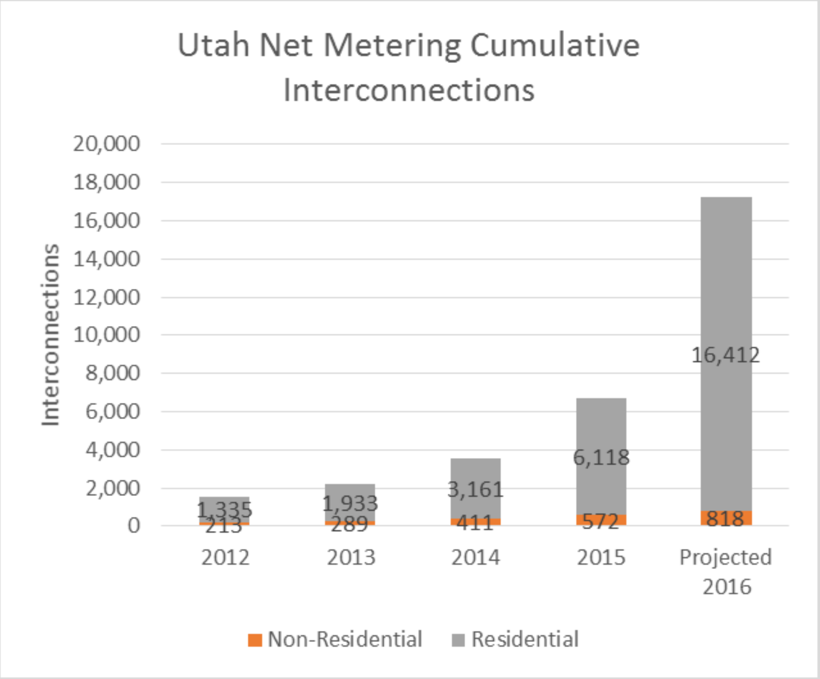
Let's turn the answers on.

Agenda

- Introduction – Joelle Steward
- Load Research Study – Lee Elder
- Distribution System Studies – Douglas Marx
- Cost of Service Analyses – Robert Meredith
  - Net Power Costs – Mike Wilding
- Reconciliation to Current Rates – Robert Meredith
- Proposed Rates – Joelle Steward
- Large Non-Residential Compensation – Joelle Steward
- Application Fees – Joelle Steward
- Deferral for Incremental Revenue – Joelle Steward

Net Metering Growth

Figure 1 in Filing



- **2016 Cumulative Interconnections - Actual**
  - Residential – 15,992
  - Non-residential – 787
- **2016 Cumulative Generation**
  - Residential – 97.4 MW
  - Non-Residential - 32.7 MW
- **Net Metering Applications**
  - 2016 PacifiCorp – 18,268
    - Utah – 16,951
  - 2015 PacifiCorp – 8,015

Source: Steward/Workpapers/Figure 1 – Growth in Net metering Participation

Overview of Filings

Tariff Advice Filing - SUSPENDED

- Close current net metering tariff (Schedule 135) to new service, proposed effective Dec 9, 2016.
- Proposed new transitional tariff (Schedule 135a)
  - Would apply to new net metering applicants and mirrors current net metering tariff for transitional period until new net metering rate tariff approved.

Compliance Filing and Request to Complete Analysis under NEM Statute

- Provides cost of service analyses required by November 2015 Order that show costs exceed benefits
- Requests approval of new Schedule 136 for modifications to net metering program
  - Requires new residential net metering customers to take service on new rate Schedule 5, with cost-based rates
  - Eliminates option for non-residential customers to receive compensation for excess energy at the average retail rate
- Requests approval of new residential Schedule 5 to implement separate rates for residential net metering customers
- Proposes deferral for incremental revenues of new rates until next general rate case
- Requests new application fees for net metering interconnections to provide for more concurrent recovery of administrative costs.
- Revisions to interconnection agreements to reflect changes.

NET METERING LOAD RESEARCH STUDY

Presentation Overview

- Background of Load Research
- Overview of Technical Components of Utah Residential Net Metering Study

What is Load Research?

- The study of how and when our customers use energy so that PacifiCorp can most effectively:
  - Allocate Costs
  - Design Customer Rates
  - Forecast Loads
  - Size Transformers & Distribution Circuits
  - Provide Enhanced Customer Service

Stratification Process

- RMP utilizes a stratified sampling process with systematic, random selection
- Stratification allows for fewer customers to be sampled
- Variance within each strata is lower than the population overall. Thereby, lowering the number of sampling units required
- Adhere to PURPA requirements, which aligns with the process used by the Company for load design for all rate cases

Load Profile Sampling Design

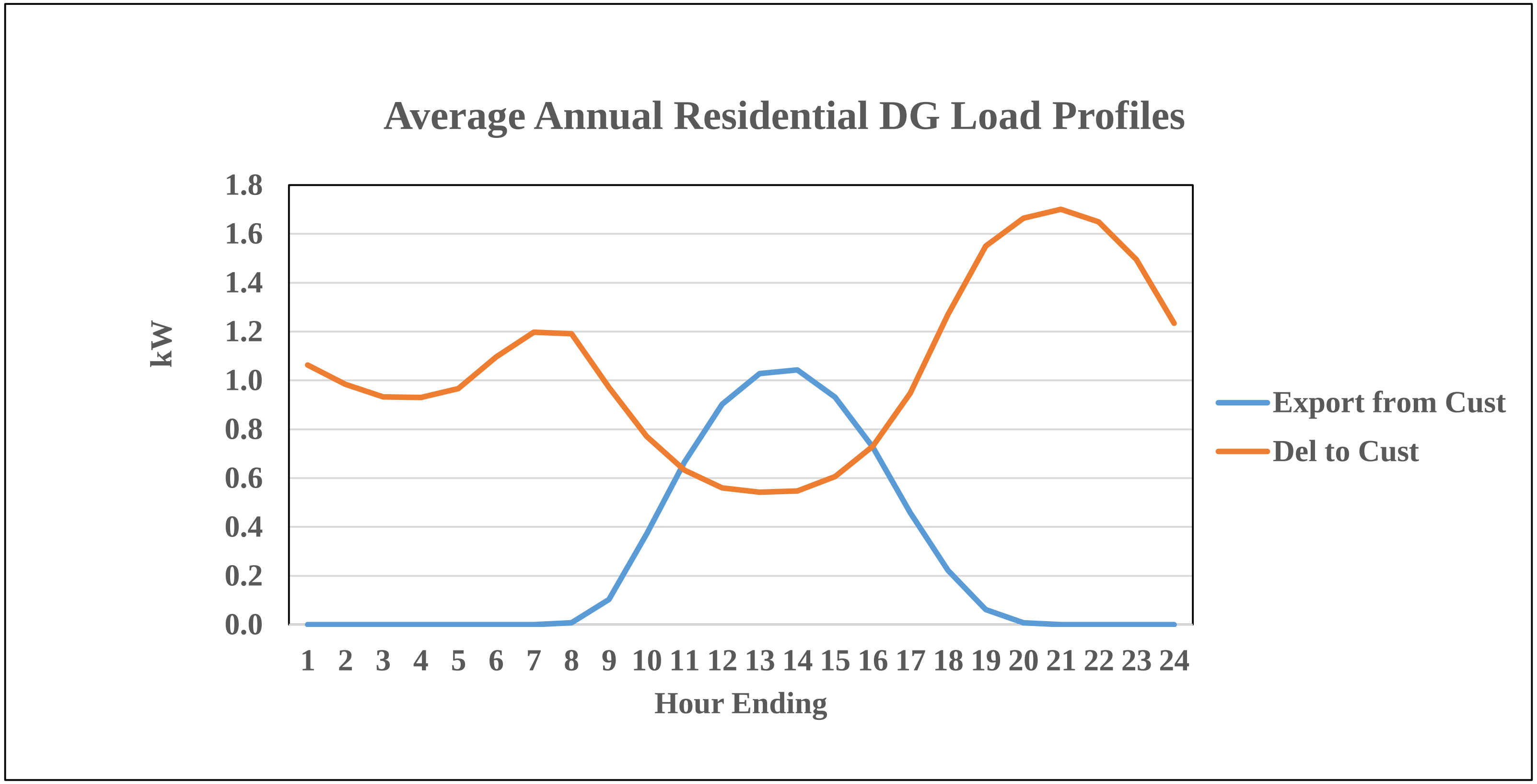
- Sample meters selected based on their billed net energy usage
- Sample design called for 45 load profile meters to provide estimates of system peak demand that achieve, at a minimum, ±10% precision at the 95% confidence level
- Ultimately, 52 load research profile meters were used for this study

Load Profile Sample Design

Stratum	Boundaries	a Sample Mean kWh	b Pop (N)	c Variance of Mean	d Standard Deviation	e Weighted Deviations (b x d)	f Proportion (e/e total)	g Optimal Allocation (f x g total)	h Optimal with Attrition	i Final with Attrition
1	0 - 400 kWh	204.1	761	13,410	116	88,124	0.26	12	12	15
2	401 - 900 kWh	594.3	527	20,107	142	74,729	0.22	10	10	14
3	901 - 2,000 kWh	1,229.5	236	71,022	267	62,894	0.19	8	10	12
4	>2,000 kWh	3,317.1	54	4,318,915	2,078	112,223	0.33	15	15	21
Total	NA	NA	1,578	NA	NA	337,969	1.00	45	47	62
							Estimated Population Mean			594.3
								Sample Estimate		45
							Adjusted Sample Estimate			62

Stratum	TOTAL KW Optimal n	TOTAL KW Adjusted n	TOTAL KW Final	MEAN KW Adjusted. n		Total Weighted Standard Deviation	Total Weighted Variance
1	694,849,754	694,849,754	543,766,649	279		56	6,467
2	608,710,945	608,710,945	418,154,803	244		47	6,715
3	545,937,890	420,893,636	341,320,020	169		40	10,622
4	649,688,250	649,688,250	384,815,348	261		71	147,796
Total Variance	2,499,186,838	2,374,142,585	1,688,056,820	953		214	171,599
Standard Error	49,992	48,725	41,086	31		V=	919
Desired Conf. Level	0.95	0.95	0.95	0.95			
(z two tailed)	1.96	1.96	1.96	1.96			
Conf. Interval	97,984	95,501	80,528	61			

Load Profile Results



Production Profile Meters

- Of those 52 customers with load profile meters, the Company receive permission to install production profile meters on 36 of these same homes
- Benchmarked residential distributed generation production shape to the hourly shapes from National Renewable Energy Laboratory's ("NREL")

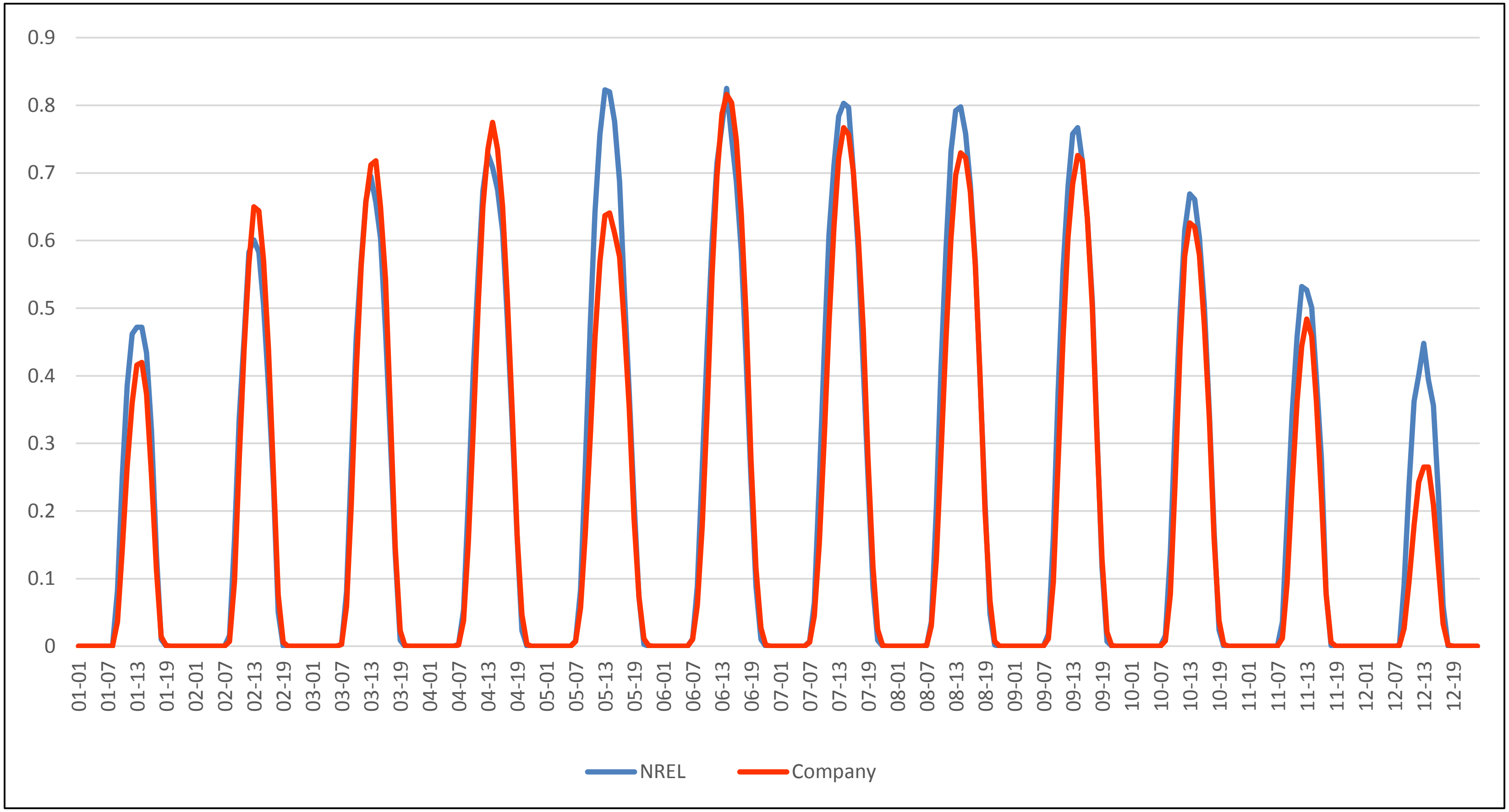
Production Profile Curve Comparison

- Used ten PVWatts hourly curves for those same counties where Company solar production meters were installed and weighted both the same
- Scaled the average hourly solar production load shapes of PVWatts in order to compare to the Company's standardized production load shape
- A scaled production load shape converts usage values into percentage values. Removes the magnitude of the usage, leaving its shape (profile)
- Magnitude was introduced later by multiplying the scaled load curve by the solar system size

Comparison Assumptions

– Hourly production shape for 2015 is similar to the "typical solar" year from NREL
– Customer production values taking directly from the meter
– With exception to system size, NREL default inputs were used
  - Typical Meteorological Year 2 data
  - DC System Size - (1kw)
  - Module Type – Standard
  - Array Type – Fixed
  - System losses – 14%
  - Tilt (deg.) – 20
  - Azimuth (deg.) – 180 (south facing)

Production Curve Shapes



Source: Meredith/Workpapers/Figure 2

Regression Analysis

- Conducted a regression analysis to gauge the relationship between the independent variables (the Company residential DG production shape) the dependent variable (the PVWatts® DG production shape)
- Regression analysis asserts there is a relationship between the dependent and independent variables
- Autocorrelation was corrected in the model through the use of autoregressive coefficients

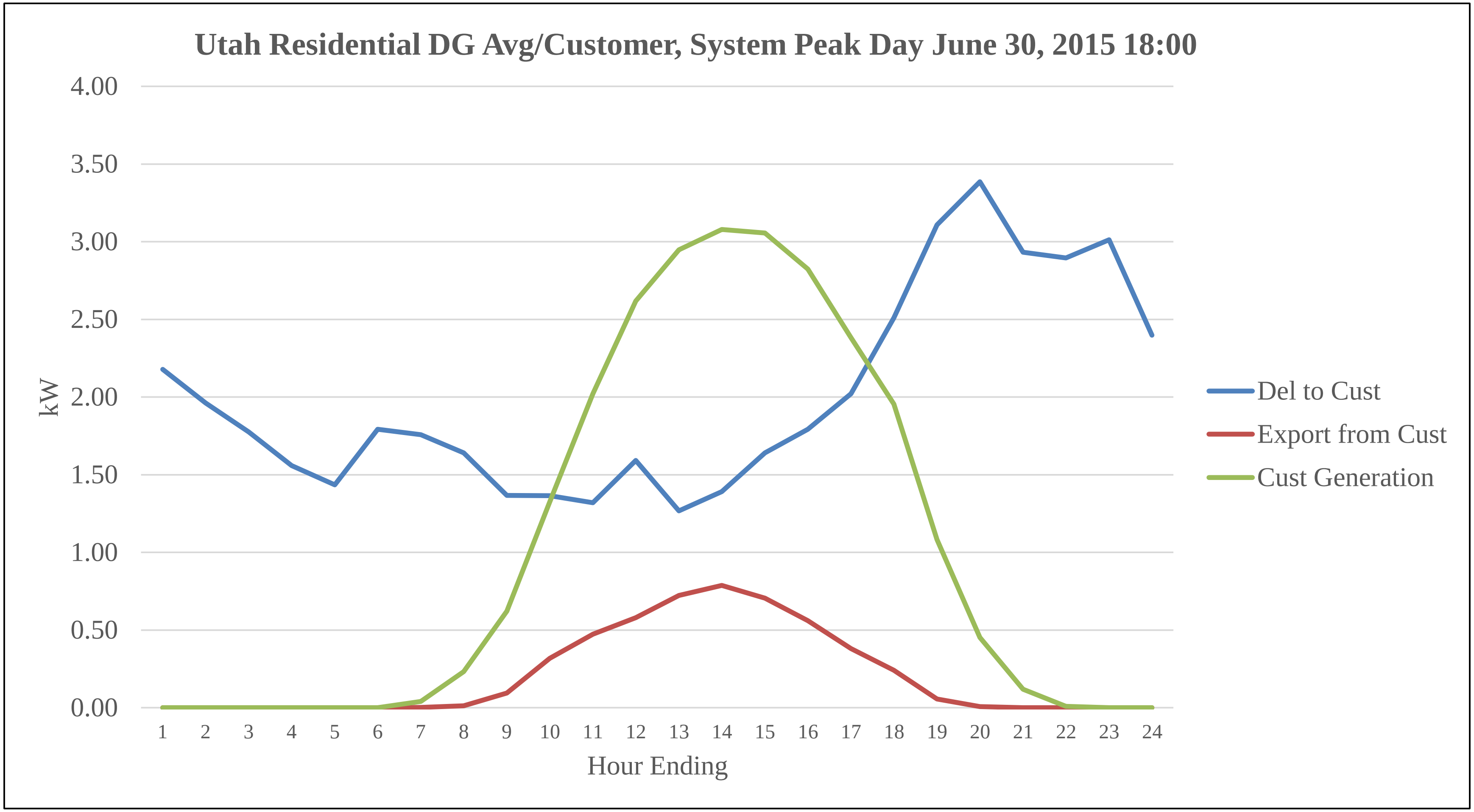
Regression Results

- The regression has an Adjusted R-squared of 0.994, indicating that the model is a good predictor of the dependent variable
- The correlation coefficient of 0.984 indicates a strong association between the independent and dependent variables
- In other words, the Company residential DG production shape and the PVWatts® DG production shape are very similar

Residential and Residential Net Metering Customers

- Compared load characteristics for residential and residential net metering
- Sample design for Utah residential class called for 145 load profile meters to provide estimates of system peak demand that achieve, at a minimum, ±10% precision at the 90% confidence level
- Ultimately, 195 load research profile meters were used

Load Shapes on System Peak Day



Differences in Residential NEM Customer Profiles

Figure 2. Average Annual Load Profile of Residential and Residential Net Metering Customers

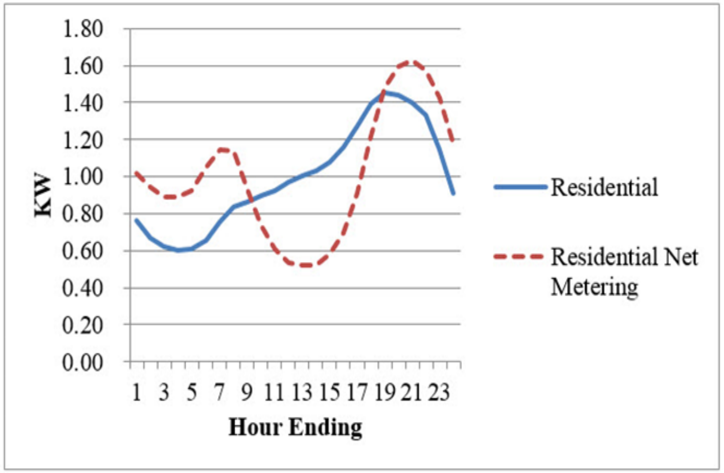
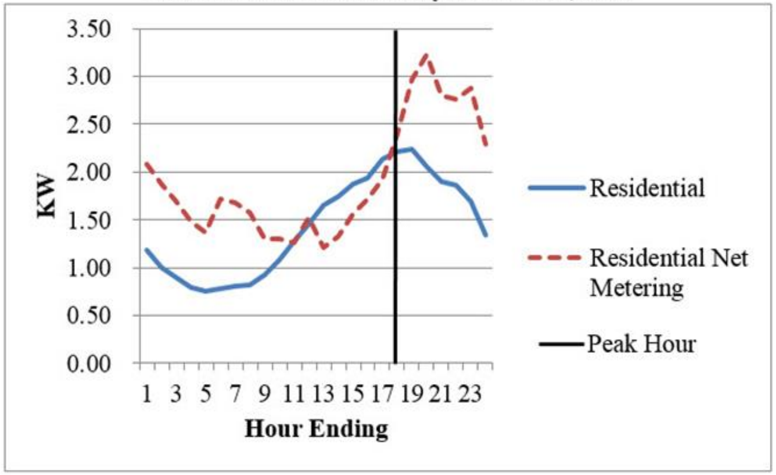


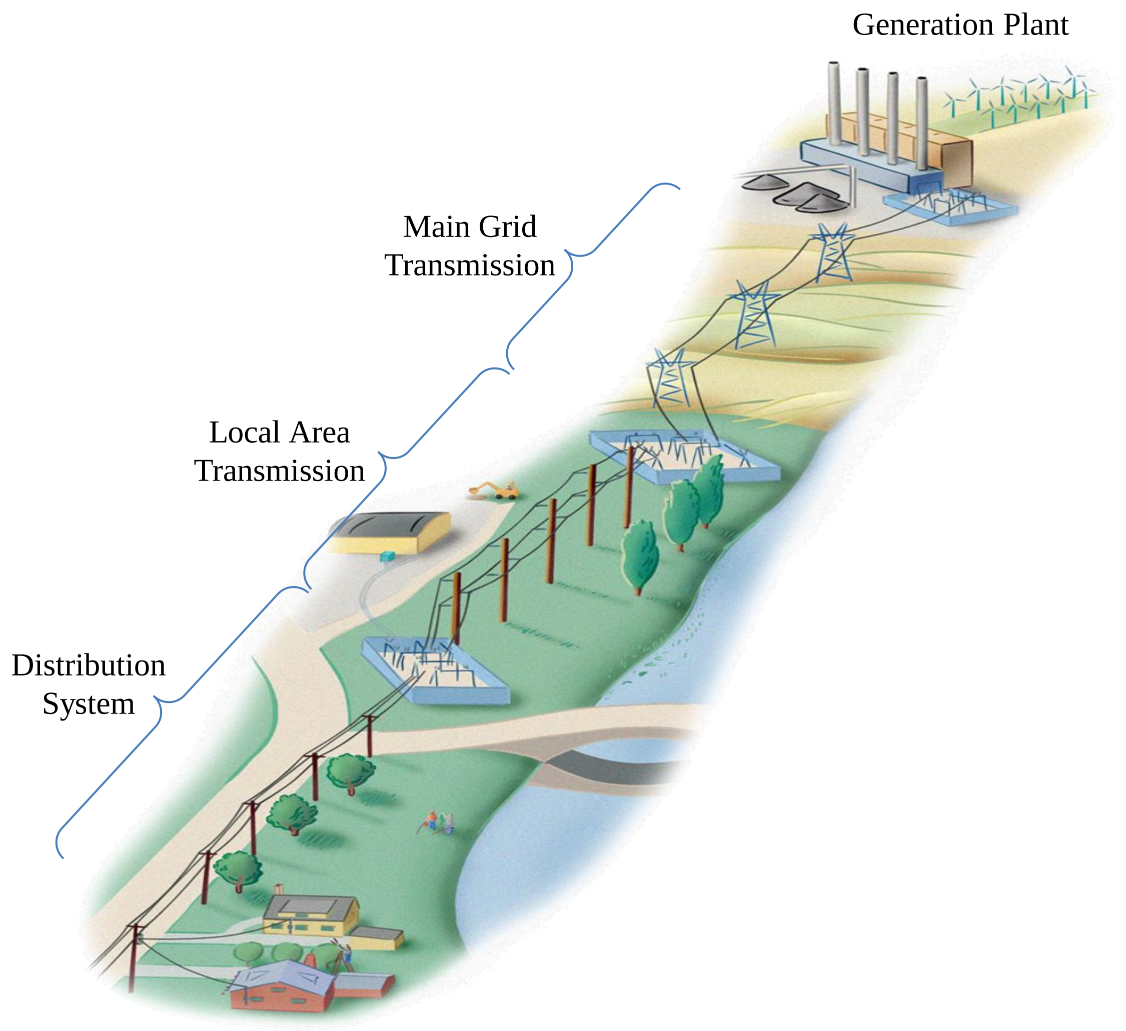
Figure 3. Load Profile of Residential and Residential Net Metering Customers on the Peak Day on June 30, 2015



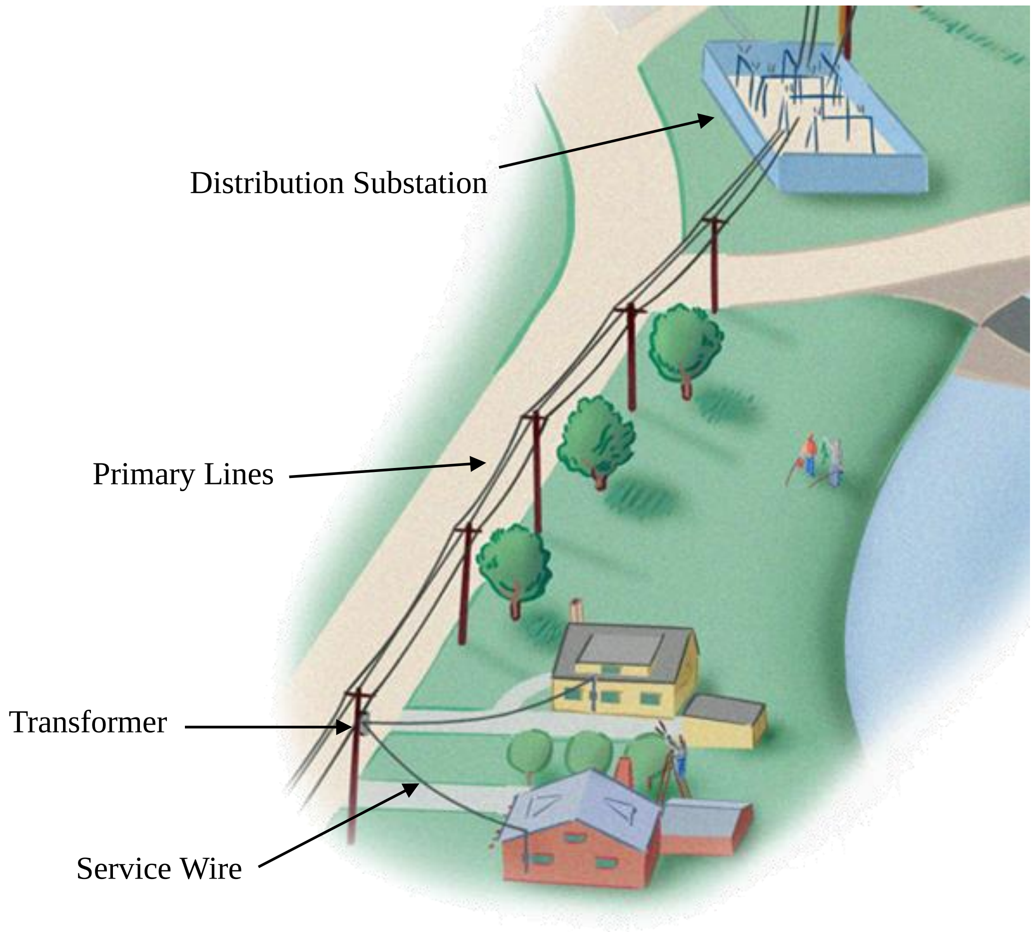
Source: Steward/Workpapers/Figures 2 & 3

DISTRIBUTION SYSTEM STUDIES

Electric System Overview



Distribution System

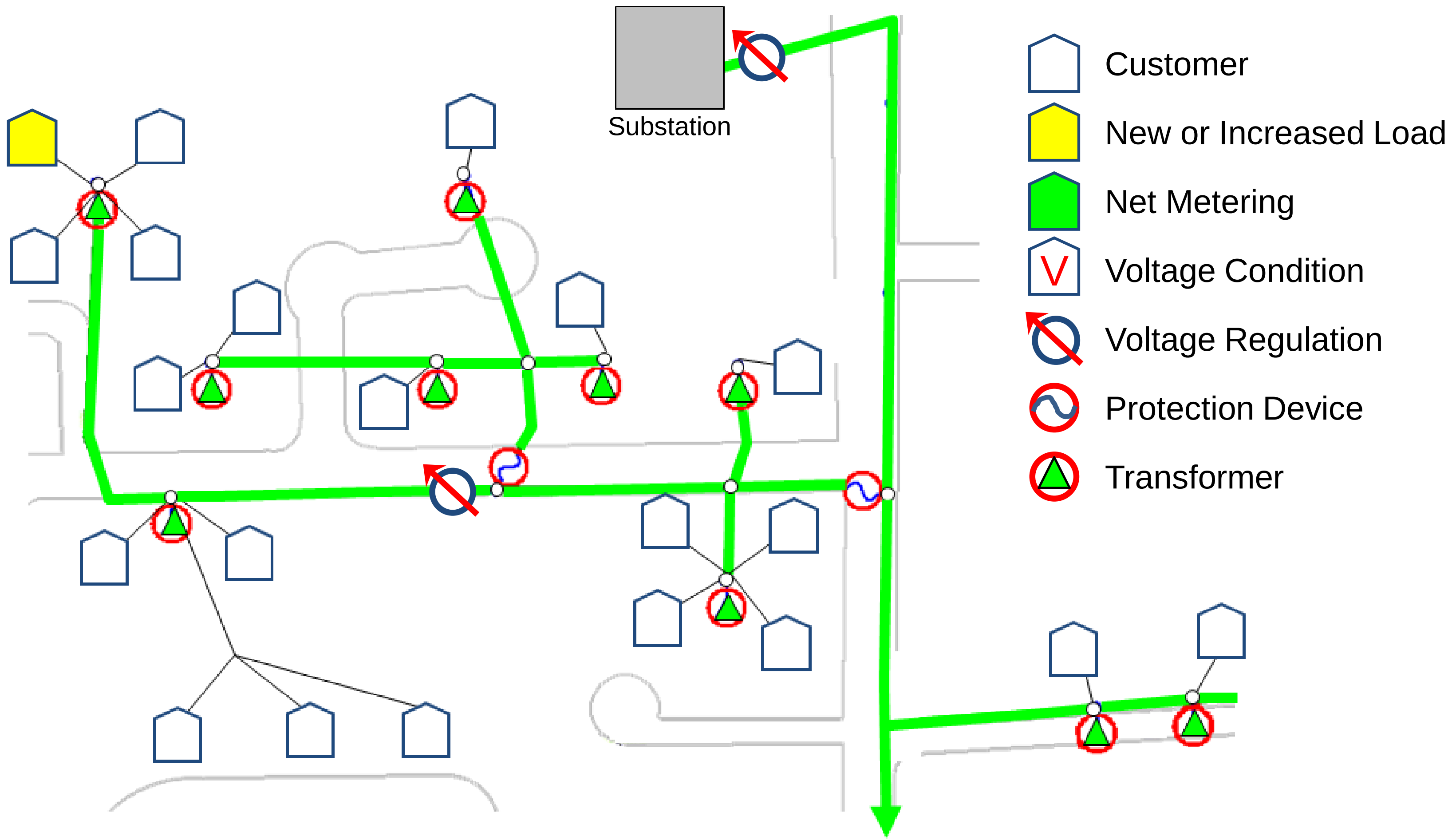


Distribution Planning

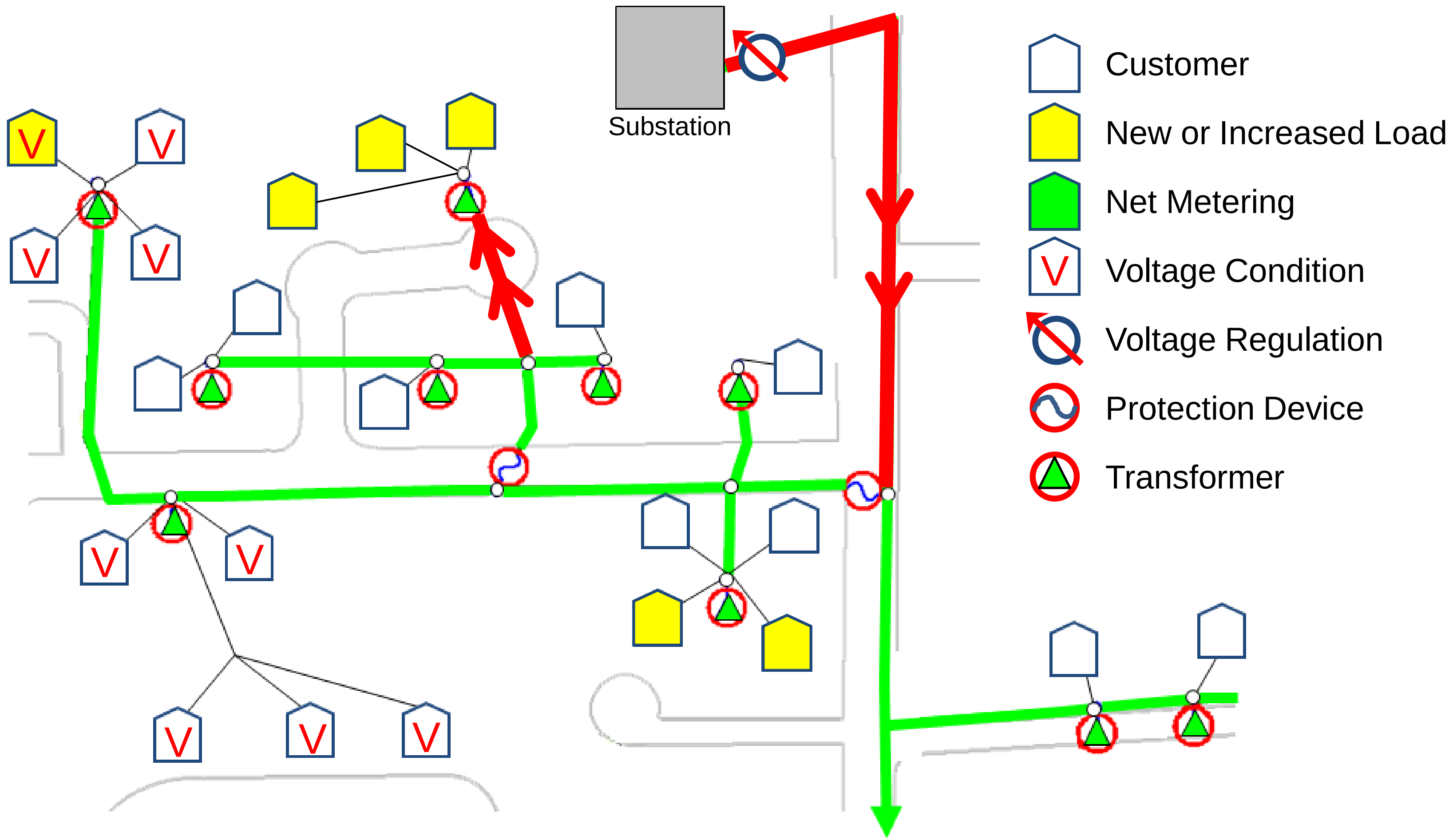
- **Identify:**
  - Reliability issues
  - Overloaded lines and equipment
  - Voltage issues

- **Design:**
  - Solutions to ensure safe and reliable electric service for our customers

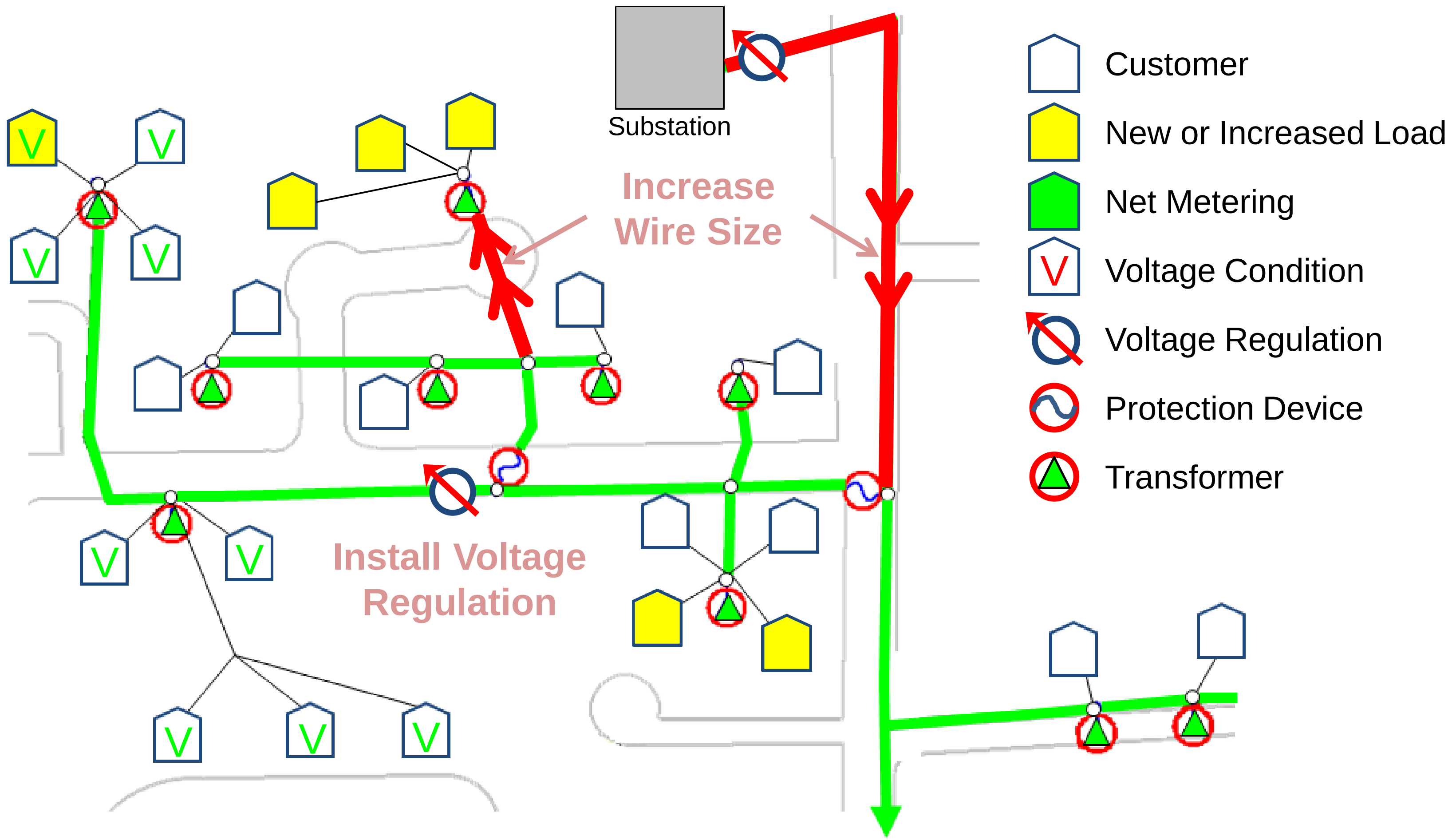
Traditional Planning



New Loads – Traditional Planning



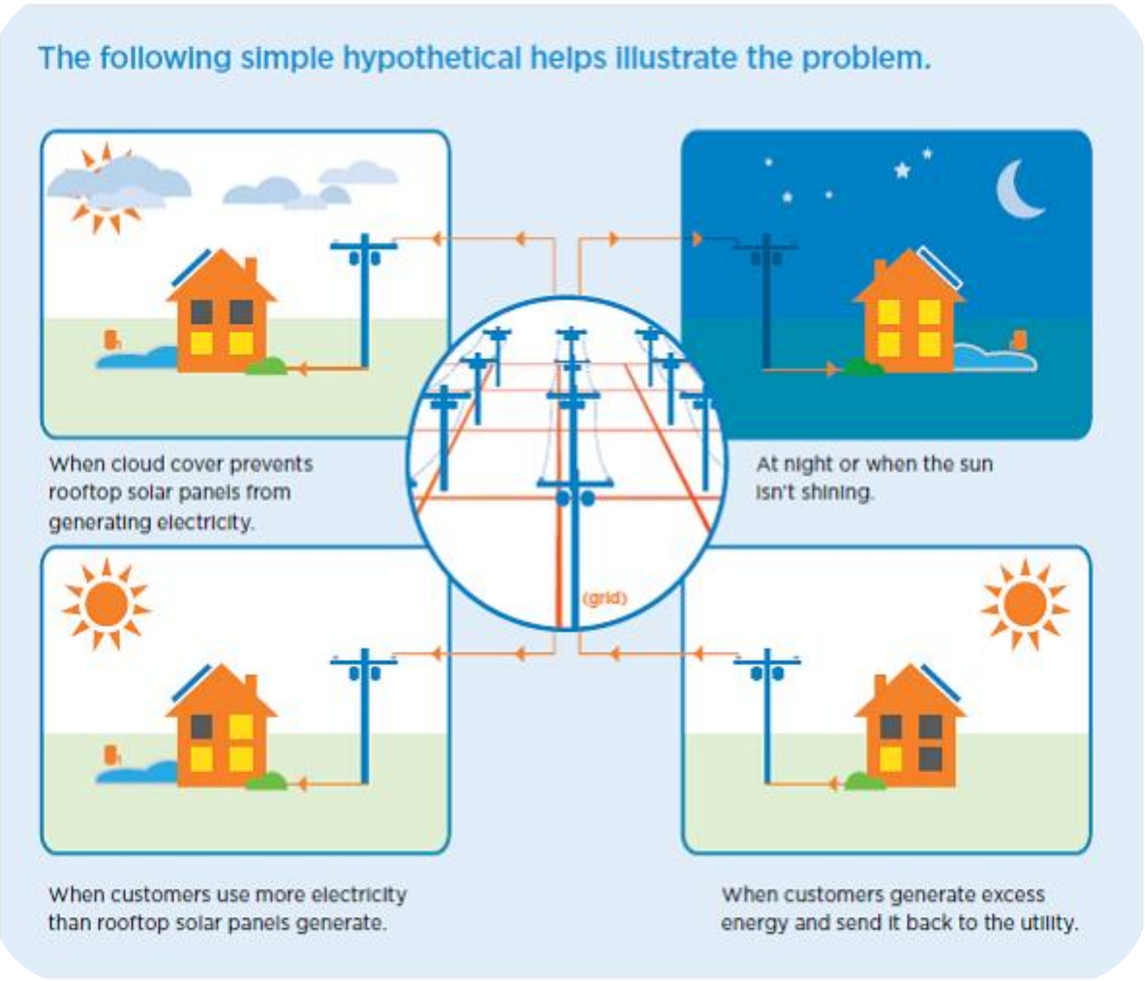
Solutions – Traditional Planning



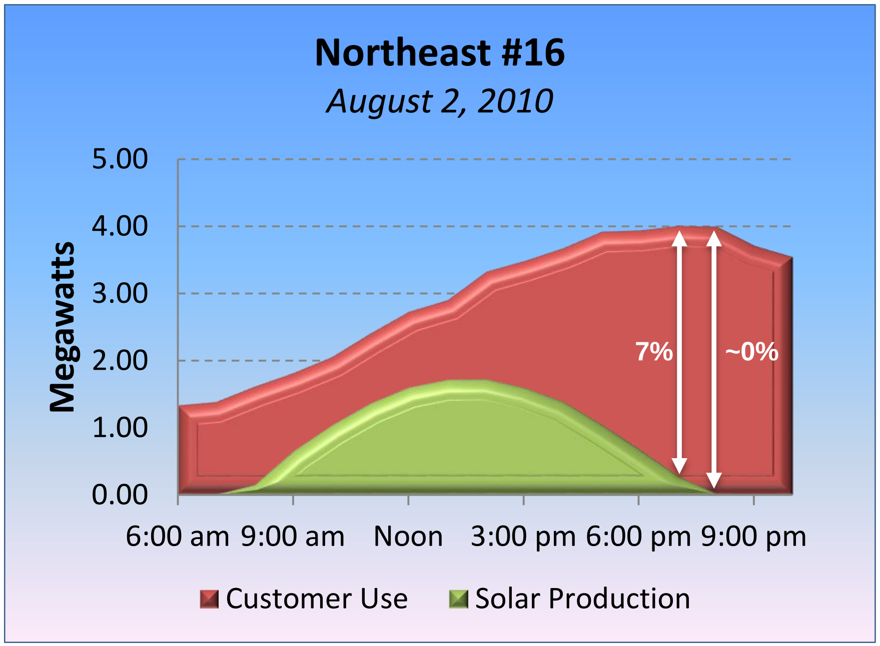
Distributed Energy Resources

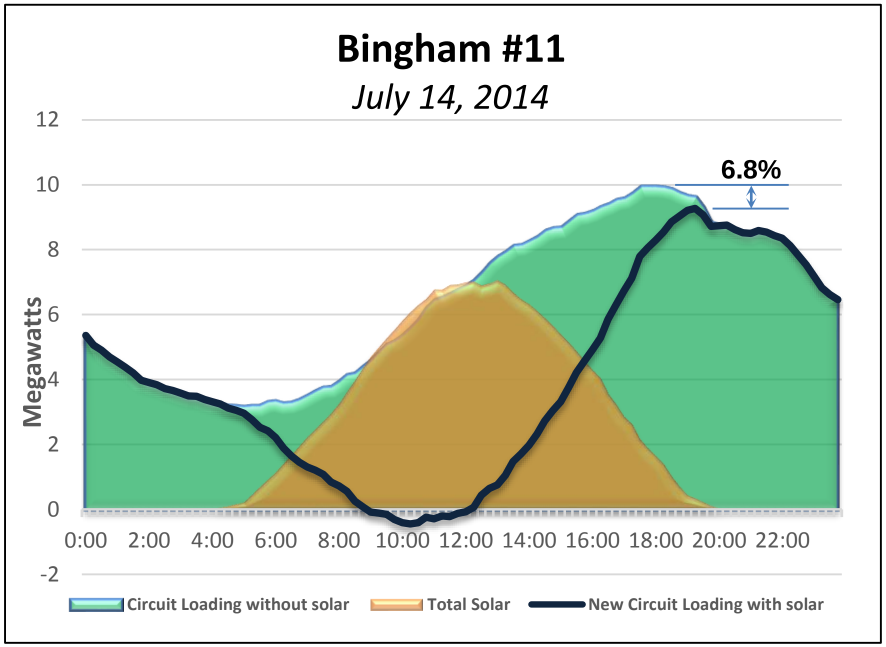
- A distributed energy resource (DER) is a small power generator located at any point on the distribution system
  - Photovoltaic systems
  - Wind systems
  - Fuel cells

Customer Generated Power

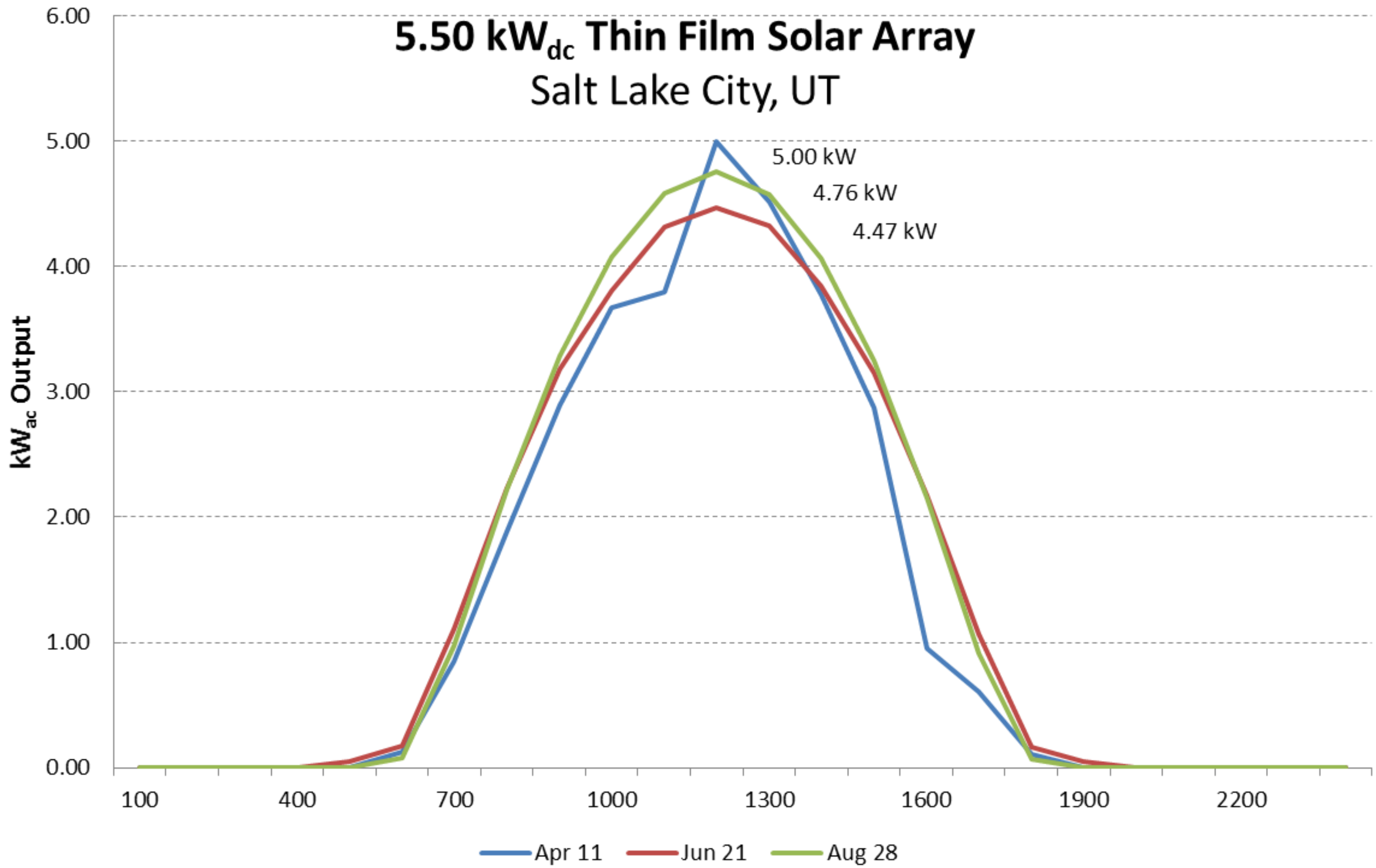


Circuit Level Studies

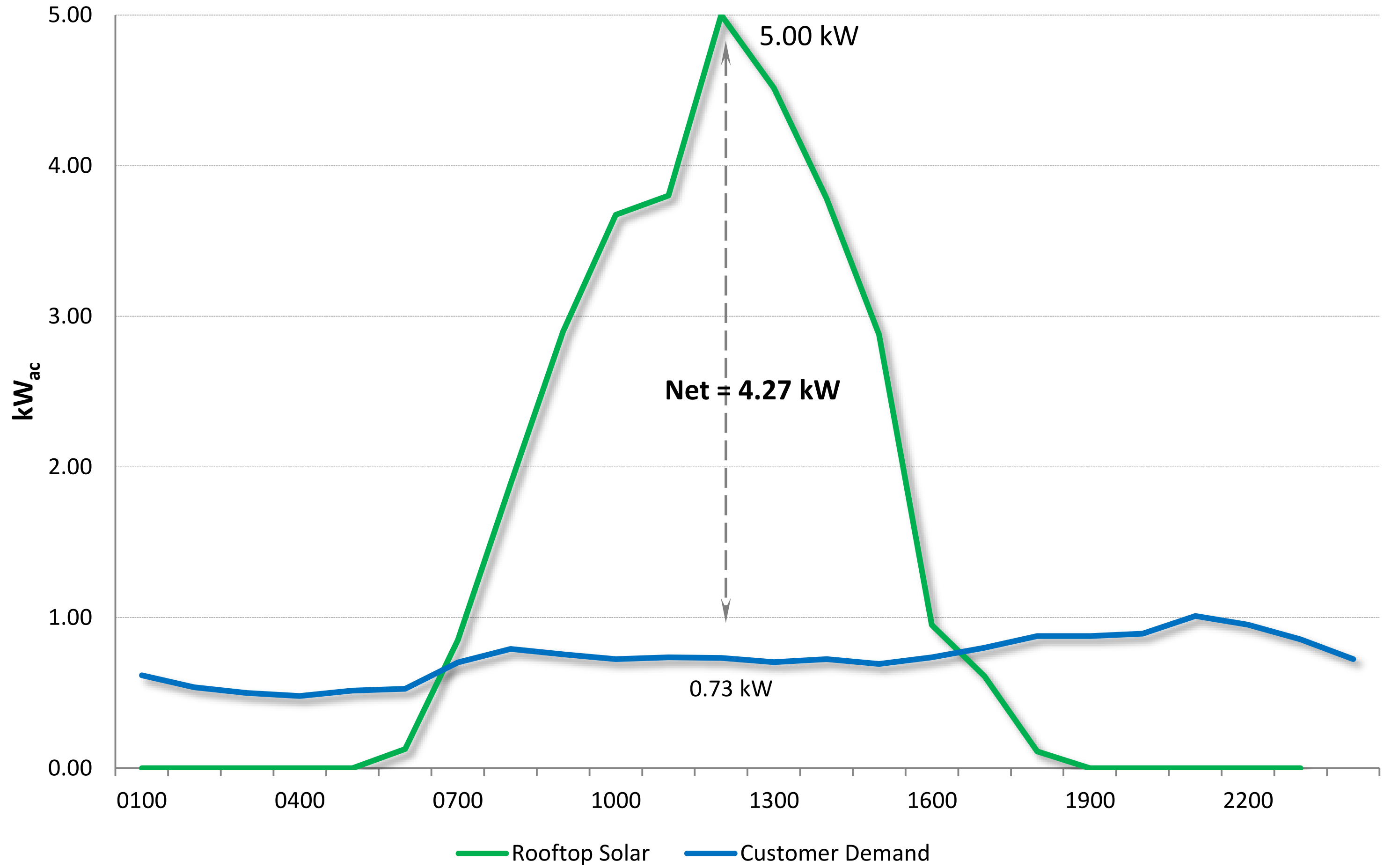




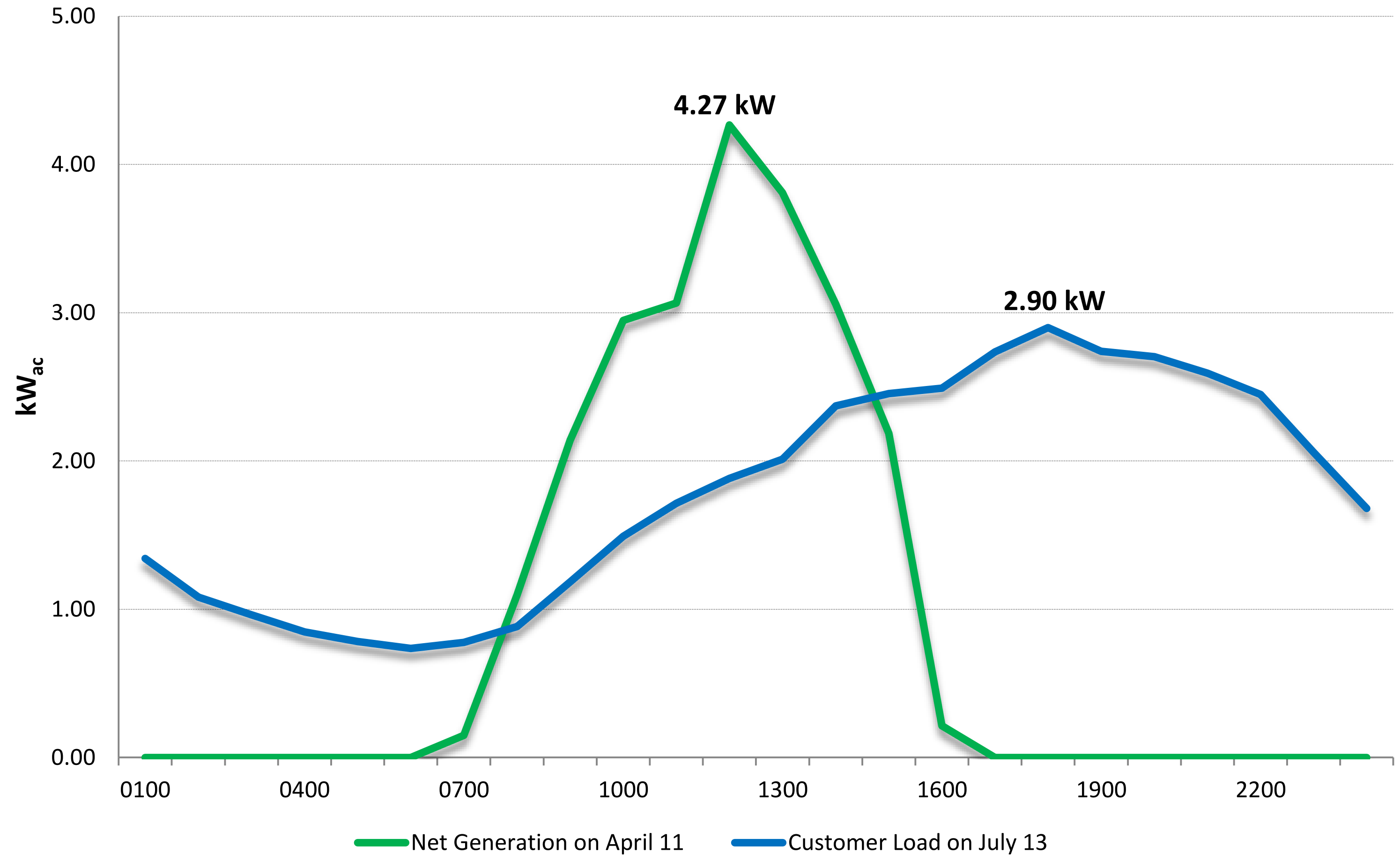
Solar Production – NREL



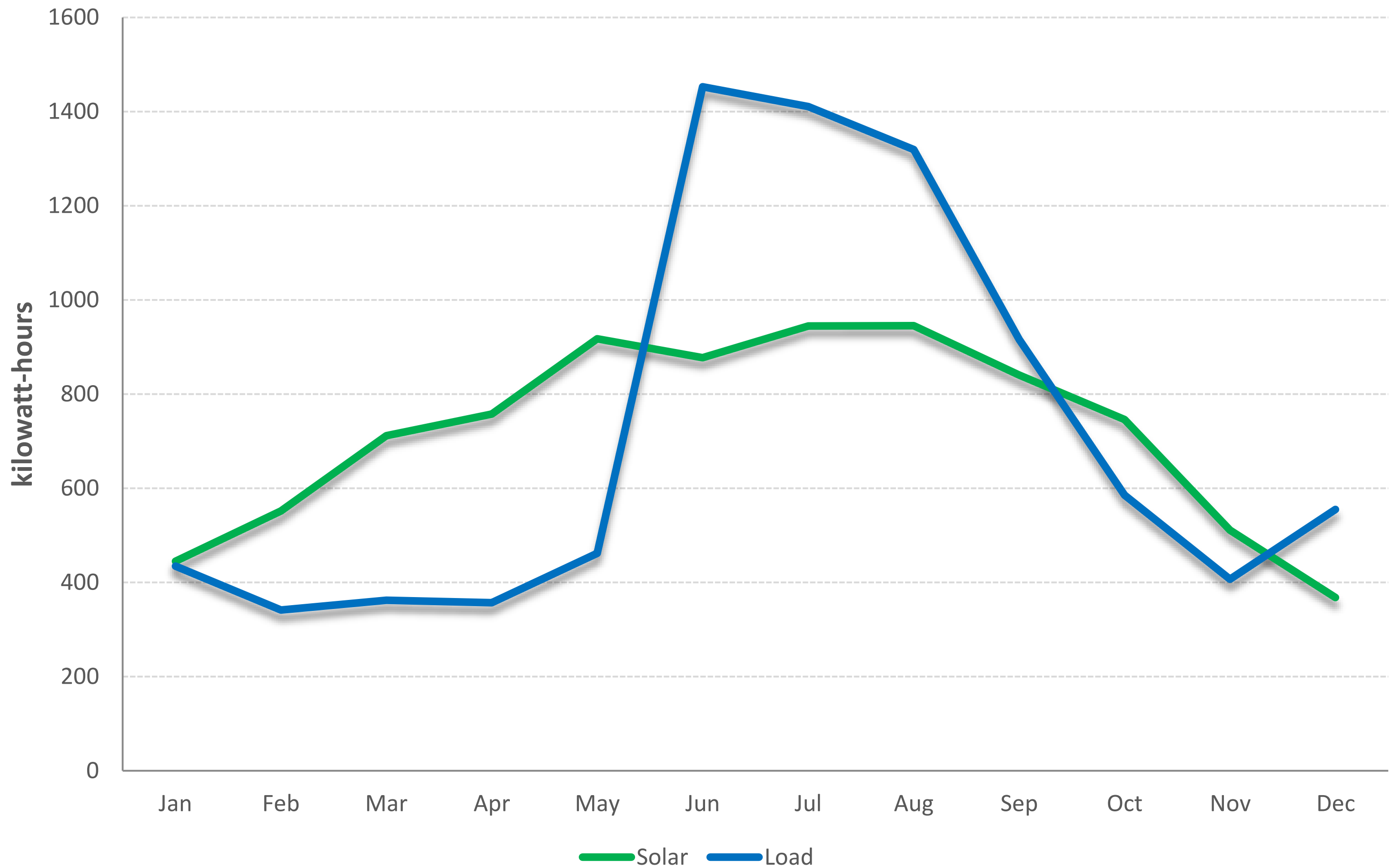
Net Generation – April 11



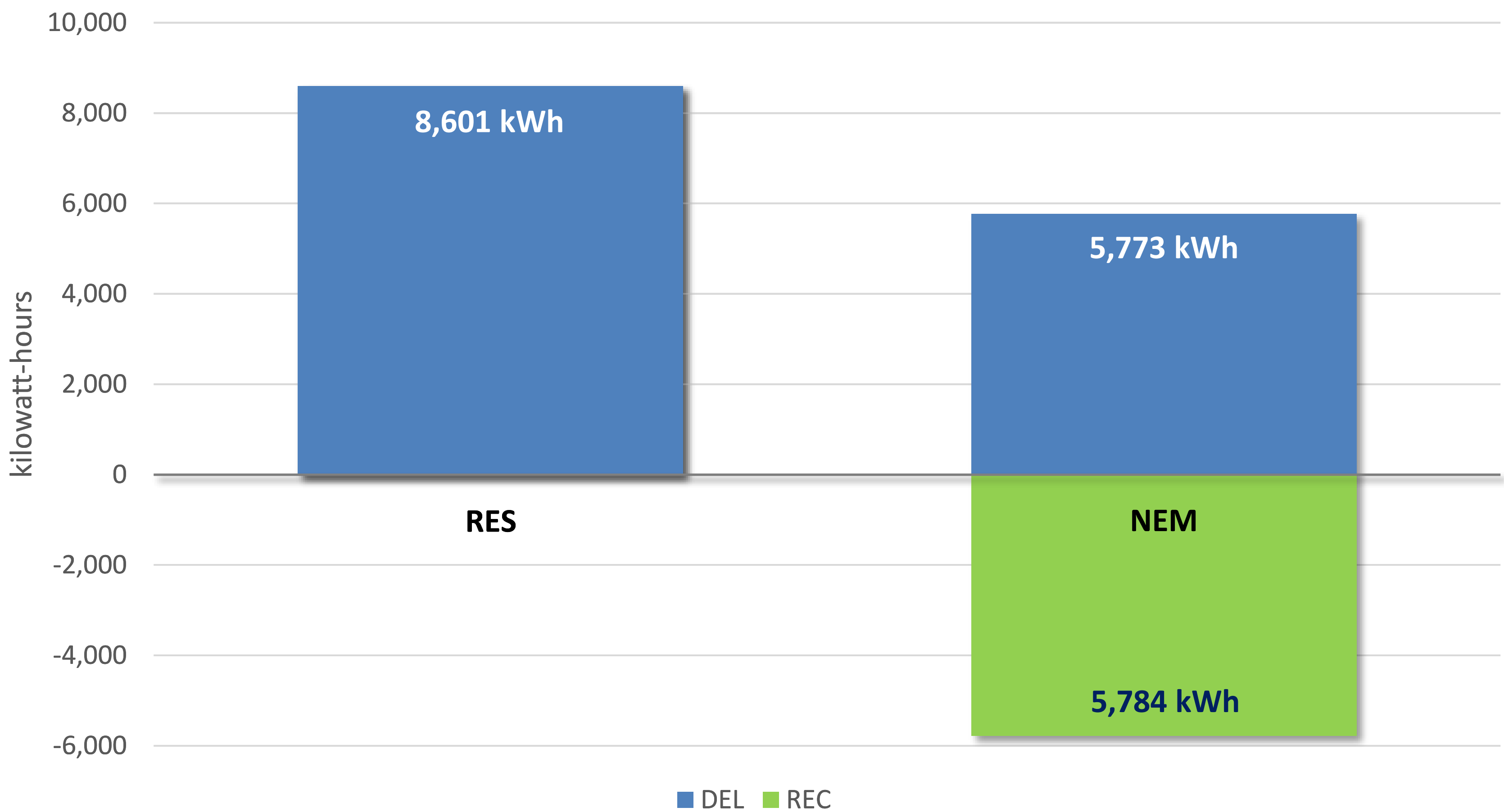
Peak Energy Requirements



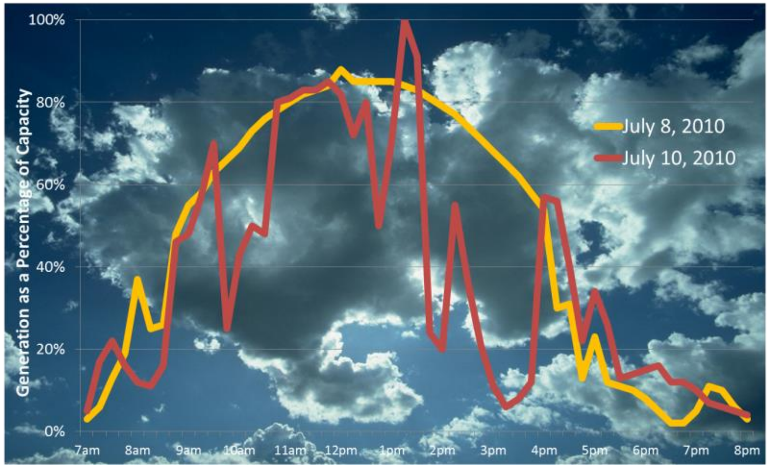
Annual Energy Profiles

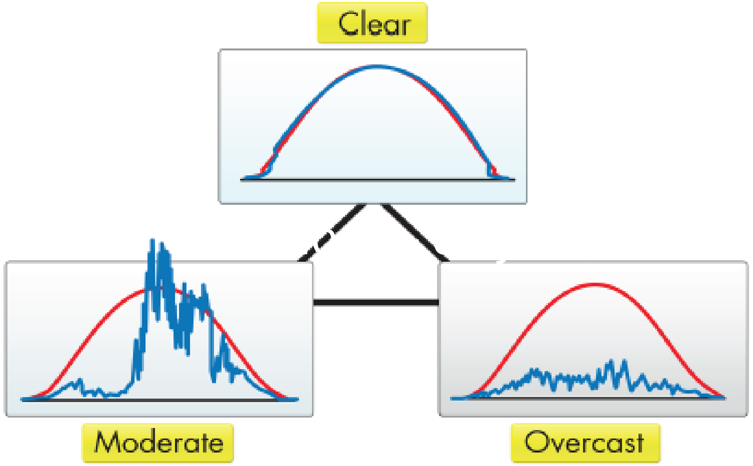


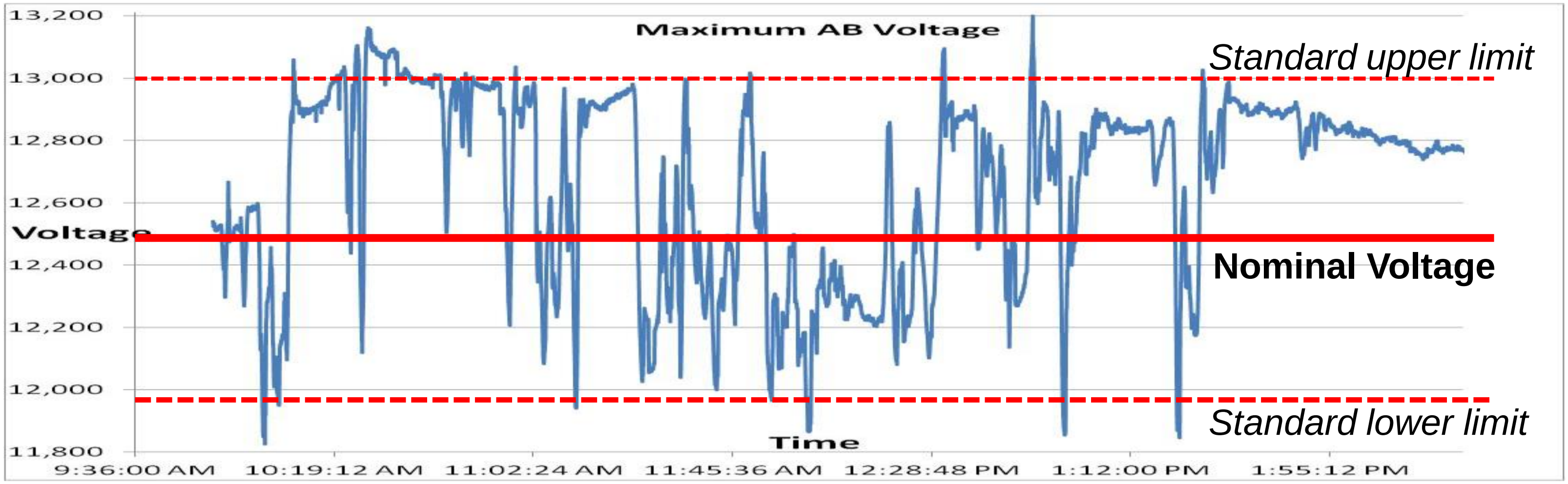
Annual Energy Flows



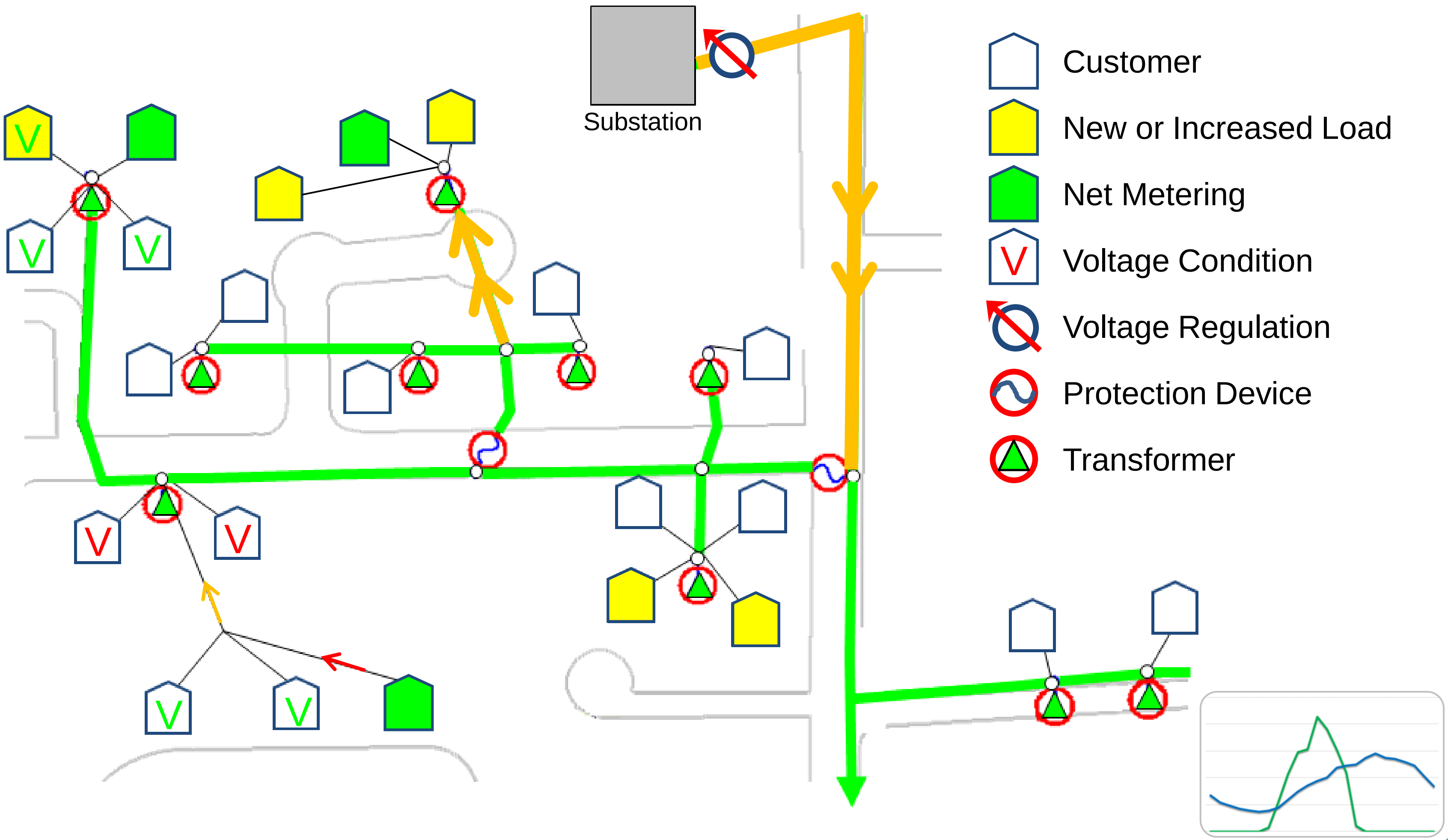
Power Quality & Voltage Control



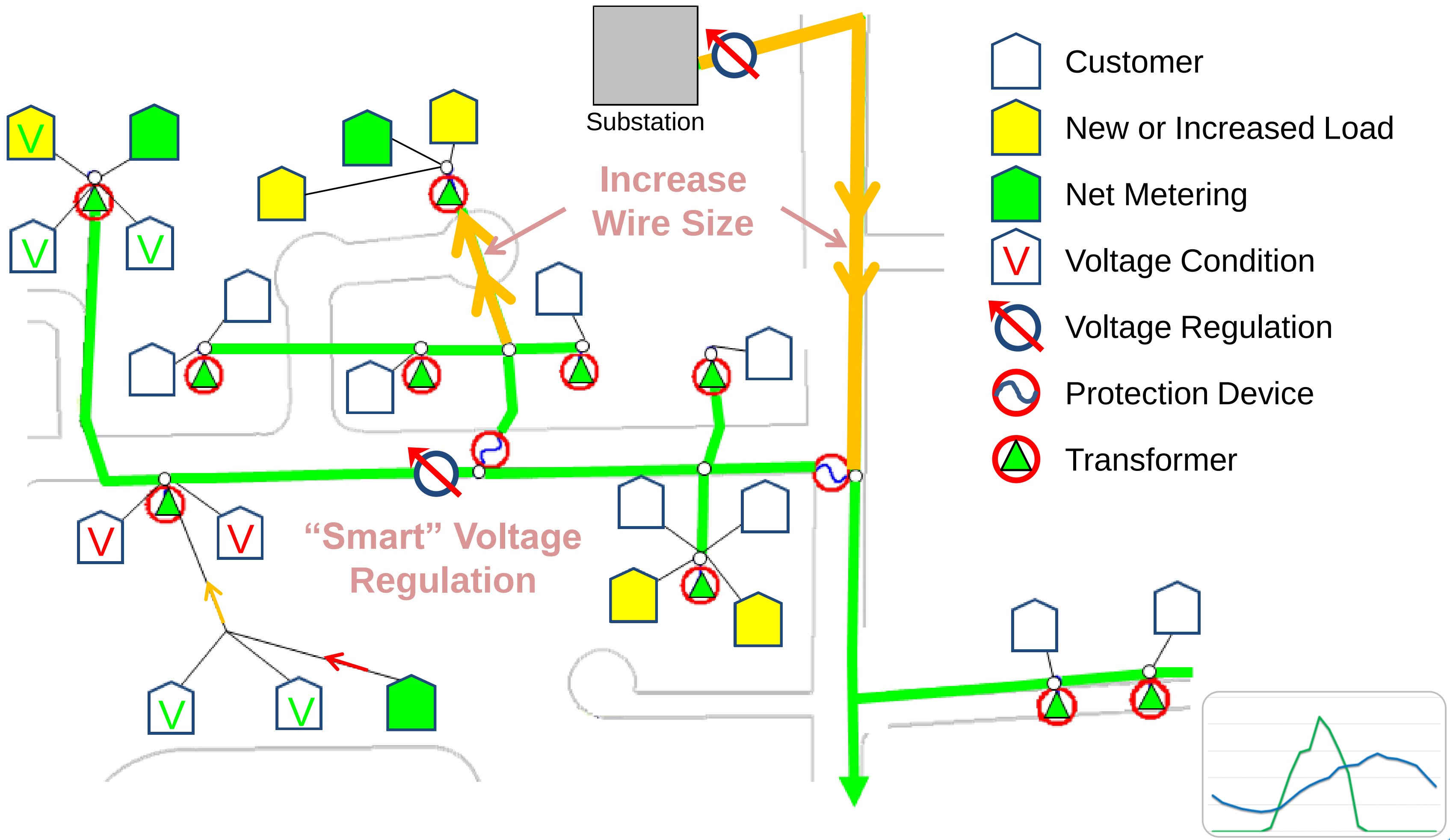




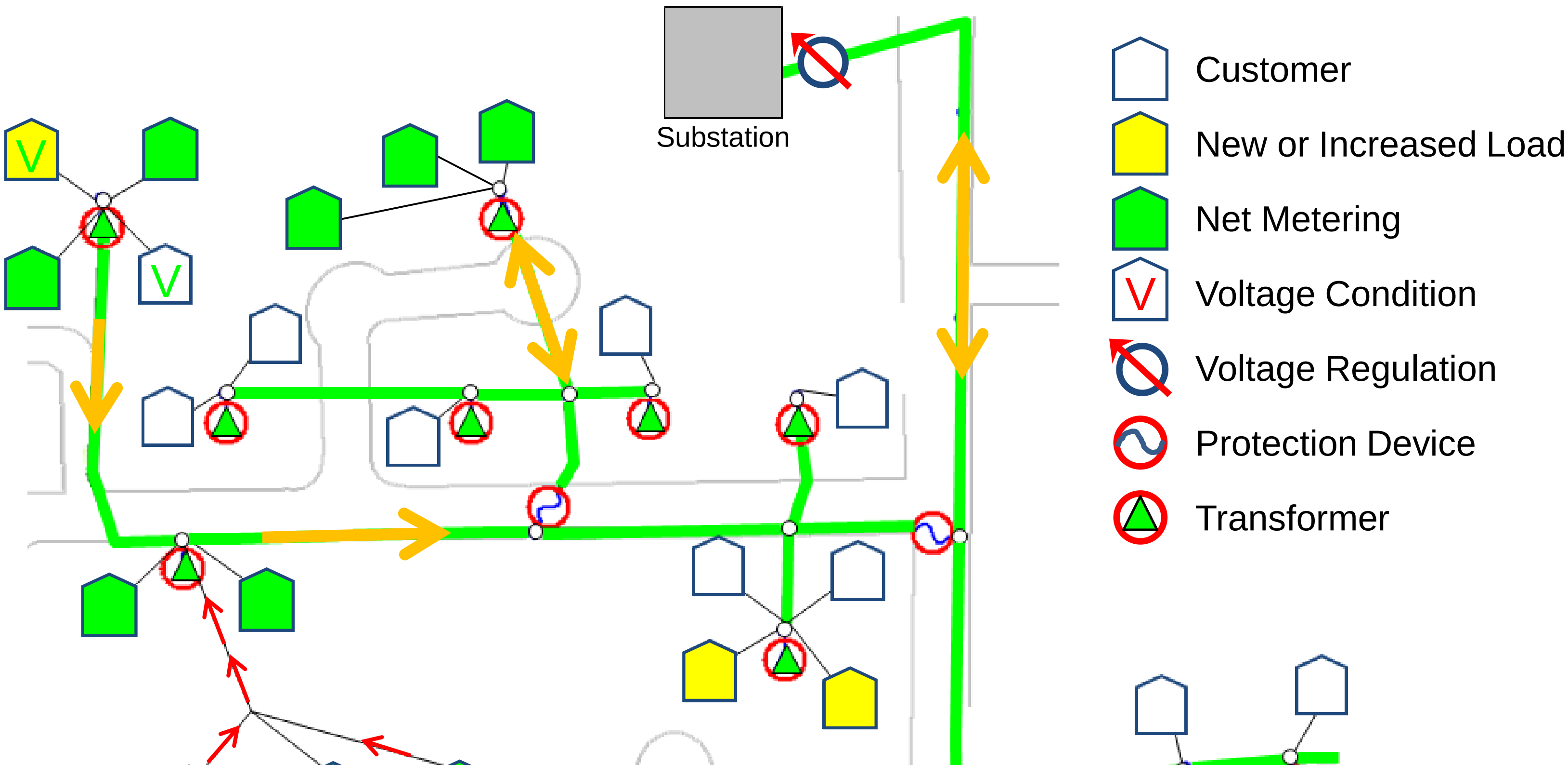
Distribution Planning – DER

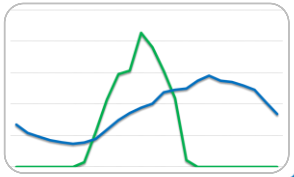


Potential Solutions

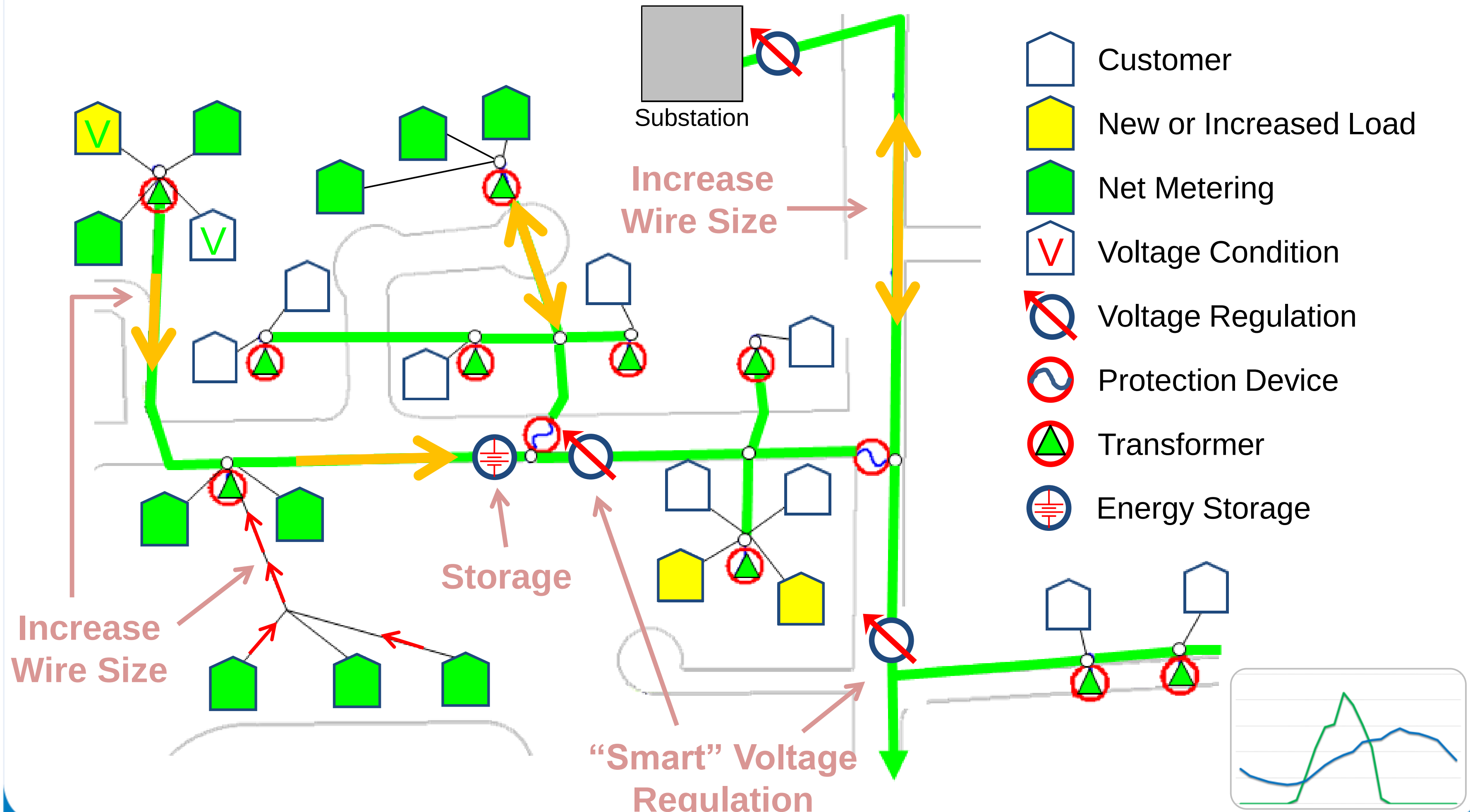


High Levels of DER





Solutions for High Levels of DER



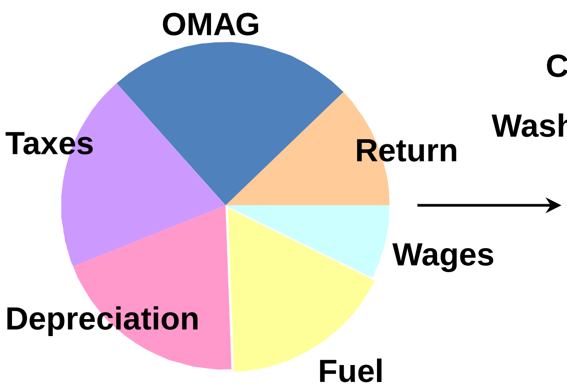
COST OF SERVICE ANALYSES

BACKGROUND

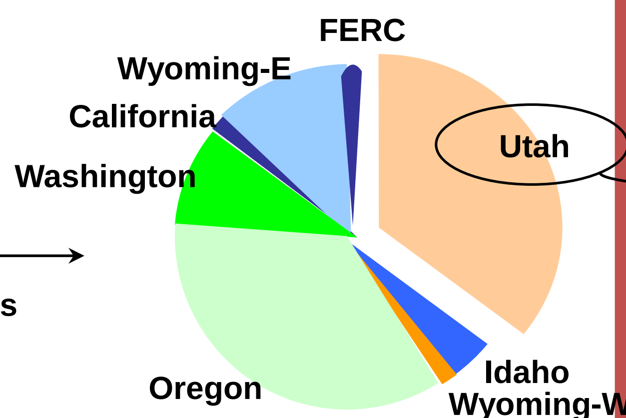
What is Cost of Service?

Revenue Requirement

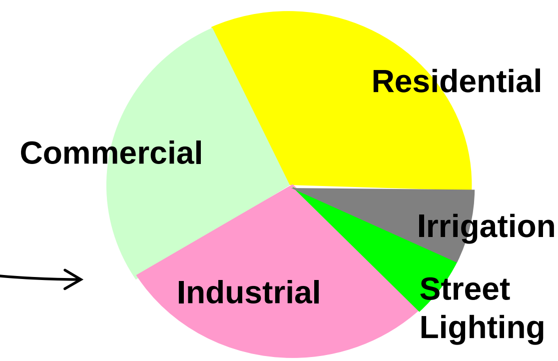
Step 1: Calculation & Normalization



Step 2: State Allocation



Step 3: Utah Case Customer Class Cost of Service



Compliance Filing - Two Cost of Service Analyses

- November 2015 Order directed development of 2 studies using the cost of service model:

  1 – Comparison of cost of service with and without the net metering program

  - Actual Cost of Service (ACOS)
  - Counterfactual Cost of Service (CFCOS)

  2 - Cost of service analysis with net metering on separate classes

  - Actual Cost of Service with Net Metering Broken out (NEM Breakout COS)

- Studies prepared using calendar year 2015, which coincides with load research study for residential net metering customers

COST OF SERVICE ANALYSES

RESULTS

Summary Results

- All analyses show costs exceed benefits at system, state, and residential class levels.
  - Costs include: increases due to metering, engineering, administration, customer services, and bill credits (reduced revenue)
  - Benefits include: lower net power costs, lower interjurisdictional allocations, and lower line losses
- In 2015 Study Period, there were approximately 5,000 NEM customers in Utah, of which 4,390 were residential.
- The CFCOS less ACOS analysis estimated a cost shift of $1.7 million, or about $377 per year per residential NEM customer.
- The NEM Breakout COS analysis showed that a 65% or $1.8 million increase is required to bring these customers to full cost of service.

Analysis 1 - Cost of Service With and Without Net Metering Program

- Exhibit RMM – 1 summarizes differences between CFCOS and ACOS
    - At System Level
        - – Difference between CFJAM and AJAM for Total Company
    - At State Level
        - – Difference Between CFJAM and AJAM for Utah jurisdiction (after state allocations)
    - At Customer Class Level
        - – Difference Between CFCOS and ACOS

Source: Meredith/Workpapers/Exhibit RMP__(RMM-1) Backup/

Name	Date modified	Type	Size
Net Metering COS Change File	11/2/2016 8:43 AM	Microsoft Excel W...	969 KB
Net Metering Program Cost Exhibit	11/7/2016 11:43 AM	Microsoft Excel W...	45 KB

Exhibit RMM-1

- Shows net metering program at state level - net cost is $2.049 million

	A	B	C	D
1		**Costs and Benefits of the Net Metering Program at the**		
2		**State of Utah Jurisdictional Level**		
3				
4			**Unit**	**State**
5	**Costs**	Increased Metering Cost	$000	$161
6		Increased Engineering/Administration	$000	$528
7		Increased Customer Service/Billing Cost	$000	$83
8		Bill Credits	$000	$4,237
9				
10		**Total Cost**	$000	$5,010
11				
12	**Benefits**	Lower Net Power Costs	$000	($1,168)
13		Lower Interjurisdictional Allocation	$000	($1,673)
14		Lower Line Losses	$000	($119)
15				
16		**Total Benefit**	$000	($2,960)
17				
18		**Net Cost /(Benefit)**	$000	$2,049
19				
20		**Net Metering Energy Production**	MWh	52,877
21				
22		**Net Cost /(Benefit)**	$/MWh	$38.76
23				

Exhibit RMM-1

- Shows net metering program at customer class level - the net cost for residential customers is $1.659 million

Costs and Benefits of the Net Metering Program at the Customer Class Level

		Unit	Residential	Schedule 23	Schedule 6	Schedule 8	Schedule 10	Other Classes	Total
Costs	Increased Metering Cost	$000	$112	$19	$17	$2	$2	$8	$161
	Increased Engineering/Administration	$000	$369	$48	$76	$17	$4	$13	$528
	Increased Customer Service/Billing Cost	$000	$72	$8	$2	$0	$0	$1	$83
	Bill Credits	$000	$2,987	$429	$578	$221	$22	($0)	$4,237
	Total Cost	$000	$3,540	$504	$673	$240	$29	$22	$5,009
Benefits	Lower Net Power Costs	$000	($675)	($134)	($315)	($143)	($11)	$111	($1,168)
	Lower Class Allocation	$000	($1,137)	($257)	($303)	($237)	($10)	$271	($1,673)
	Lower Line Losses	$000	($69)	($14)	($32)	($15)	($1)	$11	($118)
	Total Benefit	$000	($1,881)	($405)	($650)	($395)	($21)	$393	($2,959)
	Net Cost /(Benefit)	$000	$1,659	$100	$23	($155)	$7	$415	$2,049
	Net Metering Energy Production	MWh	28,304	6,012	12,342	5,736	484	N/A	52,877
	Net Cost /(Benefit)	$/MWh	$58.60	$16.59	$1.85	($26.96)	$15.46	N/A	$38.76
	Net Metering Customer Count	#	4,390	327	194	8	13	N/A	4,931
	Net Cost /(Benefit)	$/Customer/Year	$377.83	$305.44	$118.25	($20,169)	$576.66	N/A	$415.62

Exhibit RMM-1

- The detail for differences at the system and state level are based upon the Juridictional Allocation models (JAM)

Source: Meredith\Workpapers\JAM Models\

Name	Date modified	Type	Size
Bill Credit Calculation	11/4/2016 9:39 AM	File folder	
COS Models	1/12/2017 3:33 PM	File folder	
Exhibit RMP__(RMM-1) Backup	1/17/2017 8:40 AM	File folder	
Exhibit RMP__(RMM-14) Backup	1/12/2017 2:25 PM	File folder	
JAM Models	1/9/2017 9:36 AM	File folder	
Exhibit RMP__(RMM-2)	11/7/2016 11:44 AM	Microsoft Excel W...	27 KB
Exhibit RMP__(RMM-4)	10/14/2016 11:06 ...	Microsoft Excel W...	13 KB

- The detail for differences at the customer class level are based upon the Cost of Service Studies (COS)

Source: Meredith\Workpapers\COS Models\

Name	Date modified	Type	Size
Bill Credit Calculation	11/4/2016 9:39 AM	File folder	
COS Models	1/12/2017 3:33 PM	File folder	
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Exhibit RMP__(RMM-14) Backup	1/12/2017 2:25 PM	File folder	
JAM Models	1/9/2017 9:36 AM	File folder	
Exhibit RMP__(RMM-2)	11/7/2016 11:44 AM	Microsoft Excel W...	27 KB
Exhibit RMP__(RMM-4)	10/14/2016 11:06 ...	Microsoft Excel W...	13 KB

Exhibit RMM-1

- The line by line detail for benefits and costs at the customer class level can be found at:

  Meredith\Workpapers\ Exhibit RMP___(RMM-1) Backup\Net Metering COS Change File.xlsx

Name	Date modified	Type	Size
Net Metering COS Change File	11/2/2016 8:43 AM	Microsoft Excel W...	969 KB
Net Metering Program Cost Exhibit	11/7/2016 11:43 AM	Microsoft Excel W...	45 KB

Exhibit RMM-2

- Page 3 of Exhibit RMM-2 shows the difference in COS study summaries between CFCOS and ACOS

Rocky Mountain Power
Counterfactual Cost Of Service less Actual Cost of Service By Rate Schedule
State of Utah
12 Months Ended Dec 2015
2010 Protocol (Non Wgt)
7.56% = Target Return on Rate Base

	A	B	C	D	E	F	G	L	M
Line No.	Schedule No.	Description	Annual Revenue	Return on Rate Base	Rate of Return Index	Total Cost of Service	Production Cost of Service	Increase (Decrease) to = ROR	Percentage Change from Current Revenues
1	1	Residential	2,986,647	0.04%	0.00	1,327,908	1,470,701	(1,658,740)	-0.25%
2	6	General Service - Large	577,888	0.00%	(0.00)	555,001	600,287	(22,887)	0.00%
3	8	General Service - Over 1 MW	221,119	-0.02%	(0.01)	375,747	302,613	154,628	0.11%

- Shows the same $1.659 million result for residential as in Exhibit 1, but in different format

Analysis 2 - Net Metering on Separate Classes

- Exhibit RMM-12 shows that the residential net metering class would require a 65% or $1.8 million increase in present revenues to be at cost of service

Rocky Mountain Power
Cost Of Service By Rate Schedule
State of Utah
12 Months Ended Dec 2015
2010 Protocol (Non Wgt)
7.56% = Earned Return on Rate Base

	A	B	C	D	E	F	G	L	M
Line No.	Schedule No.	Description	Annual Revenue	Return on Rate Base	Rate of Return Index	Total Cost of Service	Production Cost of Service	Increase (Decrease) to = ROR	Percentage Change from Current Revenues
1	1	Residential	719,990,943	6.86%	0.91	749,260,727	434,755,608	29,269,784	4.07%
2	1-135	Residential-NEM	2,778,025	0.35%	0.05	4,585,118	2,097,092	1,807,093	65.05%
3	6	General Service - Large	525,707,898	9.05%	1.20	488,017,093	343,639,590	(37,690,806)	-7.17%

Analysis 2 - Net Metering on Separate Classes

- For NEM classes other than residential, there is not such a large need for an increase to present revenues
- While Schedule 6 NEM and Schedule 8 NEM show results that are more favorable non-NEM Schedule 6 and 8 customers, it is important to put this difference in context to the relative size of their private generation

	A	B	C	D	E	F	G	L	M
Line No.	Schedule No.	Description	Annual Revenue	Return on Rate Base	Rate of Return Index	Total Cost of Service	Production Cost of Service	Increase (Decrease) to = ROR	Percentage Change from Current Revenues
3	6	General Service - Large	525,707,898	9.05%	1.20	488,017,093	343,639,590	(37,690,806)	-7.17%
4	6-135	General Service - Large-NEM	7,890,216	9.31%	1.23	7,225,176	5,010,595	(665,040)	-8.43%
5	8	General Service - Over 1 MW	149,029,192	8.37%	1.11	143,254,255	104,339,609	(5,774,937)	-3.88%
6	8-135	General Service - Over 1 MW-NEM	5,387,429	9.40%	1.24	4,940,518	3,680,363	(446,911)	-8.30%

Analysis 2 - Net Metering on Separate Classes

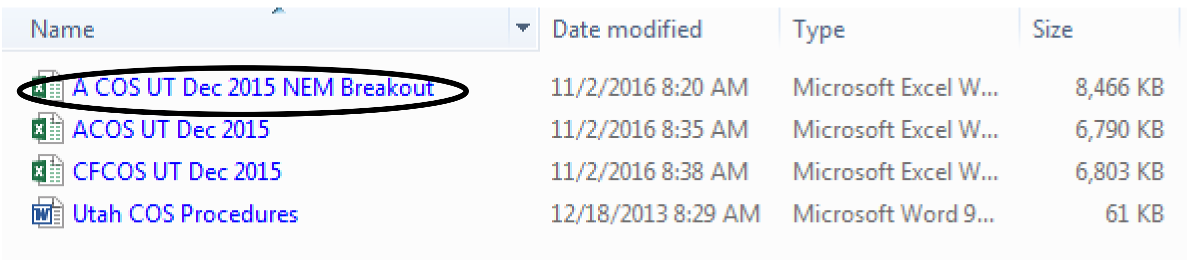
- Table 2 in Meredith's testimony shows private generation production is small relative to full requirements energy for Schedule 6 and Schedule 8

NEM Class	Full Requirements Energy Usage (MWh)	Estimated Private Generation Production (MWh)	Private Generation Relative to Full Requirements Energy Usage (%)
Residential Net Metering	51,468	28,304	55%
Schedule 23 Net Metering	9,971	6,012	60%
Schedule 6 Net Metering	98,655	12,342	13%
Schedule 8 Net Metering	77,889	5,736	7%
Schedule 10 Net Metering	1,724	484	28%

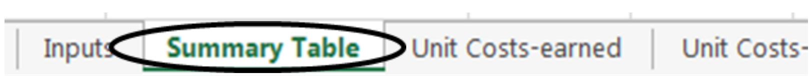
Exhibit RMM-12

- Results on the NEM Breakout COS study at:

  Meredith\Workpapers\COS Models\A COS UT Dec 2015 NEM Breakout.xlsx



- Exhibit RMM-12 is in the same format as Exhibit RMM-2 and can be found on the 'Summary Table' tab in "A COS UT Dec 2015 NEM Breakout.xlsx"



COST OF SERVICE ANALYSES

ACTUAL COST OF SERVICE (ACOS)

ACOS

- Based upon Results of Operations for the 12 months ended December 31, 2015
- Same model as 2015 Annual Cost of Service Study filed on June 15, 2016, but with a few minor changes
  - See lines 73 through 80 of Meredith Direct Testimony

COST OF SERVICE ANALYSES

COUNTERFACTUAL COST OF SERVICE (CFCOS)

CFCOS

- Starting point is the ACOS
- Direction from Commission to RMP: “use its best efforts to estimate what its cost of service would be if net metering customers produced no electricity, drawing their entire load from PacifiCorp and providing no surplus energy to the system.”
- Differences between CFCOS and ACOS Inputs
  - Higher Net Power Costs
  - Line Losses for Net Power Costs
  - Removal of Bill Credits
  - Lower Engineering/Administrative Costs
  - Lower Customer Service and Billing Costs
  - Lower Metering Costs
  - Higher Allocations of System Costs to Utah

CFCOS - Net Power Costs

- Differences between CFCOS and ACOS Inputs
  - Higher Net Power Costs
  - Line Losses for Net Power Costs
  - Removal of Bill Credits
  - Lower Engineering/Administrative Costs
  - Lower Customer Service and Billing Costs
  - Lower Metering Costs
  - Higher Allocations of System Costs to Utah

CFCOS - Net Power Costs

- Without the energy produced from private generation systems from customers participating in net metering in Utah, net power costs are higher.
- Calculation of this net power cost analysis is in Mr. Wilding's direct testimony.
- Results from net power cost analysis flow to the CFJAM and then the CFCOS.

Net Power Cost Analysis

- NPC benefits calculated by assuming a system with no private generation from net metering customers
  - Test period:
    - January to December, 2015
  - Two GRID runs:
    - Base Study - April 30, 2015 filed Utah Schedule 37 study
    - No Net Metering Study - 58GWh NEM generations removed from Base study
  - NPC benefits of the Program calculated in two steps:
    - Step 1: Calculate change in generation and market transactions between base study and Net metering study
    - Step 2: Multiply the change in generation and market transactions from Step 1 with actual unit costs of generation and market transactions

Net Power Cost Analysis (cont'd)

- NPC benefits are calculated on a monthly basis applying the percentage change (the weight) of the energy to the 2015 actual unit costs of each NPC component

Change in Generation/Market Transactions (GWh)

NPC Component	Base Study	No NEM Study	Change	Percentage Change
System Balancing Sales	(7,427)	(7,404)	22	39%
System Balancing Purchases	3,841	3,858	17	30%
Coal Generation	37,729	37,746	17	29%
Natural Gas Generation	12,890	12,891	1	2%
Total	**47,033**	**47,090**	**58**	**100%**

- Actual Unit Costs
  - Market transactions: Actual PV monthly market price
    - adjusted by the ratio of unit cost change in market transactions between two GRID studies Base study PV Price
  - Coal and Gas Fuel expense: Actual monthly unit cost of coal generation and gas generation from 2015 Actual NPC
  - Integration cost is deducted to reflect reduction in integrations costs when Net Metering generation is removed

Net Power Cost Analysis (cont'd)

Example – January 2015

January 2015 NPC NEM Analysis

Utah Net Metering Generation (MWh)	**1,989**				
	A	B	C	D	D
NPC Component	**Change (MWh)**	**Percentage of Total Change**	**2015 Actual NPC ($/MWh)**	**2015 Actual NPC Weighted ($/MWh) (Column B X Column C)**	**NPC Benefit of Solar (Column A X Net Metering Solar Generation)**
System Balancing Sales	256	12.87%	$ 22.89	$ 2.95	
System Balancing Purchases	1,177	59.19%	$ 22.89	$ 13.55	
Coal Generation/Fuel Expense	510	25.66%	$ 19.60	$ 5.03	
Natural Gas Generation/Fuel Expense	45	2.28%	$ 35.14	$ 0.80	
Integration Costs				$ (2.83)	
Total	1,989	100%		**$ 19.49**	**$ 38,772**

Adjustment		
1 - market transaction		
Base study PV price ($/MWh)	a	$25.54
%of incremental market cost/base PV price	b	89.5%
Actual PV price ($/MWh)	c	$25.58
Adjusted market cost ($/MWh)	c * b	$22.89

CFCOS - Line Losses

- Differences between CFCOS and ACOS Inputs
  - Higher Net Power Costs
  - Line Losses for Net Power Costs
  - Removal of Bill Credits
  - Lower Engineering/Administrative Costs
  - Lower Customer Service and Billing Costs
  - Lower Metering Costs
  - Higher Allocations of System Costs to Utah

CFCOS - Line Losses

- The profile of energy production from private generation systems used in the net power cost analysis was expanded for line losses
- The full level of line losses from generator to meter are applied to production
- A determination of the installed kW by the voltage level (secondary or primary) of NEM customers on each NEM class is used to determine a weighted loss factor for each class
- Calculation of line loss expansion can be found at:

  Meredith\Workpapers\ Utah_NMT_Production_Estimates_2015 @ Generator.xlsx

CFCOS - Removal of Bill Credits

- Differences between CFCOS and ACOS Inputs
  - Higher Net Power Costs
  - Line Losses for Net Power Costs
  - Removal of Bill Credits
  - Lower Engineering/Administrative Costs
  - Lower Customer Service and Billing Costs
  - Lower Metering Costs
  - Higher Allocations of System Costs to Utah

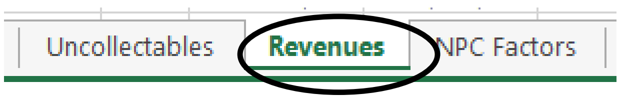
CFCOS - Removal of Bill Credits

- Bill credits removed to estimate the impact of no energy from private generation systems.
- Bill credits are calculated by taking the difference between estimated revenue at full requirements energy usage and actual billed revenue.
- The calculation of these bill credits can be found at: Meredith\Workpapers\Bill Credit Calculation\

Name	Date modified	Type	Size
Bill Credit Calculation	1/17/2017 11:42 AM	File folder	
COS Models	1/17/2017 10:17 AM	File folder	
Exhibit RMP___(RMM-1) Backup	1/17/2017 9:02 AM	File folder	

CFCOS - Removal of Bill Credits

- The reduction in bill credits can be found by comparing the differences in revenue between the CFCOS and ACOS studies on the 'Revenues' tab.



- The inputs for revenues can be found on cells T6 through T77.

	R	S	T
1			
2			12 Months Ended Dec 2015
3		Rate Schedule	Revenue
4			
5		Residential	
6		1	$704,161,905
7		2	334,122
8		3	21,259,588
9		-	0

CFCOS - Removal of Bill Credits

- The reduction in bill credits is also an input to the CFJAM model
- This reduction in CFJAM occurs on the ‘Adjustments’ tab on adjustment number 13.1 (columns AE to AH)

	A	B	AE	AF	AG	AH
1	Calculate Selected Adjustments		29	30	31	32
2						
3	ADJUSTMENT SELECTION SWITCH		1	1	1	1
4	MACRO SWITCH		1	1	1	1
5	Update Allocation Factors		Yes	Yes	Yes	Yes
6						
7	ADJ NUMBER		13.1	13.1	13.1	13.1
8	ADJ TYPE		Net Metering	Net Metering	Net Metering	Net Metering
9						
10	BASE PERIOD					
11	INDICATOR	UNADJUSTED RESULTS	Increm. Revenue - Residential	Increm. Revenue - Commercial	Increm. Revenue - Industrial	Increm. Revenue - Irrigation
834	440UT	785,636,116	3,012,996			
835	440WA	143,669,156				
836	440WYP	99,306,583				
837	440WYU	12,829,836				
838	442CA	56,245,126				
839	442ID	211,452,532				
840	442OR	644,568,652				
841	442OTHER	6,085,770				
842	442UT	1,294,773,340		1,014,914	187,046	22,468
843	442WA	198,308,713				

CFCOS -Lower Engineering/Administrative

- Differences between CFCOS and ACOS Inputs
  - Higher Net Power Costs
  - Line Losses for Net Power Costs
  - Removal of Bill Credits
  - Lower Engineering/Administrative Costs
  - Lower Customer Service and Billing Costs
  - Lower Metering Costs
  - Higher Allocations of System Costs to Utah

CFCOS -Lower Engineering/Administrative

- Processing applications for the net metering program entails incremental administration and engineering cost
- Detail for administrative cost calculation can be found at:

  Meredith\Workpapers\Exhibit RMP___(RMM-7).xlsx
- This cost is entered into the CFJAM on the adjustment number 13.4 (column AK) on the ‘Adjustments’ tab

CFCOS -Lower Engineering/Administrative

- To determine administrative cost for 2015 for Utah, the number of interconnections was counted and a complexity weighting was applied based upon the rate schedule. This is shown on page 3 of Exhibit RMM-7.
- On page 2 of Exhibit RMM-7, the percentage of weighted interconnections in Utah to total Company weighted interconnections was applied to the Company's customer generation department budget for 2015
- Page 1 then shows the net administrative cost by customer class by reducing total administrative cost by application fee revenue

CFCOS -Lower Engineering/Administrative

- Exhibit RMM-8 shows the calculation costs for engineering.
  - The hourly rate for an engineer is calculated by multiplying the estimated hours to review interconnections by rate schedule.

Engineering Cost Related to Utah Net Metering Program
12 Months Ending December 31, 2015

Description		**FERC Account**	**Total Cost for Utah**	**Cost Related to Residential**	**Cost Related to Schedule 23**	**Cost Related to Schedule 6**	**C**
Cost of Engineer ($/hour)	91.72						
Application Review Time (Hours)				0.33	0.50	2.00	
Cost of Engineering for Each Interconnection				$30.57	$45.86	$183.44	
2015 Applications				7,383	350	243	
Estimated Incremental Cost of Engineering		580	$299,808	$225,698	$16,051	$44,576	

- Detail for engineering cost calculation can be found at:

  Meredith\Workpapers\Exhibit RMP___(RMM-8).xlsx

- This cost is entered into the CFJAM on the adjustment number 13.2 (column AI) on the 'Adjustments' tab

	A	B	AI
1	Calculate Selected Adjustments		33
2			
3	ADJUSTMENT SELECTION SWITCH		1
4	MACRO SWITCH		1
5	Update Allocation Factors		Yes
6			
7	ADJ NUMBER		13.2
8	ADJ TYPE		Net Metering
9			
10	BASE PERIOD		
11	INDICATOR	UNADJUSTED RESULTS	Increm. Engineering-Interconnects Expense
990	580UT	801,638	(299,808)

CFCOS - Lower Customer Service and Billing Costs

- Differences between CFCOS and ACOS Inputs
  - Higher Net Power Costs
  - Line Losses for Net Power Costs
  - Removal of Bill Credits
  - Lower Engineering/Administrative Costs
  - Lower Customer Service and Billing Costs
  - Lower Metering Costs
  - Higher Allocations of System Costs to Utah

CFCOS - Lower Customer Service and Billing Costs

- The net metering program requires incremental customer service and billing costs
- Customer service and billing costs include 3 categories:
  - Phone calls
  - Initial Setup
  - Ongoing Support
- Developing the costs related to each of these areas required obtaining estimates from Company personnel involved in the day-to-day operations at the call centers regarding the total time spent on each of these activities. Those figures were then multiplied by the fully-loaded hourly cost for a call center agent.

CFCOS - Lower Customer Service and Billing Costs

- Detail for the customer service and billing costs can be found at: Meredith\Workpapers\Exhibit RMP___(RMM-6).xlsx
- This cost is entered into the CFJAM on the adjustment number 13.5 (column AL) on the 'Adjustments' tab

Customer Service and Billing Cost Related to Utah Net Metering Program
12 Months Ending December 31, 2015

Description	FERC Account	Total Cost for Utah	Cost Related to Residential	Cost Related to Schedule 23	Co
Phone Calls	903	$13,686	$12,607	$598	
Initial Setup	903	$18,795	$17,797	$481	
Ongoing Support	903	$50,510	$44,843	$3,336	
Total	903	$82,991	$75,247	$4,415	
2015 Applications		8,015	7,383	350	
2015 Interconnections		3,127	2,961	80	
2015 Net Metering Customers		4,945	4,390	327	

CFCOS - Lower Metering Costs

- Differences between CFCOS and ACOS Inputs
  - Higher Net Power Costs
  - Line Losses for Net Power Costs
  - Removal of Bill Credits
  - Lower Engineering/Administrative Costs
  - Lower Customer Service and Billing Costs
  - <u>Lower Metering Costs</u>
  - Higher Allocations of System Costs to Utah

CFCOS - Lower Metering Costs

- When customers interconnect to their private generation to the Company's system, either a new meter is installed (capital) or an existing meter is reprogrammed (expense) to read bi-directional energy flows
- Detail for metering costs can be found at:

  Meredith\Workpapers\Exhibit RMP___(RMM-9).xlsx

CFCOS - Lower Metering Costs

- On RMP___(RMM-9).xlsx, the ‘Page 1&2’ tab shows the following assumptions for metering cost by customer class:
  - Cost to reprogram
  - Percentage reprogram versus replace
  - Interconnections by year
  - Cost to Replace Meter
- The ‘Page 1&2’ sheet also shows the change in each cost element by FERC account including:
  - Metering Gross Plant (Account 370)
  - Accumulated Depreciation (Account 108370)
  - Depreciation Expense (Account 403)
  - Reprogramming Expense (Account 586)

CFCOS - Lower Metering Costs

- On RMP___(RMM-9).xlsx, the 'Page 3' tab shows the calculation of metering depreciation and also displays additional details related to deferred income tax impacts.
- Lower metering costs are entered into the CFJAM on adjustment numbers 13.3, 13.7, 13.8, 13.9 and 13.10 (columns AJ, AN, AO, AP and AQ) on the 'Adjustments' tab

CFCOS - Higher Allocations of System Costs to Utah

- Differences between CFCOS and ACOS Inputs
  - Higher Net Power Costs
  - Line Losses for Net Power Costs
  - Removal of Bill Credits
  - Lower Engineering/Administrative Costs
  - Lower Customer Service and Billing Costs
  - Lower Metering Costs
  - <u>Higher Allocations of System Costs to Utah</u>

CFCOS - Higher Allocations of System Costs to Utah

- On both the CFJAM and CFCOS, demand and energy are increased to reflect the increase in loads for Utah and for the residential, schedule 23, schedule 6, schedule 8, and schedule 10 customer classes.
- Change in energy and demand factors in CFJAM uses the profile from:

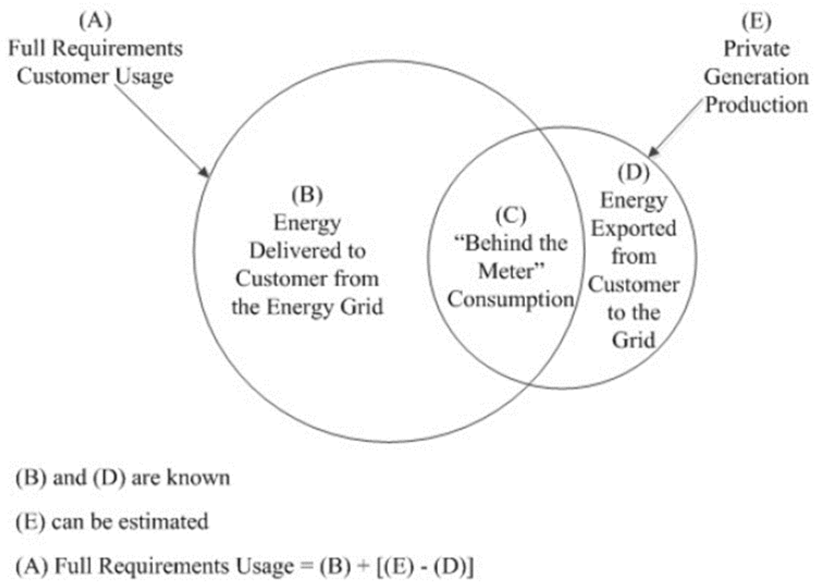
  Meredith\Workpapers\Utah_NMT_Production_Estimates_2015 @ Generator.xlsx

CFCOS - Higher Allocations of System Costs to Utah

- The change to demand and energy factors in the CFJAM can be viewed on the ‘Factors’ tab.
  - The System Energy (SE) and System Generation (SG) are the key factors which change with demand and energy
- The change to the demand and energy factors in the CFCOS can be viewed on the ‘Demand Factors’ and ‘Energy Factor’ tabs.
  - The F10 and F30 are the key demand and energy allocation factors for the class cost of service study.

CFCOS - Higher Allocations of System Costs to Utah

- Exhibit RMM-4 shows the difference in energy sales from the CFCOS (full requirements energy) and ACOS (billed energy)
- Full requirements usage = Energy Delivered + [Private Generation Production – Energy Exported]



CFCOS - Higher Allocations of System Costs to Utah

- Demand for both the CFJAM and CFCOS are based upon demands for the AJAM and ACOS plus private generation production at peak times.
- Energy for the CFJAM is based upon AJAM plus private generation production.
- Private generation at input can be found at:

  Meredith\Workpapers\Utah_NMT_Production_Estimates_2015 @ Generator.xlsx

COST OF SERVICE ANALYSES

ACOS WITH NET METERING BROKEN OUT (NEM BREAKOUT COS)

NEM Breakout COS

- Analysis 2 – Compares cost of serving net metering customers to same class without net metering
- Five new classes added to ACOS:
  - Residential NEM
  - Schedule 23 NEM
  - Schedule 6 NEM
  - Schedule 8 NEM
  - Schedule 10 NEM
- The NEM Breakout COS includes the following changes from the ACOS:
  - Additional NEM classes with different input values
  - Direct assignments for customer service/billing, engineering, and administration
  - Net power cost related value of excess energy is assigned to NEM classes with these credits being assigned to all classes as an offsetting cost

NEM Breakout COS - Inputs

- Separated NEM Classes include the following major differences in inputs:
  - Revenue (‘Revenues’ tab)
  - Energy (‘Energy Factor’ tab)
  - Demand(‘Demand Factors’ and ‘Dist. Factors’ tabs)
  - Customer Counts (‘Cust Factors’ tab)
  - Meter Costs (‘MetersServices’ tab)
  - Customers per transformer (‘Dist. Factors’ tab)

NEM Breakout COS – Direct Assignments

- In addition to different input values, direct assignments are made for incremental engineering, administration, and customer service/billing costs.
- These direct assignments are shown on a new tab named ‘Cust Gen Assign’.
- These direct assignments go directly to the net metering customer classes and flow through the model on FERC accounts 580 and 903.

NEM Breakout COS – Excess Energy Treatment

- Demand and energy allocations for the net metering classes are based upon energy delivered to the customer
- Revenue is based on the net metering billing construct for net metering classes
  - Energy delivered minus energy exported plus the impact of banking
- Since revenue for NEM classes includes delivery net of excess energy (either from exported energy during the monthly billing period or from the customer's bank), the cost model needs to recognize the value of exported energy
- On a new tab named 'Excess NEM Value', excess energy is expanded by line losses and assigned a value based upon the results of the net power cost analysis

NEM Breakout COS – Excess Energy Treatment

- The value of excess energy is functionalized to the Production function and directly assigned as a credit to the NEM classes
- This direct assignment is shown on the 'Production' tab, rows 370 through 373

296	FERC ACCT	DESCRIPTION	COSFactor		Utah Jurisdiction Normalized	Residential Sch 1	Residential NEM Sch 1-135
369							
370		Excess NEM Credits					
371		Value of Excess NEM Credits	A	1.00	(553,067)	-	(364,128)
372		Cost of Excess NEM Credits	F30		553,067	159,721	958
373		Total Excess NEM Credits			241,184,541	86,926,267	109,265

- The value of excess energy is offset by a cost that is allocated to all classes on the F30 factor

RECONCILIATION OF COS TO CURRENT RATES

Reconciliation of COS to Current Rates

- The revenue requirement upon which the Company bases its proposed Schedule 5 rates is the result for the Residential NEM class in the NEM Breakout COS adjusted downward to the level of costs in the last GRC.
- Exhibit RMM-14 shows the unit costs for all residential from the last GRC (column A), residential non-NEM from the NEM Breakout COS (column B), and residential NEM from the NEM Breakout COS (column C)
- This adjustment can be found:

  Meredith\Exhibits\Exhibit RMP___(RMM-14).xlsx

Reconciliation of COS to Current Rates

- Exhibit RMM-14 shows the allocated costs for the following categories:
  - Production
    - Demand-Related Energy-Related
  - Transmission
    - Demand-Related Energy-Related
  - Distribution
    - Substations Poles & Conductor Transformers Services Meters
  - Retail
  - Miscellaneous

Reconciliation of COS to Current Rates

- Column D calculates the percentage of the overall residential class costs that are related to residential NEM for each cost category.
- Column E shows the application of the percentages on column D to the unit costs from the last GRC on column A.
- The overall revenue requirement that the Company uses for its proposed Schedule 5 rates is the sum of each of the adjusted categories as found on cell J24

PROPOSED SCHEDULE 5

SERVICE FOR RESIDENTIAL CUSTOMER GENERATORS

Proposed Rates

Schedule 5 - Residential Service for Customer Generators	
	Proposed Price
Customer Charge	
1 Phase	$15.00
3 Phase	$30.00
Demand Charge	
On-peak ($/kW)*	$9.02
Energy Charge	
All kWh (¢/kWh)	3.8143

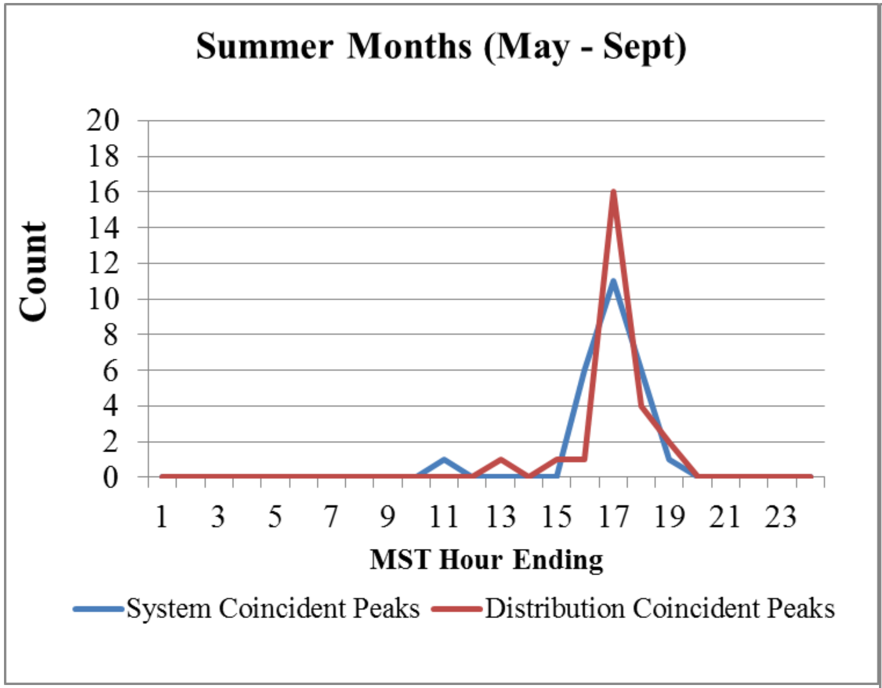
*On-peak periods with 60 minute interval:
October - April 8:00 a.m. to 10:00 a.m. and 3:00 p.m. to 8:00 p.m.,
May - September 3:00 p.m. to 8:00 p.m.,
Monday-Friday, except holidays.

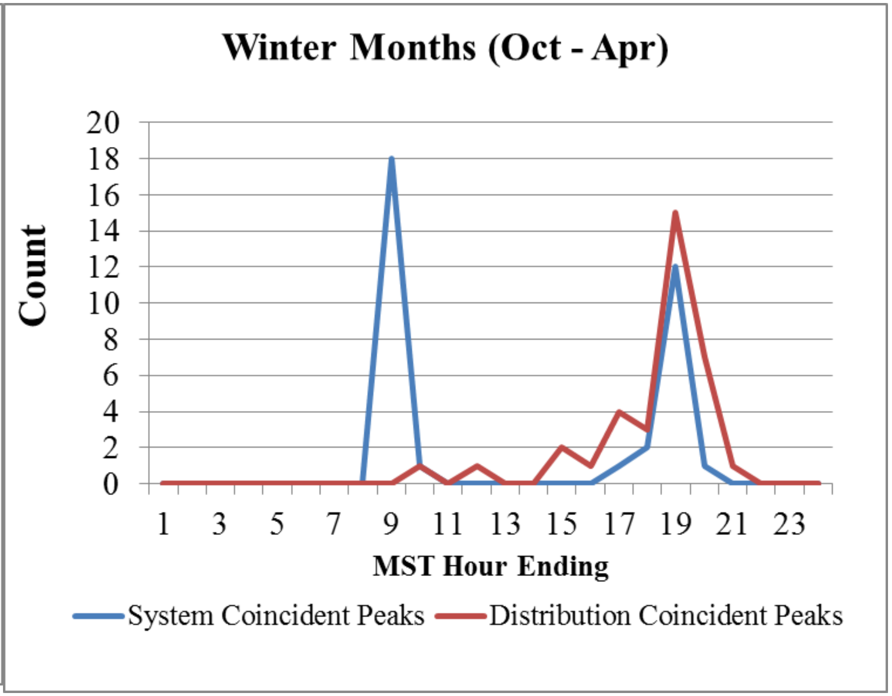
- Developed from the Residential NEM class in the NEM Breakout Study
- 2015 COS results adjusted to authorized revenue requirement in last rate case
- Addresses issue of NEM customers reducing energy use but not on-peak demand
- Customer charge recovers costs for customer service, meters, service drops, transformers
  - Excludes costs recovered through proposed application fee
- Demand charge recovers demand-related costs for distribution (poles, wires, substations), transmission, and generation
  - Proposed for on-peak period only
  - Calculated on 60 minute interval
- Energy charge recovers energy-related costs

Source: Steward/Workpapers/UT NEM Blocking 2015

On-Peak Periods

- To determine on-peak periods, examined system coincident peak and distribution coincident peaks over last 5 years
- Proposed periods capture 94 percent of peaks





- Exhibit JRS-4

Exhibit JRS-7: Billing Comparison for New Residential Private Generation Customers on New Rates

% of DG Production to Full Requirements Energy Usage

Full Requirements	0%	10%		25%		50%		75%		100%	
Monthly kWh	Present	Proposed	% Change	Proposed	% Change	Proposed	% Change	Proposed	% Change	Proposed	% Change
500	$55.4	$53	-5%	$49	-11%	$44	-20%	$39	-29%	$34.23	-38%
750	$84.6	$71	-16%	$67	-21%	$59	-30%	$51	-39%	$34.23	-60%
1,000	$113.9	$99	-13%	$84	-26%	$74	-35%	$63	-44%	$43.74	-62%
1,250	$146.3	$118	-19%	$110	-25%	$88	-40%	$75	-48%	$53.26	-64%
1,500	$178.8	$137	-24%	$127	-29%	$103	-43%	$88	-51%	$62.77	-65%
1,750	$211.2	$155	-26%	$145	-32%	$117	-44%	$90	-57%	$72.28	-66%
2,000	$243.6	$174	-29%	$162	-34%	$132	-46%	$102	-58%	$81.80	-66%
2,500	$308.5	$221	-28%	$196	-36%	$161	-48%	$126	-59%	$91.31	-70%
3,000	$373.4	$258	-31%	$230	-38%	$190	-49%	$150	-60%	$110.34	-70%

Assumptions

1. Average monthly DG generation kWh/kW	116
2. Average on-peak load factor %	29%
3. Average monthly Full kWh for Residential NM customer	977
4. DG demand impact index: on-peak kW/MWh	1.47
5. Estimated on-peak kW = Full kWh/(730*29%) - DG MWh x 1.47	

- Developed from a profile from a specific customer with a representative profile for net metering customers. (See response to DPU DR 4.2 for additional supporting data.)

Billing Comparison for Residential Private Generation Customers Between Current and New Rates

Full	50%	50%		10%	10%		25%	25%		50%	50%		75%	75%		100%	100%	
kWh	Present	Proposed	% Change	Present	Proposed	% Change	Present	Proposed	% Change	Present	Proposed	% Change	Present	Proposed	% Change	Present	Proposed	% Change
500	$30	$44	50%	$50	$53	6%	$41	$49	20%	$30	$44	50%	$18	$39	119%	$8	$34	312%
750	$41	$59	43%	$76	$71	-6%	$63	$67	6%	$41	$59	43%	$24	$51	116%	$8	$34	312%
1,000	$55	$74	33%	$102	$99	-3%	$85	$84	-1%	$55	$74	33%	$30	$63	114%	$8	$44	426%
1,250	$70	$88	26%	$130	$118	-9%	$107	$110	4%	$70	$88	26%	$35	$75	113%	$8	$53	541%
1,500	$85	$103	21%	$159	$137	-14%	$130	$127	-2%	$85	$103	21%	$41	$88	112%	$8	$63	655%
1,750	$99	$117	18%	$188	$155	-18%	$154	$145	-6%	$99	$117	18%	$48	$90	87%	$8	$72	770%
2,000	$114	$132	16%	$218	$174	-20%	$179	$162	-10%	$114	$132	16%	$55	$102	84%	$8	$82	884%
2,500	$146	$161	10%	$276	$221	-20%	$227	$196	-14%	$146	$161	10%	$70	$126	80%	$8	$91	999%
3,000	$179	$190	6%	$334	$258	-23%	$276	$230	-17%	$179	$190	6%	$85	$150	78%	$8	$110	1228%

Exhibit JRS-6 shows:

- Current customers receive bill savings of 10.5 cents/kWh for generation output
- Under proposed rates, bill savings would be 7.1 cents/kWh for generation output

LARGE NON-RESIDENTIAL COMPENSATION OPTIONS

Large Non-Residential Compensation Options

- Three options set in 2008 NEM Order (Docket 08-035-78) for non-residential customers on Schedules 6, 6A, 6B, 8, and 10

	2016 Credit (¢/kWh)	
Large Non-Residential Options	Baseload	Fixed Solar
Option 1. Average Sch 37 Price	1.8821	1.5991
Option 2. Seasonal Sch 37 Price		
Summer	2.0345	1.7515
Winter	1.8062	1.5232
Option 3. Average Retail Price		
Schedule 6	8.4498	
Schedule 6A	11.7871	
Schedule 6B	10.8910	
Schedule 8	7.5210	
Schedule 10	7.5619	

- All customers elect Option 3 – the average retail price
- Option 3 is reset annually based on the average retail rate – including all billing components – for the prior year for each rate schedule
- Company proposes to eliminate average retail rate (Option 3) for compensation of excess energy based on the same principle as proposed for residential, that compensation for energy purchases should not include fixed costs

APPLICATION FEES

Proposed Application Fees

- Proposed application fees to more closely match administrative costs

Net Metering Application Fees		
	Current	Proposed
Level 1	0	$60
Level 2	$50	$75
per kW	$1.00	$1.50
Level 3	$100	$150
per kW	$2.00	$3.00

- In 2015, administrative costs were approximately $560k, however, authorized fees recovered only $17k.
- With proposed fees, Company would have recovered $500k.
- Without Level 1 fee, Company would propose higher residential customer charge (~$8.50) on Schedule 5.

Exhibit JRS-8

Breakdown of Net Metering Application Related Costs and Revenue						
Description	Residential Net Metering	General Small Dist. NEM Sch 23-135	General Large Dist. NEM Sch 6-135	General +1 MW NEM Sch 8-135	Irrigation Sch 10	Total
(A)	(B)	(C)	(D)	(E)	(F)	(G)
Application Fee Costs						
Administration Cost	$198,752	$16,110	$19,667	$671	$7,048	$242,248
Initial Setup Customer Service Cost	$17,797	$481	$379	$12	$126	$18,795
Engineering Cost	$225,698	$16,051	$44,576	$2,476	$11,006	$299,807
Total Cost Related to Net Metering Application	$442,247	$32,641	$64,622	$3,159	$18,180	$560,850
Application Quantity						
Tier 1 Applications	7,381	284	220	8	9	7,902
Tier 2 Applications	2	66	21	1	21	111
Tier 3 Applications	-	-	2	-	-	2
Total Application Quantity	7,383	350	243	9	30	8,015
% of Applications in Tier 2 or 3	0.0%	18.9%	9.5%	11.1%	70.0%	1.4%
Application Fee Revenue						
KW in Tier 2 or 3 Applications	38	4,104	4,630	1,242	1,224	11,238
Price per KW (Tier 1)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Price per KW (Tier 2 or 3)	$1.00	$1.00	$1.00	$1.00	$1.00	$1.00
Price per Tier 1 Application	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Price per Tier 2 Application	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00
Price per Tier 3 Application	$100.00	$100.00	$100.00	$100.00	$100.00	$100.00
Tier 2 and 3 Revenue	$138	$7,404	$5,880	$1,292	$2,274	$16,988
Cost per Application	$59.90	$93.26	$265.93	$351.03	$606.01	$69.98
Proposed Application Fee Revenue						
Proposed Price per KW (Tier 1)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Proposed Price per KW (Tier 2 or 3)	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50
Proposed Price per Tier 1 Application	$60.00	$60.00	$60.00	$60.00	$60.00	$60.00
Proposed Price per Tier 2 Application	$75.00	$75.00	$75.00	$75.00	$75.00	$75.00
Proposed Price per Tier 3 Application	$150.00	$150.00	$150.00	$150.00	$150.00	$150.00
Proposed Tier 1, 2, and 3 Revenue	$443,067	$28,147	$22,021	$2,418	$3,951	$499,603
Difference Between Costs and Proposed Fee Revenue	-$819	$4,495	$42,601	$741	$14,230	$61,247

INCREMENTAL REVENUE DEFERRAL

Schedule 5 Revenue Deferral

- Proposal to defer the difference between revenue under approved rates and current rates
- Calculation would be prepared using actual billing/usage units each month
- Amortization would be proposed in next rate case

Thank You





ROCKY MOUNTAIN POWER

Let's turn the answers on.