

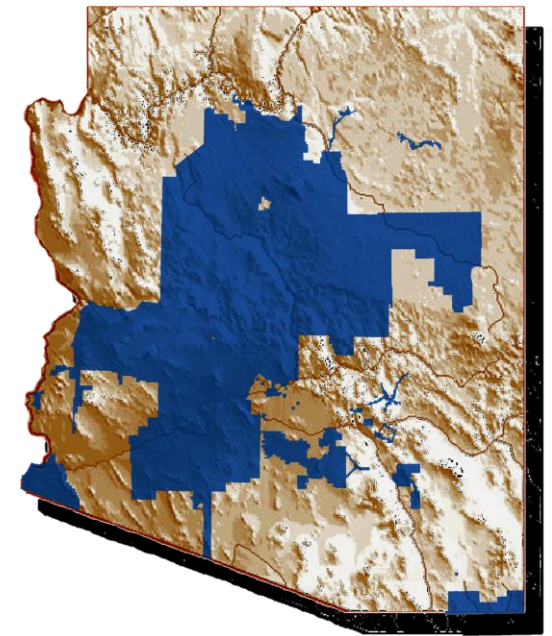
Modernizing Residential Electric Rates - The Arizona Experience

ESIG Conference Feb 2021
Chuck Miessner APS



About APS

- Investor-owned utility in Arizona
- 1.1 million residential customers
- 58% on TOU-E and TOU-D rates
- 120,000 customers with rooftop solar
- Fully deployed Advanced Metering Infrastructure



APS Retail Service Territory

What is a Smart Rate?

We Need Smart Rates to Incent Smart Homes

- Seeks to match lifestyle, bill savings and resource cost savings
- Aligns price signal to resource needs and costs



Rate Changes Made

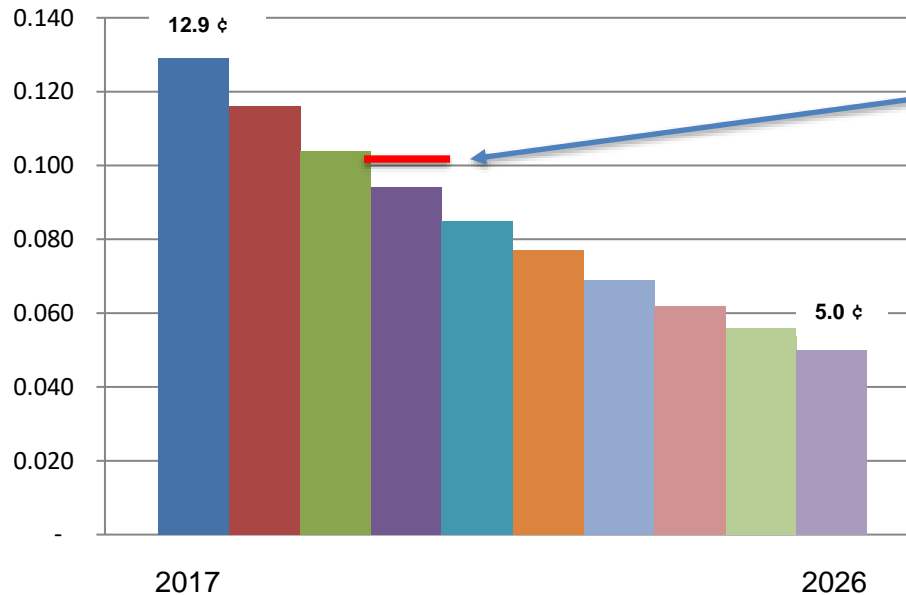
- Reformed Net Metering
- Eliminated Inclining Block Rates
- Focused on TOU and Demand Rates
- Shortened On-Peak Hours to Provide a Better Resource
- Added Winter Super-Off-Peak Period to Address “Duck Curve”

Net Metering Reform

- Replaced net metering with a solar power purchase rate
- Limited rate options for new solar customers, added grid charge
- Grandfathered existing customers on net metering and old rates

Solar Purchase Rate 2017-2026 \$-kWh

Estimated based on max 10% reduction per year
Applies to excess solar generation above customer's load
Customer locks in for 10 years at their initial rate

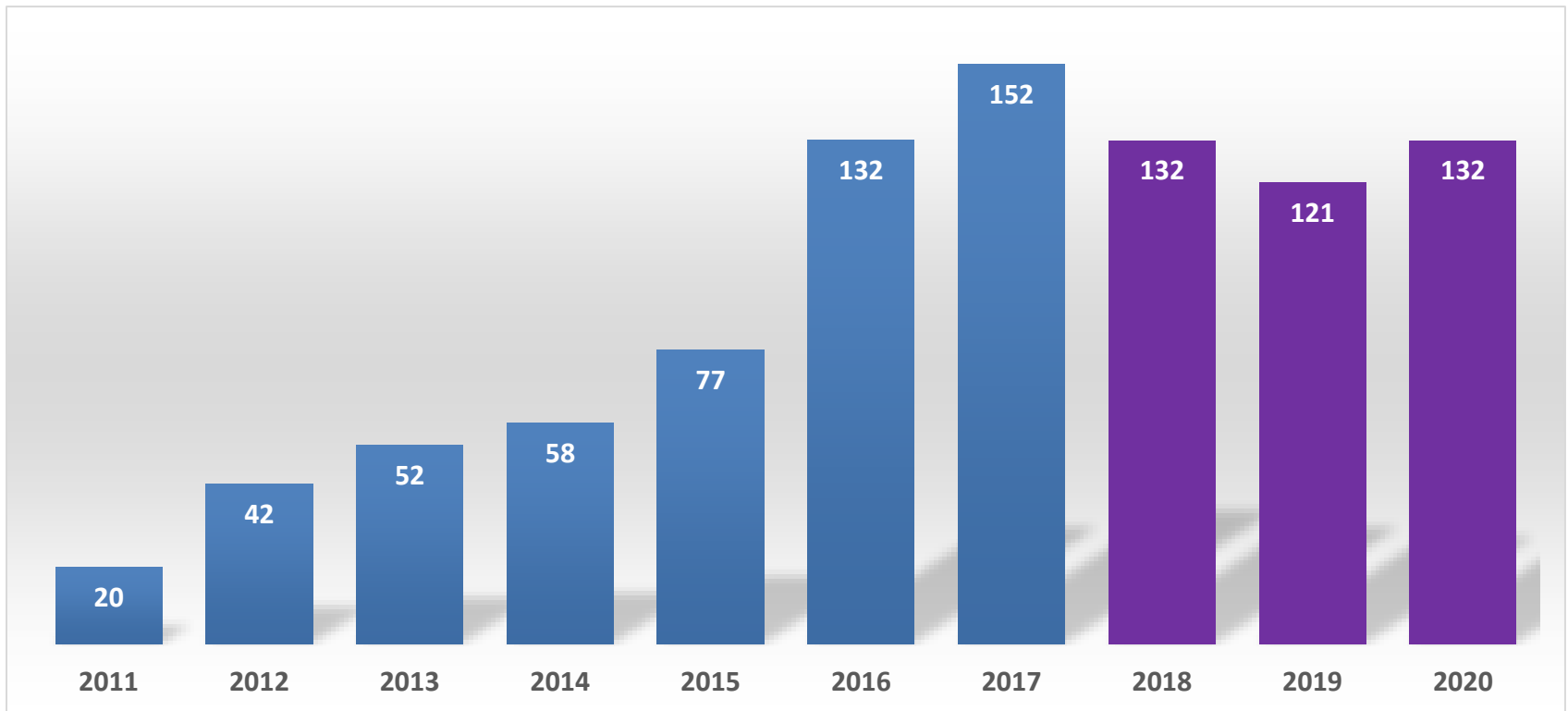


The 2020 rate remained at \$0.1045 due to Covid

Residential Rooftop Solar New Annual Installed Capacity MW-dc

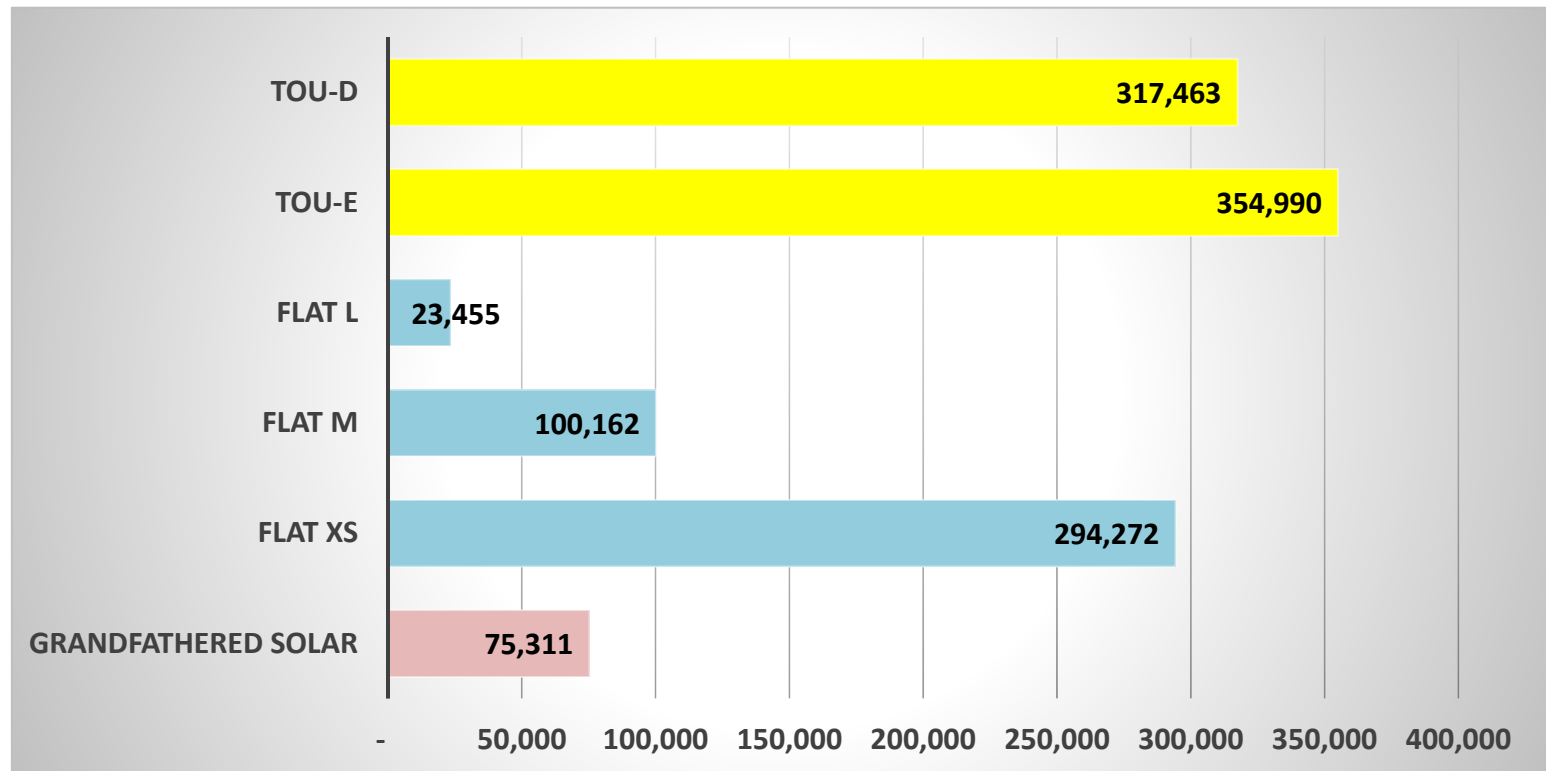
← Net Metering →

← Purchase Rate →



Residential Rate Participation

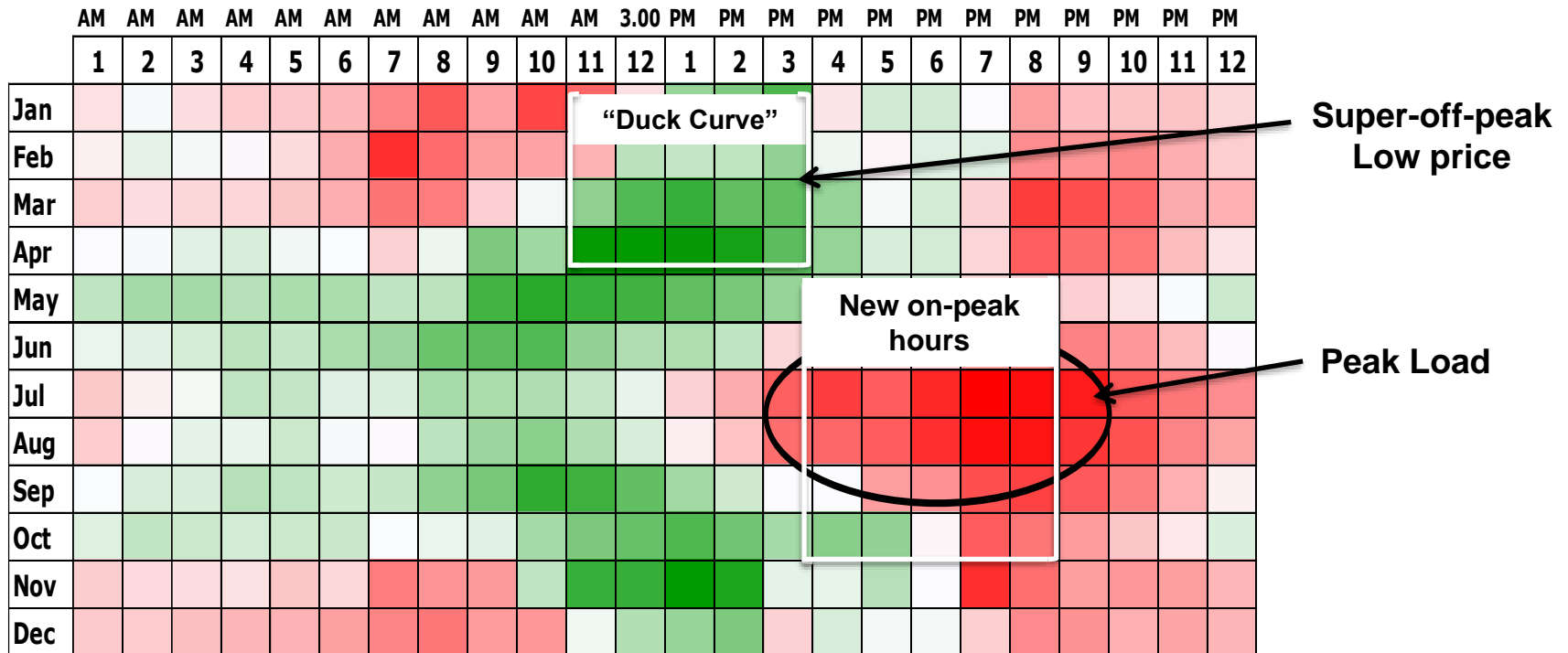
Customers by Rate Dec 2020



New TOU Rates

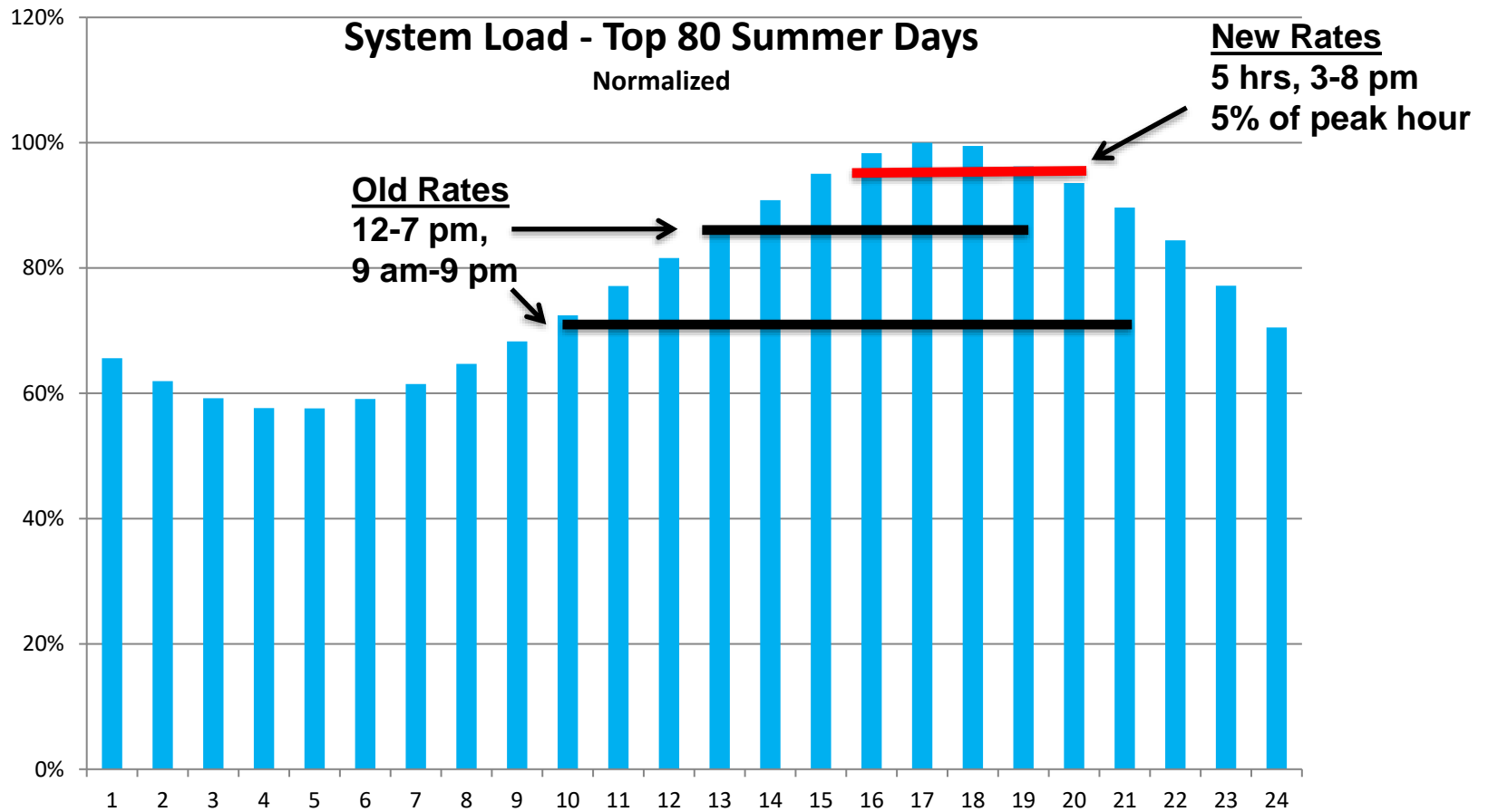
Capacity and Energy Costs

Time of Day Relative Energy & Capacity Heat Map
Levelized 2020 to 2035



New TOU On-Peak Hours

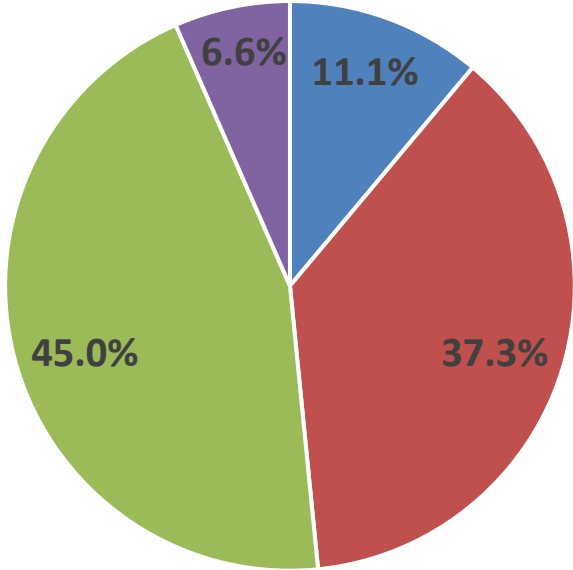
Summer Load (top days)



Information is illustrative

Residential TOU-Demand Rate

Percent of Monthly Bill



■ on-peak kWh ■ off-peak kWh
■ on-peak kW ■ Basic Charge

Service Charge (\$ per Month)
\$ 13.00

Demand Charges (\$ per kW) ¹
 Summer \$ 17.438
 Winter \$ 12.239

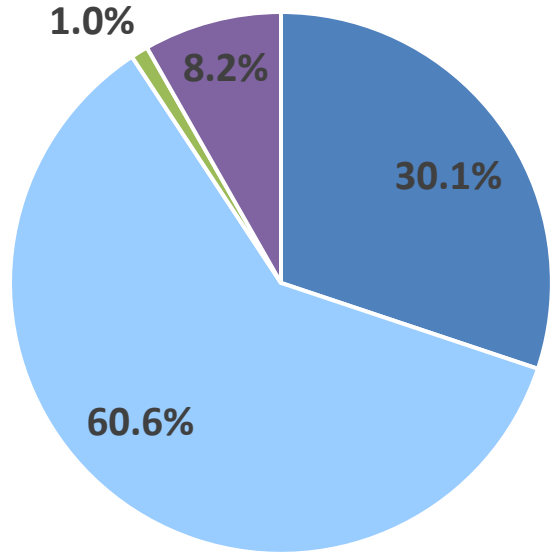
Energy Charges (\$ per kWh)

	<u>Peak ²</u>	<u>Off Peak</u>
Summer	0.08683	0.05230
Winter	0.06376	0.05230

1. Demand is based on the highest one-hour kW read during on-peak hours in a billing month.
2. On peak hours are 3 pm to 8 pm, excluding weekends and holidays.

Residential TOU-Energy Rate

Percent of Monthly Bill



- on-peak kWh
- off-peak kWh
- super-off kWh
- Basic Charge

Service Charge (\$ per Month)

\$ 13.00

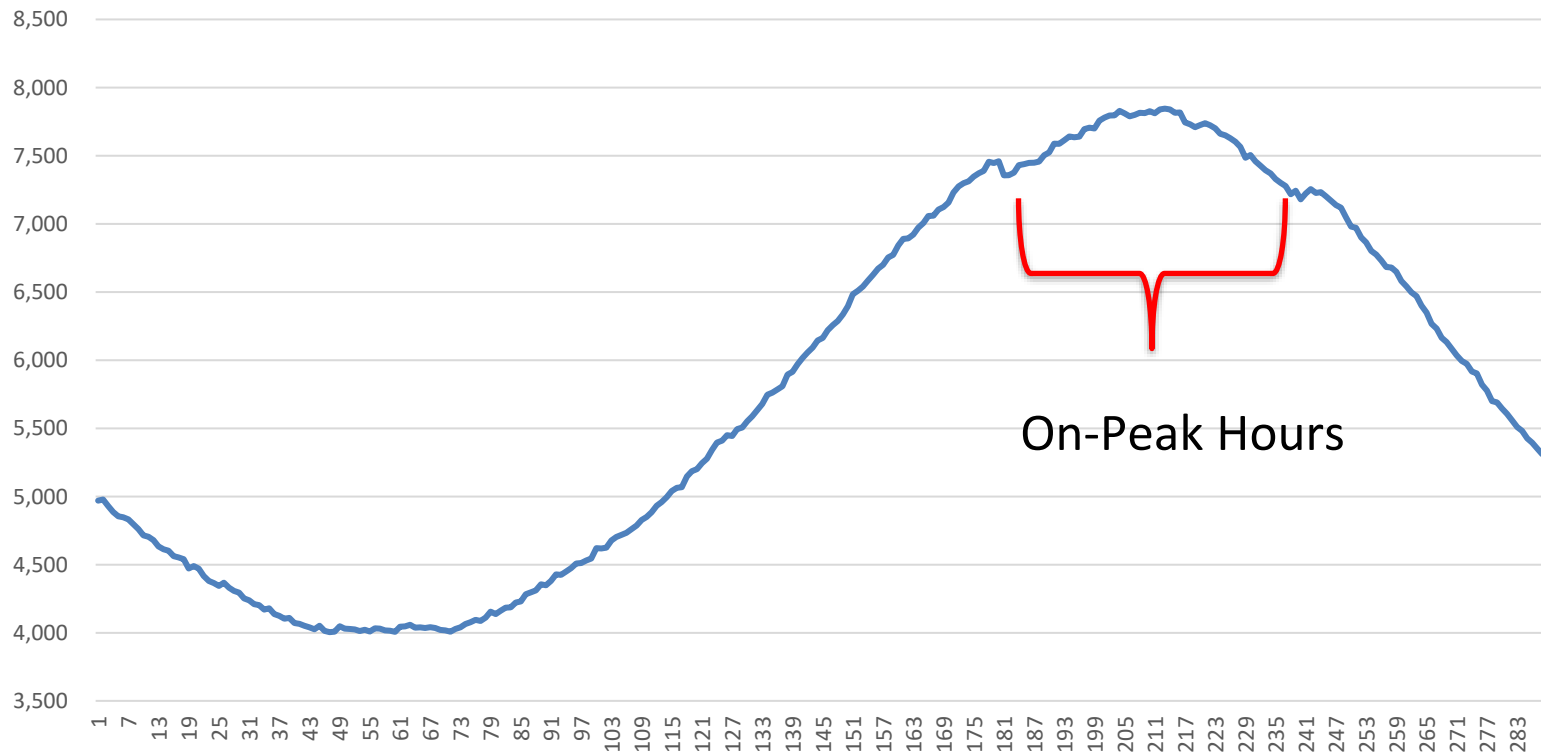
Energy Charges (\$ per kWh)

	<u>Peak</u>	<u>Off Peak</u>
Summer	0.24314	0.10873
Winter	0.23068	0.10873

On peak hours are 3 pm to 8 pm, excluding weekends and holidays.

TOU Rate Impact on Customer Demand

System Load MW – Peak Summer Day
5 min intervals



TOU-Demand vs TOU-Energy Test

- ❑ Studied Interval load data, billing determinants and bills for customers that switched from TOU-E to TOU-D rate (same on-peak hours)
- ❑ Compared same home, before and after switching
- ❑ Census for customers in Phoenix metro area with complete load data
 - ❑ 1 year load data prior to switching
 - ❑ 1 year load data after switching
- ❑ Same customer in home during test period
- ❑ 977 customers
- ❑ Weather normalized load

Test Results – Summer Load and Bill Savings

Above what was already occurring from a TOU-Energy rate

Ranked by Top % kW Savers

% Customers	Total kWh	On-Peak kWh	On-Peak kW	Bill	
10%	-23%	-32%	-31%	-30%	Top 10% savers
20%	-14%	-19%	-17%	-21%	Next 10% savers
30%	-11%	-13%	-12%	-18%	
40%	-5%	-9%	-8%	-14%	
50%	-2%	-5%	-5%	-10%	
60%	0%	-3%	-2%	-10%	
70%	1%	0%	2%	-6%	
80%	4%	3%	5%	-5%	
90%	7%	8%	10%	-1%	
100%	18%	22%	25%	10%	Bottom 10% savers
Average	-2.9%	-5.2%	-3.9%	-11%	

Thank You and Questions