RAP® Energy solutions for a changing world

Time of Use Rates: A Practical Option – If Done Well

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What Does This Rate Design Say?

Key Points

TOU rates are appropriate if:

a) costs vary by time of day, and

b) costs of measurement are small

Technology helpful to empower consumers

Most low-income consumers will benefit

Most low-use consumers will benefit

Peak-Time Rebates are an alternative

Keep the on-peak period as narrow as possible

Types of TOU Rates

- Simple Two-Period Rates
- Seasonal Two-Period rates
- Three-Period Rates
- Critical Peak Pricing (CPP)
- Real-Time Pricing (RTP)
- *Alternative: Peak-Time Rebates (PTR)*

Example Two-Period Rate
Jacksonville, FL

		Standard	Optional TOU
Customer Charge	$/month	$7.34	$7.34
Energy Charge	$/kWh		
On-Peak		$0.1072	$0.2156
Off-Peak		$0.1072	$0.0628

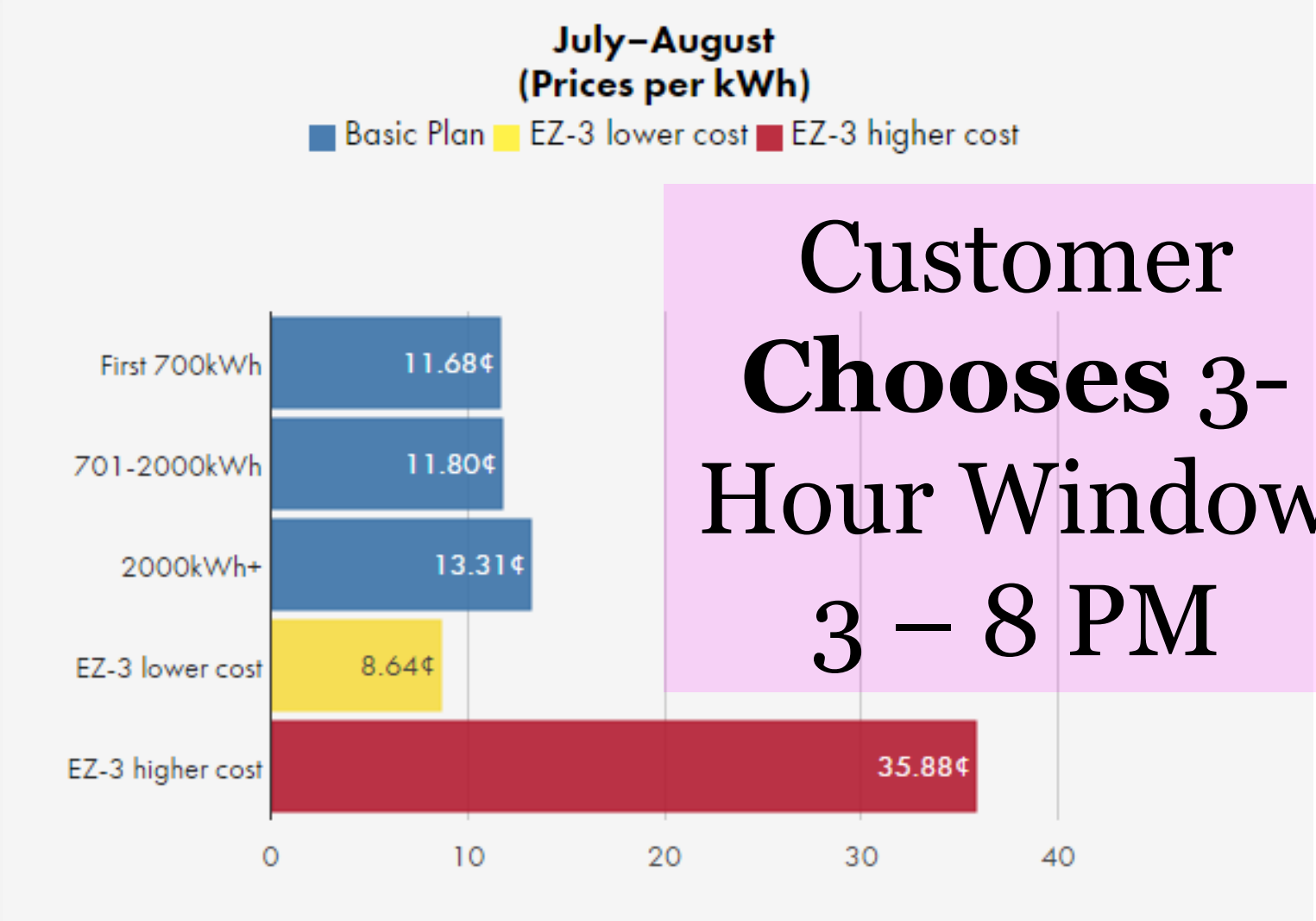
Example Seasonal Three-Period Rate
Southern California Edison

	Summer	Winter
Customer Charge	**$0.94**	**$0.94**
On-Peak	**$0.436**	**$0.336**
Shoulder	**$0.286**	**$0.282**
Off-Peak	**$0.131**	**$0.135**

Example Critical Peak Rate
Oklahoma Gas and Electric

		Summer
Customer Charge		**$13.00**
Off-Peak		**$0.044**
On-Peak		**$0.160**
Critical Peak		**$0.400**
Critical: Maximum 80 hours per year		
On-Peak: 2 - 7 PM Monday - Friday		

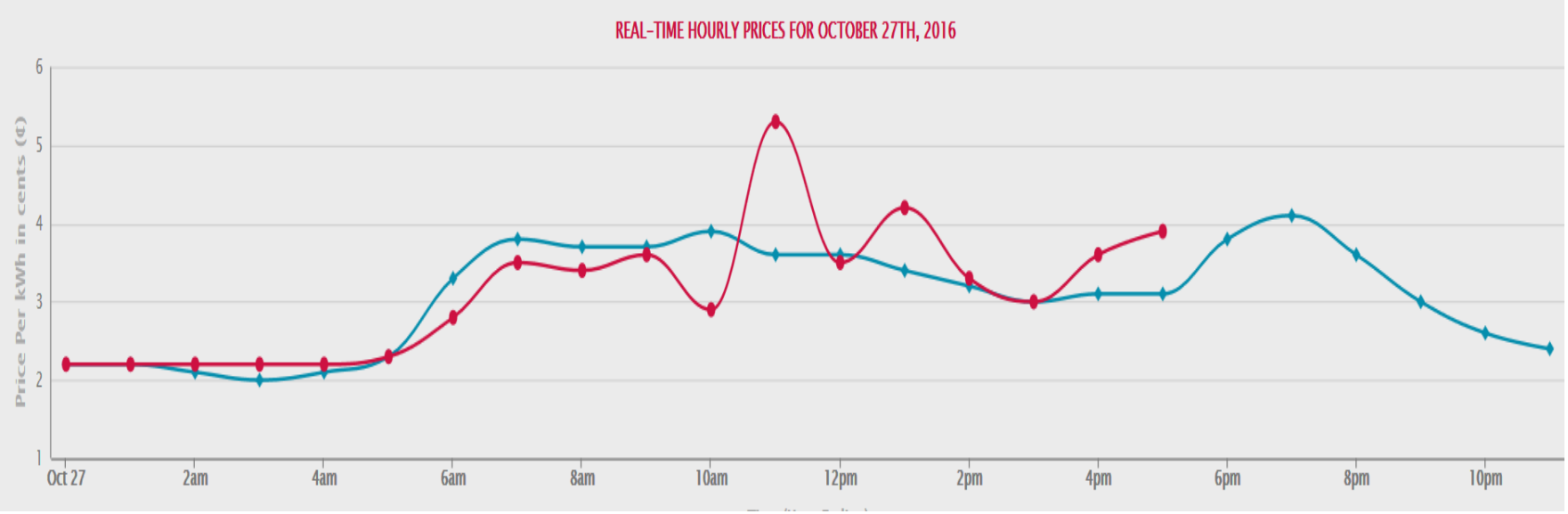
Salt River Project "EZ-3" Rate (Summer)



Customer **Chooses** 3-Hour Window 3 – 8 PM

Real-Time Pricing
Commonwealth Edison

- Customer Charge
- Distribution Charge
- “Personal Capacity Charge”
- Hourly Energy Charge



Incorporating TOU with Inclining Blocks Is Not Difficult

Energy Charge:

Billing Months - May through September inclusive
8.8498¢ per kWh first 400 kWh
11.5429¢ per kWh next 600 kWh
14.4508¢ per kWh all additional kWh

TOU Overlay:

On-Peak Surcharge: $.05/kWh
Off-Peak Discount: $.05/kWh

Demand Charges

- Historically used for Commercial and Industrial customers
- NOT used for small commercial or residential due to high diversity.
- Non-Coincident Peak **(NCP):**
  - **$/kW measured at any hour**
- Coincident Peak **(CP):**
  - **$/kW measured 3 PM – 7 PM ONLY**

Demand Charges: A Poor Choice

Exhibit 3. Garfield and Lovejoy Criteria and Alternative Rate Forms

Garfield and Lovejoy Criteria	CP Demand Charge	NCP Demand Charge	TOU Energy Charge
All customers should contribute to the recovery of capacity costs.	N	Y	Y
The longer the period of time that customers pre-empt the use of capacity, the more they should pay for the use of that capacity.	N	N	Y
Any service making exclusive use of capacity should be assigned 100% of the relevant cost.	Y	N	Y
The allocation of capacity costs should change gradually with changes in the pattern of usage.	N	N	Y
Allocation of costs to one class should not be affected by how remaining costs are allocated to other classes.	N	N	Y
More demand costs should be allocated to usage on-peak than off-peak.	Y	N	Y
Interruptible service should be allocated less capacity costs, but still contribute something.	Y	N	Y

Peak-Time Rebates

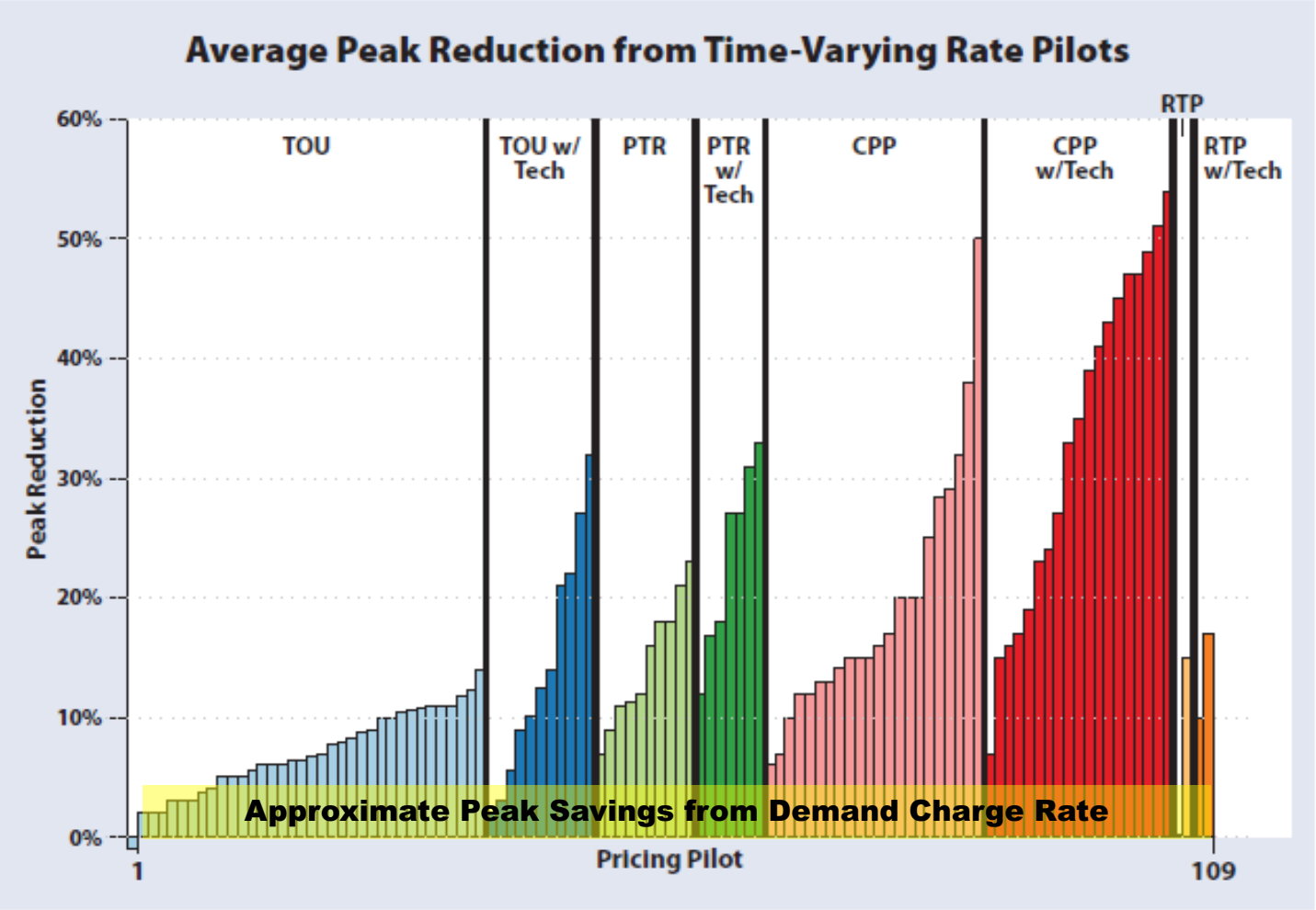
- Targeted at a few key critical peak hours
- Events announced
- Customer usage during event compared to a baseline usage for that customer.
- Credit applied for reduced usage

NO surcharge applied for increased usage

Baltimore Gas and Electric PTR

Customer Charge	**$ 7.90**
Distribution Charge	**$ 0.035**
Default Supply	**$ 0.092**
PTR Credit	**$ (1.25)**

TOU and Critical Peak Pricing Works



Technology Can Help

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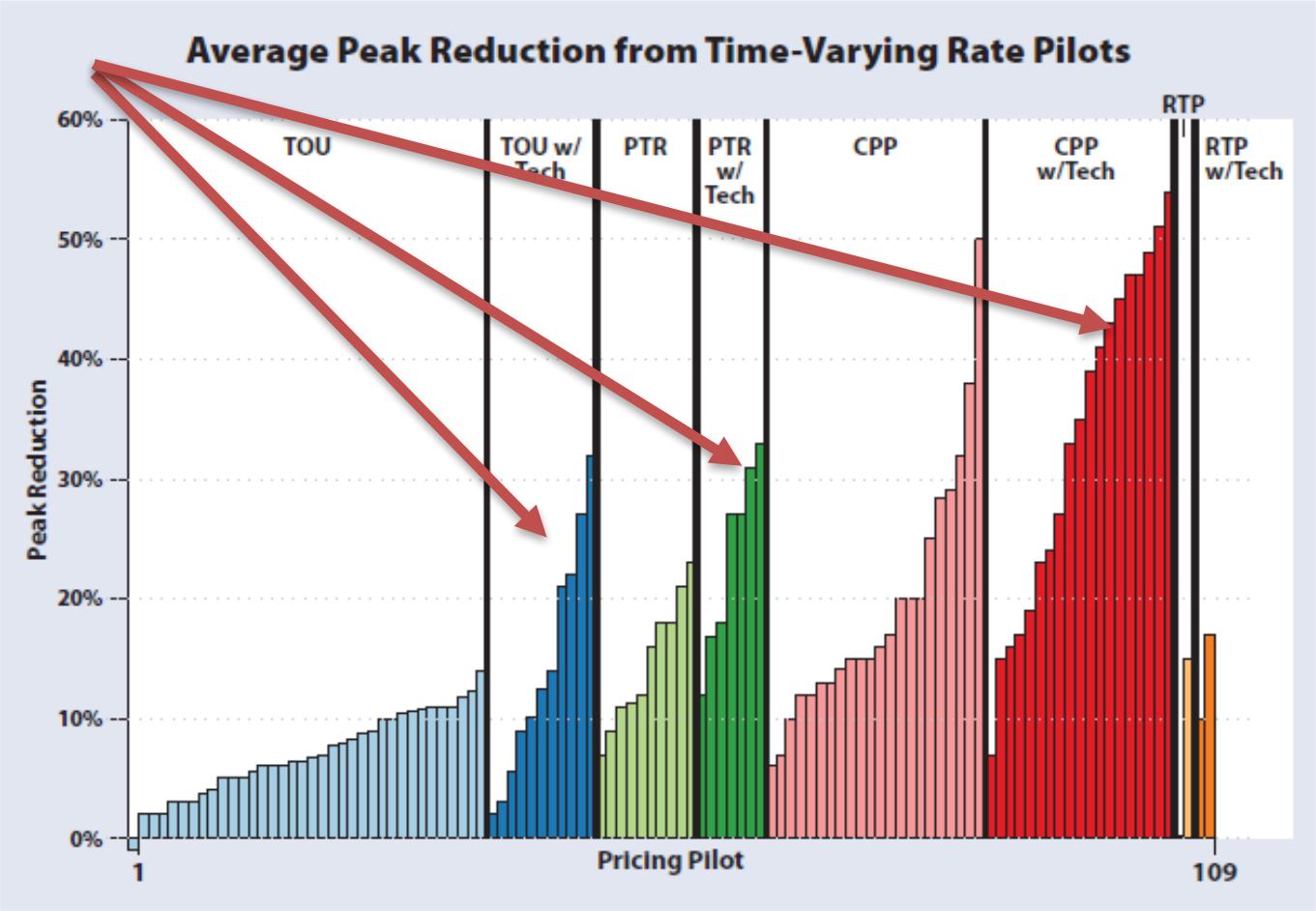
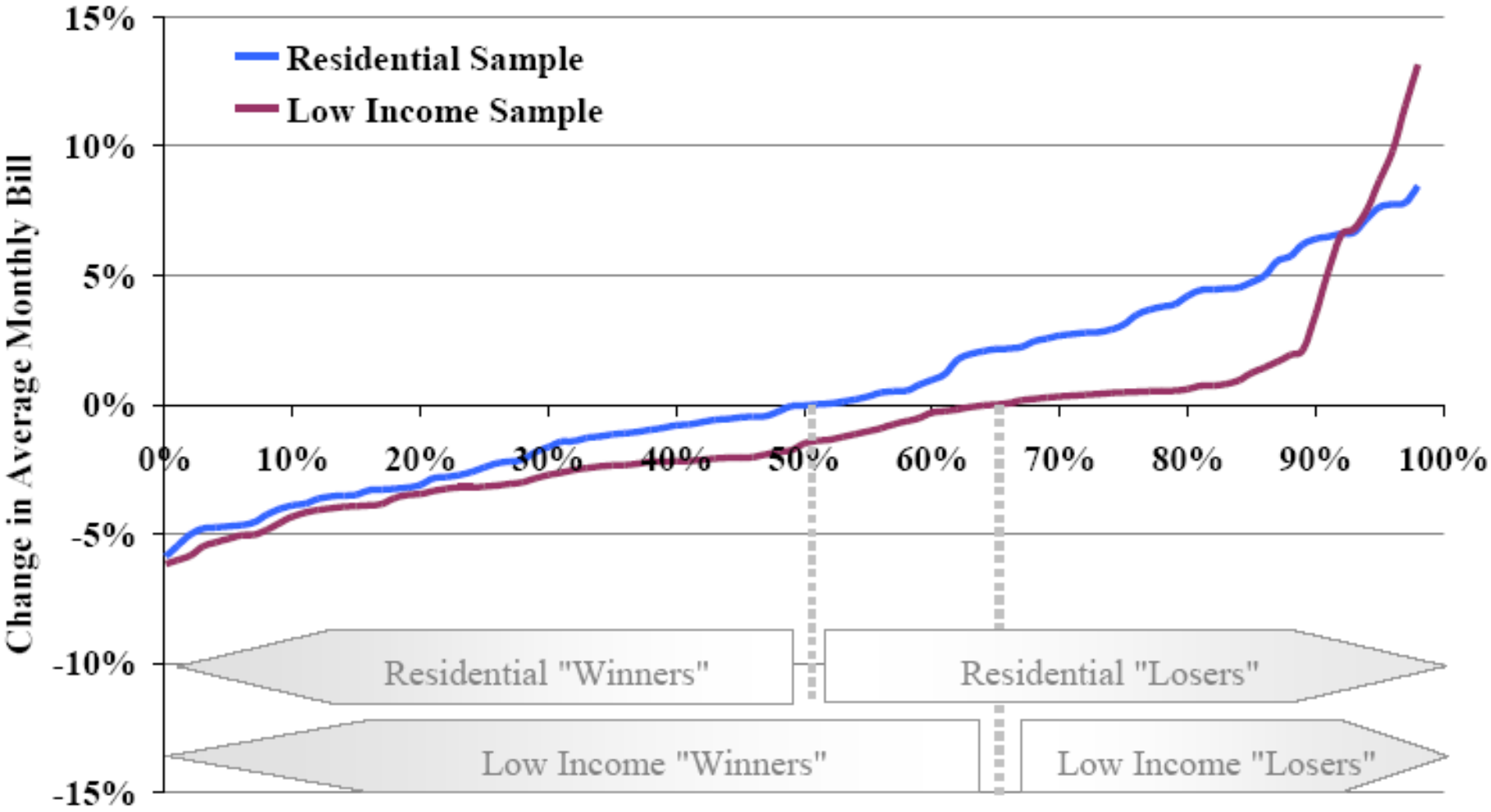


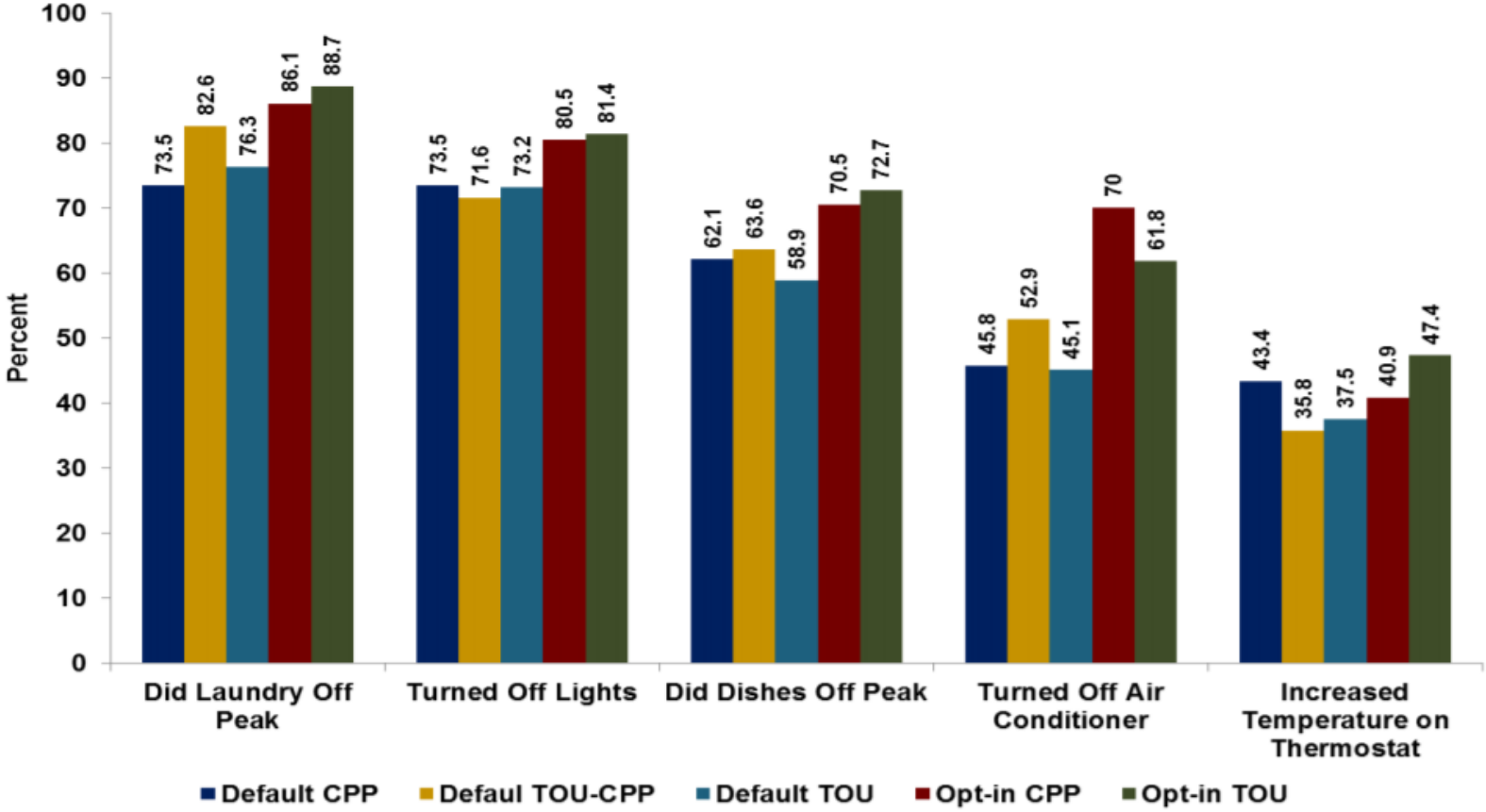
Impact of TOU on Low-Income

- More Likely:
  - Apartment
  - Electric Water Heat
  - Window AC
- Less Likely:
  - Pool or spa
  - Central AC
- Challenge:
  - Upgrade appliances
  - Smart technology

Impact of TOU on Low-Income



SMUD: Customers Actually Do Things



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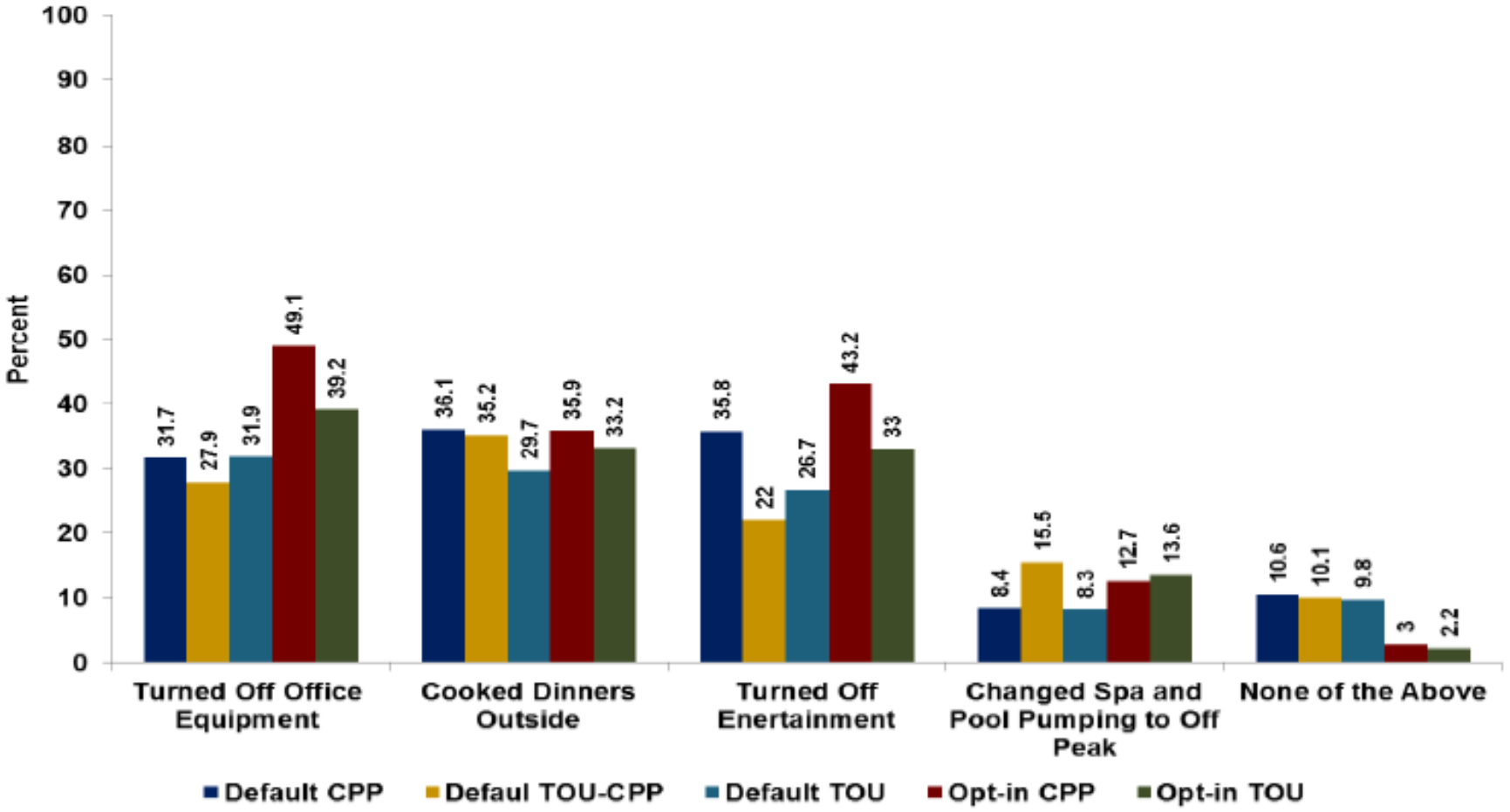

Impact of Different Rate Forms On kWh Usage and Peak Demand

	Peak Demand	Total kWh
Flat Rate $5/mo + $.12/kWh	Baseline	Baseline
Inclining Block	▼5% -10%	▼5% -10%
High Fixed Charge	▲5% - 10%	▲5% - 10%
NCP Demand Charge	▼1% -2%	▲5% - 10%
CP Demand Charge	▼5% -10%	▲5% - 10%
TOU Rate	▼10% -20%	Little Change
Critical Peak Rate	▼20% - 30%	Little Change
TOU + Inclining Block	▼15% - 30%	▼5% -10%
Critical + Inclining Block	▼25% - 35%	▼5% -10%

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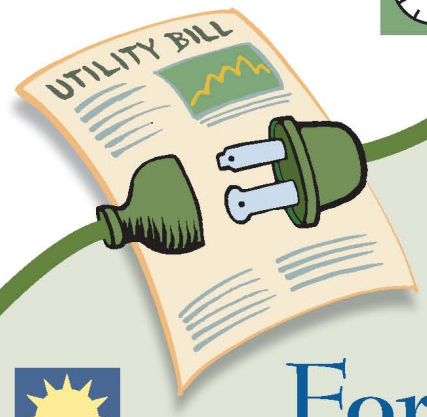
Smart Rate Design



For a Smart Future

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July 2015

Smart Rate Design

Customer-Specific Charges		
Customer Charge	$/Month	$ 3.00
Transformer:	$/kVA/Mo	$ 1.00

Bi-Directional Energy Charges		
Off-Peak	$/kWh	$ 0.08
Mid-Peak	$/kWh	$ 0.12
On-Peak	$/kWh	$ 0.18
Critical Peak	$/kWh	$ 0.75

Expected Results

- Beneficial load shift
- Value proposition for:
  - Load management technology
  - Smart appliances and GIWH
  - Customer-based storage and EVs
  - Consumer engagement
- Important: Deploy **technology** with roll-out.
- Important: Keep peak period to **~3 hours.**

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 sector. 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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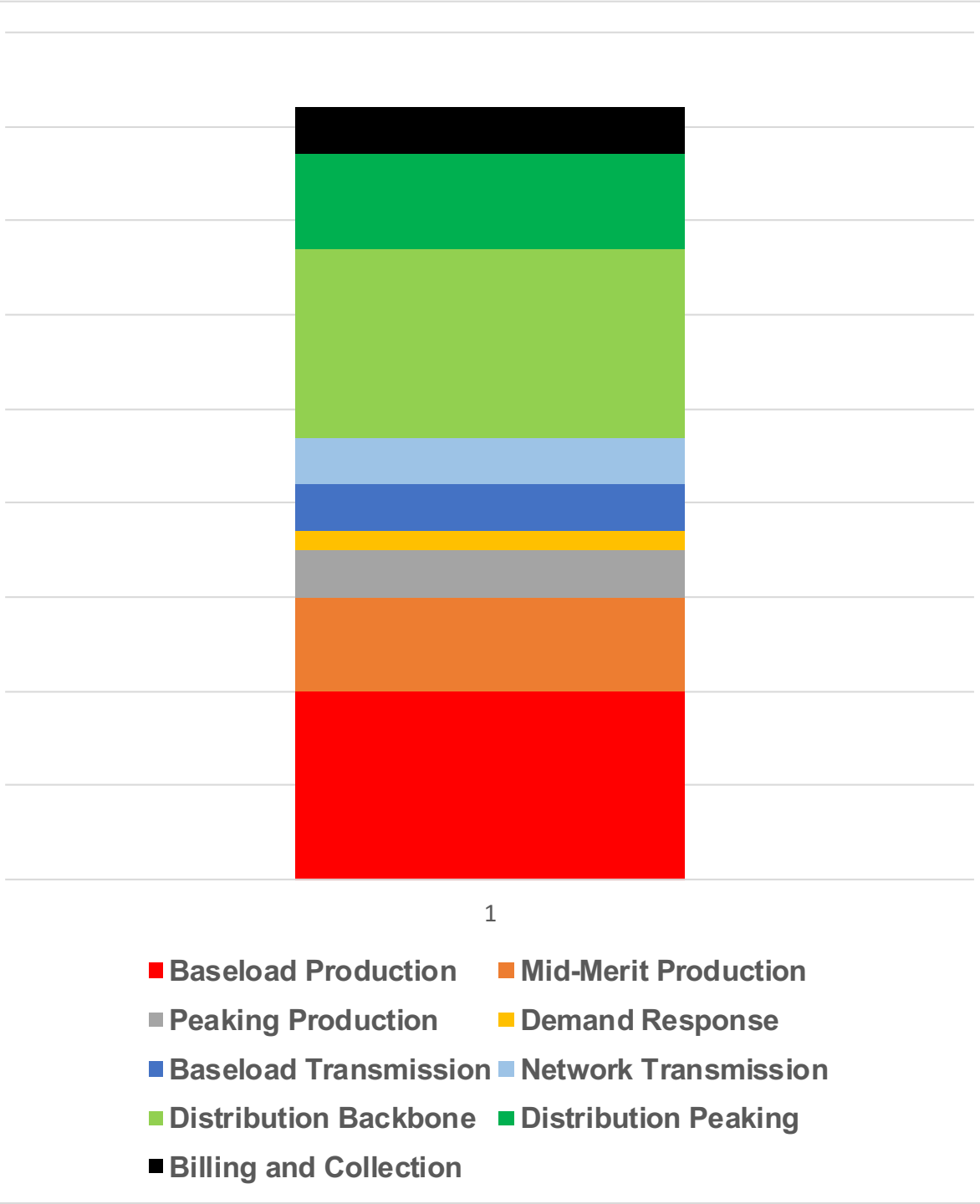
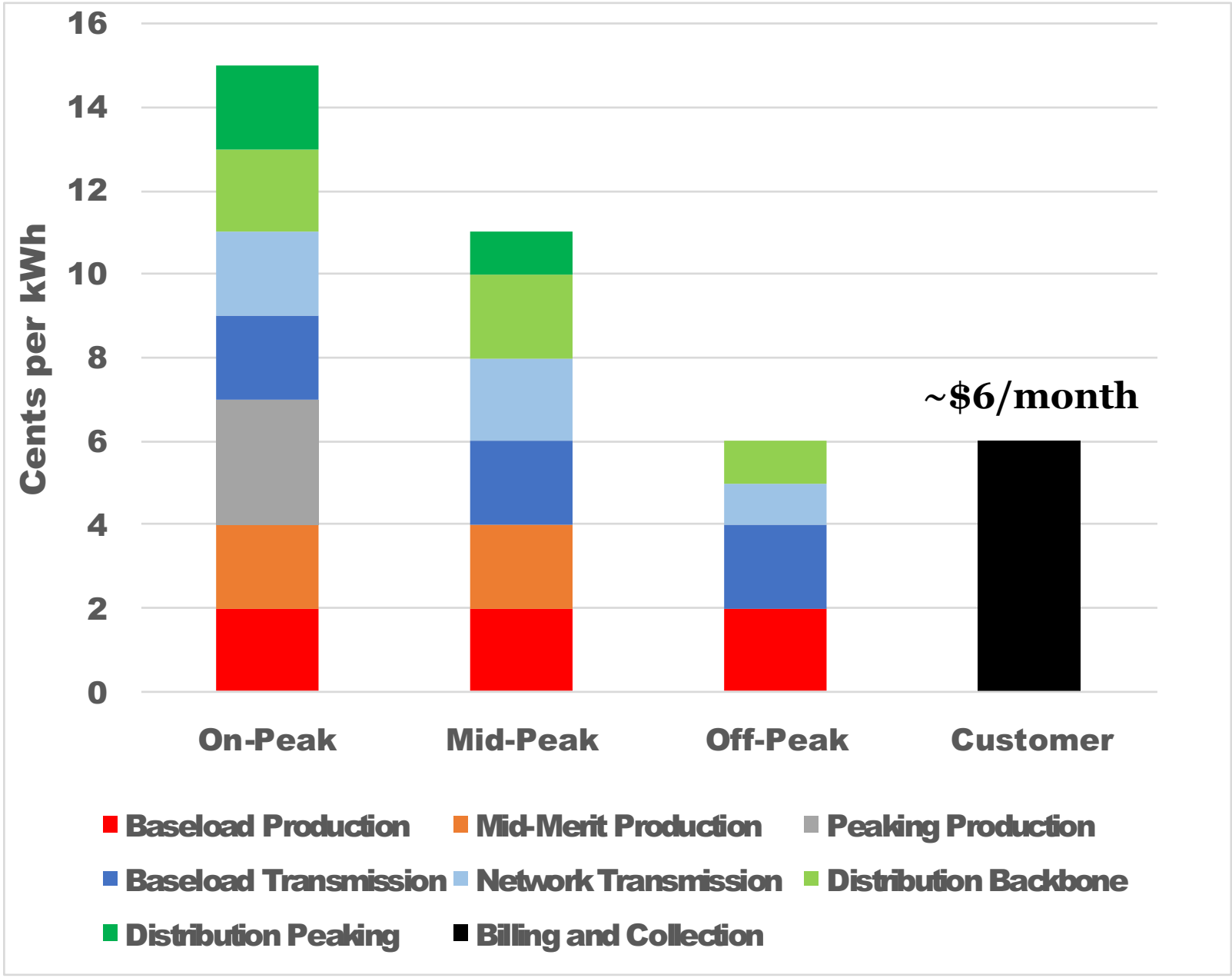
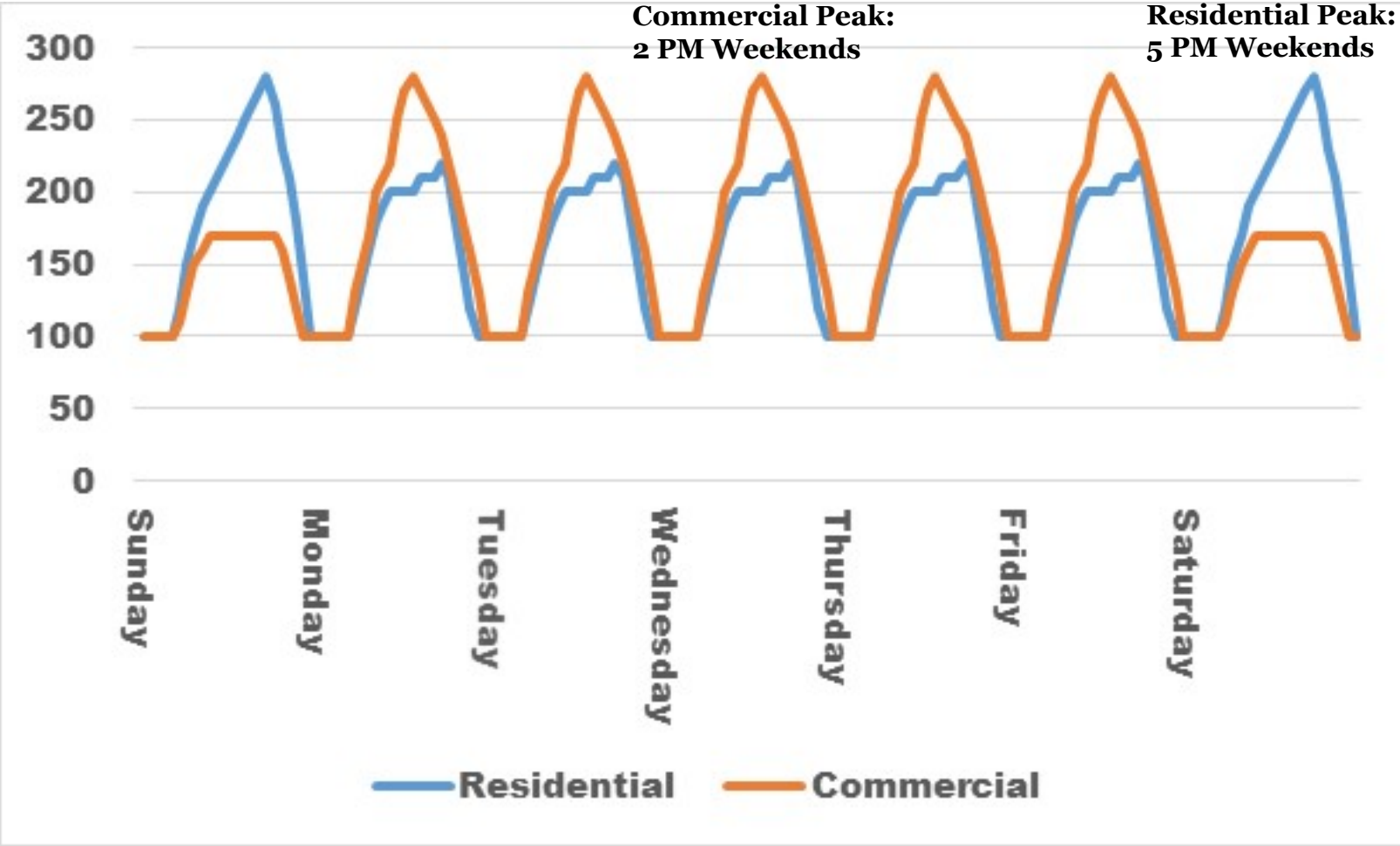
Supplemental Slides for Q&A If Needed

Functionalized System Costs

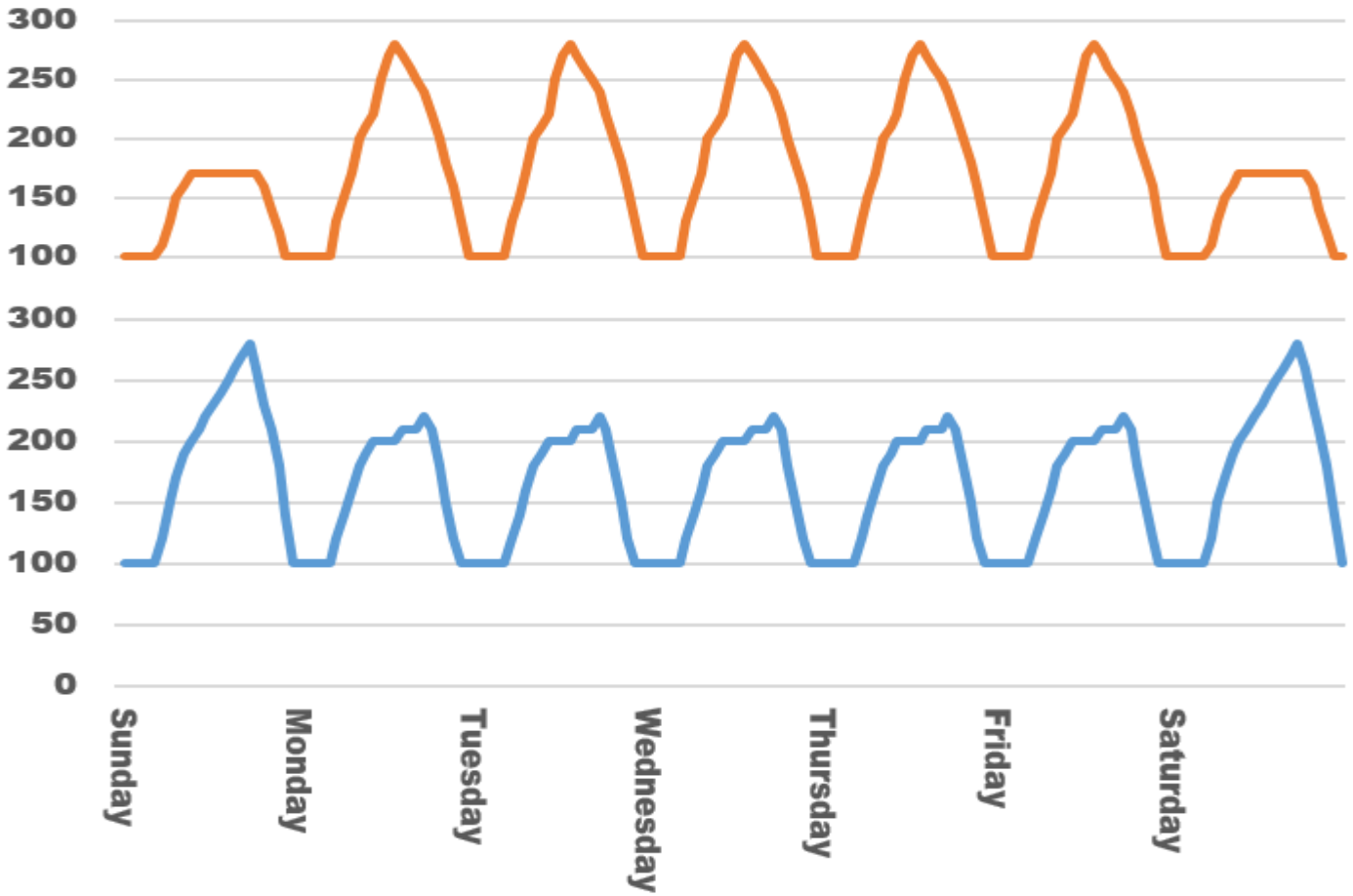



16
14
12
10
8
6
4
2
0
Cents per kWh
~$6/month
On-Peak
Mid-Peak
Off-Peak
Customer
Baseload Production
Mid-Merit Production
Peaking Production
Baseload Transmission
Network Transmission
Distribution Backbone
Distribution Peaking
Billing and Collection

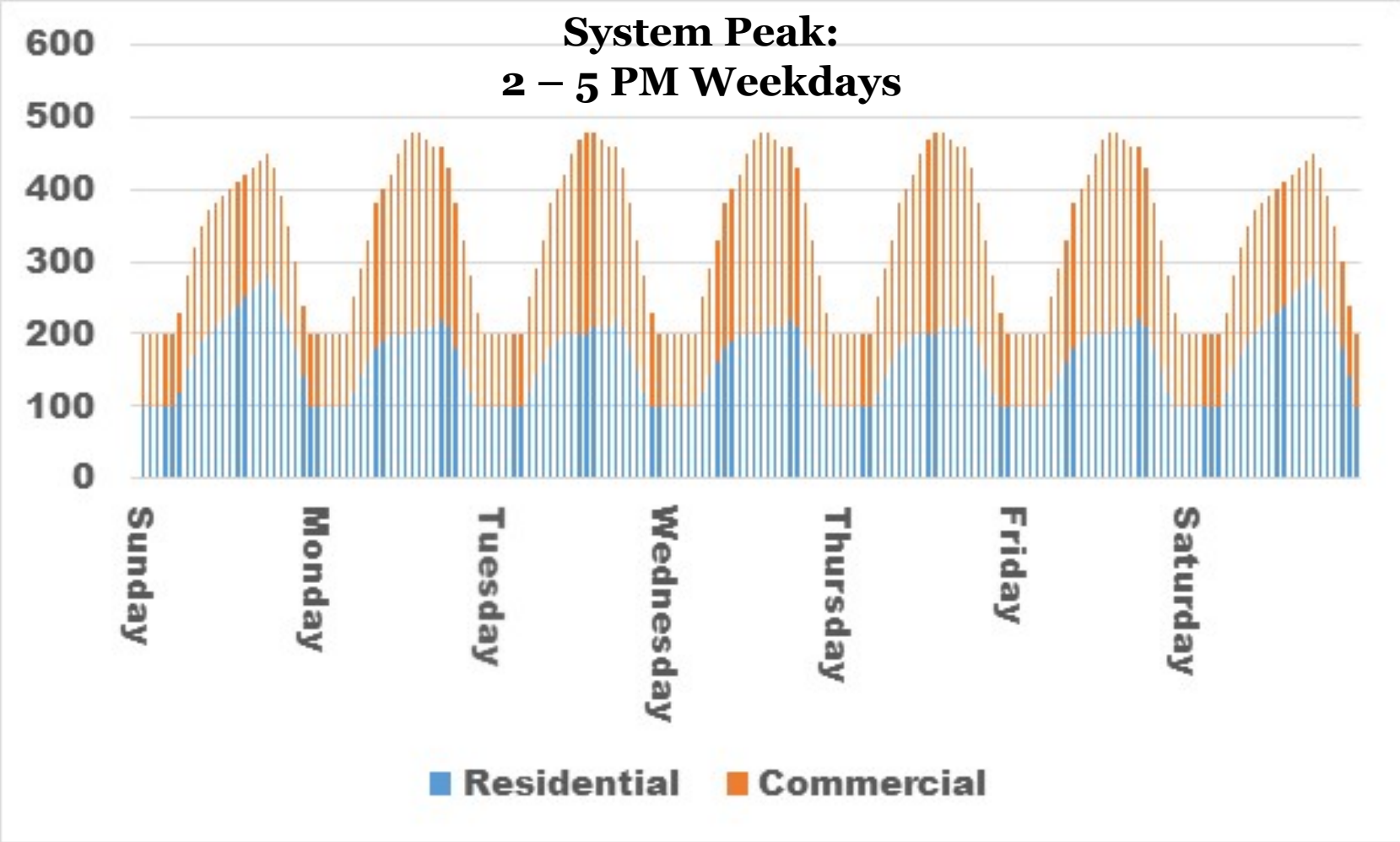
Different Classes and Circuits Peak at Different Times



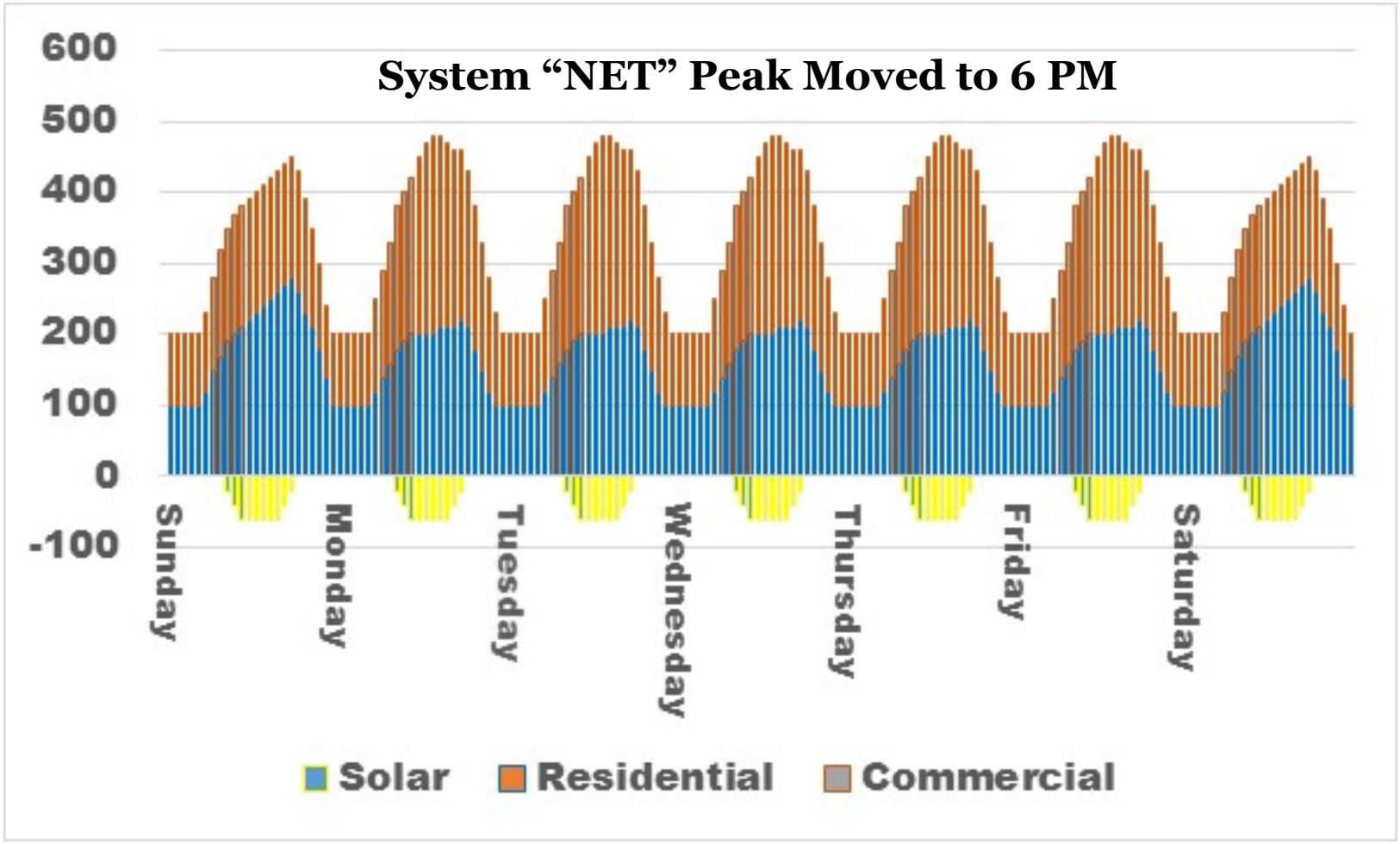
Class Demands May Drive Distribution Capacity Requirements



System Peak Drives Power Supply Costs



Solar Can Change This



Peak Load Impacts May Reach A Limit

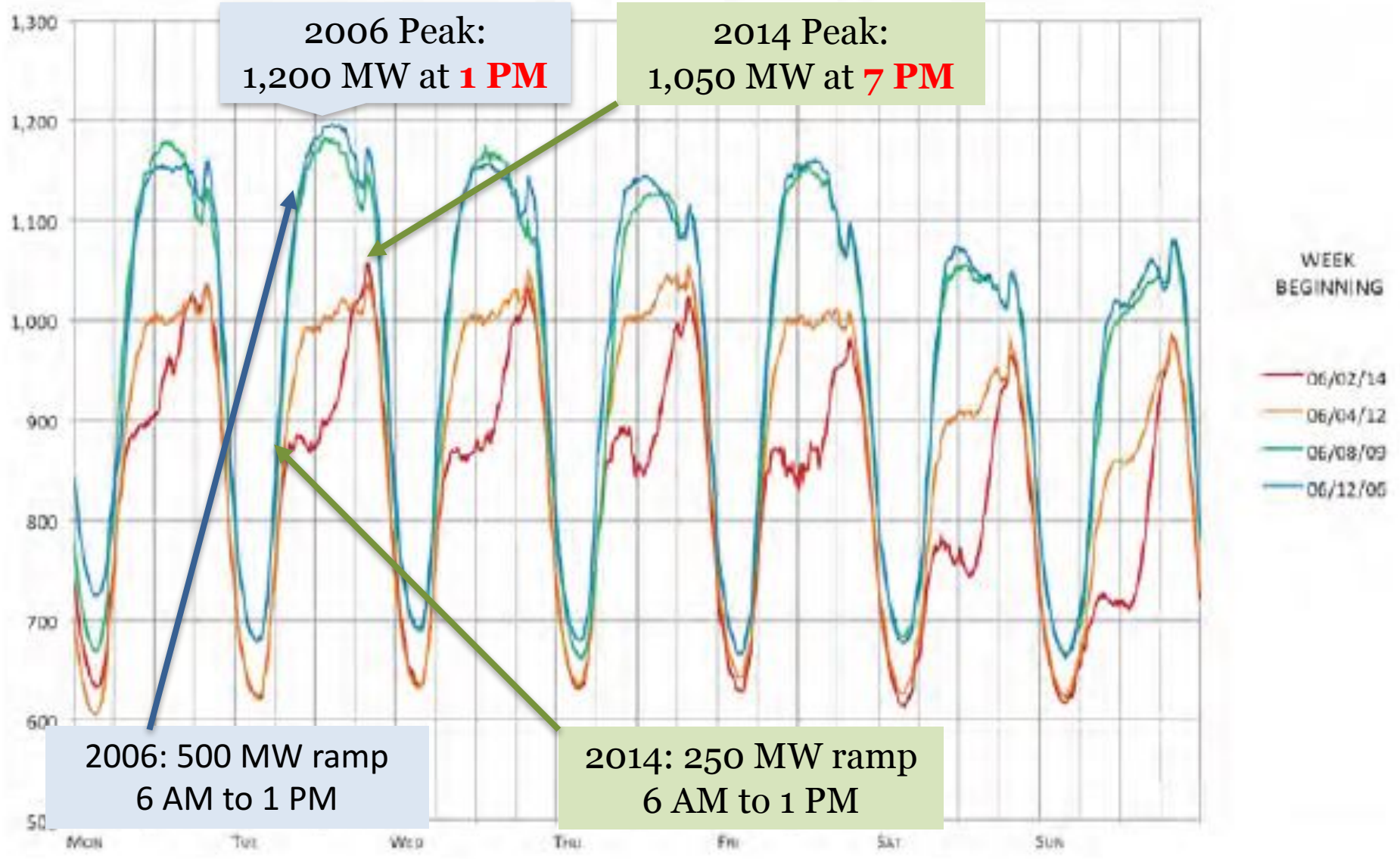


Figure 1-7. O'ahu System Load Profiles, 2006–2014

Source: Hawaiian Electric Co