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Smart Non-Residential Rate Design

California Public Utilities Commission

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Agenda

1. Why NR Rate Design Needs to Change
2. Match Fixed & NC Demand Charges Specifically to Cost Causation
3. Reward Load Diversity
4. Address Peak Demand
5. Establish Price Signals that Convey System Cost
6. Additional Considerations for a Model Tariff
7. Takeaways

1 Why NR Rate Design Needs to Change

Bonbright Principles Still Useful

1. Fair
2. Simple
3. Unambiguous
4. Revenue adequacy
5. Proxy for what competition would provide

Technologies Affect What is Possible

Some technologies are here…

- **Advanced metering**
- **Solar**
- **Wind**

Some technologies are ascending…

- **Battery storage**
- **Demand response**

Some are still emerging…

- **Ice air conditioning**

… and Desirable

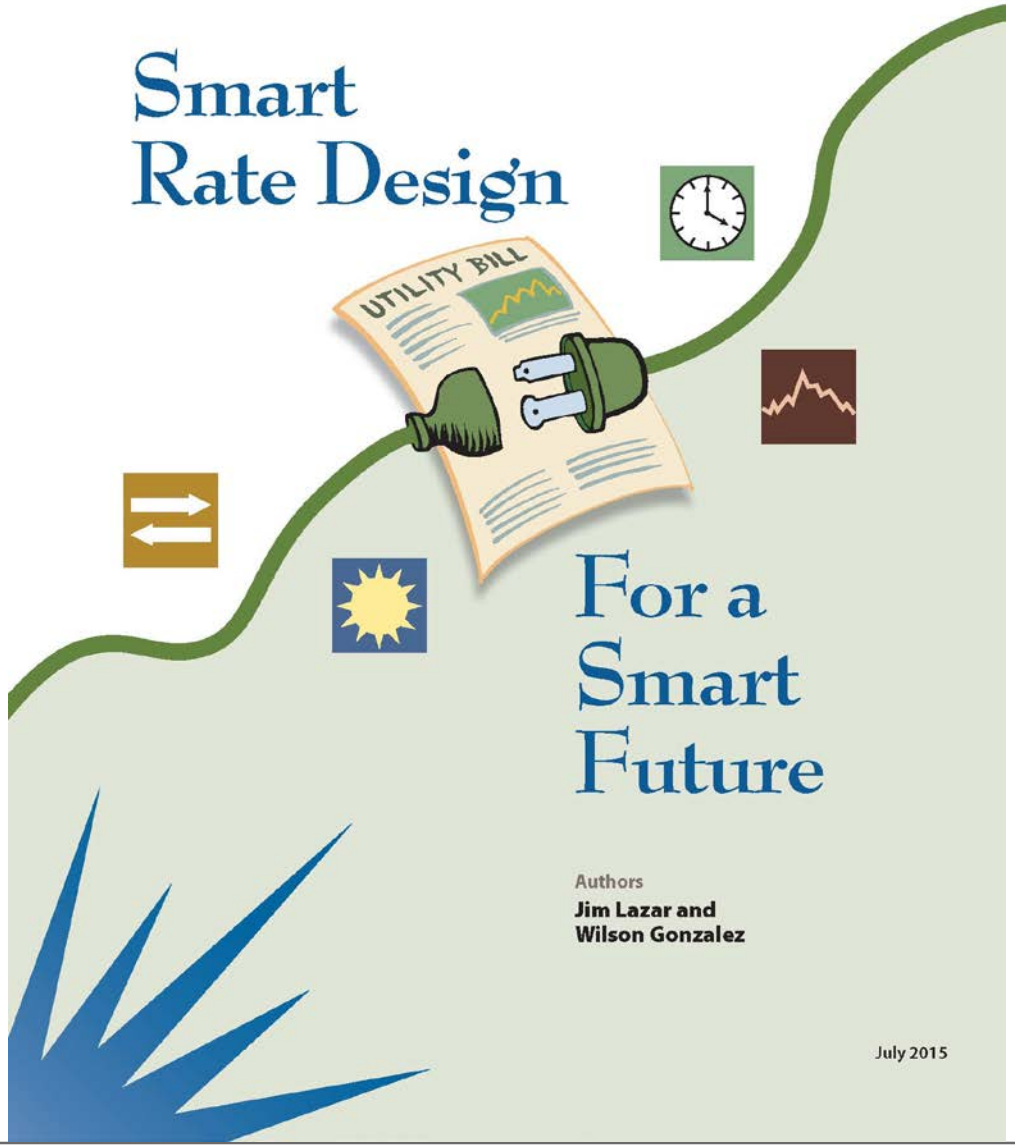
Technology delivers much lower carbon emissions -

- **Buildings sector**
- **Transportation sector**
- **Power sector**

California Policy Affects How Bonbright is Applied

- SB 350
- DER Action Plan
- And whatever is next

RAP® Energy solutions for a changing world



Illustrative Future Non-Residential Rate Design

Table ES-1. Proposed Illustrative Rate Design for Non-Residential Consumers

	Production	Transmission	Distribution	Total	Unit
Metering, Billing			$100.00	$100.00	Month
Site Infrastructure Charge			$2/kW	$2/kW	kW
Summer On-Peak	$0.140	$0.020	$0.040	$0.20	kWh
Summer/Winter Mid-Peak	$0.100	$0.015	$0.035	$0.15	kWh
Summer/Winter Off-Peak	$0.070	$0.010	$0.020	$0.10	kWh
Super Off-Peak	$0.030	$0.010	$0.010	$0.05	kWh
Critical Peak	Maximum 50 hours per year			$0.75	kWh

Optional Real-Time Pricing

- A wholesale energy cost component, charged on a per kWh basis, that fluctuates hourly
  - Based on CAISO locational marginal prices
- Transmission, distribution costs, and residual generation costs in time-varying rates

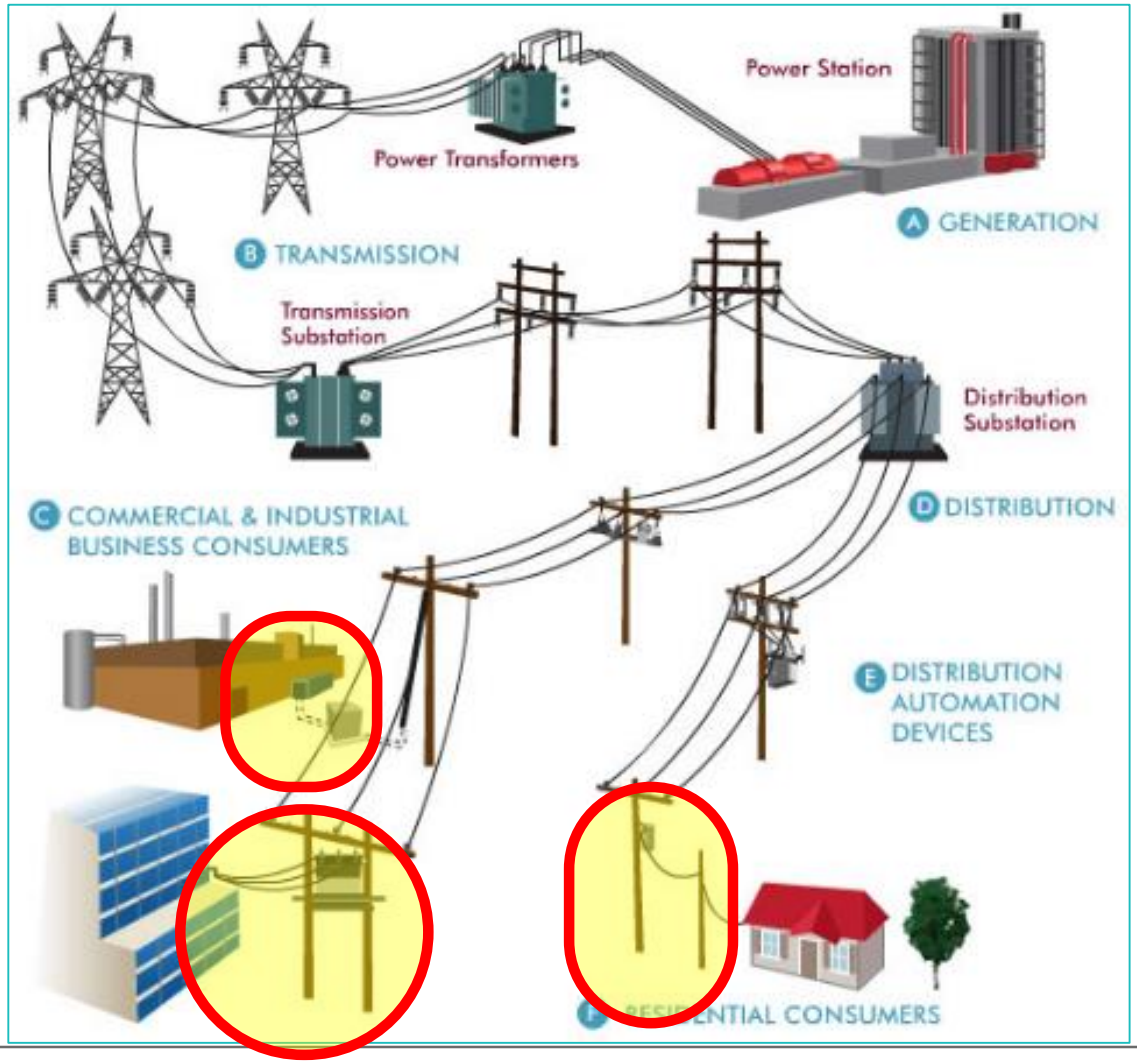
2 Match Fixed & NC Demand Charges Specifically to Cost Causation

NR Principle #1

- Service drop, metering, and billing costs should be recovered in a customer fixed charge

- Final transformer is a customer-specific charge

Costs that Vary with Customer NCP: Final Line Transformer and Service Drop



Large Non-Residential Customers Typically on Demand Charge Tariffs

Site Infrastructure Charge

Customer Type	NCP Demand	$/kW	Site Infrastructure Charge
Small Retail or Office	20 kW	$2	$40/month
Supermarket	300 kW	$2	$600/month
Office Tower	600 kW	$2	$1,200/month
Suburban Shopping Mall	2,000 kW	$2	$4,000/month

3 Reward Load Diversity

NR Principle 2.1

- **De-emphasize NCP demand charges except as noted in NR Principle 1**

- **All shared generation and transmission capacity costs should be reflected in system-wide time-varying rates so that diversity benefits are equitably rewarded**

Rate Design Matters:
Eversource impedes workplace charging in large commercial

NCP Demand Charge **$13.75/kW**

Energy Charge: **~$0.12/kWh**

6.6 kW charger, 200 kWh/month:

$90 Demand + $24 energy = $114 =

= $0.57/kWh or $5.70/gallon equivalent

Source: Jim Lazar, RAP

Rate Design Matters:

SMUD encourages workplace charging in large commercial prior to the system peak period

NCP Demand Charge: $2.82/kW

CP Demand: (2 – 8 PM, summer): $6.91/kW

Energy Charges:

Off-Peak: $0.10

Mid-Peak: $0.13

On-Peak (2 – 8 PM, Summer): $0.19

6.6 kW charger, 200 kWh/month:

$18.61 Demand + $23 energy = $42

= $0.21/kWh or $2.10/gallon equivalent

Source: Jim Lazar, RAP

Load Diversity Between School and Church

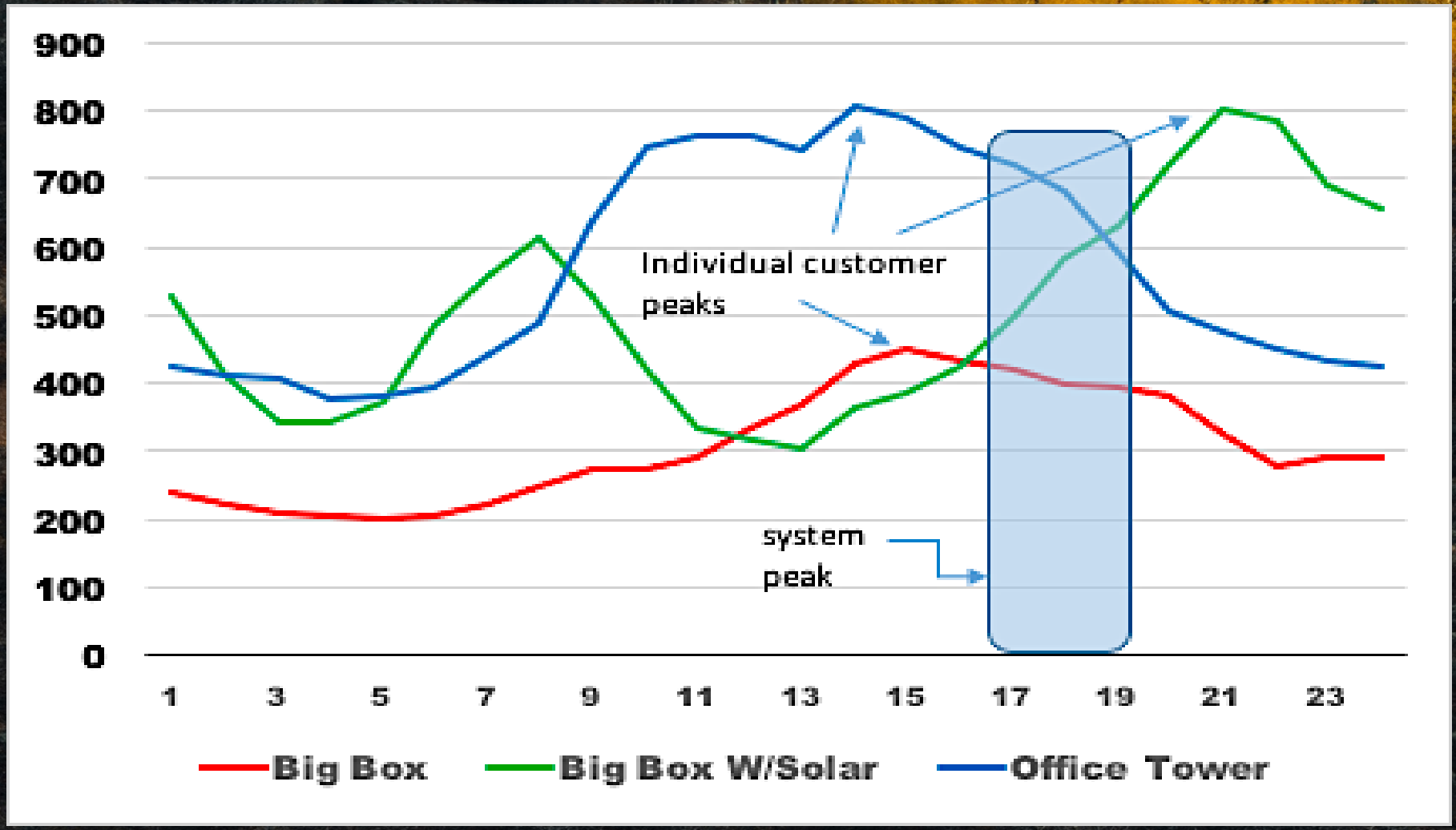
Hours	System Peak	Church	School	Mini-Mart	Total
Weekday 9-4	Mid-Peak	5	45	50	100
Weekday 4-8	On-Peak	5	15	50	70
Nights	Off-Peak	5	5	50	60
Weekend	Off-Peak	45	5	50	100
NCP		45	45	50	140
%		32%	32%	36%	
CP		5	15	50	70
%		7%	21%	71%	

4 Address Peak Demand

NR Principle 2.2

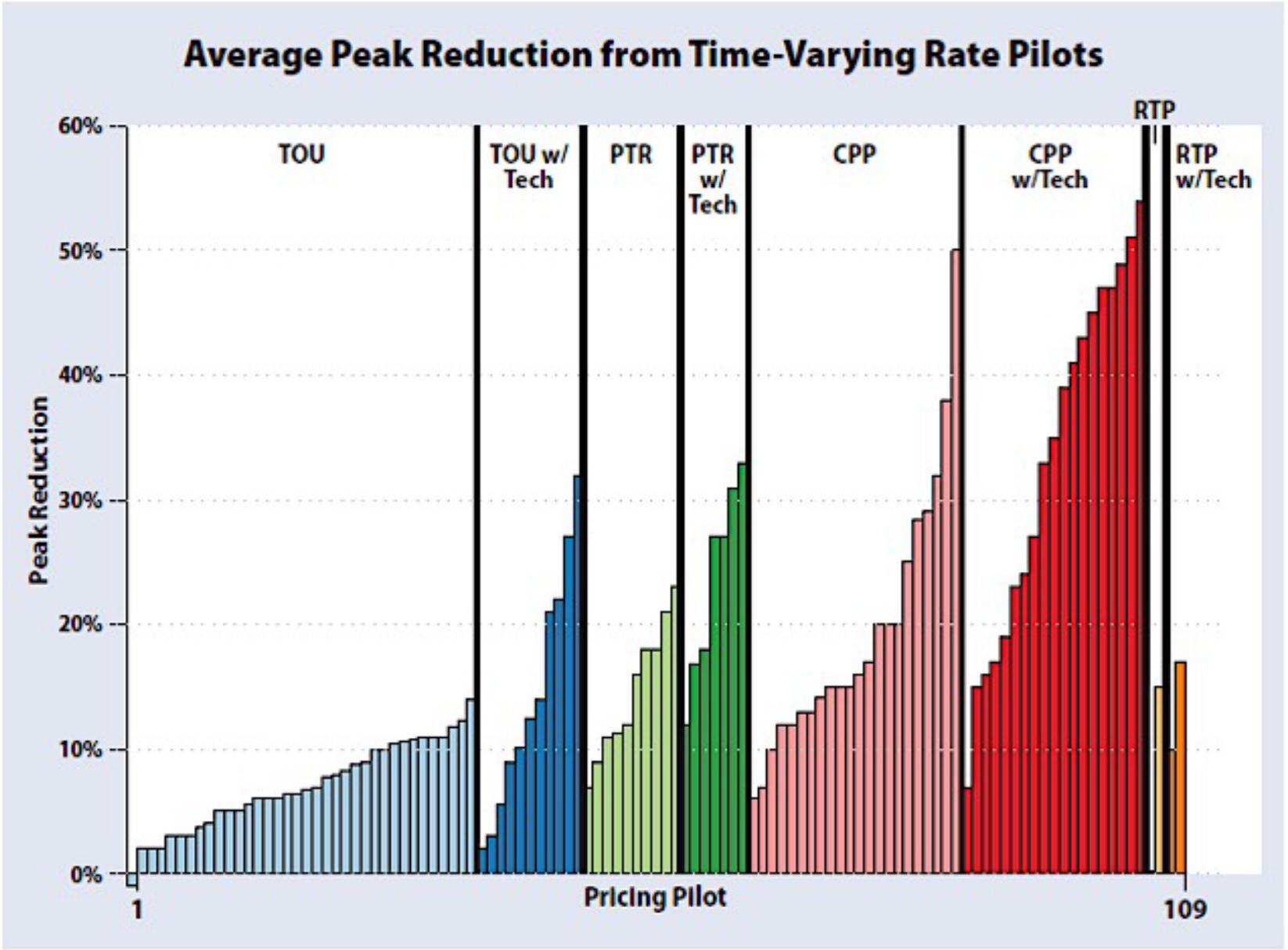
- **Shift shared distribution network revenue requirements into regional or nodal time-varying rates**

Three Actual Large Commercial Customers



Rate Designs That Address Peak Demand

- A Critical Peak Price
- Well-designed Time of Use Prices
- Transparent Real Time Prices
- Peak Time Rebates
- Coincident Peak Demand Charges

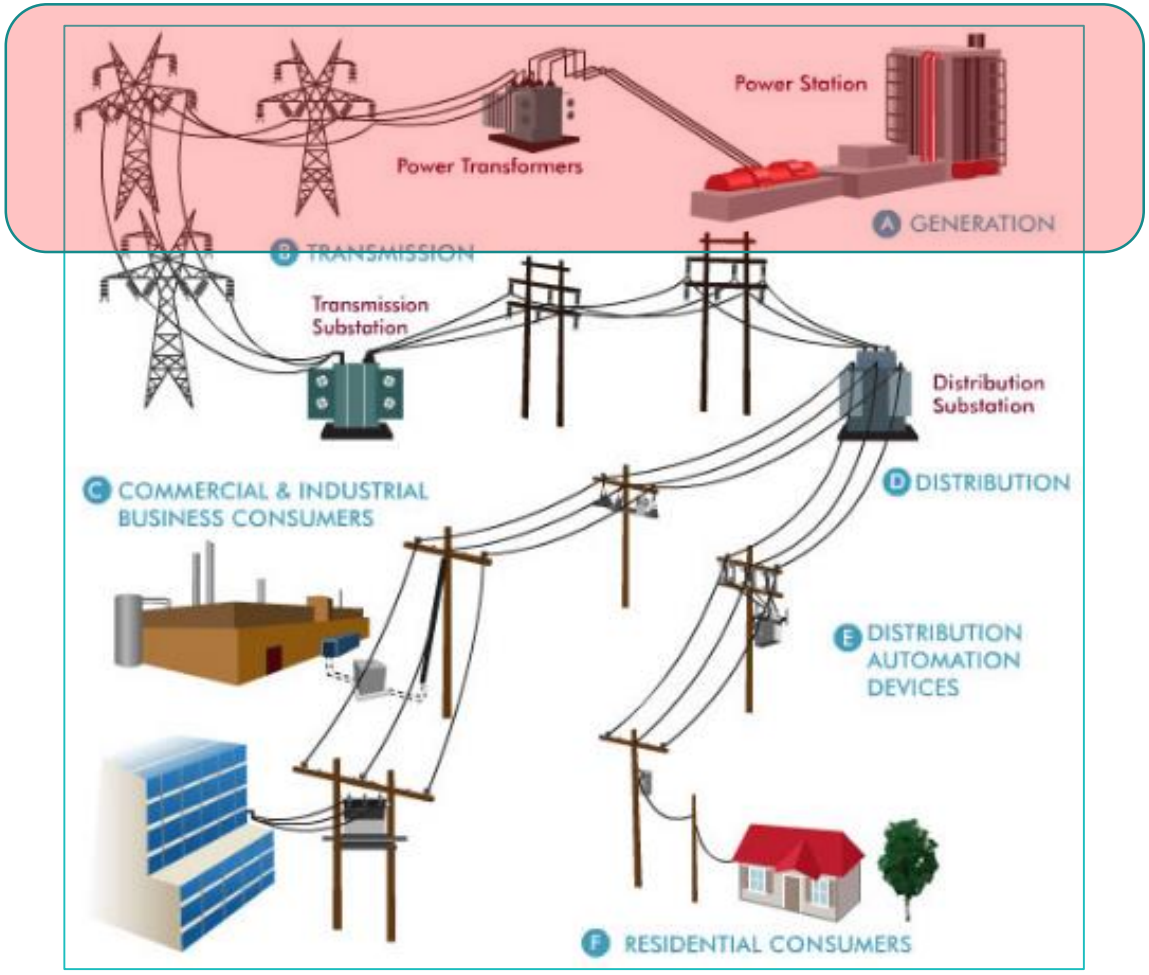

Average Peak Reduction from Time-Varying Rate Pilots
60%
50%
40%
30%
20%
10%
0%
Peak Reduction
TOU
TOU w/ Tech
PTR
PTR w/ Tech
CPP
CPP w/Tech
RTP
RTP w/Tech
1
Pricing Pilot
109

5 Establish Price Signals that Convey System Cost

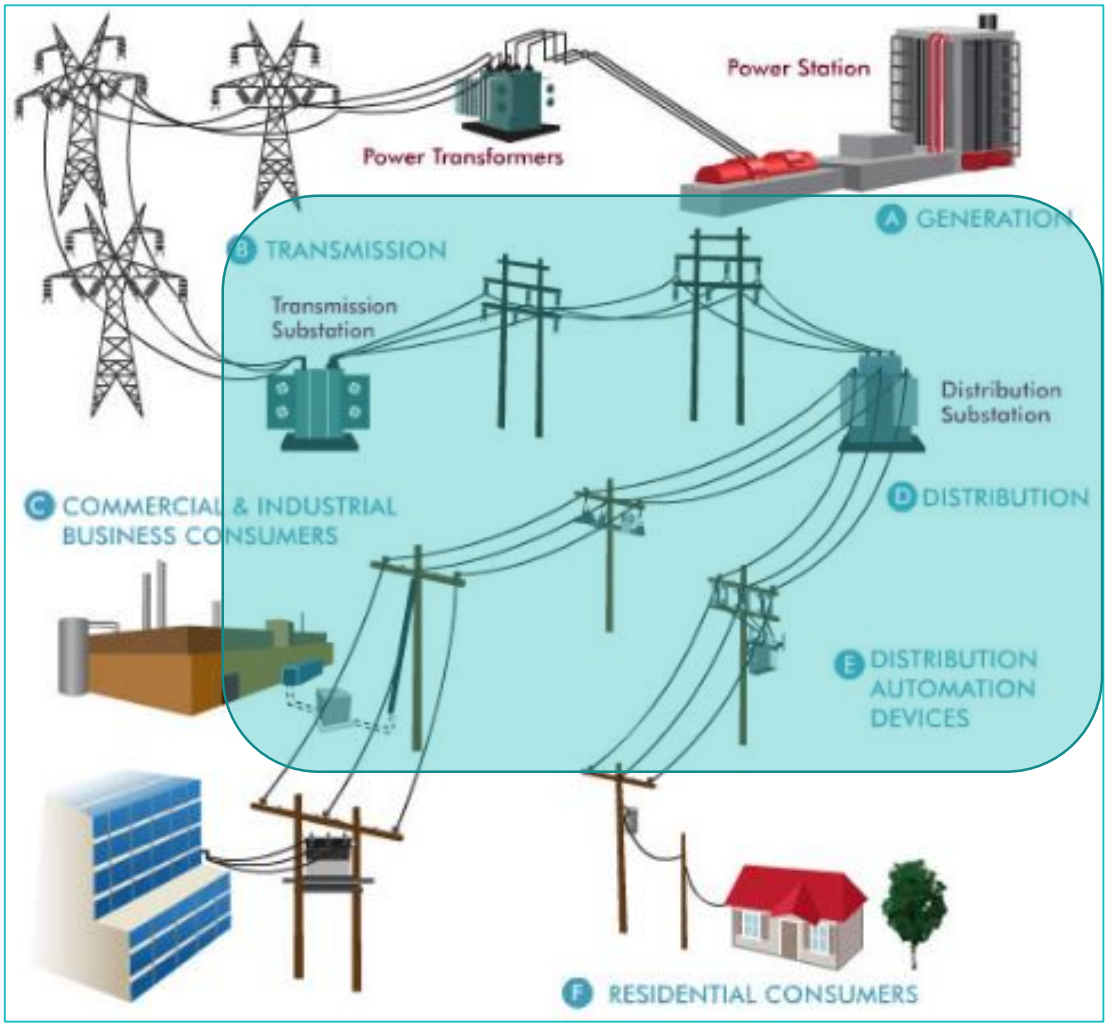
NR Principle 2.2

- **Shift shared distribution network revenue requirements into regional or nodal time-varying rates**

Costs that Vary with System TOU Loads: Generation and Bulk Transmission



Costs that Vary with Nodal TOU Loads: Network Transmission and Distribution



NR Principles 2.3 & 2.4

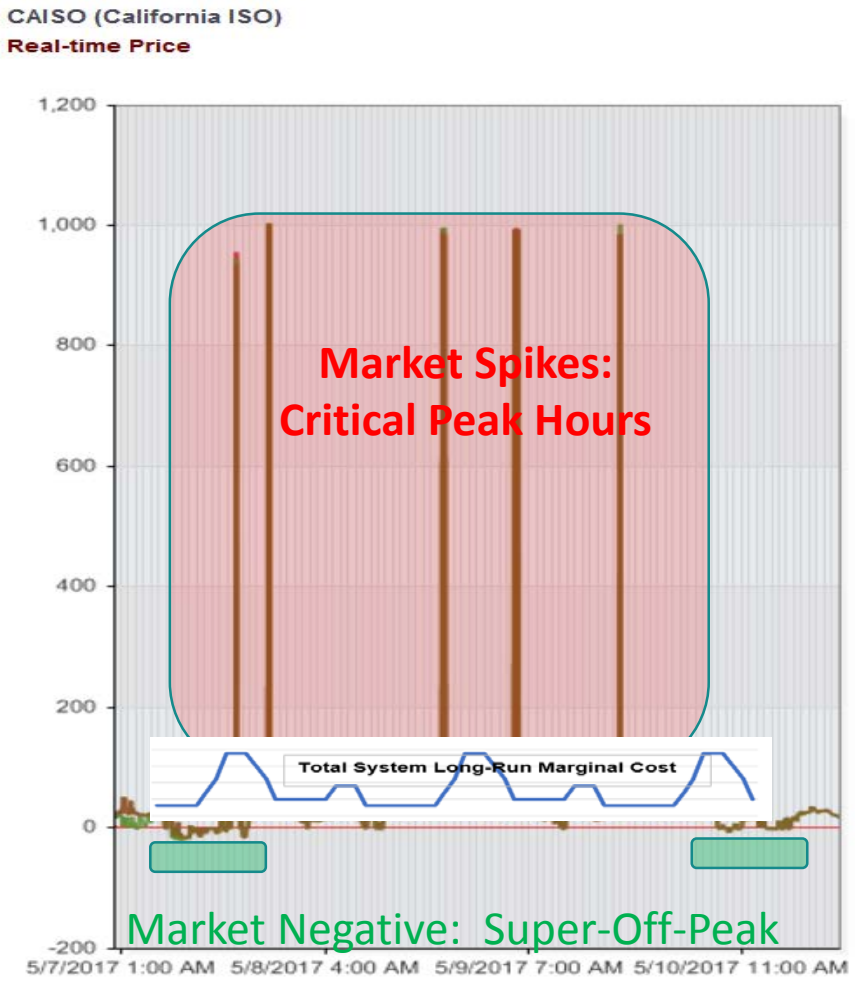
- **NR Principle 2.3: Consider short-run marginal cost pricing signals and long-run marginal cost pricing signals**
- **NR Principle 2.4: Time-varying rates should align incentives for controllable load, customer generation, and storage dispatch with electric system needs**

Focus on Long-Run Costs
Except when deviation is severe

Market spikes: Critical Peak Pricing

Market goes negative: Super-Off-Peak Pricing

Long-run marginal costs are the relevant, except during periods of severe deviation.



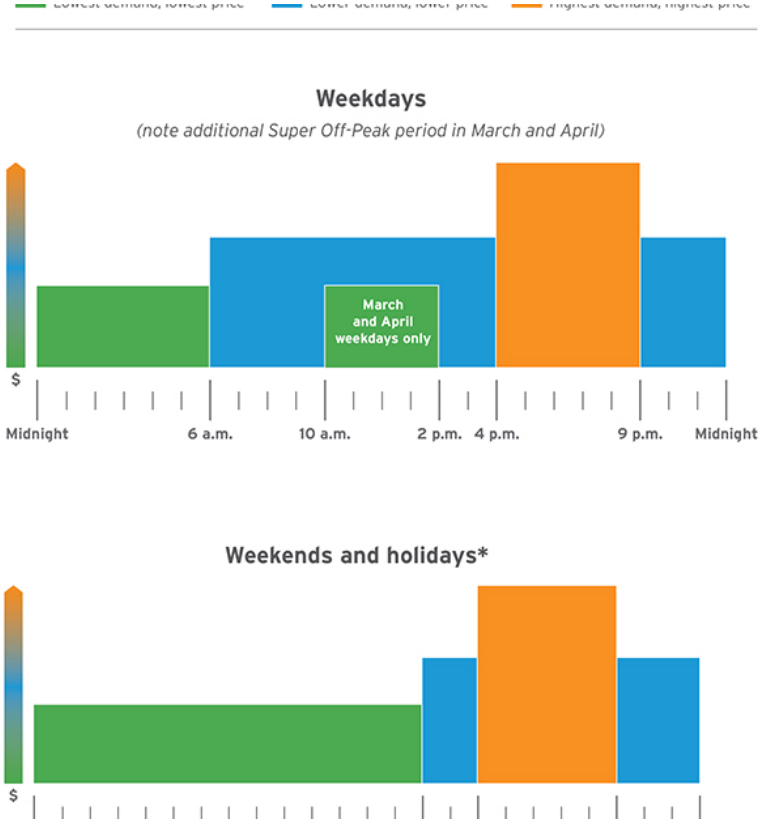
Reasons to Consider TOU Rates

- More equitable cost recovery
- Reduce peak demand
- Provide price signal for electric vehicle charging during off-peak and shoulder hours
- Provide price signal for air conditioning controls or ice storage
- Provide price signal for beneficial use of on-site storage

SDG&E New TOU Rates: A Big Improvement

On-peak period moved to early evening

Super off-peak period attractive for EV charging, ice-storage A/C and other controllable loads



6 Additional Considerations for a Model Tariff

NR Principle 2.5

- **Simple default tariff**
- **Optional tariffs with more granular elements**

What Utility Tariff Best Exemplifies Our Principles?

- We looked at about 20 utilities from CA, around the country and a couple of international examples
- We looked at:
  - Customer charges
  - Demand charges (Distribution and Generation)
  - Volumetric rates
  - Time of use rates
  - Seasonal rates

SMUD Rate Design
NR Best of Class

Customer Charge	$108/month	
Site Infrastructure Charge	$3.80/kW/month	
Super Peak Demand Charge	$7.65/kW	
Energy Charge	Summer	Winter
Super Peak	$0.20	N/A
On-Peak	$0.137	$0.104
Off-Peak	$0.109	$0.083

We made two changes:

1) Convert the super-peak demand charge to a critical peak energy charge, applied to specific hours of system stress;
2) Add a super-off-peak rate, to encourage consumption when energy is unusually abundant and market prices are near zero.

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Critical Peak	Maximum 50 hours per year			$0.75	kWh

Optional Real-Time Pricing

- A wholesale energy cost component, charged on a per kWh basis, that fluctuates hourly
- Tied to CAISO locational marginal prices
- Transmission, distribution, and residual generation costs would be collected in TOU rates

NR Principle 2.6

- **Optimal non-residential rate design will evolve as technology and system operations mature**

- **Opportunities to revisit rate design should occur regularly**

7 Takeaways

1. **Match Fixed & NC Demand Charges Specifically to Cost Causation**
2. **Reward Load Diversity**
3. **Address Peak Demand**
4. **Establish Price Signals that Convey System Cost**
5. **Include an Optional Real Time Pricing Tariff**

About RAP

The Regulatory Assistance Project (RAP)® is an independent, non-partisan, non-governmental organization dedicated to accelerating the transition to a clean, reliable, and efficient energy future.

Learn more about our work at raponline.org

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