



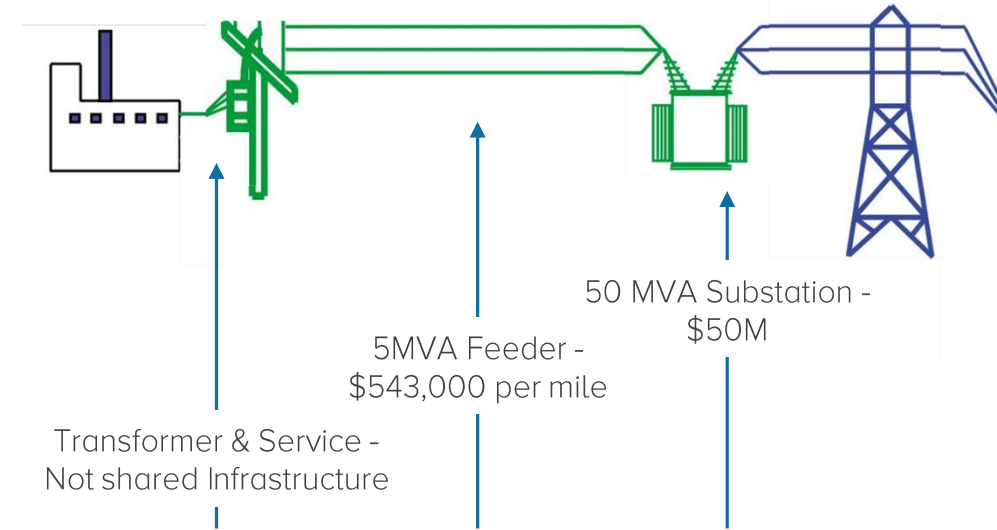
# CPUC ADVANCED RATE DESIGN FORUM

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Strategen Consulting- December 2017

# C&I customer asset costs are based on predicted demand

- Connection infrastructure (service, transformer etc.) is sized based on anticipated maximum demand.
  - Infrastructure can be expected to operate 20-30 years or more
- Regardless of overall energy throughput, the costs are fixed
  - Overloading a transformer (demand) reduces the life of the transformer but energy throughput does not



Estimated Customer Maximum Demand  
 This sizing reverberates up the distribution system

12/16kV 480V Transformer and 100' cable length		Shared Infrastructure	
Equipment	Unit Cost	Capacity of Feeder <sup>1</sup>	Capacity of Substation <sup>2</sup>
300kVA & Service	\$35,000	4%	<1%
500kVA & Service	\$44,000	7%	1%
750kVA & Service	\$51,000	11%	1%
1000kVA & Service	\$66,000	14%	1%
1500kVA & Service	\$92,000	21%	2%
2500kVA & Service	\$173,000	35%	3%

<sup>1</sup>Percentage of feeder capacity used by customer at a 0.7 coincidence factor

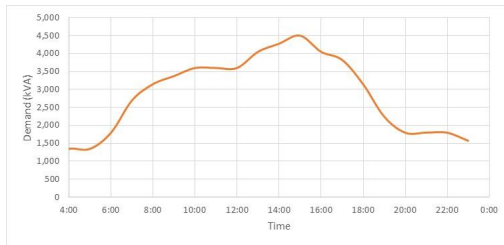
<sup>2</sup>Percentage of substation capacity used by customer at a 0.5 - 0.6 coincidence factor

[https://www.copper.org/environment/sustainable-energy/transformers/education/trans\\_life\\_cycle.html](https://www.copper.org/environment/sustainable-energy/transformers/education/trans_life_cycle.html)  
<https://www.mercatus.org/system/files/1904-AC04-DOE-Distribution-Transformers-TSD.pdf>  
 Averages and costs based on SCE 2018 rate case.  
[https://www.researchgate.net/figure/307868306\\_fig1\\_Figure-3-Electricity-distribution-network](https://www.researchgate.net/figure/307868306_fig1_Figure-3-Electricity-distribution-network)

# Load profiles at different levels of the system

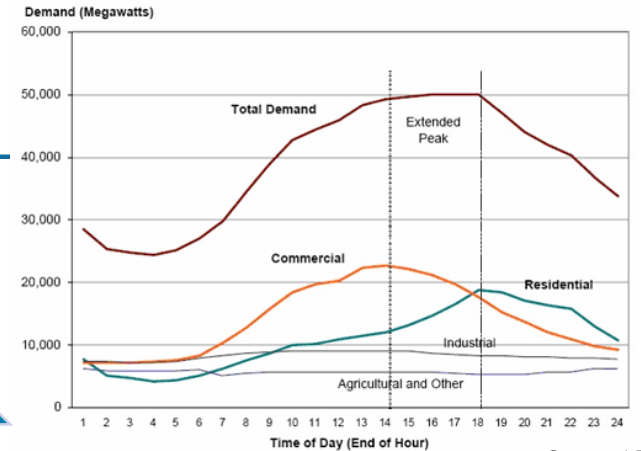
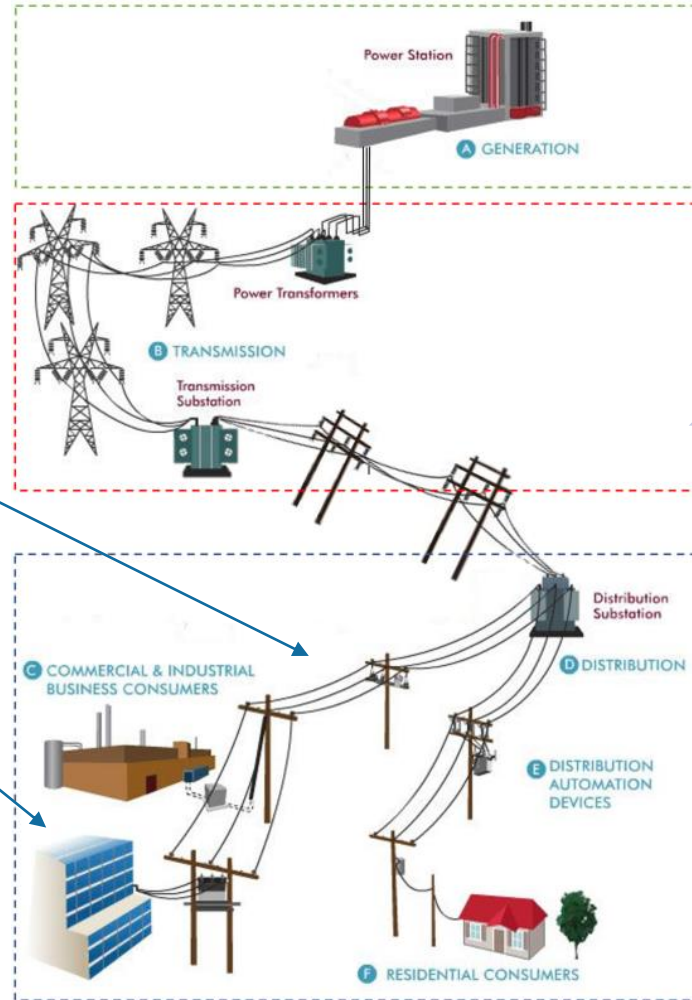
## C&I Feeder

- Commonalities emerge
- (eg. 9-5pm hrs).
- Peak during the day



## Single C&I customer.

- Load usage can be random.
- Difficult to assign a peak time.



Source: LBNL

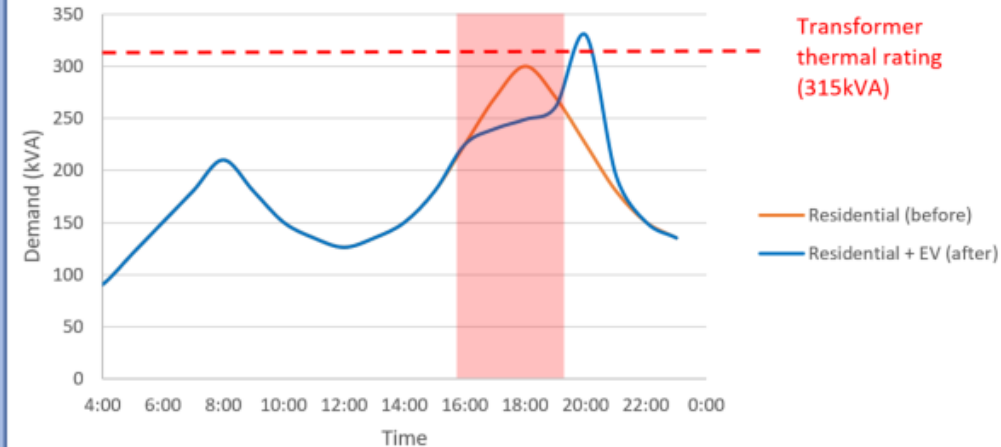
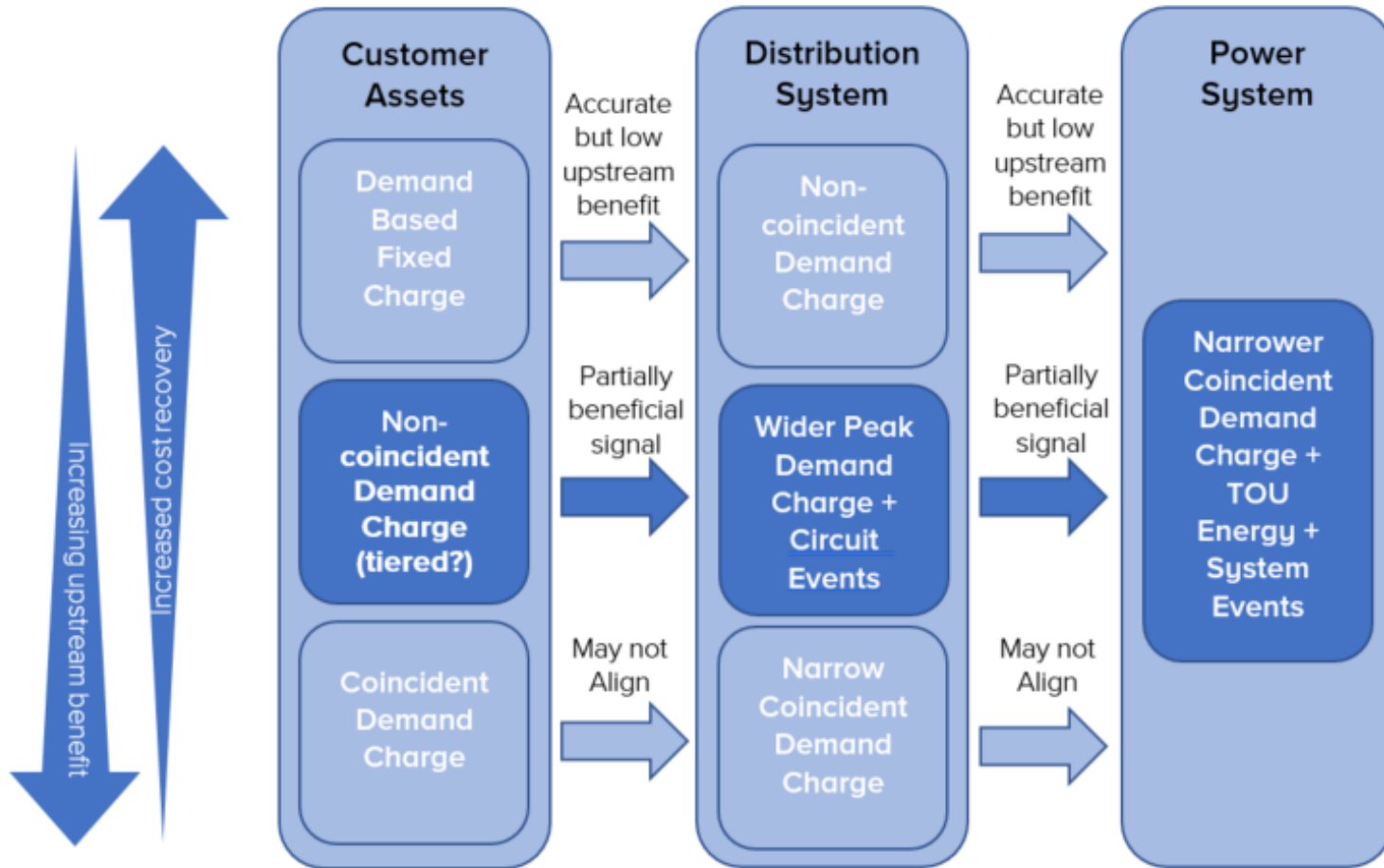
Customers Served

## System level

- Anomalies at lower levels are washed out and peak demand can be more easily predicted.



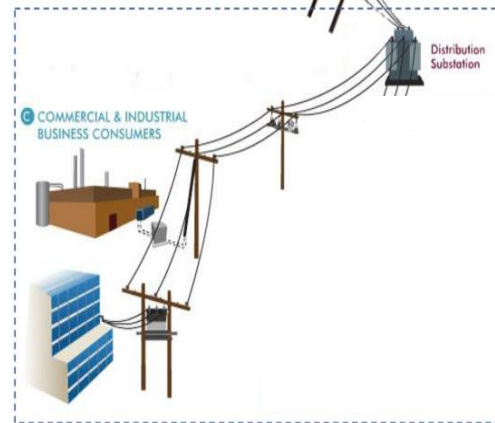
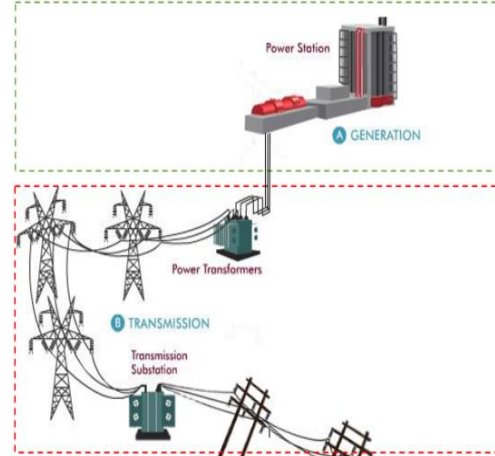
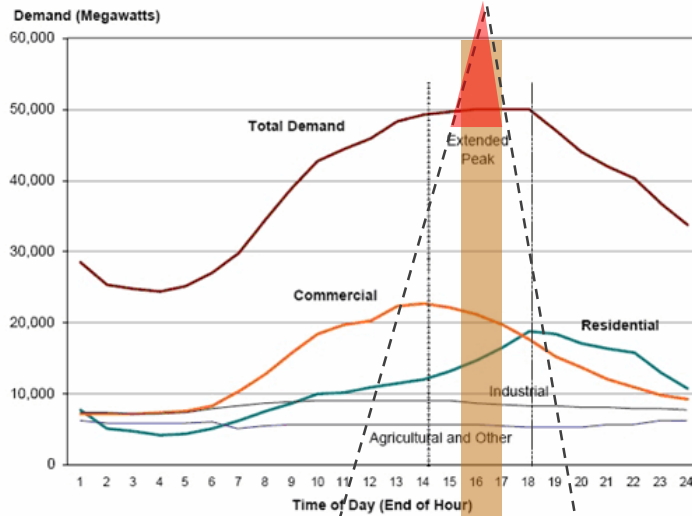
# Applicability of different charges to demand related investments



# Applicability of different demand charges

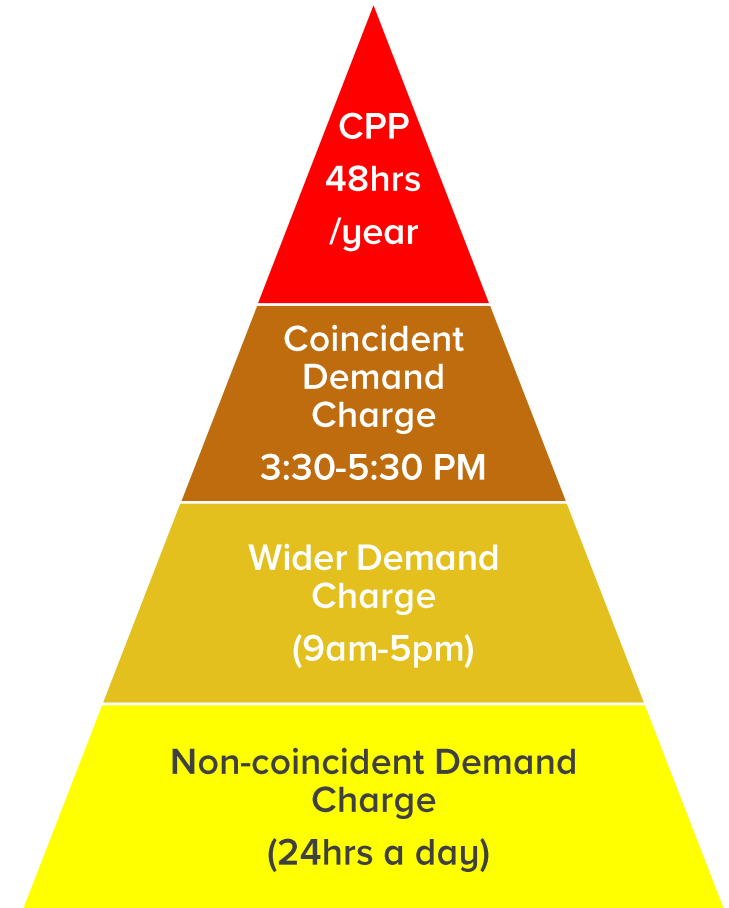
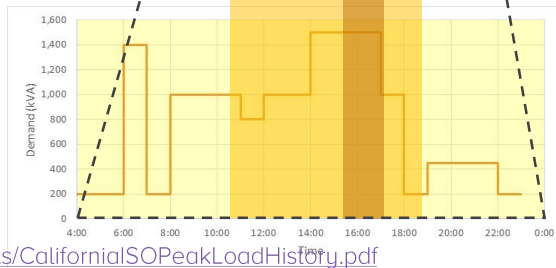
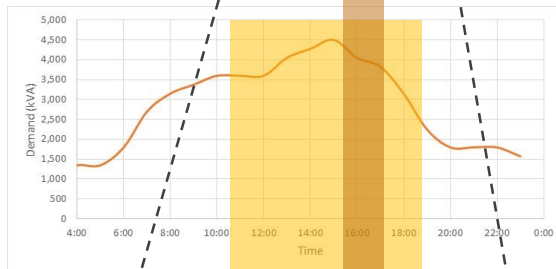
## System level

- Critical peak period demand charge
- Summer months
- 3:30pm – 5:30pm Based of historic system peaks



## C&I

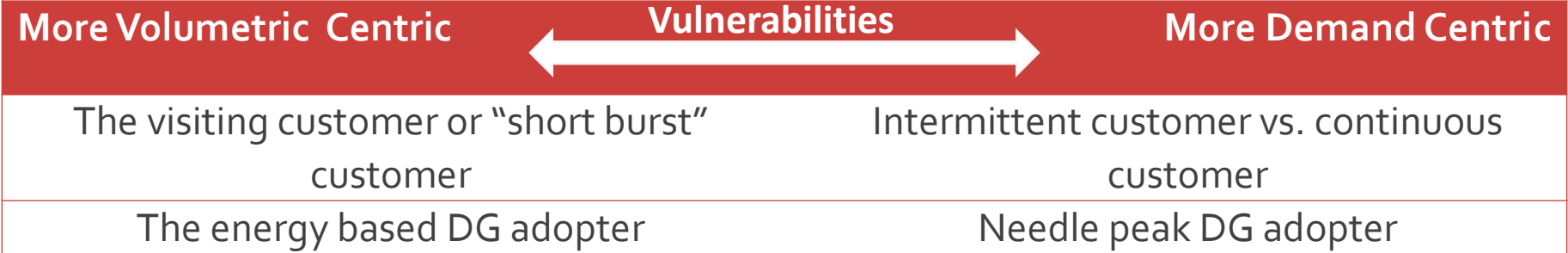
- Monthly demand charge all year between e.g. 9:00am– 5:00pm
- Daily non-coincident demand charge for all hours



Source: <https://www.caiso.com/Documents/CaliforniaSOPeakLoadHistory.pdf>  
[https://www.researchgate.net/figure/307868306\\_fig1\\_Figure-3-Electricity-distribution-network](https://www.researchgate.net/figure/307868306_fig1_Figure-3-Electricity-distribution-network)

# Comparison of rate tools

TOU Volumetric	<i>Coincident Daily Demand Charge</i>	<i>Coincident Monthly Demand Charge</i>
Easiest to understand	Easier to understand and less complex	Encourages close monitoring of load
Easiest to avoid demand linked costs	No “bad day” penalty	Promotes consistency
Encourages energy based technology	Encourages daily use of technology	Penalizes any high use of fixed infrastructure







# Thank You

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# REV Smart Home – Con-Ed

Table 3: SHR Demo Rates (CECONY)

Rate components	Rate components ( <i>billing determinants in italics</i> )			
	Rate A		Rate B	
Supply Charge	Hourly NYISO LMP prices, Zone H, I, J ( <i>kWh consumed each hour</i> )			
Embedded Delivery Charge	\$1.096 / max daily kW	<i>Daily charge based on interval with highest demand between 12 pm and 8 pm</i>	\$33.999 per kW subscribed	<i>Monthly charge based on subscribed kW preselected by customer (default level to cover 85% of eligible hours)</i>
Coincident Generation Event	\$11.344 / max event kW	<i>Incremental to daily demand charge. Event charge based on interval with highest demand during event hours. 24 hour advance notice provided for events, hours may vary by event and by event type.</i>	\$3.638 / kW (moderate days) \$7.051 / kW (extreme days)	<i>Event charge based on interval with highest demand during event hours. 24 hour advance notice provided for events, hours may vary by event.</i>
Coincident Transmission Delivery Event	\$1.145 / max event kW		\$1.748 / kW over (moderate days) \$3.029 / kW over (extreme days)	<i>Incremental to subscription. Overage based on interval with highest demand during event hours. Overage penalty only charged on demand above subscribed kW. 24 hour advance notice provided for events, hours may vary by event and by event type.</i>
Coincident Distribution Delivery Event	\$4.608 / max event kW		\$7.010 / kW over (moderate days) \$12.216 / kW over (extreme days)	
Fixed Monthly Customer Charge	\$15.76 per month			
Adjustments and Surcharges	\$0.XX ( <i>kWh consumed</i> ); varies, includes System Benefit Charges, MAC, RDM, etc.			