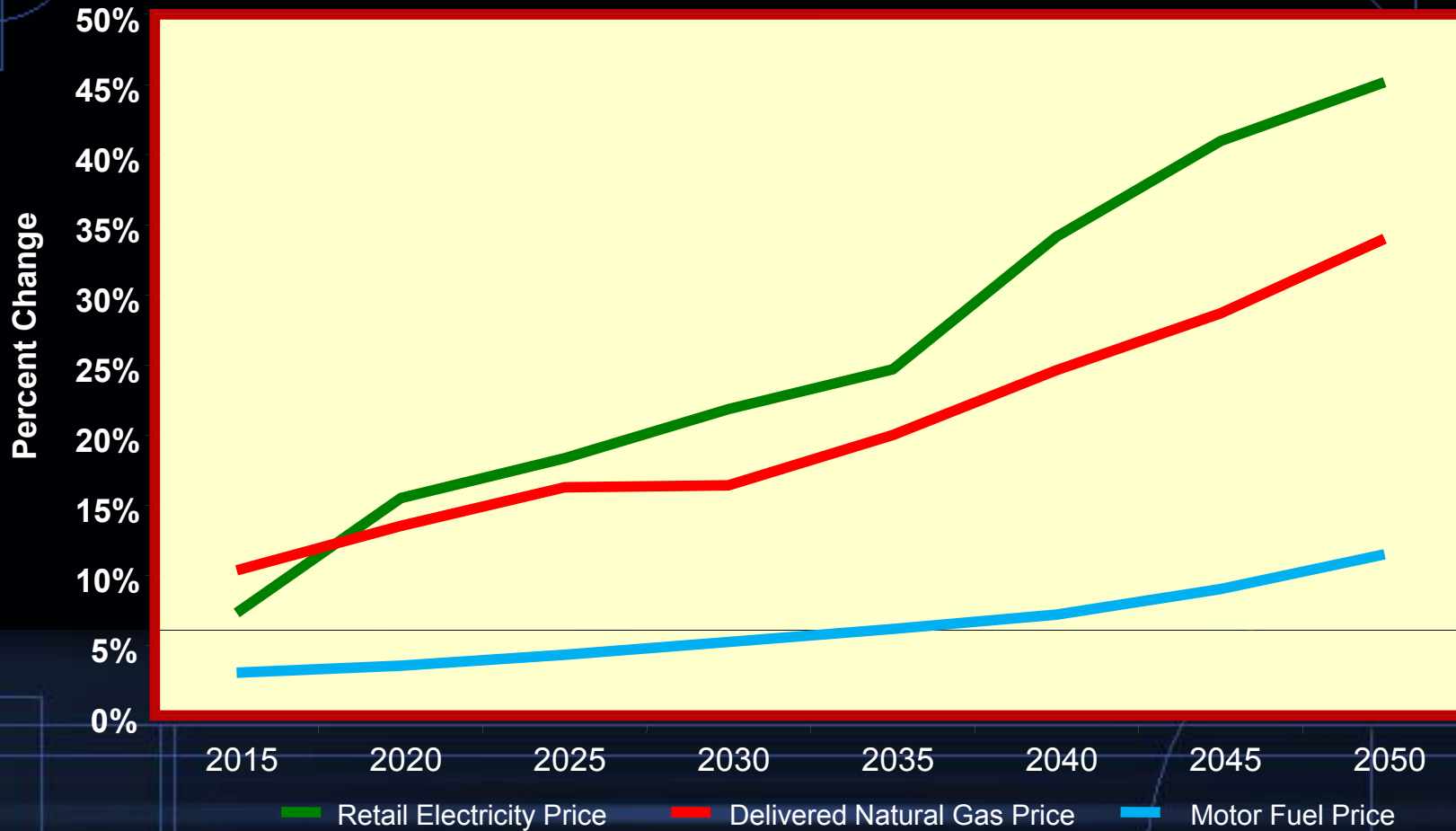


Green House Gas Price Impact on Electricity Natural Gas and Motor Fuel at the Pump



Interruptible Credits

- Recent trend among utilities to under-value credits paid to interruptible load
- Long term avoided resource costs vs. short term avoided costs of market purchases
- Short term valuation does not properly reflect capacity value of interruptible load
- Short term approach may be appropriate in certain circumstances
- One reasonable approach to long term valuation is the cost of a combustion turbine peaking unit

Riders/Automatic Price Adjustment Clauses

- Riders are designed to track changes in only a single cost item
 - Most common riders: fuel and purchased power adjustment mechanisms
 - DSM costs and/or lost revenues are becoming more common for rider recovery
- Intended for significant, volatile cost items beyond utilities' control
- Riders often misused by utilities
- Utilities attempt to shift risk to customers

Rider Advantages / Disadvantages

ADVANTAGES

- Matches cost with revenue of covered item
- Can reduce the need for frequent rate cases

DISADVANTAGES

- Constitutes single-issue ratemaking
- Can increase utilities revenues
- Provide no incentive for cost control

Automatic Price Increase

- **Proposed Illinois Legislation**
 - House Bill 14
 - Formula ratemaking allows for automatic yearly price increase
 - Less oversight than current regulatory process
 - After-the-fact review shifts burden of proof to consumers

Nuclear Generation

- Provides approximately 20% of electricity in U.S.
- U.S. has not approved new nuclear plant in 30 years
- Large capital costs vs. low fuel costs
- Recent legislation proposed in Iowa for recovery of costs for construction work in progress (CWIP) for nuclear generation
- Nuclear generation's future - ???
- Small modular reactors (SMR)

Other Issues

- **Allocation of wind direct costs**
 - Capital cost and fixed O&M
 - Energy resource vs. traditional fixed cost
 - Energy resource basis penalizes large users of electricity

Other Issues

- **FERC Order 745**
 - Demand response resources compensated for services provided to energy market at market price for energy or locational marginal price (LMP)
 - Helps to ensure competitiveness of organized wholesale energy markets and remove barriers to the participation of demand response resources, thus ensuring just and reasonable wholesale rates.

Emerging Issues Questions

Basic Concepts



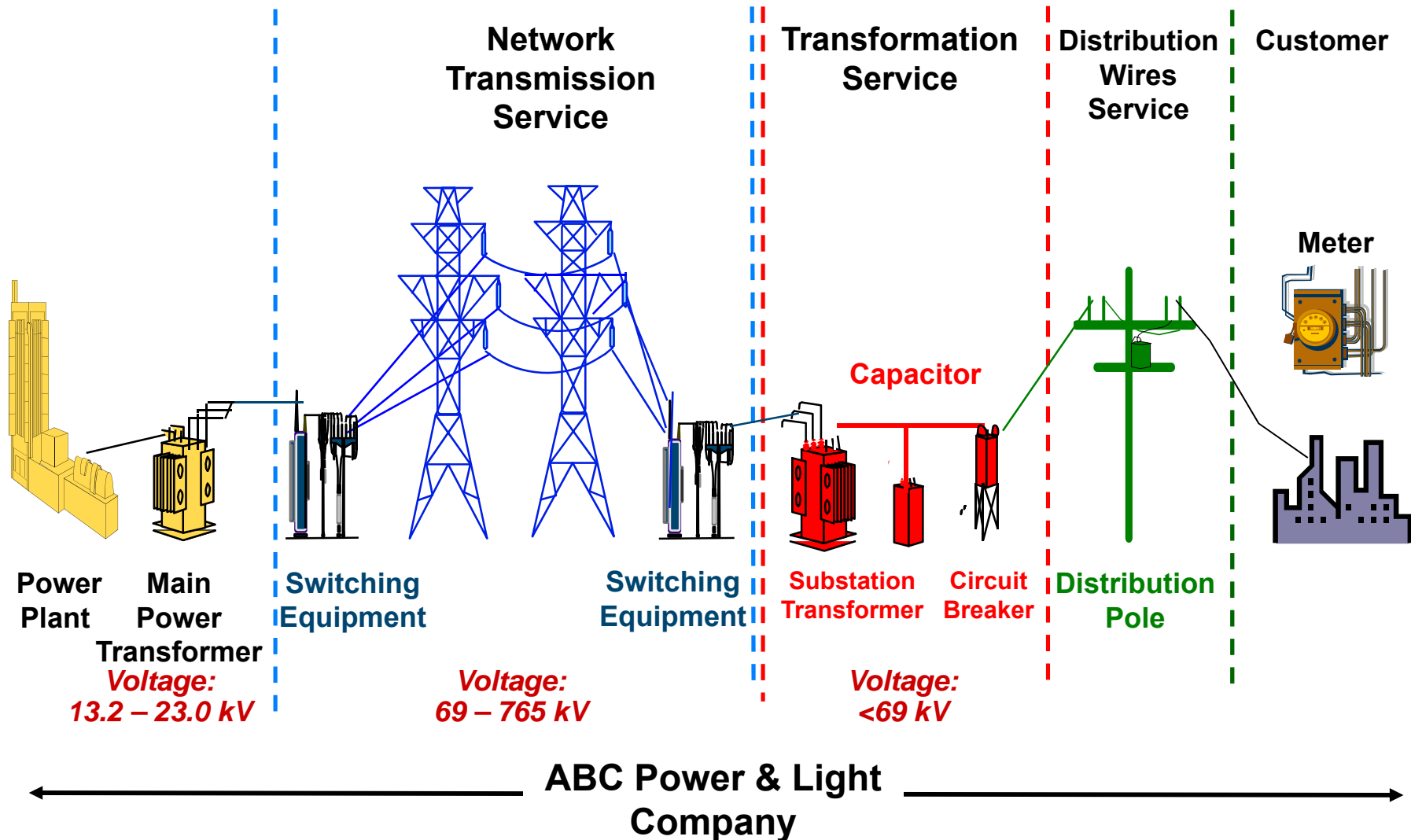
Electric System Functions

- Generation
- Transmission
- Distribution
- Customer



Electric System Functions

Functional Components of an Integrated Electric Utility Company



Energy vs. Demand

- Energy = Work (light, heat, motion)
- Demand = Rate of Work
- Energy ~ Distance
- Demand ~ Speed
- Energy = Demand Summed (integrated) over time

Measuring Energy

- 1,000 watt-hours = 1 kilowatt-hour (kWh)
- 1,000 kWh = 1 megawatt-hour (MWh)
- 1,000 MWh = 1 gigawatt-hour (GWh)

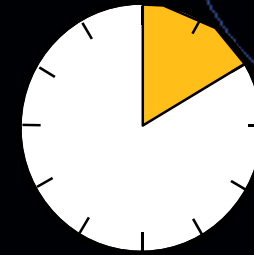
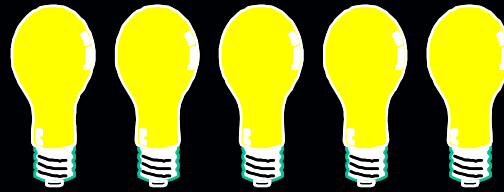
Measuring Demand

- **1,000 watts** = 1 kilowatt (kW)
- **1,000 kW** = 1 megawatt (MW)
- **1,000 MW** = 1 gigawatt (GW)

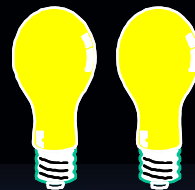
Do Not Confuse the Two

- Energy in Megawatthours
- Billed no matter when you use it.
- Demand in Kilowatts
- Billed based on Peak (maximum) demand in month

Relationship Between Energy and Demand



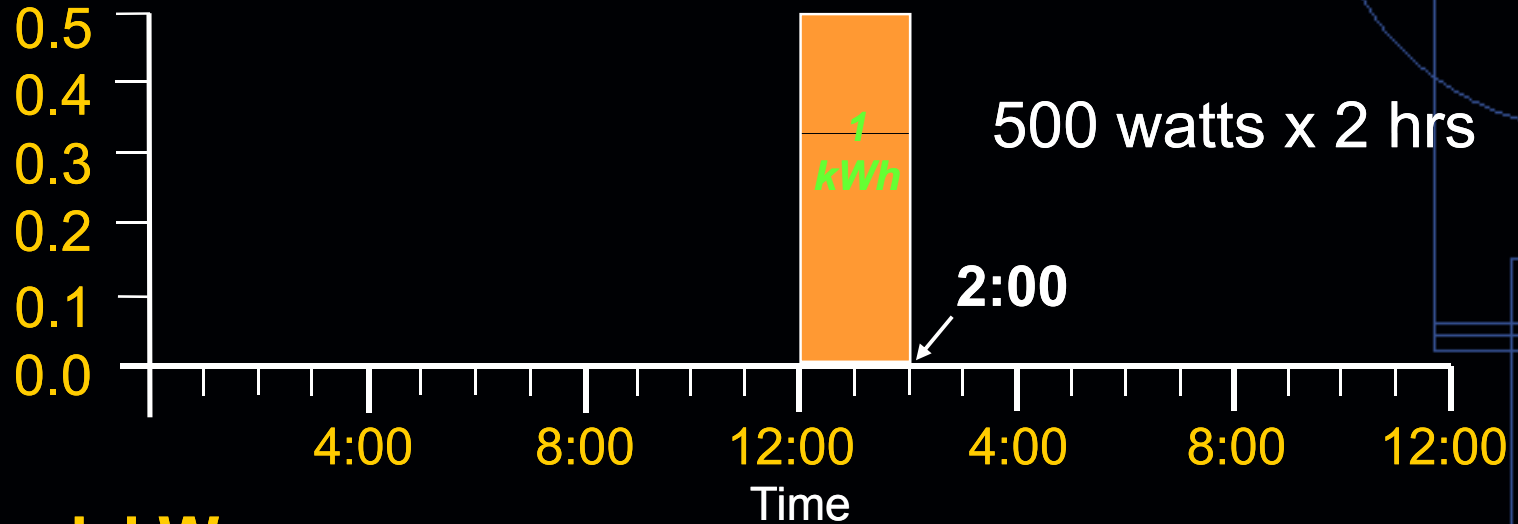
Energy: 500 watts x 2 hours = 1000 watthours = 1.0 kWh
Demand: 500 watts = 0.5 kW



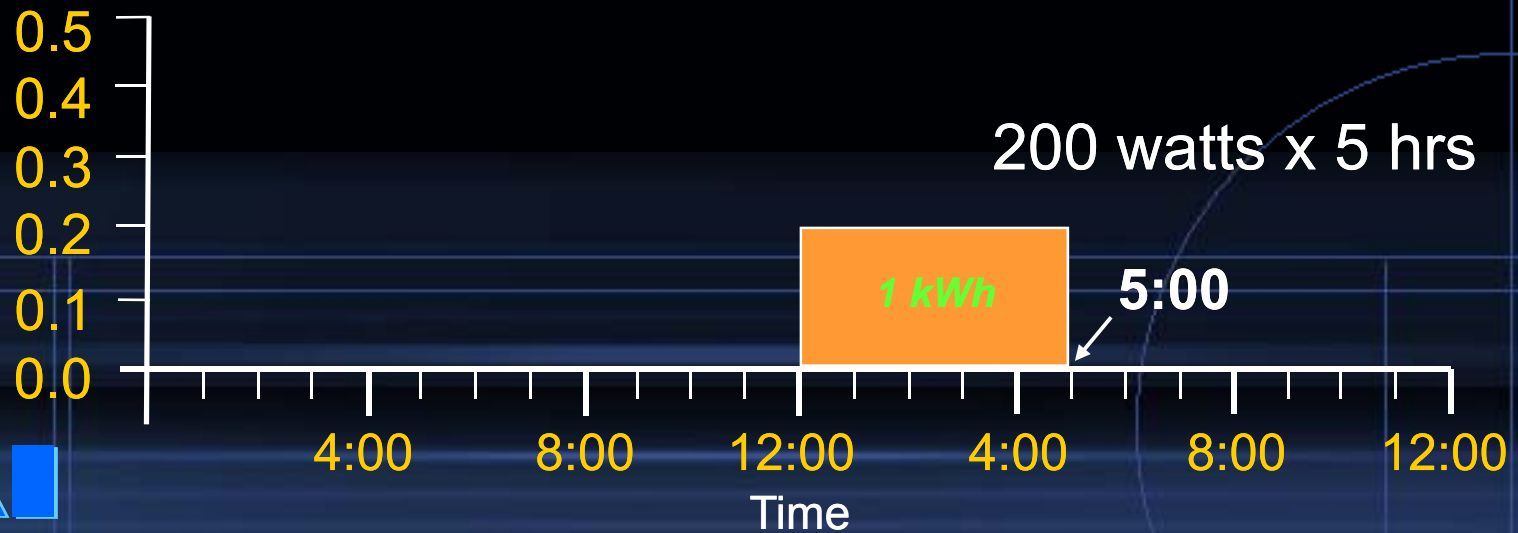
Energy: 200 watts x 5 hours = 1000 watthours = 1.0 kWh
Demand: 200 watts = 0.2 kW

Daily Demand Pattern

Demand kW



Demand kW



Load Factor

- Relationship between demand and energy usage
- Measures how efficiently you are using your electricity
- Average Demand / Peak Demand
- Average Demand = Energy Usage / Time of Consumption

Load Factor

$$\text{Monthly LF} = \frac{\text{kWh consumed in } \textit{month}}{\text{Peak kW of Month} \times \sim 730 \text{ Hours}}$$

$$\text{Annual LF} = \frac{\text{kWh consumed in } \textit{year}}{\text{Peak kW of Year} \times 8,760 \text{ Hours}}$$

Why is Load Factor Important?

- Load factor measures how efficiently a class utilizes facilities installed to meet maximum demand
- Most fixed costs related to demand
- In general, a higher load factor suggests more energy is taken off-peak

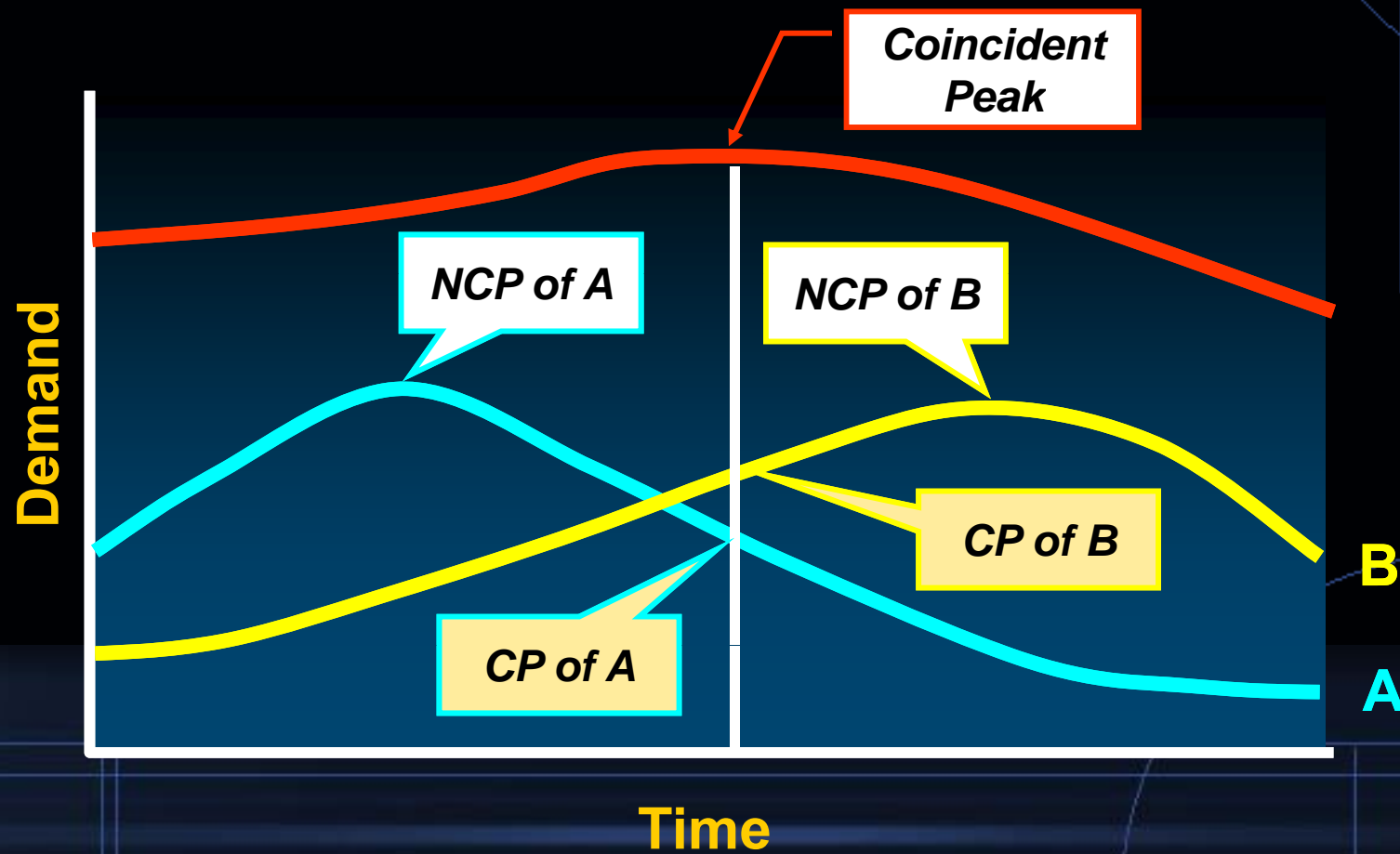
It Costs Less (per MWh) to Serve a High Load Factor Customer!!!

- High Load Factor customer spreading fixed costs over a larger number of MWh

Two Measures of Demand

- **Coincident vs. Non-Coincident**
 - Depends upon time of peak demand
 - Coincident demand looks at time when system is peaking (monthly or annually)
 - Non-Coincident looks at individual customer or class

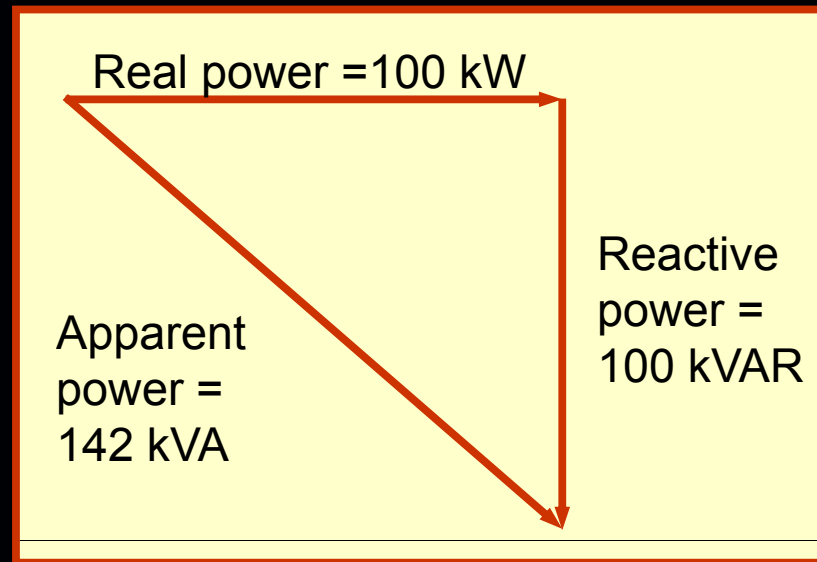
CP and NCP Demands



Reactive Power

- Occurs when voltage and current are out of phase
- Real power (kW) flows from generator to load
- Reactive power (kVAR) flows back and forth and supplies no energy
- Reactive power has a cost and contributes to losses

Power Factor Triangle



Real power = 100 kW

and

Apparent power = 142 kVA

then

Power Factor = $100/142 = 0.70$ or 70%

Why Improve Your Power Factor?

**Utilities usually charge a
penalty for power factors
less than 0.95 or 95%**

QUESTIONS?