Econ 101
Resource Planning at Electric Utilities

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Today's discussion

1. How are electric utilities different from other businesses
2. Electric utility business models
3. How do Public Power providers differ?
4. How do electric utilities plan to meet customer demand?
5. Importance of "Keeping the Lights On"
6. What variables influence electric utility resource planning decisions?
7. What are the key issues relative to preparation of a resource plan?
8. How do these concepts relate to electric generation at Glen Canyon Dam?
9. Recap

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How are electric utilities different from other businesses?

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Utility evolution to monopoly status

- Multiple providers in same area did not make economic sense
- Monopoly status given to utilities
- Utilities agreed to rate and service regulation
- Exclusive service territories established

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Electricity is a unique product

- Produced at the same time it is consumed
- Customers do not order the product
- Very limited ability to store the product
- Reliability of service is critical

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Electricity markets are unlike markets for most other products

- Wholesale prices are occasionally higher than retail prices
- Electric utilities sell at wholesale and retail levels
- Electric utilities transact wholesale business amongst themselves
- Location can have a significant effect on price
- Significant transportation barriers exist between some markets
- Regulation at wholesale and retail levels performed by different agencies

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Electric utility business models

Differences between Investor Owned Utilities (IOUs) and Public Power

	Investor Owned Utilities	Public Power
Source of Funds	Stocks, Bonds, retained earnings	Bonds, Revenues in excess of costs
Ownership	Stockholders	Customers
Business Objectives	Customer Service Return to Stockholders	Customer Service
View of Costs and Revenues	Revenues need to cover business costs and provide return to stockholders	Revenues need to cover costs of running the business

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Regulatory structure

- FERC regulates wholesale activity between utilities
- State utility commissions regulate rates and service for IOUs but have less authority over Public Power
- Utilities have established their own internal regulatory structure – Regional Reliability Councils
  - Councils establish standards for many aspects of electric utility design, operation and maintenance
  - Primary objective is to insure high level of service reliability for retail customers
  - WECC is the Council for the western US
    Public Power customers are subject to reliability standards as prescribed by WECC

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How do Public Power providers differ?

- Development of Preference Power concept – Electricity produced from Federal power projects would be marketed to Public Power utilities
- Preference concept implemented by USBR
- Preference concept used to market power from dams that constitute the Colorado River Storage Project, which includes Glen Canyon Dam.

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Federal wholesale power providers (WAPA)

- Provides electricity produced at a specific hydro project
- Service provided to a specific set of customers
- Service provided under terms of a signed contract with customers
- Customers buy electricity at prices set to cover project repayment
- WAPA not responsible for meeting retail customer load growth

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Public Power entities with retail customers

- CRSP contractors are in this category
- Providers serve retail customers – homes, commercial, agriculture, industries
- Providers obligated to meet customer load growth
- Providers must procure/build new generation to meet growth
- Providers are responsible for costs associated with new generation

How do electric utilities plan to meet customer demand?

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Obligation to meet load is critical factor

Meeting load is a function of having sufficient generating capacity

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Most electric utilities plan based on capacity, not energy

- Capacity is the capability to perform at a certain level
- Measured by output capability
- How fast can an auto travel
- Energy is the amount of production over a specified period of time
- How far can an auto travel in an hour, or a day?

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Reserves are needed to insure that capacity is available at all times

- Financial reserves are needed to operate a business – working capital
- Inventory of materials in silos – concrete business
- Inventory of equipment in a warehouse – electrical contractor
- Electric utility reserves are generators that can produce additional electricity
- What other business builds and maintains production capacity that might only be used 5% of the year?

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Why are reserves of generating capacity needed?

- Each utility must have reserves to insure service to its retail customers
- Reserves are a requirement set by regulatory agencies and reliability organizations (WECC)
- Needed to accommodate uncertainty in forecasts of peak customer demand
- Needed for response to unexpected loss of generating capacity
- Needed for sudden increase in customer demand (winter morning, for example)

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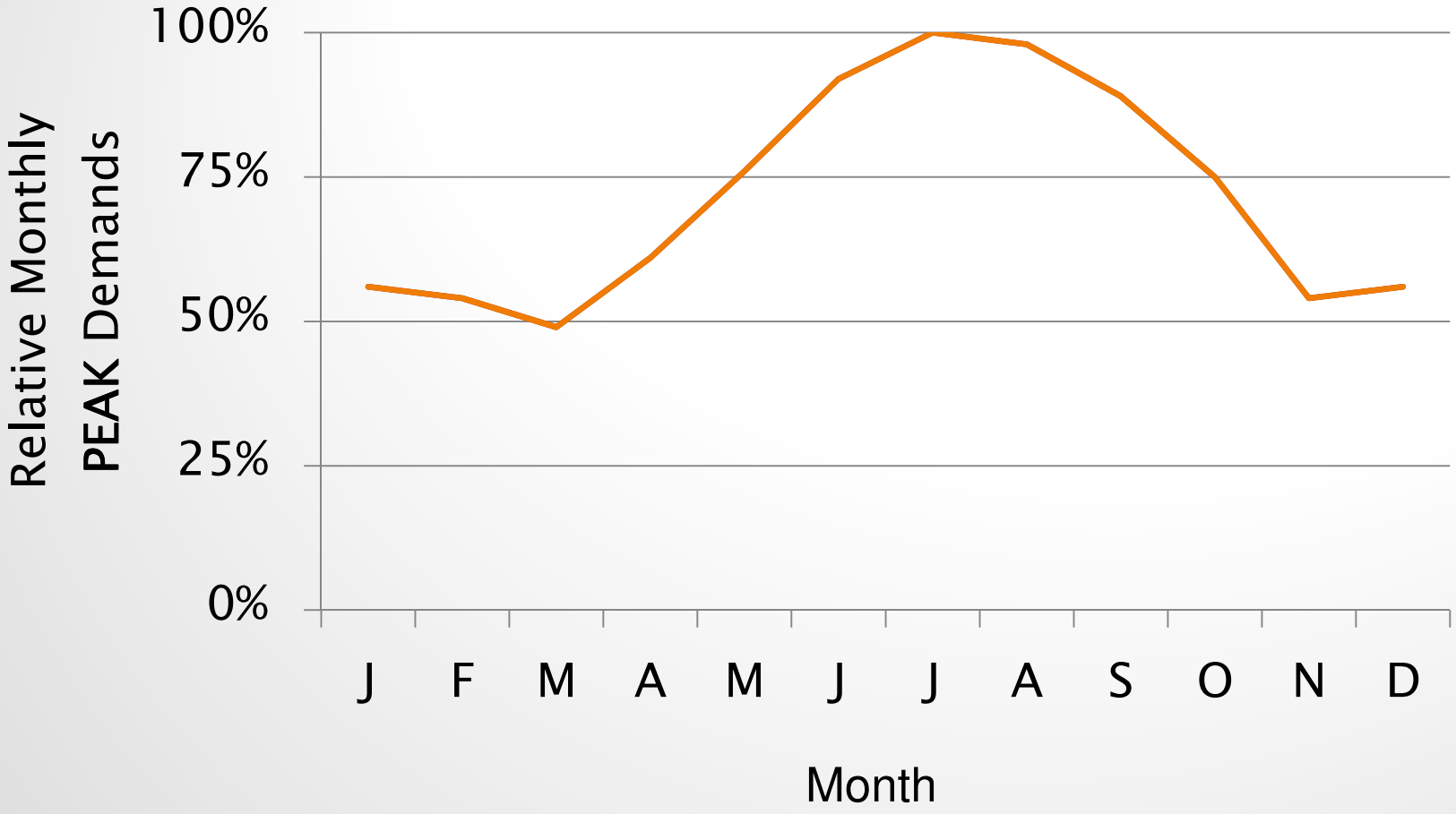
Variation in Monthly Customer Electricity Demand



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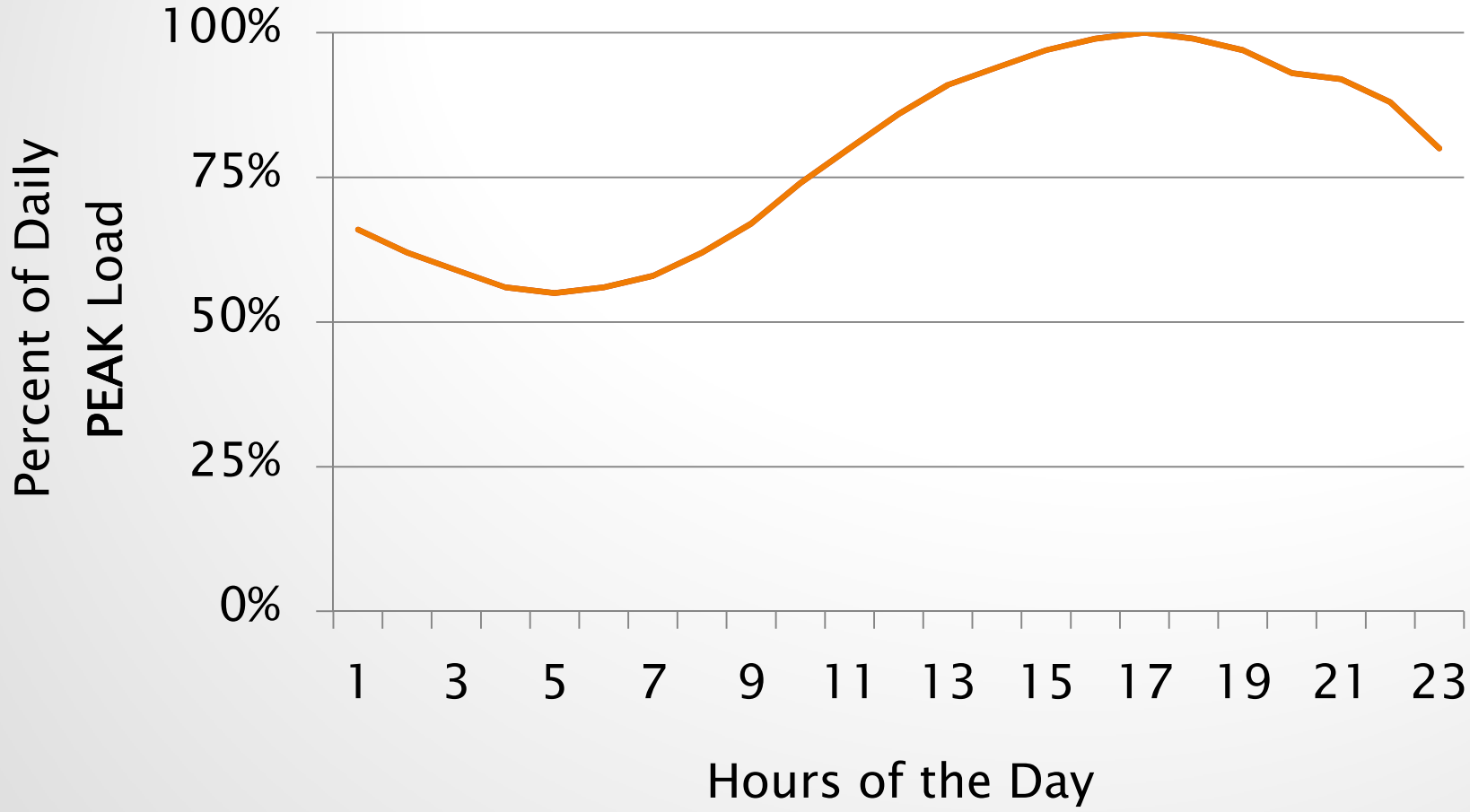
Summer Daily Load Shape



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Planning horizon measured in years

- Some plans look 20 years ahead
- Need to forecast locations where customers will live and work
- Critical that electric supply infrastructure be in place before customers build
- Generating facility infrastructure can take 3-15 years to permit and build
- Transmission line infrastructure can take almost as long
- Government entities at all levels regulate permits needed to build electricity infrastructure

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Forecasts of customer demand

- Electricity use varies by type of customer
  - Industrial use can be fairly constant through the day
  - Residential use varies significantly, driven largely by weather
  - Commercial use can be a combination of the two
- Customer use changes over time – A/C, computers, electric vehicles

Importance of "Keeping the Lights On"

- Modern life depends on electricity for many things
- Reliability of supply is a key component of the monopoly status for utilities
- Electric utilities build in redundancies and backup plans to help increase reliability
- Entire mission of the Regional Reliability Councils (WECC) is based on this concept
- Loss of service due to insufficient generation has significant negative repercussions from a customer and regulatory perspective
- Note recent (early February) customer service interruptions in Phoenix, El Paso and most of Texas

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What variables influence electric utility resource planning decisions?

- Diversity of generation type
  - How does generation portfolio compare to overall customer use
  - Objective is to own a combination of generating assets to most efficiently supply overall customer use
- Project development timeline
- Construction costs (fixed costs)
- Operating costs (fixed and variable costs)

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What variables influence electric utility resource planning decisions?

- Transmission of electricity to areas where customers live and work
  - Can existing electric lines be used?
  - If new transmission lines are needed how likely can they be built?
- Renewable generation goals
  - Must consider intermittency of electric output
- Environmental protection issues
- Water availability

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What variables influence electric utility resource planning decisions?

- Choice of fuels (if not renewable)
  - Risk of supply
  - Infrastructure needed for supply – gas pipeline, railroad, dam
- Permits and regulatory approvals
- Public acceptance
- Decision process is similar to consumer's choice of home, auto, etc. but much more complex, and carries much greater impact to society

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What are the key issues relative to preparation of a resource plan?

- Prepare a customer load forecast
- Build a set of assumptions and uncertainties
- Identify a list of resource options
- Perform an initial screening process – eliminate options due to various factors
- Evaluate costs and financial considerations
- Evaluate risks with each resource option
- Apply planning and utility experience and judgment
- Resource plans are always subject to modification – assumptions, load forecasts, resource options, costs and technology can all change over time

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What are the key issues relative to preparation of a resource plan?

- Resource planning models address costs of generation options
  - Construction costs
  - Financing costs
  - Operating costs – fuel, operations, maintenance, improvements

How do these concepts relate to electric generation at Glen Canyon Dam?

- Public Power entities are buyers of CRSP generation from WAPA
- Most of the CRSP generation comes from GCD
- CRSP is part of the long term resource plan for each of the Public Power entities that purchase such capacity and energy
- Reliance on CRSP capacity to help meet projected customer demand plus needed reserves
- Any reduction in resources for each Public Power buyer must be replaced to maintain same level of reliability for their customers
- Long term loss of resources would necessitate a long term replacement of capacity
- Construction of new capacity requires a planning process as described earlier

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Recap

- Electric utilities operate in a market that is unlike most others
- Key Public Power objective is to minimize overall costs of providing service
- Reliability of electricity supply is critical for customers
- Electric utility resource plans are based on capacity to insure reliable service
- Resource planning decisions are based on a large number of variables
- CRSP Public Power customers rely on CRSP capacity and energy marketed by WAPA

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