Initial Discussion on the Cost of Service Study and Rate Design

Special Board Meeting

May 8, 2014

Agenda

- The Rate Plan and Process
- Strategic Considerations
- What Other Utilities are Doing
- Wrap Up

Objectives

- Provide rate study overview
- Describe approach & process
- Discuss what other utilities are doing
- Identify rate options for consideration
- Discuss strategic considerations

Rate Study Overview

- PEC study focus is on current position and development of innovation rate options for customers
- **Rate study doesn't equate to rate increase**
- Setting electric rates is an art that requires forecasting the future, balancing competing interests, and meeting financial goals
- The process of setting rates involves both economic analyses as well as public policy decision making

Importance of Rate Studies

- Helps utilities manage costs and revenues
- Helps avoid drastic increases or reductions to rates
- Provides cost clarity and elimination or reduction of subsidies
- Provides points of reference for utility goal setting

Used as a Management Tool

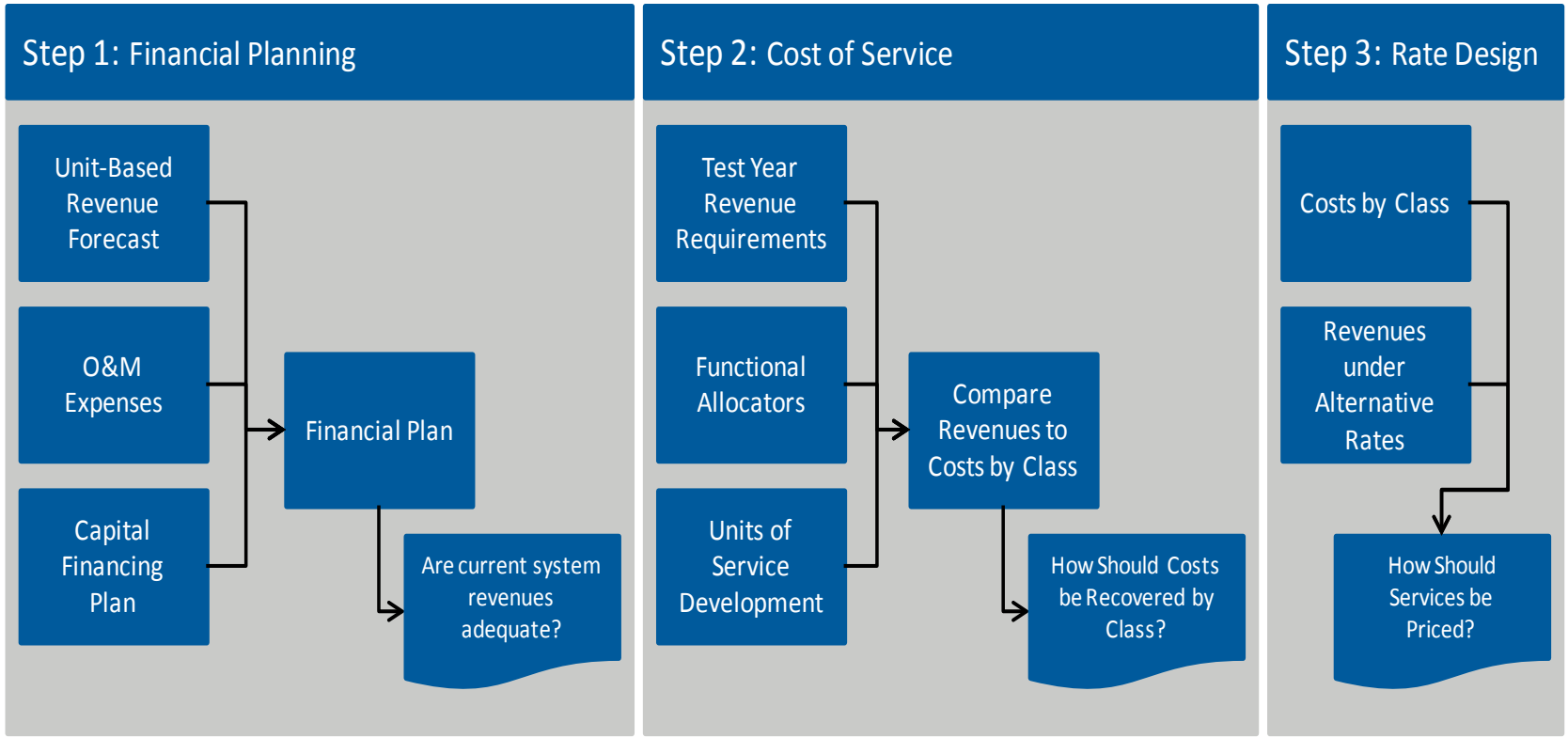
- Costs need to be known for prudent business practices
- Tracks changing costs and points to whom should bear the burden
- Provides guidelines for revenue adjustments and rate designs
- Evaluates financial plan's potential impact on customers
- **Evaluates appropriateness of price signals**

Reasons for Completing Rate Study

- Changes in operating and capital costs
  - Includes power supply costs
- Master plan and/or budgeting process
- Shifts in rate class service characteristics
- Advances in technology
- Proper revenue recovery
  - Regulatory requirements
- **Develop rate options for meeting utility and customer needs**

Approach and Process

Rate Study Components



Revenue Requirement

- What is a revenue requirement?
  - The level of income necessary for the prudent operation and maintenance of the electric utility.
  - A revenue requirement allows a utility to meet all of its monetary obligations.
  - A revenue requirement provides the foundation for determining the necessary revenue to be recovered with electric rates.
  - Identifies the test period requirements for ratemaking.

Financial Planning Considerations

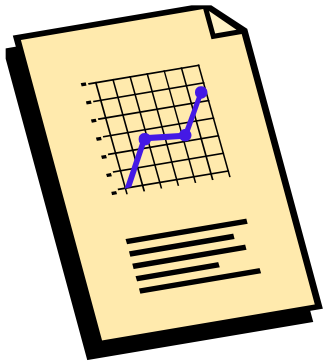
- Operation and maintenance expenses
- Debt service requirements
- Reserve levels
- Financing of capital projects

Load Forecast Considerations

- Historical system load data
  - Current rate classes
  - Rate class additions
- Integrated resource plans
- Renewable portfolio standards
- Normalized for weather conditions

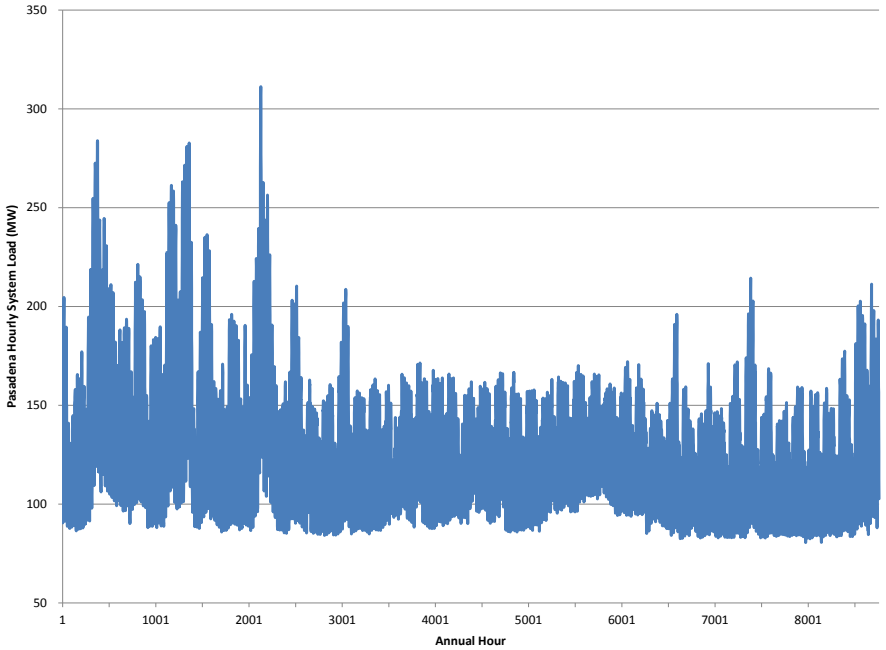
Load Forecast Outputs

- System load
  - Loads by rate class
  - Coincident and non-coincident seasonal loads
  - Load factors
  - System losses
- Rate class specific
  - Energy sales
  - Billing demand



Other Considerations

- Advanced metering Load assumptions
  - EVs, net metering, solar, co-generation, etc.
- Market pricing data
- On-peak, mid-peak, off-peak pricing periods
- Holidays



What is Cost of Service?

- Cost of service is:
  - A method to equitably allocate the revenue requirements of the utility among various classes of service.
  - The cost of service provides two key pieces of information:
    - Allocated total costs to each class of service
    - COS average unit costs
      - $/customer/month
      - $/kWh
      - $/kW

Why Cost of Service?

- Costs are not accounted for on a class-by-class basis
- Many costs are socialized for the benefit of all customers
- Not all customers consume in the same manner or require the same facilities to be served
- The fundamental question: What cost differences exist to serve the various customer classes of service?

Analytical Steps

- Functionalization
  - Preliminary arrangement of costs according to functions performed by the utility.
- Classification
  - Process of classifying functionalized costs to cost components
- Allocation
  - Assignment of classified cost to customer classes of service

The Rate Plan

- Prepare plan pertaining to rate function
- Rate structure influences external and internal environment
- Integrate operations and capital financial planning with overall objectives
- Identifies and incorporates customer needs and desires

Preparing a Rate Plan

- Situation analysis
- Establish rate objectives
- Identify methods to meet objectives
- Analyze and select method
- Prepare implementation plan
- Implement rate plan

Rate Plan Benefits

- Establishes framework, minimizes deviation in approach between analyses
- Provides stability of processes in an ever changing environment
- Identifies and evaluates new and innovative rate options

Rate Design Objectives

- Electric rates should be…
  - lowest possible price consistent with customer requirements, quality service efficiently rendered, and a return to the owner
  - simple and understandable
  - equitable among classes
  - designed to encourage efficient use of the utility plant
  - comply with requirements of local, state and federal regulations

Industry Trends

- Increasing use of demand charges to recover distribution costs and power supply costs
- Volatility in power supply markets resulting in more utilities using power cost adjustments
- Increased interest of economic development rates
- Movement toward residential inclining block rates
- Implementation of TOU rates for all customers

Rate Design Elements, Concepts, and Options

Rate Design Options

- Flat
- Block
  - Declining
  - Inverted
- Seasonal
- Time-based (including Electric Vehicle)
- Economic development

Rate Design Options

- Index
- Marginal cost-based
- Interruptible
- Negotiated
- Industrial

Rates that Create Revenue Stability

- Declining block rates
- Increased customer charges
- Decoupling distribution charges
- Power cost adjustments
- Standby rates
- Distribution rates that reflect cost of service

Rates that Reflect Utility Cost

- Time-of-use rates
- Real-time pricing rates
- Coincident demand rates
- Seasonal rates
- Interruptible rates

Energy Conservation Rates

- Inverted block rates
- Feed-in rate tariffs
- Net metering
- Seasonal rates

TOU Rate Programs

- Most programs are voluntary
- More becoming involuntary, large classes
- Barriers
  - Customer vs. utility investment
  - Pricing differentials
  - Pricing periods
  - Small monetary incentives

Time-of-Use Pricing Periods

- Define goals
  - Shave peak (system vs. class)
  - Shift usage
  - Data analytics
  - Hedge against market costs
  - Revenue neutrality
- Consider
  - Underlying power supply cost
  - Market pricing
  - Customer behavior

	Base Pricing Period Schedule			
Hour	Winter		Summer	
Ending	Weekday	Weekend	Weekday	Weekend
01:00 AM	Off-Peak	Off-Peak	Off-Peak	Off-Peak
02:00 AM	Off-Peak	Off-Peak	Off-Peak	Off-Peak
03:00 AM	Off-Peak	Off-Peak	Off-Peak	Off-Peak
04:00 AM	Off-Peak	Off-Peak	Off-Peak	Off-Peak
05:00 AM	Off-Peak	Off-Peak	Off-Peak	Off-Peak
06:00 AM	Off-Peak	Off-Peak	Off-Peak	Off-Peak
07:00 AM	Off-Peak	Off-Peak	Off-Peak	Off-Peak
08:00 AM	On-Peak	Off-Peak	Off-Peak	Off-Peak
09:00 AM	On-Peak	Off-Peak	Off-Peak	Off-Peak
10:00 AM	On-Peak	Off-Peak	Off-Peak	Off-Peak
11:00 AM	On-Peak	Off-Peak	Off-Peak	Off-Peak
12:00 PM	On-Peak	Off-Peak	Off-Peak	Off-Peak
01:00 PM	On-Peak	Off-Peak	On-Peak	Off-Peak
02:00 PM	On-Peak	Off-Peak	On-Peak	Off-Peak
03:00 PM	On-Peak	Off-Peak	On-Peak	Off-Peak
04:00 PM	On-Peak	Off-Peak	On-Peak	Off-Peak
05:00 PM	On-Peak	Off-Peak	On-Peak	Off-Peak
06:00 PM	On-Peak	Off-Peak	On-Peak	Off-Peak
07:00 PM	On-Peak	Off-Peak	Off-Peak	Off-Peak
08:00 PM	Off-Peak	Off-Peak	Off-Peak	Off-Peak
09:00 PM	Off-Peak	Off-Peak	Off-Peak	Off-Peak
10:00 PM	Off-Peak	Off-Peak	Off-Peak	Off-Peak
11:00 PM	Off-Peak	Off-Peak	Off-Peak	Off-Peak
12:00 AM	Off-Peak	Off-Peak	Off-Peak	Off-Peak

Next Generation Rate Design

- Promote energy efficiency
- Promote equity
- Facilitate customer choice
- Communicate prices and costs

Achieving Potential of the Smart Grid

- Requires a change in the way electricity is priced
- Dynamic pricing offers customers new options
- Made possible by recent technological developments

Dynamic Pricing Structures

- Critical peak pricing
- Peak time rebates
- Real time pricing

Dynamic Pricing Benefits

- Customer response
- Low income customers could be winners
- Free customers from hidden charges

Flat Rates

- Flat rates – an average rate charged volumetrically in cents per kWh, that would be applicable for all usage in all climate zones (e.g., 12 cents per kWh)
  - Advantages
    - Simple and understandable
  - Disadvantages
    - Not likely to fully reflect cost-causation
    - Does not encourage changes in energy usage (e.g., on-peak to off-peak usage, etc.)

Fixed Charges and Volumetric Charges

- **Fixed charges** – monthly charge (e.g., $5/month) applicable to all customers regardless of usage intended to reflect costs that do not change with usage and are necessary to ensure constant availability of service.
- **Volumetric charges** – per kWh charges based on electricity usage during the billing cycle (e.g., $0.12/kWh) intended to reflect costs that change with usage (e.g., variable generation charges), but typically includes generation, distribution, transmission, and public purpose program costs.
- Advantages of Recovering Some Cost via Fixed Charges
  - Simple and understandable
  - May better reflect cost-causation
  - Fixed monthly charge reflect non-volumetric costs
  - Fixed costs are necessary to serve all customers per month for each customer
- Disadvantages
  - Likely to increase bills for low-use customers compared to a tiered system
  - Fixed charges may not fully reflect cost-causation for classes of customer (e.g., multi-family vs. single-family residences), but fixed charges could be differentiated by SFR vs. MFR
  - May decrease incentives to conserve

Demand Charges

- **Demand charge**: Calculated on a per-kilowatt (kW) basis for a customer's monthly maximum usage (e.g., $5/kW). Demand charges reflect the cost of transmission and distribution facilities built to meet customers' maximum power demands. Demand charges are in addition to volumetric energy charges (per kWh), but the volumetric energy charges are lower than those on rate schedules without demand charges.
  - Advantages
  - ➢ May better reflect cost-causation
  - Disadvantages
  - ➢ May not be simple and understandable for residential customers (typically have been used for larger, more sophisticated customers)
  - ➢ Likely to increase bills for low-use customers compared to a tiered system
  - ➢ May discourage energy efficiency, conservation; customer-generation, uncertain effect on demand response

Time Variant Pricing

- **Time-of-Use Rate**: A rate that prices electricity according to the season or time of day that it is used. A time-of-use (TOU) rate design more closely reflects the actual cost of providing electricity:
  - Lower rates during a utility's off-peak and partial-peak demand periods
  - Higher rates during seasonal and daily peak demand periods
  - By charging more during the peak period, when incremental costs are highest, TOU rates send more accurate price signals to customers.
  - Advantages
    - Accomplishes several goals: marginal cost pricing, cost causation, encouraging conservation and peak reduction, economically efficient decision making.
    - Many customers could see reduced bills.
    - Encourages solar PV and off-peak charging of electric vehicles
  - Disadvantages
    - Could cause some customers' bills to increase, especially those with above-average peak-period usage.

Tiered Time-of-Use Rates

- **Time-of-Use Rates can also be Tiered**: An un-tiered 2-season, 2-3 par TOU rate would have peak, mid-peak and off-peak rates in the winter for a total of 5 different rates.
- In comparison, a 4-tiered TOU rate would have 20 rates. (5 rate periods x 4 tiers)
  - Advantages
  - There are no inherent advantages other that the theoretical ability to accomplish two rate design goals: keeping tiers in place while implementing TOU pricing.
  - Disadvantages
  - Tiered TOU rates make it more complex for the customer to understand the price signal since prices change according to the time of day and increase as consumption progresses through the billing cycle.

Dynamic Pricing

- **Dynamic Rate**: A rate in which prices can be adjusted on short notice (typically an hour or day ahead) as a function of system conditions. A dynamic rate cannot be fully predetermined at the time the tariff goes into effect; either the price or the timing is unknown until real-time system conditions warrant a price adjustment. Examples include: real-time pricing (RTP), critical peak pricing (CPP).
- **Real-Time Pricing Rate**: A dynamic rate that allows prices to be adjusted frequently, typically on an hourly basis, to reflect real-time system conditions.
  - Advantages
  - ➢ Accomplishes several goals: marginal cost pricing, cost causation, encouraging conservation and peak reduction, economically efficient decision making.
  - Disadvantages
  - ➢ Other than voluntary CPP programs, dynamic pricing is not widespread in residential rates.
  - ➢ Without the aid of technology controls, most residential customers lack the ability to monitor and respond to real-time pricing.

Critical Peak Pricing

- **Critical Peak Price**: A dynamic rate that allows a short-term price increase to a predetermined level (or levels) to reflect real-time system conditions. In a fixed-period CPP, the time and duration of the price increase are predetermined, but the days are not predetermined. Typically CPP programs provide participating customers an incentive to shift usage to non-peak hours, and charge higher rates during peak hours on a CPP event day. CPP event days are called 24 hours in advance, with customer notification provided through several communication channels.
  - Advantages
  - ➢ Enrolled customers that respond to event notifications will see bill reductions.
  - ➢ For residential customers CPP may be most appropriate as a purely opt-in program or a default with the ability to opt out to TOU rates.
  - Disadvantages
  - ➢ Enrolled customers that don't respond to event notifications may see bill increases.
  - ➢ Some view CPP as a punitive program, but this argument falls away when the customer chooses to opt-in or declines to opt-out of CPP.

Peak-Time Rebate

- **Peak-Time Rebate**: A program that offers a bill credit for customers who reduce their energy use when requested by the utility during a specific time. Typically event hours are during peak demand periods and events are called with day-ahead notice in response to system conditions PTR offers a payment per kWh reduced during event periods, but does not assess any penalties for households that do not achieve reduction of electricity usage. To encourage customers to embrace automated enabling demand response technologies, PTR often pays a premium incentive per kWh reduced for customers enrolled in an automatic enabling technology program. Bill credits for each unit of electricity reduced are calculated based on event day reduction in electric usage below an established customer-specific reference level for that day.
  - Advantages
  - A “no risk” proposition for customers who can only win by reducing load during event hours.
  - More customer-friendly as a mandatory program due to lack of penalties.
  - A possible stepping stone to default time-variant pricing such as TOU.
  - Disadvantages
  - Initially low awareness among customers means business as usual for most.
  - Some potential for “ structural winners,” i.e. those that receive a bill credit without making any intentional behavior change.

Strategic Considerations

Strategic Considerations

- More rate options will be offered
- Consumer backlash will not go away
- The freeze on home area networks will thaw – just a little
- Micro grids will move from curiosity to reality

PEC Rate Philosophies

- Evaluate Inclining vs Declining Block Rates
- Address ERCOT and Future Cost Volatility
- Evaluate Present Rate Design
- Fees and Charges that Need Adjustment
- Identify Top Goals for the Rate Study

Transition to New Rate Structures

- In some instances, rate design changes are mitigated or phased in over time to promote customer acceptance and to ensure that customers do not experience excessive bill impacts
  - Example: Customer and Demand Charges phased by incremental increases until the full charge is in effect.
- Advantages
  - May promote better acceptance
  - May avoid excessive bill impacts
- Disadvantages
  - Could delay implementation of rates that better reflect cost causation and system goals

What Other Utilities are Doing

Specific Rate Issues

- Arizona Net Metering
- California Utilities and Renewables
- Austin Value of Solar
- Other TX Large Cooperative Rates
- Recent COS Studies and Innovative Rates
- TOU / CPP Program
- Cobb EMC

Arizona Net Metering

- Net Metering historically in place to grow solar industry. Solar industry has grown over
- Arizona Corporation Commission (ACC) ruled that net metering should spread cost of grid to all customers
- ACC determined that the current net metering program creates an unfair cost shift to non-solar customers
- ACC voted 3-2 to institute a separate distribution charge on customers who install rooftop solar (Nov 2013)
- Existing customers with rooftop solar are not impacted.
- Future APS rooftop solar customers will pay a demand charge ($0.70/kW) to cover the cost of distribution.

California / Renewables

- All California utilities have 33% RPS target by 2020. Many are well on their way to achieving it.
- California utilities have enacted numerous incentives, rates, and policies rates for distributed renewables.
- Many utilities have one or several of the following to meet state wide RPS requirements:
  - PPAs from large renewable resources
  - Feed In Tariffs
  - Utility Rebates
  - Net Metering (2017 law sunsets. Debate is starting)
  - Time of Use Rate Options
  - Electric vehicle charging rates

Austin Energy - Value of Solar Credit

- Austin Energy has RPS of 30% by 2020
- Provides $1.50/watt rebate for small solar
- Value of Solar (VOS) Credit for Residential
  - Residential usage is billed at applicable utility rate tariff
  - Utility meters the solar PV output separately and provides credit equal to kWh output x VOS Credit
  - VOS = $0.128 / kWh currently
  - VOS credit determined annually and based on Austin determined avoided costs (energy, distribution, etc.)
  - Residential VOS credit is similar to a Feed In Tariff for Solar
- Net metering employed for Commercial customers

Other Large Texas Coops

- Bluebonnet
  - Similar to PEC (distribution / power / fixed charges)
  - Have a green energy rate option
- Sam Houston
  - Similar to PEC (distribution / power / fixed charges)
- Trinity Valley
  - Basic customer, energy charge, fixed charge structure.
  - Rolling out new AMI deployment. To be completed by 2015.
- United Electric
  - Similar to PEC (distribution / power / fixed charges)
  - Small experimental residential TOU program with seasonal on/off peak rates
  - Small experimental commercial TOU program demand charge with ratchet for large commercial

Cobb EMC

- Georgia Coop with Various Options for Customers
- Residential
  - Simple (Annual Average Rates / Usage)
  - Standard (Seasonal + Inclining Block over 900 kWh/month)
  - TOU (Off $0.086/kWh, On $0.20/kWh)
  - CPP (Off $0.086/kWh, On $0.16/kWh, CPP $0.337/kWh)
  - All include Wholesale Power Adjustment and fixed charge
- Commercial (single phase)
  - Standard (Seasonal + Declining Block over 1000 kWh/month)
  - TOU (Off $0.103/kWh, On $0.257/kWh)
  - CPP (Off $0.103/kWh, On $0.235/kWh, CPP $0.337/kWh)
  - All include Wholesale Power Adjustment and fixed charge

Salt River Project

- Basic Price Plan
  - Energy prices are the same - no matter when you use it
  - Prices go up slightly when energy usage in a month exceeds certain levels, which vary in winter and summer
  - New customers often start on this plan
  - Customers who stay on this plan typically don't use a lot of energy, are seasonal visitors or find that other plans aren't a good fit for their lifestyle and household

Salt River Project

- Time-of-Use Price Plan
  - Discounted energy prices during off-peak hours and charge higher prices during specific on-peak hours Monday-Friday
  - Customers save an average of 7.5% annually over the Basic Plan by shifting some energy use to off-peak hours
  - Lower-cost, off-peak hours include weekends, observed holidays and seasonal weekday off-peak hours

Salt River Project

- EZ-3 Price Plan
  - Customers select one of two on-peak periods
    - Three on-peak hours per day, two choices
    - 3-6 pm or 4-7 pm (weekdays, year-round)
  - Discounted energy prices during off-peak hours and higher prices during specific on-peak hours Monday-Friday, when it costs more to produce electricity
    - Off-peak hours include weekends, observed holidays and all weekday off-peak hours

Salt River Project

- M-Power Price Plan
  - Buy energy in the amount you choose
    - more than 110 SRP PayCenter® machines Use an in-home display unit to monitor your energy costs
  - Save energy – the average M-Power customer reduces energy usage by 12% annually
  - Convenience of no monthly bills or late charges
  - The equipment deposit is $87.50

Inclining vs Declining Rates

- Inclining – Incentivizes energy conservation. Higher rates the more energy is used.
- Declining – Incentivizes greater energy usage. Lower rates the more energy is used.
- Not a cost based rate but can be implemented with a power cost adjustment.

ERCOT and Future Cost Volatility

- Current power cost adjustment (PCA) recognizes power supply cost changes on a monthly basis.
- Maintain PCA and adjust as needed to reflect cost volatility in ERCOT.
- Alternate considerations:
  - PCA rate stabilization fund to soften monthly PCA swings
  - PCA rate stabilization rider to soften monthly PCA swings
  - Summer / Winter Base Power Cost

Top Goals for Study

- Public Involvement
  - 1
  - 2
- Rev Requirements
  - 1
  - 2
- Cost of Service
  - 1
  - 2
- Rate Design
  - 1
  - 2

Rate Design Definitions

Rate Design Definitions

- **Revenue Neutrality**: A regulatory requirement that any alternative rate design must recover the same total revenue requirement as the default rate design, assuming that customers make no change in their usage patterns.
- **Fixed Costs**: Costs that do not vary with usage. For example, this may include some types of distribution costs, customer service, meters, etc.
- **Cost-Causation**: Method of allocating costs (e.g., generation, transmission, distribution) and designing rates based on the drivers of the cost categories in an attempt to assign those costs to the customer who caused the costs to be incurred.
- **Cross-Subsidy**: Recovering costs incurred by one group of customers from another group of customers.

Rate Design Definitions

- **Marginal Cost**: The cost of providing one additional unit of a good or service. In the electric utility context there are several types of marginal costs – energy, generation capacity, transmission capacity, and distribution capacity. The change in utility costs resulting from an additional customer or additional use of energy or capacity, or the change in costs related to a change in output.
- **Embedded Cost**: Method of allocating costs starting with the utility revenue requirement and assigning these costs based on cost-causation principles (e.g., meter costs for residential class assigned to residential class)

Rate Design Definitions

- **Rate Cost Components**: Rates are typically unbundled into generation, distribution, and transmission components based on key cost drivers for each component.
  - **Generation Costs**: Costs related to generating power to produce electricity. Typically defined in terms of capacity costs (e.g., $100/kW) and energy costs, ($0.08/kWh).
  - **Transmission Costs**: Costs associated with the transmission system for moving power long-distances or at high voltage, regulated primarily by FERC.
  - **Distribution Costs**: Costs associated with distributing power to customers (e.g., poles and wires, meters). Typically defined in terms of capacity costs ($/kW) and customer costs ($ per customer)
  - **Public Purpose Charges**: Costs associated with a variety of programs, including energy efficiency, demand response, solar and distributed generation, low-income and medical needs.

Rate Design Definitions

- **Peak Demand**: The maximum amount of energy carried by the utility system during a specific time period (e.g., a year, season, month, or day), also referred to as peak load. Peak demand determines the required system capacity.
- **Off-Peak**: Time period when the electric system does not usually face high peak demand.
- **Coincident Peak Demand**: The level of demand of a customer or customer class at the time of system peak demand.
- **Non-Coincident Peak Demand**: The maximum demand of a customer or customer class during a billing period, regardless of when the system peak occurs.

Rate Design Definitions

- **Demand Response**: The ability of an individual electric customer to reduce or shift usage or demand in response to a financial incentive or reliability need.
- **Energy Efficiency**: Using less energy to perform the same function at a comparable level of service through the installation of equipment or adoption of a practice.
- **Energy Conservation**: Total reduction in energy use, including using less energy to perform a function or reducing the level of service for a function.

Rate Design Definitions

- **Price Elasticity of Demand**: The relative response of a change in quantity demanded to a relative change in price. More specifically the price elasticity of demand can be defined as the percentage change in quantity demanded due to a percentage change in demand price.
- **Income Elasticity of Demand**: The relative response of a change in demand to a relative change in income. More specifically the income elasticity of demand can be defined as the percentage change in demand due to a percentage change in buyers' income. The income elasticity of demand quantitatively identifies the theoretical relationship between income and demand.

Rate Design Definitions

- **System Conditions**: Any or all of the following: wholesale electricity costs, reliability conditions, short-term environmental impacts, the relationship between supply and demand.
- **Dispatch**: A broadcast signaling the initiation of a control strategy or price adjustment.
- **Automatic Control Technology**: Any technology that allows the customer or their agent (e.g., and electric service provider or a demand response provider) to pre-program a control strategy – for an individual electric load, group of electric loads, or an entire facility – to be automatically activated in response to a dispatch.
- **Notification**: Information provided to customers regarding price adjustments or system conditions. "Day-ahead" notification provides at least 24 hours advance notice. "Hour-ahead" notification provides at least one hour advance notice.

Rate Design Definitions

- **Seasonal Rate**: A rate in which the price of electricity changes by season.
- **Public Goods Charge (PGC)**: A non-bypassable surcharge imposed on all retail sales to fund public goods research, development and demonstration, energy efficiency activities, and low income assistance programs.
- **Medical Baseline**: Customers who rely on life support equipment or those who have life threatening illnesses or compromised immune systems are given a higher baseline quantity to ensure their medical needs for electricity are met at affordable prices.