# Developing a Path to the Future Trends in Electric Rate Design

Mark Beauchamp, President
Utility Financial Solutions, LLC

Thursday, August 1, 2024

Breakout Session #1: 2:00 – 4:00PM

# Utility Financial Solutions, LLC

- International consulting firm providing cost of service and financial plans and services to utilities across the country, Canada, Guam and the Caribbean
- Instructors for cost of service and financial planning for APPA, speakers for organizations across the country, including AWWA
- Hometown Connections preferred vendor


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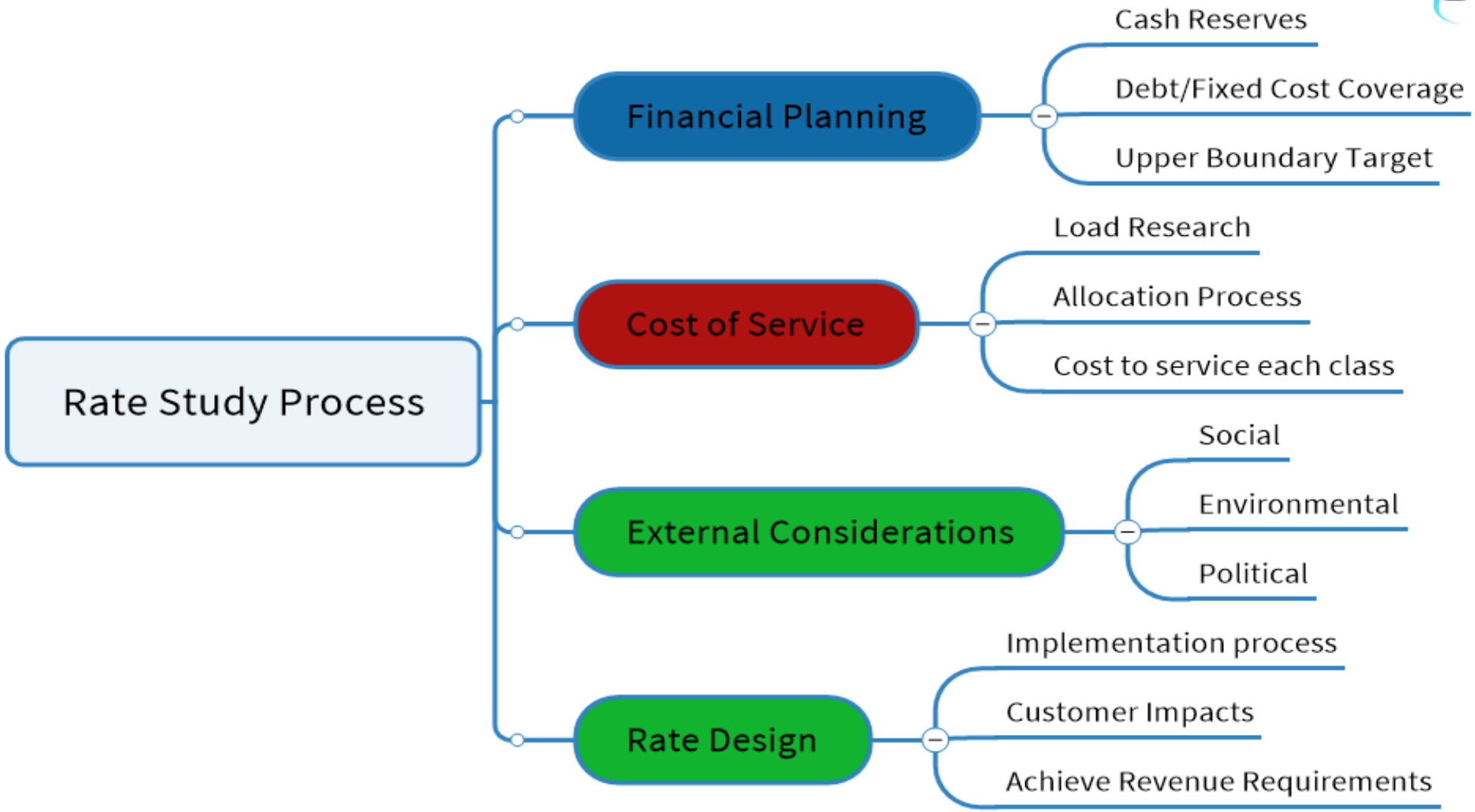
Hometown Connections


Rate Study Process
Financial Planning
Cash Reserves
Debt/Fixed Cost Coverage
Upper Boundary Target
Cost of Service
Load Research
Allocation Process
Cost to service each class
External Considerations
Social
Environmental
Political
Rate Design
Implementation process
Customer Impacts
Achieve Revenue Requirements

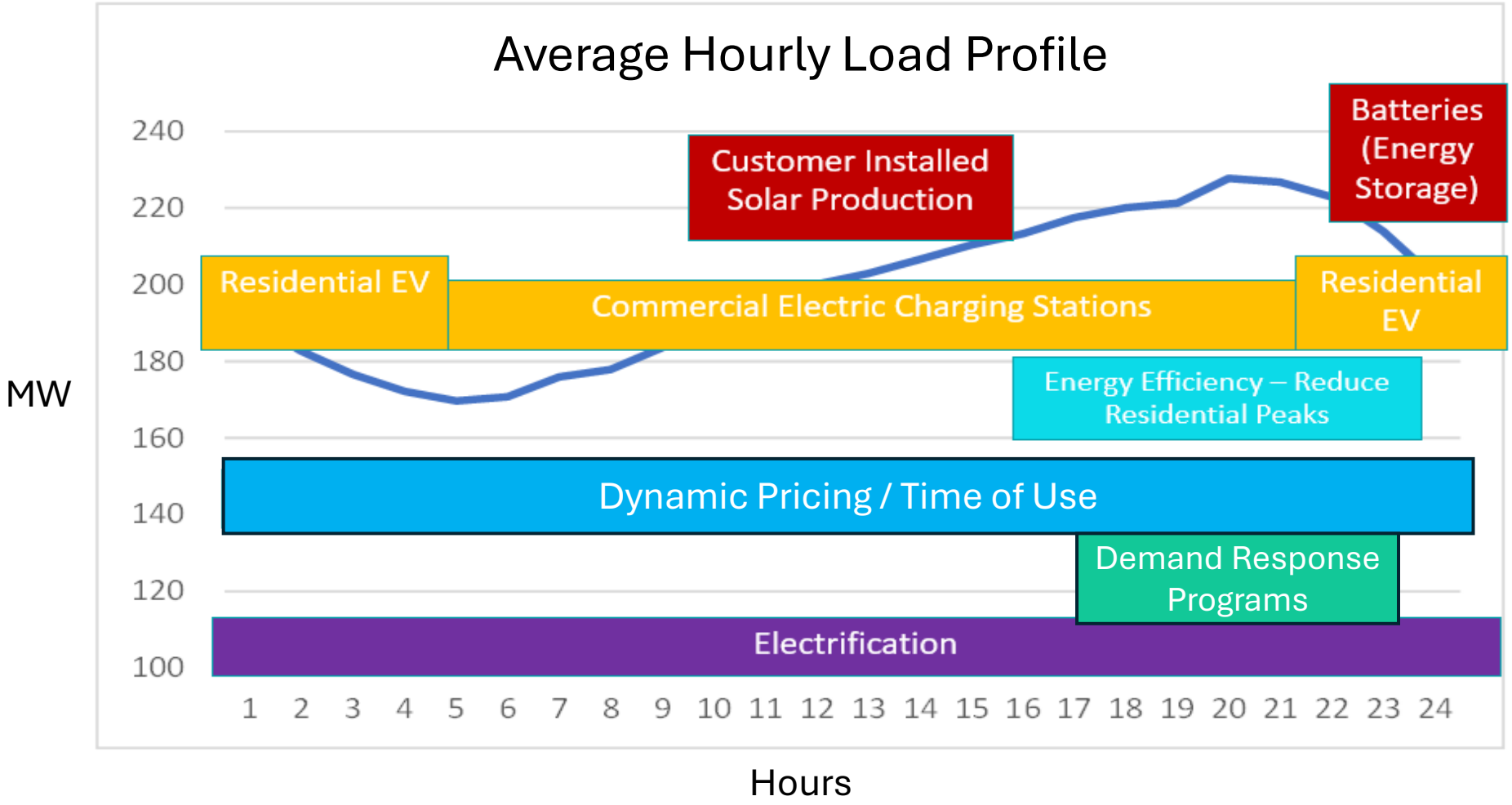
# Opportunities and Challenges

## Decarbonization

- Energy Efficiency
  - Objective: Reduce customer reliance on electricity
- Solar and Wind
  - Objective: Carbon free intermittence resource
- Energy Storage
  - Objective: System resiliency
- Transportation
  - Objective: Reduce reliance on oil
- Electrification of Buildings
  - Objective: Reduce use of natural gas


How are challenges managed and how do Utilities take advantage of opportunities?

# Technology Impacts on Hourly System Usages



# Historical Establishment of Rates

- Previous customers were placed into rate classes based on similar usage patterns and customer requirements
  - When energy was used
  - Metering requirements
  - Service levels – Secondary/Primary/Sub-T
  - Customer load factors
- Categories of Rates
  - Residential
  - Commercial
  - Industrial

*Customer usage patterns now vary substantially from class averages*

# Major Rate Design Changes + Trends

- **Demand Charges AMI required**
- **Dynamic Pricing (AMI required)**
- **Commercial EV Charging Station Rates**
- **Revisions to Traditional Net Metering Programs**
- **Rebate Programs for EE and Battery Storage**
- **Demand Side Management Rates**

# What is a Customer Charge? (Facilities Charge)

**A customer charge recovers cost for connection to grid regardless of energy consumption**

- Meter operation, AMI maintenance, and AMI replacement costs
- Billing costs
- Customer service department
- Service into customers facilities
- **Portion of distribution system**
  - Cost to get a wire from the sub-transmission system to customer
  - Based on minimum sizing (If all customers only used a single kWh)

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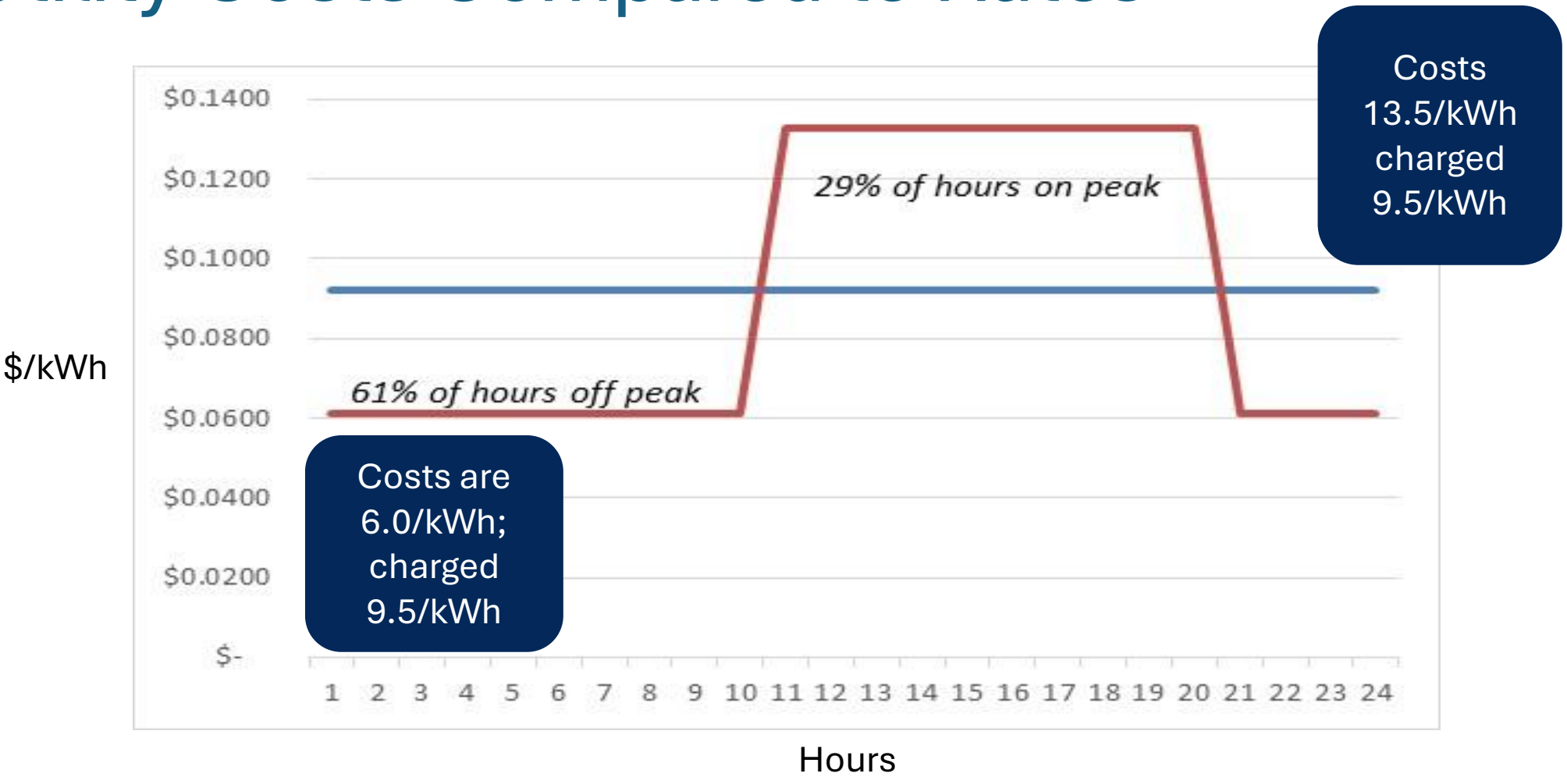
# Modernizing Rate Structures

# Utility Costs Compared to Rates

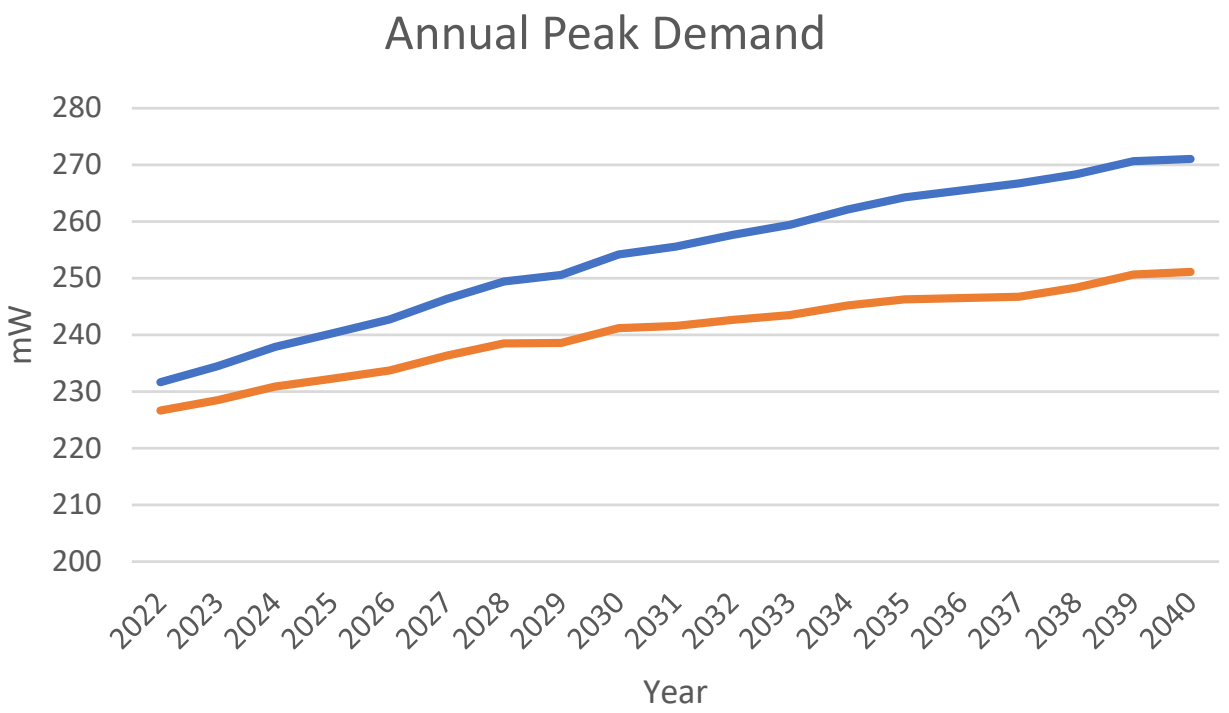


# Concerns About Time Differentiated Rates

- Customer education (Acceptance of Rate?)
- Customer bill impacts?
- Should we offer a PILOT program to work out any potential issues?
- Investment and proper technology needed for AMI, database management, and billing system.
- Will solar customers benefit or be adversely impacted?

# Potential Capacity Reductions

## *TOU vs Non-TOU*



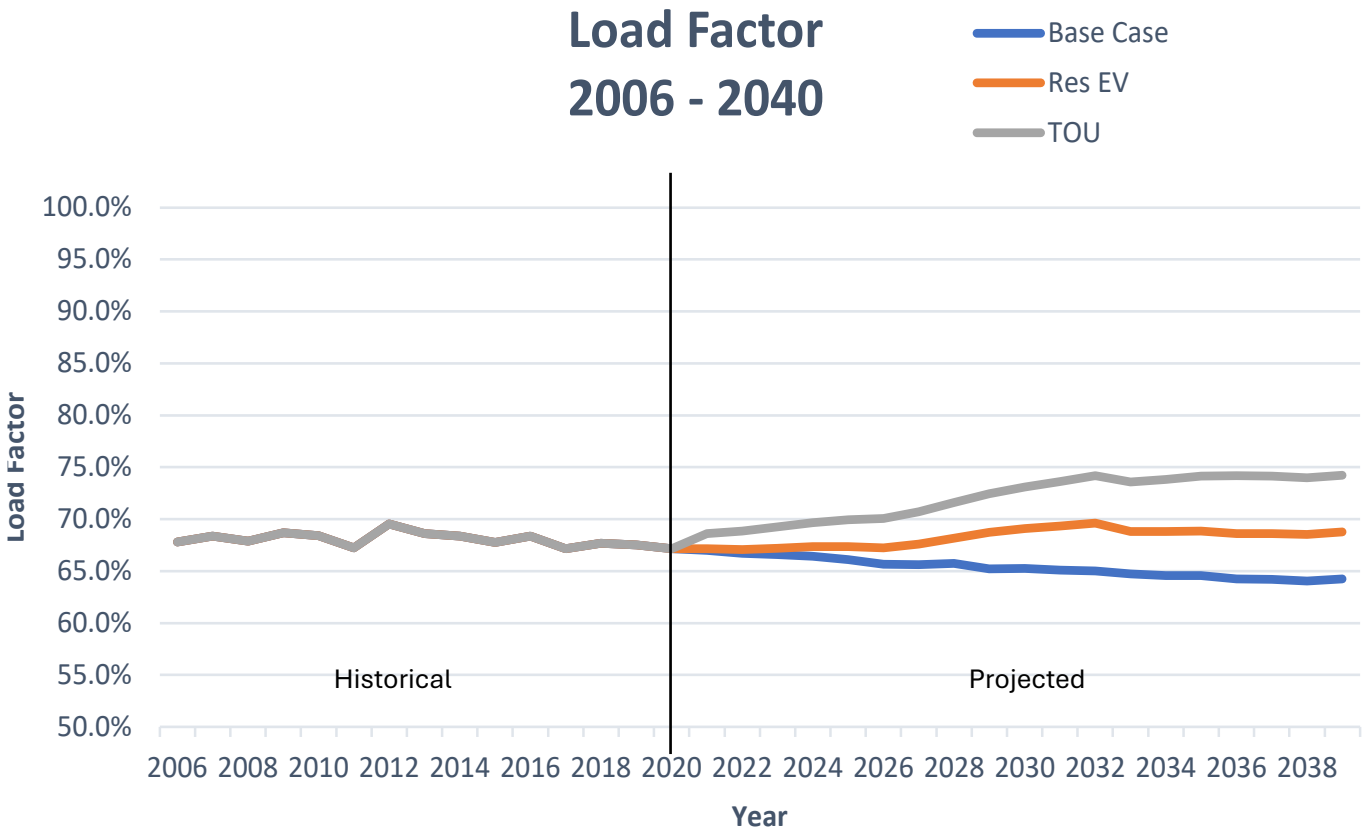

TOU vs. Non-TOU Rate

- Residential rate differential -
  on peak = 2x the off peak
- Mandatory residential TOU program
- Potential capacity reduction from TOU could be 20 MW, likely greater

Blue Line: Projected Peak (no TOU)

Orange Line: Projected Peak (with TOU)

# System Load Factor Improvements




- Improving system load factors reduces power supply cost for all customers
- Better use of substations, transmission system, and generators
- Shifting usage to off peak time periods reduces the need for future capacity

# Residential Considerations in Future Rate Designs

- Short Term – Creation of three residential rate options for customers
  - Standard residential rate
  - EV time of use rate
  - Residential time of use rate
- Long Term – One residential time of use rate
- Demand charges may be several years away

# Implementation of Time-Based Rates
## *Residential*

Suggestions:

- Full implementation of Time of Use rate for residentials with electric vehicles
- Phase in for Residential Customers

✓ Develop a Long-Term Transition Plan

| Rates | Current | Phase One | Phase Two | Phase Three |
|---|---|---|---|---|
| Monthly Facilities Charge: | | | | |
| Single Phase | $ 15.50 | $ 15.50 | $ 15.50 | $ 15.50 |
| Three Phase | $ 27.75 | $ 27.75 | $ 27.75 | $ 27.75 |
| Energy Charge: | | | | |
| Power Supply On-Peak Energy | $ 0.09800 | $ 0.11900 | $ 0.14000 | $ 0.16100 |
| Power Supply Off-Peak Energy | $ 0.09800 | $ 0.09100 | $ 0.08400 | $ 0.07700 |
| Revenue from Rate | $ 2,281,638 | $ 2,281,139 | $ 2,280,640 | $ 2,280,141 |
| Change from Previous | | 0.0% | 0.0% | 0.0% |
| **Average Increase** | | **2.0%** | **1.9%** | **1.9%** |
| **Average Decrease** | | **-2.1%** | **-2.2%** | **-2.3%** |

# Municipal System Time of Use Rates

| Wholesale Providers Rates | | | |
|---|---|---|---|
| Demand | | $ | 11.69 |
| Transmission | | $ | 4.40 |
| Energy | On | | 0.0338 |
| | Off | | 0.0213 |

| | Hours/Year | Percentage of Annual Hours |
|---|---|---|
| On Peak Hours | 1,130 | 13% |
| Off Peak Hours | 7,630 | 87% |

| Rates | Current | Option A | Option B : 3 yr phase in Year 1 | Year 2 | Year 3 |
|---|---|---|---|---|---|
| Monthly Facilities Charge: | | | | | |
| All Customers | $ 50.00 | $ 80.00 | $ 80.00 | $ 80.00 | $ 80.00 |
| Energy Charge: | | | | | |
| Winter : On-Peak : 9:00am - 12:59pm | $ 0.02860 | $ 0.19216 | $ 0.08312 | $ 0.13764 | $ 0.19216 |
| Winter : Off-Peak : all other hours | $ 0.02860 | $ 0.03686 | $ 0.03083 | $ 0.03305 | $ 0.03528 |
| Summer : On-Peak : 5:00pm - 9:59pm | $ 0.03956 | $ 0.19732 | $ 0.09215 | $ 0.14474 | $ 0.19732 |
| Summer : Off-Peak : all other hours | $ 0.03956 | $ 0.03257 | $ 0.03814 | $ 0.03671 | $ 0.03528 |
| Demand Charge: | | | | | |
| Oct - May Demand | $ 21.00 | $ 10.25 | $ 16.84 | $ 13.54 | $ 10.25 |
| June - Sept Demand | $ 32.00 | $ 10.25 | $ 24.75 | $ 17.50 | $ 10.25 |

# Getting the Wheels In Motion for EV Rates

# Topics

- Commercial Installed Charging Stations
- Utility Installed Charging Stations
- Residential Home Charging

- Other Considerations
  - Load Management
  - Installation Costs

**Growth of Electric Vehicles Depend on:**

- Availability of **Working** Charging Stations
- Time to Charge Vehicles
- Cost of Vehicle
- Cost of Electricity
- Cost of Upgrades to Homes or Commercial Stations for Charging

# How do Residential EV's Impact Electric Sales?

- kWh's per vehicle: (1 mile = 0.25 kWh)

| Annual Miles | kWh's | Number of homes | Additional kWh Sales |
|---|---|---|---|
| 15,000 | 3,750 | 1,000 | 3,750,000 |
| 10,000 | 2,500 | 1,000 | 2,500,000 |
| 5,800 | 1,450 | 1,000 | 1,450,000 |

- Additional 200 kWh/month per vehicle
- EV's are projected to represent between 13% – 29% of new car purchases by 2030 (EIA Energy Data)

Transportation is projected to account for as much as 21% of electric sales by 2050

# Charging Station Characteristics

**Level 1** – (1 to 2 kW)

**Level 2** – Homeowner, commercial & utility owned (6 to 20 kW)

**DC Fast Charger** – (50kW - 350kW)

- Commercial charges tend to be low load factors, often less than 10% (currently)
  - Very sensitive to demand charges
  - May need substantial distribution investments

# Load Factor and Average Cost

## *Relationship to Rate Design*

| | | |
|---|---|---|
| Demand Charge | $ | 15.80 |
| Energy Rate | $ | 0.084 |

| Load Factor | | Average Cost per kWh |
|---|---|---|
| 5% | $ | 0.52 |
| 10% | $ | 0.30 |
| 20% | $ | 0.19 |
| 40% | $ | 0.14 |
| 60% | $ | 0.12 |

| Infrastructure | Basis for Charge |
|---|---|
| Power Supply | Customers contribution toward Peak |
| Transmission | Customers contribution toward Peak |
| Sub-Transmission | Customers contribution toward Peak |
| Distribution | Customer Peak |

- Rates tend to be developed based on class averages
- The load factor of car charging stations often results in greater diversity and may result in charging rates above costs when based on the general service rate tariff

# Commercial/GS Charging Station Rate Tariff

| Rate Component | General Service Rate Tariff | EV Charging Rate Tariff |
|---|---|---|
| Customer Charge | $ 40.00 | $ 40.00 |
| Demand Charge (per kW) | $ 15.80 | $ 2.30 |
| Power Supply | 9.00 | - |
| Transmission | 3.00 | - |
| Sub-Transmission | 1.50 | - |
| Distribution | 2.30 | 2.30 |
| Energy Rate (per kWh) | | |
| Off Peak | $ 0.084 | $ 0.060 |
| On Peak | 0.084 | 0.167 |
| Critical Peak | 0.084 | 0.234 |

| Load Factor | General Service Rate Tariff | EV Charging Rate Tariff |
|---|---|---|
| 5.0% | $ 795 | $ 322 |
| 10.0% | $ 917 | $ 512 |
| 20.0% | $ 1,163 | $ 893 |
| 40.0% | $ 1,653 | $ 1,653 |
| 60.0% | $ 2,144 | $ 2,414 |

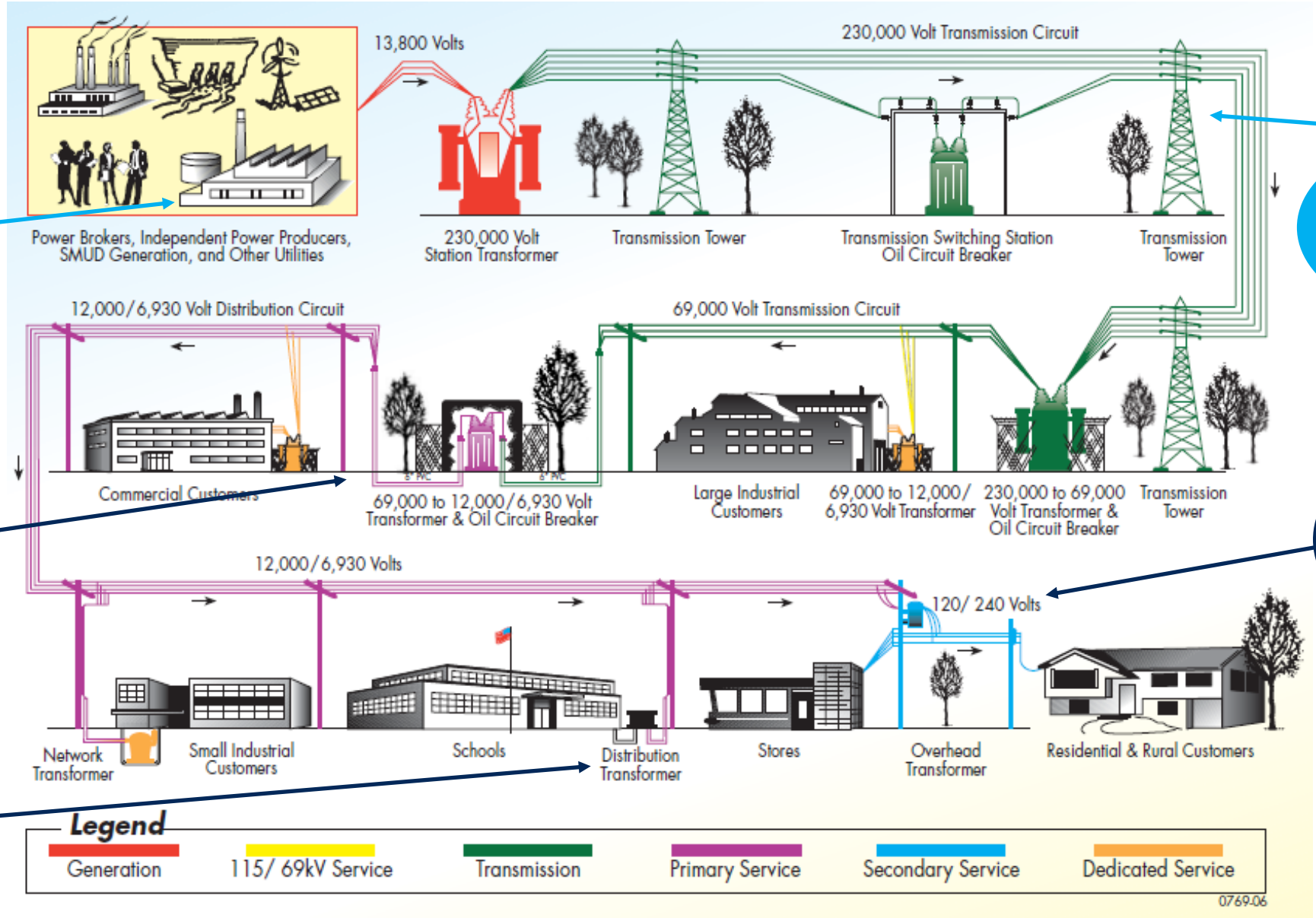
Capacity - Utility

Transmission Providers Peak Demand

Sub-T Peak Usage - Utility

Peak Usage - Customer

Peak Usage - Area



# Questions

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