

TEP Integrated Resource Plan

Advisory Council Meeting

WELCOME

KEVIN SKINNER
CORPORATE TRAINING PROGRAM MANAGER



Tucson Electric Power

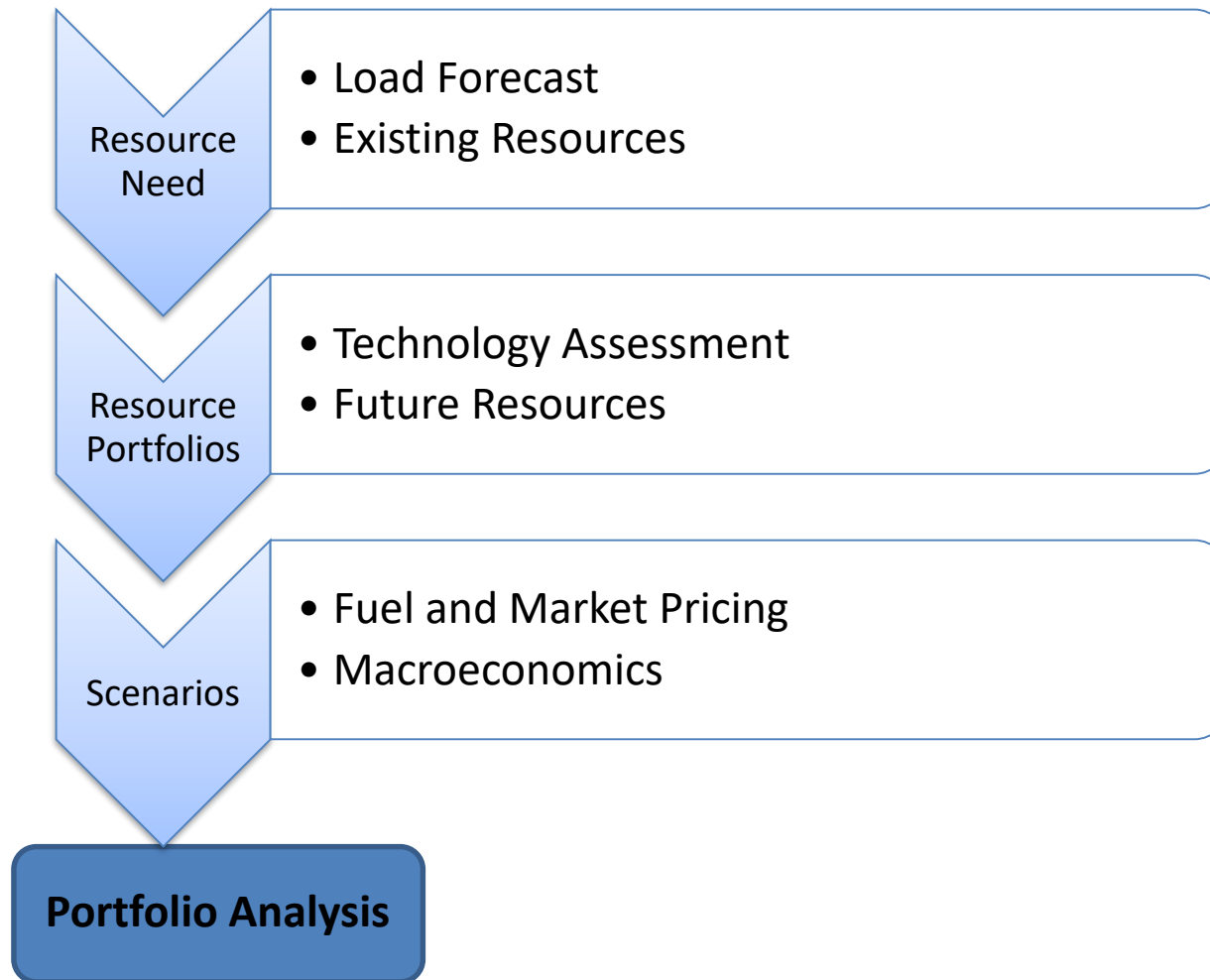
Integrated Resource Planning Overview

JEFF YOCKEY
MANAGER, RESOURCE PLANNING





Integrated Resource Plan (IRP) Overview



Just a Plan

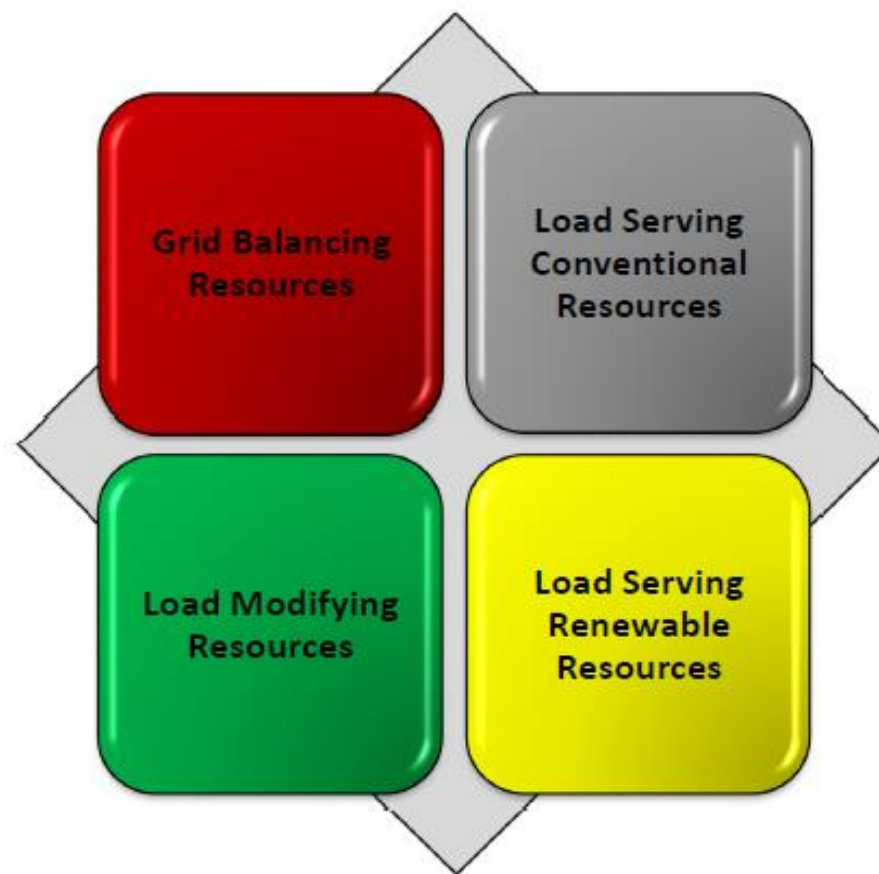
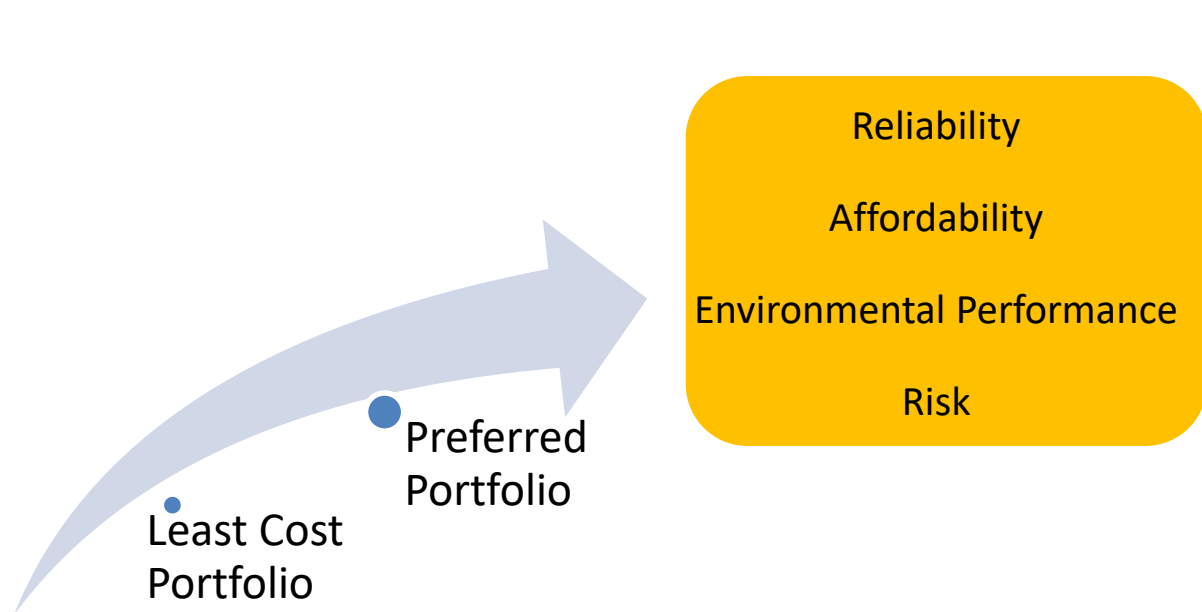
- Additional steps needed for specific actions
- Must be regularly updated

Timing

- 3-year planning cycle
- 15-year outlook
 - 2020-2035



Evolving Planning Objectives





Greenhouse Gas Reduction Goal

Science-Base GHG Reduction Targets
In Collaboration With



THE UNIVERSITY OF ARIZONA
**Institute of the
ENVIRONMENT**

State of the Climate Science Report

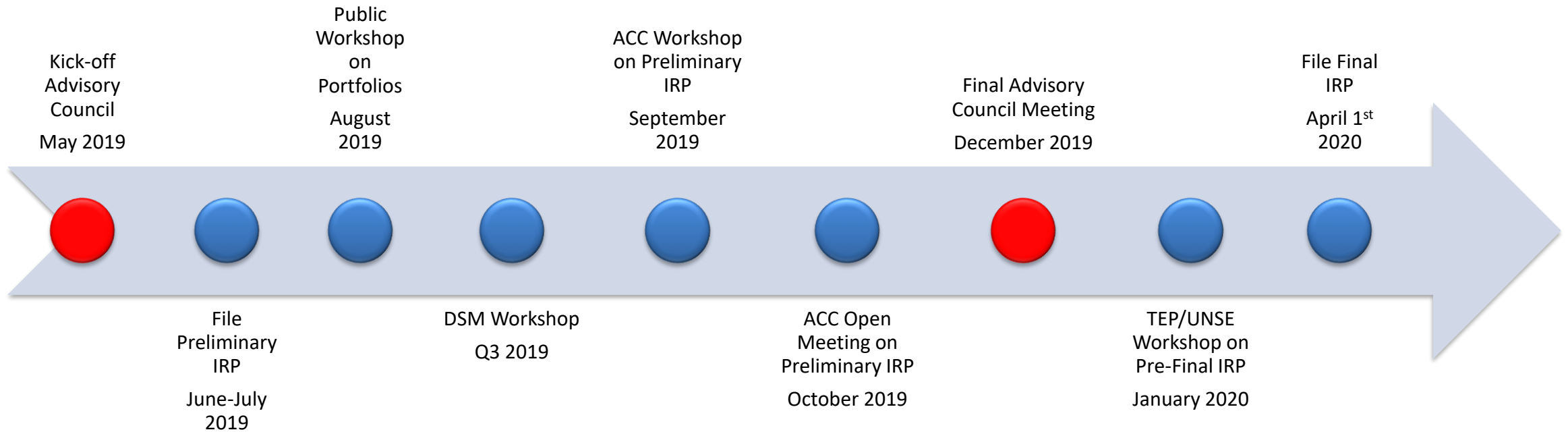
Establish Corporate Science Based
GHG Emission Reduction Targets for TEP

Identifying Plausible Scenarios for
Carbon Reduction

Evaluating Implications of Scenarios



IRP Schedule



Advisory Council Overview

KEVIN SKINNER
CORPORATE TRAINING PROGRAM MANAGER





2019 Integrated Resource Plan Advisory Council



- Balance
- Deep Dive on Each Topic
- Transparency



Participant Activity

- How does planning occur in your organization?
 - Planning cycle
 - Planning horizon
 - What groups do you involved (internal, external)
 - Nexus between your plans and decision making

Planning Under Uncertainty

JEFF YOCKEY

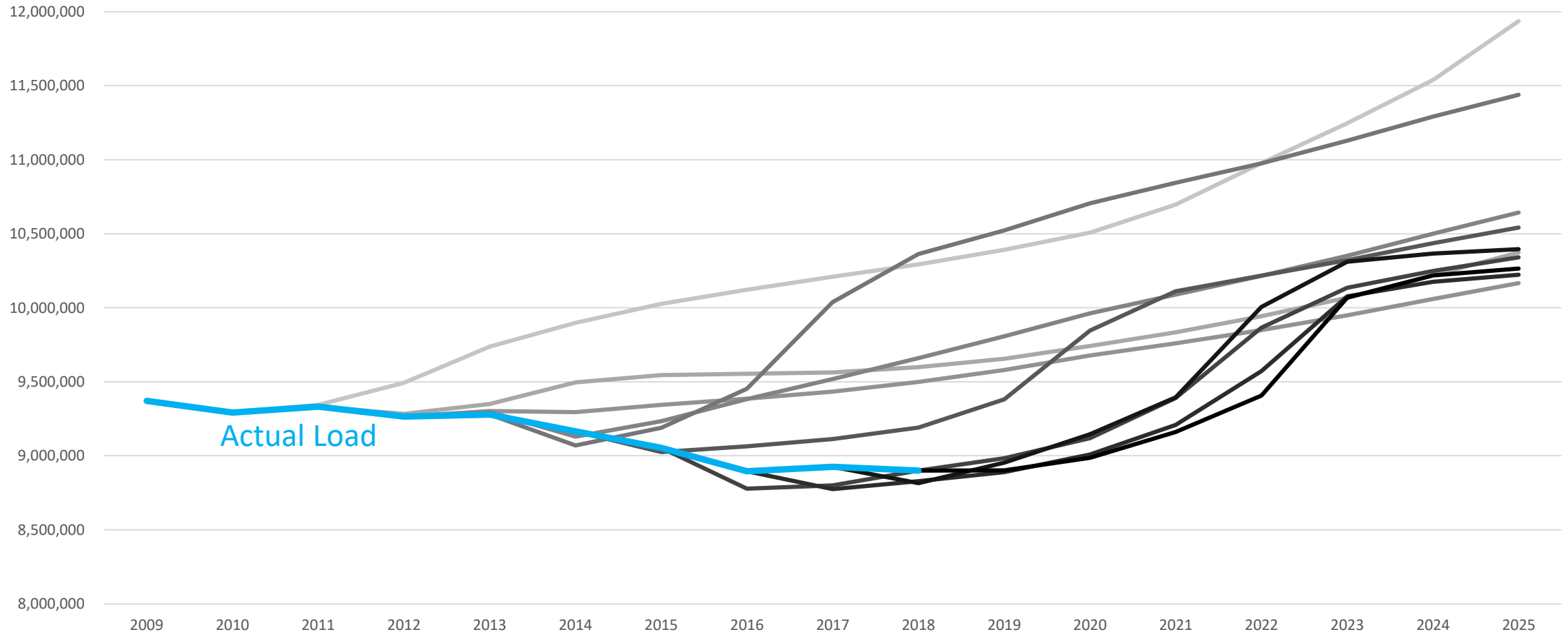
MANAGER, RESOURCE PLANNING



Tucson Electric Power



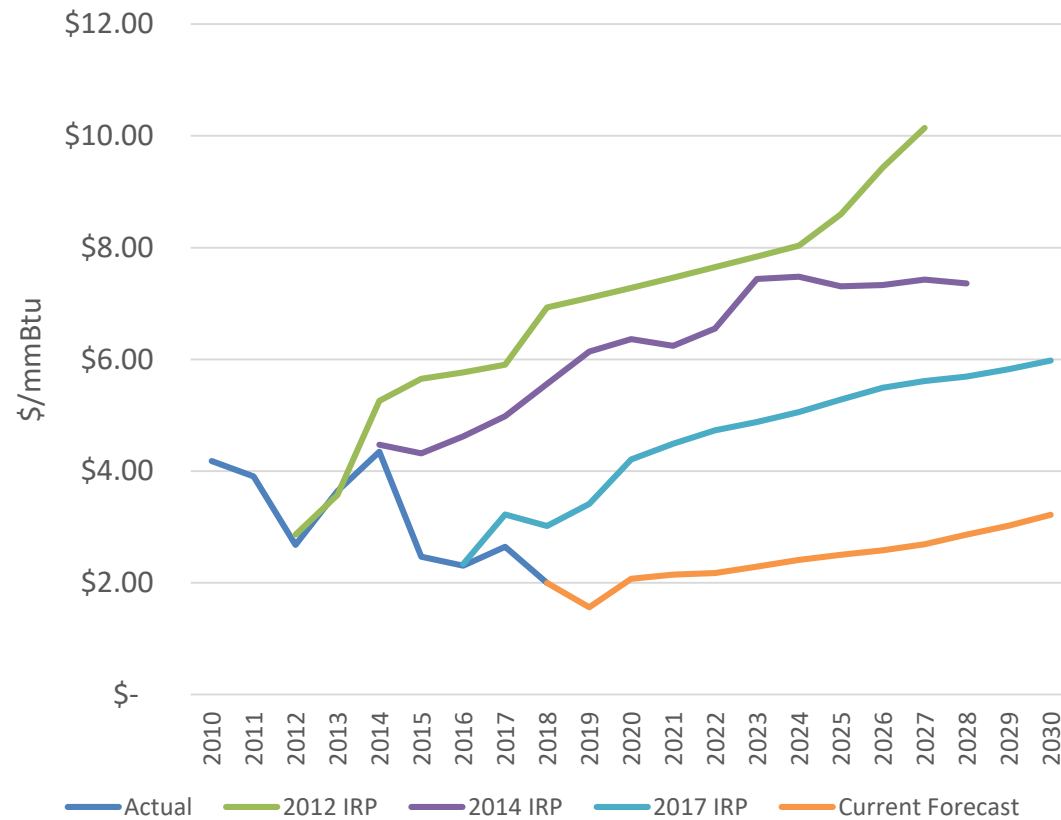
Customer Load Uncertainty



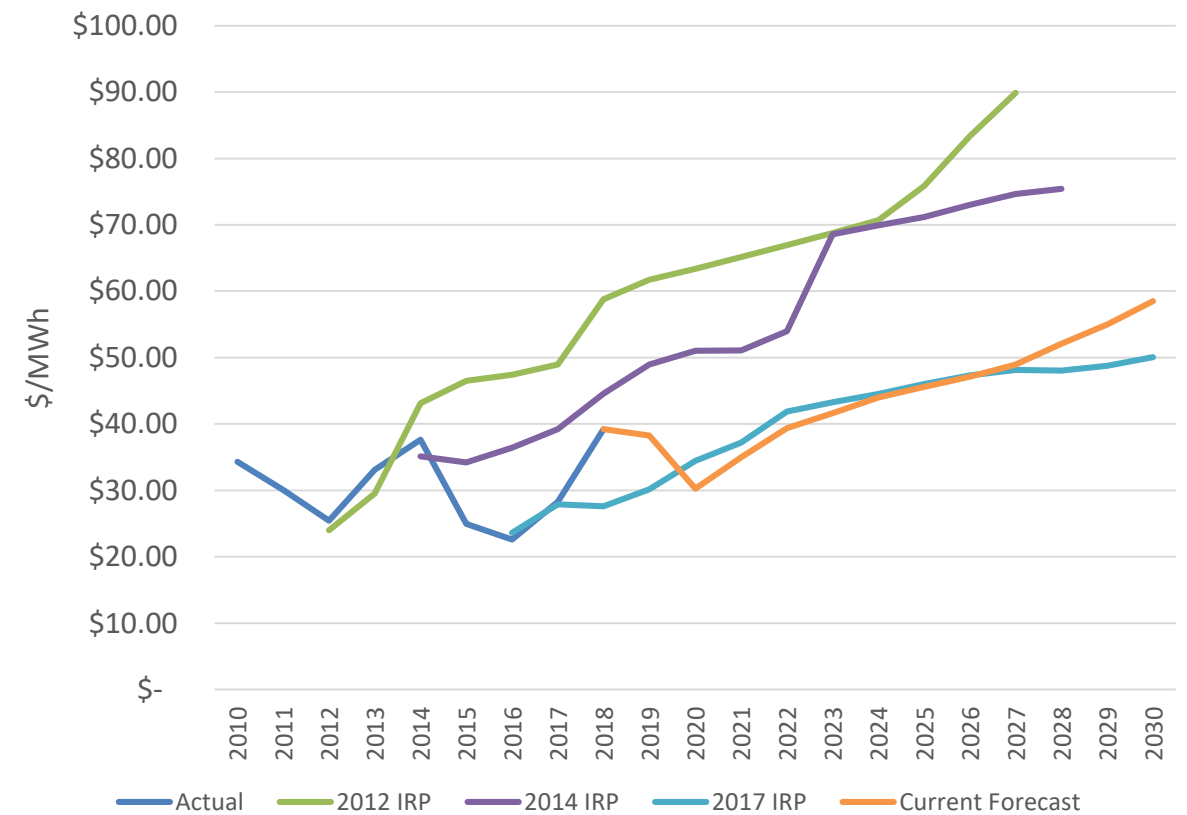


Market Uncertainty

Permian



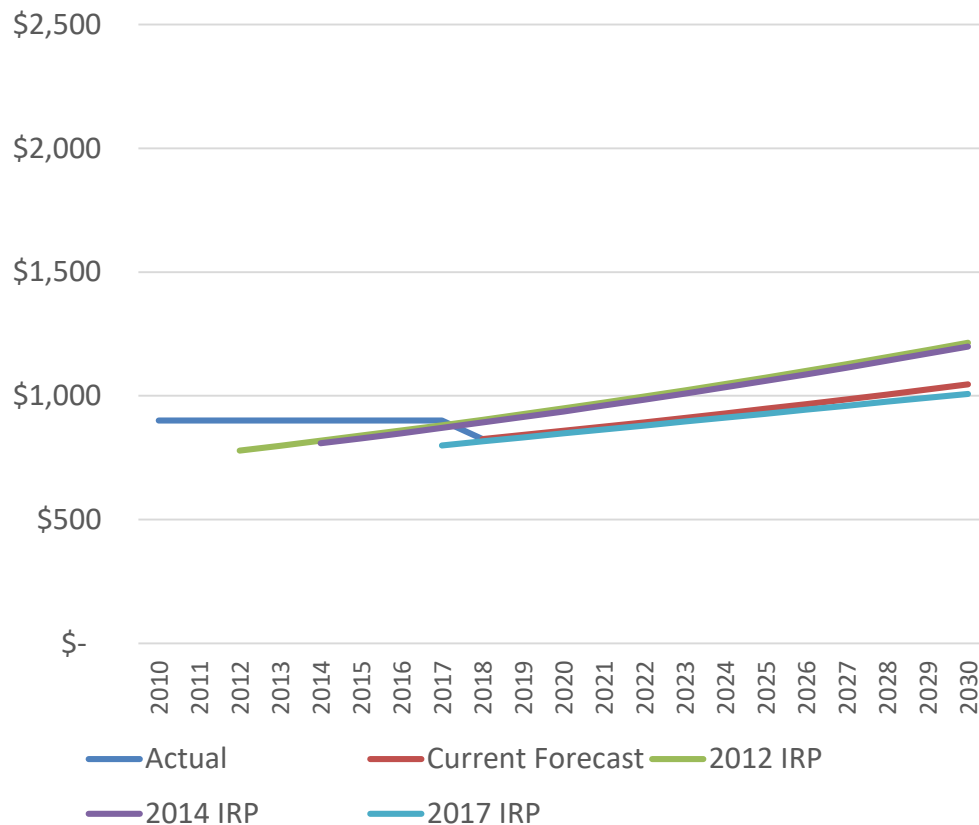
Palo Verde 24x7



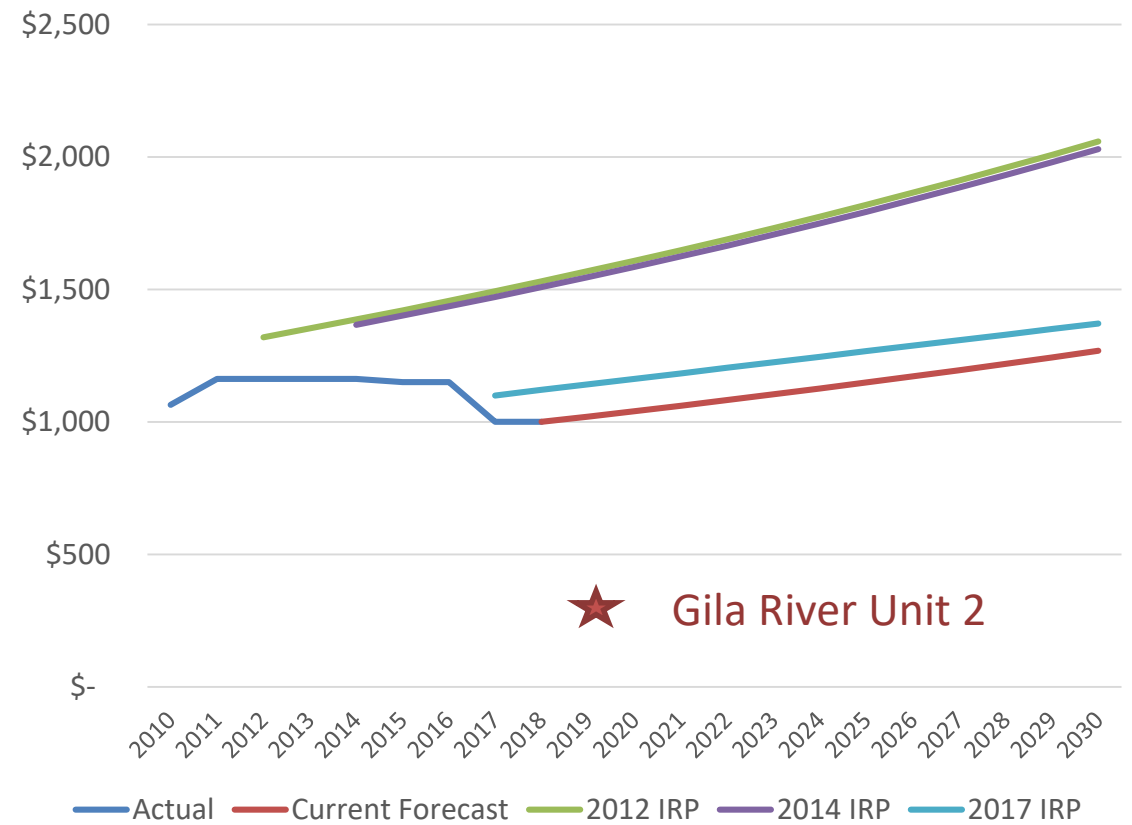


Capital Expense Uncertainty

Combustion Turbine (\$/kW)



Natural Gas Combined Cycle (\$/kW)

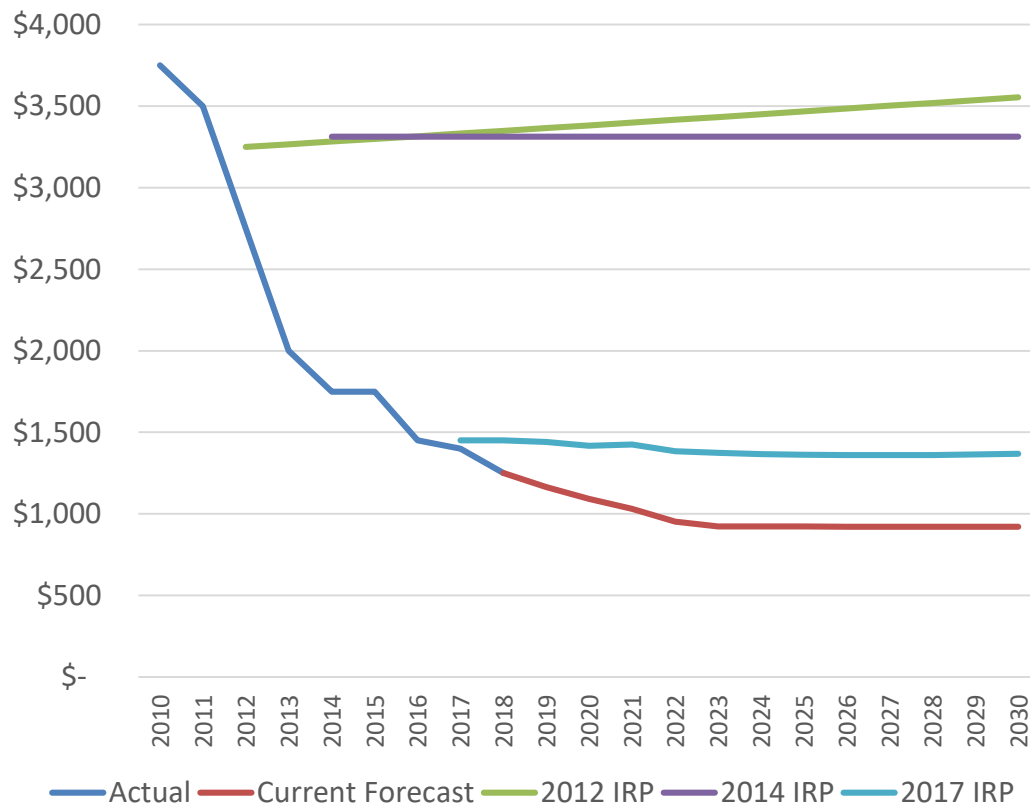


★ Gila River Unit 2

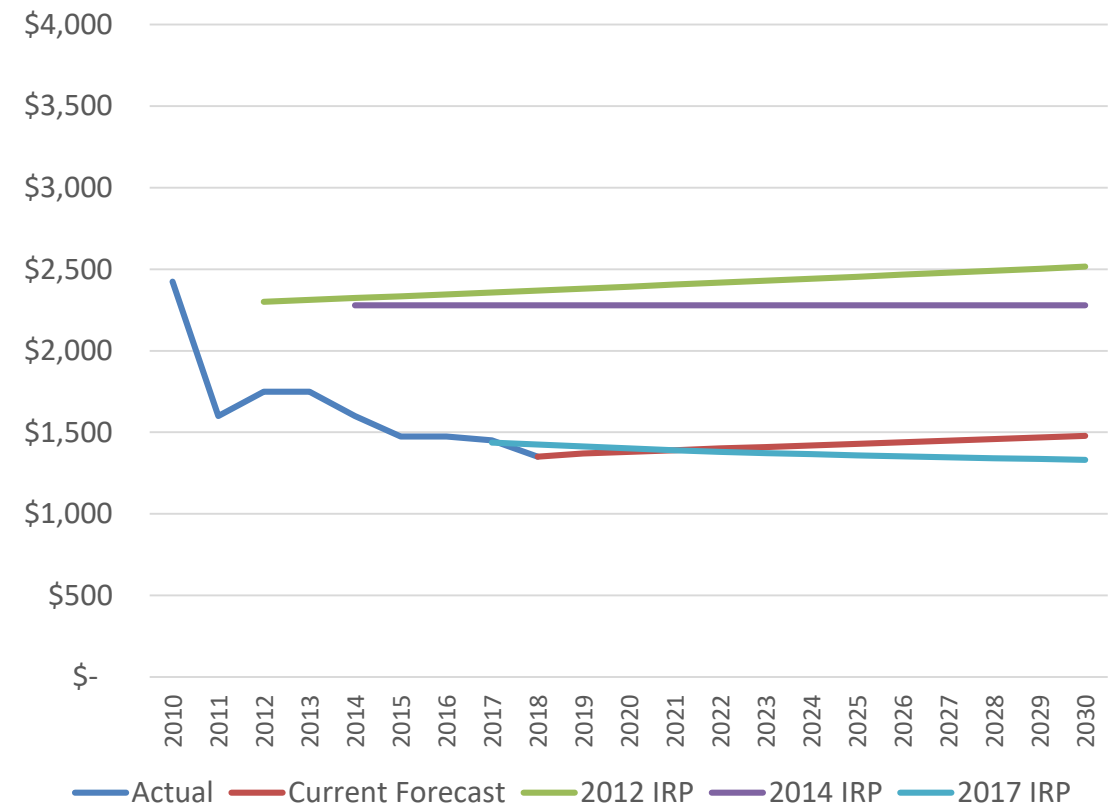


Capital Expense Uncertainty

Solar Single-Axis Tracking (\$/kW)



Wind (\$/kW)





Deferral of Capital Expenses

San Juan Generating Station



EPA requirement to install selective catalytic reduction (SCR) for Regional Haze

Investment of nearly \$1 billion in each plant

Alternative to shutdown two units and install SNCR on other two



All units to retire by mid-2022

Navajo Generating Station



Alternative to shutdown one unit and defer SCR to 2030

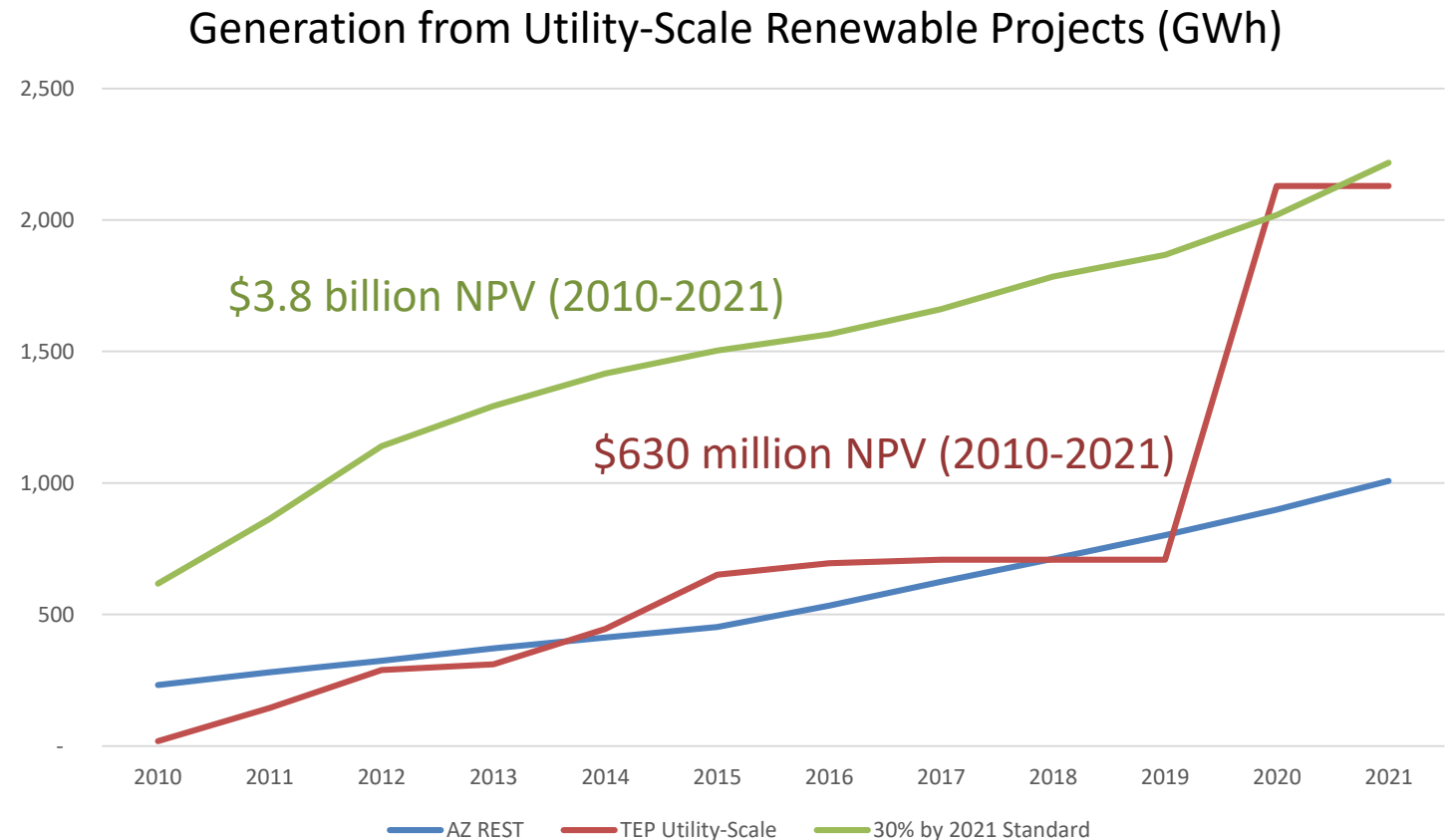


All units to retire by end of 2019



Mandated Resource Acquisitions

- Arizona Renewable Energy Standard and Tariff (REST)
 - 15% of retail load served from renewable energy by 2025
 - Phased in to allow for technology development
- What if the Arizona REST was 30% by 2021
 - Over \$3 billion NPV in additional costs
 - Annual renewable costs exceed annual fuel costs with only a fraction of the generation





Participant Activity

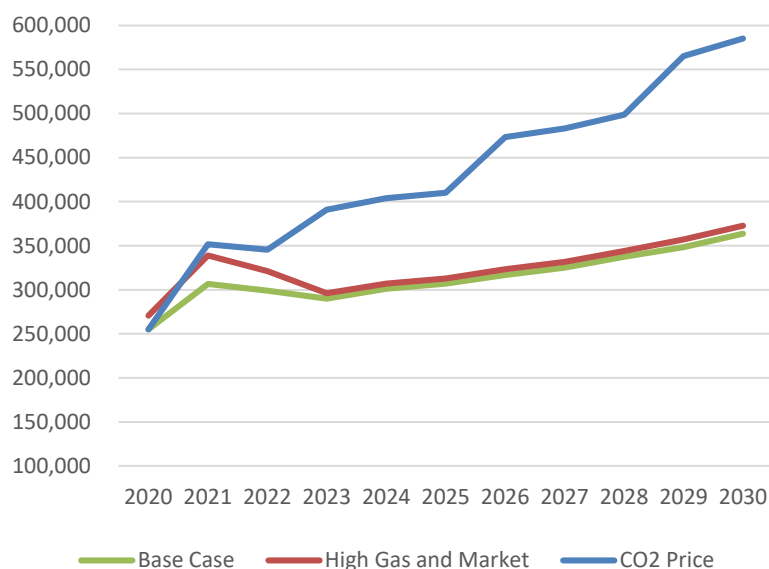
- What are the uncertainties that you plan around?
 - Economic
 - Technology
 - Geopolitical
 - Other

- What are the uncertainties that TEP should be planning around?
 - Economic
 - Technology
 - Geopolitical
 - Other

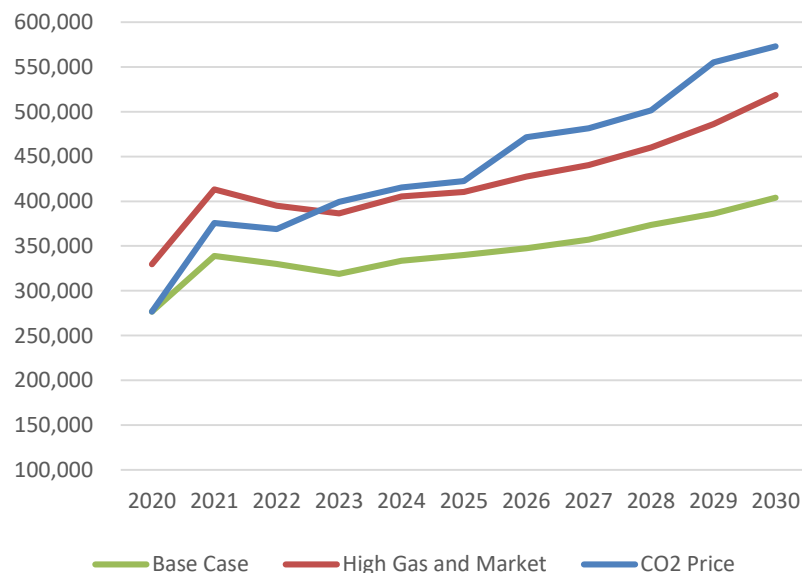


Diversification Benefits

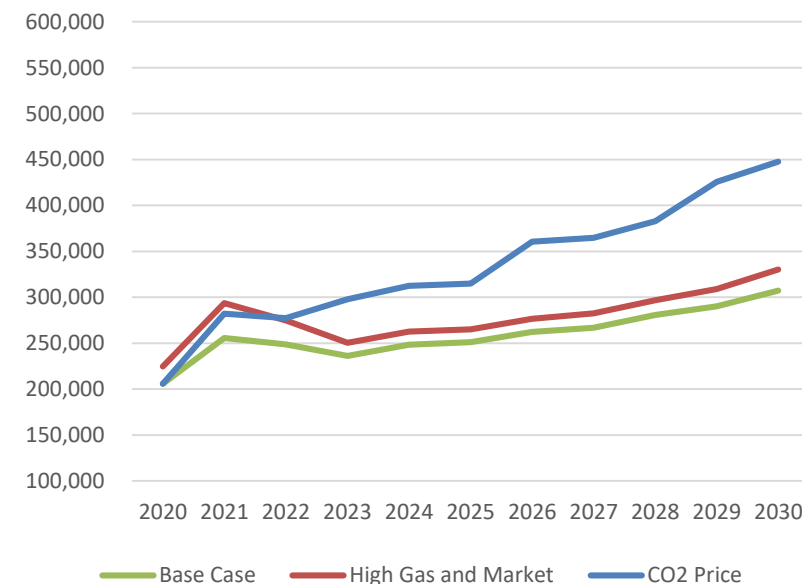
70% Coal; 20% Gas; 10% Renew



20% Coal; 70% Gas; 10% Renew



33% Coal; 33% Gas; 34% Renew



Effect of future conditions on Total Fuel and Purchase Power Costs

CO₂ Price \$5 - \$20/ton

Natural Gas Price 2X; Market Price 1.5X



Summary

- The future is uncertain and strong forecasting tools do not change that
- Avoid “big bets” – decisions involving significant expense yet which do not perform well across all reasonably foreseeable futures
- The timing of resource acquisitions can have a significant impact on the cost effectiveness of those decisions
- Diversification helps mute the impact of unfavorable future outcomes and provides opportunity to take advantage of favorable future outcomes



Next Steps

Future Agenda Items

- Utility Revenue Formula
- Production Cost Modeling
- Model Input Assumptions
- Resource Adequacy
- Demand Side Management/Demand Response
- Greenhouse Gas Reductions/Carbon Pricing
- Transmission
- Distributed Resources/Smart Grid/Electric Vehicles

Meeting Times

- Exclude Monday and Friday??
- AM or PM
- 3rd Week
 - Tuesday through Thursday
- 2nd Week
 - Alternate days

Questions / Feedback