PNM 2023-2042 IRP: Siemens Market Price Outlook, Itron Load Forecast, and Pricing topics

STEERING MEETING #9

DECEMBER 15, 2022

DISCLOSURE REGARDING FORWARD LOOKING STATEMENTS

The information provided in this presentation contains scenario planning assumptions to assist in the Integrated Resource Plan public process and should not be considered statements of the company's actual plans. Any assumptions and projections contained in the presentation are subject to a variety of risks, uncertainties and other factors, most of which are beyond the company's control, and many of which could have a significant impact on the company's ultimate conclusions and plans. For further discussion of these and other important factors, please refer to reports filed with the Securities and Exchange Commission. The reports are available online at www.pnmresources.com.

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MEETING GROUND RULES

THE FOCUS OF THE MEETING IS THE DEVELOPMENT OF THE 2023 IRP

01

- Questions and comments are welcome – One Person Speaks at a Time

02

- Reminder; today's presentation is not PNM's plan or a financial forecast, it is an illustration of the IRP process

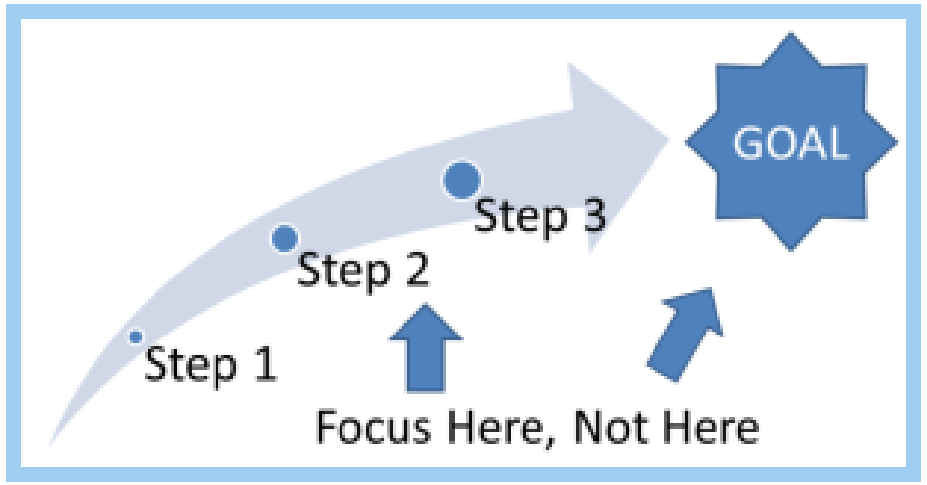
03

- When asking a question, please speak clearly and slowly as all questions will be logged and labeled with the person and organization responsible for asking the question

04

- These meetings are about the 2023 IRP, questions and comments should relate to this IRP. Any questions or comments related to other regulatory proceedings should be directed towards the specific filing.

THE FOCUS OF THE MEETING IS THE DEVELOPMENT OF THE 2023 IRP



The technical sessions are about discussing the advantages and disadvantages regarding the application of different technical methodologies within the IRP modeling framework.

We are not here to focus on the results or drive towards a specific result. **We all know where we are going: 100% Carbon Free by 2040. The focus in the IRP development is how do we get there in the best way possible for PNM's customers and New Mexico.**

AGENDA

- Welcome & Introductions
- Siemens – Price Outlook
- Itron – Load Forecast
- PNM Pricing topics – TOU & TOD rates, modern rate design
- Next Steps

Price Outlook

Public Service New Mexico

December 2022

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Introduction

- Siemens PTI developed market assumptions for PNM in July 2022
- Market forecast of natural gas, carbon emission price, and capital costs were developed to assist PNM with its 2023 Integrated Resource Plan (discussion at a prior stakeholder meeting)
- The forecast for each of these commodities was developed based on input from subject matter experts, research, internal analysis, and propriety data over the 2022-2043 planning period

Scenario	Description
Baseline	Reference view based on market forwards early and longer term by fundamentals accounting for expected policy
High	High prices reflect increasing social costs for CO_2 and higher price of natural gas based on statistical analysis
Low	Low prices reflect no costs for CO_2 and lower price of natural gas based on lower band of statistical analysis

Market Drivers

Gas and CO2 price scenarios

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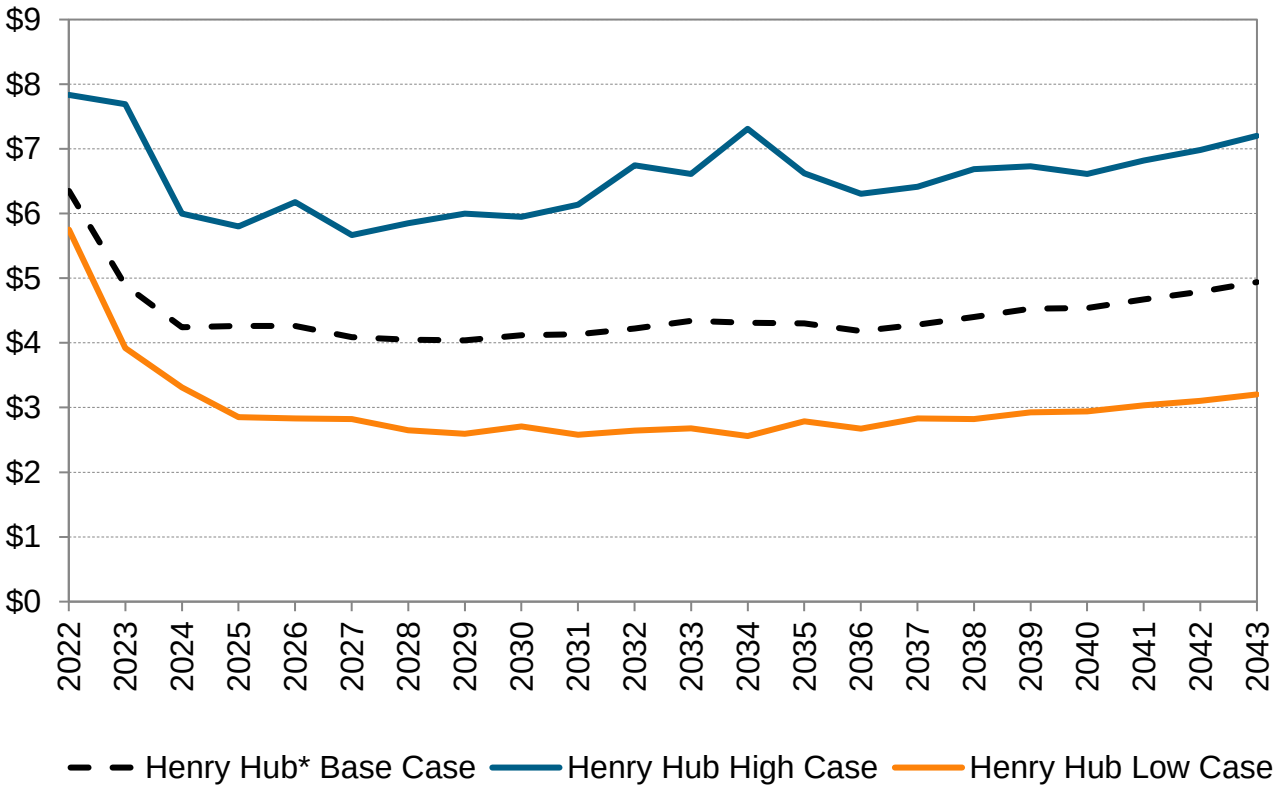
Natural Gas Price Scenarios – Henry Hub

HH Natural Gas Price Scenarios, $2021/MMBtu



*Base case prices were developed using NYMEX forwards for Henry Hub for the first 18 months starting July 2022, mix of forward and fundamentals for next 18 months; fundamentals March 2025 onwards

Henry Hub Low and High Cases

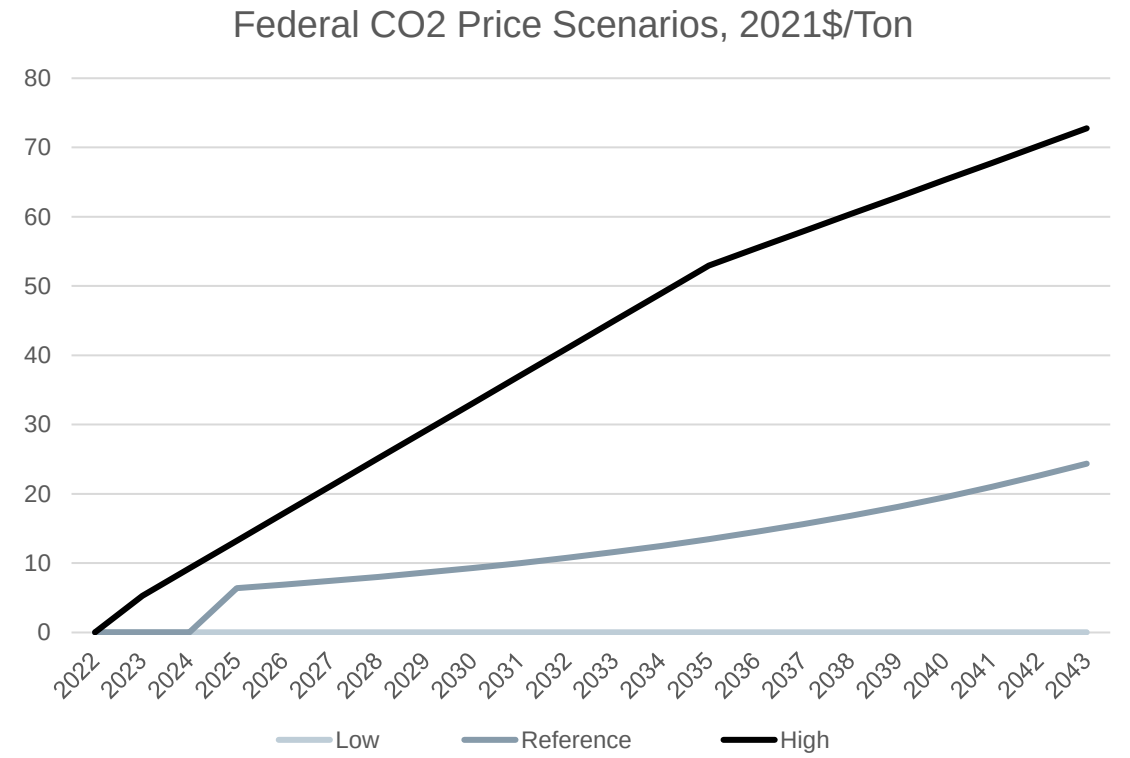
Low Case –Reflects an outlook based on a statistical analysis of historical at the 10% confidence internal. Prices settle around $3/MMBtu longer term

High Case – Reflects an outlook based on Statistical analysis of historical at 90% confidence interval. Prices increase above ~$6/MMBtu longer term

Carbon Price Scenarios – Federal

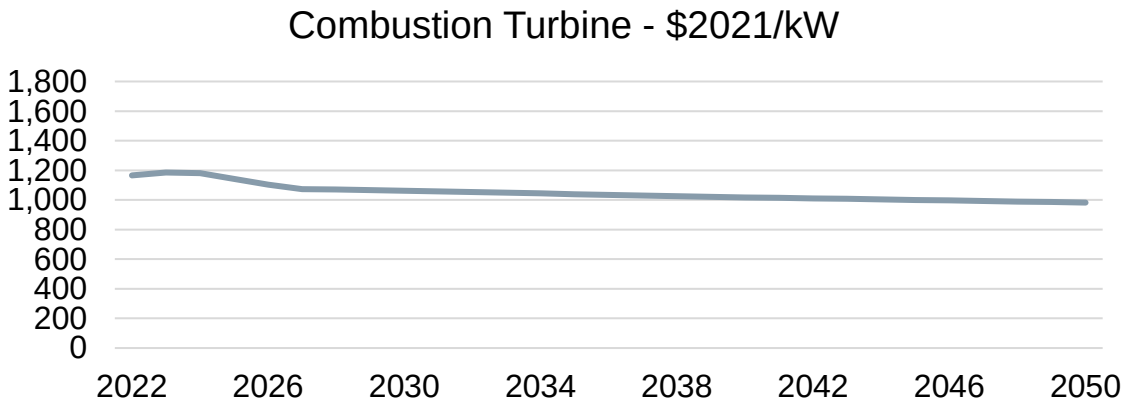
- Range of federal carbon prices reflects uncertain outlook for carbon policy and resulting pricing in western states
- Baseline scenario assumes a carbon policy starting in 2025 to achieve 80% reduction in carbon emission in the power sector relative to 2005 levels
- High scenario nears $70/ton by the end of the forecast horizon and incorporates social cost of carbon emission
- Low case represents no cost for carbon emission

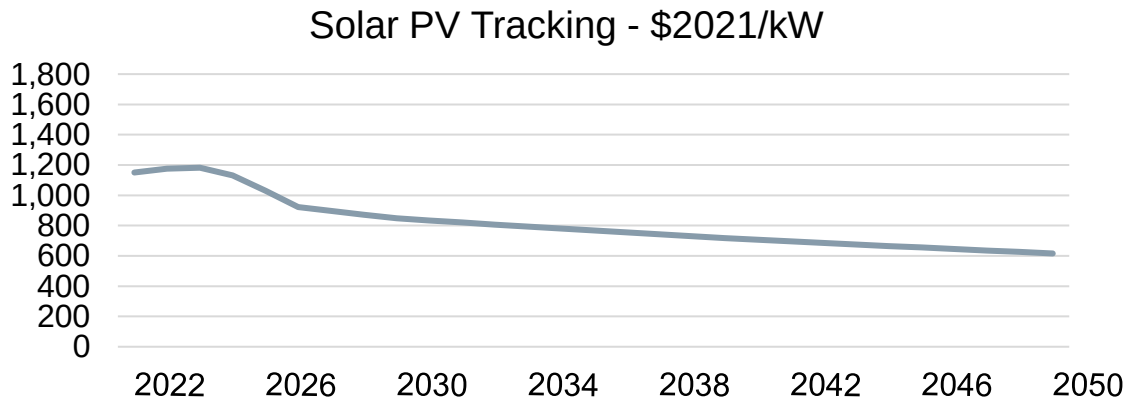
U.S. Carbon Price Scenarios

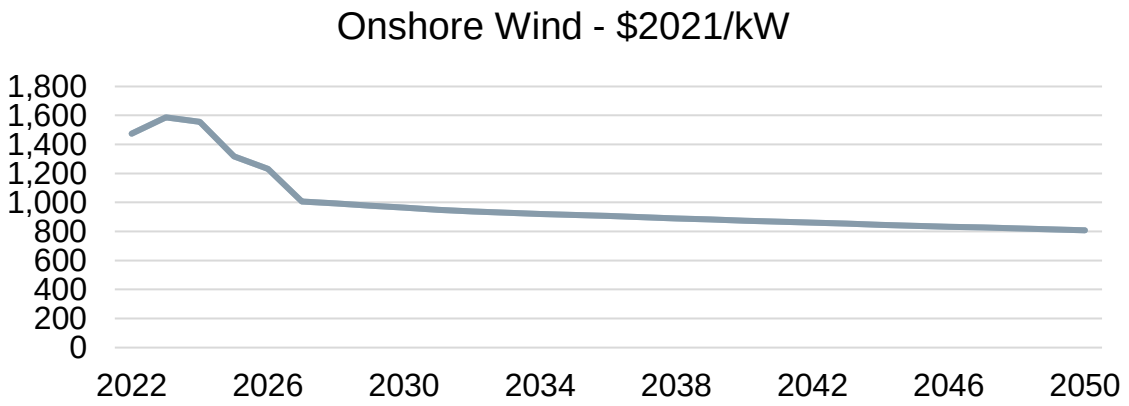


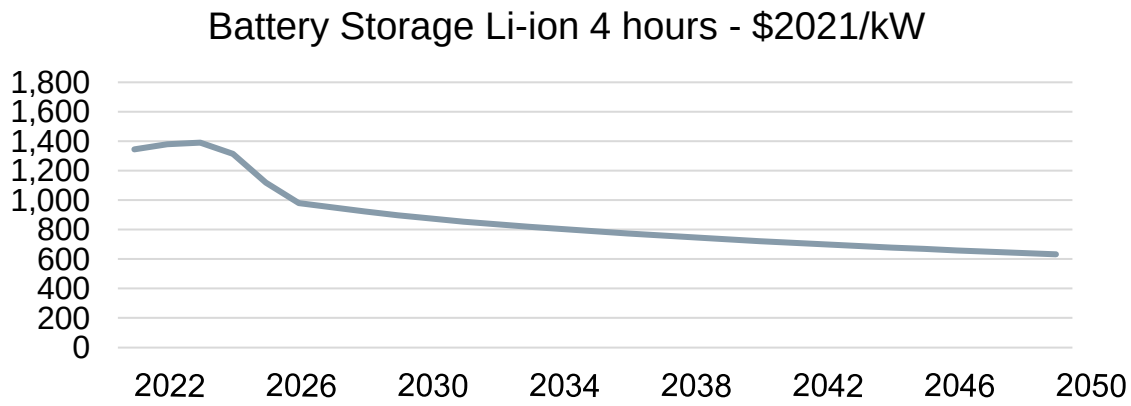
Capital cost forecast for select technologies incorporates regional factors to build in New Mexico

**Costs outlook does not reflect incentives provided by the Inflation Reduction Act 2022*









Power Price Outlook

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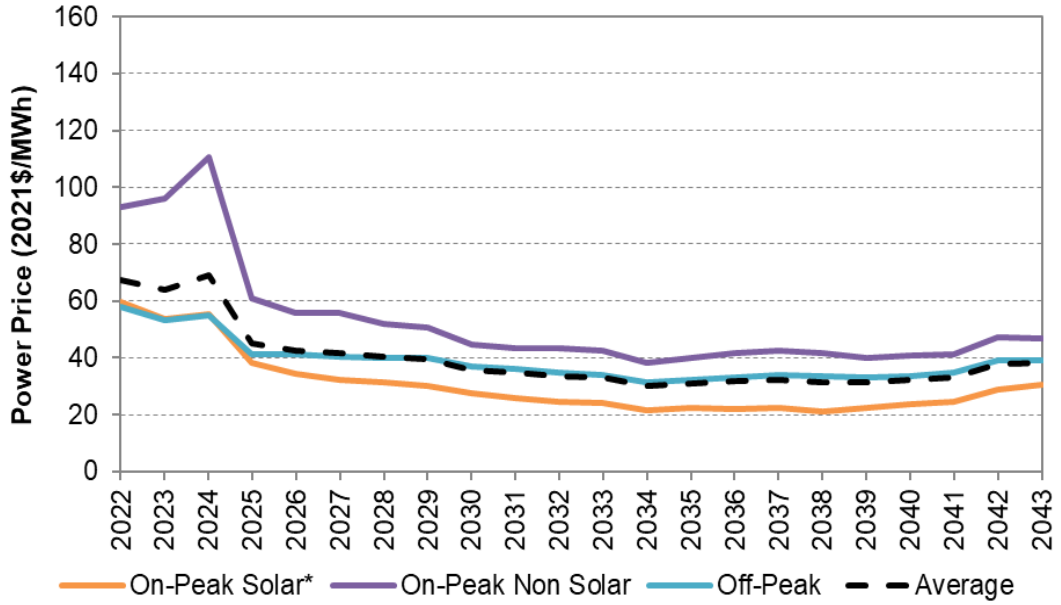
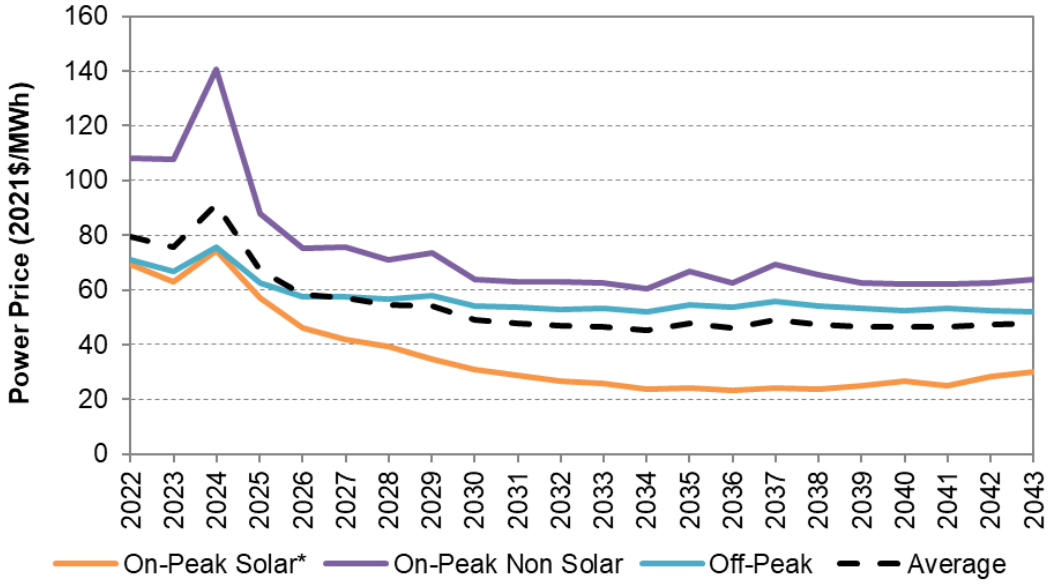
Baseline Zonal Energy Prices – Annual

- **Near Term** – High pricing reflected in recent and forward market pricing supported by higher natural gas prices and scarcity pricing due to supply chain issues
- **Mid-Term** – On-peak energy prices decline driven by an increase in solar capacity, reducing prices in many hours of the peak period. Off-peak prices remain stable to decreasing with natural gas prices through the mid-2020s.
- **Long-Term** – All-hours energy prices remain fairly flat on the expectation of no real additional increase in gas prices while the impact from solar to on-peak prices widens.

Four Corners Annual Pricing



Palo Verde Annual Pricing

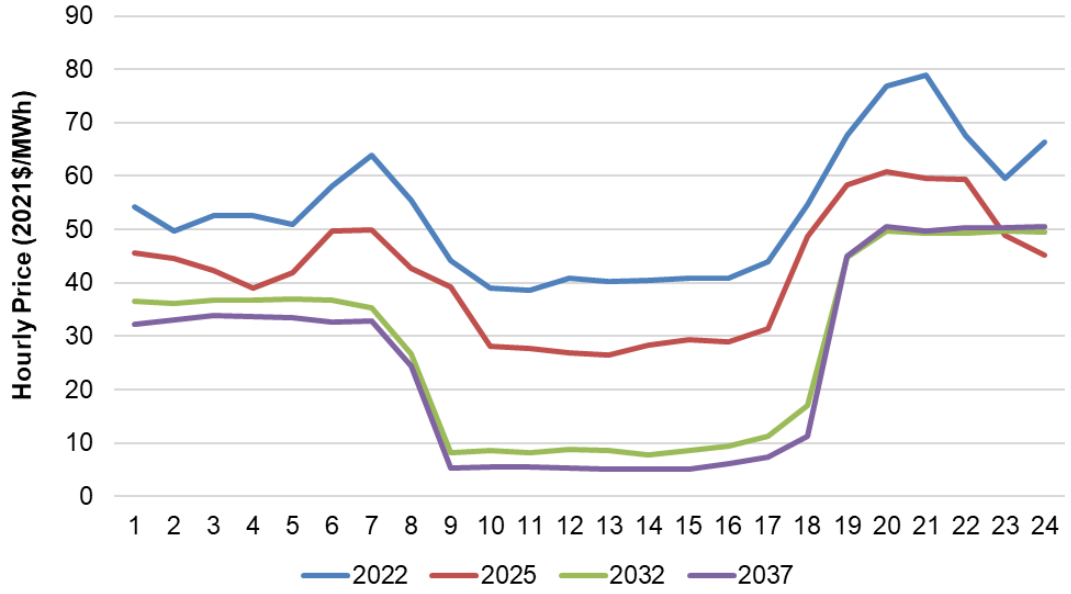


*On-peak solar defined as the hours of 8 A.M. to 5 P.M.

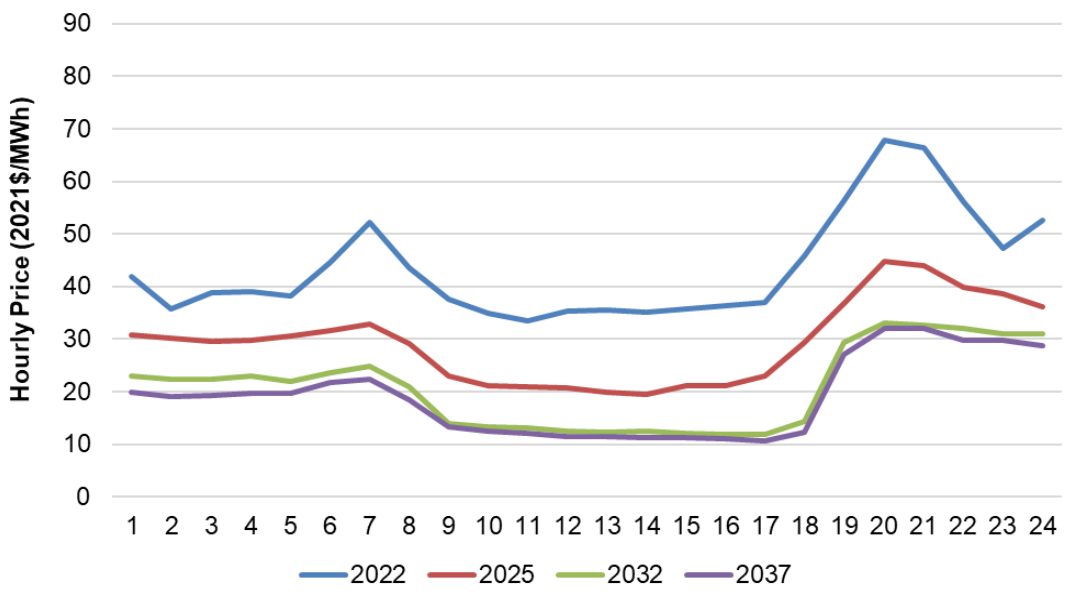
Increased Solar Penetration Exacerbates Duck Curve Resulting in Lower On-Peak Energy Prices

- With growth in solar generation expected to exceed electricity demand growth, the duck curve is expected to increase.
- Peak solar hours, from 8 A.M. to 5 P.M., will experience price drop while the balance of peak power hours are expected to see higher prices.

Palo Verde Average Hourly Pricing (April)



Four Corners Average Hourly Pricing (April)



Base Case Pricing and Market Fundamentals Summary

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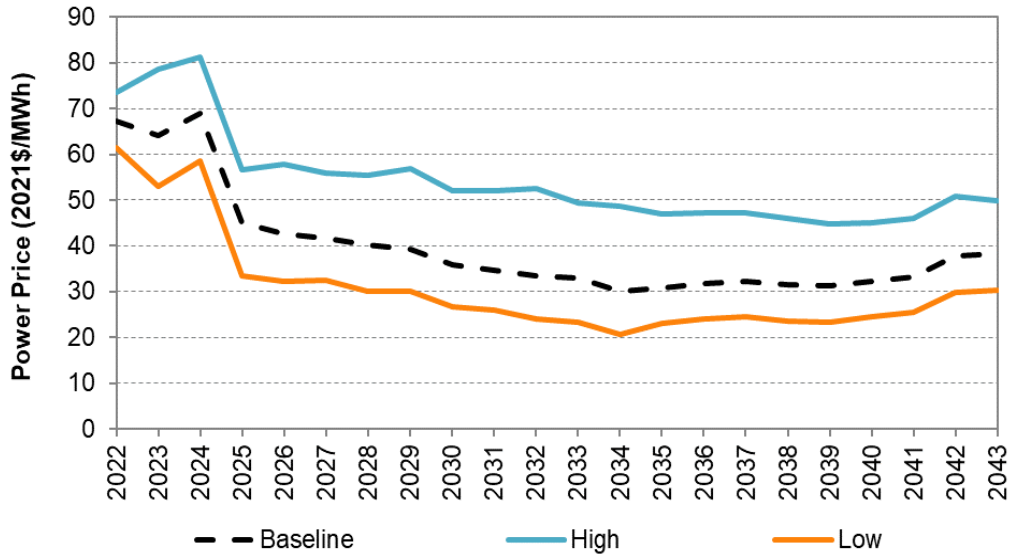
Ingenuity for life

- Forward pricing for Four Corners and Palo Verde are currently higher than historical values due to scarcity pricing and high fuel costs
- RPS and carbon reduction requirements are expected to support high renewable adoption resulting in lower on-peak pricing
- Under the Baseline Case, new builds in the region are largely solar, storage, and fast-ramping gas units based on economics
- On-peak pricing outside of solar hours and off-peak pricing is expected to remain higher yet stable over time
- All-hours pricing is expected to decrease from current high levels through the 2020s and remains flat thereafter
- With the growth in solar generation expected to exceed electricity demand growth, the duck curve is expected to increase.
- Peak solar hours, from 8 A.M. to 5 P.M., will experience a price drop while the balance of peak power hours is expected to see higher prices.

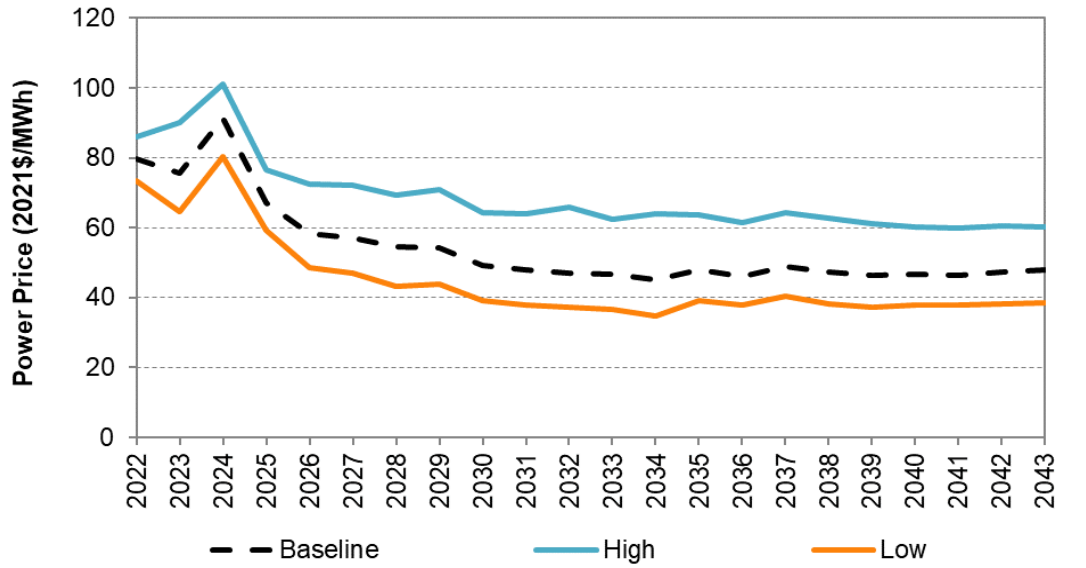
Zonal Energy Price Scenarios – Four Corners and Palo Verde

- Higher natural gas prices in the mid-and long-term as well as higher carbon prices in the long-term support higher energy pricing in the High Case
- The absence of a carbon price and sustained lower natural gas prices over the forecast period support energy pricing remaining at, near, or below current levels over the forecast period in the Low Case

Four Corners



Palo Verde



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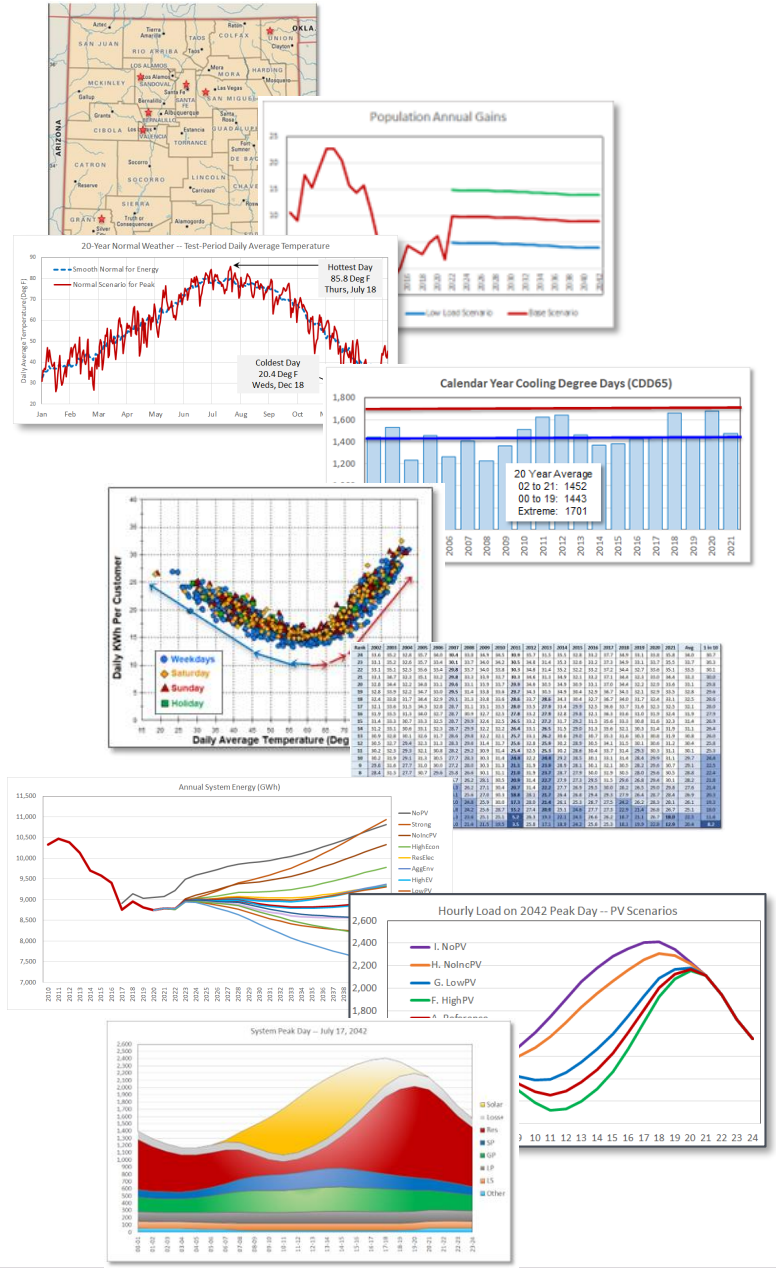
Draft PNM Integrated Resource Plan Forecast Scenarios

Stuart McMenamin
Itron, Inc.

December, 2022

Agenda

- Economic Data and Forecasts
- Weather Data, Normal and Extreme Weather
- Behind the Meter PV Data and Forecasts
- Electric Vehicle Forecast
- Other Scenario Inputs (Electrification, TOU)
- Energy Modeling and Forecasts
  - Customer growth forecast
  - Statistically Adjusted End Use (SAE) Method
  - Use per customer models
  - Energy and peak forecast summary
- Hourly System Load and Peak Demand Forecasts
  - Bottom-up load shape and peak demand forecast
- Forecast Scenarios and Results



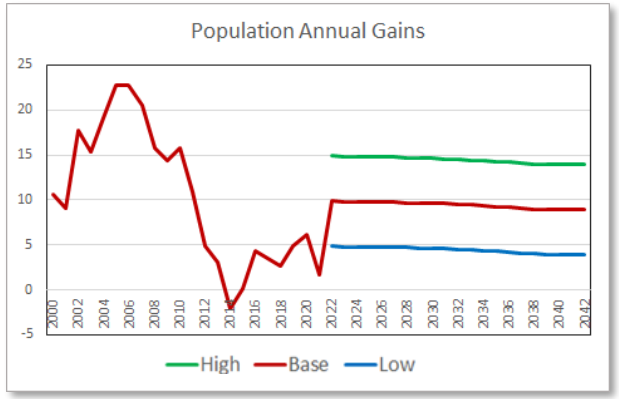
Economic Data and Forecasts

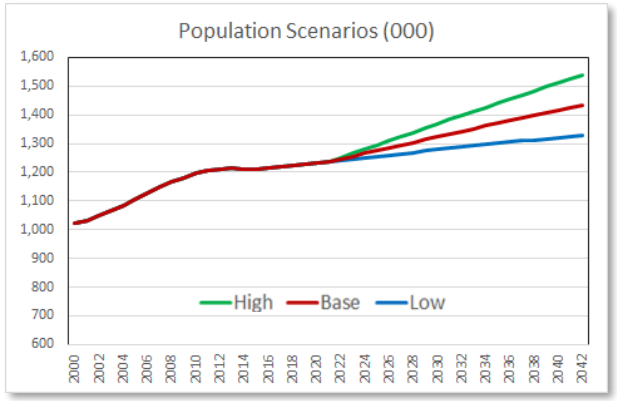
Economic Data and Forecast

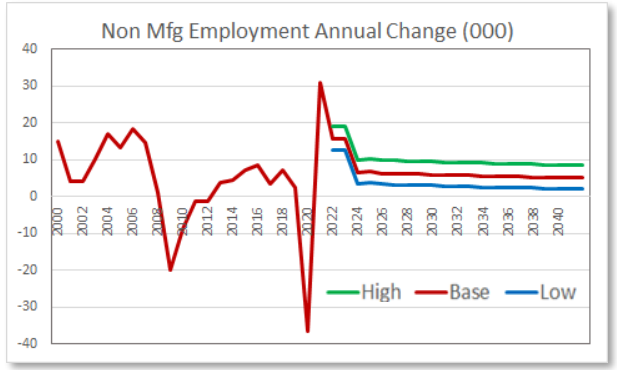
- Forecast provided by Woods and Poole
- Annual history from 1950 to 2021
- Annual forecast to 2050
- State and County level data
- Used data for PNM counties:
  - North: Bernalillo, San Miguel, Sandoval Santa Fe, Union, Valencia
  - South: Grant, Hidalgo, Luna, Otero
- Annual data converted to monthly using centered moving averages

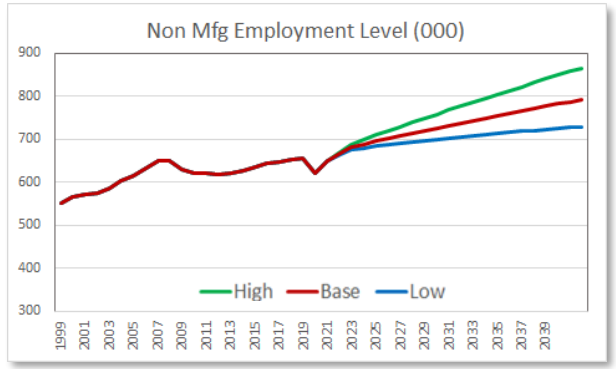
Economic Scenarios

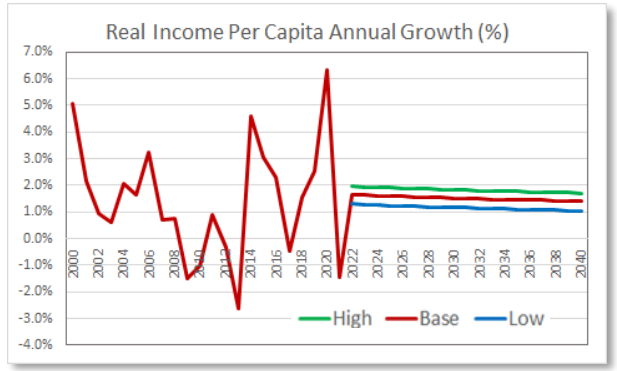
- Population Annual Gains
  - High Case: 14,400
  - Base Case: 9,400
  - Low Case: 4,400
- Non Mfg. Employment Annual Gains
  - High Case: 9,300
  - Base Case: 5,800
  - Low Case: 2,800
- Real Per Capita Income Growth
  - High Case: 1.8%
  - Base Case: 1.5%
  - Low Case: 1.1%

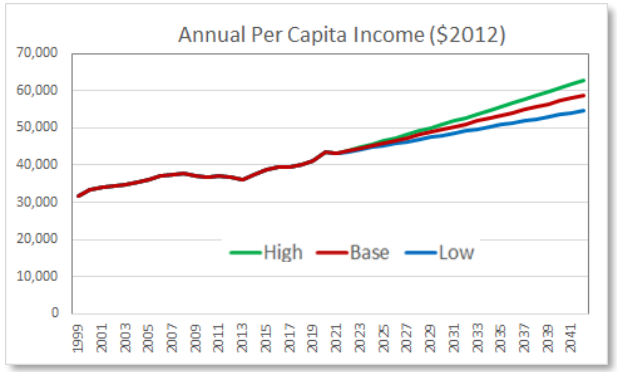






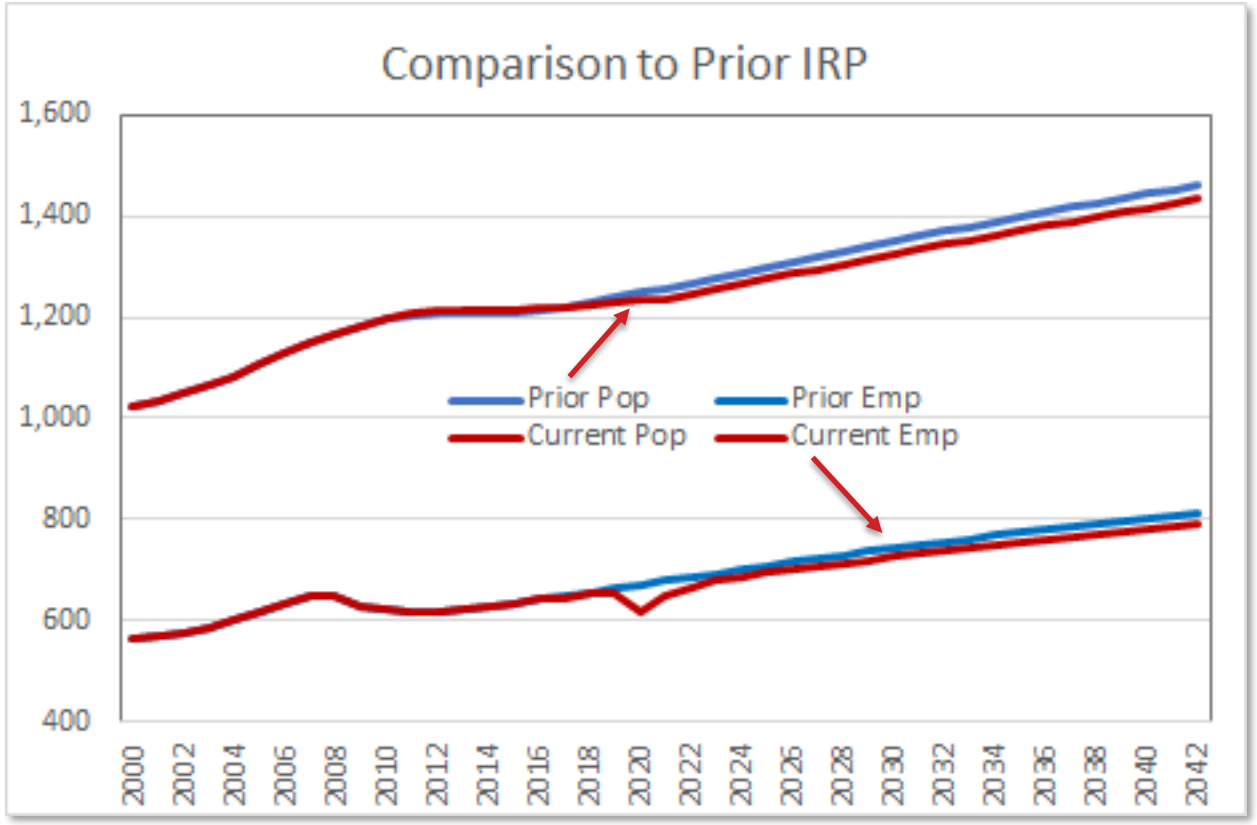






Comparison with Prior IRP

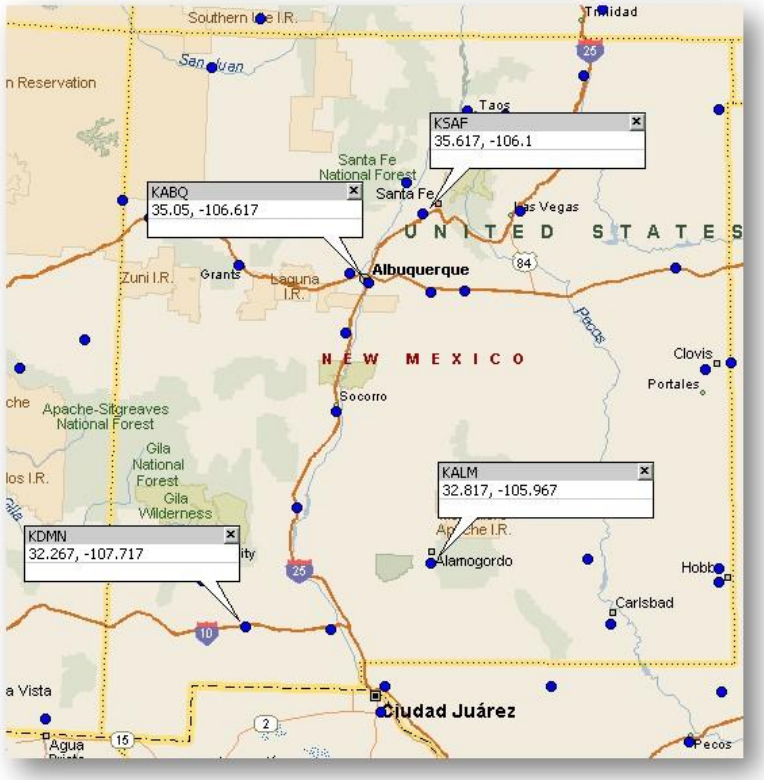
- Main drivers of growth are Population and Nonmanufacturing Employment
- Current forecasts are slightly weaker
  - Population in 2042 down 28k
  - Employment in 2042 down 19k
- Most of the difference is in place by the end of 2022, so gains beyond 2022 are about the same.



Weather Data and Normal Weather

Weather Data and Daily Scenarios

- Hourly weather data from AccuWeather
  - Temperature – Used to compute Degree Days
  - Global horizontal irradiation (GHI) – Used for solar generation
- 4 Stations
  - North: Albuquerque (KABQ), Santa Fe (KSAF)
  - South: Deming (KDMN), Alamogordo (KALM)
- Station weights for weather variables
  - Based on monthly billed sales
  - Heating Degree weights based on winter sales
  - Cooling Degree weights based on summer sales
  - Solar GHI weights based on annual sales



Station	Heating Degrees	Cooling Degrees	Solar GHI
KABQ	75.0%	77.8%	76.3%
KALM	3.0%	3.2%	3.1%
KDMN	9.0%	8.4%	8.9%
KSAF	13.0%	10.5%	11.7%

Hottest Days 2002 to 2021 (Rank by Season)

Rank	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Avg	1 in 10
1	84.8	87.5	82.6	83.6	85.1	84.4	83.2	85.2	85.4	84.8	87.1	89.0	86.5	86.5	86.2	87.6	86.7	84.8	**87.8**	86.3	85.8	88.4
2	84.6	**86.9**	81.7	83.2	84.5	84.2	83.1	85.0	85.1	84.8	86.5	86.5	85.4	85.0	85.4	86.8	85.5	84.7	**87.6**	85.9	85.1	87.2
3	83.8	85.9	81.2	82.9	83.7	83.4	82.3	84.9	84.9	84.7	85.1	85.6	83.8	83.0	84.9	**85.9**	85.2	84.7	**86.8**	85.8	84.4	86.3
4	83.6	**85.8**	81.2	82.7	83.6	83.1	82.3	84.5	84.5	84.6	84.5	84.4	83.6	82.8	84.7	83.6	85.2	83.7	85.4	85.6	84.0	85.7
5	82.5	**85.6**	81.0	82.7	83.6	83.1	82.0	84.3	84.4	84.3	84.4	84.2	82.3	82.4	84.6	83.6	84.8	83.4	**84.8**	84.5	83.6	85.2
6	82.4	**85.5**	80.8	82.3	83.5	82.9	81.7	83.9	83.8	84.2	84.3	83.2	82.0	82.0	84.5	83.5	**84.5**	82.9	83.8	84.4	83.3	85.0
7	82.0	**85.3**	80.7	82.1	83.3	82.9	81.7	83.8	83.7	84.1	84.0	82.9	81.9	81.8	**84.3**	83.4	83.7	82.9	83.8	84.3	83.1	84.8
8	82.0	**85.0**	80.6	82.0	83.0	82.8	81.6	83.7	82.8	83.9	**83.9**	82.0	81.7	81.8	84.3	83.1	83.7	82.8	83.5	84.3	82.9	84.4
9	81.7	**84.8**	80.5	82.0	82.9	82.8	81.1	83.5	82.8	83.7	**83.8**	82.0	81.5	81.3	84.1	83.0	83.5	82.1	83.5	83.5	82.7	84.3
10	81.6	**84.4**	80.3	81.9	82.9	82.5	80.8	83.0	82.7	83.6	83.7	81.8	81.3	81.2	**83.8**	82.9	83.4	81.9	83.5	83.2	82.5	84.1
11	81.4	**84.4**	80.2	81.8	82.7	82.5	80.6	82.9	82.5	83.5	**83.6**	81.6	81.1	81.1	83.6	82.9	83.1	81.7	83.3	82.2	82.3	84.0
12	81.4	**84.1**	80.1	81.8	82.6	82.3	80.5	82.9	82.3	**83.5**	83.3	81.3	81.1	80.8	83.5	82.3	83.0	81.6	83.1	82.0	82.2	83.8
13	81.3	**83.6**	80.0	81.6	82.0	82.1	80.4	82.5	82.2	83.0	83.2	81.3	81.0	80.8	**83.4**	82.1	82.8	81.5	82.7	81.9	82.0	83.5
14	81.1	**83.6**	80.0	81.6	82.0	82.1	80.3	82.2	82.0	82.9	83.0	81.3	81.0	80.7	**83.3**	81.7	82.7	81.5	82.6	81.6	81.9	83.5
15	80.9	**83.4**	79.7	81.5	81.8	82.0	79.7	82.0	81.9	82.9	82.9	81.2	80.7	80.6	**83.2**	81.4	82.7	81.3	82.5	81.3	81.7	83.3
16	80.7	**83.4**	79.5	81.4	81.7	82.0	79.6	81.1	81.8	82.8	82.8	81.2	80.3	80.1	**83.2**	81.0	82.7	81.3	82.4	80.9	81.5	83.3
17	80.7	**83.3**	79.4	81.1	81.5	81.4	79.0	80.8	81.4	**82.8**	82.7	81.0	80.3	80.1	82.6	80.8	82.0	81.1	82.3	80.9	81.3	83.0
18	80.7	**83.2**	79.2	81.1	81.4	81.2	79.0	80.7	81.4	**82.7**	81.8	80.8	80.3	80.0	82.4	80.2	81.9	81.1	82.3	80.7	81.1	83.0
19	80.5	**82.8**	79.2	80.9	81.2	81.1	79.0	80.7	81.3	**82.7**	81.8	80.3	80.2	79.9	82.3	80.1	81.7	81.0	82.1	80.5	81.0	82.7
20	80.4	**82.4**	79.2	80.7	81.0	80.9	78.8	80.7	80.8	**82.7**	81.6	80.2	79.9	79.9	82.2	80.0	81.7	80.8	82.1	80.1	80.8	82.6
21	80.3	**82.4**	79.1	80.6	80.9	80.8	78.6	80.3	80.6	**82.3**	81.4	80.2	79.7	79.6	82.1	80.0	81.6	80.7	82.1	80.0	80.7	82.3
22	80.3	**82.4**	79.0	80.5	80.4	80.7	78.5	79.9	80.5	**82.2**	81.1	80.1	79.6	79.4	82.0	79.8	81.5	80.6	81.9	79.7	80.5	82.3
23	80.2	**82.3**	78.9	80.5	80.2	80.6	78.3	79.9	80.4	**82.2**	81.1	80.1	79.4	79.4	81.7	79.6	81.4	80.6	81.9	79.5	80.4	82.3
24	80.1	**82.2**	78.8	80.4	80.0	80.6	78.3	79.9	80.2	**82.1**	81.0	80.0	79.3	79.3	81.6	79.6	81.0	80.5	81.6	79.3	80.3	82.2

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Used in Base Scenario

Used in Extreme Scenario

Coldest Days 2002-2021 (Rank by Season)

Rank	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Avg	1 in 10
24	33.6	35.2	32.8	35.7	34.0	**30.4**	33.8	34.9	34.5	**30.9**	35.7	31.5	35.5	32.8	33.2	37.7	34.9	33.1	33.8	35.8	34.0	30.7
23	33.1	35.2	32.6	35.7	33.4	**30.1**	33.7	34.0	34.2	**30.5**	34.8	31.4	35.3	32.6	33.2	37.3	34.9	33.1	33.7	35.5	33.7	30.3
22	33.1	35.1	32.3	35.6	33.4	**29.8**	33.7	34.0	33.8	**30.3**	34.8	31.4	35.2	32.2	33.2	37.2	34.4	32.7	33.6	35.1	33.5	30.1
21	33.1	34.7	32.3	35.1	33.2	**29.8**	33.3	33.9	33.7	**30.3**	34.6	31.3	34.9	32.1	33.2	37.1	34.4	32.3	33.0	34.4	33.3	30.0
20	32.8	34.4	32.2	34.8	33.1	**29.6**	33.1	33.9	33.7	**29.9**	34.6	30.5	34.9	30.9	33.1	37.0	34.4	32.2	32.9	33.6	33.1	29.8
19	32.8	33.9	32.2	34.7	33.0	**29.5**	31.4	33.8	33.6	**29.7**	34.3	30.5	34.9	30.4	32.9	36.7	34.3	32.1	32.9	33.5	32.8	29.6
18	32.4	33.8	31.7	34.4	32.9	29.1	31.3	33.8	33.6	**28.6**	33.7	**28.6**	34.3	30.4	32.7	36.7	34.0	31.7	32.4	33.1	32.5	28.6
17	32.1	33.6	31.5	34.3	32.8	28.7	31.1	33.1	33.5	**28.0**	33.5	**27.9**	33.4	29.9	32.5	36.6	33.7	31.6	32.3	32.5	32.1	28.0
16	31.9	33.5	31.3	34.0	32.7	28.7	30.9	32.7	32.5	**27.8**	33.2	**27.9**	32.8	29.8	32.1	36.3	33.6	31.0	31.9	32.4	31.9	27.9
15	31.4	33.3	30.7	33.3	32.5	28.7	29.9	32.6	32.5	**26.5**	33.2	**27.2**	31.7	29.2	31.5	35.6	33.3	30.8	31.6	32.3	31.4	26.9
14	31.2	33.1	30.6	33.1	32.3	28.7	29.9	32.2	32.2	**26.4**	33.1	**26.5**	31.5	29.0	31.3	35.6	32.1	30.3	31.4	31.9	31.1	26.4
13	30.9	32.8	30.1	32.6	31.7	28.6	29.8	32.2	32.1	**25.7**	33.1	**26.2**	30.6	29.0	30.7	35.3	31.6	30.3	30.8	31.9	30.8	26.0
12	30.5	32.7	29.4	32.3	31.3	28.3	29.6	31.4	31.7	**25.6**	32.8	**25.9**	30.2	28.9	30.5	34.1	31.5	30.1	30.6	31.2	30.4	25.8
11	30.2	32.3	29.3	32.1	30.8	28.2	29.2	30.9	31.4	**25.4**	32.5	**25.3**	30.2	28.6	30.4	33.7	31.4	29.3	30.3	31.1	30.1	25.3
10	30.2	31.9	29.1	31.3	30.5	27.7	28.3	30.3	31.4	**24.4**	32.2	**24.4**	29.2	28.5	30.1	33.1	31.4	28.4	29.9	31.1	29.7	24.4
9	29.8	31.6	27.7	31.0	30.0	27.2	28.0	30.3	31.3	**21.1**	31.9	**23.9**	28.9	28.1	30.1	32.1	30.5	28.2	29.6	30.7	29.1	22.5
8	28.4	31.3	27.7	30.7	29.6	25.8	26.6	30.1	31.1	**21.0**	31.9	**23.7**	28.7	27.9	30.0	31.9	30.5	28.0	29.6	30.5	28.8	22.4
7	28.3	31.1	27.0	30.6	29.5	25.7	26.2	28.1	30.5	**20.9**	31.4	**22.7**	27.9	27.3	29.5	31.5	29.6	26.8	29.4	30.1	28.2	21.8
6	28.3	30.0	26.0	30.0	29.2	23.3	26.2	27.1	30.4	**20.7**	31.4	**22.2**	27.7	26.9	29.5	30.0	28.2	26.5	29.0	29.8	27.6	21.4
5	27.9	29.2	24.7	29.9	29.1	23.1	25.6	27.0	30.3	**18.8**	28.1	**21.7**	26.4	26.8	29.4	29.3	27.9	26.4	28.7	28.4	26.9	20.3
4	26.8	29.1	24.2	28.7	29.0	22.0	24.8	25.9	30.0	**17.3**	28.0	**21.4**	26.1	25.3	28.7	27.5	24.2	26.2	28.3	28.1	26.1	19.3
3	26.3	28.6	22.7	28.6	28.9	21.8	24.2	25.6	28.7	**15.2**	27.4	**20.9**	25.1	24.6	27.7	27.3	22.9	21.4	26.8	26.7	25.1	18.0
2	24.5	24.6	22.5	25.2	23.4	21.3	23.6	25.1	25.1	**5.2**	26.3	19.3	22.1	24.5	26.6	26.2	18.7	21.1	26.7	**18.0**	22.5	11.6
1	24.4	23.2	20.6	21.1	20.2	21.0	21.4	21.5	19.5	**3.5**	25.8	17.1	18.9	24.2	25.8	25.3	18.1	19.9	22.8	**12.9**	20.4	**8.2**

Used in Base Scenario

Used in Extreme Scenario

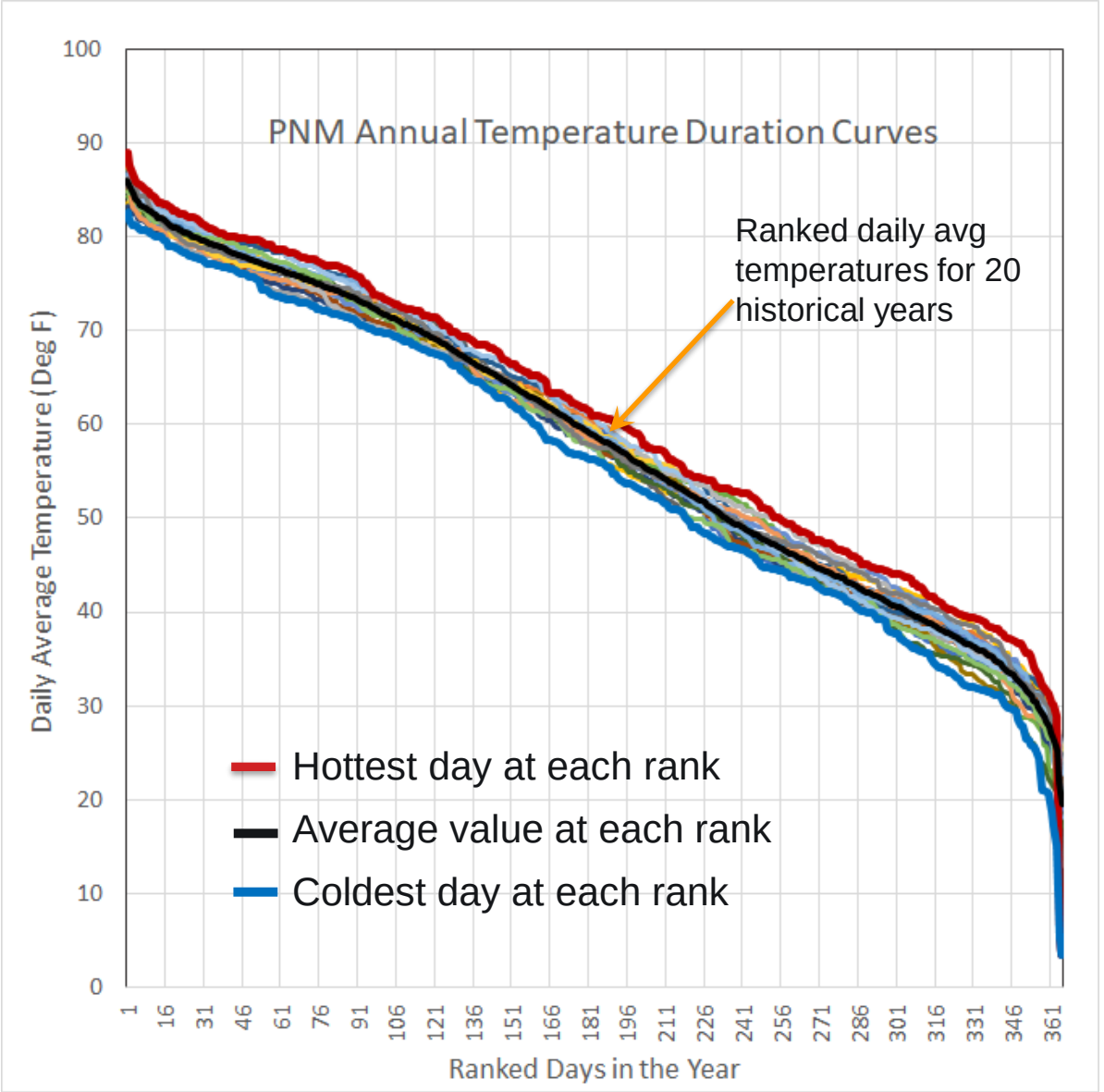
<30

<25

<10

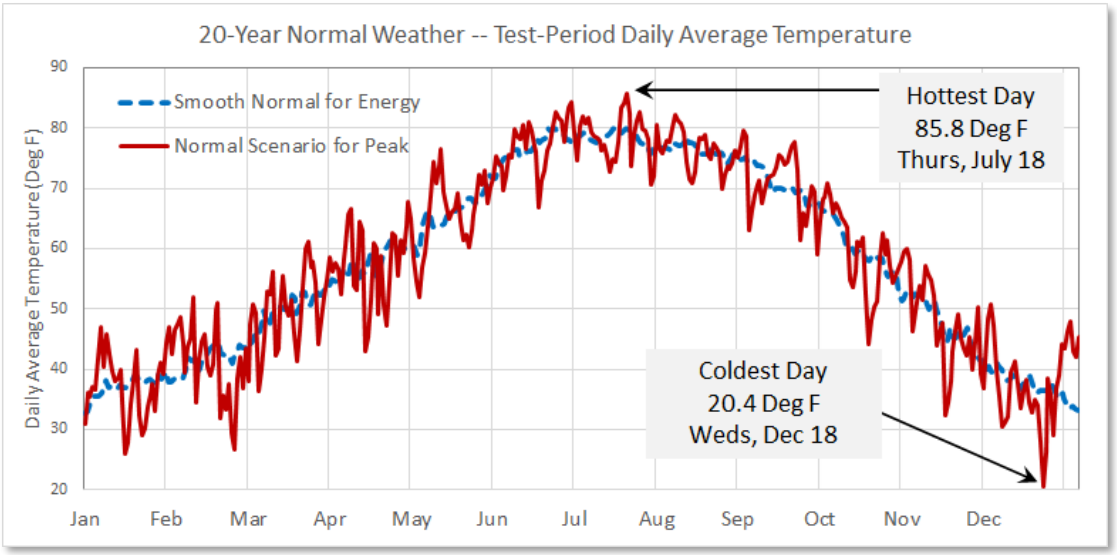
WEATHER SCENARIOS

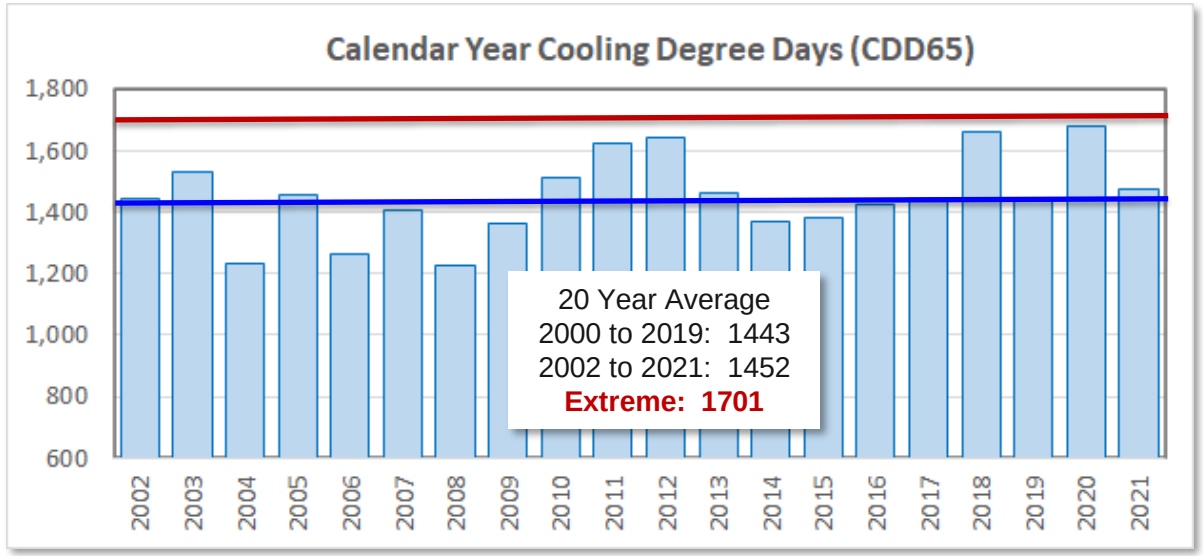
- Daily weather for hourly models
  - For each year, rank daily data by season
    - -- Hottest day to coldest day
  - Base/Normal = Average for each rank
    - -- Thick black line in the chart
    - -- Typical Hottest day: 85.8
    - -- Typical Coldest day: 20.4
  - Extreme = 1 in 10 weather
    - -- Thick red line is Extreme hot weather
    - -- Thick blue line is Extreme cold weather
    - -- Computed as average of 2 in 20
    - -- Hottest day: 88.4
    - -- Coldest day: 8.2
  - Assign base and extreme daily weather to a consistent daily pattern to use in hourly forecast models

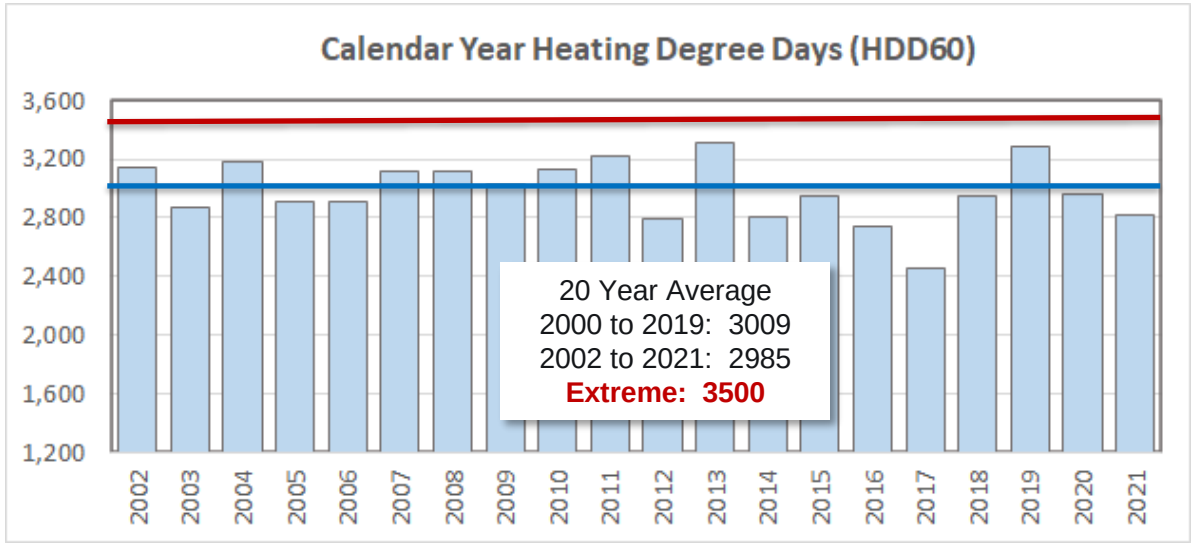


Normal Monthly Weather

- Normal Weather: 20-year normal
  - Compute daily average temperature
  - Compute daily CD (base 55, 60, 65, 70, 75)
  - Compute daily HD (base 60, 55, 50, 45)
  - Average by date for energy forecast
    -- Avg Jan 1 values, Jan 2 values, …
  - Results in a “smooth normal pattern”
  - Monthly HDD, CDD computed from daily







WEATHER RESPONSE MODELING

Weather Response Analysis

- Load Research data provide hourly and daily use estimates for a statistical sample
- Daily use shows a strong response to daily weather
- Response of load to weather is non linear
- Load research data are used to calculate HD and CD weights
  - Daily regression models
  - Y is daily sales per customer
  - X variables are daily CD and HD values
  - Calculate weights for low, medium, and high-powered degrees

Residential Weights

Spline	Wgt
HD60	0.285
HD55	0.422
HD45	0.293
CD60	0.188
CD65	0.286
CD70	0.526

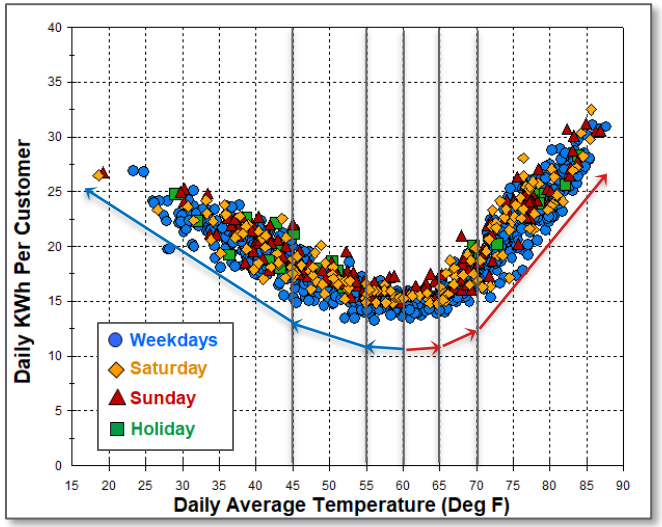
Small Power Weights

Spline	Wgt
HD55	0.572
HD45	0.428
CD55	0.237
CD65	0.629
CD75	0.134

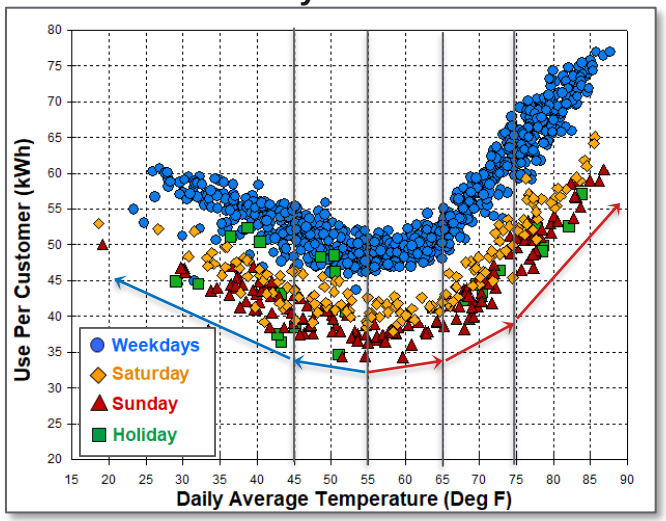
General Power Weights

Spline	Wgt
HD55	0.307
HD45	0.693
CD55	0.448
CD65	0.552

Residential Daily Sales Per Customer



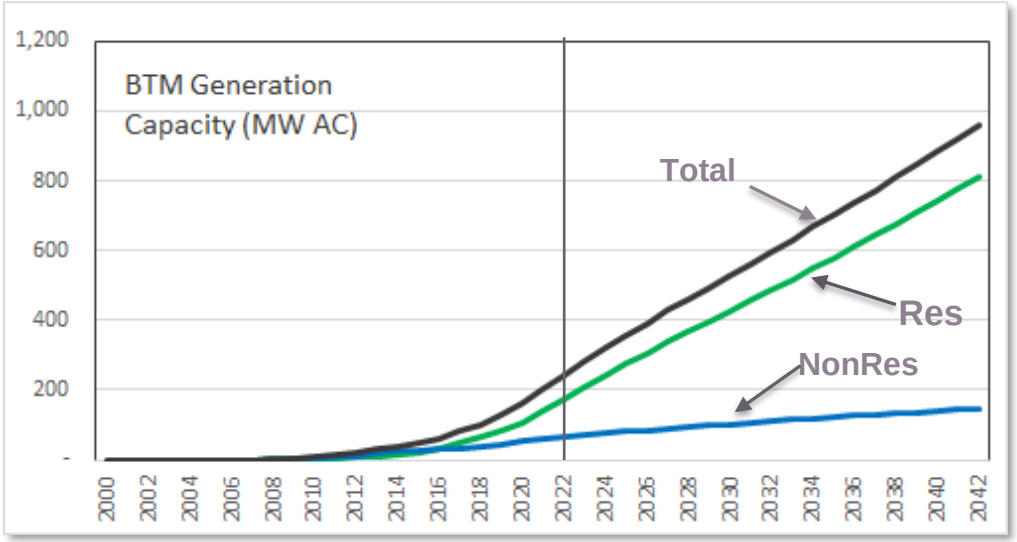
Small Power Daily Sales Per Customer

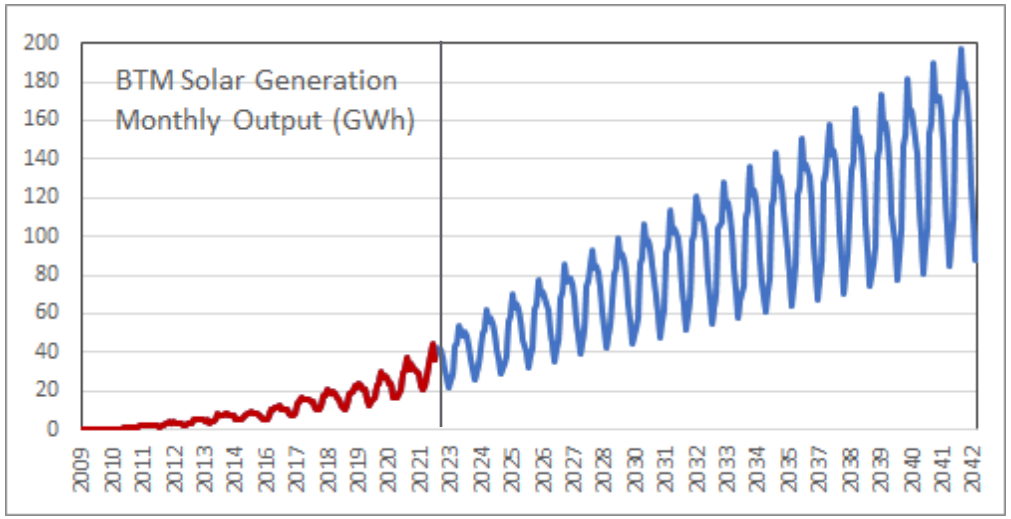


Behind the Meter (BTM) Solar Data and Forecasts

Behind the Meter (BTM) Solar Capacity and Generation

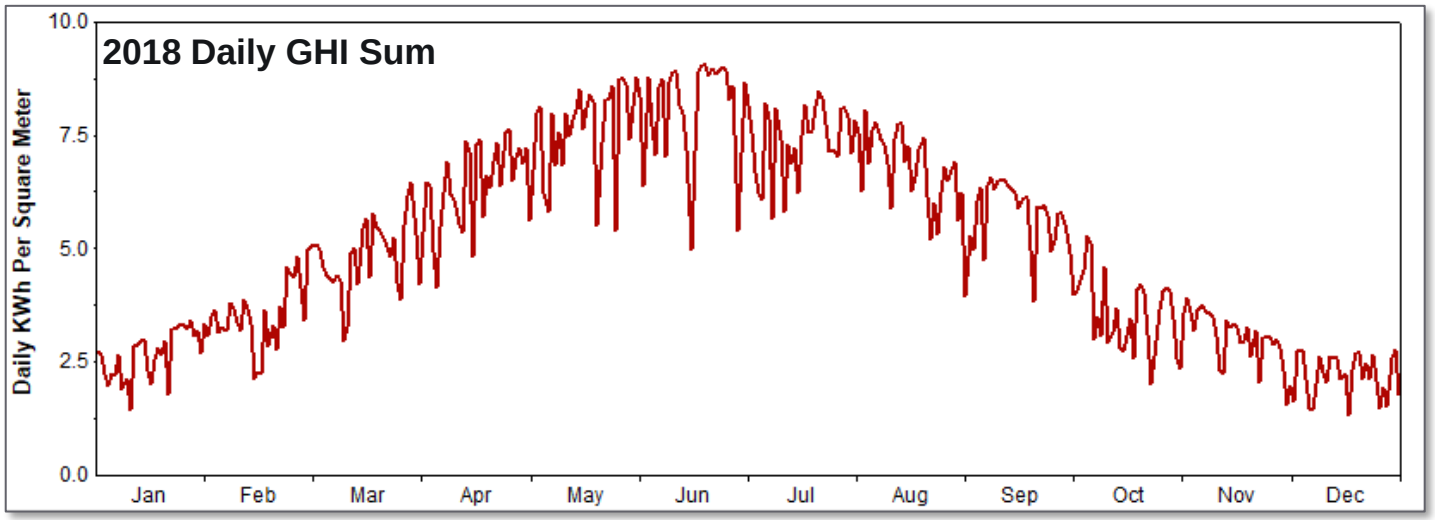
- Solar Generation Capacity (KW)
  - Output capacity (AC) for new systems in KW
  - Aggregated by month (Res & NonRes)
  - Forecasted through 2042
- Solar Generation Data (KWh)
  - All solar customers have generation output meters
  - Data are gathered monthly on a billing-cycle basis
  - Totals are calculated by billing month and rate class
- Solar Generation Model (Daily and Hourly)
  - Y = Daily average KWh output per KW capacity
  - X = Daily average GHI Sum
  - Daily forecast allocated to hours based on hourly GHI
  - Forecasts of PV generation output
    - GWh = Capacity (KW) * KWhPerKW / 1,000,000

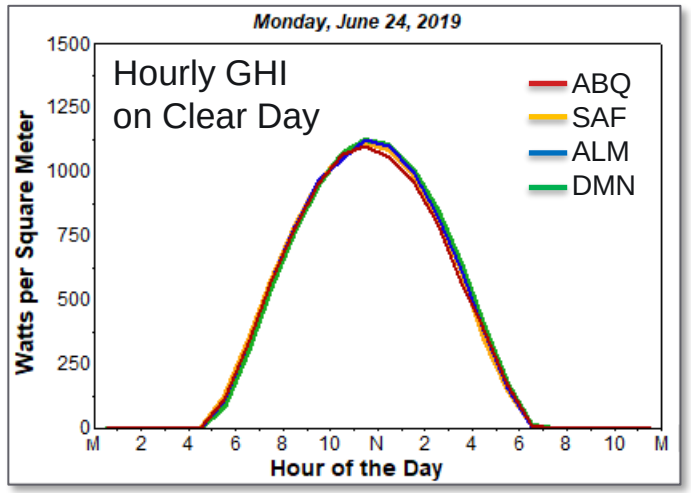


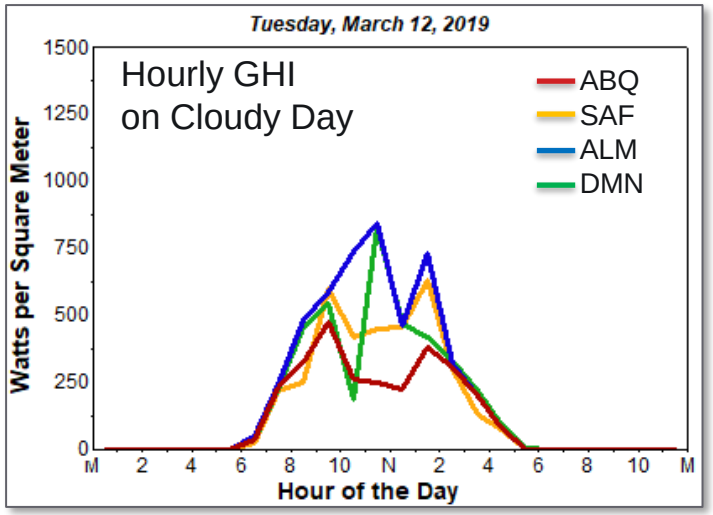


Global Horizontal Irradiation (GHI) Data

- Global Horizontal Irradiation (GHI) from AccuWeather
  - Hourly GHI data for four weather stations
  - Daily sums and monthly sums used in modeling
- 2018 pattern used for daily & hourly forecasting
  - 2018 Annual GHI within .3% of 20-year average
  - Rotated to forecast days based on daily temperature pattern
  - No change from prior IRP

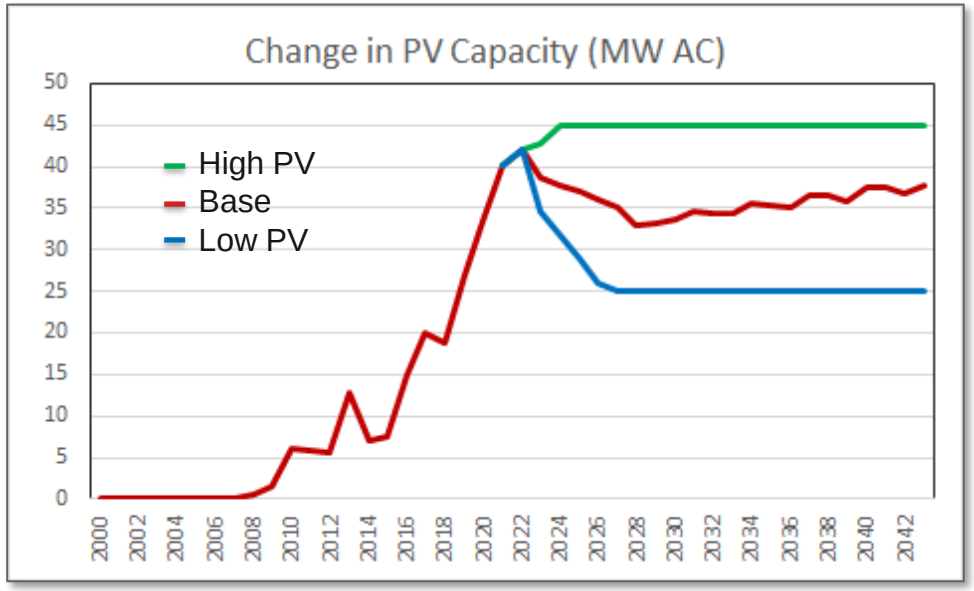


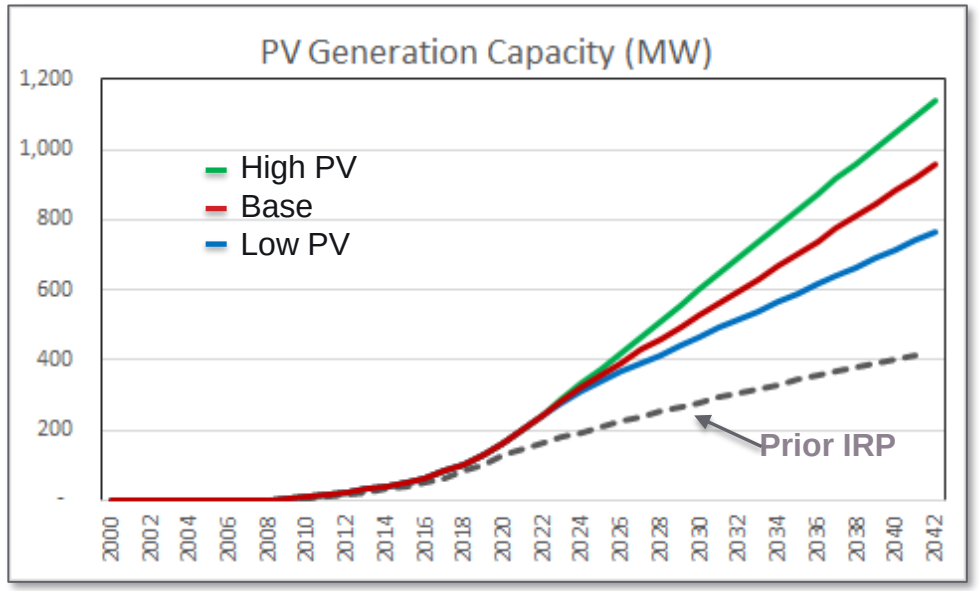




PV Scenarios

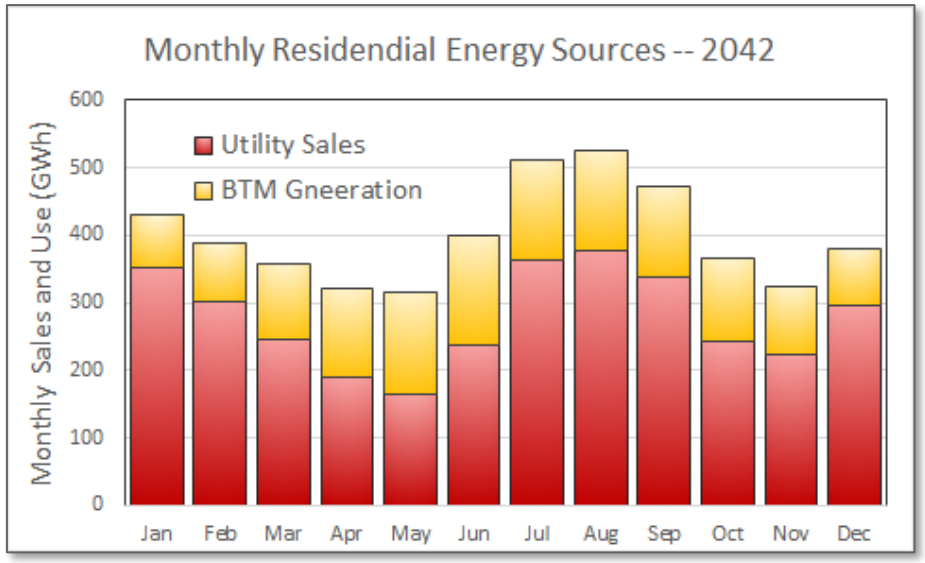
- Base Forecast is consistent with recent Annual Energy Outlook forecasts for the region assuming continuation of investment tax credits.
- 2022 Generation Capacity: 243 MW AC
- Annual PV Capacity Additions 2022 to 2040
  - High PV: 45 MW/year
  - Base PV: ~35 MW/year
  - Low PV: 25 MW/year
- 2042 Generation Capacity (MW)
  - High PV: 1,141 MW
  - Base PV: 958 MW
  - Low PV: 765 MW

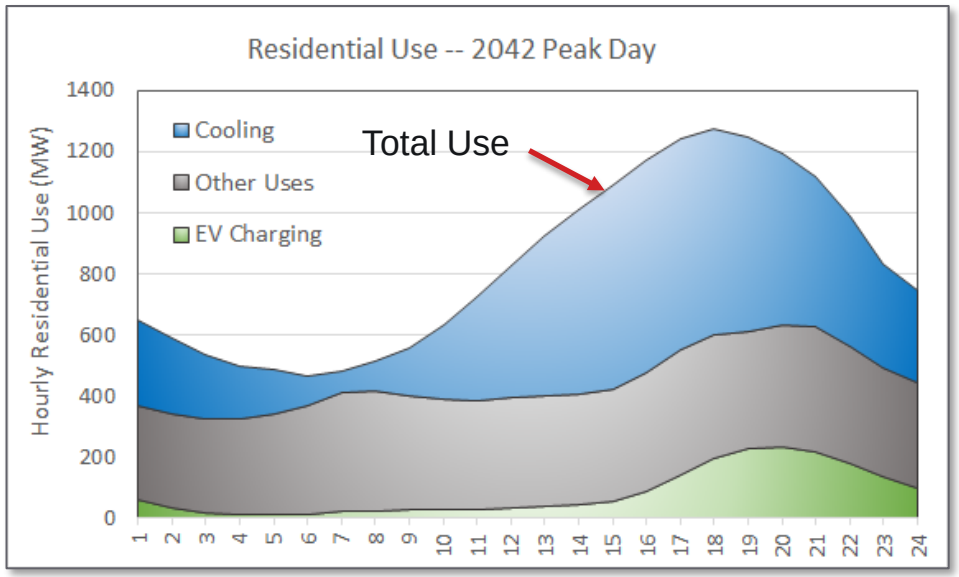


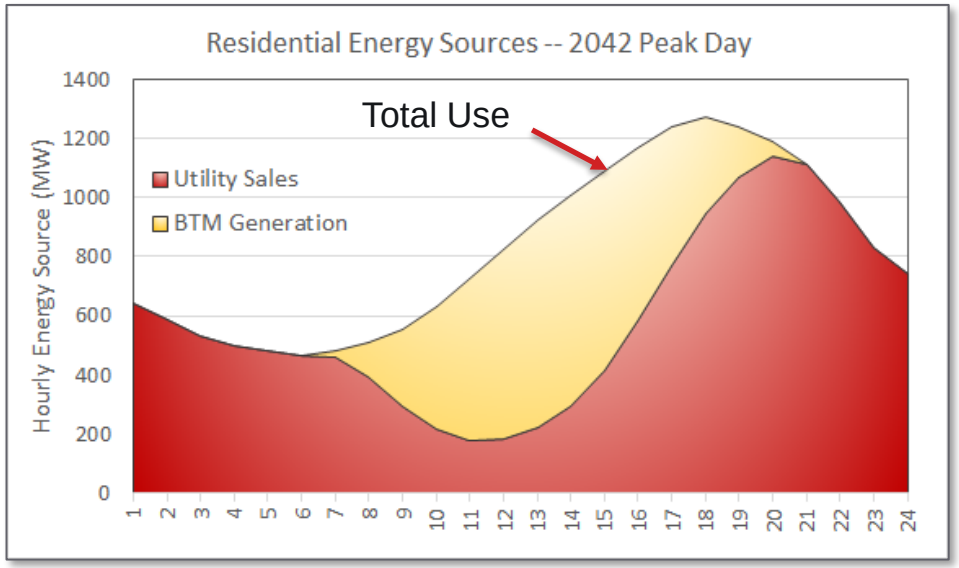


Use vs. Sales

- The presence of BTM Solar masks customer loads (end-use consumption).
- This impact is biggest for the residential class.
- Measured sales is the part of use that is supplied by utility generation.
- Models forecast customer use. Subtract generation to forecast utility sales.



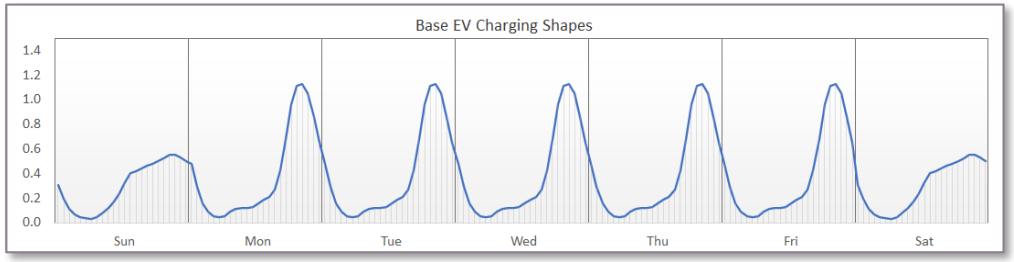


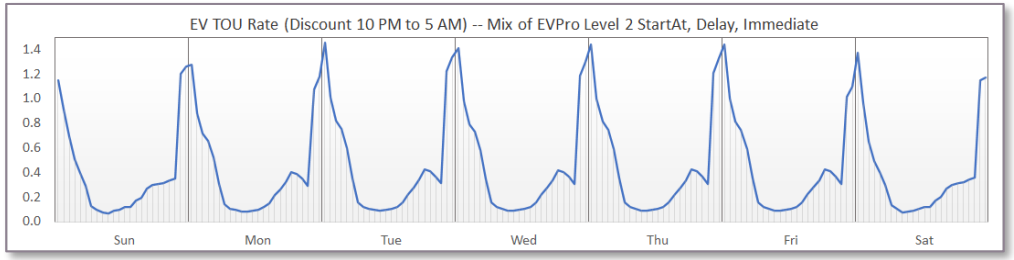


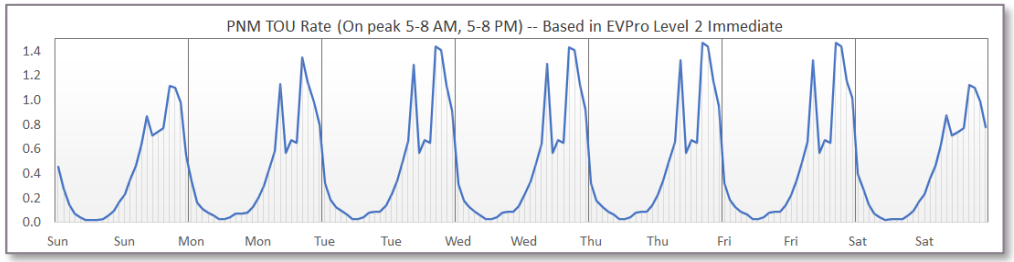
Electric Vehicle Forecast

ELECTRIC VEHICLE FORECAST

- Forecasts are based on fractions of new car sales
  - Total New Mexico annual car sales are about 87,000
  - US EV adoption forecast is the main driver
    - Rapidly increasing share of new cars (5% now, 60% by 2042)
  - NM adoption is about 41% of US adoption
  - 75% of NM adoptions are in PNM territory
  - EV annual energy use is about 4 MWh per vehicle
  - About 80% of charging is residential
- Charging profiles based on National Labs data
  - Base shape – Idaho National labs
  - TOU shapes based on NREL EV-Pro strategies
    - Scheduled Start (Start at specified time)
    - Delayed Start (Charge by specified time)
    - Immediate (Unscheduled, like base shape)

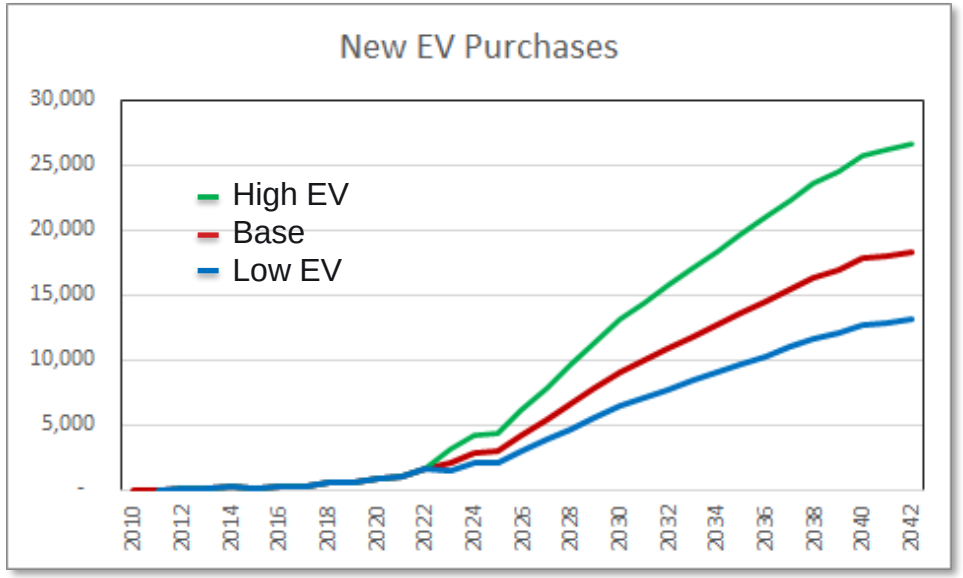


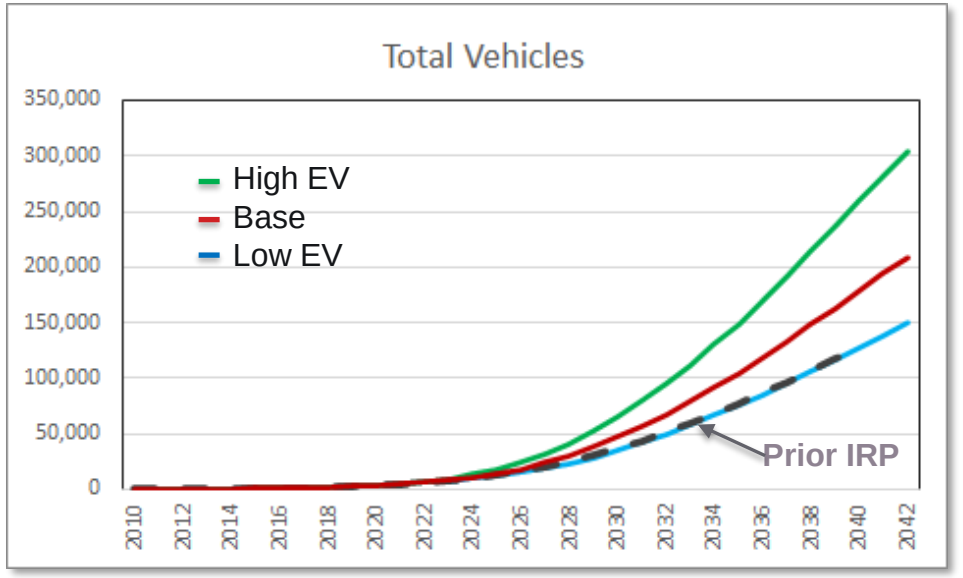




EV SCENARIOS

- Annual EV Additions 2023 to 2042
  - High EV: Grows to 27,000 by 2042
  - Base EV: Grows to 18,000 by 2042
  - Low EV: Grows to 13,000 by 2042
- 2042 Electric Vehicle Count
  - High EV: 304,000
  - Base EV: 209,000
  - Low EV: 138,000
- Higher than prior IRP forecast
  - 40% higher in 2040
  - Driven by faster US adoption forecast
  - Prior IRP similar to current Low case

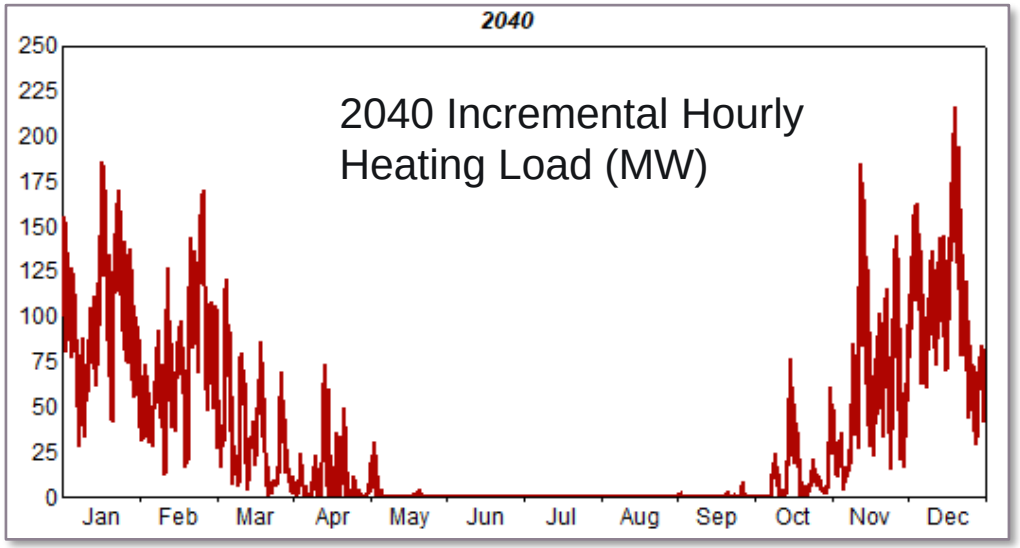


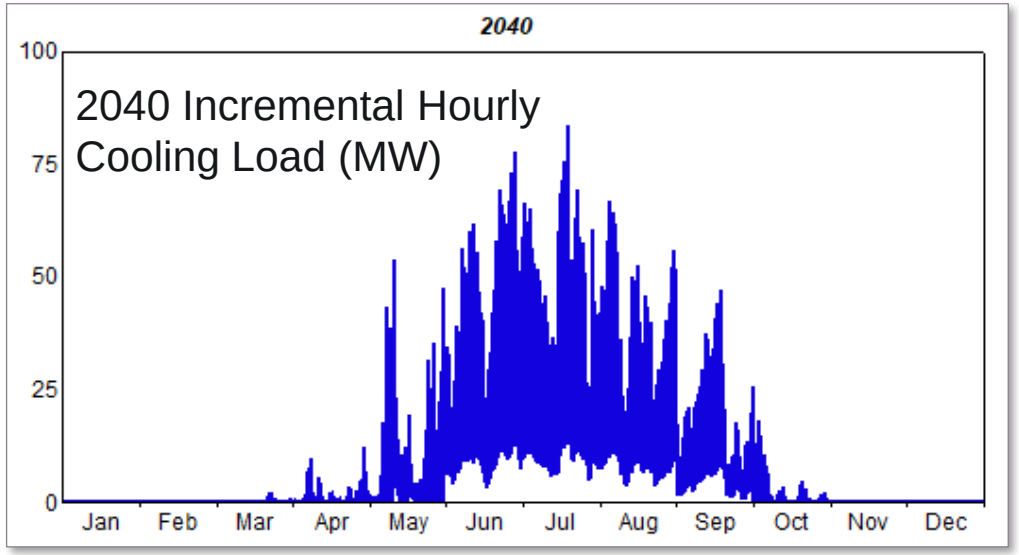


Other Scenario Inputs

Building Electrification

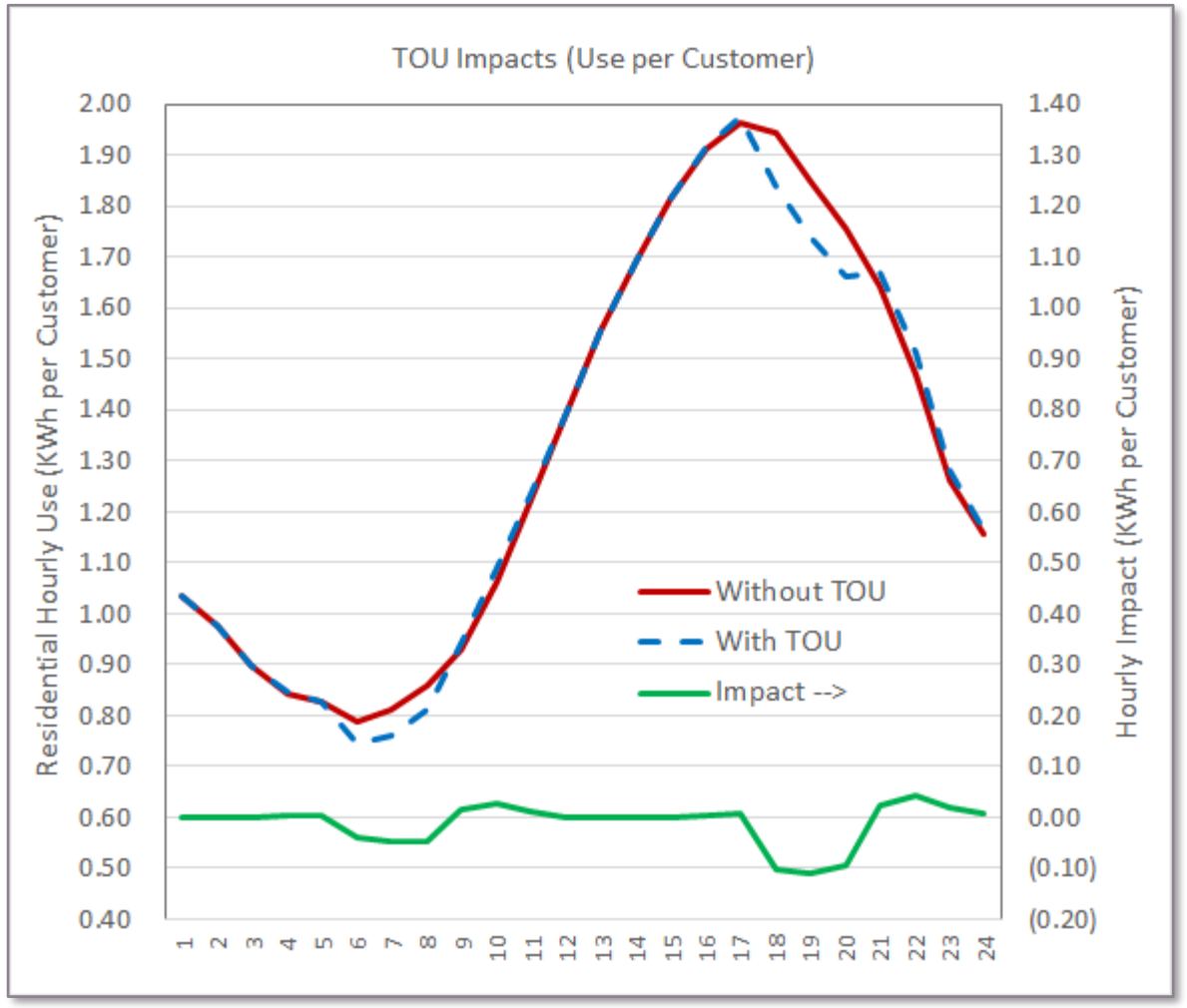
- New homes starting in 2025
  - Natural Gas and Propane not allowed
  - Electric heat share goes from 15% to 90%
  - Mostly heat pumps, 80% of the increase
  - Less evaporative cooling, more central air
- Existing homes converted to heat pumps
  - About 2% per year (7,000 homes)
  - Evaporative cooling displaced in 40% of the 2%
  - Incremental cooling UEC is 1700 KWh
- Heat pump heating UEC averages 2400 KWh
- Overall electric heating share increases:
  - 15.5% in 2020 to 45% in 2040
- Heating/Cooling shapes from load research





Residential Time of Use Rates

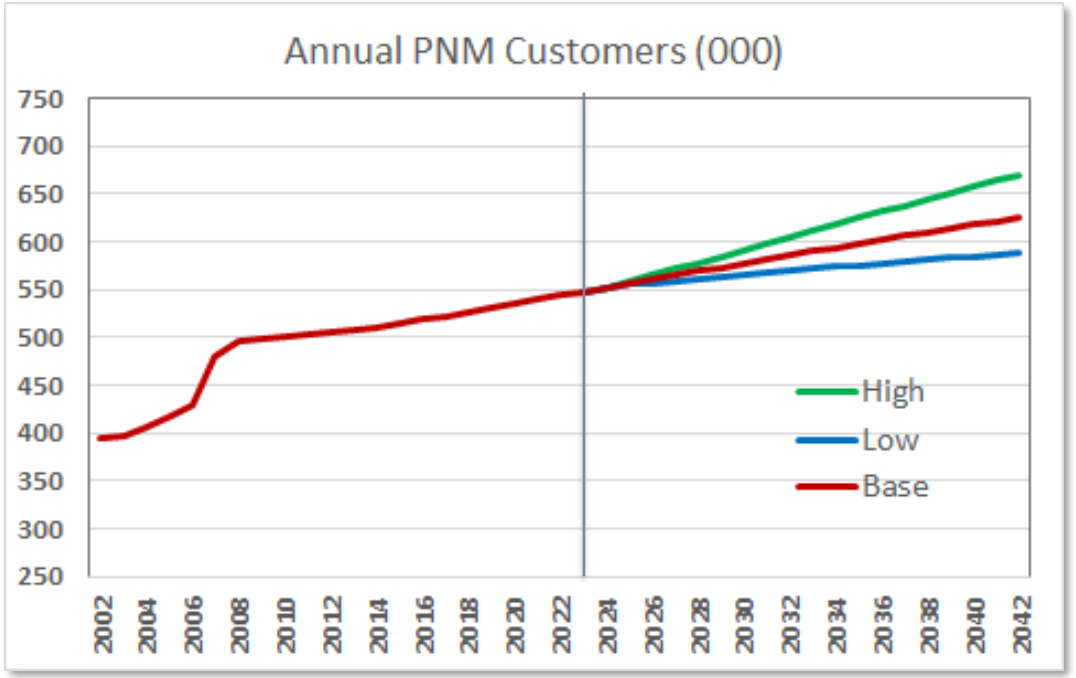
- Introduce Residential TOU in 2030
  - Pilots through 2029
  - Full Opt-out program in 2030
  - On-peak 5-8 AM, 5-8 PM.
  - Assume 20% opt out, 80% do not
  - Applies also to EV not on WHEV rate
- EV impacts modeled separately
- Energy impact levels from summary report by ACEEE of 50 pricing pilots (on/off price ratio ~ 2)
  - On-Peak reduction: 6%
  - Average energy reduction: 1%



Energy Modeling and Forecasts

PNM Customer Forecast

- Residential trend model through 2024
  - Population elasticity model after 2024
- Small Power trend model through 2024
  - Pop/Emp elasticity model after 2024
- Regression model for General Power (GP)
  - Population and Non-Manufacturing Employment
- Elasticity model for Large Power (LP4)
  - Non-Manufacturing Employment
- Manual Adjustment for Industrial Loads
  - LP4 addition in 2023
  - LS30 expansion in 2022 to 2024
- Scenarios reflect High/Low Economics
- Very little change from prior IRP

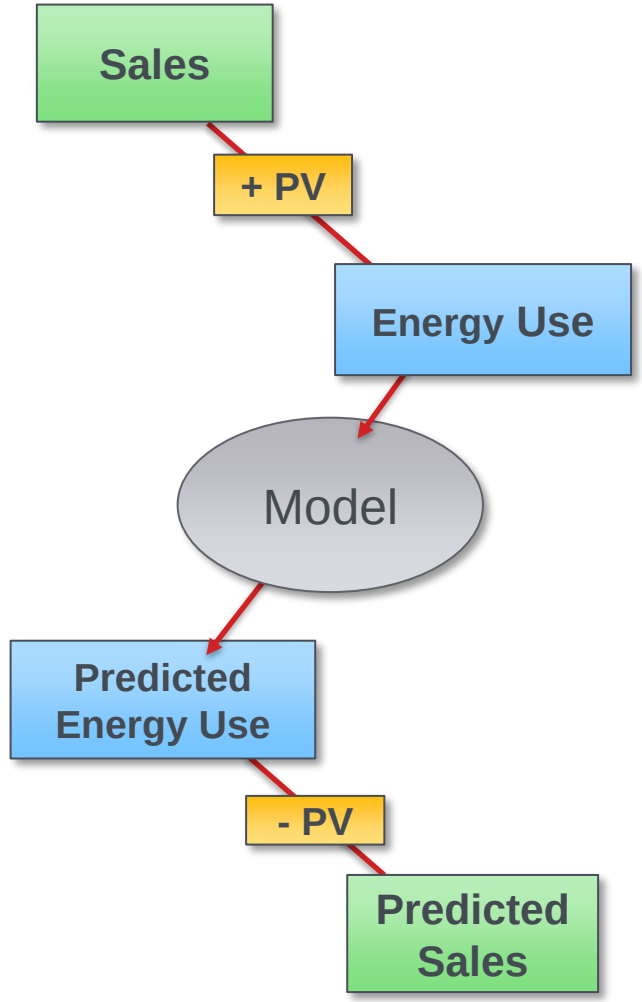


Range	Average Annual Customer Gain				
	Res	SP	GP	LP	Total
2012-2022	3,449.4	382.6	-12.8	-6.6	3,810.2
2022-2032	3,814.5	411.4	10.7	0.2	4,236.6
2032-2042	3,580.4	385.7	9.5	0.3	3,975.9
Range	Average Annual Growth Rate				
	Res	SP	GP	LP	Total
2012-2022	0.74%	0.73%	-0.30%	-3.23%	0.73%
2022-2032	0.76%	0.73%	0.26%	0.10%	0.75%
2032-2042	0.67%	0.64%	0.22%	0.17%	0.66%

*Total excludes lighting classes

Energy Use and Energy Sales

- Same approach as in prior IRP
- Monthly sales and monthly energy use:
  - Sales = net delivery of energy through the customer meter
  - Energy use = consumption of appliances and equipment
  - Energy use is bigger than sales because of PV generation
  - Models explain energy use
- Monthly Use Models
  - Regression models
  - Y is energy use per customer (UPC)
  - X variables are end-use drivers and weighted CD and HD variables
- PNM Sales and Load
  - Sales computed as Energy Use – PV Generation

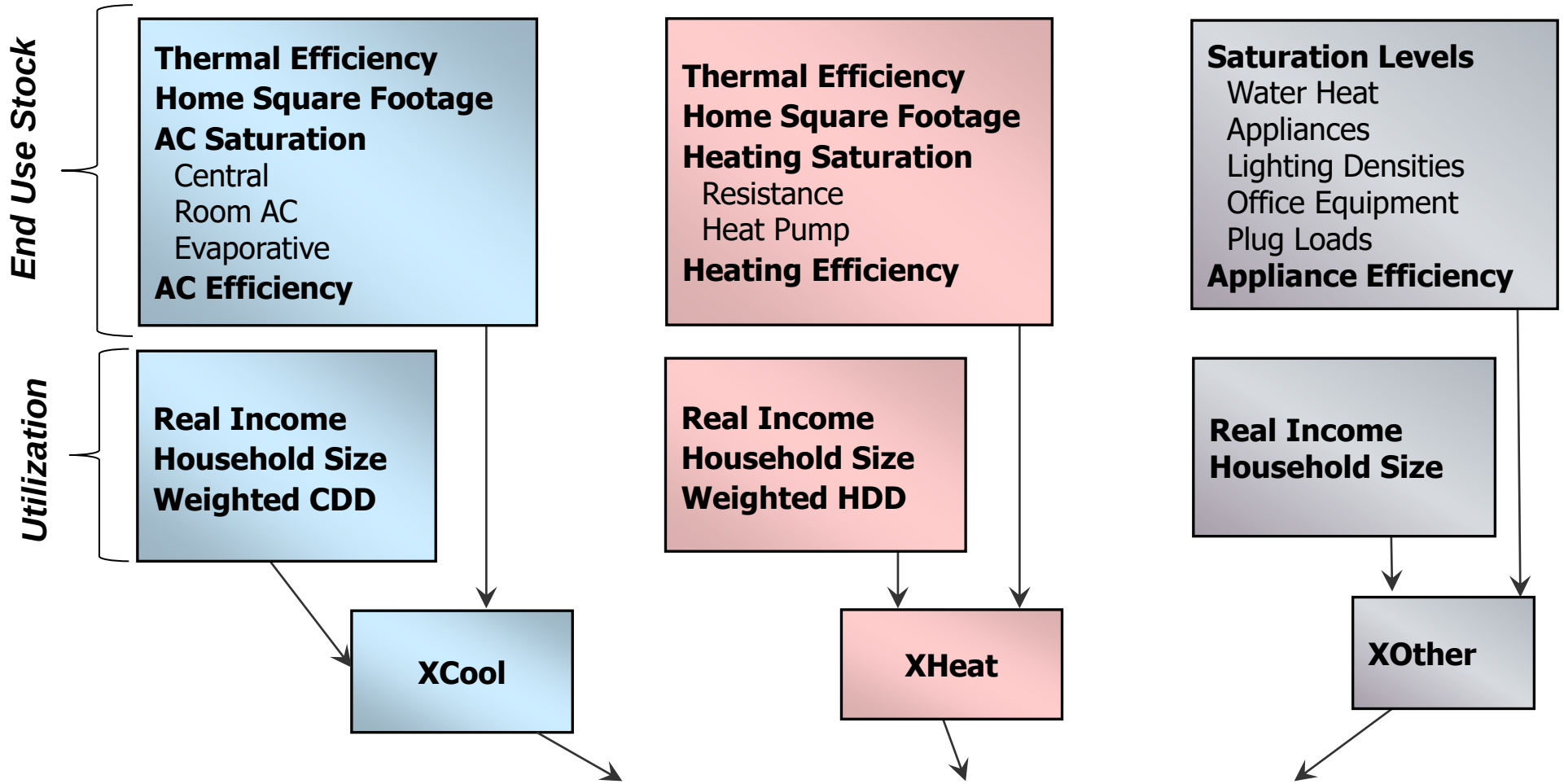


Statistically Adjusted End-Use Framework

- Residential and commercial models use Statistically Adjusted End-Use (SAE) Model
- SAE models account for:
  - Appliance saturation and equipment density
  - Appliance and equipment efficiency
  - Thermal efficiency of buildings
- Efficiency and saturation data initialized using 2021 EIA data for Mountain region
- Saturation and intensity values are modified to agree with PNM data
  - Base-year intensities and saturations from PNM Efficiency Potential Study
- Residential framework is shown on the next slide
- Commercial framework is similar (applied to SP, GP, LP4)

Residential SAE Modeling Framework

SAE = Statistically Adjusted End-Use

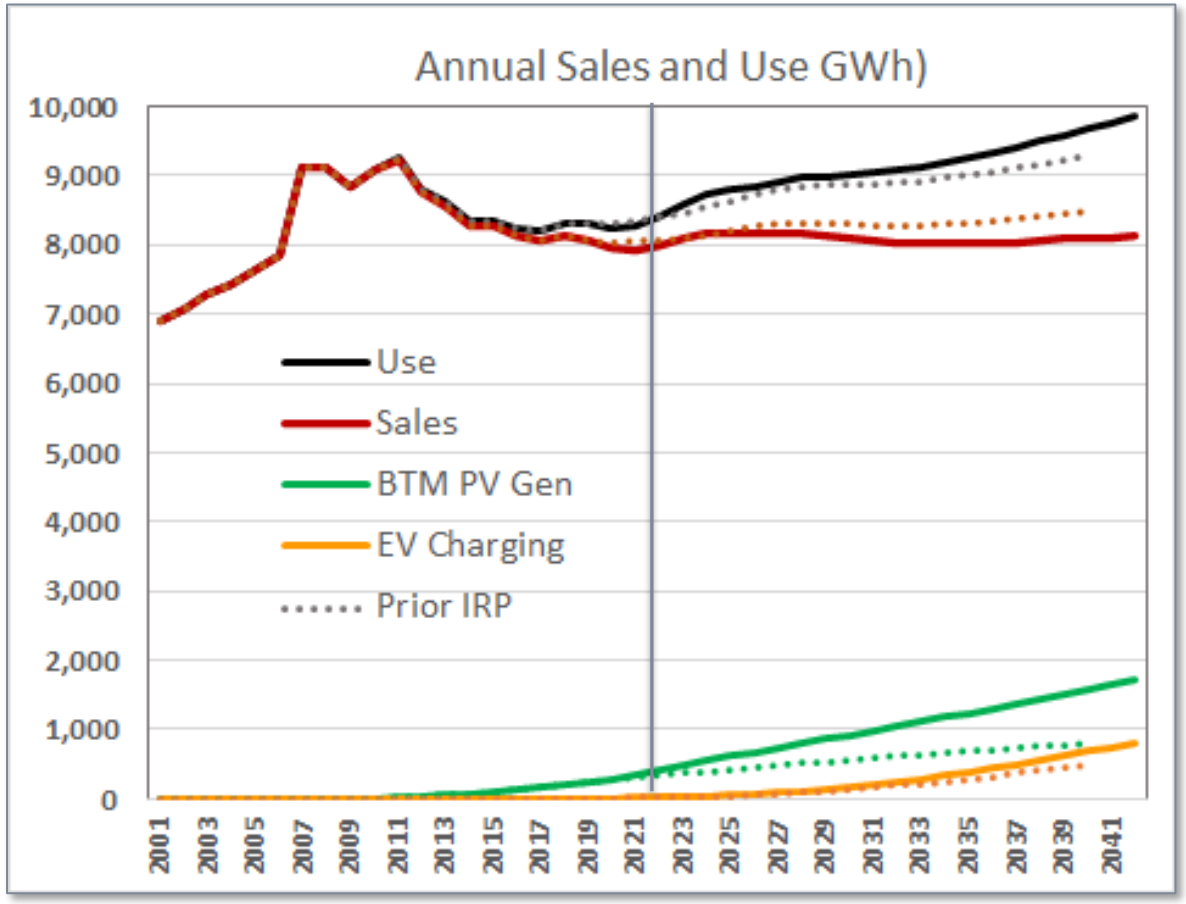


$$\text{Sales}_m + \text{PVGen}_m = a + b_c \times \text{XCool}_m + b_h \times \text{XHeat}_m + b_o \times \text{XOther}_m + e_m$$

Energy Forecast Summary

Year	Customers	Sales (GWh)	EV Sales (GWh)	PV Output (GWh)
2012	505,407	8,560.3	0.4	37.5
2017	521,850	8,129.0	4.9	158.8
2022	543,509	8,105.1	21.5	410.5
2027	564,851	8,160.3	85.3	744.6
2032	585,874	8,018.0	250.6	1,055.1
2037	606,132	8,060.7	503.6	1,372.8
2042	625,633	8,152.7	809.1	1,707.8

Year Range	Customers AGR	Sales AGR	Year	EV % of Sales	PV % of Sales
			2010	0.00%	0.44%
2012 to 2017	0.64%	-1.03%	2015	0.06%	1.95%
2017 to 2022	0.82%	-0.06%	2020	0.26%	5.06%
2022 to 2027	0.77%	0.14%	2025	1.04%	9.12%
2027 to 2032	0.73%	-0.35%	2030	3.13%	13.16%
2032 to 2037	0.68%	0.11%	2035	6.25%	17.03%
2037 to 2042	0.64%	0.23%	2040	9.92%	20.95%

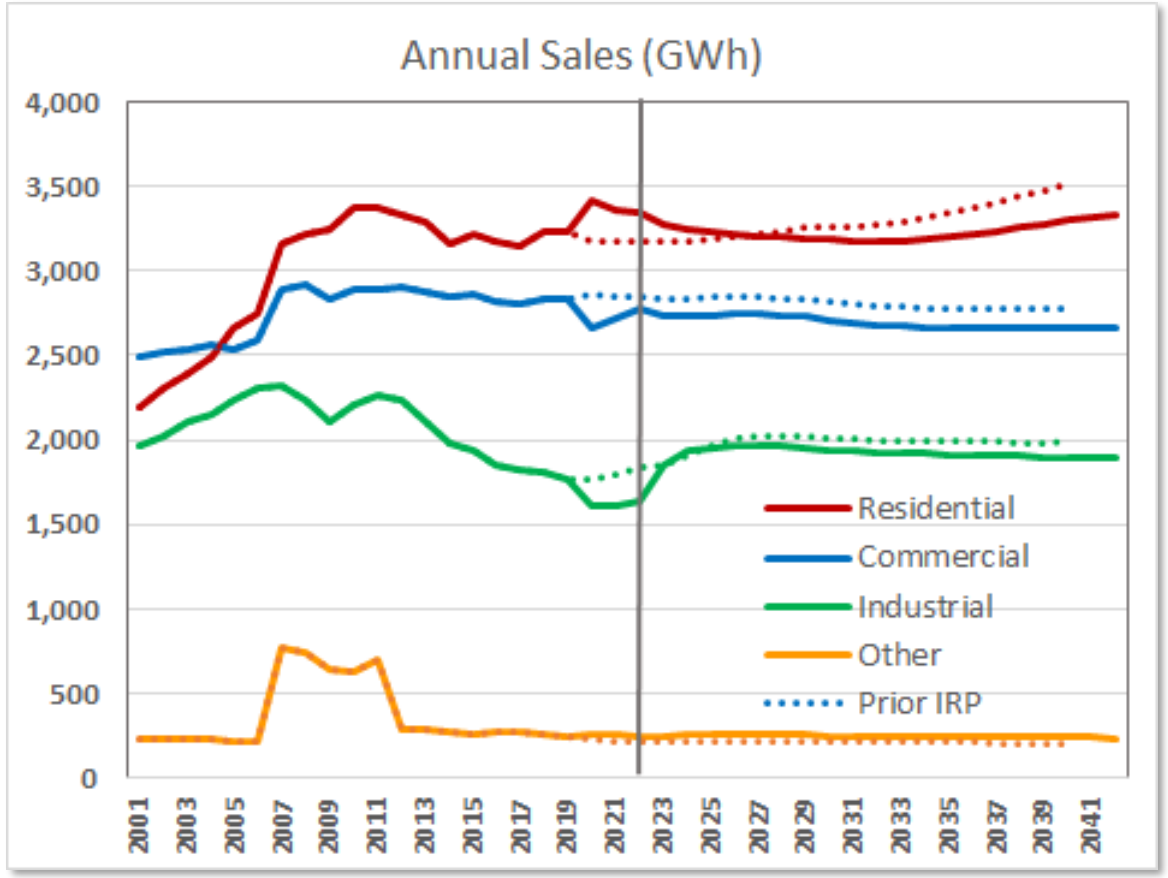


Excludes LS36B and incremental economic development loads

Energy Sales Forecast by Customer Class

Energy Sales in GWh					
Year	Residential	Commercial	Industrial	Other	Total
2012	3,295	2,880	2,103	282.5	8,560
2017	3,233	2,830	1,805	261.5	8,129
2022	3,271	2,737	1,849	248.9	8,105
2027	3,206	2,740	1,960	254.0	8,160
2032	3,177	2,672	1,922	247.3	8,018
2037	3,257	2,660	1,903	241.7	8,061
2042	3,348	2,674	1,894	236.6	8,153

Annual Growth Rate for Energy Sales					
Year Range	Residential	Commercia	Industrial	Other	Total
2012 to 2017	-0.37%	-0.35%	-3.02%	-1.54%	-1.03%
2017 to 2022	0.23%	-0.66%	0.48%	-0.98%	-0.06%
2022 to 2027	-0.40%	0.02%	1.18%	0.40%	0.14%
2027 to 2032	-0.18%	-0.50%	-0.40%	-0.53%	-0.35%
2032 to 2037	0.50%	-0.09%	-0.20%	-0.46%	0.11%
2037 to 2042	0.55%	0.11%	-0.09%	-0.42%	0.23%

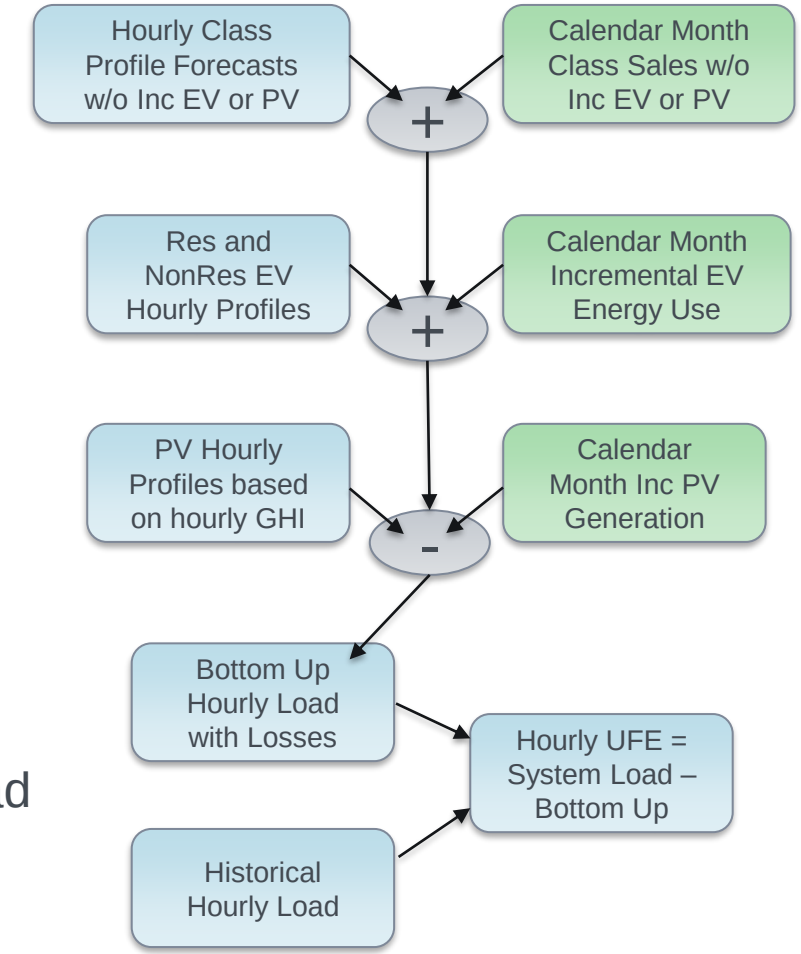


Commercial is Small Power + General Power
Industrial is Large Power + Large Service
Other is Irrigation, Water, and Lighting
Industrial excludes LS30B and incremental economic development loads

Hourly Load and Peak Demand Forecast

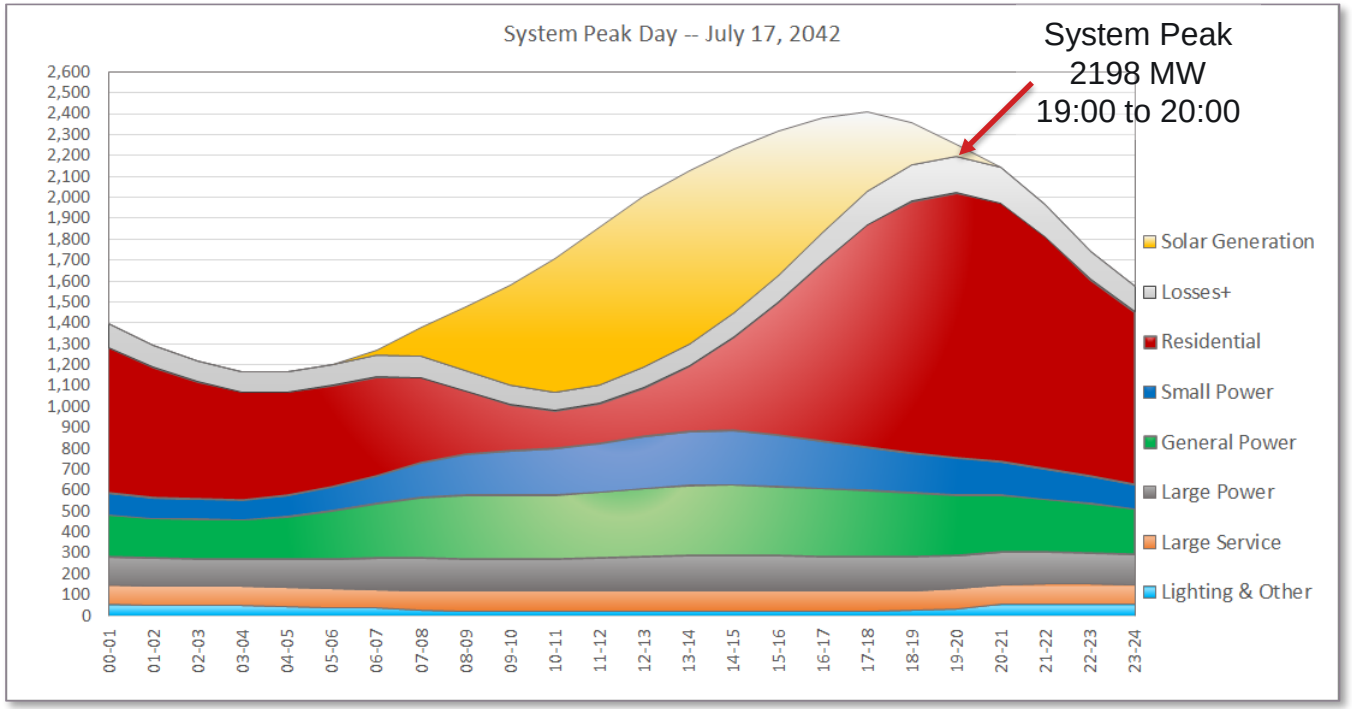
Hourly Load and Peak Load Forecasts

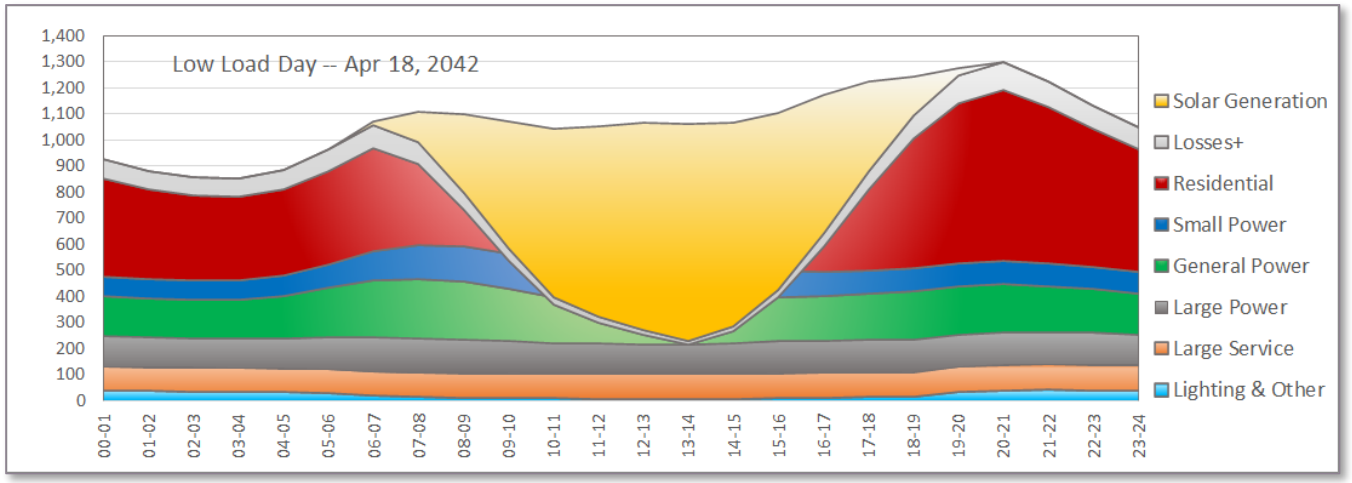
- Hourly load models for each class
  - Estimated with hourly load research data for 2015 to 6/2022
  - Forecasted using normal daily weather pattern
- Hourly shapes for EV and PV
  - EV shapes: Idaho National Labs, NREL EV Pro
  - PV shapes based on hourly GHI data
- Bottom-up logic
  - Calendar month sales forecast without incremental EV or PV
  - Calibrate class hourly profile to calendar month energy value
  - Scale EV profile to incremental EV energy, add to class load
  - Scale PV profile to incremental PV energy, subtract from class load
  - Multiply by annual loss factor based on voltage level
  - Add across classes
- Compute and apply UFE adjustment factors by month and hour



Hourly Loads

- Bottom-up process depiction
  - Class loads are at the meter
  - Excludes rate class LS36 and post 2024 economic development loads
  - Loss estimate based on loss factors by delivery voltage
  - Includes allocation of UFE
- Solar is total BTM generation at the customer meter



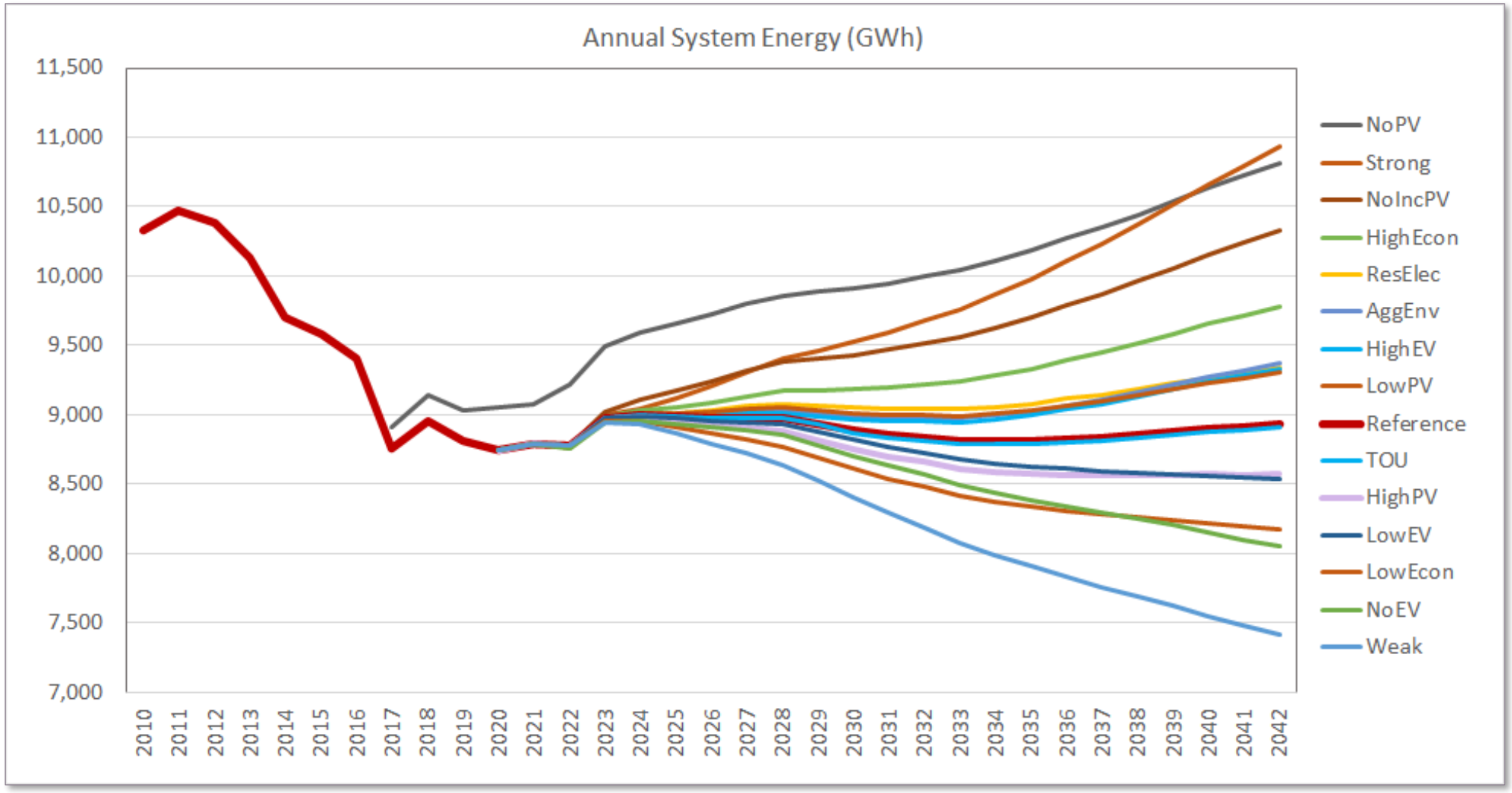


Forecast Scenarios

Scenario Definitions

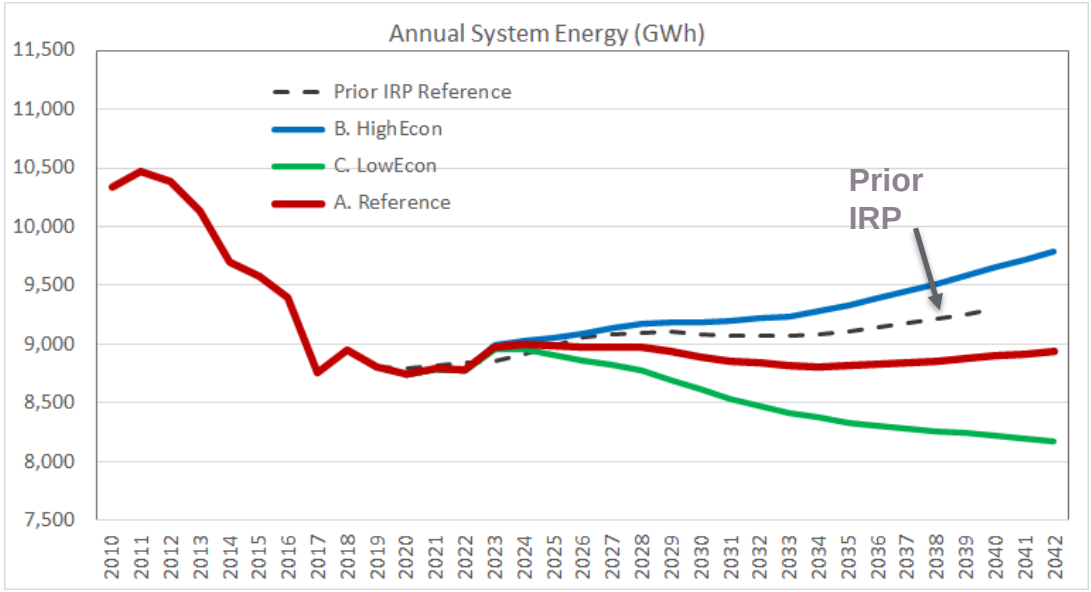
	Scenario	Economic Forecast	BTM PV	EV Adoption	Building Electrification	TOU	Weather	Description
A	Reference Forecast	Mid	Mid	Mid	Mid	No	Normal	**Base Forecast**
B	High Economics	**High**	Mid	Mid	Mid	No	Normal	Strong Econ, Misc. End Use
C	Low Economics	**Low**	Mid	Mid	Mid	No	Normal	Weak Econ, Misc End Use
D	Strong Energy Growth	**High**	LowPV	**High**	**High**	No	Normal	Strong Econ, Misc End Use,` Weak PV, Strong EV, Add Res Electrification
E	Weak Energy Growth	**Low**	HighPV	**Low**	Mid	No	Normal	Weak Econ, Misc End Use Strong PV, Weak EV
F	High BTM PV	Mid	**HighPV**	Mid	Mid	No	Normal	Strong PV
G	Low BTM PV	Mid	**LowPV**	Mid	Mid	Mid	Normal	Weak PV
H	Zero Incremental PV	Mid	**Zero Inc PV**	Mid	Mid	Mid	Normal	Zero Incremental PV
I	Zero PV	Mid	**Zero PV**	Mid	Mid	No	Normal	No PV Ever
J	High EV Adoption	Mid	Mid	**High**	Mid	No	Normal	Strong EV
K	Low EV Adoption	Mid	Mid	**Low**	Mid	No	Normal	Weak EV
L	Aggressive Environmental Regulation	Mid	**HighPV**	**High**	**High**	No	Normal	Strong PV, Strong EV, **Add Res Electrification**
M	High Building Electrification	Mid	Mid	Mid	**High**	No	Normal	**Add Res Electrification**
N	TOU Pricing	Mid	Mid	Mid	Mid	**Yes**	Normal	**Add TOU Impacts**
O	Extreme Weather Scenario	Mid	Mid	Mid	Mid	No	Extreme	Repeat Base case with Extreme weather. Hot summer, Cold winter, Incorpoate weather trend

Annual System Energy Scenarios

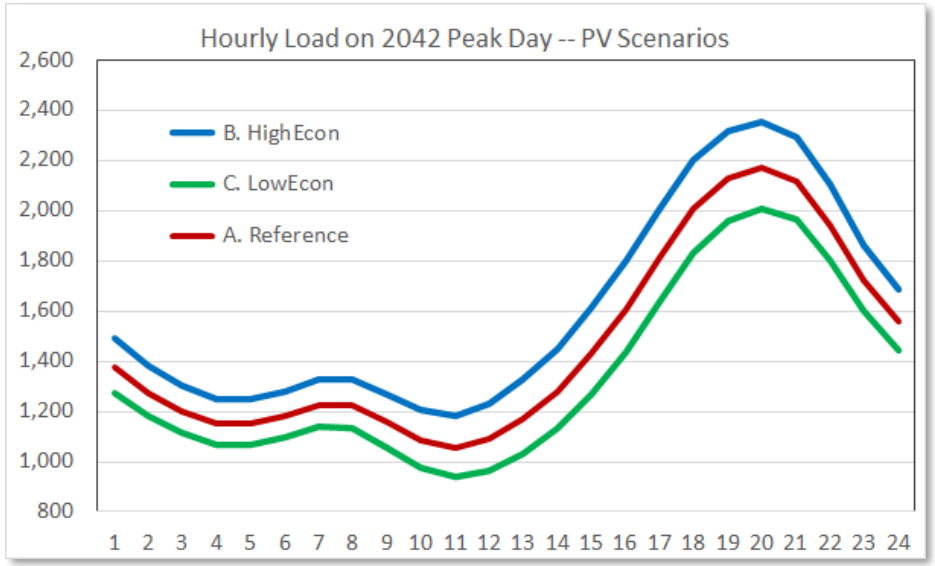


Growth Scenarios

- Reference Case
- High Economic Growth
  - High Population, Employment, Income
  - High Miscellaneous end-use growth
- Low Economic Growth
  - Low Population, Employment, Income
  - Low Miscellaneous end-use growth

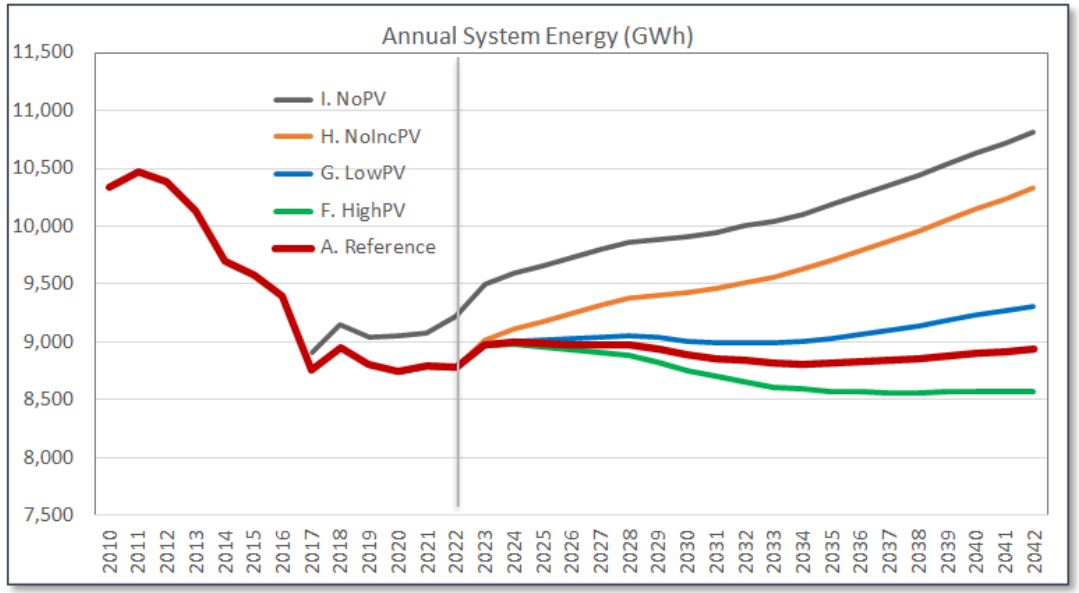


Year	Annual System Energy (GWh)			Annual Peak (MW)		
	Base	High Econ	Low Econ	Base	High Econ	Low Econ
2022	8,777	8,777	8,777	1,961	1,961	1,961
2027	8,978	9,132	8,820	1,898	1,932	1,865
2032	8,838	9,218	8,480	1,933	2,017	1,856
2037	8,839	9,449	8,281	2,033	2,164	1,915
2042	8,934	9,785	8,176	2,169	2,353	2,006

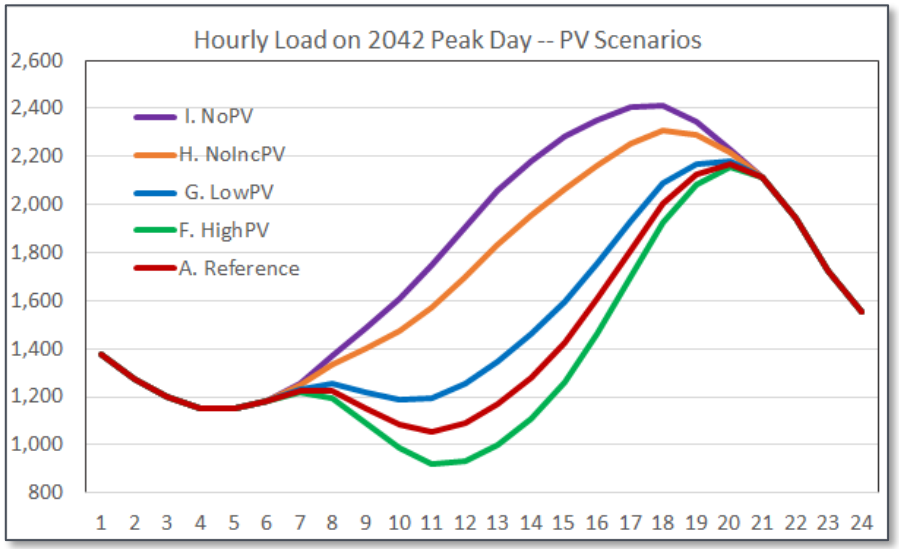


Behind the Meter PV Scenarios

- PV Capacity in 2042
  - Base – 1,141 MW
  - High – 958 MW
  - Low – 765 MW
  - No Incremental – 243 MW (same as 2022)
- Peak Hour
  - Without PV, hour ending 18 (5 pm to 6 pm)
  - With PV, hour ending 20 (7 pm to 8 pm)

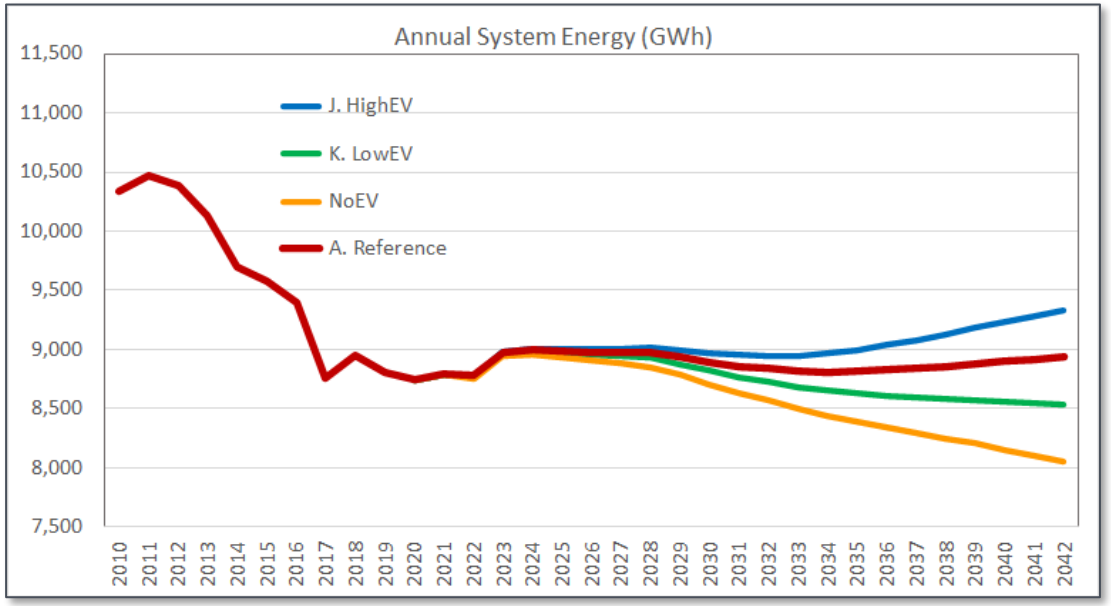


Year	Annual System Energy (GWh)					Annual Peak (MW)				
	Base	High PV	Low PV	NoIncPV	No PV	Base	High PV	Low PV	NoIncPV	No PV
2022	8,777	8,777	8,777	8,777	9,218	1,961	1,961	1,961	1,961	2,087
2027	8,978	8,910	9,044	9,315	9,796	1,898	1,883	1,913	1,975	2,127
2032	8,838	8,659	8,994	9,517	10,000	1,933	1,918	1,951	2,052	2,193
2037	8,839	8,561	9,097	9,870	10,351	2,033	2,023	2,046	2,168	2,288
2042	8,934	8,573	9,310	10,335	10,816	2,169	2,157	2,182	2,310	2,415

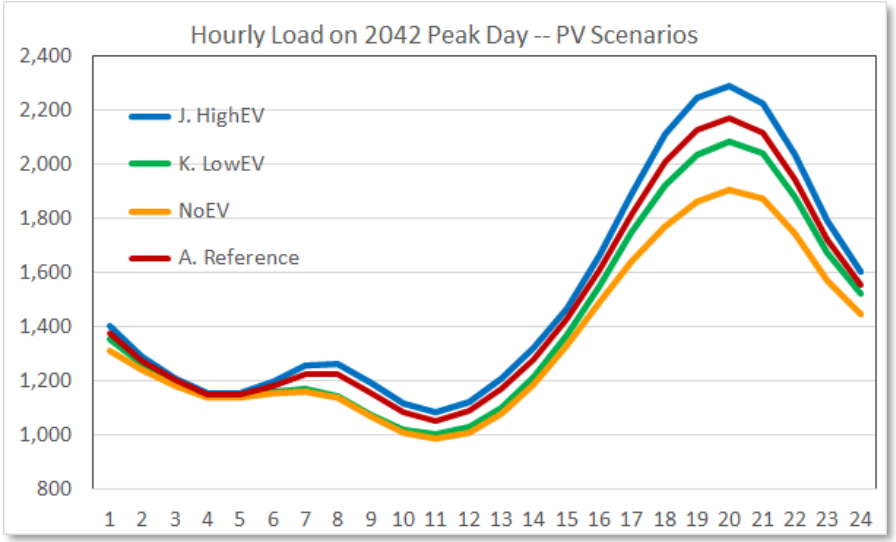


Electric Vehicle Scenarios

- The Reference forecast includes base levels of EV adoption. In the three scenarios, the number of vehicles in 2042 are as follows:
  - High PV: 304,000
  - Base PV: 209,000
  - Low PV: 150,000
- Annual sales and peak results are summarized below

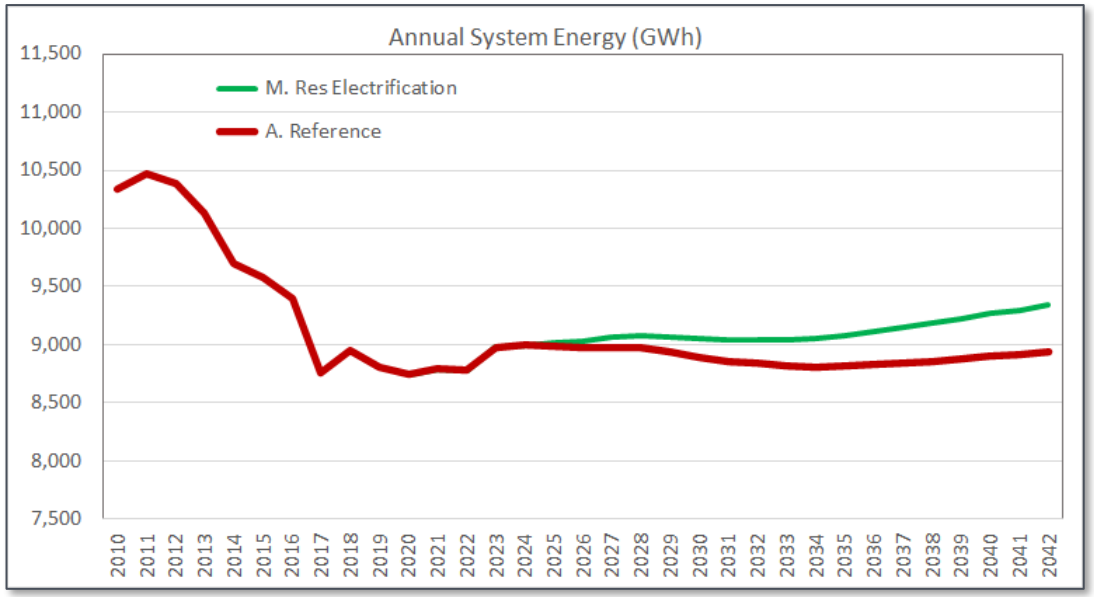


Year	Annual System Energy (GWh)				Annual Peak (MW)			
	Base	High EV	Low EV	No EV	Base	High EV	Low EV	No EV
2022	8,777	8,777	8,777	8,754	1,961	1,961	1,961	1,956
2027	8,978	9,007	8,947	8,885	1,898	1,906	1,892	1,873
2032	8,838	8,950	8,725	8,566	1,933	1,967	1,907	1,850
2037	8,839	9,079	8,595	8,292	2,033	2,105	1,980	1,869
2042	8,934	9,329	8,532	8,055	2,169	2,287	2,082	1,906

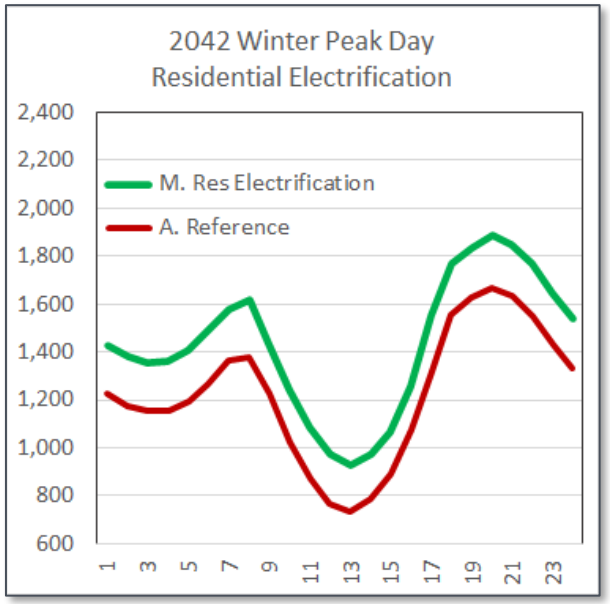


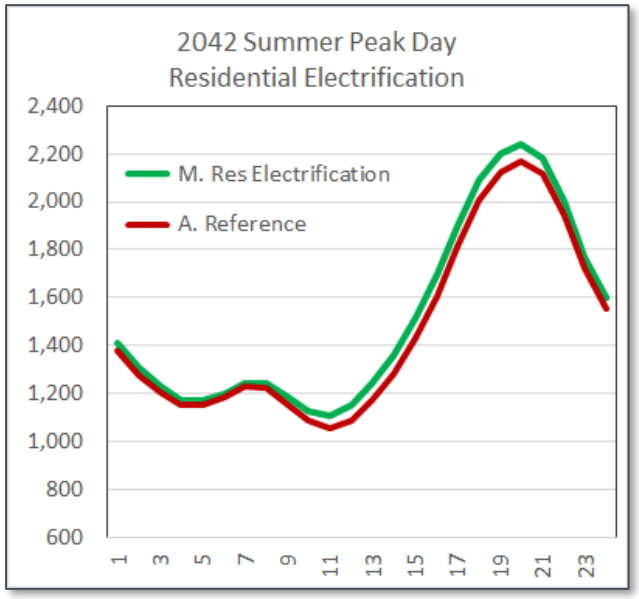
Residential Electrification

- Residential Electrification Scenario
  - Gas/Propane not allowed in new homes
  - Conversion incentives for existing homes
  - Electric heat share rises from 15% to 45%
  - Increased cooling loads as heat pumps replace evaporative cooling



Year	Annual System Energy (GWh)		Annual Peak (MW)	
	Base	Building Electrification	Base	Building Electrification
2022	8,777	8,777	1,961	1,961
2027	8,978	9,060	1,898	1,914
2032	8,838	9,043	1,933	1,972
2037	8,839	9,147	2,033	2,087
2042	8,934	9,339	2,169	2,240

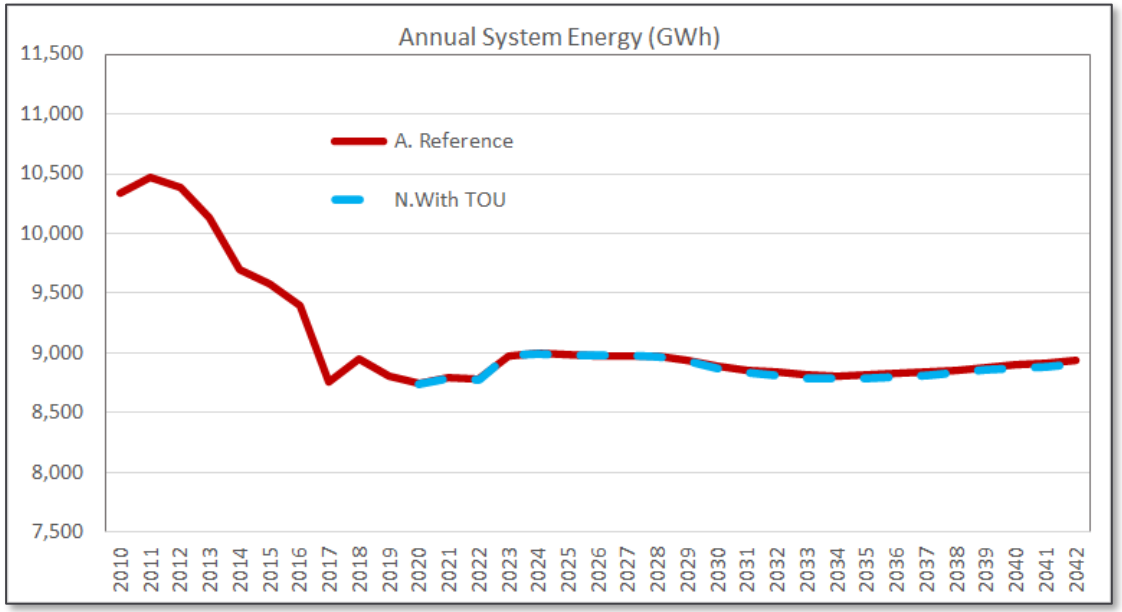


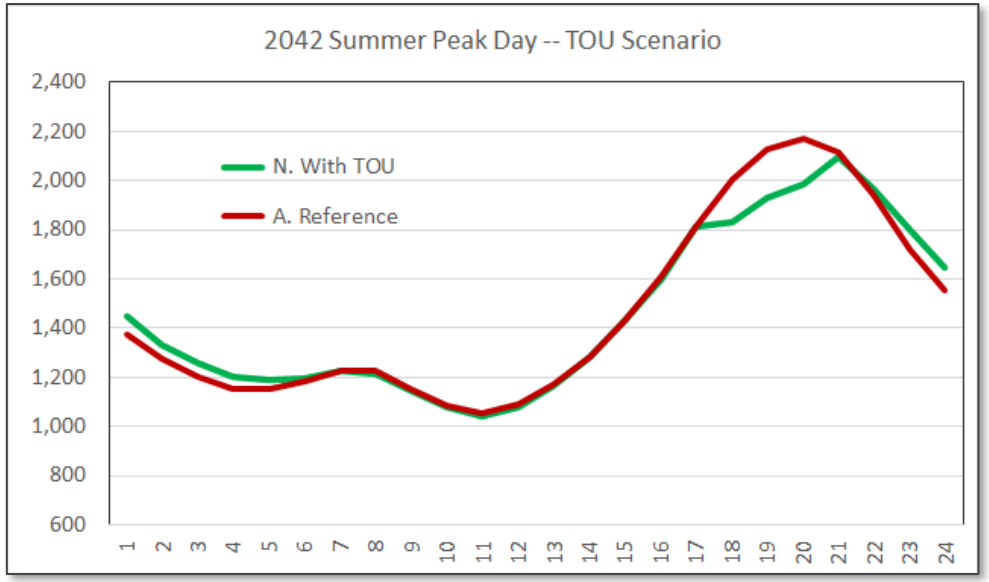


TOU Scenario

- The TOU scenario introduces residential TOU rate pilots in 2025, and full programs in 2030
  - Whole house EV Rate (10 pm to 5 am)
  - Opt-out TOU Rate (5-8 am, 5-8 pm)
- EV impacts based on EVPro profiles and PNM rate parameters.
- Non EV impacts based on TOU rate impact studies.

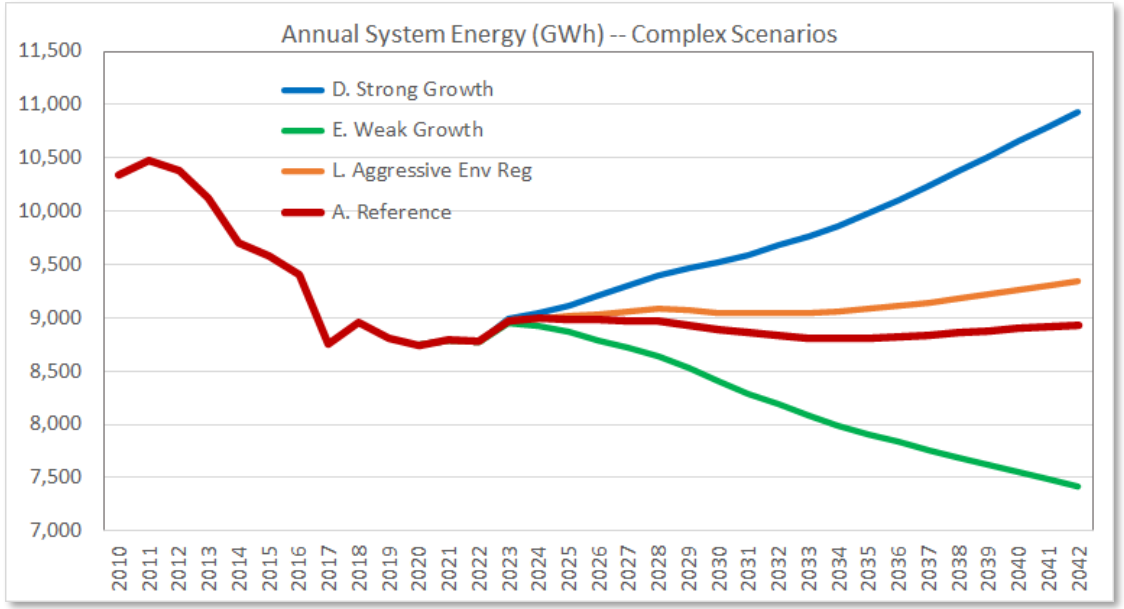
Year	Annual System Energy (GWh)		Annual Peak (MW)	
	Base	With TOU	Base	With TOU
2022	8,777	8,777	1,961	1,961
2027	8,978	8,977	1,898	1,890
2032	8,838	8,816	1,933	1,865
2037	8,839	8,814	2,033	1,968
2042	8,934	8,907	2,169	2,095



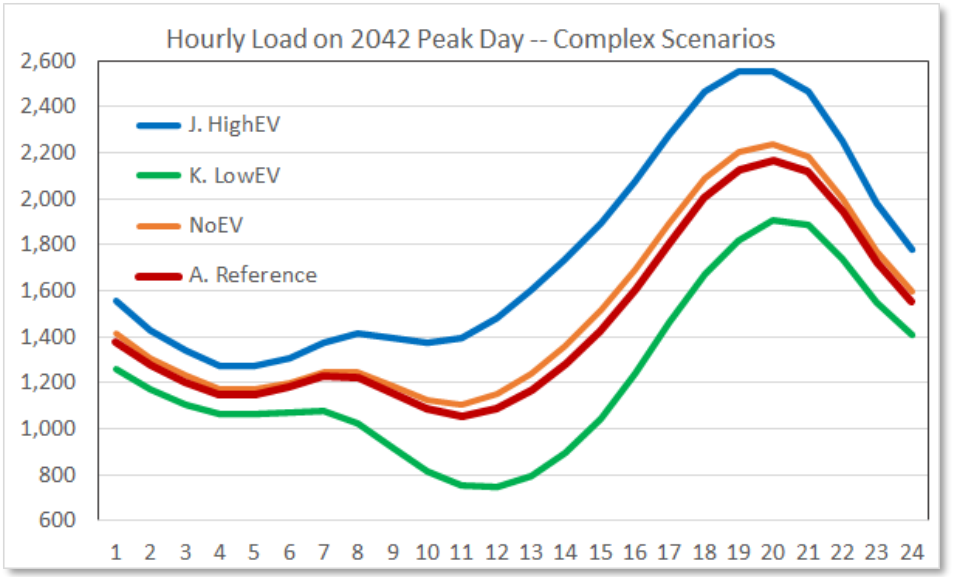


Complex Scenarios

- Strong Growth Scenario
  - High Econ Growth, Weak PV, Strong EV, Residential Electrification
- Weak Growth
  - Low Econ Growth, Strong PV, Weak EV
- Aggressive Environmental Regulation
  - Strong PV, Strong EV, Residential Electrification

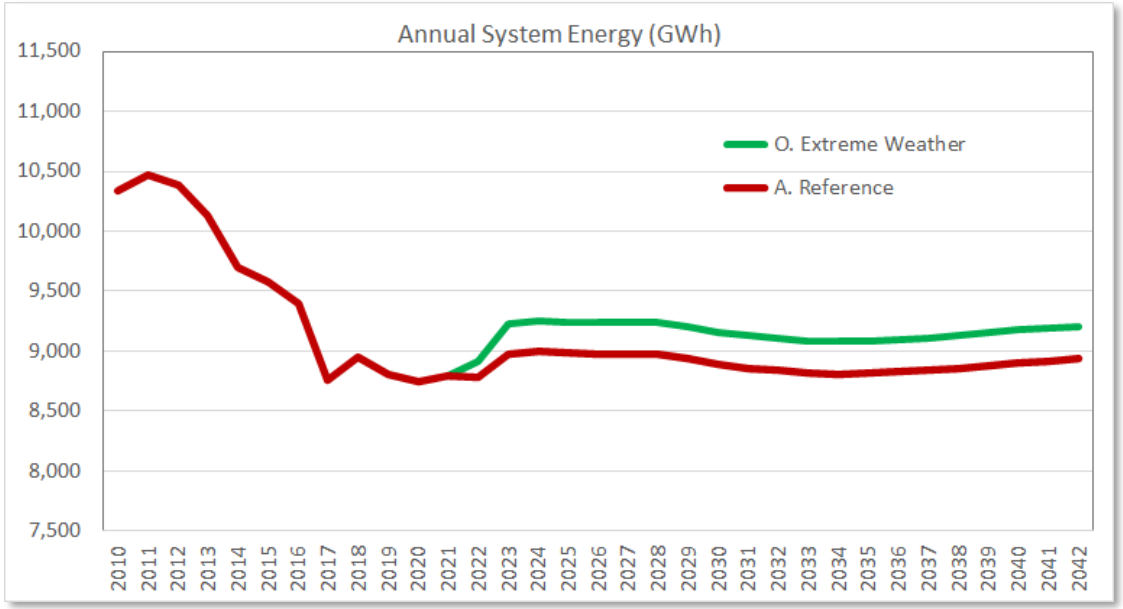


Year	Annual System Energy (GWh)				Annual Peak (MW)			
	Base	Strong Growth	Weak Growth	Aggressive Env Reg	Base	Strong Growth	Weak Growth	Aggressive Env Reg
2022	8,777	8,777	8,777	8,777	1,961	1,961	1,961	1,961
2027	8,978	9,307	8,723	9,060	1,898	1,970	1,843	1,914
2032	8,838	9,678	8,186	9,043	1,933	2,106	1,818	1,972
2037	8,839	10,236	7,759	9,147	2,033	2,313	1,852	2,087
2042	8,934	10,933	7,413	9,339	2,169	2,556	1,907	2,240

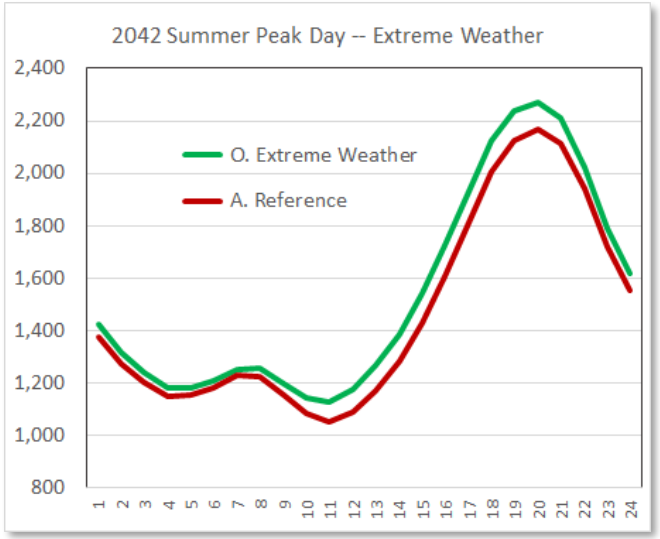


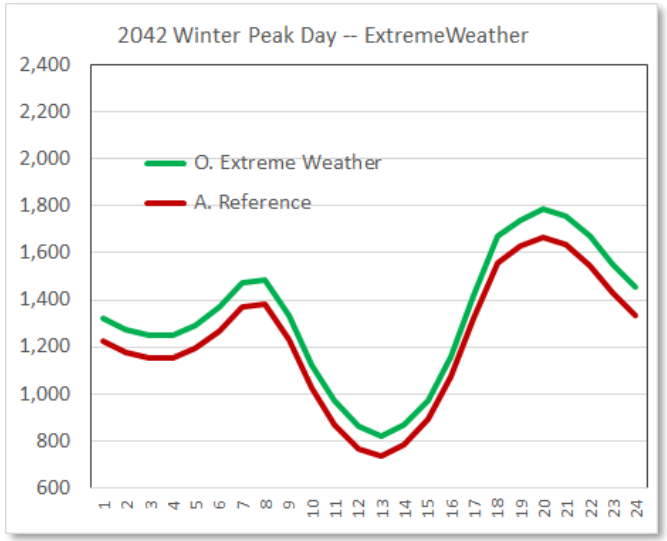
EXTREME WEATHER

- Reference uses rank and average
- Extreme uses rank and average of top 2
  - Summer peak day is 2.6 degrees warmer
  - Winter peak day is 12.2 degrees colder
  - Monthly HDD60 is 17% higher than normal
  - Monthly CDD65 is 17% higher than normal



Year	Annual System GWh		Summer Peak (MW)		Winter Peak (MW)	
	Base	Extreme Weather	Base	Extreme Weather	Base	Extreme Weather
2023	8,975	9,225	1,883	1,983	1,371	1,491
2027	8,978	9,242	1,898	2,003	1,435	1,559
2032	8,838	9,108	1,933	2,037	1,487	1,610
2037	8,839	9,111	2,033	2,130	1,583	1,705
2042	8,934	9,208	2,169	2,270	1,668	1,788





Putting EE on the Supply Side

- The forecast scenarios all include strong impacts from continued energy efficiency gains.

- To put EE on an equal footing with supply-side options, the scenario forecasts are adjusted upward to remove the impacts of incremental program activity, including:
  - The Program bundle for 2023 to 2027
  - Bundles A to E for 2028 and beyond

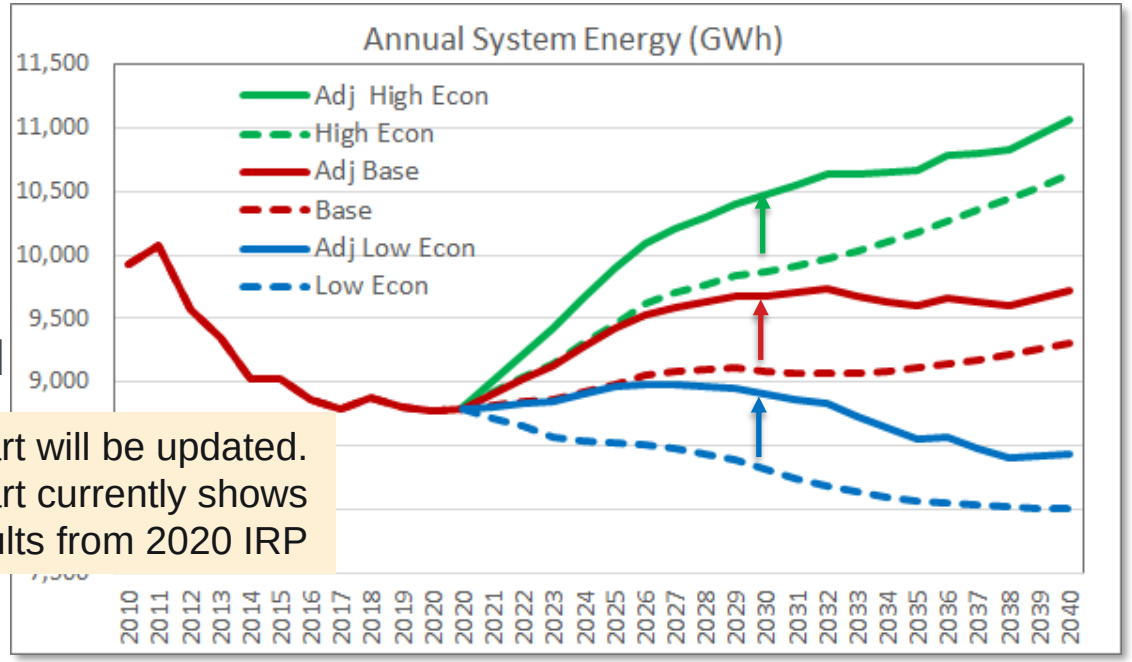


Chart will be updated. Chart currently shows results from 2020 IRP

- To compute the adjustments, load shape impacts by EE bundle are accumulated across years based on average measure life of each bundle. The cumulative impacts are then added to the hourly scenario forecast. The resulting adjusted hourly load shapes are the basis for the IRP process treating EE programs as a supply-side resource. The chart depicts the impact of this adjustment process for annual system energy in the three economic growth scenarios.

THANK YOU

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Pricing and Rate Design Issues

Heidi Pitts – Lead Pricing Analyst

IRP STAKEHOLDERS

DECEMBER 15, 2022

DISCUSSION TOPICS

Time-of-Day pilot rate details

- How does the pricing incentive differ for residential customers?
- Proposed on-peak/off-peak hours
- Bill guarantee
- Rates and ratios

Pricing Advisory Committee (“PRAC”)

- What has been accomplished so far?
- What are future goals?
- Modern Rate Design and timeline
- Issues to consider

TIME-OF-DAY PILOT

Comparison of current TOU vs. proposed TOD

RATE CASE PROPOSALS: TIME-OF-USE AND TIME-OF-DAY

Current Time-of-Use (TOU) rates will continue

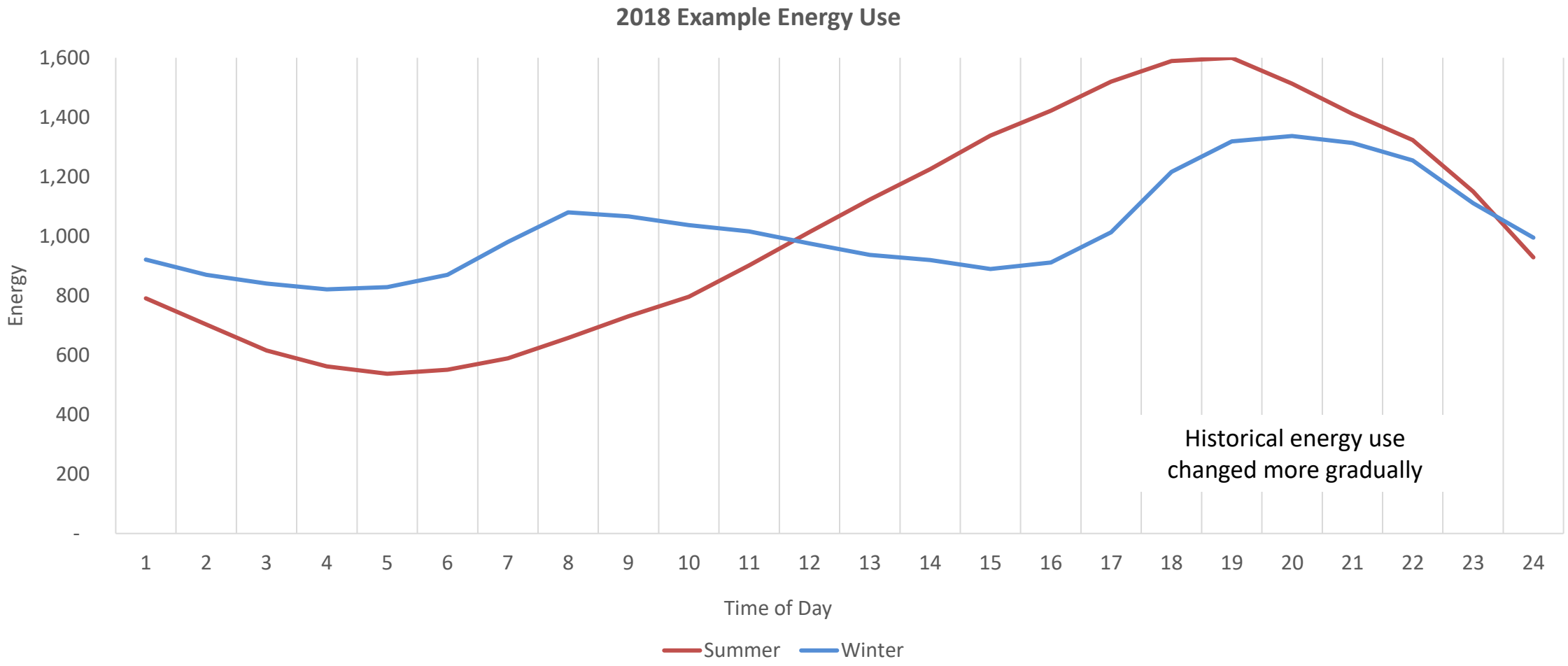
- However, Rates 1B Residential TOU and 2B Small Power TOU will be closed to new customers.
- Current TOU on-peak/off-peak hours will stay the same

Time-of-Day pilot proposed in rate case

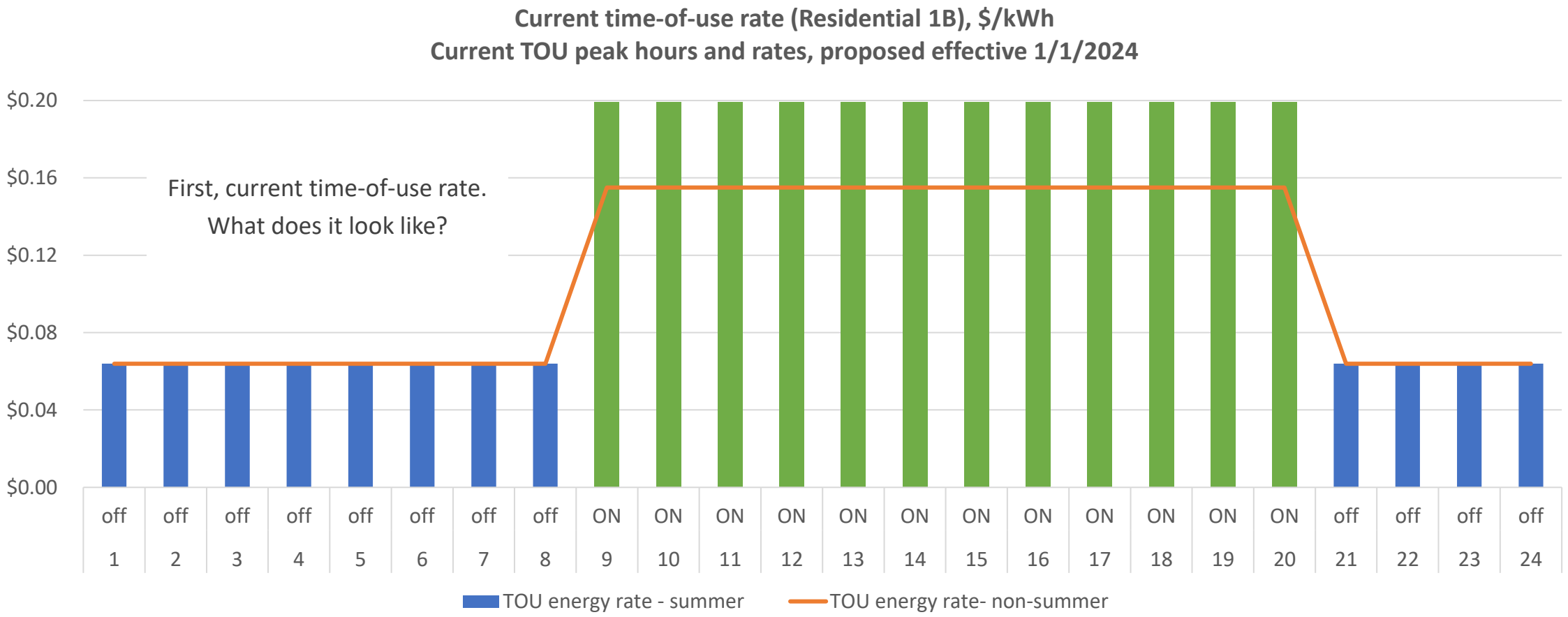
- Updated on-peak / off-peak hours and rates
- Bill guarantee for residential and small power
- Energy rates should reflect cost of energy

Starting with current TOU…..

CURRENT TIME-OF-USE REFLECTS HISTORICAL USAGE PATTERNS



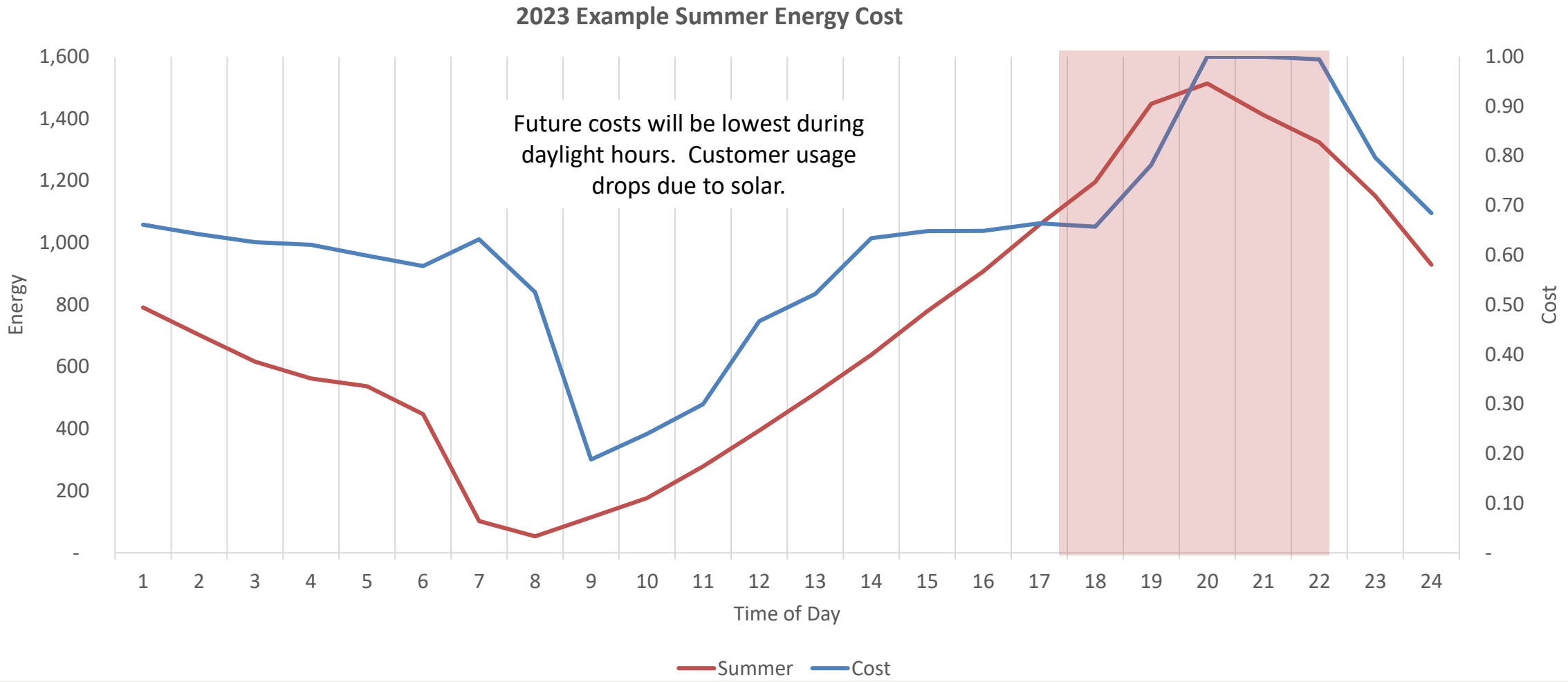
CURRENT TIME-OF-USE RATES



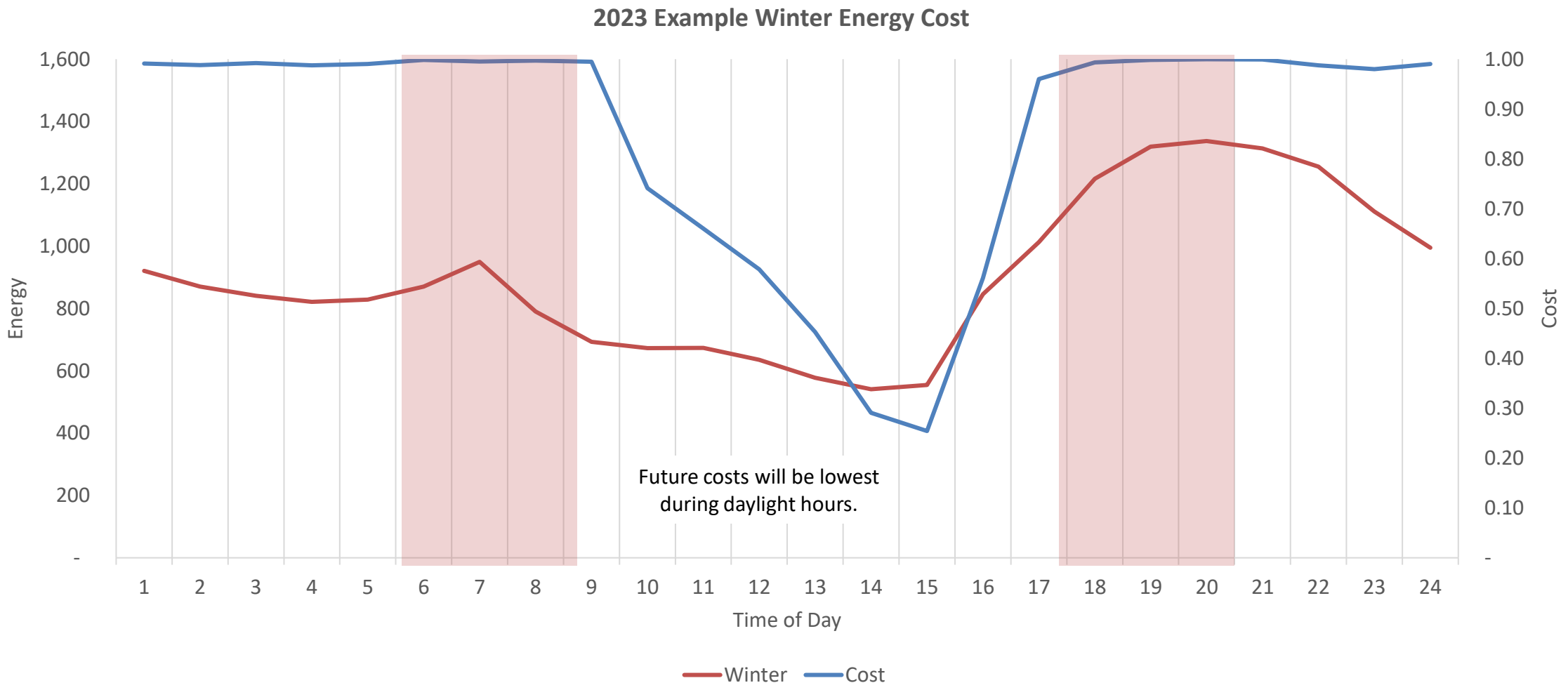
TIME-OF-DAY OVERVIEW

- Limited customer participation
  - 7,500 residential / 2,500 non-residential (all customer classes except 6, 20, 36B)
- Bill guarantee for residential and small power customers
- On peak M-F, June-Aug:
  - Residential: 5:00 to 8:00pm (15 hours/week)
  - Non-residential: 5:00 to 10:00pm (25 hours/week)
- On peak M-F, Sept to May:
  - Residential & non-residential: 5:00 to 8:00 am and pm (30 hrs/week)
- Super off-peak M-F, year-round:
  - Non-residential: 8:00am to 5:00pm (45 hours/week)
- Off-peak: all other hours
- Energy rates should reflect cost of energy – when customers use energy is the key to controlling their energy bills.

PILOT TIME-OF-DAY WILL REFLECT FUTURE DAYTIME ENERGY COST

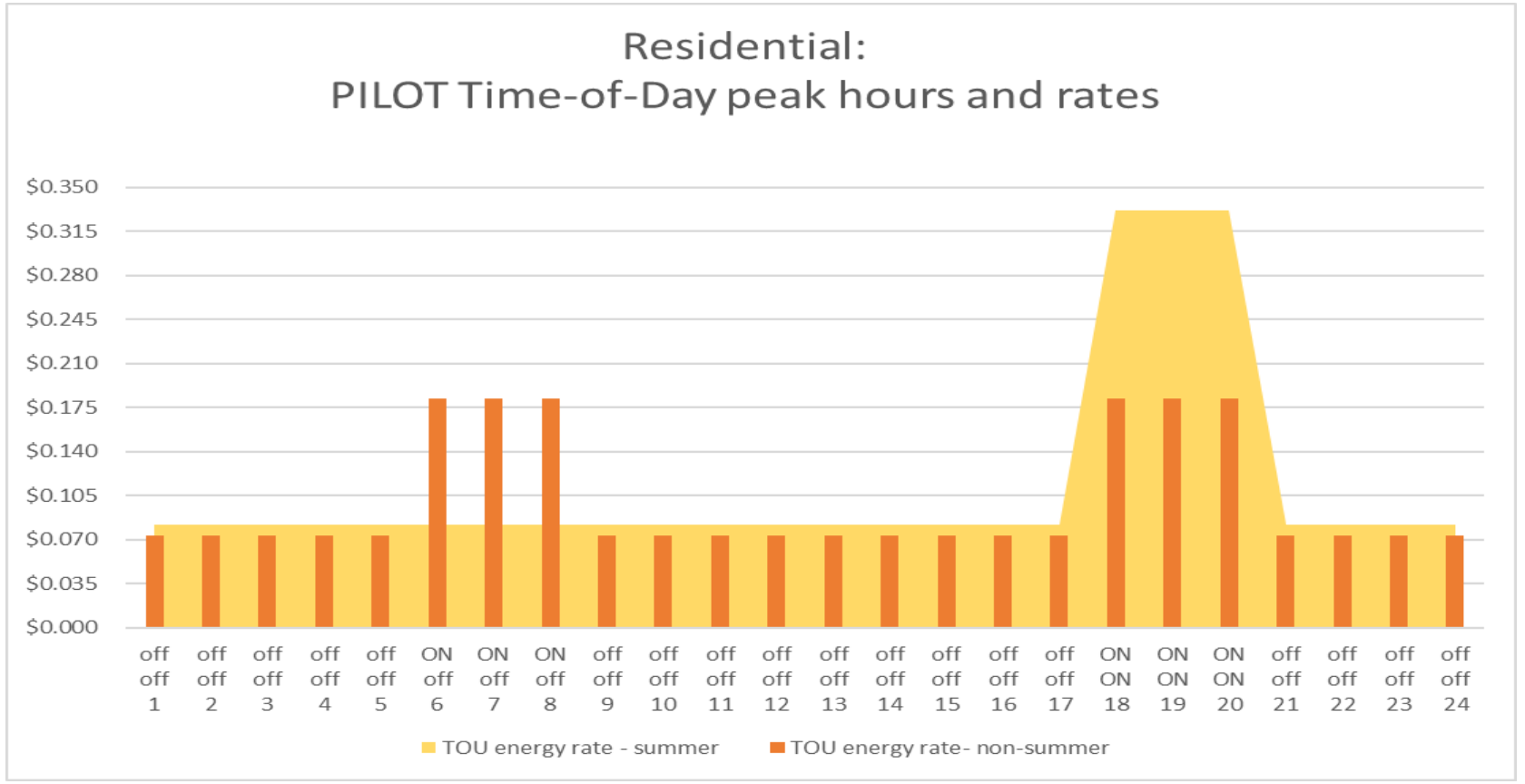


ENERGY COST DURING THE DAY – MOVING FORWARD



RESULT IS A TIME-OF-DAY (TOD) RATE DESIGN

When customers use energy will inform the rate they pay, rather than how much they use.



Pricing Advisory Committee

Accomplishments and future goals

PRICING ADVISORY COMMITTEE (“PRAC”)

- Goal: a group to discuss Modern Rate Design issues

- Met in June, August, and September; plan to meet every 3-4 months going forward

- Topics of discussion to date:
    - Modern Rate Design
    - Low income customers, how to define and analyze
    - Inter-class subsidies
    - Cost allocation

PRAC – MODERN RATE DESIGN ISSUES TO CONSIDER

- Price signal should encourage consumption to help balance the grid (excess solar or at night)
- Net metering
- Customer choices
- Class subsidies
- Intermittent generation from renewable resources
- Energy Storage
- PPAs. Will more customers bring their own renewables?
- Electric vehicle adoption
- Cost allocation (fossil fuels historically → renewable energy future)
- Align cost allocation with cost causation

MODERN RATE DESIGN – RATE STRUCTURES

- Cellular interval meters
    - Pilot Whole House Electric Vehicle (WHEV) rate
    - Pilot Non-residential charging station
    - Pilot Time-of-Day rate (proposed in current rate case)
- AMI meters
    - TOD rates could be offered to all customers
    - Real time pricing
    - Critical peak pricing
- Modern billing system needed

Questions??????

NEAR-TERM SCHEDULE*

FUTURE MEETING TIME & LOCATION

When: January 17, 2023 (Tentative)

Topic: AEG EE bundles, PNM EE program & highlights, ELCC & PRM study results, Summer 2022 review

Start Time: 9:00 AM

Location: Virtual

**meeting dates and topics are subject to change based on presenter's availability*

NEXT MEETING

We encourage you to send in your thoughts ahead of time to IRP@pnm.com so that we can summarize them and address them in a future next meeting. Please have your submissions in by January 13, 2023.

MAKE SURE WE HAVE UP TO DATE CONTACT INFORMATION FOR YOU

www.pnm.com/irp for documents

IRP@pnm.com for e-mails

Register your email on sign-in sheets to receive alerts of upcoming meetings and notices that we have posted to the website.

Thank you