PNM 2017-2036 Integrated Resource Plan

NOVEMBER 10, 2016 AM LOAD FORECAST, PRICES & FOLLOW-UP

Talk to us.

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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Pat O’Connell

Director, Planning and Resources

AGENDA

LOAD FORECAST, PRICES AND FOLLOW-UP ITEMS

- Meeting preliminaries
- PNM load forecast
- Rates and rate structure design
- Follow-up items from previous Public Advisory Meetings
- Wrap-up

SAFETY AND LOGISTICS

MEETING PRELIMINARIES

- Fire escape routes via stairways at east and west ends of hallway; please let us know if you require special handicap egress or special assistance
- We must obey any fire or emergency alarm; even drills/test alarms
- Restrooms – Women's room at west end; Men's room at east end
- PNM’s WiFi
- Please be aware that there are outlets/network connections on the floor

SAFETY AND LOGISTICS CONTINUED

MEETING PRELIMINARIES

- Must sign-in with security desk each time you enter the building
- Must be escorted in and out of the building by a PNM employee
- Recycling is easy and encouraged
- Please note that meeting room is scheduled immediately following the IRP meeting

MEETING GROUND RULES

MEETING PRELIMINARIES

- IRP Public Advisory purpose is to solicit and receive public input
- Questions and comments are welcome
- Comments should be respectful of all participants
- Use name tents to indicate you have a comment or question
- Please silence your cell phone
- Reminder: today's presentation is not PNM's plan or a financial forecast, it is a discussion of PNM's planning process

SCHEDULE

THREE PUBLIC ADVISORY PHASES, ONE DEADLINE

- July – October: Build assumptions and discuss scenarios and sensitivities
- November – February: Discuss analysis plan and discussion of findings
- March – June: Discuss draft report
- July 3, 2017 – File report documenting the Plan and process with New Mexico Public Regulation Commission

NEAR TERM SCHEDULE

MEETING SCHEDULE THROUGH NOVEMBER

- July 30: Kickoff, overview and timeline
- July 27: Reliability standards & grid modernization concepts
- August 11: Baseload resources
- September 1: Transmission, renewable energy & energy efficiency
- September 22: Natural gas price forecasts & environmental regulations
- **November 10 am: Load forecast, rates and tariffs, responses to public comments**
- **November 10 pm: Discussion of modeling tools including Strategist and SERVM, discussion of initial modeling roadmap**

FORECAST DISCUSSION INTRODUCTION

THE IMPORTANCE OF DEMAND AND ENERGY FORECASTS FOR IRP

- Load forecasts are important planning tools
- Future resource mix in the most cost effective portfolios is affected by
    a) Peak demand
    b) Energy sales
- Presenting three forecast scenarios for use in the Integrated Resource Planning Process
    a) Future is unpredictable
    b) Scenario analysis provides insight into four year action plan items

John Shaw

Senior Economist

FORECAST DISCUSSION INTRODUCTION

AGENDA

1. Mid energy forecast assumptions
2. Mid energy and demand forecast
3. Low and high energy forecast assumptions
4. Low and high energy and demand forecast

DEFINITIONS

1. Residential UPC: Use Per Customer. The average household energy use in kWh's per month.

2. Residential Customers: Mostly household

3. Commercial Customers: Mix of large to small business customers including grocery stores, hospitals, universities, etc.

DEFINITIONS

4. Industrial Customers: Mix of the largest users, including manufacturing, mining, datacenters, etc.

5. Retail energy: Energy measured at the meter for PNM (GWh).

6. Demand: Hourly energy at time of peak for PNM (MW).

FORECAST MODEL COMPONENTS

- System Forecast
  - Retail
  - Decrements to Retail
    - Energy Efficiency
    - Rooftop Solar
    - Codes and Standards
  - Wholesale

FORECAST MODEL DRIVERS

Retail

- Based on historical trends
- Economic indicators
- Large customers may be individually forecasted
- Losses

Decrements to Retail

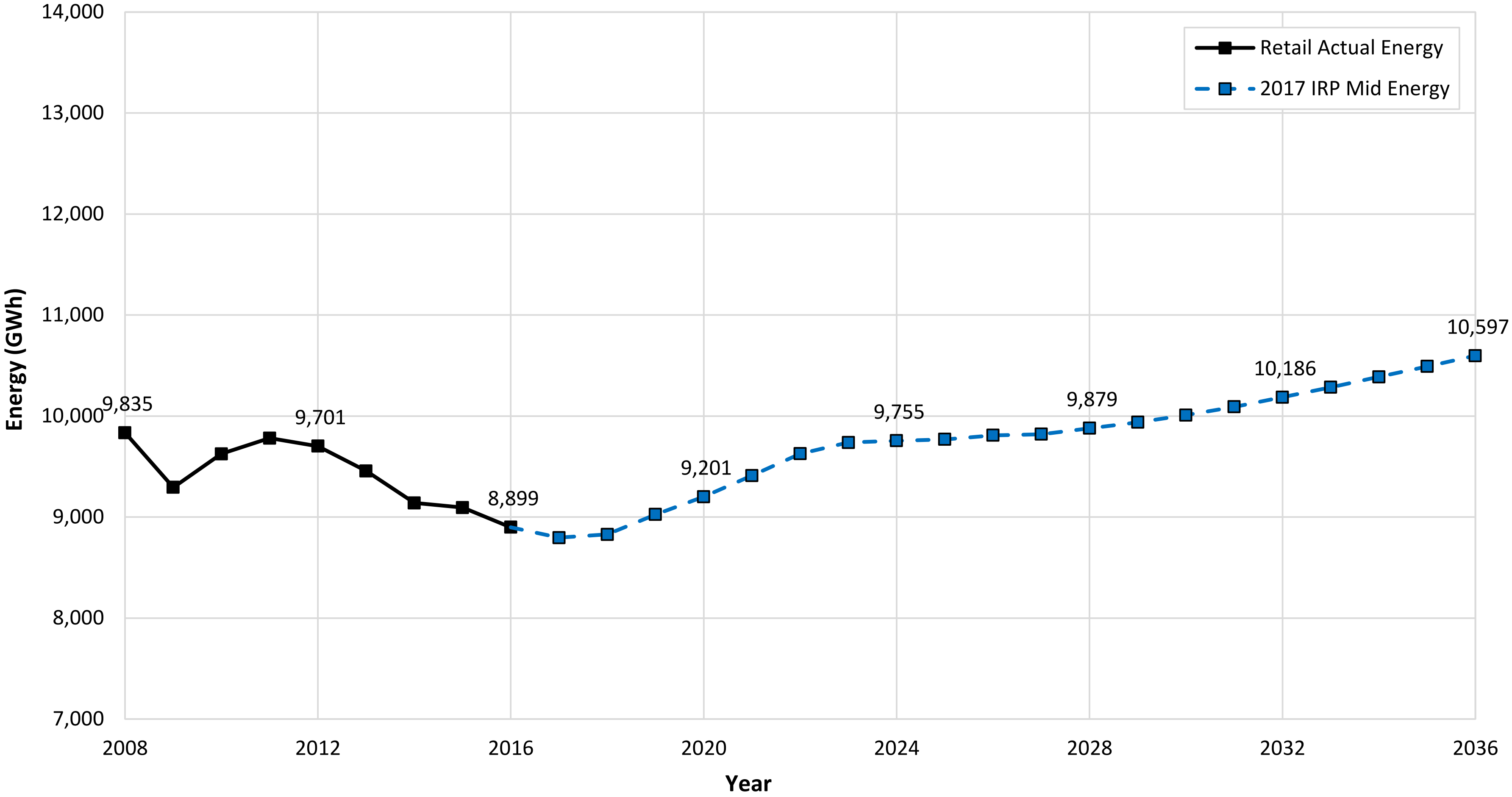
- Energy Efficiency: EE program energy savings
- Rooftop Solar: Number of applications/interconnections
- Codes and Standards: Percentage of residential and small commercial energy sales

Wholesale

- Based on contractual agreements

MID LOAD FORECAST

PNM 2017 IRP MID ENERGY FORECAST



MID CASE ENERGY FORECAST

Mid Case Customer Counts

Year	Residential	Commercial
2011	448,344	54,289
2015	457,737	56,002
2017	464,608	56,783
2022	483,345	58,278
2027	501,569	59,554
2032	518,440	60,786
2036	530,589	61,787

Mid Case UPC (Use per Customer)

Year	Residential kWh/month
2011	620
2015	588
2017	571
2022	546
2027	558
2032	581
2036	615

Mid Case Customer Growth Rates

Years	Residential	Commercial
2013,14,15	0.5%,0.6%,0.7%	1.1%,0.7%,0.6%
2017-2021	0.8%	0.5%
2022-2026	0.8%	0.4%
2027-2031	0.7%	0.4%
2032-2036	0.6%	0.4%

MID CASE ENERGY FORECAST GROWTH RATES

Mid Case Energy Growth Rates

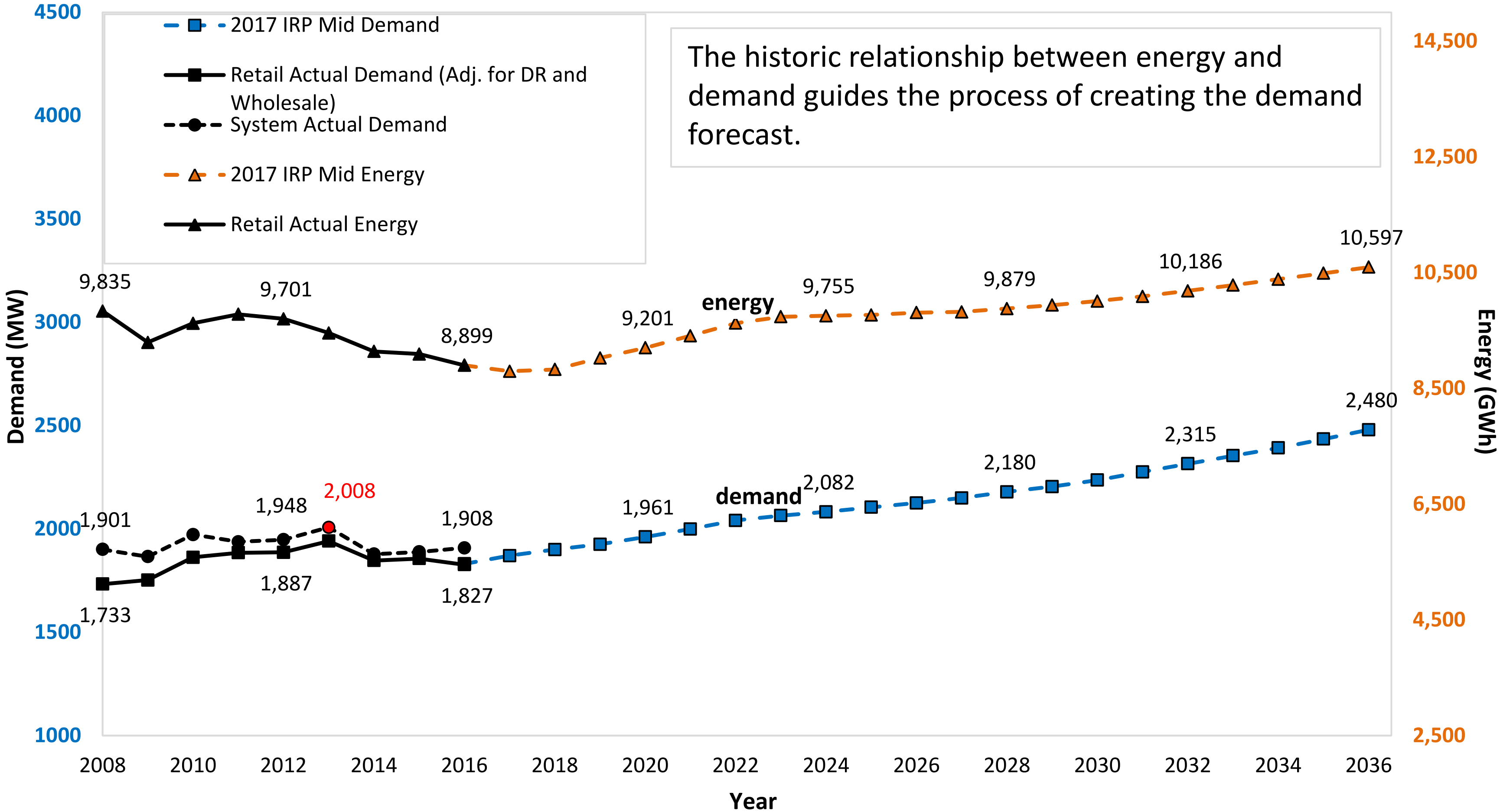
Years	Residential	Commercial	Industrial	Total Retail
2011-2015	-0.8%	-1.2%	-4.1%	-1.5%
2017-2021	-0.4%	-1.0%	17.6%	1.8%
2022-2026	1.2%	-0.7%	1.5%	0.5%
2027-2031	1.4%	0.4%	0.0%	0.7%
2032-2036	2.0%	0.5%	0.0%	1.0%

Mid Case Energy

Year	Retail Energy (GWh)
2011	8,750
2015	8,244
2017	8,069
2022	8,870
2027	9,051
2032	9,386
2036	9,763

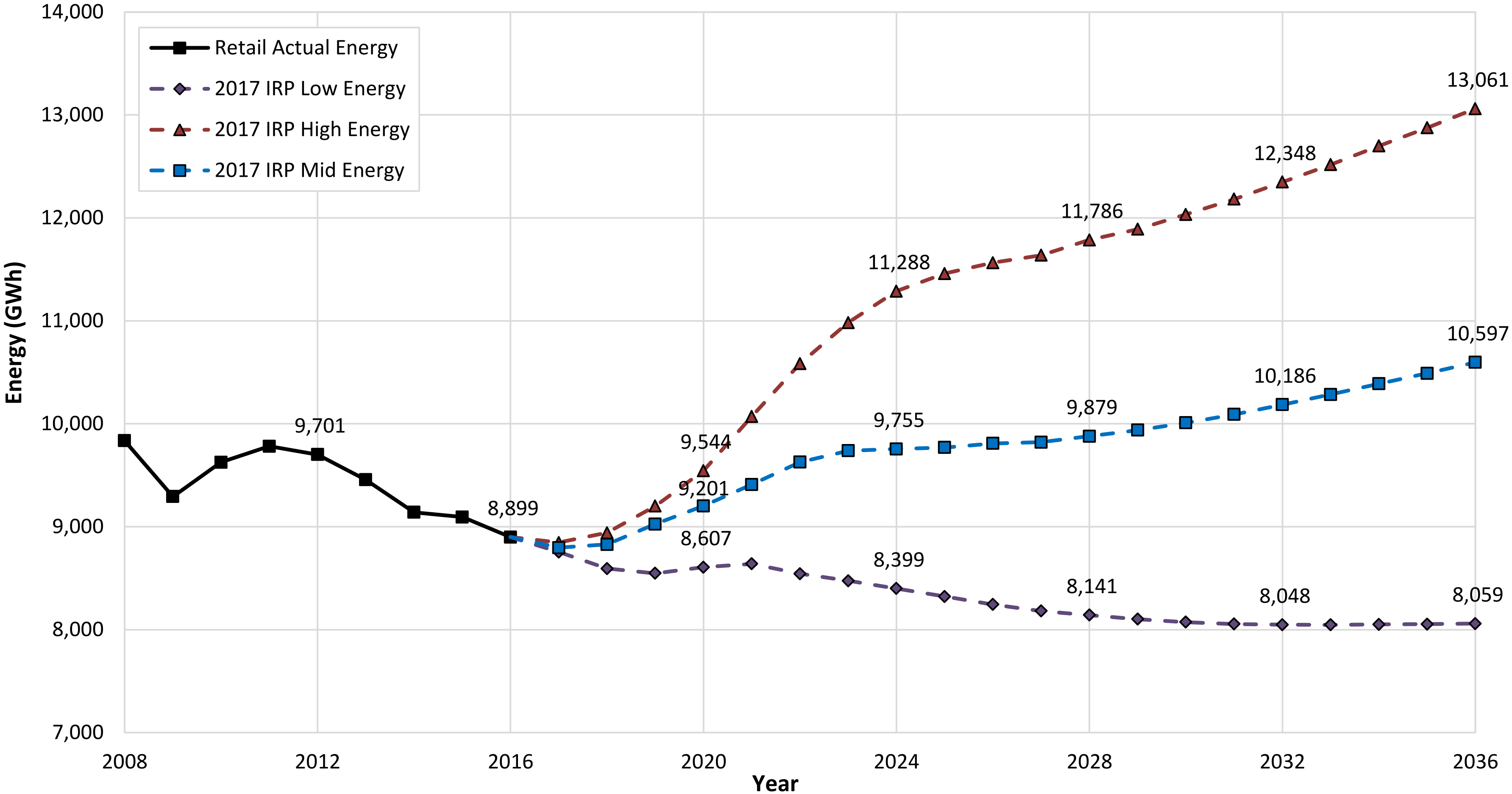
It will take over 6 years to
reach the energy usage last seen in 2011.

MID SUMMER PEAK DEMAND AND ANNUAL ENERGY



HIGH AND LOW FORECASTS

PNM 2017 IRP ANNUAL ENERGY FORECAST



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RESIDENTIAL CLASS ENERGY FORECAST

Residential UPC

Year	Low	Mid	High
2011	620	620	620
2015	588	588	588
2017	565	571	576
2022	508	546	567
2027	483	558	585
2032	466	581	615
2036	469	615	651

Residential Customer Growth

Years	Low	Mid	High
2017-2021	0.0%	0.8%	1.4%
2022-2026	0.0%	0.8%	1.4%
2027-2031	0.0%	0.7%	1.4%
2032-2036	0.0%	0.6%	1.4%

Residential Energy Sales Growth

Years	Low	Mid	High
2017-2021	-2.3%	-0.4%	0.9%
2022-2026	-1.0%	1.2%	2.0%
2027-2031	-0.8%	1.4%	2.3%
2032-2036	0.1%	2.0%	2.9%

COMMERCIAL CLASS ENERGY FORECAST

Commercial Customer Growth

Years	Low	Mid	High
2017-2021	0.0%	0.5%	1.2%
2022-2026	0.0%	0.4%	1.2%
2027-2031	0.0%	0.4%	1.2%
2032-2036	0.0%	0.4%	1.2%

Commercial Energy Sales Growth

Years	Low	Mid	High
2017-2021	-1.4%	-1.0%	-0.4%
2022-2026	-1.1%	-0.7%	-0.1%
2027-2031	-0.1%	0.4%	0.9%
2032-2036	0.1%	0.5%	0.9%

INDUSTRIAL AND RETAIL CLASS ENERGY FORECAST

Industrial Energy Sales Growth

Years	Low	Mid	High
2017-2021	12.2%	17.6%	23.5%
2022-2026	0.1%	1.5%	6.0%
2027-2031	0.0%	0.0%	0.0%
2032-2036	0.0%	0.0%	0.0%

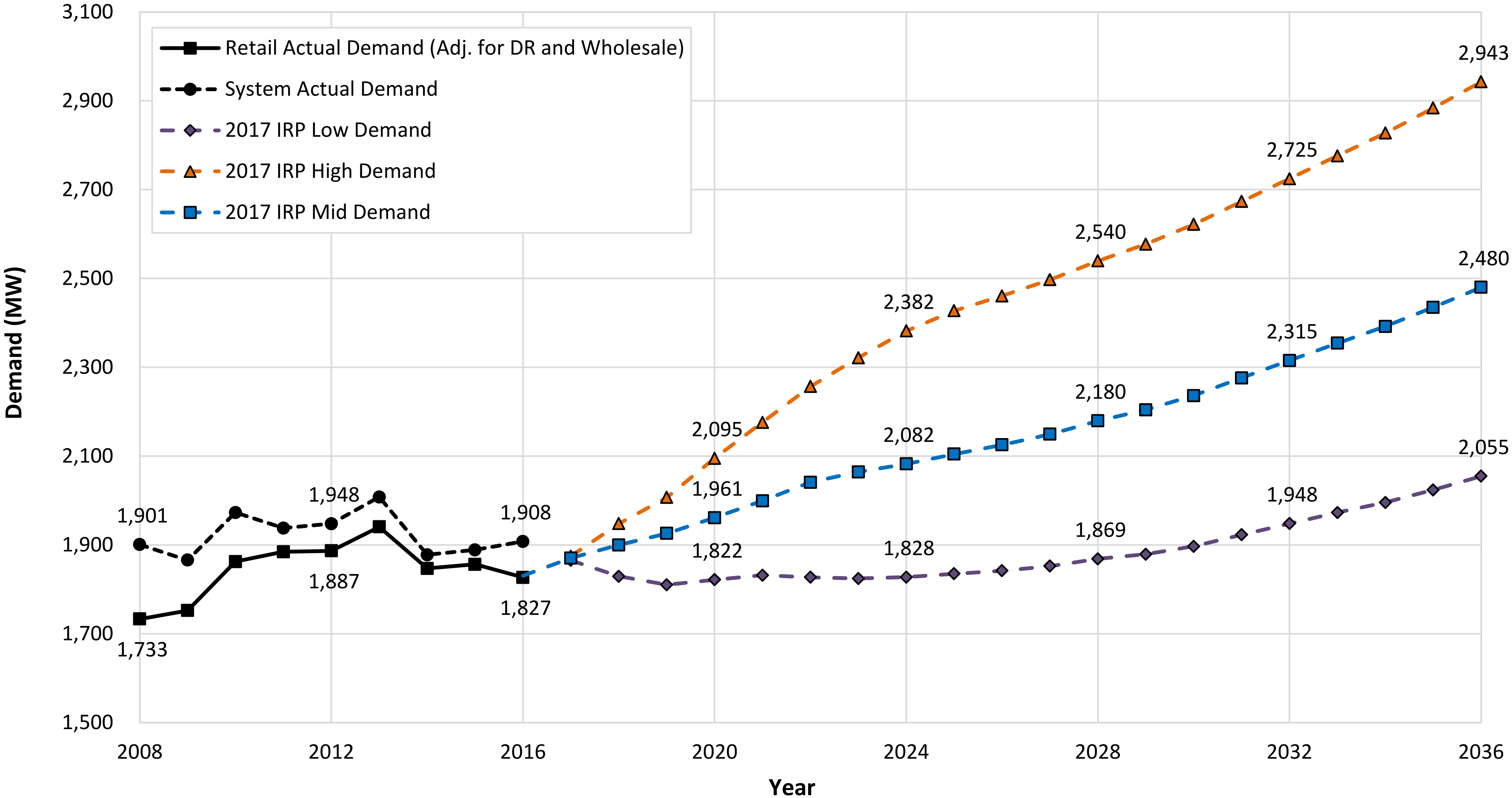
Total Retail Energy Sales Growth

Years	Low	Mid	High
2017-2021	-0.1%	1.8%	3.5%
2022-2026	-0.8%	0.5%	2.3%
2027-2031	-0.3%	0.7%	1.1%
2032-2036	0.1%	1.0%	1.4%

PNM 2017 IRP DEMAND FORECASTS

1. Mid Case – based on mid case historical relationship between energy and demand
2. High Case - uses the same mid case historical relationship between energy and demand, with the high energy forecast at the 95% Upper Confidence Limit
3. Low Case – uses the same mid case historical relationship between energy and demand, with the low energy forecast at the 95% Lower Confidence Limit

PNM 2017 IRP SUMMER PEAK DEMAND



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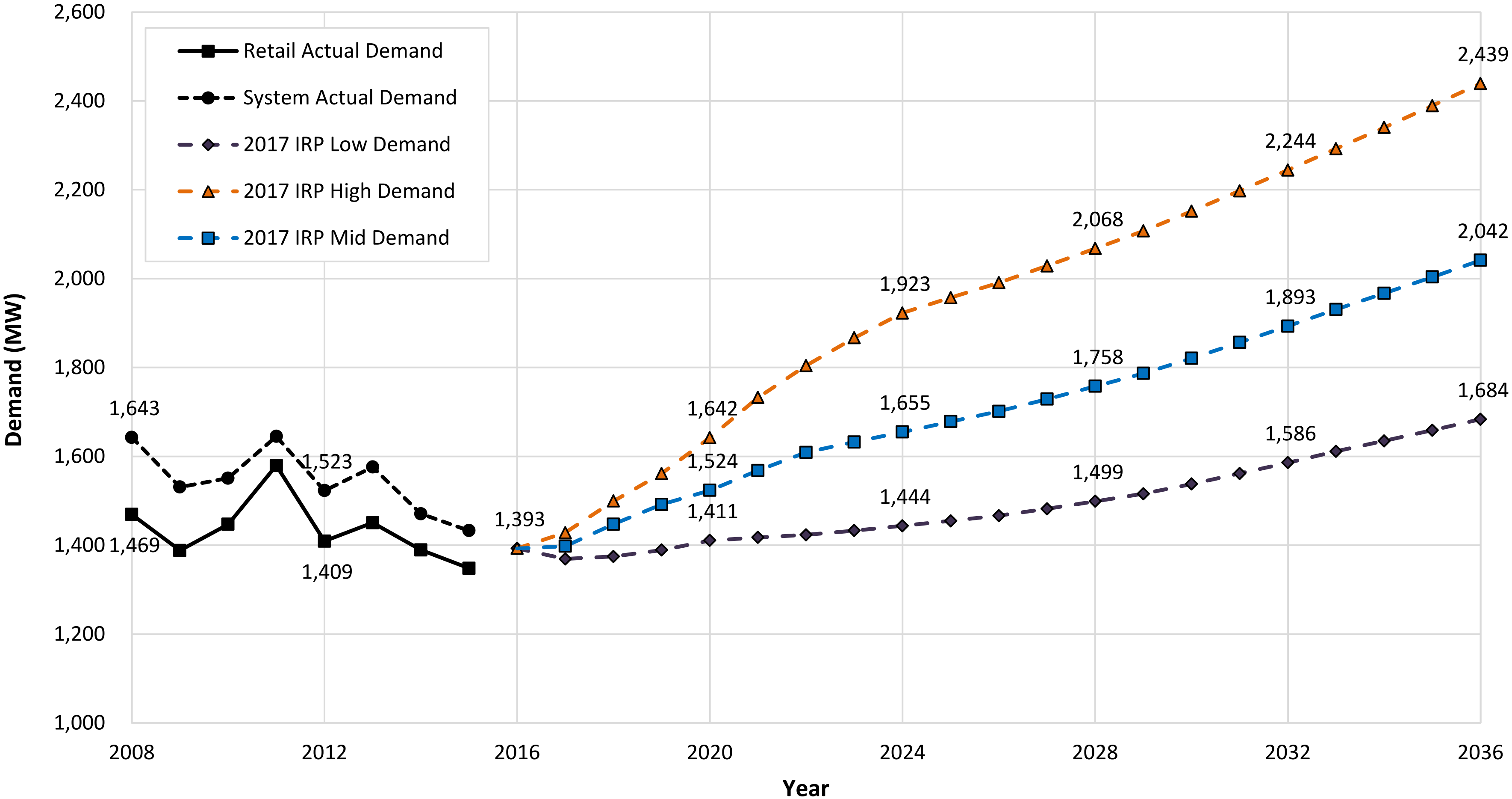
PNM 2017 IRP WINTER PEAK DEMAND



Scott Vogt

Manager, Business & Pricing Analysis

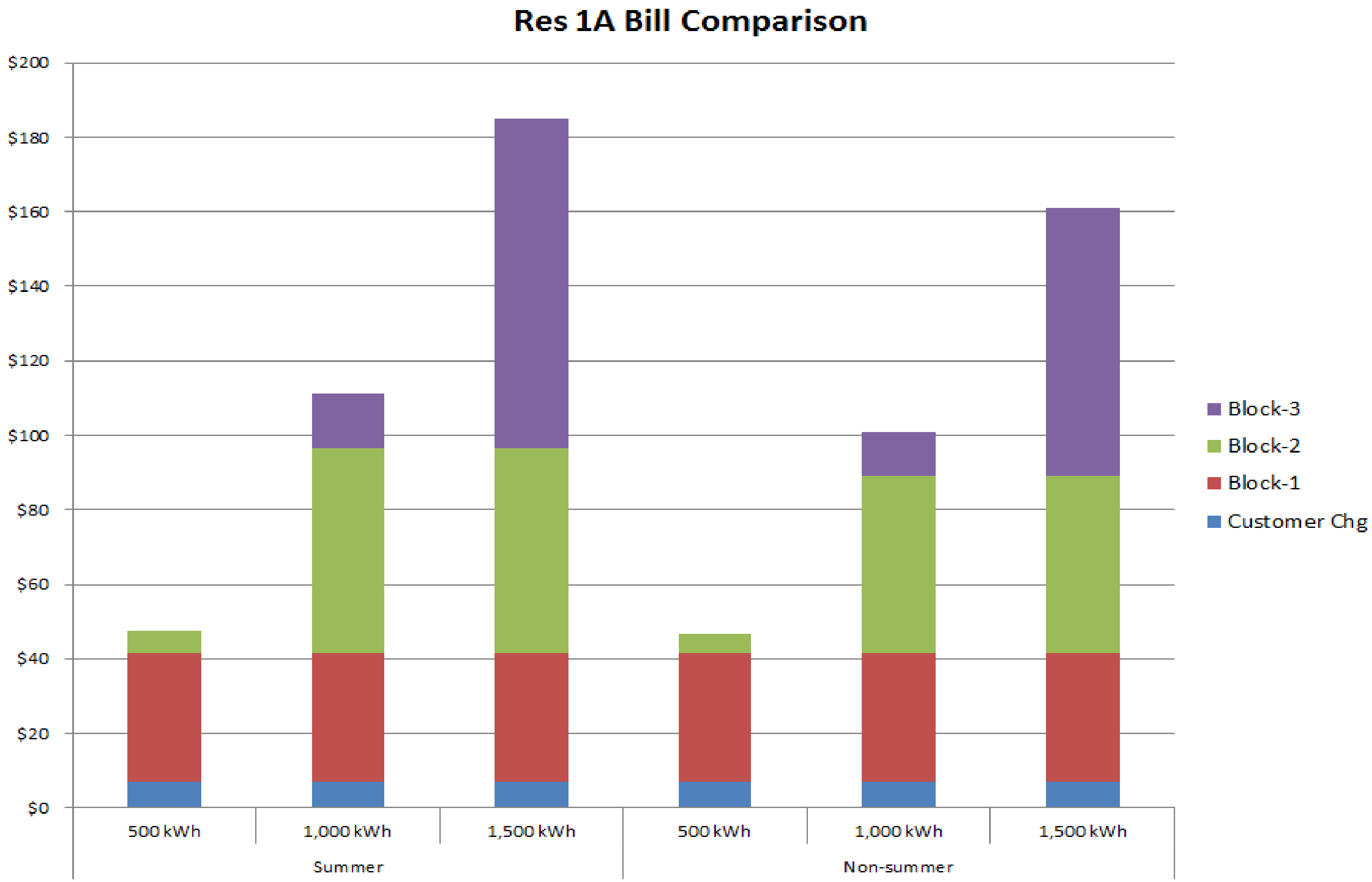
AGENDA

- Introduction
- NMAC 17.7.3.9.F(3):
    - Current Rate Design
        - The utility shall describe its existing rates and tariffs that incorporate load management or load shifting concepts.
    - Potential Future Rate Design
        - The utility shall also describe how changes in rate design might assist in meeting, delaying or avoiding the need for new capacity.

CURRENT RATE DESIGN – RES BLOCK RATES

- **Inclining Block Rates for Residential**
    - 3 inclining blocks of usage
        - 0-450 kWh / 450-900 kWh / 901 kWh and above
    - Inclining prices correspond to usage
        - Low rate / medium rate / high rate
    - In combination with a seasonal rate structure, helps encourage greater energy conservation during the summer months

CURRENT RATE DESIGN – RES BLOCK RATES

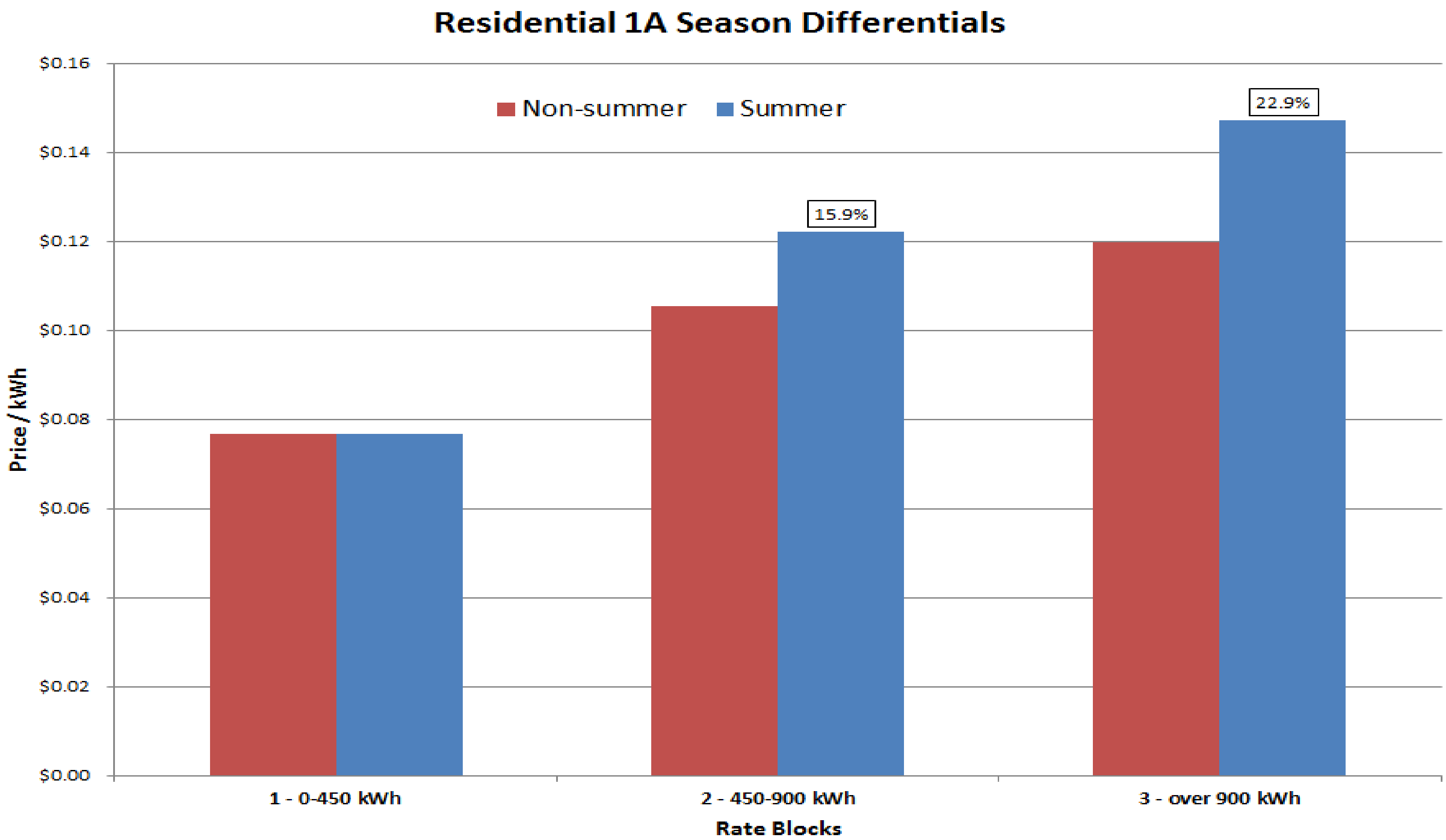


Rates 15-00261-UT, Only Includes Customer Charge and Energy Rates for illustration

CURRENT RATE DESIGN – SEASONAL RATES

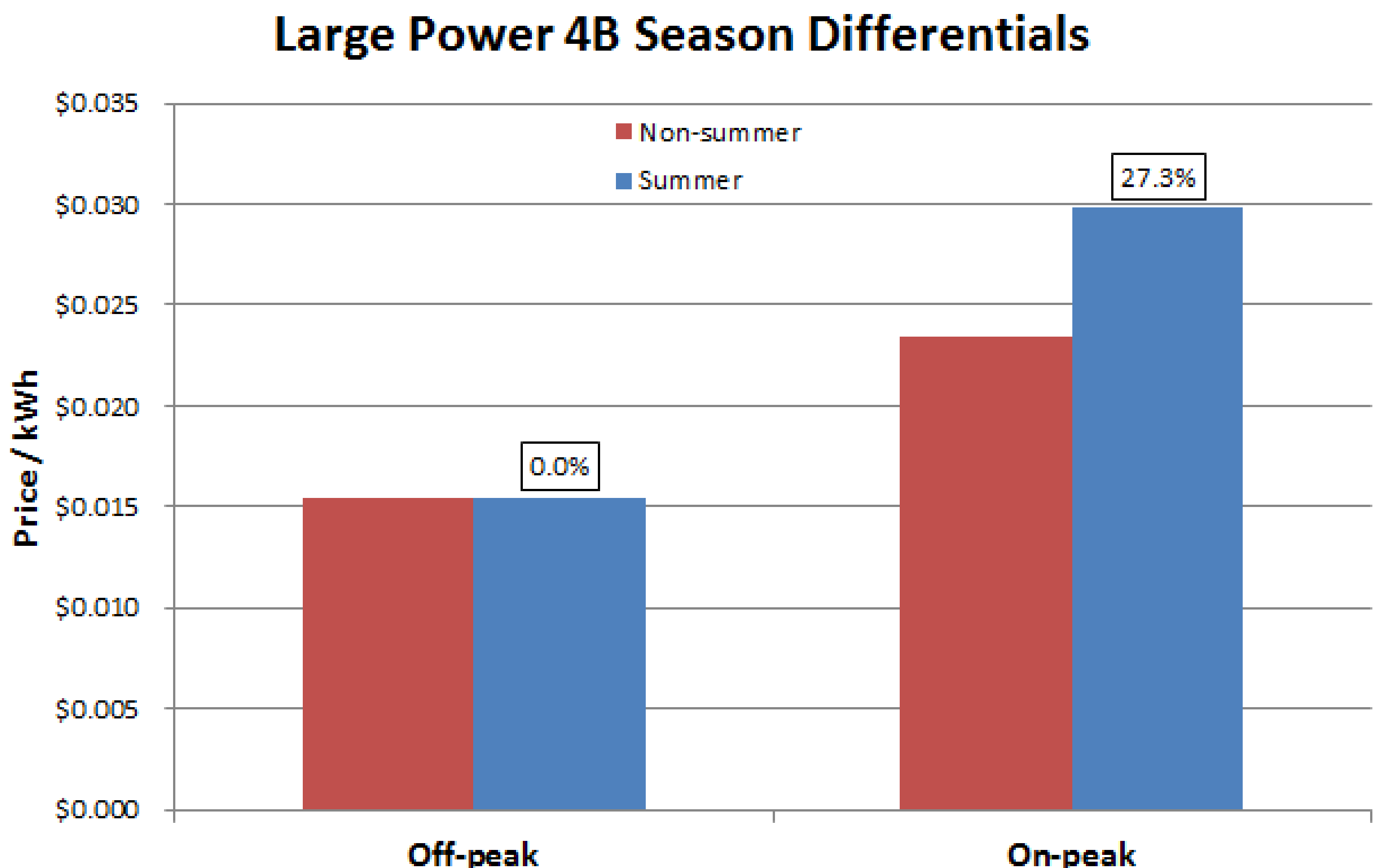
- **Seasonal Rates**
  - Rate differentials between peak and non-peak **seasons** designed to encourage customer load management and load shifting during peak months when the system experiences its highest loads
  - Seasons:
    - On-peak summer – June, July, August
    - Off-peak non-summer - all other months
  - All retail rate schedules contain seasonal rates

CURRENT RATE DESIGN – SEASONAL RATES



Rates 15-00261-UT

CURRENT RATE DESIGN – SEASONAL RATES



Rates 15-00261-UT

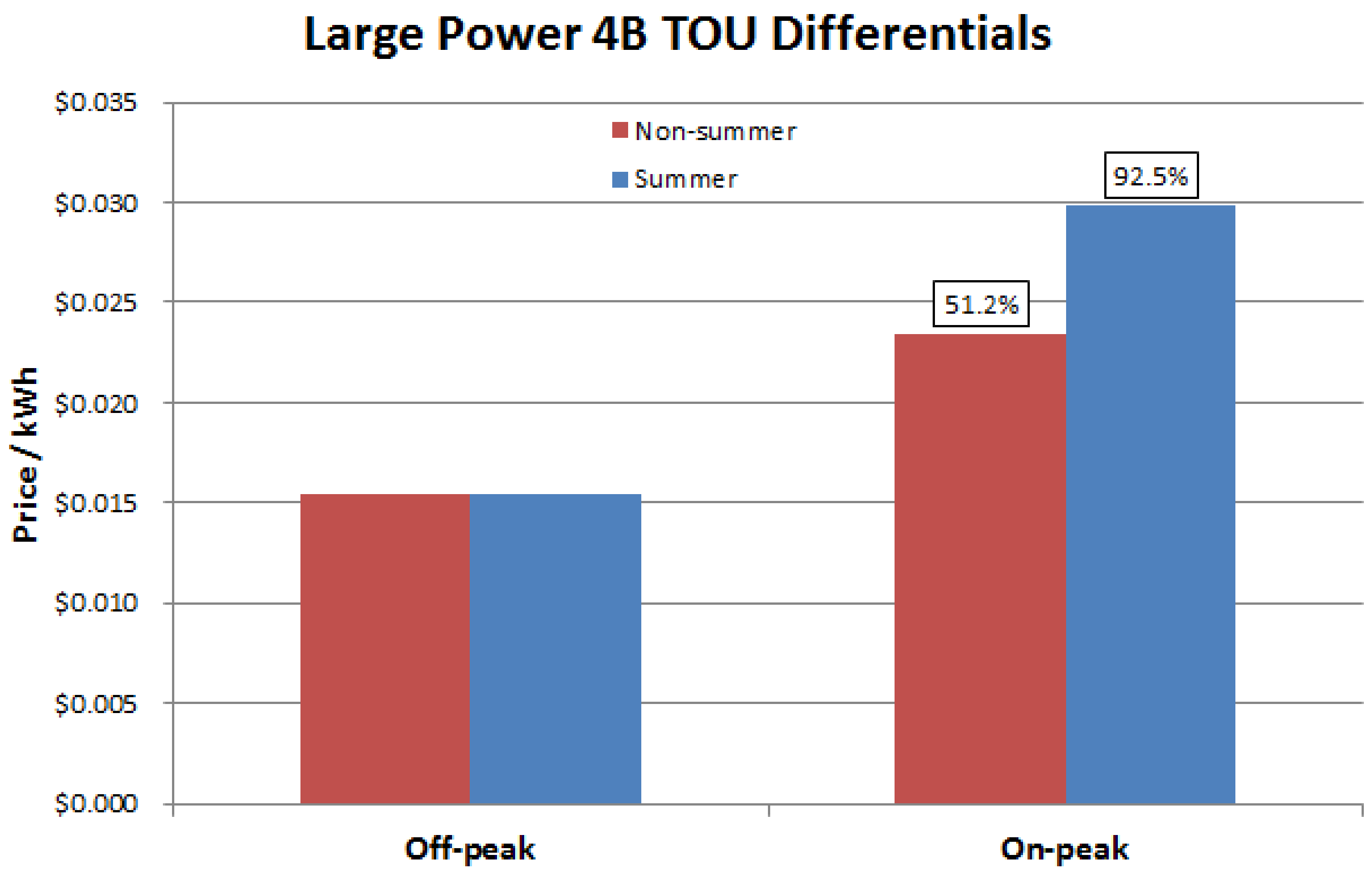
On-peak hours: 8am-8pm, M-F (60 hours per week)

Talk to us.

CURRENT RATE DESIGN – TOU RATES

- **Time-of-Use Rates (TOU)**
  - Standard rate for all non-residential rate schedules
  - Residential, Small Power and Irrigation: TOU optional
  - Rate differentials between on-peak and off-peak **hours of day**
  - TOU rates = price differentials for energy used during on-peak and off-peak hours = more accurate price signals
  - Price differentials designed to influence consumption changes
  - Requires more sophisticated metering
  - Changes in peak use by all customers may reduce purchased power costs and/or delay additional generation resources

CURRENT RATE DESIGN – TOU RATES



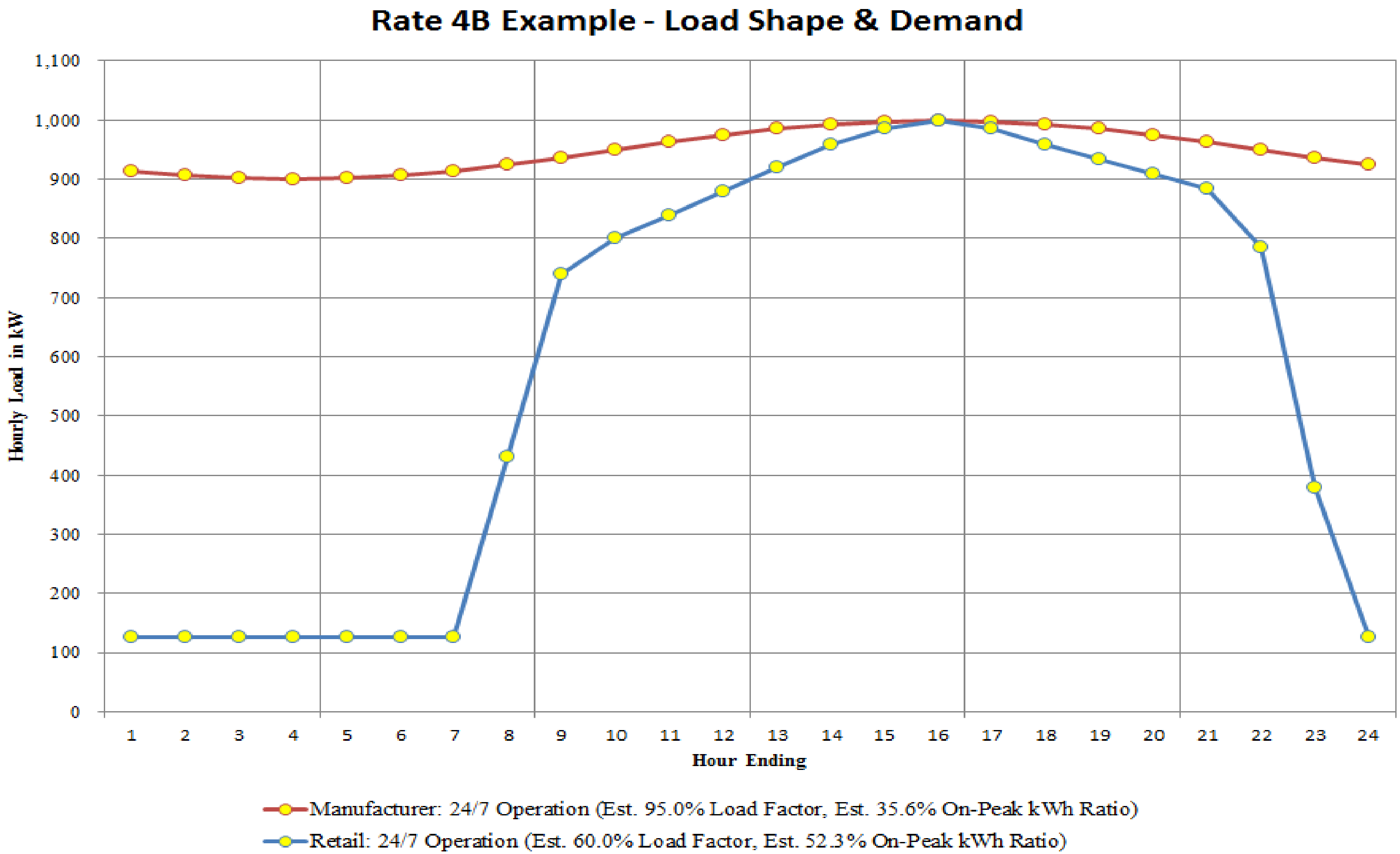
Rates 15-00261-UT

On-peak hours: 8am-8pm, M-F (60 hours per week)

CURRENT RATE DESIGN – DEMAND RATES

- **Demand Rates** –
    - Applicable to Commercial & Industrial Customers only
    - Demand rates charge for on-peak usage over a given period of time
    - Demand charges encourage customers to:
        - reduce power usage during on-peak hours and/or
        - to shift usage from on-peak to off-peak hours, improving the utilization/efficiency of the system
    - Demand charge is significant portion of the bill

CURRENT RATE DESIGN – DEMAND RATES



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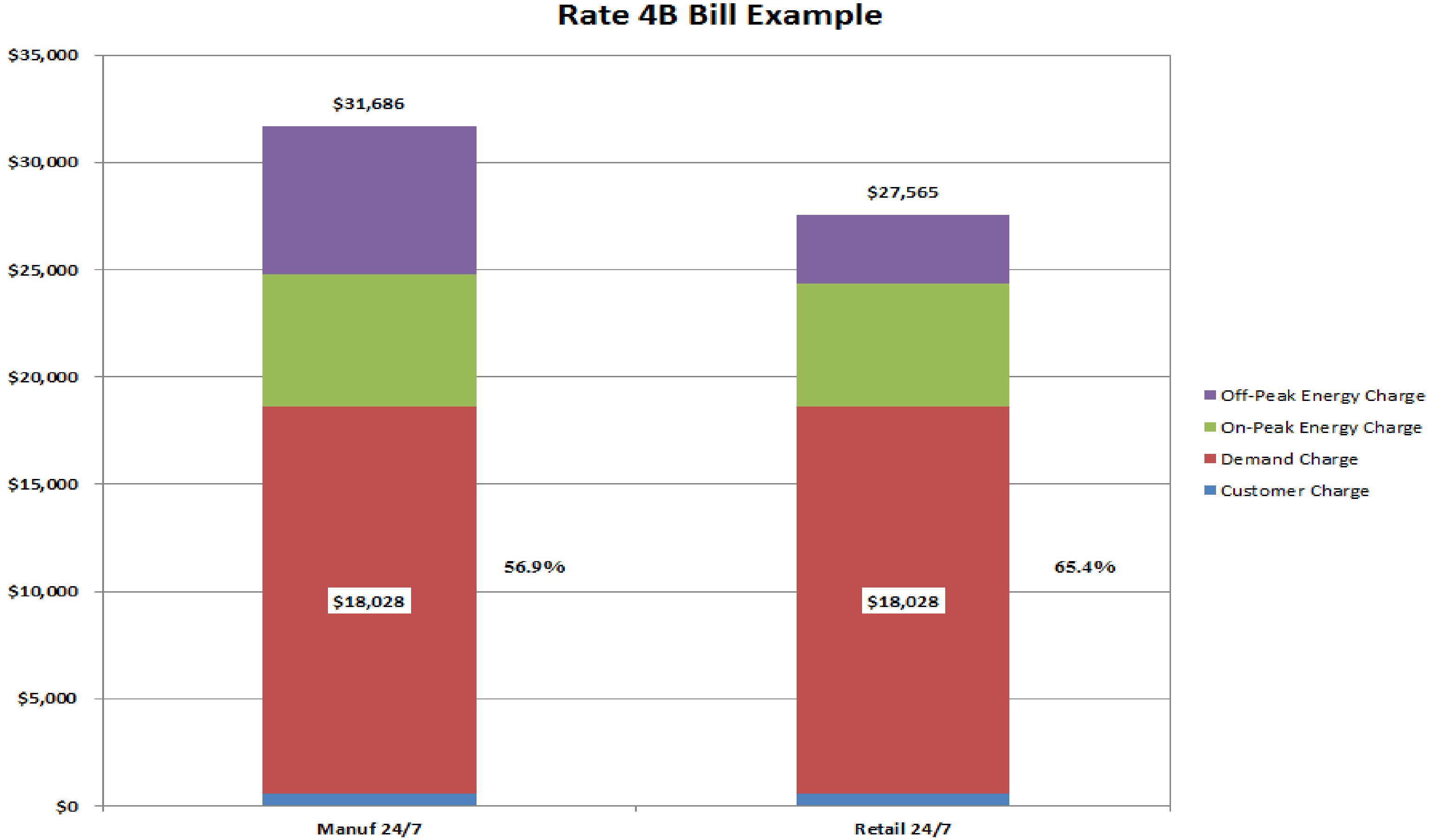
CURRENT RATE DESIGN – DEMAND RATES



Rates 15-00261-UT, Only Includes Customer Charge and Energy Rates for illustration
Manuf 24/7 = Dmd=1,000 kW, On-pk=246,832 kWh, Off-pk=446,668 kWh, Total kWh=693,500, LF=95%
Retail 24/7 = Dmd=1,000 kW, On-pk=229,215 kWh, Off-pk=208,785 kWh, Total kWh=438,000, LF=60%

Talk to us.

CURRENT RATE DESIGN - CONTINUED

- **Incremental Interruptible Power Rate** –
  - Applicable to large Industrial Customers
  - Emergency load management technique
  - Provides a financial incentive to certain high-volume customers who agree to be interrupted
  - Requires a 30 minute response
  - Allows PNM to interrupt their usage during times of emergencies
  - MW expected during an interruption: 15MW

POTENTIAL RATE DESIGN OPTIONS

- Focus on peak time price signal
- TOU default rate for Residential
- Automated Meter Infrastructure
  - While not a rate option, AMI enhances data necessary to design more effective rate structures
  - Case 15-00312-UT Cost Benefit Analysis (HEM-2) showed NPV 2020-2039 of $23 million

POTENTIAL RATE DESIGN OPTIONS

- Improved TOU design – critical peak, mid-peak, off-peak, greater differentials, better price signals, requires better information (costs, usage)

- Final Order 15-00261-UT regarding TOU rates
  - Facilitator appointed by NMPRC – William Herrmann
  - To meet with intervening parties and PNM
  - Collaborate on development of proposals for an effective TOU rate design

Pat O'Connell

Director, Planning and Resources

RELATIONSHIP TO IRP

LOAD FORECASTS AND PRICING DISCUSSION

- PNM will use the three load forecasts to define scenarios analyzed in the IRP, we will discuss the initial modeling plan later today.
- The impact of the existing rates and tariffs are captured in the models used to create the load forecasts.
- The scenario analysis will examine sensitivity around the load forecasts and if that analysis shows an impact on the four year action plan, PNM will consider the implications for future rate and tariff proposals as part of the IRP.

CONVERSION OF SJGS TO NATURAL GAS

ADVISORY GROUP QUESTIONS, COMMENTS AND FURTHER STUDY

- In 2008 the owners of San Juan Generating Station studied the concept of using natural gas as the primary fuel instead of coal as a potential Regional Haze Rule compliance strategy.

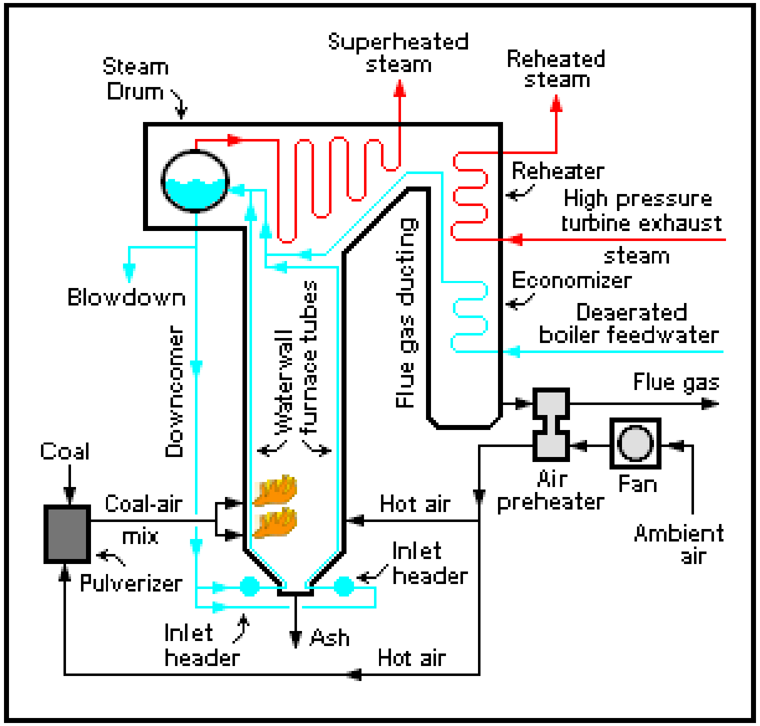
- The studies showed that it is technically feasible to replace coal with natural gas under two strategies: refiring and repowering.

- Neither of the two technically feasible strategies were desirable to the owners for several reasons.

SJGS REFIRING

ADVISORY GROUP QUESTIONS, COMMENTS AND FURTHER STUDY

- Strategy summary: replace the coal supply and combustion equipment with natural gas supply and combustion equipment.
- The result would be a large natural gas steam unit with none of the flexibility of natural gas combustion turbines and a much higher heat rate than natural gas combined cycle plants.



SJGS REFIRING

ADVISORY GROUP QUESTIONS, COMMENTS AND FURTHER STUDY

- Refiring option 1 requires installing the natural gas combustion equipment only with no boiler modifications to account for differences in natural gas versus coal combustion, resulting in 30% unit derates. This would cost approximately $11.3 million for 245 MW of capacity at Unit 1 or 2 or $14.8 million for 385 MW of capacity at Unit 3 or 4.

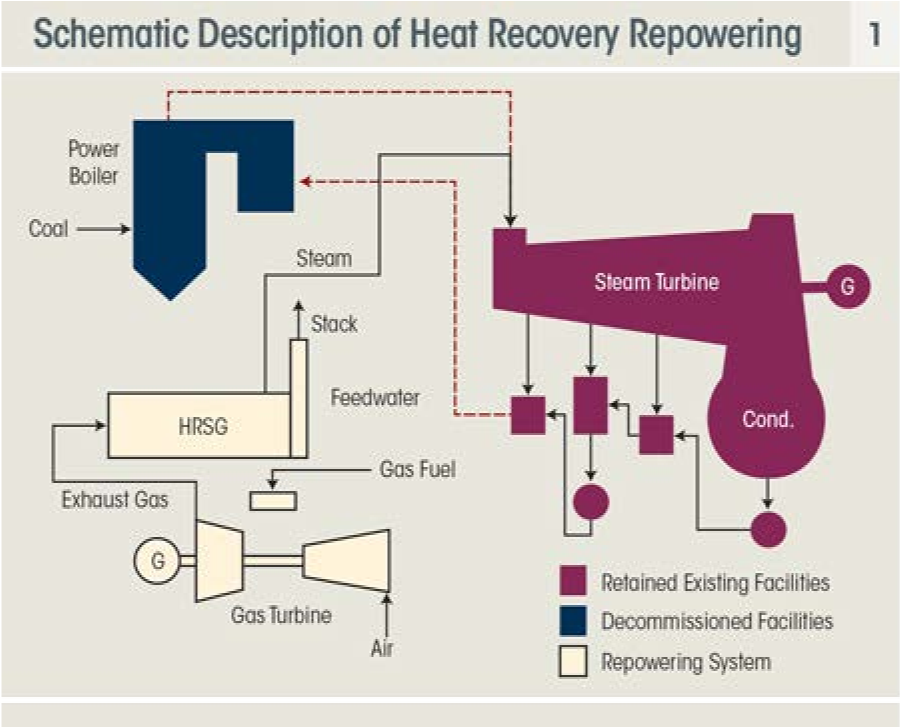
- Refiring option 2 requires installing the natural gas combustion equipment and modifying the boiler to account for differences in natural gas versus coal combustion with no unit derates. This would cost approximately $19.2 million for 350 MW of capacity at Unit 1 or 2 or $25.3 million for 550 MW of capacity at Unit 3 or 4.

SJGS REPOWERING

ADVISORY GROUP QUESTIONS, COMMENTS AND FURTHER STUDY

- Install new combustion turbines and heat recovery steam generators to supply steam to the existing steam turbine generator at one or more of the four units at SJGS thereby creating a new natural gas combined cycle generator.

- Use of any of the existing steam turbine generators for repowering would result in more capacity than PNM could justify and no other owners were interested in a natural gas combined cycle plant at 5,300 feet above sea level.



SJGS REPOWERING

ADVISORY GROUP QUESTIONS, COMMENTS AND FURTHER STUDY

- The optimal configuration if a Unit 1 or 2 boiler is used would result in 4 CTs and 4 HRSGs for a total of 1,032 MW of capacity for $797 M.

- The optimal configuration if a Unit 3 or 4 boiler is used would result in 5 CTs and 5 HRSGs for a total of 1,259 MW of capacity for $997 M.

GEOTHERMAL

ADVISORY GROUP QUESTIONS, COMMENTS AND FURTHER STUDY

Q: Does the efficiency of geothermal decrease as it is used, related to earth core cooling. Does its capacity diminish over time?

A: The amount of heat extraction from most geothermal plants is small relative to the heat content of the earth within the geothermal field. However, local depletion can occur if the injection and extraction wells do not have sufficient mass of hot rock between them to allow the field heat to recover adequately. Geothermal deep drill plants are generally designed to provide sustainable heat levels in that migration of heat from surrounding rock will match the heat extraction.

NUCLEAR FUEL SUPPLY AND DISPOSAL

ADVISORY GROUP QUESTIONS, COMMENTS AND FURTHER STUDY

Q: Where is PVNGS uranium sourced and where is waste going?

A: PVNGS has a fuels committee which blends a mix of supplies. Raw uranium ore must be processed and manufactured into usable fuel assemblies, so it may not be possible to identify the actual source of the raw mined ore that ends up in the PVNGS reactors. The largest countries in terms of uranium supplies are Kazakhstan, Canada, Australia and Niger.

The spent fuel from U.S. commercial power plants is stored on-site at the plants. The fuel is first stored in "spent fuel pools", which are made of reinforced concrete with steel liners. The fuel is immersed in water which shields the radiation and cools the fuel rods. After a number of years of cooling, the fuel is moved into on-site dry cask storage.

http://www.nrc.gov/waste/spent-fuel-storage/faqs.html

SMALL MODULAR NUCLEAR REACTORS

ADVISORY GROUP QUESTIONS, COMMENTS AND FURTHER STUDY

Q: For Small Modular Reactors, does an 8-year construction period apply?

A: The 8 year period assumes there will be no major delays for planning, the license from the NRC, and construction. Realistically, 10 to 12 years may be more typical for a new project.

Q: What is the outlook for Small Modular Reactors?

A: Their smaller size may make investment less risky for private companies and may make it easier to obtain needed permitting/licensing. The modular construction approach may help costs come down, if large manufacturing facilities can be built; but this likely requires a guaranteed market for many units. So there is still much uncertainty in SMRs' role in future power generation.

NUCLEAR PLANTS UNDER CONSTRUCTION

ADVISORY GROUP QUESTIONS, COMMENTS AND FURTHER STUDY

Q: What is the current state of nuclear construction in the U.S. and around the world?

A: There are several new nuclear plants under construction world-wide

a) There are 440 reactors in 32 countries, about 11% of world electric generation (energy) in 2015
b) Watts Bar #2 (TVA) on-line in 2016; Vogtle (Georgia Power) and Summer (South Carolina) are scheduled for 2019;
c) 60 reactors currently under construction worldwide; mostly Asia
d) Japan, Germany and others are moving to reduce nuclear generation
e) SMRs may be easier to permit/build, but cost will be high unless manufacturers see a large market

DEMAND SENSITIVITY TO TEMPERATURE

ADVISORY GROUP QUESTIONS, COMMENTS AND FURTHER STUDY

Q: Is there some factor of customer relationship to temperature? Asked differently, can we show demand related to temperature over time?

A: Yes. Summer peak hour will occur on a hot day, winter peak hour will occur on a cold day. But other factors matter too. For example, summer peak is unlikely to happen Friday through Monday and more likely to occur on a Tuesday, Wednesday or Thursday.

TRANSMISSION QUESTIONS

ADVISORY GROUP QUESTIONS, COMMENTS AND FURTHER STUDY

Q: Can you detail some of the most important transmission planning issues over the next 4-5 years?

A: Transmission lead times can be much longer than the time required to construct resources.

Q: Are the transmission tariffs of utilities in New Mexico and Arizona location specific?

A: Yes. The costs are dictated by the utilities' transmission investments to serve their customers and third parties using the transmission system.

Q: Would joining the EIM affect the reserve requirement?

A: It would not affect PNM's reserve requirements. As an EIM member, PNM would continue to have responsibility for generation capacity, flexible reserves, and maintaining reliability.

TRANSMISSION

ADVISORY GROUP QUESTIONS, COMMENTS AND FURTHER STUDY

Q: Speaking of the Verde project, from a political standpoint, why is it feasible to build now compared to back in the 1980s?

A: PNM is not participating in the Verde Project. The Project is under development by Verde Transmission, LLC and PNM does not know exactly how they assess the political viability for project approval.

Q: Can you give a general cost of building new transmission?

A: $1M per mile for 345kV, between $250k and $500k per mile for 115kV.

Q: Can you break down the cost of towers, wires, etc.?

A: 30-40% conductor with attachments; 40-50% transmission structure; 10% right-of-way.

WIND RESOURCES

ADVISORY GROUP QUESTIONS, COMMENTS AND FURTHER STUDY

Q: How much territory is necessary for geographical averaging to take care of variability in wind resources? Does WECC help with this?

A: Geographic dispersion helps with some aspects of wind variability. Separation (such as the 200 miles between Red Mesa and NMWEC) does help with sudden up or down ramps as weather fronts move through a wind site.

Achieving the benefit of geographic dispersion requires additional transmission to connect wind farms to the load centers.

CUSTOMER-SITED DISTRIBUTED GENERATION

ADVISORY GROUP QUESTIONS, COMMENTS AND FURTHER STUDY

Q: Please break out the percentage for residential verses commercial?

A: Currently, the split between residential and commercial customers is roughly 50/50. Commercial installations are generally much larger and the largest of those are often ground-mount systems. Almost all DG systems are fixed tilt solar.

	# Customers	MW Installed	kW/Customer
Commercial Customer DG	493	26.6 AC	52.3
Residential Customer DG	7,681	29.8 AC	3.9

ENERGY EFFICIENCY

ADVISORY GROUP QUESTIONS, COMMENTS AND FURTHER STUDY

Q: What percentage of the budget of EE programs goes back to customers?

A: In terms of direct incentives and rebates, 46% of the total program budget was in the form of participant incentives in 2015. Because the dollar value of the energy and demand savings exceeds the program costs, in essence all of the budget (and more) goes back to the participant customers and all other customers.

Q: By customer class, what has been the average reduction of energy?

A: Through 2015 approximately 500 GWh of savings are the result of PNM's Energy Efficiency programs. Approximately 56% of those savings are to the residential segment. The commercial savings are composed of approximately: 18% Small Power; 48% General Power; 30% Large Power; 4% Large University; and a small percentage to Water/Sewer.

ADVISORY GROUP QUESTIONS, COMMENTS AND FURTHER STUDY

Q: Please provide the number of participating multifamily units and explain how PNM administers that program?

A: Multifamily is a type of hybrid program. PNM works with the building owner, but the benefits are split between the owner and the tenants. Projects often take up to 2 years to complete. The program is designed to meet the needs of the hard-to-reach multifamily customer segment by offering an attractive mix of low-cost direct install measures, such as lighting replacement, along with deeper savings measures, such as upgrades to cooling equipment, all in one package. For a detailed description of PNM's multifamily program please refer to https://pnmmultifamily.com/

To date, 902 units have been completed with over 9,000 units in the pipeline.

Thank you

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