2021 Integrated Resource Plan

February 5, 2021

Welcome

2021 El Paso Electric Company Integrated Resource Plan Public Participation February 2021 Meeting

Agenda

1) Modeling Update joint presentation by E3 and EPE
2) Discuss dates of future meetings

Safe Harbor

Certain matters discussed in this Integrated Resource Plan ("IRP") public advisory group presentation other than statements of historical information are "forward-looking statements" made pursuant to the safe harbor provisions of the Section 27A of the Securities Act of 1933, as amended, and Section 21E of the Securities Exchange Act of 1934, as amended.

Forward-looking statements often include words like we “believe”, “anticipate”, “target”, “project”, “expect”, “predict”, “pro forma”, “estimate”, “intend”, “will”, “is designed to”, “plan” and words of similar meaning, or are indicated by the Company’s discussion of strategies or trends. Forward-looking statements describe the Company’s future plans, objectives, expectations or goals and include, but are not limited to, statements regarding [anticipated future generation costs, resource need, customer growth rates, rate structure, fuel costs, purchased power pricing]. Such statements are subject to a variety of risks, uncertainties and other factors, most of which are beyond El Paso Electric Company's ("EPE" or the "Company") control, and many of which could have a significant impact on the Company's operations, results of operations, and financial condition, and could cause actual results to differ materially from those anticipated. Additional information concerning factors that could cause actual results to differ materially from those expressed in forward-looking statements is contained in EPE's Form 10-K for the fiscal year ended December 31, 2019 and Quarterly Reports filed in 2020. Any such forward-looking statement is qualified by reference to these risks and factors. EPE cautions that these risks and factors are not exclusive.

Although the Company believes that the expectations reflected in such forward-looking statements are reasonable, no assurances can be given that these expectations will prove to be correct. Forward-looking statements by their nature that could substantial risks and uncertainties that could significantly impact expected results, and actual future results could differ materially from those described in such statements. Management cautions against putting undue reliance on forward-looking statements or projecting any future assumptions based on such statements. Forward-looking statements speak only as of the date of this IRP public advisory group presentation, and EPE does not undertake to update any forward-looking statement contained herein, except to the extent the events or circumstances constitute material changes in this IRP that are required to be reported to the New Mexico Public Regulation Commission ("NMPRC" or "Commission") pursuant to its IRP Rule, 17.7.3 New Mexico Administrative Code.

Meeting Format and Guidelines

- **Presentations will be by EPE staff and invited speakers.**
  - Presenters will complete presentation prior to answering questions.
- **Participants may submit questions through the WebEx Q&A box.**
- **Please use the Chat box for technical issues/questions.**
- **Communications should be respectful, to the point and on topic.**
- **Written questions submitted after the meeting will be responded to in writing within 10 days.**

New Mexico IRP Objectives

Primary objective the NM RPS and requirements

- **Provide a resource portfolio for New Mexico that:**
  - Meets the New Mexico Renewable Energy Act requirements for renewables and decarbonization,
  - In the most cost-effective manner,
  - While maintaining reliability.
- **Analyze our total system resource planning which includes Texas resource requirements**
  - To leverage as much as possible the benefits of economies of scale,
  - Continue to pursue heavy renewable and clean energy integration for total system,
  - Assess operational requirements for total system which EPE will need to effectively address to maintain reliability.

Modeling to Meet Objectives

- **Analyze the most cost-effective portfolio without RPS requirements imposed to establish baseline cost**

- **If the previous portfolio does not meet New Mexico RPS, impose the NM RPS requirements**

- **EPE will further analyze total system scenarios with greater renewables and decarbonization**

Presentation of NM IRP and Total System

- The presentations will include total system results and will identify NM specific implications where applicable

- Future meetings will include both NM portfolio details and total system portfolios

- Jurisdictional allocation of resources and associated costs will be discussed in future meetings

EPE Joining the Western EIM

- **EPE will be joining the Western Energy Imbalance Market in 2023**

- **The EIM offers cost benefits to customers and will add further benefits integrating additional renewables**

- **Both Public Service of New Mexico and Tucson Electric Power are joining and now offer EPE a contiguous transmission connection to the Western EIM**

- **Joining the EIM does not absolve EPE's obligation to plan for resources to meet customer load nor does it impact the IRP**

El Paso Electric IRP Modeling Update

Preliminary inputs, assumptions, and scenarios

2/5/2020

Arne Olson, Senior Partner

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Outline

- Future system needs
- Existing and planned resources
- Resource options
- Draft PRM results
- Draft ELCC results
- Proposed scenarios

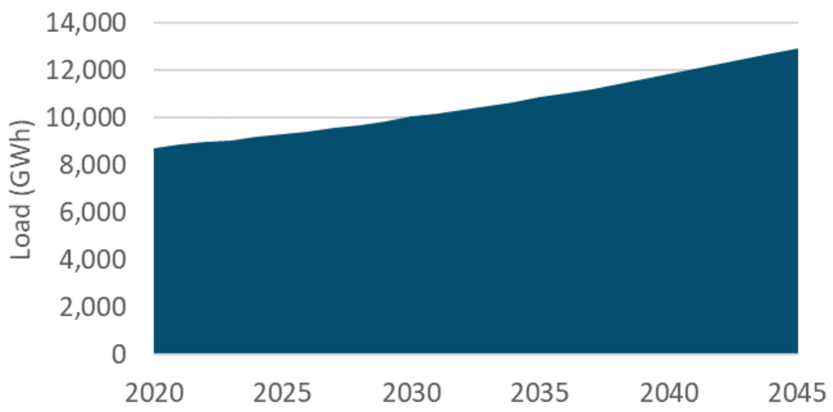
Future System Needs through 2045*

* The NM ETA requires 100% zero carbon in 2045

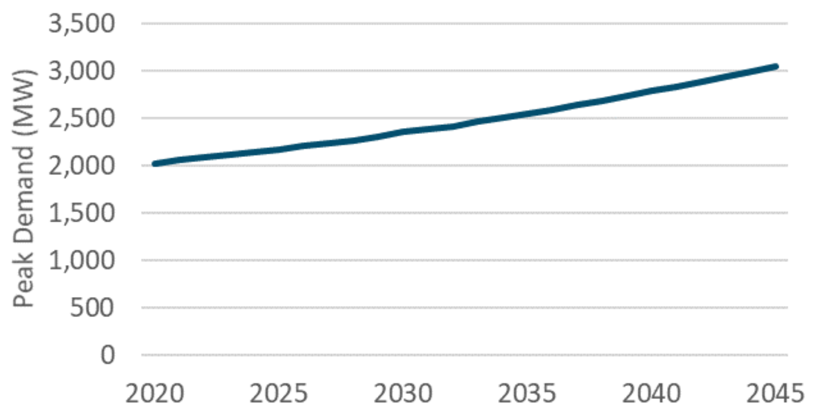
Load forecast

- Before accounting for electric vehicles,* load is forecast to grow from ~8,000 GWh in 2021 to ~13,000 GWh in 2045
- Before accounting for electric vehicles, peak load is forecast to grow from 2,000 MW in 2021 to 3,000 MW in 2045
- These load forecasts are net of incremental energy efficiency programs, which help mitigate load growth
  - Incremental EE reaches 1,000 GWh and 170 MW of contribution to peak by 2045
- The demand and energy forecasts will be updated in April

Energy demand (without EVs)



Peak demand (without EVs)



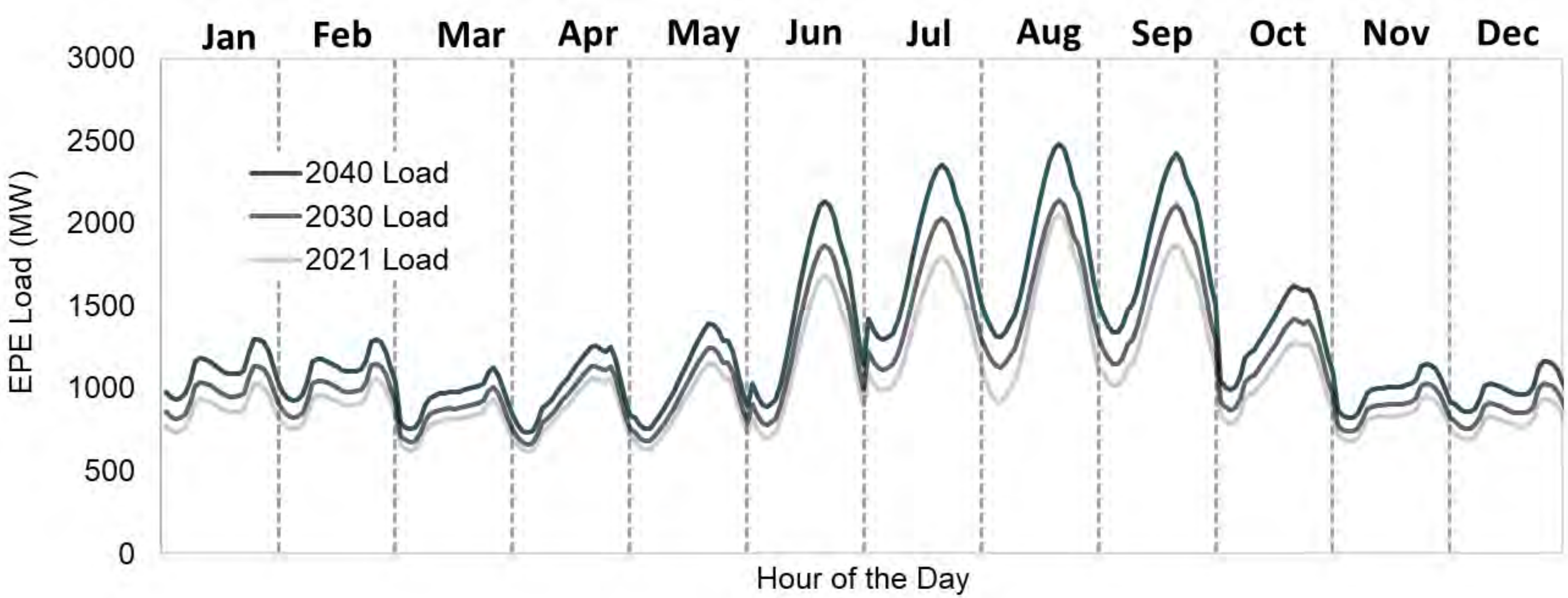
** EPE filed its Transportation Electrification Plan in Docket No. 20-00241-UT.*

Note: energy demand and peak demand is not net of incremental DGPV.

Monthly average daily load shapes

+ **Energy demand for cooling in the summer results in significant differences in seasonal energy usage and seasonal load profiles**

Average Daily Load Shape By Month Across Weather Conditions (without EVs)

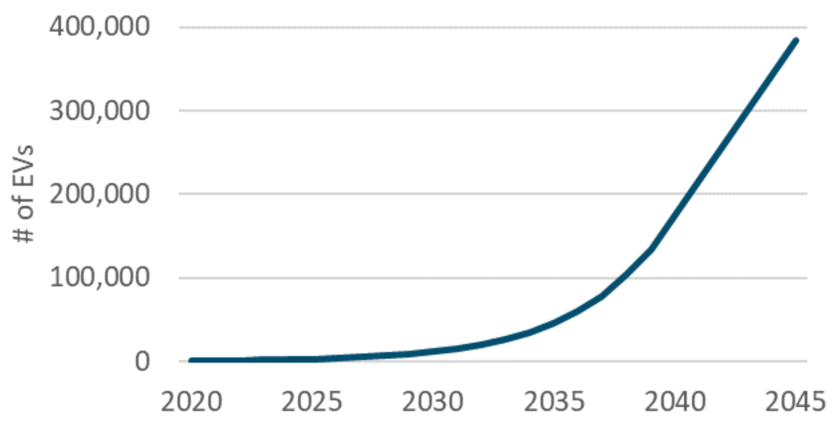


Note: hour of day based on MST

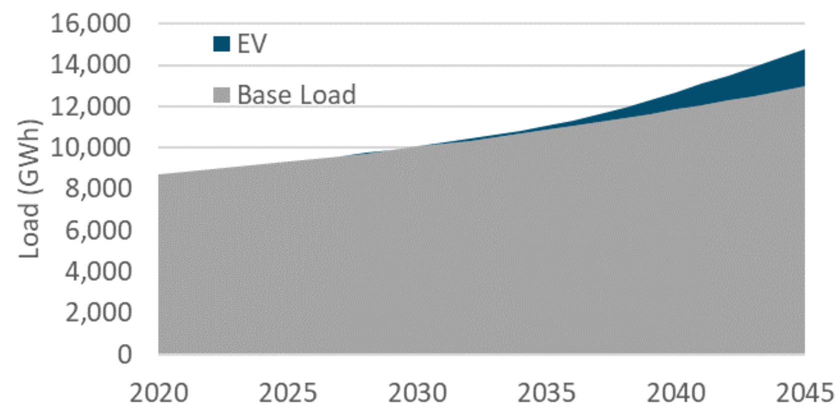
Electric vehicle forecast

- **EPE is currently developing an updated forecast for electric vehicles**
  - The current forecast relies on a data from EPE through 2039 and then is extrapolated linearly through 2045
  - EVs include both battery electric vehicles (BEVs) and plug-in hybrids (PHEVs)
- **Based on this forecast, EV charging would constitute 12% of total electric load by 2045**

Number of electric vehicles

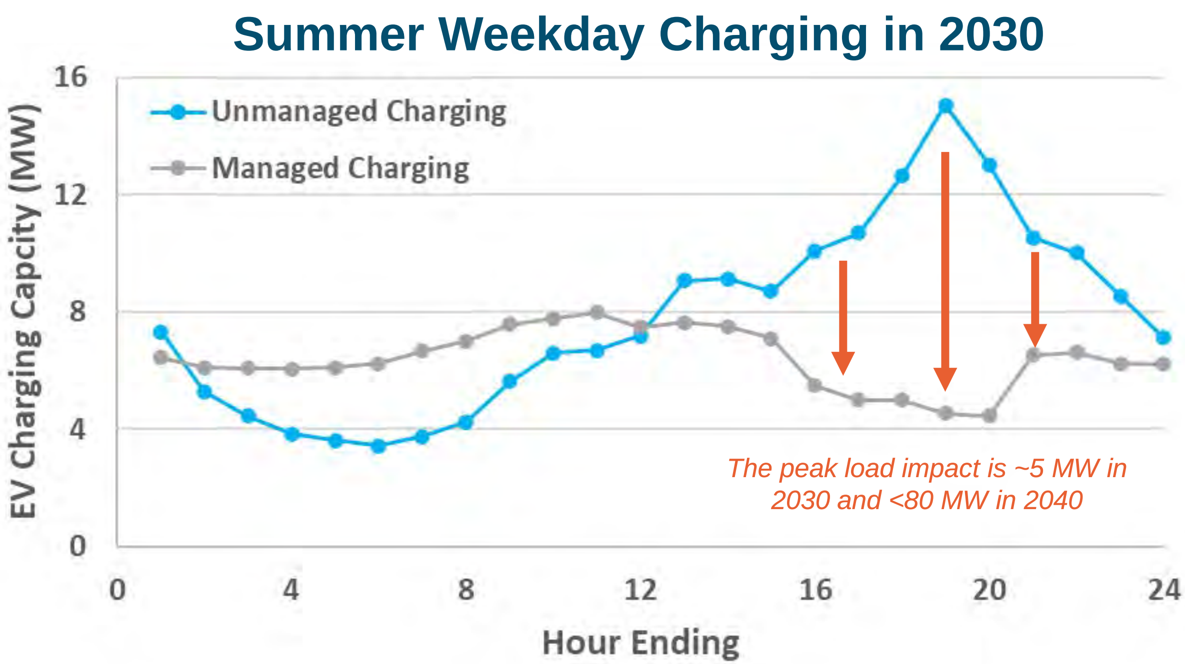


Electric vehicle energy demand



E3 developed two sets of charging profiles for a population of electric vehicles:

- The unmanaged charging profile assumes that vehicles are charged immediately following the completion of trips
- The managed charging profile assumes that vehicles charge according to a time-of-use rate or some other mechanism that ensures charging coincides with lower-cost hours



Managed charging reduces charging demand over during the afternoon and early evening hours, reducing the contribution to peak load

Reserve requirements

During each hour, El Paso Electric maintains the following reserves to ensure reliable operations of the system:

- **Spinning reserves**
  - 3.5% of load
  - Synchronized resources that can serve load in the event of a system contingency
- **Non-spinning reserves**
  - 3.5% of load
  - Resources that can serve load in the event of a system contingency
- **Regulating reserves**
  - 35 MW upward and 35MW downward reserves
  - Fast-response generators to balance real time fluctuations in load

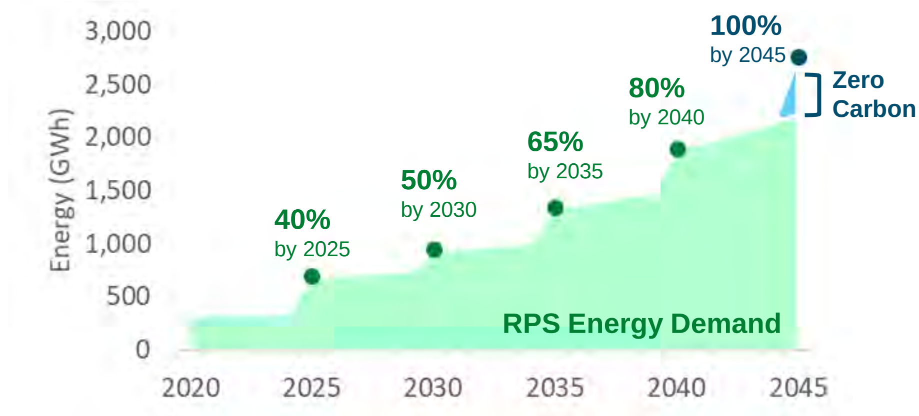
The planning reserve margin is used for long-term planning ensures that the system has enough resources to ensure reliability. The planning reserve margin is described in a later section

Clean energy policy requirements

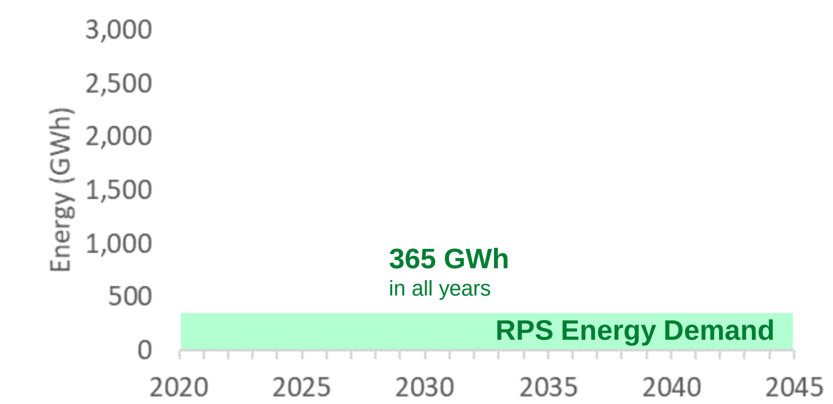
+ **New Mexico's Energy Transition Act sets increasing RPS and clean energy targets over time**
  - 80% RPS as fraction of retail sales by 2040
  - 100% zero-carbon generation by 2045

+ **Texas' RPS policy sets a fixed RPS energy requirement (in GWh) in all years**
  - El Paso Electric's share of the state RPS is assumed to remain constant

NM RPS and ETA requirement



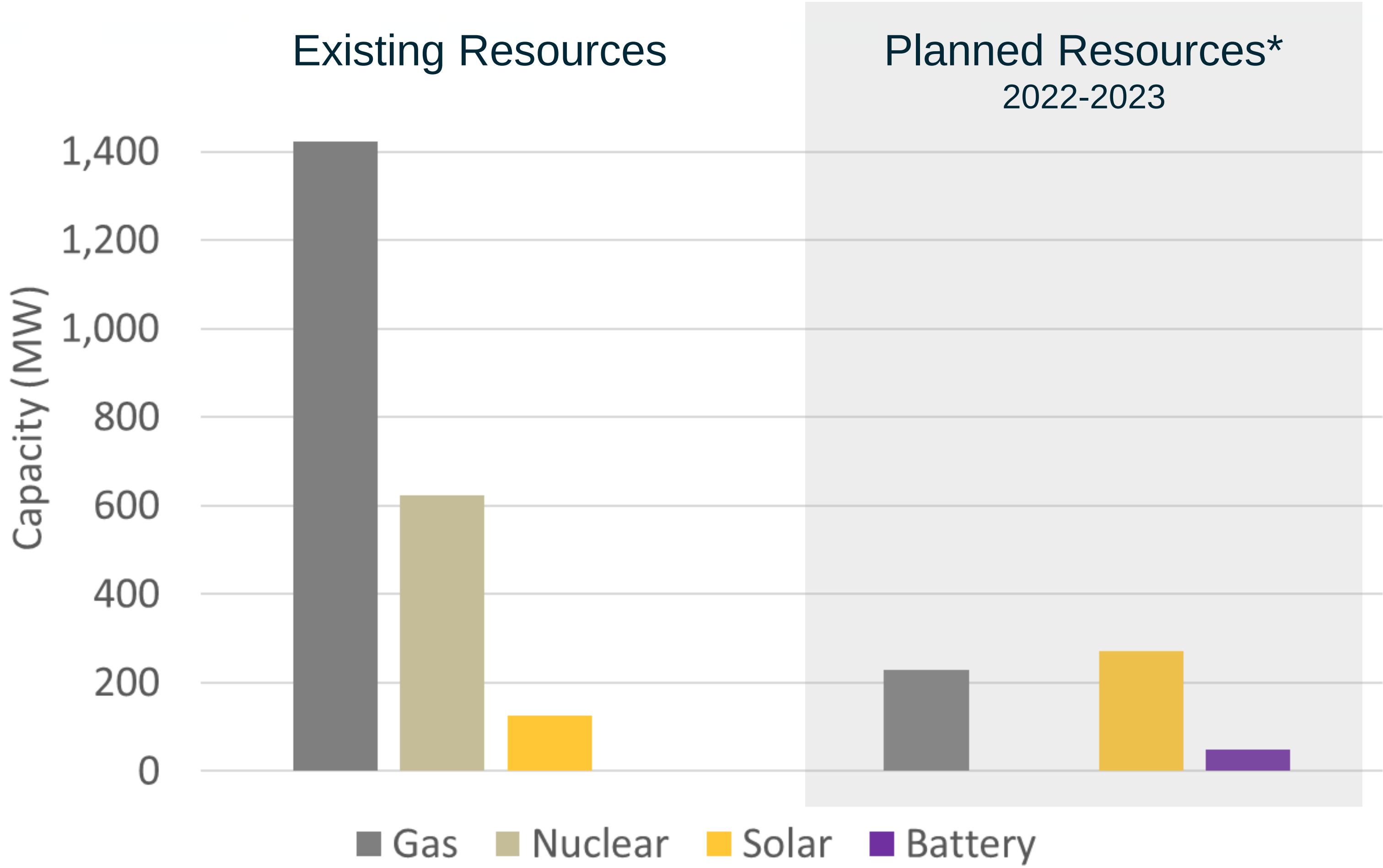
TX RPS Requirement



Note: the GWh is based on the EPE forecast for retail sales. The requirement is defined in terms of a percentage of retail sales

Existing and Planned Resources

EPE Existing and Planned Resources



** 19-00348-UT – 100 MW Solar and 100 MW Solar/50 MW Battery*
** 19-00099-UT – 70 MW Solar*
** 19-00349-UT – CCN New gas disallowed in New Mexico*

Existing thermal resources

- The following are thermal resources in EPE's resource portfolio
- In the next decade, 192 MW of capacity is expected to retire in 2022, 317 MW of capacity is expected to retire in 2026, and 63 MW is expected to retire in 2030, for a total of 572 MW

Conventional Generation	Jurisdiction	Fuel	Type	Summer Net MW	COD Year	Planned Retirement Year	Age at Retirement
Rio Grande 6*	System	Gas	Conv. Steamer	45	1957	Inactive Reserve	63
Rio Grande 7	System	Gas	Conv. Steamer	46	1958	2022	64
Rio Grande 8	System	Gas	Conv. Steamer	144	1972	2033	61
Rio Grande 9	System	Gas	CT	88	2013	2058	45
Newman 1	System	Gas	Conv. Steamer	73	1960	2022	62
Newman 2	System	Gas	Conv. Steamer	73	1963	2022	59
Newman 3	System	Gas	Conv. Steamer	90	1966	2026	60
Newman 4	System	Gas	2x1 CC	227	1975	2026	51
Newman 5	System	Gas	2x1 CC	266	2009	2061	52
Copper	System	Gas	CT	63	1980	2030	50
Montana 1	System	Gas	CT	88	2015	2060	45
Montana 2	System	Gas	CT	88	2015	2060	45
Montana 3	System	Gas	CT	88	2016	2061	45
Montana 4	System	Gas	CT	88	2016	2061	45
Palo Verde 1	System	Nuclear	Steam	207	1986	2045	59
Palo Verde 2	System	Nuclear	Steam	208	1986	2046	60
Palo Verde 3	System	Nuclear	Steam	207	1988	2047	59

** EPE filed for an application with NMPRC for abandonment on Oct 6, 2020 (Case No. 20-00194-UT). RG 6 is no longer included in EPE Official L&R.*

Existing renewable resources

The following are renewable resources in EPE's resource portfolio that are currently operating:

Existing Renewable Facilities*	Nameplate Capacity (MW)	Jurisdiction	Planned Retirement Year
Hatch (Solar)	5	NM	2036
Chaparral (Solar)	10	NM	2037
Airport (Solar)	12	NM	2037
Roadrunner (Solar)	20	NM	2031
Macho Springs (Solar)	50	System**	2034
Newman (Solar)***	10	TX	2044
Texas Community Solar	3	TX	2047
Holloman (Solar)	5	NM	2048

* *This table does not include planned renewable facilities*
** *System allocation between TX and NM. TX/NM allocation is approximately 80/20.*
*** *Newman Solar allocates 8 MW to Texas and 2 MW to EPE Community Solar Program.*

Planned resource additions

The following are resources that are not currently online but are contracted and scheduled to come online soon:

Planned Renewable Generation	Nameplate Capacity (MW)	Jurisdiction	COD	Planned Retirement Year
Hecate Energy Santa Teresa 1 (Solar)	100	System*	2022-23	2042
Buena Vista Energy Center 1 (Solar/Storage)	100/50	System	2022-23	2042
Hecate Energy Santa Teresa 2 (Solar)	50	NM	2022-23	2042
Buena Vista Energy Center 2 (Solar)	20	NM	2022-23	2042
Newman Unit 6 (gas)	228	TX**	2023	2063

** System allocation between TX and NM. TX/NM allocation is approximately 80/20.*
*** Newman Unit 6 was rejected by NMPRC. EPE will continue with permitting and planning for construction of the NWMN Unit to meet its projected Texas customer demand in 2023.*

Resource Options

Potential resource options

Preliminary listing of resources to be considered in 2021 IRP

- Solar
- Wind
- Biomass
- Geothermal
- LM/DR – EE[1]
- Battery Li-Ion
- Other Energy Storage
- Other Renewables
- Imports
- Gas Fired Reciprocating
- Gas Fired CT[2]
- Gas Fired CC[3]

Other resources & technology to be explored

- Energy Storage– pumped hydro, flow batteries, underground compressed air, hydrogen, flywheels
- Nuclear - modular nuclear possible option upon Palo Verde retirement but not prior to 2045
- Gas Turbine– conversion to hydrogen fuel
- EV and customer sited batteries

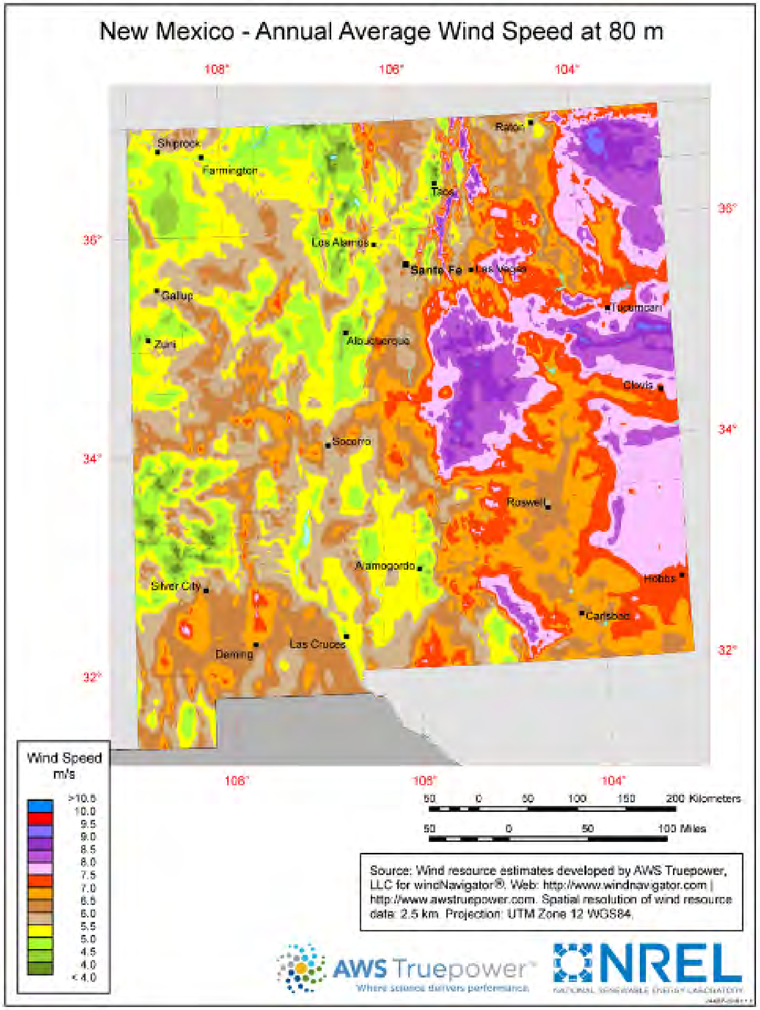
1. LM/DR-EE: Load Management/Demand Response- Energy Efficiency
2. Combustion Turbine
3. Combined Cycle

Original version presented at the 8/14/20 Public Advisory Meeting

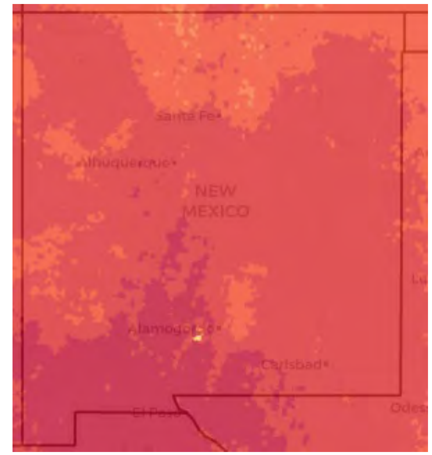
Energy+Environmental Economics

Supply-Side Resources

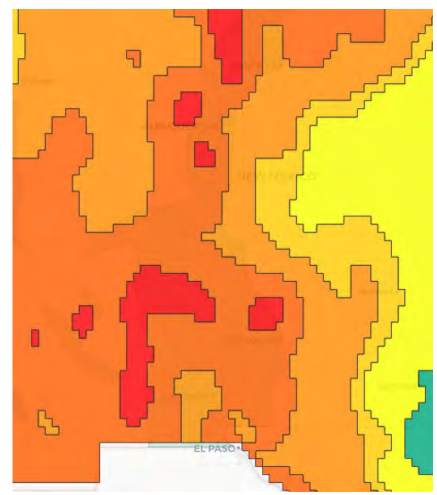
Wind



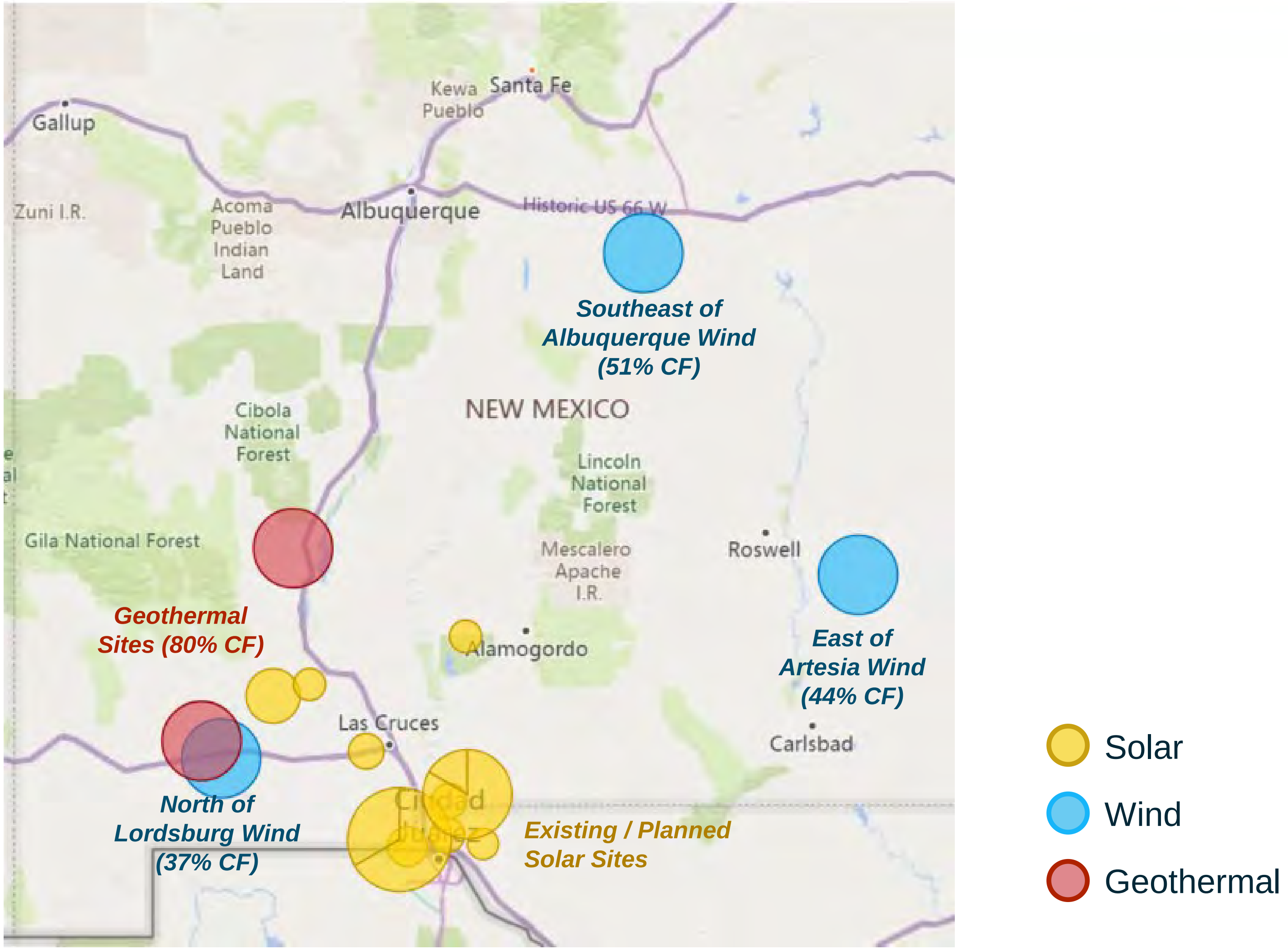
Solar



Geothermal



Renewable resource locations



The system currently does not have any wind or geothermal facilities. These are locations for potential future projects

Wind and solar profiles simulated using NREL data

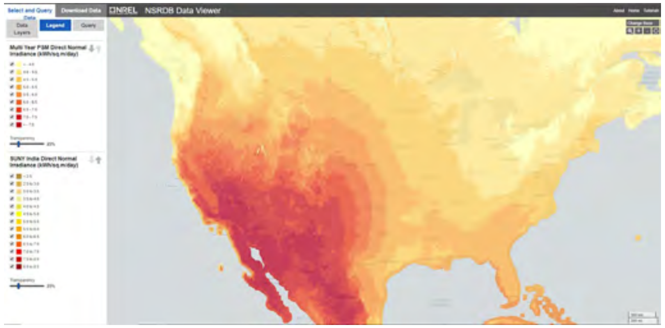
E3 creates location-specific hourly profiles for wind and solar resources using NREL's publicly available datasets

Wind Integration National Dataset (WIND Toolkit)

- **126,000 sites** across continental US
- **5-min** temporal resolution
- **2007-2013** historical period
- Available through Wind Prospector

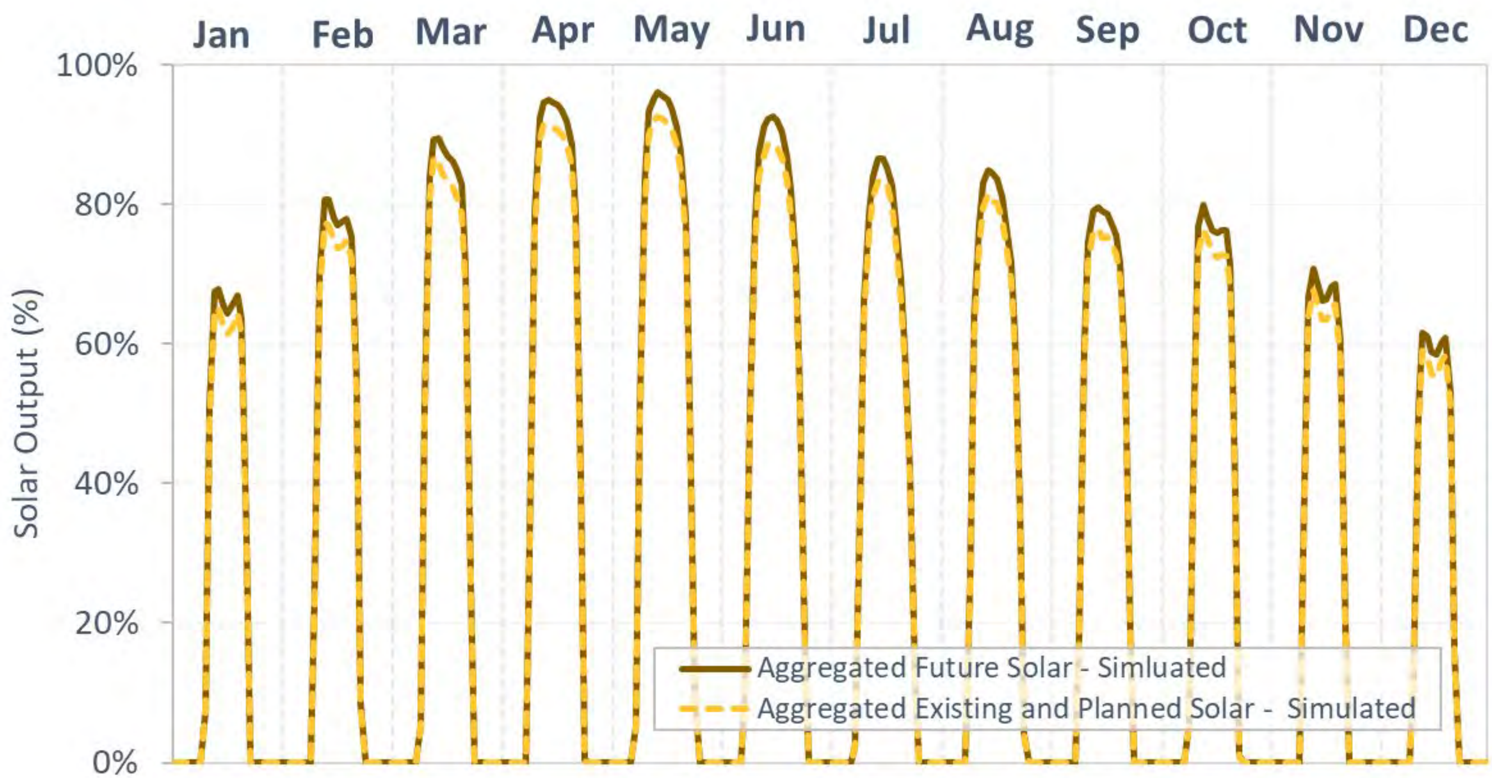
National Solar Radiation Database (NSRDB)

- **4 x 4 km** grid spatial representation
- **30-min** temporal resolution
- **1998-2017** historical period
- Available through Solar Prospector



Solar profiles

Average Daily Solar Profile By Month Across Weather Conditions



Annual capacity factor

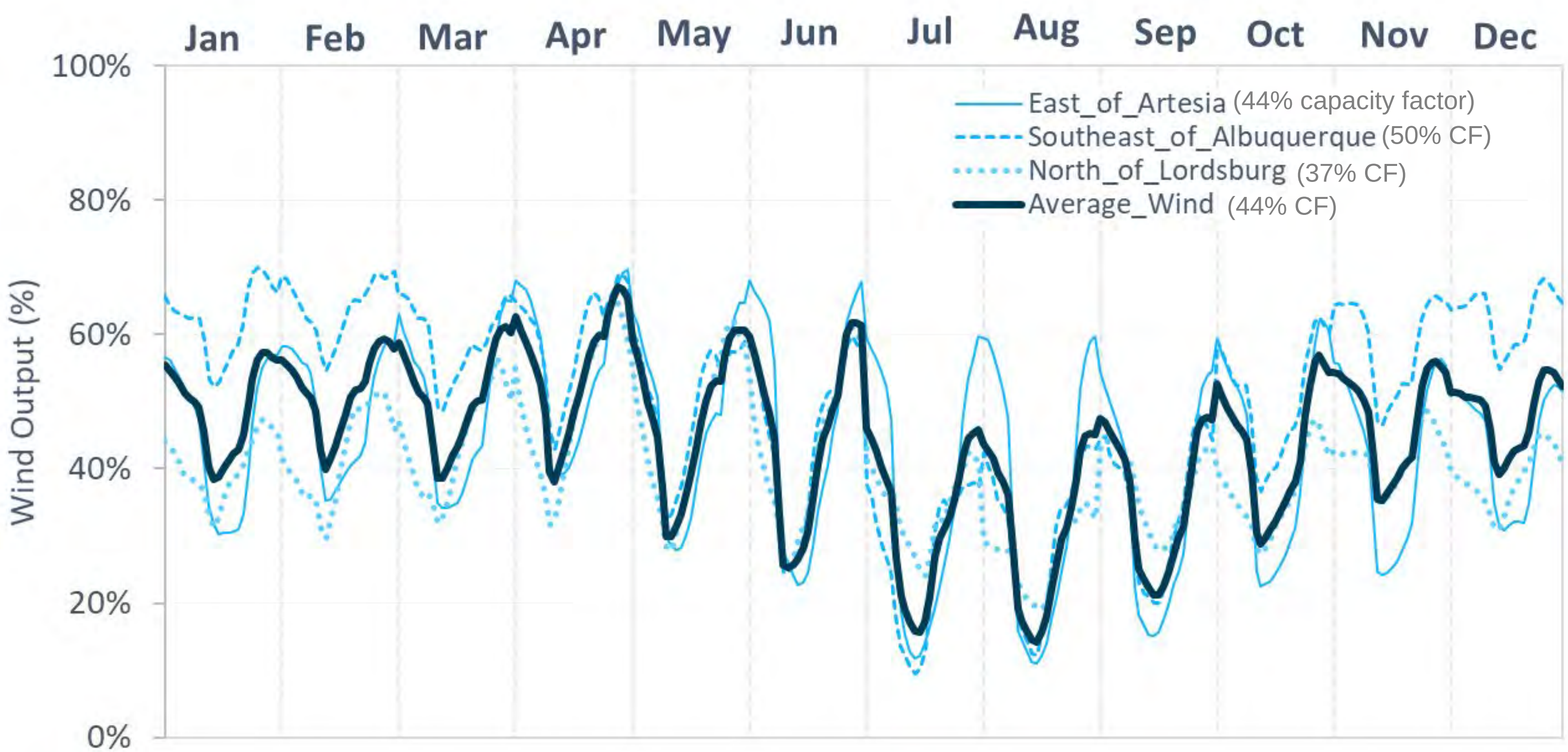
Future
- 32%

Existing/planned:
- 28% (avg.)

Note that these are average values. The profiles vary hour to hour and year to year

Wind profiles

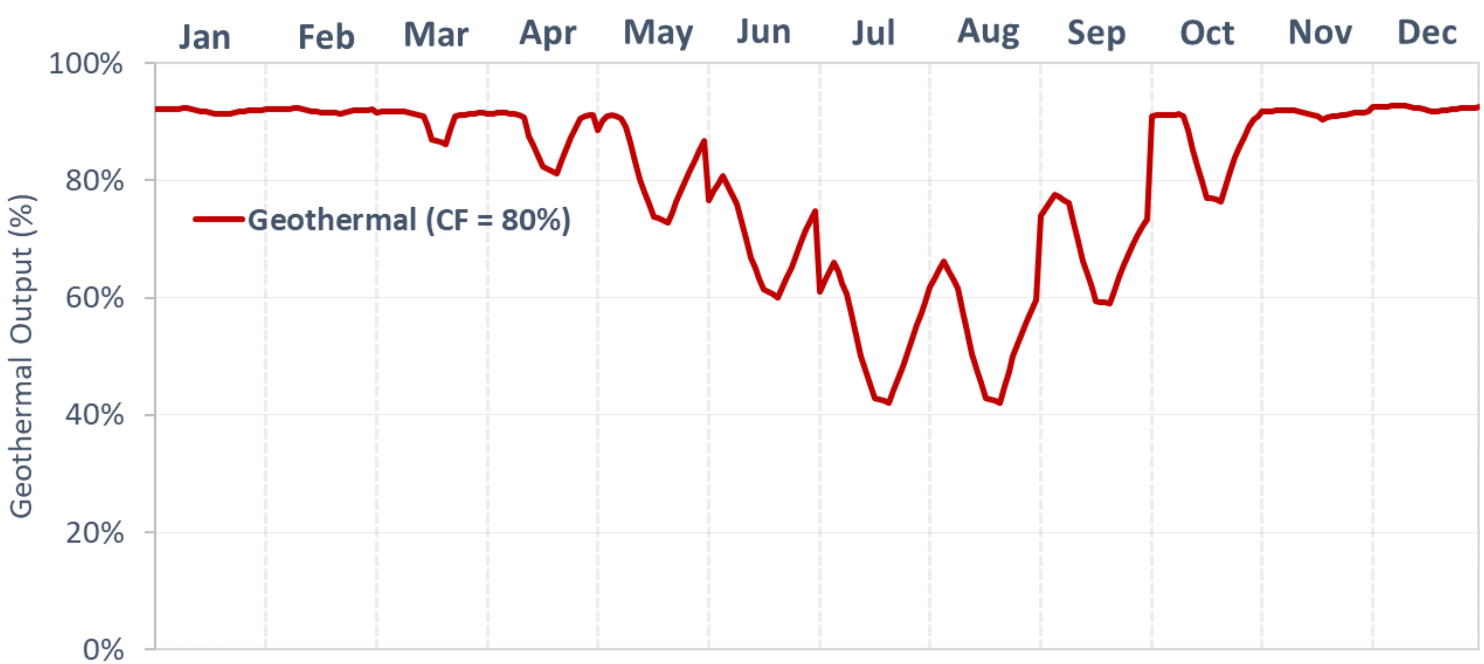
Average Daily Wind Profile By Month Across Weather Conditions



Note that these are average values. The profiles vary hour to hour and year to year

Geothermal profile

Average Daily Geothermal Profile By Month Across Weather Conditions



Source: Black & Veatch WREZ model

Note that these are average values. The profiles vary hour to hour and year to year

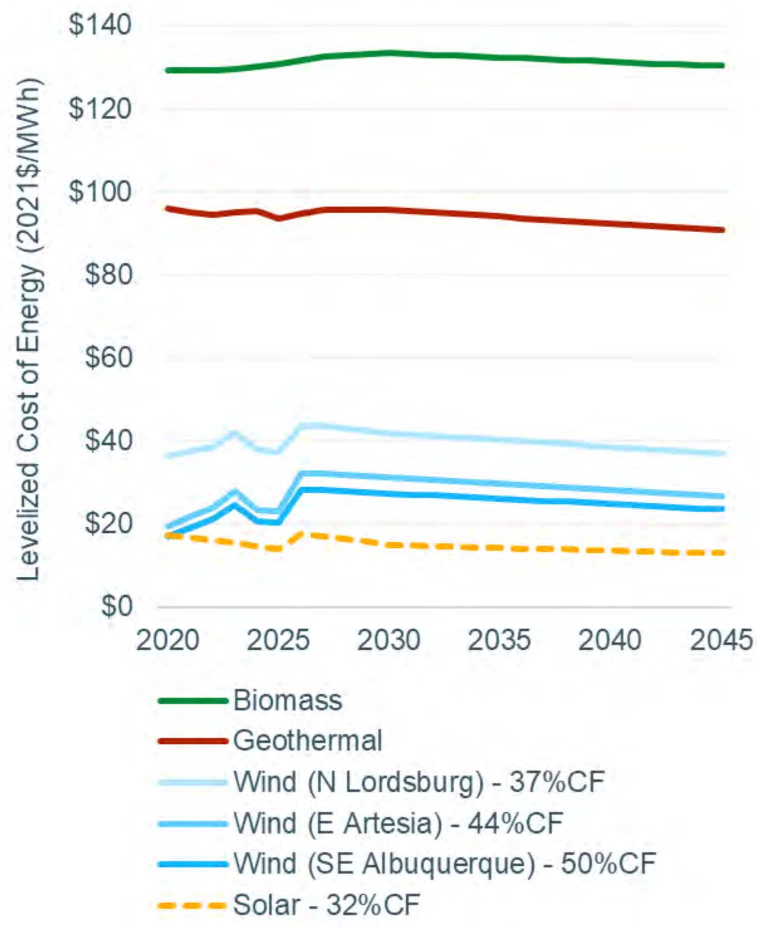
Sources for resource cost information

Resource Input	Source of Data
Resource Potential • Technical potential (MW)	*Given the abundance of solar and wind resources relative to the size of EPE's system, no limits are applied for renewables*
Technology Cost • Capital cost ($/kW) • Fixed O&M ($/kW-yr) • Interconnection cost ($/kW)	**NREL Annual Technology Baseline (ATB) for Renewables/Thermal** *Supplemented with regional cost adjustments and interconnection costs from NREL ReEDS datasets* **Lazard Levelized Cost of Storage 6.0 / NREL ATB for Batteries** *Lazard's LCOS 6.0 costs are used for batteries in the near term and the long-term cost decline trajectory from the NREL ATB is applied*
Financing • Project capital structure • Tax credits	**E3 Pro Forma Financial Model** *Calculates price for a long-term cost-based power purchase agreement between a third-party developer and a credit-worthy utility*
Transmission • Existing headroom • Cost to expand transmission	**El Paso Electric System Planning team** *Provided a simplified representation of the transmission system for purposes of determining headroom on the transmission system and the cost of expansion*

Renewable costs

- **The cost of renewables on a $/MWh basis shows a clear ordering from lower cost to higher cost:**
  - Solar
  - Wind
  - Geothermal
  - Biomass
- **The value of each resource differs and depends on several factors:**
  - Coincidence with load, during peak months and throughout the year
  - Diversity relative to other resources
  - Need for incremental transmission

Real Levelized Cost ($/MWh)

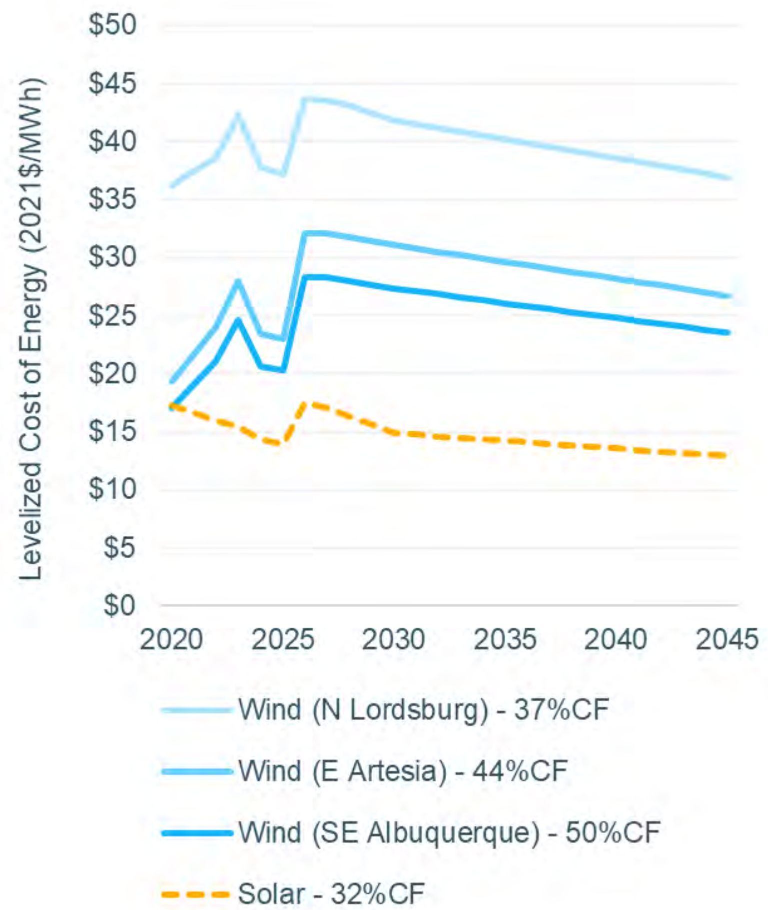


Note: these costs do not include interconnection or transmission upgrade costs

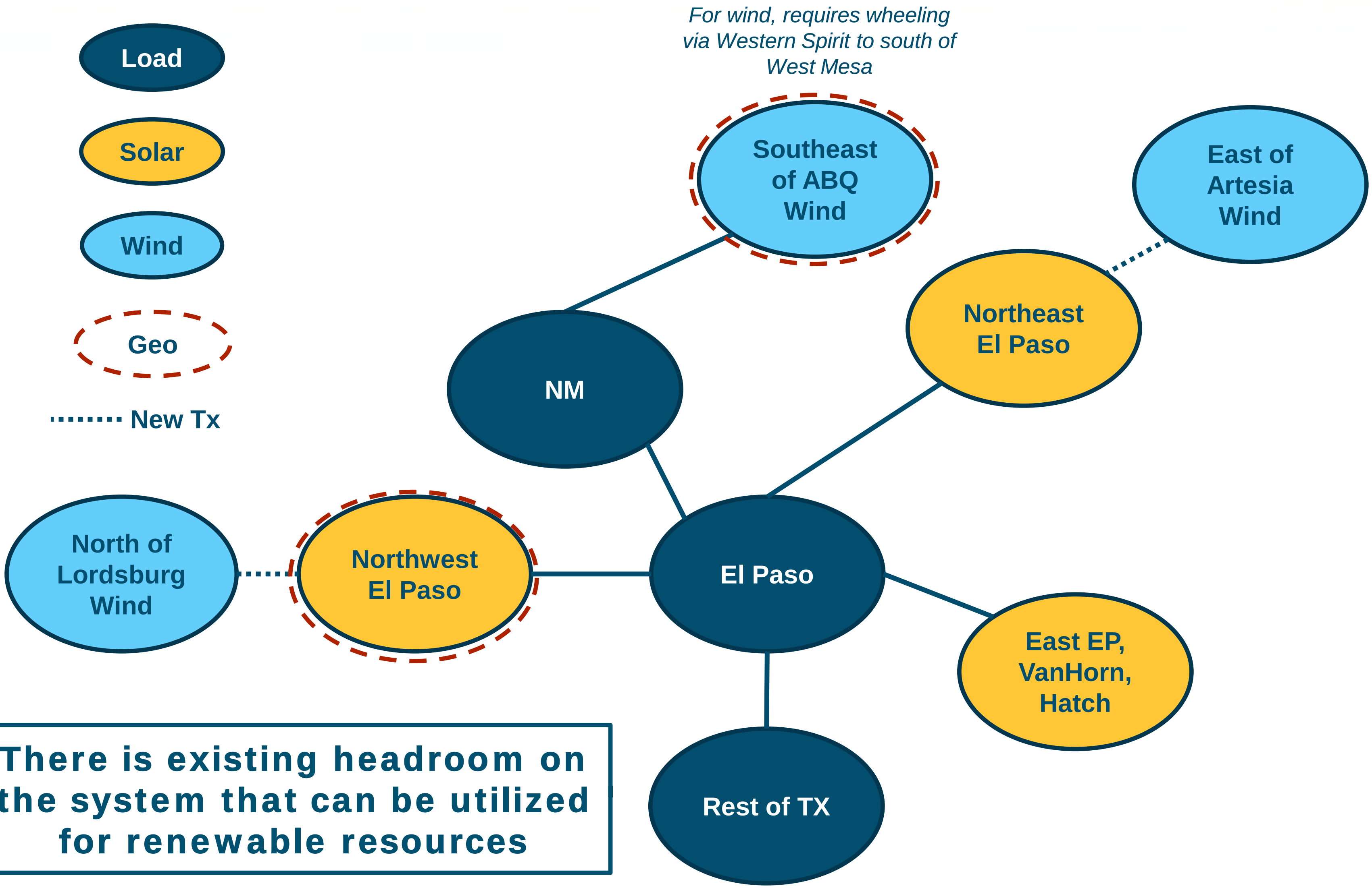
Solar and wind costs

- **The PPA rates for wind and solar are expected to rise in the near term**
  - This is due to the expiration of the production tax credit (PTC) and the step-down of the investment tax credit (ITC)
- **Technological improvements are expected to drive down the costs of solar and wind resources in the long run**

Real Levelized Cost ($/MWh)



Note: these costs do not include interconnection or transmission upgrade costs



There is existing headroom on the system that can be utilized for renewable resources

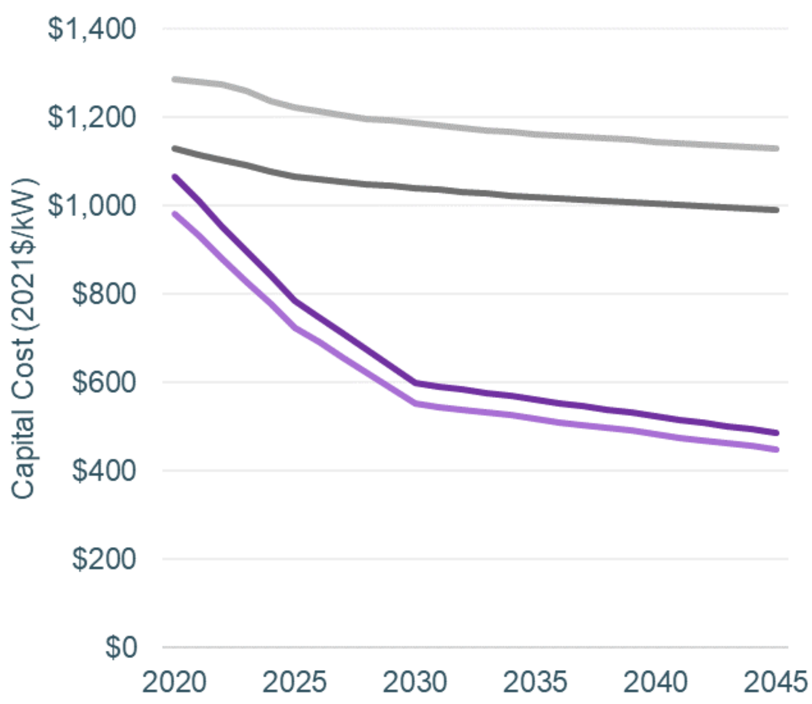
Transmission expansion beyond headroom limits for additional remote renewables

- El Paso Electric estimated transmission upgrade costs for increasing the transfer capability beyond existing headroom limits
- Below is information related to the upgrades:

Zone(s)	Terminus	Resource	Length (miles)	Voltage
Northwest El Paso	Load Centers	Solar	55	345 kV
East El Paso, Hatch	Load Centers	Solar	25-40	115 kV
Northeast El Paso	Load Centers	Solar	75	115 kV
East of Artesia	Northeast El Paso	Wind	200	345 kV
Southeast of ABQ	Load Centers	Wind	125	345 kV
North of Lordsburg	Northwest El Paso	Wind	50	345 kV

The cost of batteries is expected to decline significantly over the next few decades, while the cost of gas facilities is expected to remain more steady

Upfront Capital Cost ($/kW)

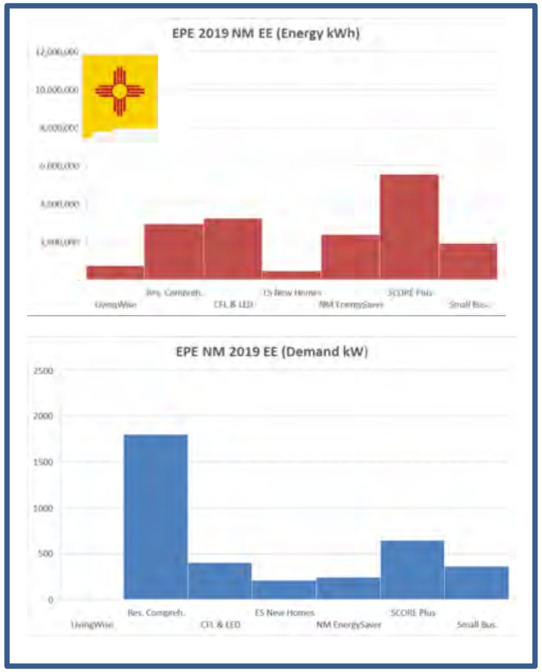


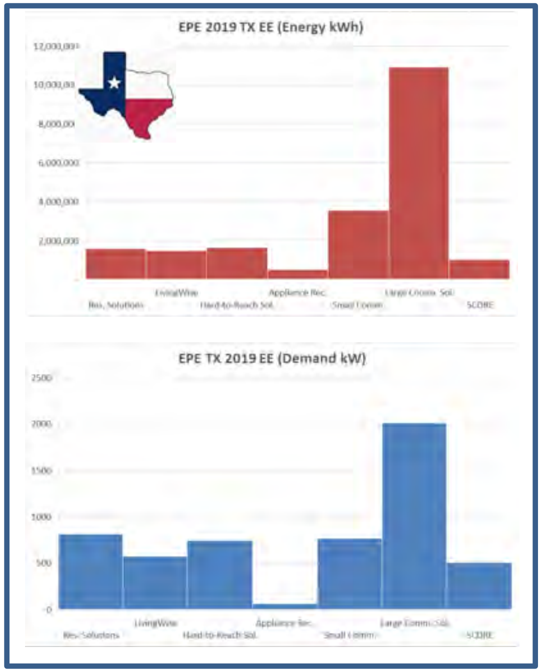
Levelized Cost ($/kW-yr)

Demand-Side Resources

Demand Response Comparison

Actual Energy Efficiency for New Mexico & Texas, 2019





Energy Efficiency Savings is currently being updated for 2020 actuals.
Does not include Voluntary Load Management

Demand Side Management/Energy Efficiency

- **EPE is exploring the possibility of contracting a national consultant to perform a Potential Study for DSM/EE as a follow up to the IRP**
- **In the IRP, the modeling will incorporate general levels of DSM to assess resource portfolio cost impact**
- **EPE is open to dialogue for DSM/EE options; however,**
  - Solicit options that are technologically viable
  - Levels that are attainable considering EPE customer count (i.e., customer count x demand reduction per customer)
  - Reasonable demand reduction amount (i.e., 1 kW per customer for thermostat program)
  - Characteristics for dispatchability and if any constraints for number of dispatches

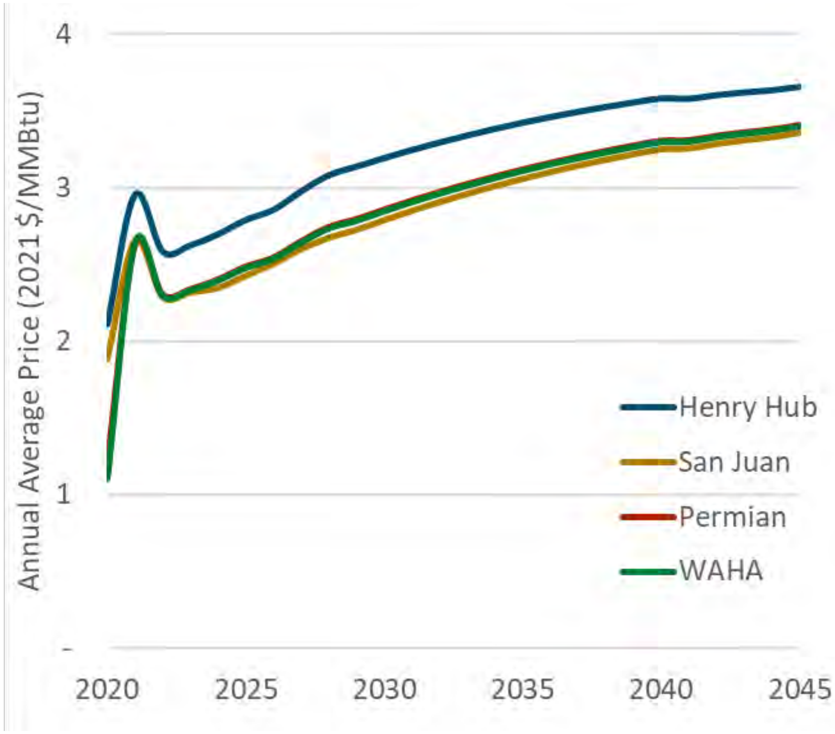
Energy+Environmental Economics

Market assumptions

Gas prices

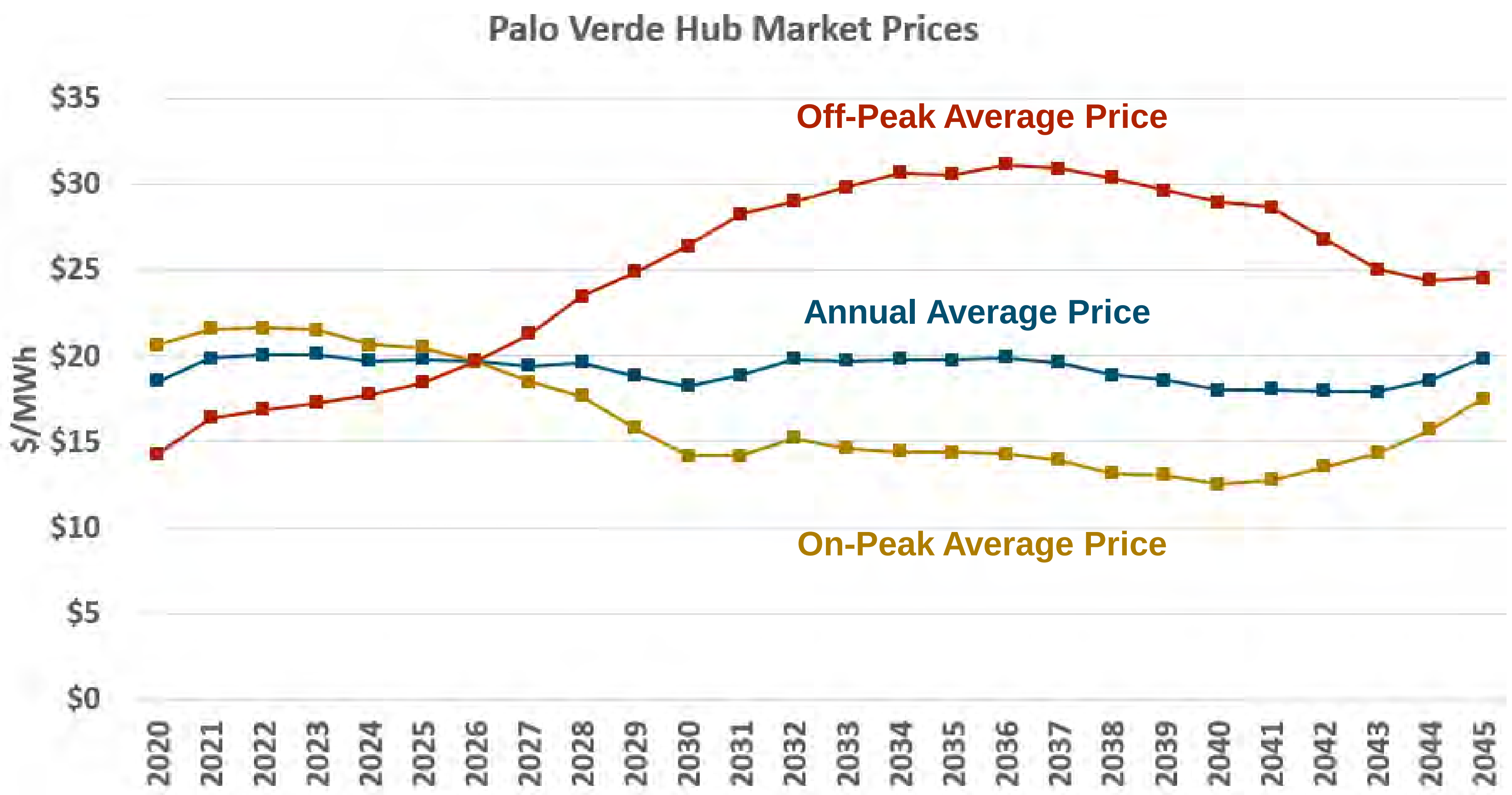
- E3 provided the gas price forecast through 2029 and E3 trended this to follow the gas price forecast from EIA's 2020 Annual Energy Outlook
- Gas prices are projected to rise steadily from 2020 through 2045
- Relative to other utilities, EPE has access to gas that is relatively lower cost

Gas Hub Prices



Market prices

+ **Below is E3's draft market price forecast by time of day (in 2021 $/MWh)**



Modeling imports and exports

Imports

+ **EPE can import power from remote generation facilities in WECC via Path 47**
  - Total import capability: 645 MW (via Path 47)
  - EPE utilizes most of this import capability to import it's share of Palo Verde generation (622 MW)
  - Additionally, the model allows market purchases and imports from the Palo Verde trading hub
+ **Imports can vary on an hourly basis depending on the hourly energy price at the Palo Verde trading hub and available headroom**
+ **The Eddy Line (DC tie to Eastern Interconnection) provides 35 MW of capacity for reliability but does not serve as an import market**

Exports

+ **EPE can export power to other entities in WECC via Path 47**
  - Total export capability: 645 MW (via Path 47)
  - First, EPE has the potential to sell a portion of the generation from its share of Palo Verde (622 MW) to other entities. This would reduce imports
  - Additionally, excess local generation can be exported to WECC, if economic
+ **Exports can vary on an hourly basis depending on the hourly energy price at the Palo Verde trading hub**

Draft PRM results

Overview

+ **The planning reserve margin (PRM) is calculated to ensure that the system has enough capacity to limit loss of load events to below the reliability target (i.e. to ensure resource adequacy)**

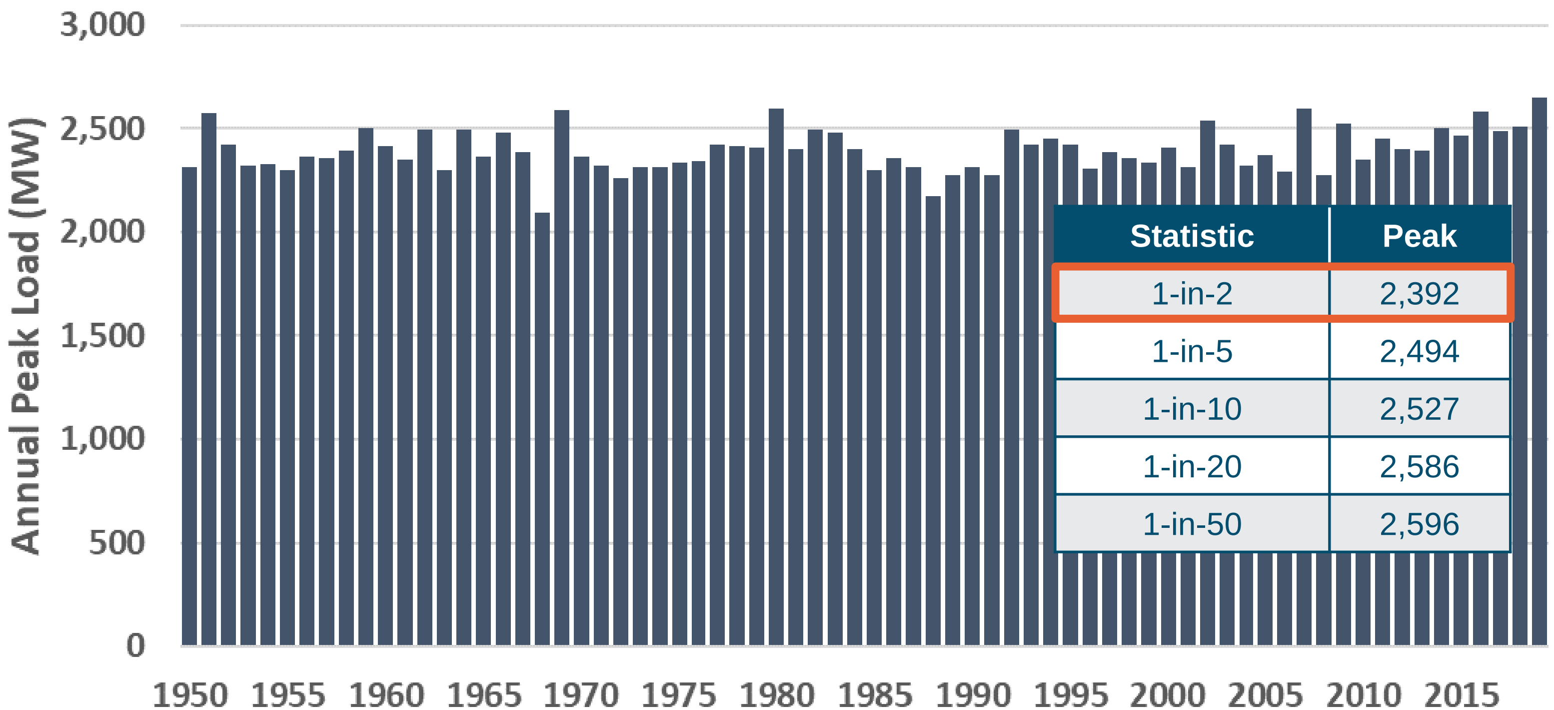
+ **E3's proprietary RECAP model simulates load and resource availability over thousands of simulations years to determine the system PRM and the ELCC of resources**

+ **The PRM is a function of:**
  - Load variability within and across years
  - Operating reserves that must be held under all circumstances
  - For the ICAP PRM convention (which is used in this presentation), thermal generator forced outages also contribute to the reserve margin requirement

Simulated annual peak load

+ **Simulated load will get scaled based on monthly peak load and energy forecast in the future analysis years**

Annual Peak Load under Different Weather Year in 2030 Conditions



Statistic	Peak
1-in-2	2,392
1-in-5	2,494
1-in-10	2,527
1-in-20	2,586
1-in-50	2,596

Basis for calculating PRM requirement

Inputs for thermal generators

The capacity rating is based on weather conditions during summer. The forced outage rates are based on multiple years of historical observations, with extreme outage events removed

Generator Name	Unit	Summer Maximum Capacity (MW)	EFOR
Rio Grande	Rio_Grande_7_ST	46	7%
	Rio_Grande_8_ST	144	5%
	Rio_Grande_9_CT	88	6%
Newman	Newman_1_ST	73	4%
	Newman_2_ST	73	8%
	Newman_3_ST	90	4%
	Newman_4_GT1	69	6%
	Newman_4_GT2	69	6%
	Newman_4_ST	89	7%
	Newman_5_GT3	67	5%
	Newman_5_GT4	67	6%
	Newman_5_ST	132	4%
	Newman_6*	228	4%
Copper	Copper_CT	63	4%
Montana	Montana_1_CT	88	3%
	Montana_2_CT	88	3%
	Montana_3_CT	88	3%
	Montana_4_CT	88	5%
Gas Unit Total		1650	5%
Palo Verde	PV1	207	1%
	PV2	208	1%
	PV3	207	1%

**Note: Newman 6 is a planned resource addition*

*** Palo Verde is also subject to transmission line outages*

Planning reserve margin results

+ **Below are planning reserve margin and system reliability metrics for the EPE system in 2021, 2030, and 2040**

Statistic	2021 EPE System	2030 EPE System	2040 EPE System
1-in-2 Peak Load (incl. EV, EE, and existing DGPV)	2,103	2,367	2,890
Total Operating Reserves (MW)	109	120	135
Target Installed Capacity (“ICAP”) PRM	**21.1%**	**19.2%**	**16.1%**
Total Effective Capacity Requirement (MW)	2,547	2,821	3,355
Capacity Shortfall (MW)	351	Not assessed	Not assessed
EUE (MWh/year)	3,571	Not assessed	Not assessed
LOLE (days/year)	10.8	Not assessed	Not assessed
LOLH (hours/year)	41.1	Not assessed	Not assessed

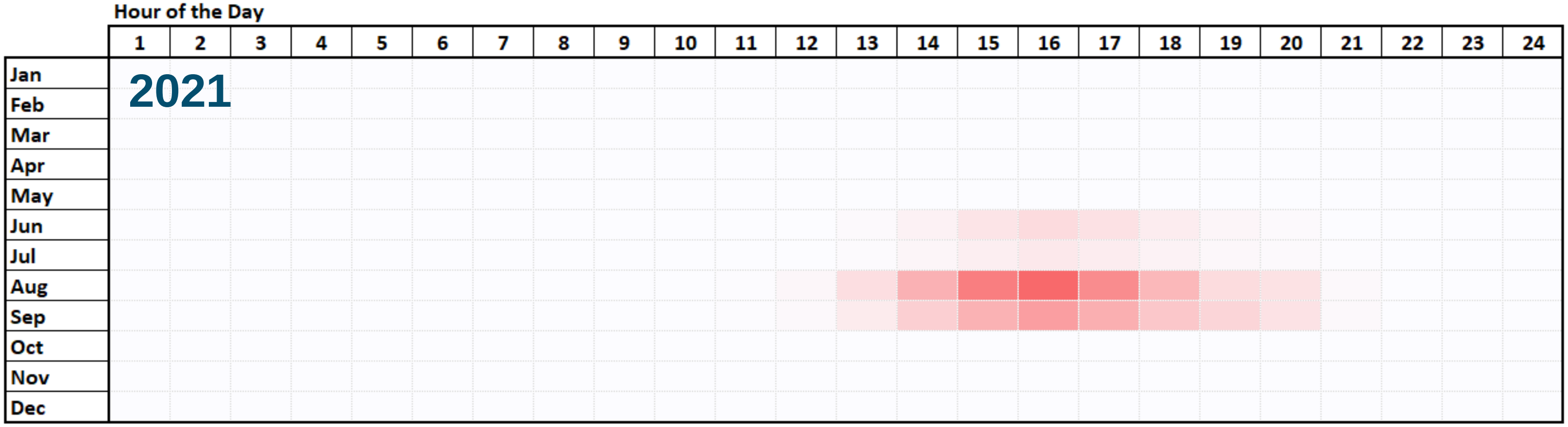
Load and resource table

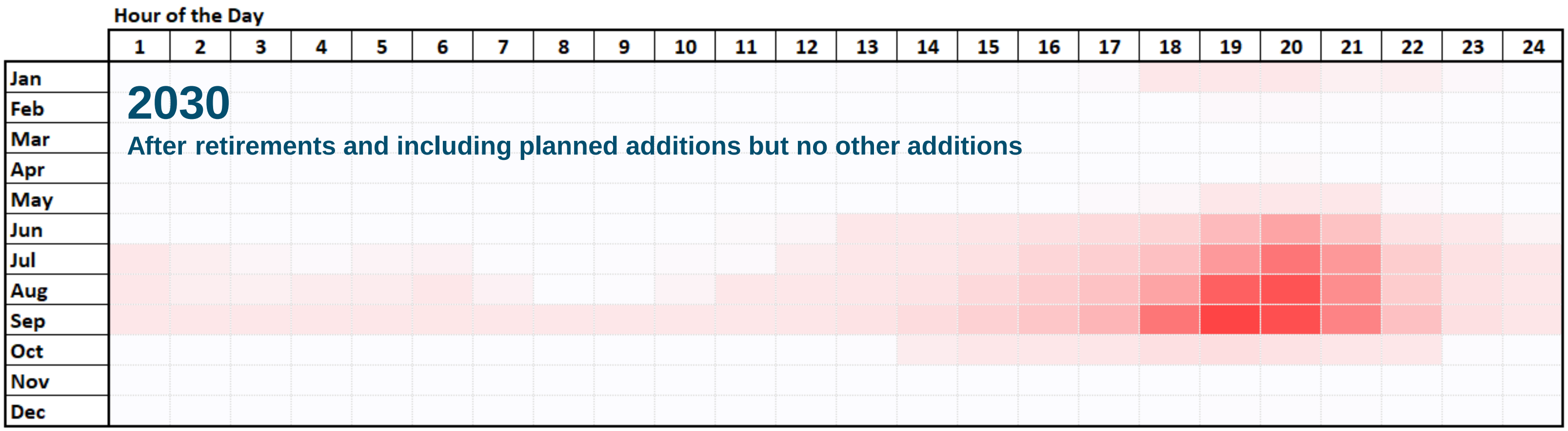
RECAP Modeling Outputs for El Paso (2021)			
1-in-2 Peak	2,103 MW[1]		
Reliability Metric	LOLE		
Target Value	0.1 days/yr		
ICAP PRM Requirement (21%)	2,547 MW		
Supply Resources	**Summer Maximum Capacity (MW)**	**Effective Capacity (MW)**	**Average ELCC %**
Gas	1,412	1,289	91%
Palo Verde[2]	622	579	93%
Solar (incl. incremental DGPV)	136	79	58%
Wind/Geothermal/Storage	0	0	n/a
Interruptible Load	43	43	100%
Imports via Eddy Line	50	35	70%[3]
TOTAL	**2,263**	**2,025**	
Total MW for Satisfying ICAP PRM	1,412 + 622 + 79 + 43 + 35 = **2,191**		
Capacity shortfall (MW)	**351**		
Actual PRM (ICAP)[4]	**4% (vs. 21% target PRM)**		

1) Including EVs, EE, and existing DGPV
2) PV3 is modelled as a system resource and subject to proxy pricing in Case No. 20-00104-UT.
3) De-rate of 30% is applied to Eddy line, based on outage data in 2020
4) The ICAP PRM convention counts thermal resources at summer maximum capacity and other resources at effective capacity. The PRM requirement accounts for the effect of forced outages at the thermal facilities

Loss of load probability distribution in 2021 and 2030

- In 2021, most of the loss-of-load events are concentrated during the peak period in the summer
- In 2030, following the addition of utility-scale and distributed solar, loss-of-lead events become more predominant in the evening hours





Draft ELCC results

Overview

- **Effective load carrying capability (ELCC) is the quantity of 'perfect capacity' that could be replaced or avoided with wind, solar, storage, etc. while providing equivalent system reliability. ELCC is calculated by RECAP in this study**
- **The ELCC of a resource depends primarily on the following:**
  - Coincidence with load
    - Positive correlation with load results in higher capacity value
  - Production variability
    - The prevalence of low production periods reduces the capacity value
  - Existing quantity of other resources
    - Same or similar resource types have diversity penalty
    - Complementary resource types have diversity benefit

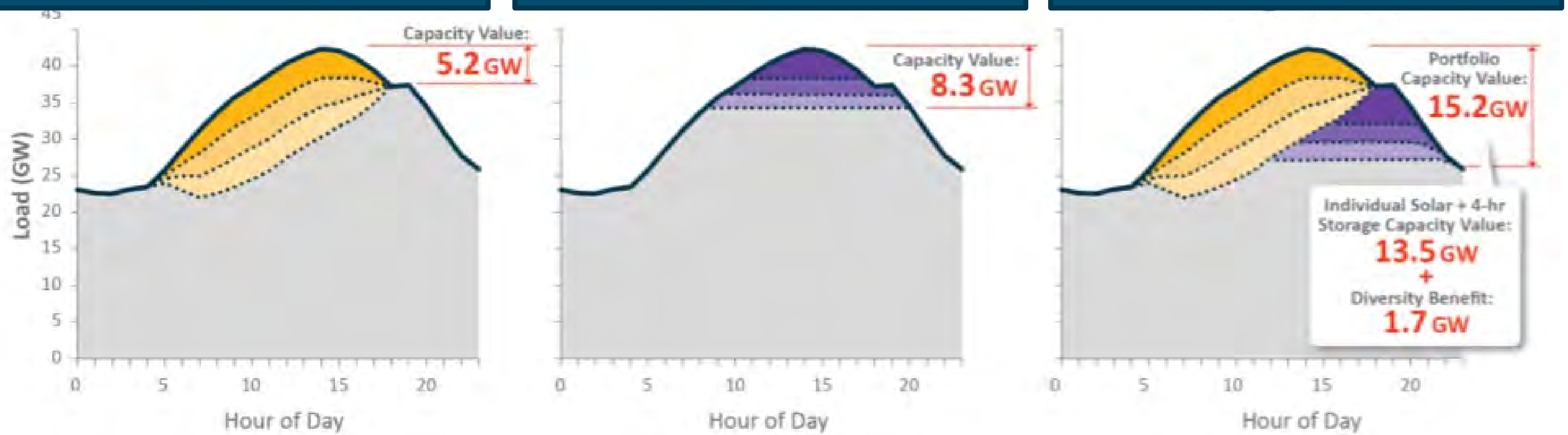
The ELCC of a resource is a function of its penetration and the penetration of other resources

Solar and storage ELCC dynamics

+ Below is a hypothetical example to illustrate the ELCC dynamics for solar additions, storage additions, and solar/storage additions on a hypothetical system

- Adding solar in isolation reduces loss-of-load events during the day, but not during the evening, so the contribution to resource adequacy decreases at higher penetrations
- Adding storage in isolation can help reduce loss-of-load events, but the relatively short duration becomes more limiting at higher penetrations of storage
- Adding both solar and storage to the system results in a greater contribution to resource adequacy than when added individually. Solar additions concentrate loss-of-load events during a limited number of hours, during which storage can discharge

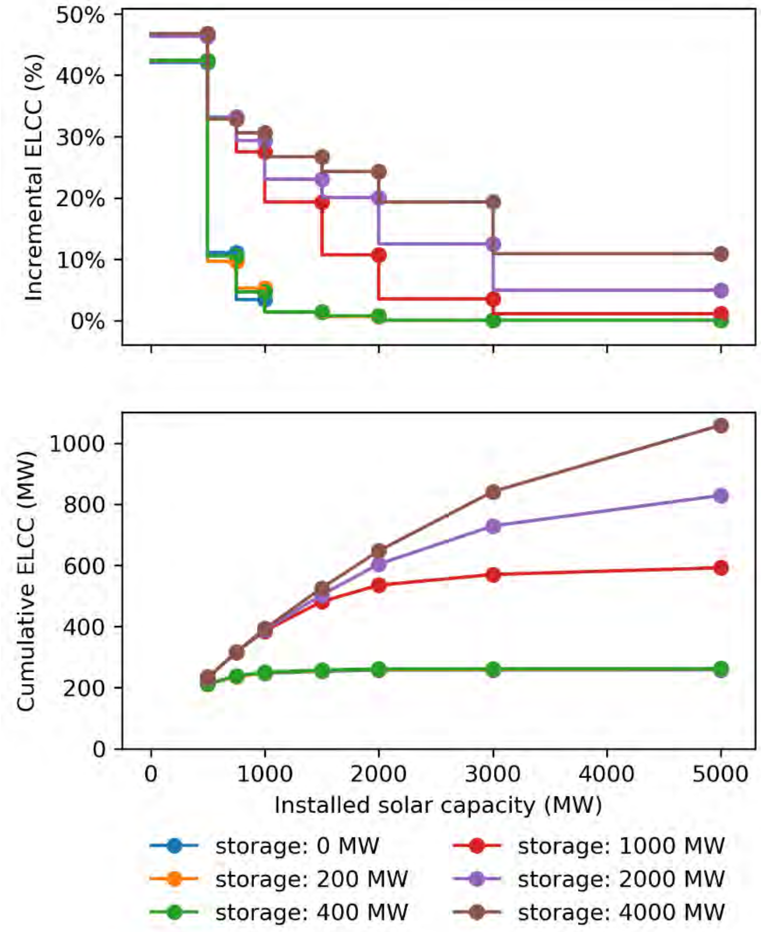
Add 15 GW Solar	Add 15 GW Storage	Add 15 GW Solar & Storage



2030 Solar ELCC curves

- **The first 500 MW solar by 2030 has an average ELCC of about 45%**
  - This includes existing utility-scale solar, planned utility-scale solar, and incremental distributed solar
  - The initial tranche of solar achieves the highest incremental contribution to resource adequacy
- **The incremental ELCC of solar drops off at higher levels**
  - For <1 GW of storage, the incremental ELCC drops below 5% after 1,000 MW
  - This reflects the net load shifting to the evening when solar output is low
- **With more storage (>1 GW), the ELCC of solar improves**
  - This suggests a significant diversity benefit between solar and storage
  - RECAP captures this diversity benefit by modeling a solar/storage ELCC surface

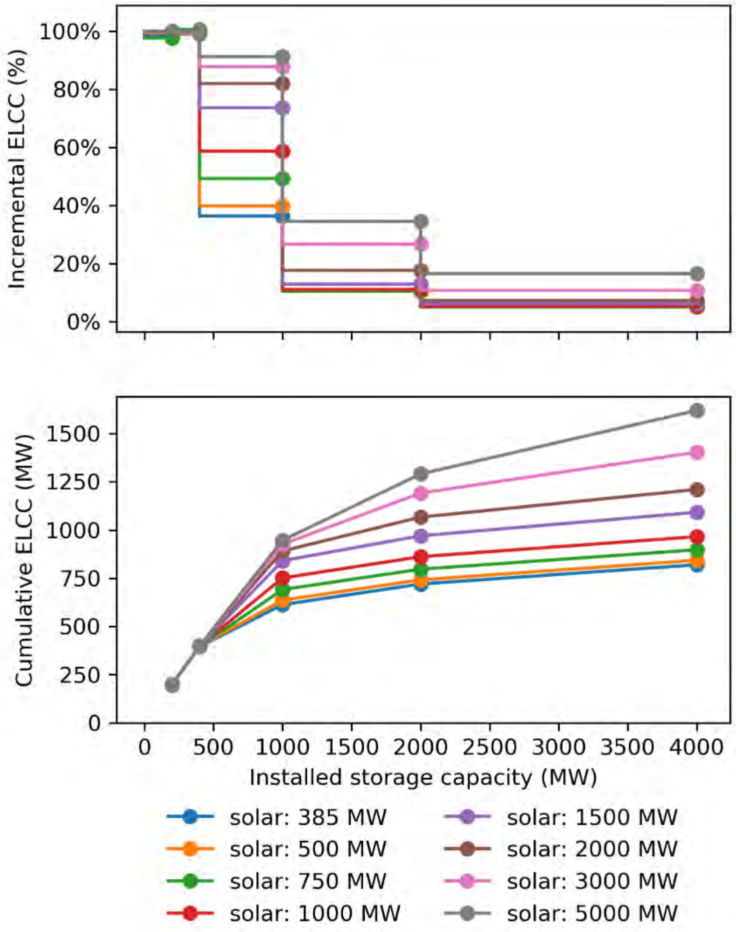
Average and Incremental ELCC for Solar



2030 Storage ELCC curves

- **The first 400 MW of 4 hour storage has an ELCC of close to 100% in 2030**
- **The incremental ELCC falls at higher penetration levels**
  - The duration becomes limiting as more storage is added
- **If the system has more solar, the ELCC of storage is higher**
  - When the system has 500 MW of solar, the incremental ELCC of storage is ~40% for the 0.5-1 GW tranche
  - When the system has 1,000 MW of solar, the incremental ELCC of storage is ~60% for the 0.5-1 GW tranche

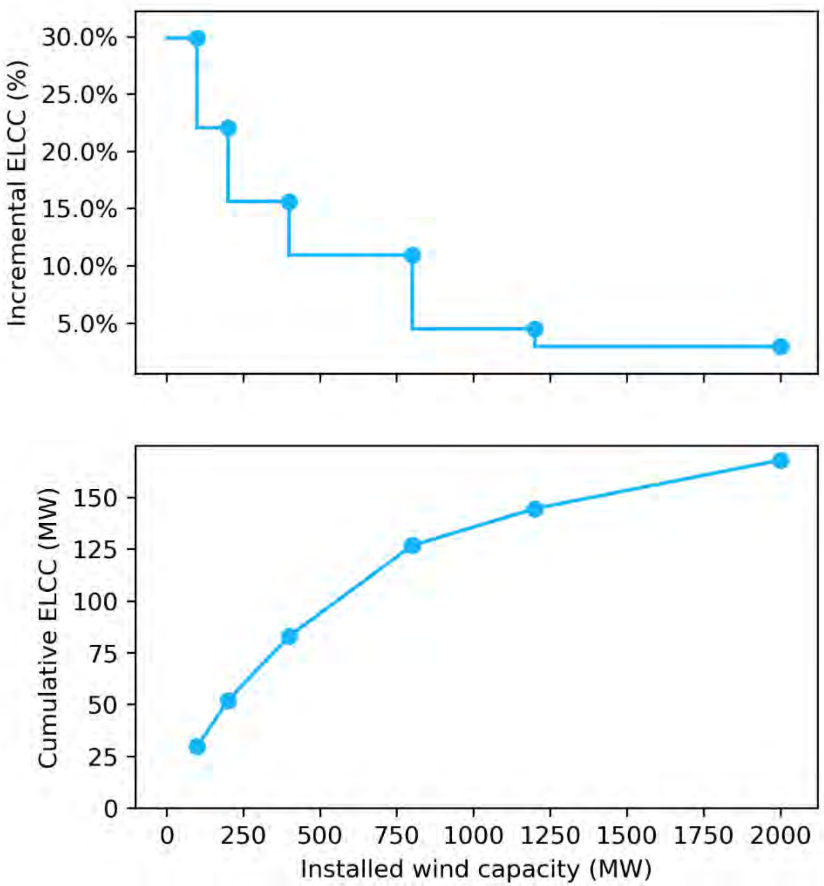
Average and Incremental ELCC for Storage



2030 Wind ELCC curves

+ **The ELCC of wind represents the ELCC of a combination of wind resources**
  - Including the North of Lordsburg, Southeast of Albuquerque, and East of Artesia locations
  - The high capacity factor of ~40%+ is negated partially by misalignment between wind output and energy demand
    - EPE load peaks in the summer and late afternoon
    - Wind output is concentrated in spring/winter and late evening
+ **The incremental ELCC of wind starts at 30% and drops to 5% at ~1 GW**

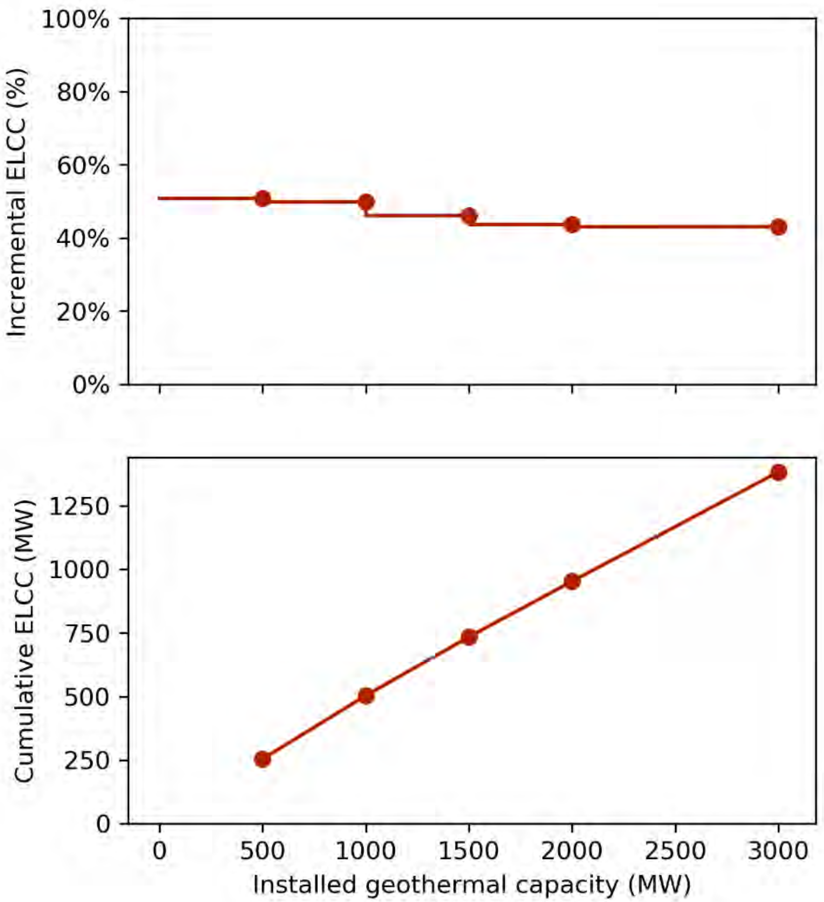
Average and Incremental ELCC for Wind



2030 Geothermal ELCC curves

+ **Geothermal has an ELCC of 50%, which is much lower than its capacity factor of ~80%**
  - Like wind, this is due to the misalignment between energy demand and geothermal output
  - Geothermal has a production dip in summer and mid day due to the higher temperatures
+ **The ELCC of geothermal shows much lower diminishing returns with increase penetration**
  - This is because geothermal produces around the clock each day
  - Even at high penetration levels, geothermal can contribute to ensuring resource adequacy

Average and Incremental ELCC for Geothermal



Energy+Environmental Economics

Proposed capacity expansion scenarios

Proposed scenarios

+ **Least-cost case**
  - Counterfactual for assessing other cases
+ **Base case (New Mexico ETA-compliant)**
  - The New Mexico ETA applies to all cases except for the least-cost case
+ **Low carbon cases**
  - Scenarios that increase the share of zero-carbon resources by more than existing policies
+ **High DG case**
  - Higher penetration of distributed solar
+ **High DSM case**
  - Higher levels of energy efficiency and demand response
+ **No new gas case**
  - No addition of gas capacity after the addition of Newman 6
+ **Carbon price cases**
  - Three carbon price trajectories

Next steps

+ **Gather stakeholder feedback**
+ **Perform capacity expansion portfolio analyses**
+ **Perform sensitivity analysis on reliability target**

Discussion

Future meetings

1) Week of March 15, 2021

2) Week of April 22, 2021

Thank You!