County of Los Alamos

Los Alamos, NM 87544
www.losalamosnm.us

Agenda - Final

County Council - Work Session

Sara Scott, Council Chair; Pete Sheehey, Vice-Chair; David Izraelevitz; Antonio Maggiore; James Robinson; Randall Ryti; and Katrina Schmidt, Councilors

Tuesday, September 17, 2019 **6:00 PM** **Fire Station No. 3**
129 State Road 4 - White Rock
TELEVISED

Joint Meeting of Council and Board of Public Utilities

1. CALL TO ORDER

2. PLEDGE OF ALLEGIANCE

3. PUBLIC COMMENT

4. APPROVAL OF AGENDA

5. PRESENTATIONS, PROCLAMATIONS AND RECOGNITIONS

A. 12215-19 Joint Board of Public Utilities & County Council Item - Los Alamos Power Resource Planning "Challenges and Opportunities"

Presenters: Steve Cummins, Deputy Utilities Manager - Power Supply

Attachments: A - Los Alamos Power Resource Planning Challenges and Opportunities

B. 11670-19 Briefing to Council by Carrie Walker, Chair of the Board of Public Utilities.

Presenters: Carrie Walker, Chair of the Board of Public Utilities

Attachments: A - Board of Public Utilities Presentation to Council FY20

6. ADJOURNMENT OF - JOINT SESSION

Council Regular Session will begin immediately after Adjournment of Joint Session

7. COUNCIL OPENING/ROLL CALL

8. APPROVAL OF COUNCIL AGENDA

9. BUSINESS

A. 12313-19 Discussion of Possible Comments to Santa Fe National Forest Draft Land Management Plan

Presenters: County Council - Work Session

10. PUBLIC COMMENT

11. ADJOURNMENT

If you are an individual with a disability who is in need of a reader, amplifier, qualified sign language interpreter, or any other form of auxiliary aid or service to attend or participate in the hearing or meeting, please contact the County Human Resources Division at 662-8040 at least one week prior to the meeting or as soon as possible. Public documents, including the agenda and minutes can be provided in various accessible formats. Please contact the personnel in the Office of the County Manager at 663-1750 if a summary or other type of accessible format is needed.

County of Los Alamos

Staff Report

September 17, 2019

Los Alamos, NM 87544
www.losalamosnm.us

Agenda No.:	A.
Index (Council Goals):	* 2019 Council Goal - Planning for Appropriate Levels of County Services
Presenters:	Steve Cummins, Deputy Utilities Manager - Power Supply
Legislative File:	**12215-19**

Title

Joint Board of Public Utilities & County Council Item - Los Alamos Power Resource Planning "Challenges and Opportunities"

Recommended Action

Presentation Only

..Utilities Manager's Recommendation

None

Board, Commission or Committee Recommendation

None

Body

In February 2019, DPU staff presented the 2017 IRP to County Council with the primary objective of giving the New Council members some history on Electric Power Resource Planning.

This presentation will give a high level overview of the resource planning that is ongoing within the department and what changes are happening in the western grid.

Fengrong Li, with FTI Consulting will present their perspective on Utility Resource Planning and the Electricity Market. This will look at what's happening in the west, particularly with the California Independent System Operator (CAISO) and the Energy Imbalance Market (EIM) as it moves east.

The Public Service Company of New Mexico (PNM) has made the decision to join the CAISO EIM in 2021. Since LAC is within PNM's Balancing Area (BA), DPU needs to be prepared to handle the new business model and fully understand the implications of being short or long on resources to meet the hourly demand. This is very important to the County since currently we purchase approximately 25 percent of our energy on the open market.

The EIM will allow LAC to take advantage of the cost saving associated with excess renewables (solar) on the western grid but at the same time power operations needs to be cognizant of spiking market prices in the evening when demand for power peaks after the solar power drops off.

DPU staff is working with UAMPS to gain a better understanding of the impacts to the real time desk operating in a 5 minute market and the back office personnel who settle all the energy transaction on a monthly basis.

As resource planning is ongoing and dynamic, staff continues to move forward with the approaching next phase of the Carbon Free Power Project (Small Modular Nuclear Reactor) and a Power Purchase Agreement, comprised of a wind and solar project here in New Mexico. We anticipate that both of these projects will come before Board and Council within this fiscal year of

2020.
Staff will have more information on PNM's participation in the CAISO EIM and its impacts on Los Alamos County's daily power operations including the development of new generating assets and the potential signing of a PPA.

Alternatives

None

Fiscal and Staff Impact/Planned Item

None

Attachments

A - Los Alamos Power Resource Planning Challenges and Opportunities

Los Alamos Power Resource Planning “Challenges and Opportunities”

Joint Board and
Council Meeting
September 17, 2019

LOS ALAMOS

ATTACHMENT A

AGENDA

- Integrated Resource Planning
- Resource Planning History
- Factors Considered in Integrated Resource Planning
- U.S. and Western Interconnection Electricity Market Perspectives (FTI Consulting Slides)
- How does the evolving Western Interconnect effect NM and LAC
- In Conclusion
- Glossary

Integrated Resource Planning

An **integrated resource plan**, or IRP, is a utility **plan** for meeting forecasted annual peak and energy demand, plus some established reserve margin, through a combination of supply-side and demand-side resources over a specified future period.

Current Resource Mix

- San Juan Generating Station (Coal), 36 MW (Exit 2022)
- Laramie River Station (Coal), 10 MW (2042)
- El Vado (Hydro), 9 MW Run-of-the-River
- Abiquiu (Hydro), 17 MW Run-of-the-River
- WAPA (Hydro), 1 MW
- Distributed Energy Resources
  - Utility Scale PV, 1 MW
  - Customers roof top solar, approx. 0.75 MW

Resource Planning History

- 1985 – 2015: IRP through the Electric Coordination Agreement (ECA)
- 2016 Board Direction for developing a Schedule and Integrated Implementation Plan for the Adopted Future Energy Resource Recommendations “IRP”
- LAC and DOE-LANL (Federal) Renewable Energy Goals Diverge
- 2017 Pace Global, a Siemens Corporation prepares IRP for LAC

  key issues
  - Laboratory Contract
  - Small Modular Nuclear Reactor’s- Competitiveness
  - Most Economical way to meet 2040 Carbon Neutral Goal
  - Future Participation in our coal fired generation resources (SJGS, LRS)
  - How DPU can meet the requirements for reliable, economic operations inside PNM’s Balancing Area

LOS ALAMOS

New Resources Considered

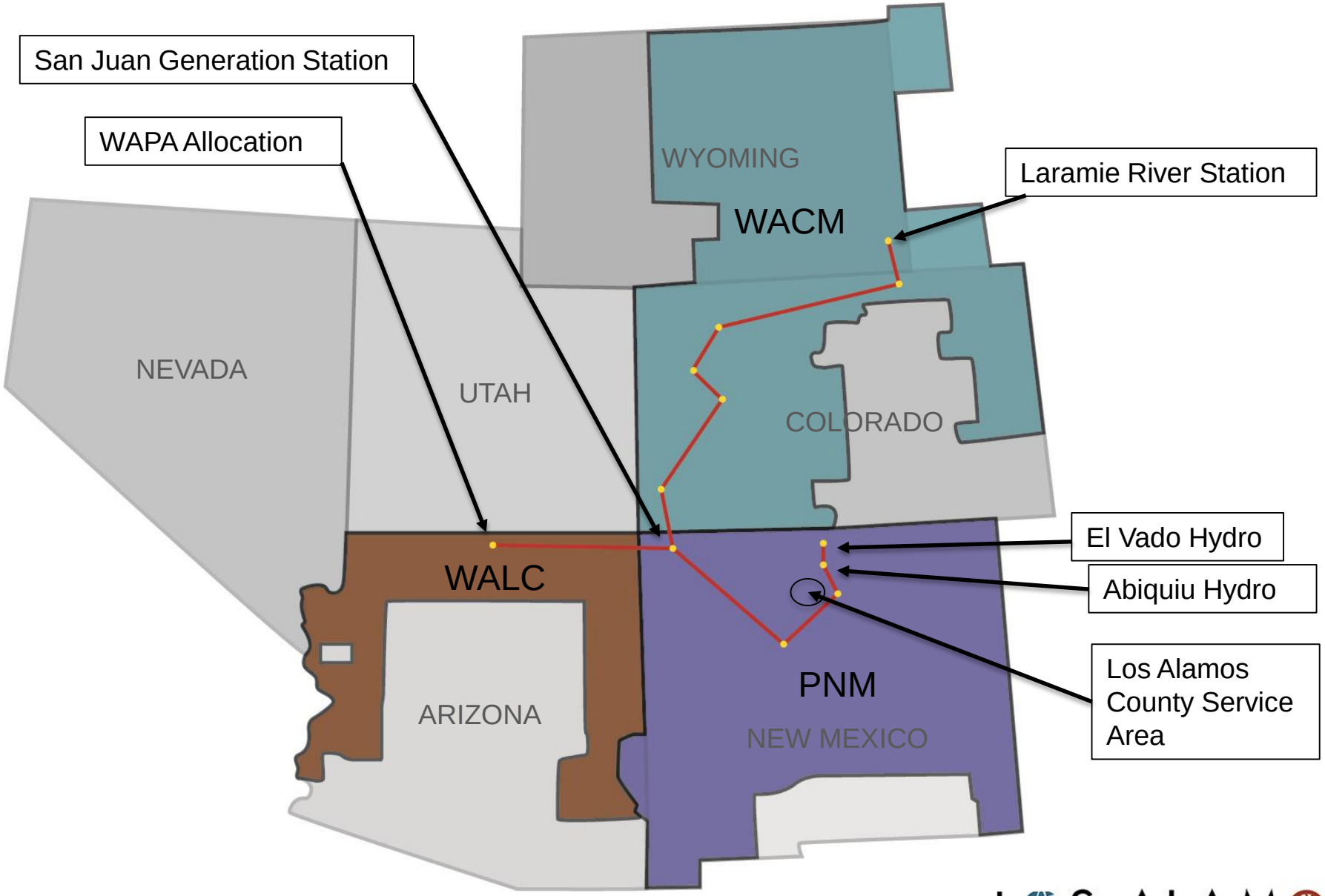
- 2008 Cochiti Hydro
- 2011 Caballo Hydro
- 2012 Horse Butte Wind
- 2015 Carbon Free Power Project
- 2016 Cove Fort Geothermal
- 2016 Solar with Vanadium Flow Battery Storage
- 2018 Laramie River Station swap for renewable energy
- 2018/2019 Pumped Storage
- 2018 Navajo Tribal Utility Authority (NTUA)-Solar Site
- 2019 Public Service Company of NM, Commercial Solar Garden
- 2019 Landfill 2nd MW solar PV
- 2019 Solar/Wind Firm Block Power, Around The Clock

Factors Considered in Resource Planning

(Existing and New Resources)

- Levelized Cost of Energy (LCOE)
- Risk
- Environmental
- Operational (Transmission, weather dependency, controllable)
- LAC & DOE-NNSA, Electric Coordination Agreement
- Generation Resource Location (Balancing Area)
- Demand and Generation Profiles
- Evolving Markets in the West

Balancing Areas and the cost associated with delivering power from the generation source to the County.



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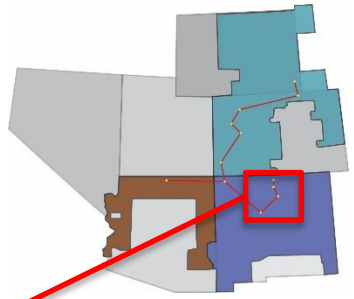
ATTACHMENT A



Pancaking Transmission Rates

NORA Electric Co-op Transmission		$3.47/MWh
TSGT Substation		$0.50/MWh
JMEC		$2.00/MWh
PNM	Approx.	$5.00/MWh
DOE-NNSA	Approx.	$2.50/MWh

Example:
El Vado Trans. Cost $13.47/MWh

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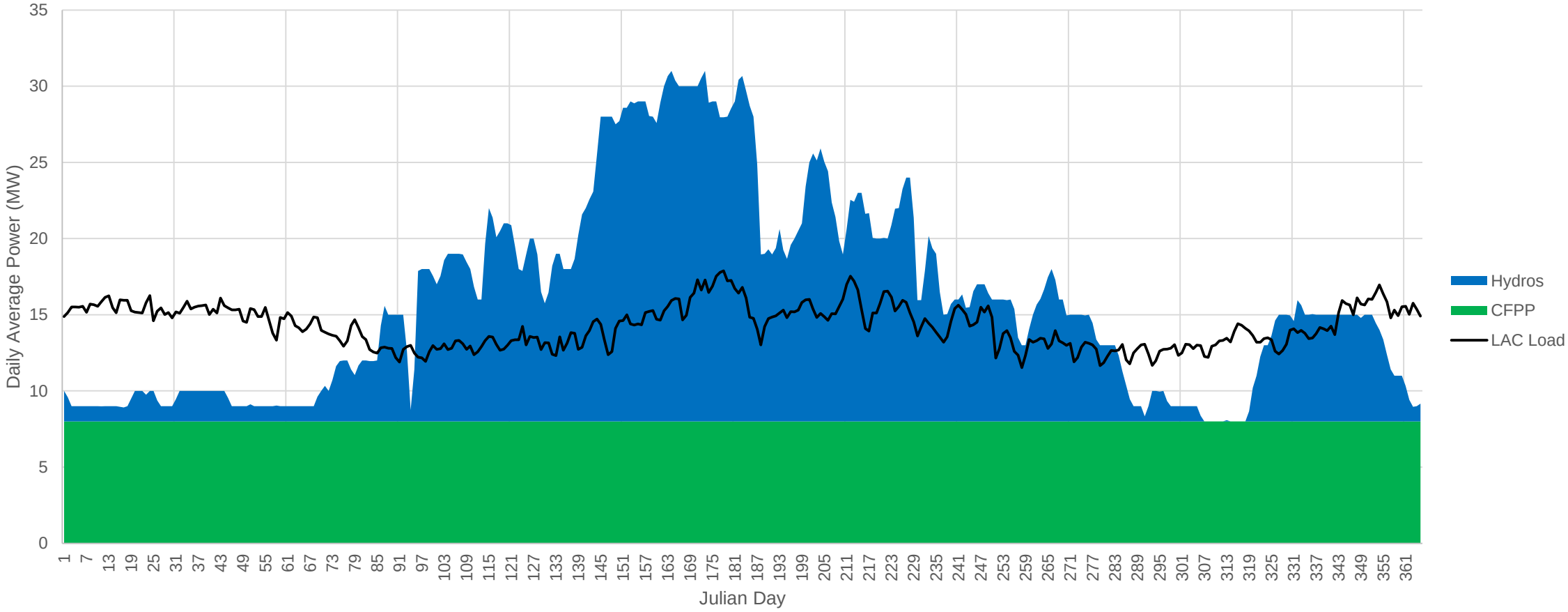
ATTACHMENT A

Example of LAC Annual Demand and Generation Profile



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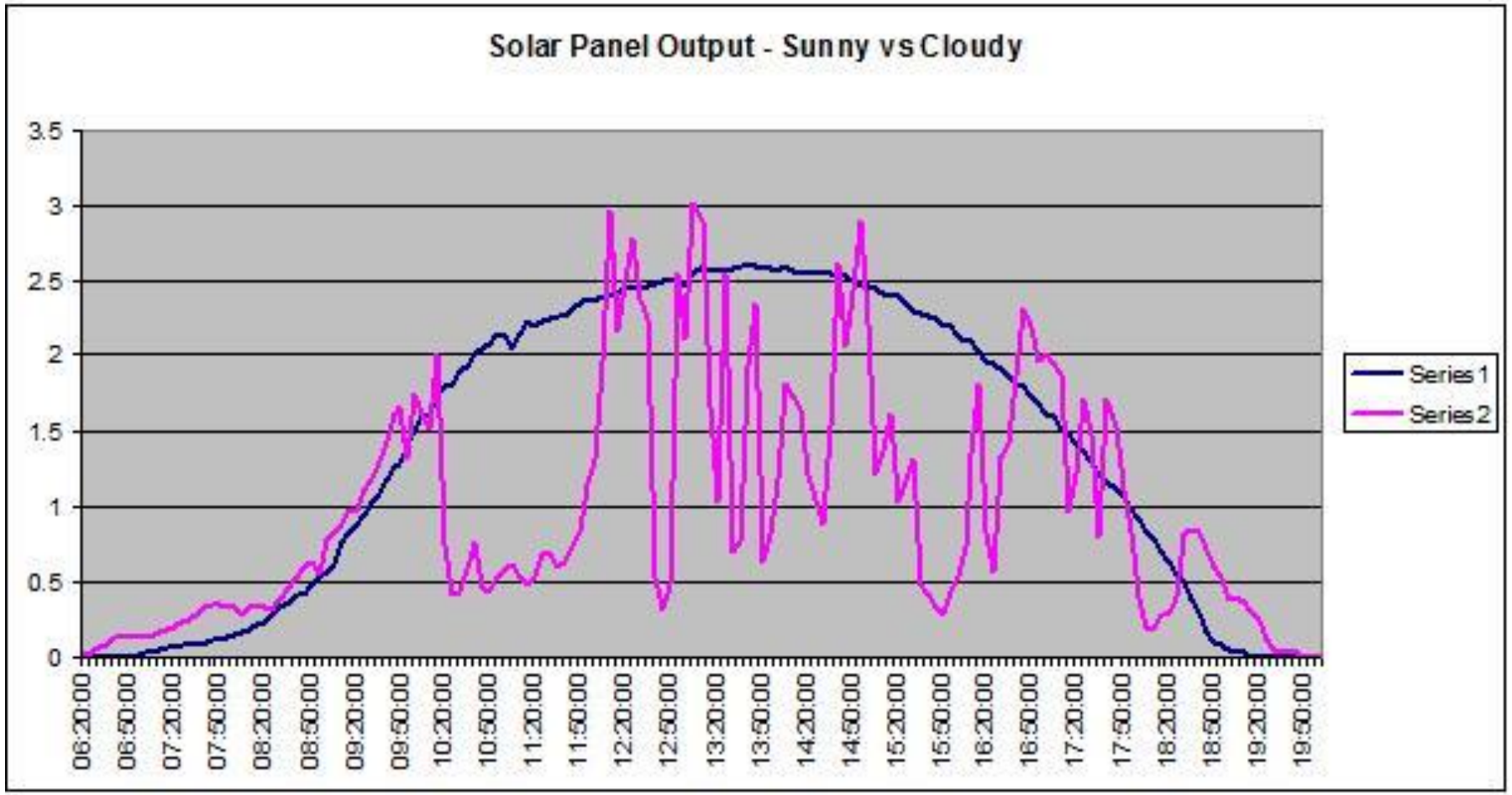
ATTACHMENT A

Intermittent Solar Resource Generation Profile



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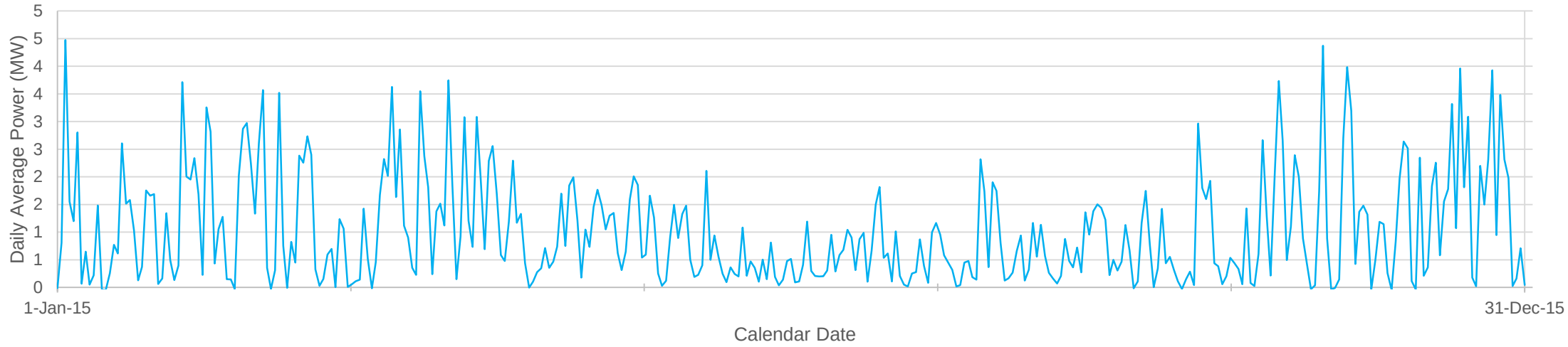
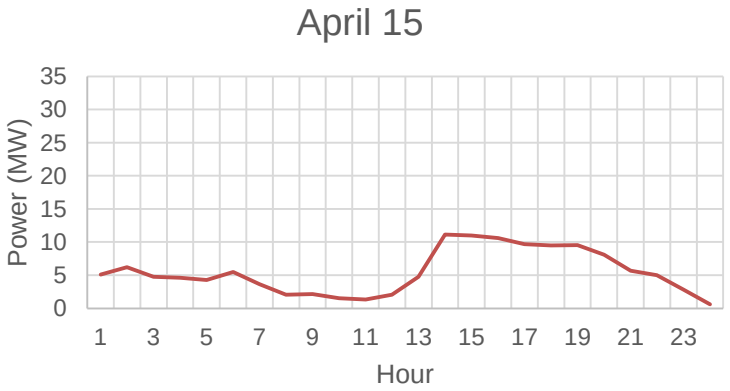
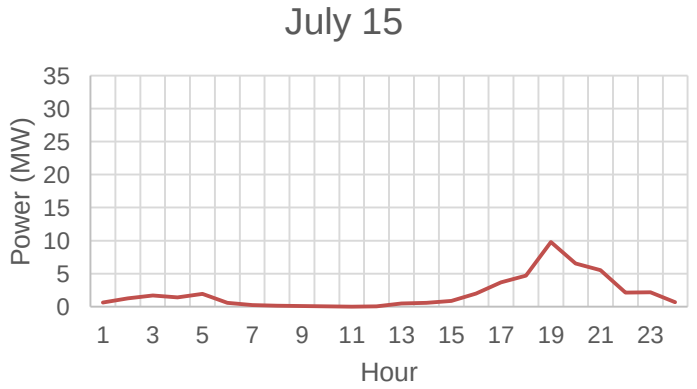
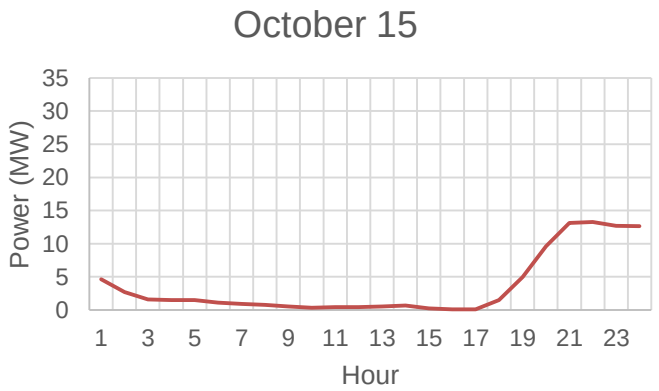
Intermittent Wind Resource Generation Profile









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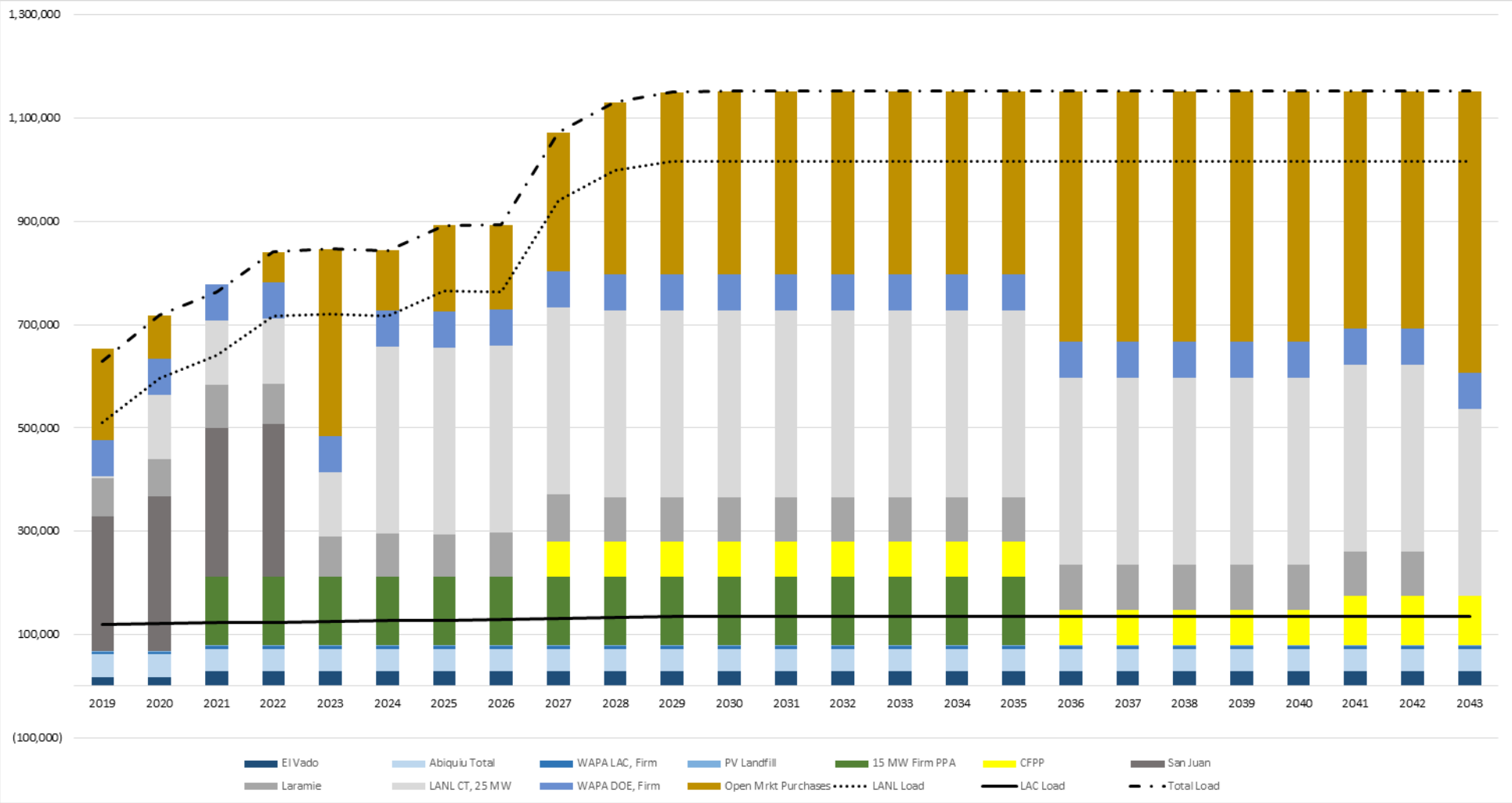
ATTACHMENT A

Future Load & Generation Option Mix



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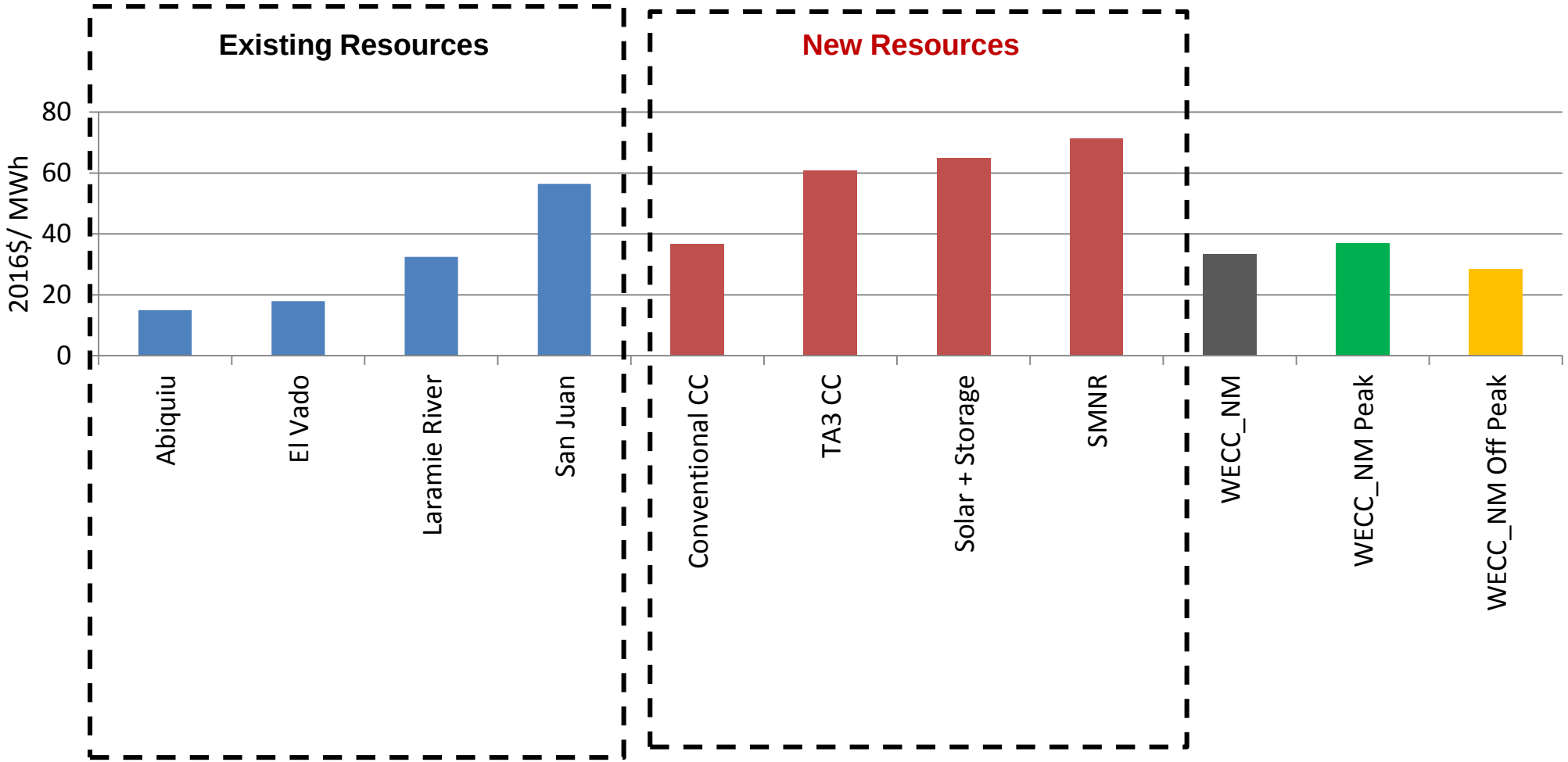
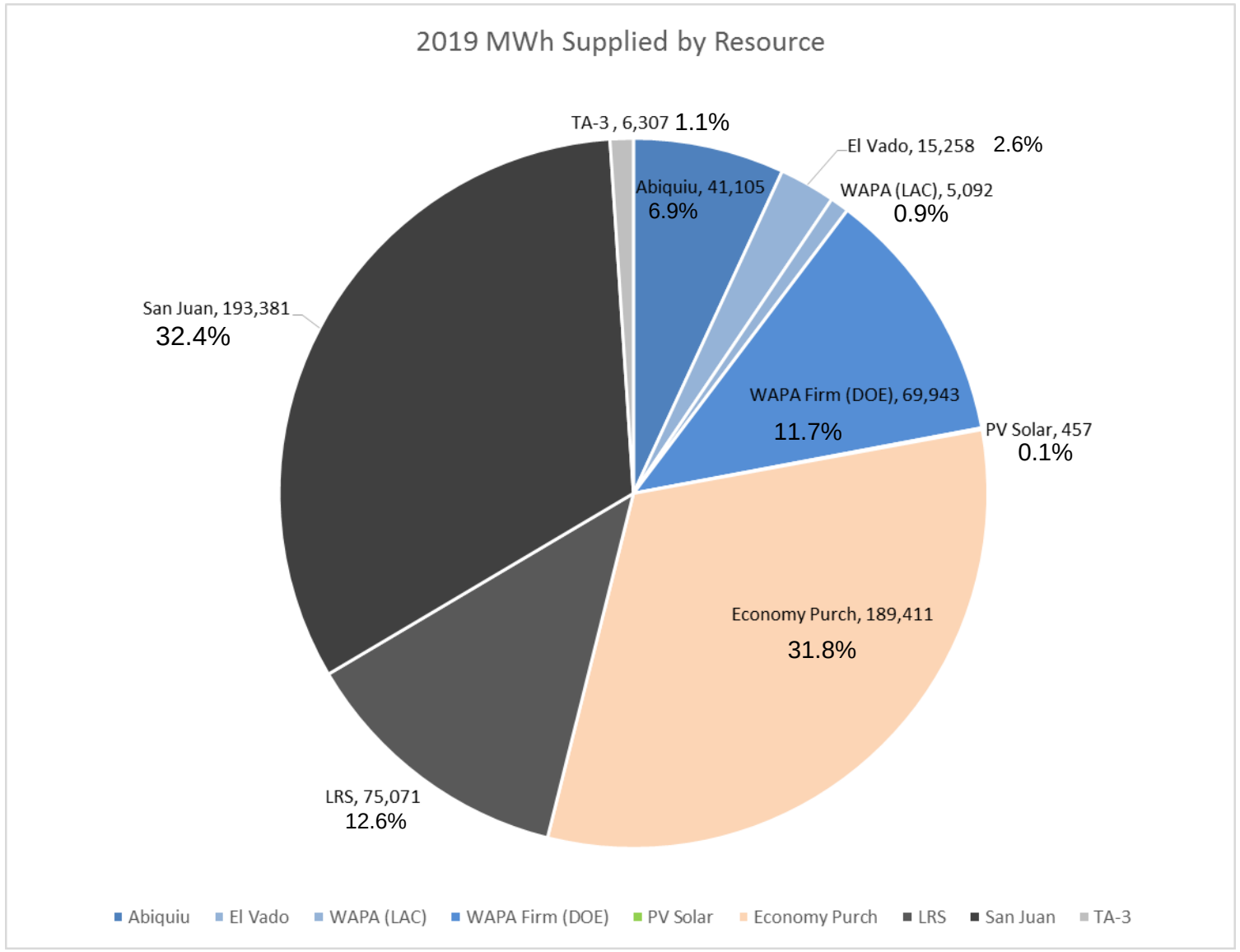
ATTACHMENT A

Levelized Cost of Energy of Existing and New Resources





Fiscal Year	Mwhs	Total $	Blended $/Mwh
FY19	562,357.79	$ 32,159,798.00	$57.19
FY18	597,653.99	$ 29,081,986.00	$48.66
FY17	578,381.78	$ 28,891,250.00	$49.95
FY16	573,288.34	$ 39,425,092.00	$68.77
FY15	519,319.31	$ 31,022,700.00	$59.74
FY14	532,669.54	$ 40,486,505.00	$76.01
FY13	572,464.00	$ 40,848,840.00	$71.36
FY12	589,364.51	$ 40,945,322.00	$69.47
FY11	563,109.22	$ 38,550,174.00	$68.46
FY10	543,273.83	$ 41,130,693.00	$75.71
FY9	542,171.09	$ 38,020,391.00	$70.13
FY8	536,335.44	$ 35,204,568.00	$65.64
FY7	559,089.84	$ 33,187,950.00	$59.36
Total/Average	**7,269,478.68**	**$ 468,955,269.00**	**$64.51**

LOS ALAMOS

ATTACHMENT A

U.S. and Western Interconnection Electricity Market Perspectives

Fengrong Li

FTI Consulting

LOS ALAMOS

FTI CONSULTING™

U.S. and Western Interconnection Electricity Market Perspectives

Presented to:

Los Alamos County Department of Public Utilities Joint Board and Council Meeting

September 17, 2019

ATTACHMENT A

Private and Confidential

Agenda

1. National Power Market Outlook
2. CAISO Market Snapshot
3. WECC Market Snapshot
4. Western Energy Imbalance Market (EIM) Update
5. Glossary

Regional disparities raise different market issues

SPP

- High reserve margin (~32 percent) contributes to reliability but exerts downward pressure on prices
- **Heavy reliance on fossil resources**
- **Growth in wind resources** expected

MISO

- Weak capacity construct with **vertical demand curve**; 2019 capacity market cleared with higher prices in all but one constrained zone
- Low energy prices accelerate retirement of uneconomic units
- **Renewable (wind and solar)** continue to dominate new builds
- Major transmission projects designed to access renewables
- Reserve margin likely to decrease with resource retirements and export capacity to PJM

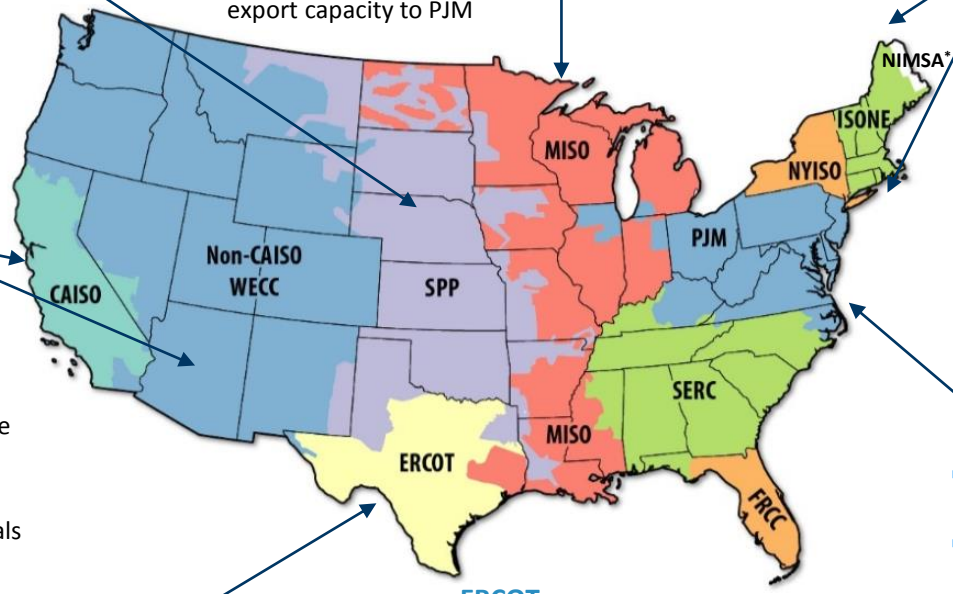
Northeast

- Natural gas infrastructure constraints and **fuel-security risk** a pressing concern
- New **Pay-for-Performance** market design in ISONE provides incentives for new resources
- High reserve margin (~26 percent ISONE; ~29 percent NYISO)
- High growth in distributed PV
- Unsustainable high capacity factors in NYISO peaking units
- **High renewable standards** have long term market impacts

* Northern Maine is regulated by Northern Maine Independent System Administrator

WECC

- Deepening **duck curve** calls for resources with flexible ramping capability
- Risk of **operating reserve shortfalls** in CAISO
- Aliso Canyon curtailment impacts CAISO and WECC
- **Expanding EIM** improves renewable integration, grid reliability and economic benefits
- CA, NM and NV's increased RPS goals impact resource investments



ERCOT

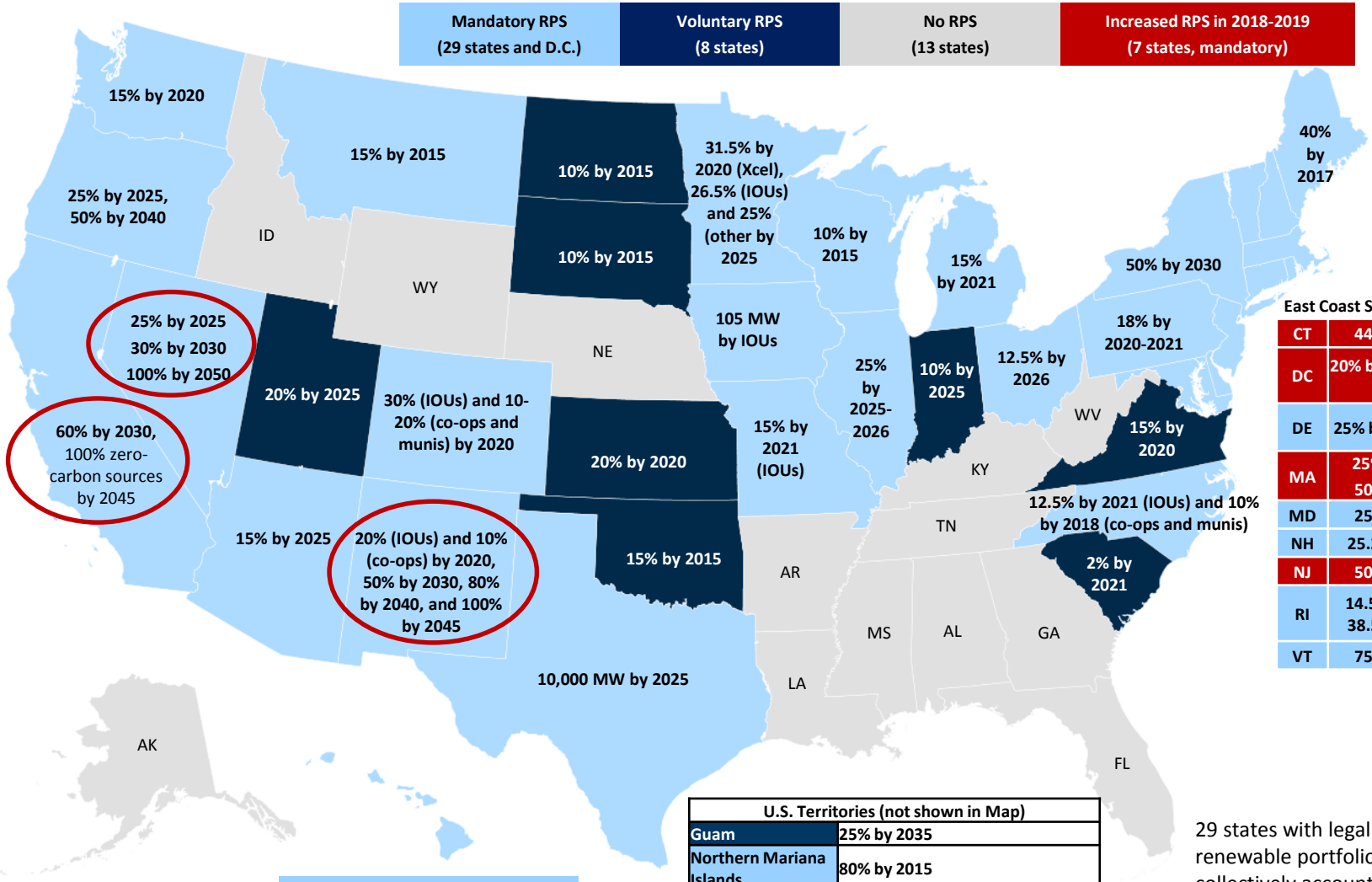
- Deregulated electricity market with high liquidity
- Coal plants closures herald **resource adequacy issues** with tightening reserve margin
- Absent of a capacity market, **Operating Reserve Demand Curve (ORDC)** is vital in supporting new builds
- Co-locating storage, solar PV and wind to enhance **grid value and profitability**

PJM

- Long-term load growth under 0.5% per year
- Large scale coal retirements: 34 GW from 2010 to 2022
- Abundant gas driving aggressive combined cycle builds in Marcellus/Utica
- Measured renewables development; offshore wind likely by mid decade
- Robust capacity market but uncertain future

National Power Market Trends

Renewables mandates have major impacts on future prices



East Coast States and DC

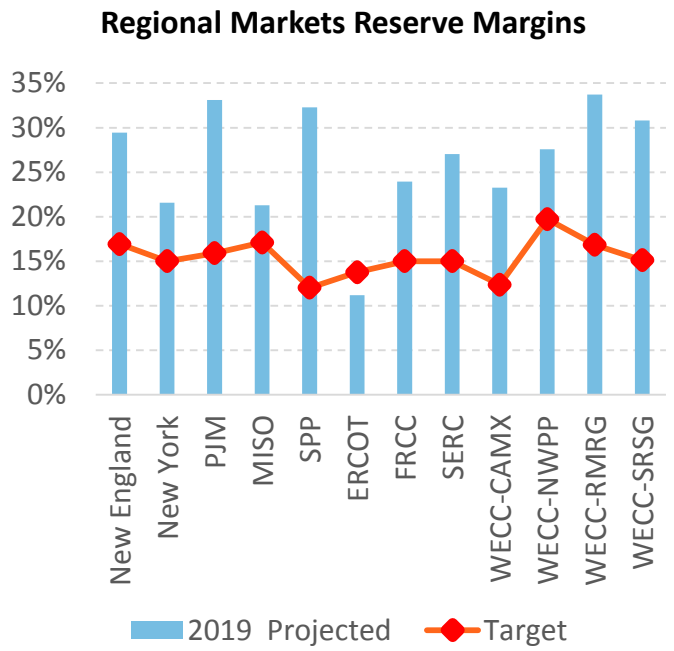
CT	44% by 2030
DC	20% by 2020, 100% by 2032
DE	25% by 2025-2026
MA	25% by 2020; 50% by 2030
MD	25% by 2020
NH	25.2% by 2025
NJ	50% by 2030
RI	14.5% by 2019, 38.5% by 2035
VT	75% by 2032

U.S. Territories (not shown in Map)	
Guam	25% by 2035
Northern Mariana Islands	80% by 2015
Puerto Rico	20% by 2016
Virgin Islands	20% by 2015, 25% by 2020, 30% by 2025, up to 51% after 2025

29 states with legally binding renewable portfolio standards collectively accounted for 63% of electricity retail sales in the U.S. in 2018

Shifting trends in how demands are met with generation

U.S. power market expects overall healthy reserve margins, with most regions over-supplied, with the exception of ERCOT due to coal retirements.



Sources: NERC Long Term Reliability Assessment, FTI analysis

U.S. Power Market Outlook	
Demand	Grid-served electricity consumption reached plateau. Flat to low annual growth rate (~0.5 percent) expected with energy efficiency and shift to less energy-intensive economic growth.
DER	DER expected to more than double in the next five years, with key growth in CA, NJ, MA and NY.
Solar / Wind	Accelerated renewable portfolio standards with increasing goals, improved renewables cost & performance, and customer preference continue to drive renewables growth.
Storage	Favorable market, economic, and regulatory drivers along with qualifying Investment Tax Credits (ITC) provide impetus for significant growth in installed capacity and expansion in territory to markets like Puerto Rico, ERCOT, and the Northeast.
Natural Gas	Natural gas is the primary on peak fuel in majority markets. Gas generation essential to manage wind and solar variability. Large CC additions expected in vertically integrated utility regions and markets with large baseload resource retirements.
Coal	58 GW of coal retirements since 2013 16 GW to be retired by 2025, and most impacted states include TX, AZ, CO, NY, MN, and WA.
Nuclear	5 GW nuclear retirements since 2013. 12 GW to be retired by 2025, and most impacted states include CA, PA, NY, and OH.

Agenda

1. National Power Market Outlook
2. **CAISO Market Snapshot**
3. WECC Market Snapshot
4. Western Energy Imbalance Market (EIM) Update
5. Glossary

CAISO Snapshot

Market overview

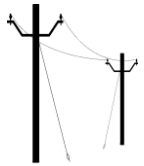
Modeled Hubs and Load Zones

CAISO is the only ISO in the WECC region

Market Overview – 2018 Snapshot

Generation

- Total Installed Capacity: ~60 GW
- Installed Wind*: 6.5 GW
- Installed Utility-scale Solar*: 11.8 GW
- Installed renewables: 22 GW



Load & Reserve Margin

- Total Energy: 226 TWh
- Peak load: 46 GW
- 10-yr Forecast Load Growth: 0.49 percent per year
- Expected average reserve margin of 23.27 percent in WECC-CAMX, above the NERC reference target of 12.35 percent.

Market Prices

- High gas prices, seasonally high load and reduced hydro generation led to high prices in 2018.
- SP 15 Hub Average Energy in 2019*
  DA: $36.21/MWh RT: $34.77/MWh
- NP 15 Hub Average Energy in 2019*
  DA: $37.09/MWh RT: $35.56/MWh

* Note: as of June 13, 2019

CAISO Snapshot

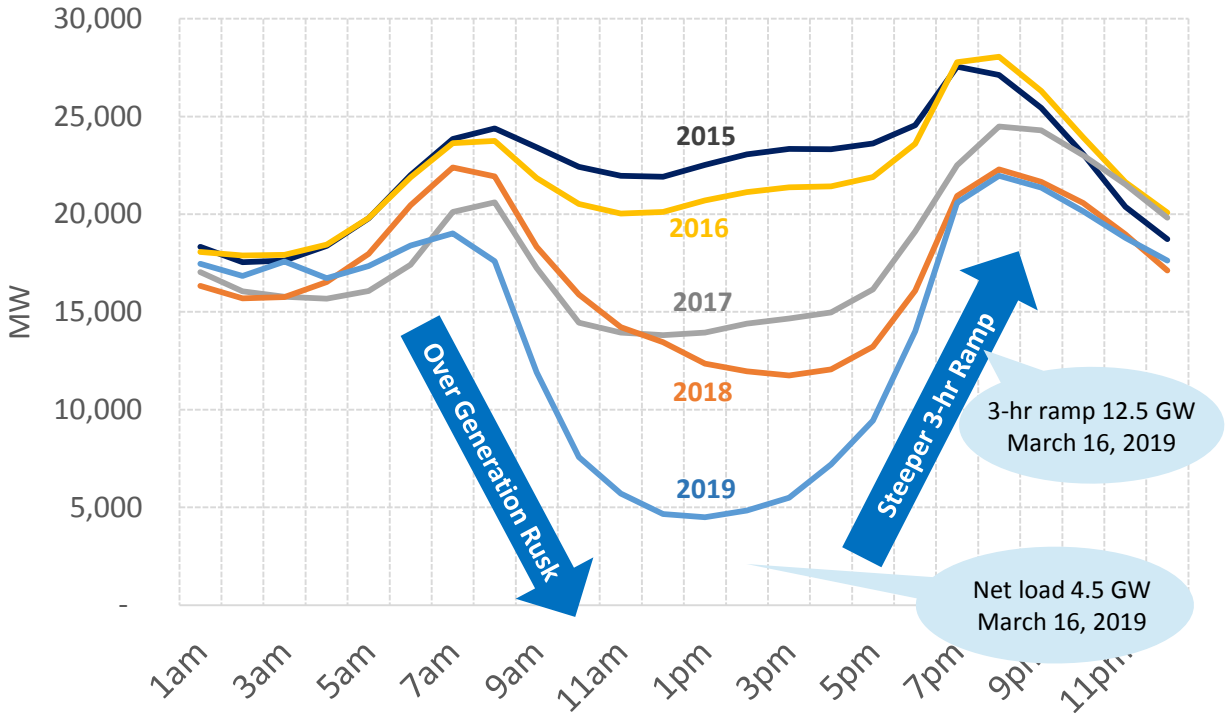
Key market trends and drivers

Factors	Description
Duck Curve	■ Increasing penetration of solar resources exacerbates the Duck Curve - characterized by high solar output during times of lower demand and daylight hours, followed by sharp reduction in output coinciding with increasing demand in the evening ■ Creates high demand on peaking and load-following generation capacity ■ Operational constraints limit Aliso Canyon output, increasing ramping requirements
Renewables	■ SB 100 accelerates California's RPS to 60 percent by 2030, and 100 percent by 2045 ■ ~34 percent of retail sales from RPS-eligible resources in 2018 > goal of 33 percent by 2020 ■ 1.7 GW/y of utility-scale solar added over the past three years – expected to continue ■ 300 MW/y of wind added over the past three years – expected to continue
Gas and Nuclear	■ 1.4 GW of gas in advanced stages and 3.0 GW in all stages to be built by 2022 ■ 6.2 GW of gas-fired power plants are slated to retire by 2022 ■ Last nuclear plant – Diablo Canyon Power Plant (2.3 GW) – will retire by 2025
Price Volatility	■ High renewables penetration leads to changes in the diurnal price profiles where prices bottom in the middle of the day driven by strong solar production ■ High delivered gas prices coupled with Operational Flow Order (OFO) at SoCal Citygate, frequent location of marginal resources drive up system marginal prices

CAISO Snapshot

Increasing over generation and steeper ramping in CAISO

CAISO Actual Net Loads on March 16th during 2015-2019



CAISO March 16th Actual Net Load (MW)		
Year	5pm -8pm Ramp	1pm Net Load
2019	12,519	4,504
2018	9,063	12,356
2017	8,343	13,937
2016	6,155	20,697
2015	3,495	22,525

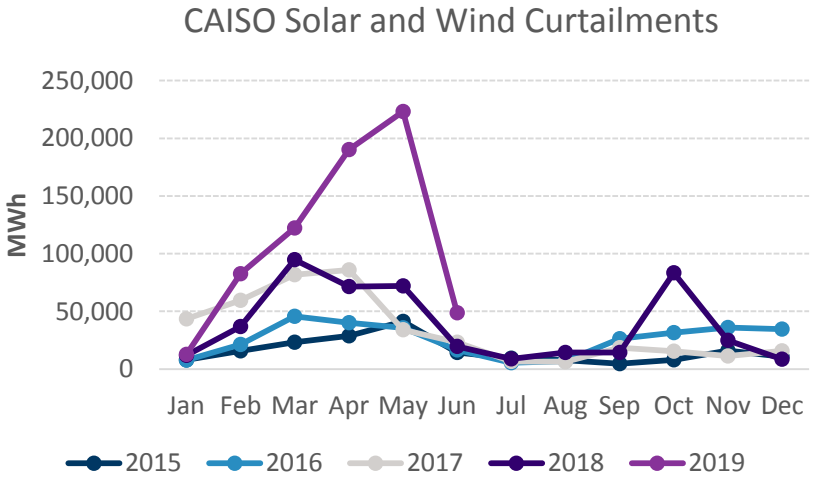
- **Changes in net load** (demand minus variable generation) demonstrate the need for flexible resources that can ramp down in the morning and up in the evening
- **Deepening net load and steeper afternoon-to-evening ramp** lead to increasing renewables curtailment and resource challenges

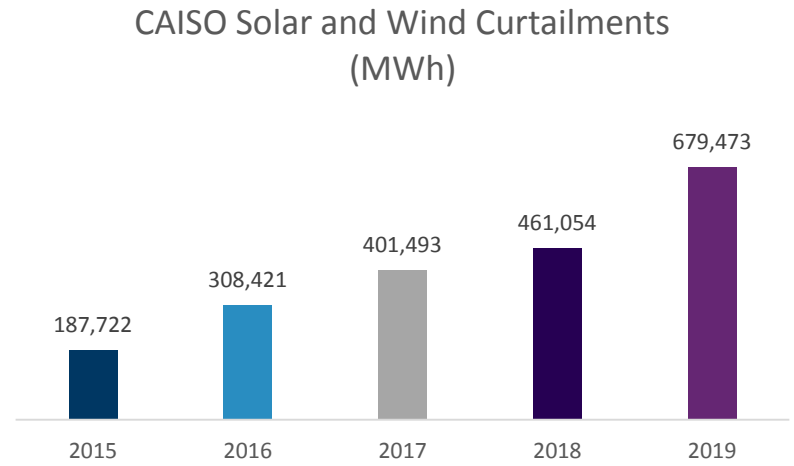
Note: March 16th is analyzed as a typical spring day because seasonally low electricity demand makes the impact of solar and wind on net load more evident.

Source: CAISO data, FTI analysis

CAISO faces challenges of solar and wind oversupply

CAISO Wind and Solar Curtailments (2015-2019)



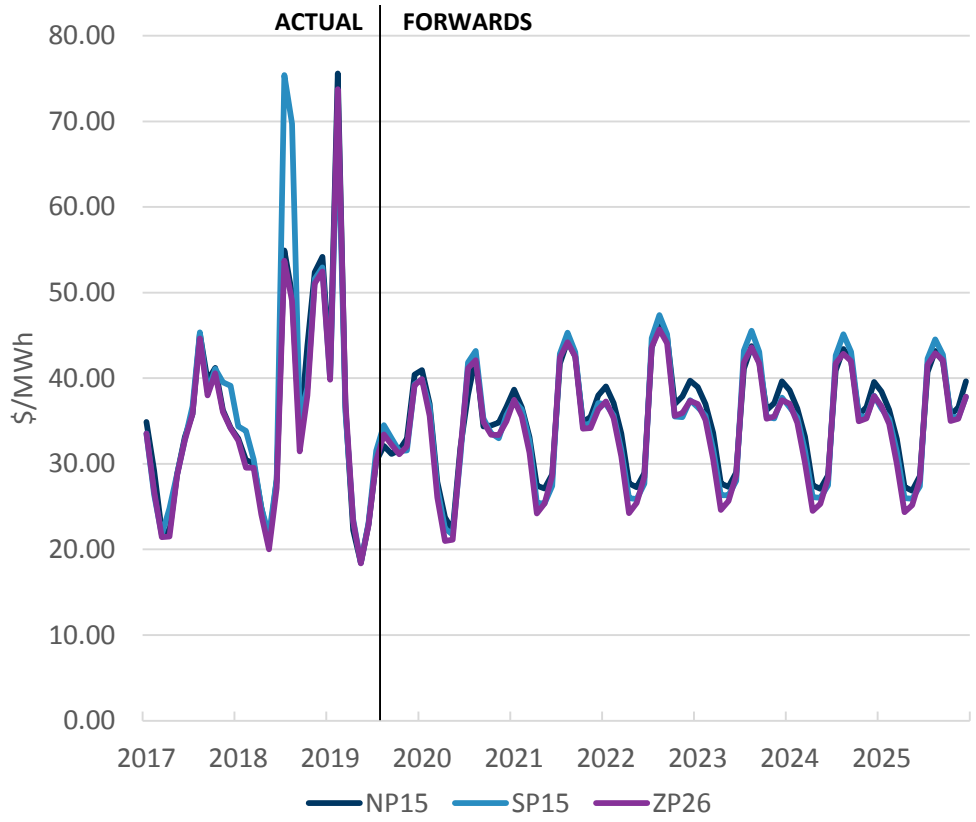


Note: 2019 data are for the period of January – June.

- **Curtailments** due to oversupply are on the rise as California integrates increasing amounts of variable renewable energy (VER) into the grid, with economic curtailments accounting for majority of renewable curtailments in CAISO
- **Deepening net load** are expected to intensify renewable curtailments, which could result in a downward spiral of overbuilding renewables to meet the 60 percent RPS mandate
- **Mitigating solutions** include energy storage, demand response, one-way and two-way charging EVs, flexible generation resources, time of use (TOU) rates, and Western EIM expansion, etc.

CAISO summer prices expected to remain high

Select CAISO Hubs Day Ahead Monthly Prices and Forward Curves



- **High prices** during peak summer months, driven by high temperatures, gas plant retirements and gas supply constraints in Southern California, and import constraints into CAISO.
- **Shoulder season prices** remain subdued across the region due to strong renewable output and anticipated return to normalcy of hydro conditions. Summer-peaking seasonality forecast to be greater than in most other regions.
- **SP 15 price** reached $980/MWh at hour 20 on July 24 2018, driven by high gas prices and low renewables production.
- **High prices in February 2019** were primarily driven by high gas prices.
- **Robust renewables growth** further pushes down the net load, and put pressure on day time power prices.

Note: CAISO settlement prices during January 1, 2017 – July 31, 2019; traded forward curves as of August 9, 2019

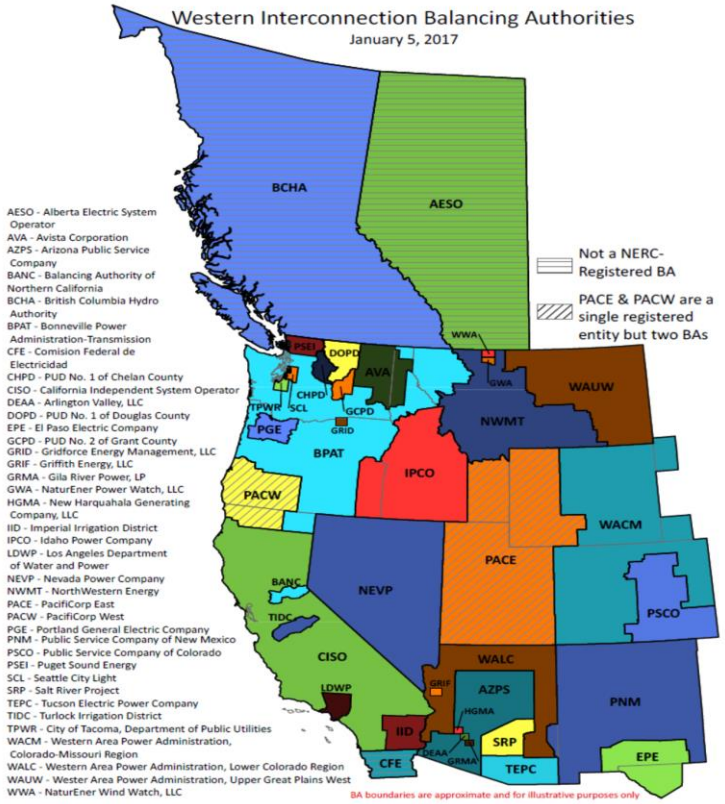
Agenda

1. National Power Market Outlook
2. CAISO Market Snapshot
3. **WECC Market Snapshot**
4. Western Energy Imbalance Market (EIM) Update
5. Glossary

WECC Snapshot

Market overview

Modeled Hubs and Load Zones

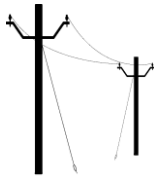


WECC is divided into 38 distinct Balancing Authority areas

Market Overview – 2018 Snapshot

Generation

- Total installed capacity: ~280 GW
- Installed Wind: 24 GW
- Installed Utility-scale Solar: ~20 GW (as of Feb 2019)



Load & Reserve Margin

- Total Energy: 880 TWh (2018)
- Peak load: 161 GW (2018)
- 10-yr Forecast Load Growth: 0.9 percent per annum
- 2018 reserve margin of 23.5 percent, above the NERC reference target of 15.4 percent.

Market Prices

- High summer temperatures across the west in 2018, weak hydro conditions (54 percent of normal year), and gas supply constraints in Southern California led to overall higher prices
- Mid-C Hub Energy 2019 Average*
  DA: $27.32/MWh
- Mead Hub Energy 2019 Average*
  DA: $31.50/MWh

* Note: as of June 13, 2019

WECC Snapshot

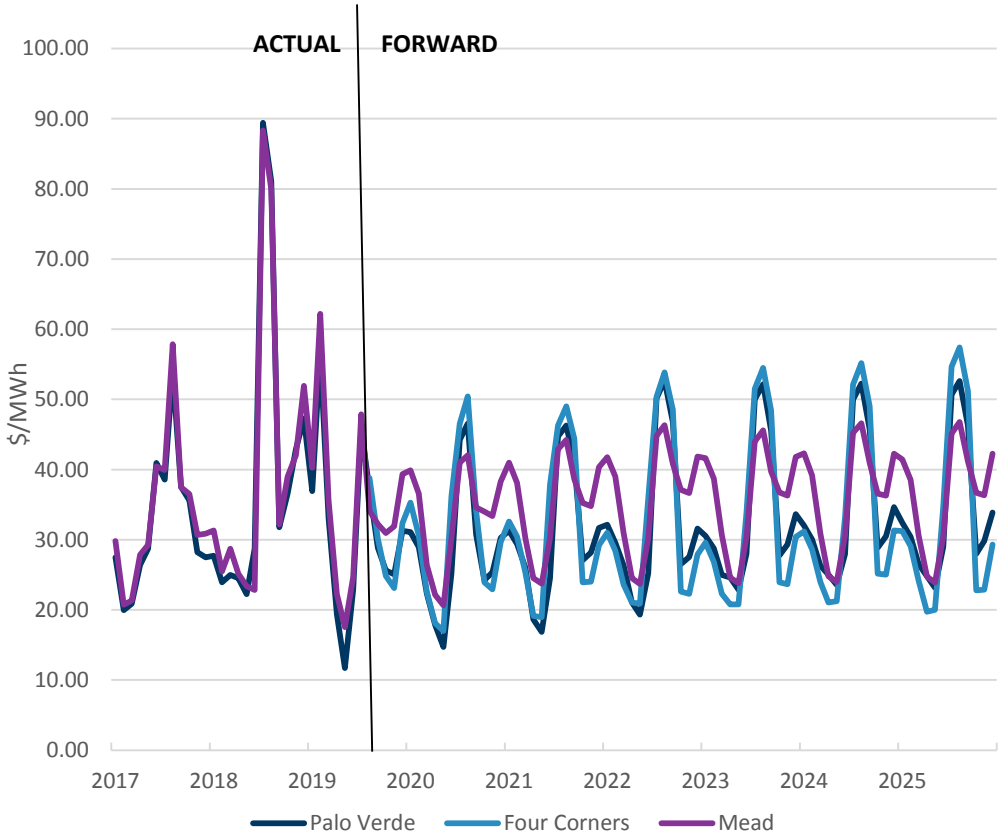
Key market trends and drivers

Factors	Description
Increased RPS Mandates	■ New Mexico RPS of 100 percent by 2045 ■ Nevada RPS of 100 percent by 2050 ■ Follows SB 100 that accelerates California's RPS to 60% by 2030 and 100% by 2045
Renewables	■ Strong solar irradiance in California and the Southeast, and wind resources across entire WECC ■ Aggressive retirement schedule for existing gas and coal units; high regulatory and policy hurdles for all new generation capacity other than renewables or energy storage in most states ○ Wind capacity increases by ~9 GW by 2026, with most additions in the Pacific Northwest ○ Solar capacity increases by ~18 GW by 2026, with most additions in California
Coal and Nuclear	■ High regulatory and policy hurdles for all new generation capacity other than renewables or energy storage in most states ■ System reserve margins are expected to become increasingly tight through 2026, driven by baseload coal and nuclear retirements (~9 GW of coal and ~2 GW of nuclear by 2026) ■ New Mexico capacity shortages, with coal retirements in the PNM Balancing Authority area not yet offset with new resource procurement. PNM has announced plans to make up the capacity shortfall through increased imports, battery storage projects, and renewables.
Ramping Requirements	■ Higher system ramping requirements create investment opportunity for storage, EV, demand response, and flexible generation resources to mitigate reliability risks

WECC Snapshot

WECC summer prices expected to remain high

Select WECC Hubs Day Ahead Monthly Prices – FTI Reference Case



Note: Historical prices during January 1, 2017 – July 31, 2019; traded forward curves as of August 9, 2019

- **High prices** during peak summer months, driven by coal retirements in New Mexico and Arizona, and expected short-term increase in scarcity pricing in California impacting neighboring areas – especially Nevada, Arizona, and New Mexico.
- **Pending PNM joining the EIM** expected to increase market opportunities for New Mexico generation resources to access different peak loads in the Western area.
- **Robust renewables growth** with ~9 GW of wind and ~18 GW of solar capacity to come online across WECC by 2026.

Agenda

1. National Power Market Outlook
2. CAISO Market Snapshot
3. WECC Market Snapshot
4. **Western Energy Imbalance Market (EIM) Update**
5. Glossary

Expanding EIM improves renewable integration & grid reliability

EIM Expansion: 9 Entities to 17 Entities by 2022

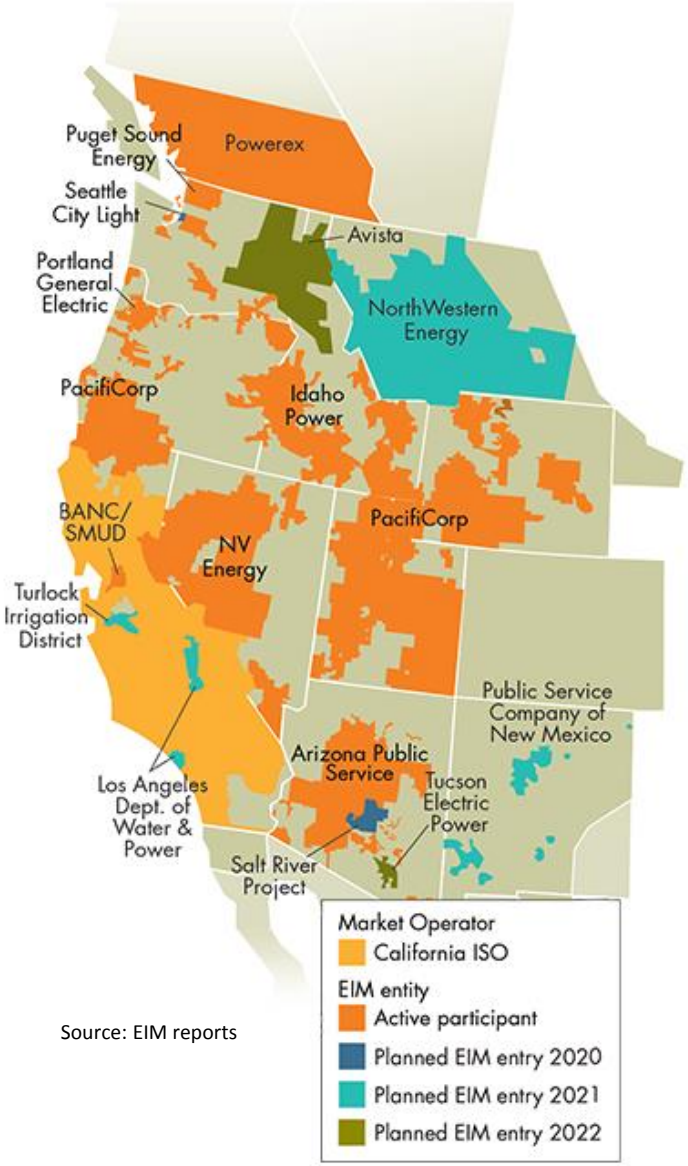
Current Participants:

- California ISO
- PacifiCorp
- NV Energy
- Arizona Public Service
- Puget Sound
- Portland General Electric
- Powerex
- Idaho Power Company
- Balancing Authority of Northern California (BANC)/Sacramento Municipal Utility District (SMUD)

Upcoming Participants:

- Salt River Project (2020)
- Seattle City Light (2020)
- Los Angeles Department of Water & Power (LADWP) (2021)
- **Public Service Company of New Mexico (PNM) (2021)**
- NorthWestern Energy (2021)
- Turlock Irrigation District (2021)
- Avista (2022)
- Tucson Electric Power (2022)

- **Energy Imbalance Market (EIM) expansion** with planned new entrants from Montana, New Mexico, Arizona, and California could contribute to improved integration of renewables
- **Diversity of load and resource** across a wide geographic area helps to manage increasing flexible capacity needs and renewable curtailment in CAISO
- **Allow participants to access the cost savings** while maintaining control over assets and responsibility in balancing requirements
- **Improved market transparency and liquidity** with inter- and intra-regional dispatches



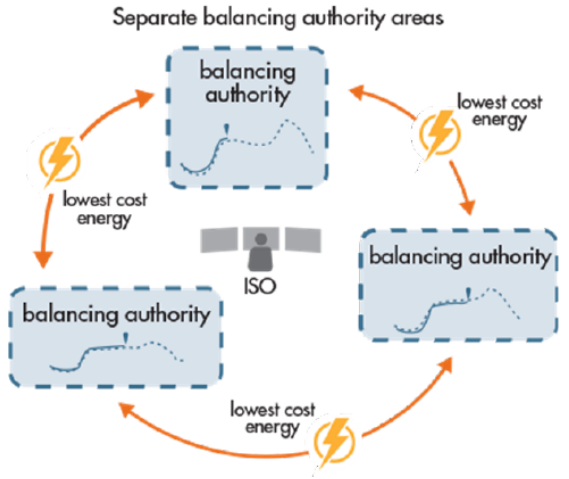
Source: EIM reports

PNM Anticipated to Join EIM in April 2021

PNM Expected to Join EIM in 2021

- **Timeline**
  - PNM anticipates to join the Western EIM in April 2021 with favorable cost benefit analysis. Estimated $20.9M initial capital and $7.4M other expenses to join; estimated benefits from $10.6M-$19.4M annually
  - On May 7, 2019, CAISO filed to FERC the EIM Implementation Agreement between CAISO and PNM
  - On June 26, 2019, FERC accepted for filing effective July 7, 2019, the EIM Implementation Agreement between CAISO and PNM
- **Benefits**
  - PNM's load peaks earlier in the day than the majority of load in the West and its robust transmission interconnections with its neighbors in the West can provide a conduit to make market exchanges that are cost effective and bring benefit to consumers in New Mexico
  - Preserves PNM autonomy, including compliance, balancing, and reserve obligations
  - Utilizes EIM automated dispatch to minimize costs, resolves imbalances and avoid congestions

EIM Ops: Real Time 5- and 15-min Market



- The EIM allows balancing authorities ("BAs") to leverage the benefits of real-time balancing while also maintaining all of their existing authority, i.e., BAs remain responsible for procurement or self-provision of reserves and ancillary services.
- All BAs start the hour with matched generation and forecasted load. Imbalances occur within the hour because load and generation typically vary slightly from what is forecasted.
- Security constrained economic dispatch ("SCED"): Resources within the EIM voluntarily provide bids and the EIM looks across the EIM region and dispatches the most economical bids available to meet these imbalances, while respecting the transmission limits.

Source: CAISO filings, EIM, PNM annual reports

ATTACHMENT A

Agenda

1. National Power Market Outlook
2. CAISO Market Snapshot
3. WECC Market Snapshot
4. Western Energy Imbalance Market (EIM) Update
5. Glossary

Glossary (1/2)

Balancing Authority (BA): A Balancing Authority (BA) is the entity that integrates resource plans ahead of time, maintains Demand and resource balance within one or more Balancing Authority Areas, and supports Interconnection frequency in real time.

Balancing Authority of Northern California (BANC),

CAISO: The California Independent System Operator is a non-profit Independent System Operator serving California. It oversees the operation of California's bulk electric power system, transmission lines, and electricity market generated and transmitted by its member utilities.

Day Ahead (DA) market: DA market is a financial market where market participants commit to buy or sell wholesale electricity one day before the operating day, to help avoid price volatility. This market produces one financial settlement.

Distributed energy resources (DERs): Electricity-producing resources or controllable loads that are directly connected to a local distribution system or connected to a host facility within the local distribution system.

Electric Reliability Council of Texas (ERCOT): ERCOT is an independent system operator (ISO) that operates the electric grid and manages the deregulated market for 75 percent of Texas.

Energy Imbalance Market (EIM): EIM is an intra-hour centralized real time energy market used to economically and securely dispatch participating resources to efficiently balance supply, transfers between participating Balancing Authority Areas (EIM Entity BA areas), and load across the market's footprint (EIM Area).

Gigawatt (GW): A GW is a unit for electric power equal to one billion (10^9) watts.

Gigawatt hour (GWh): A GWh is equal to 1 GW of electricity used continuously for one hour.

ISO-NE: ISO New England is an independent, non-profit Regional Transmission Organization (RTO), headquartered in Holyoke, Massachusetts, serving Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont.

Locational Marginal Pricing (LMP): LMPs represent the marginal cost of providing the next increment of energy demand (i.e., cost to serve the next MW of load) at thousands of pricing points, or pNodes, within an electricity grid. It provides price signals that account for the additional costs of electricity caused by transmission congestion and line loss at various points on the electricity grid.

Midcontinent Independent System Operator (MISO): MISO is an Independent System Operator and Regional Transmission Organization providing open-access transmission service and monitoring the high-voltage transmission system in the Midwest United States and Manitoba, Canada and a southern United States region which includes much of Arkansas, Mississippi, and Louisiana.

Megawatt (MW): A megawatt is a unit for measuring power that is equivalent to one million watts or 1,000 kilowatts (kW).

Megawatt hour (MWh): A megawatt hour is equal to 1 megawatt of electricity used continuously for one hour, or 1,000 kWh.

Million British Thermal Unit (MMBtu): The British thermal unit (Btu or BTU) is a traditional unit of heat; it is defined as the amount of heat required to raise the temperature of one pound of water by one degree Fahrenheit. For natural gas, 1 MMBtu ≡ 1,000,000 Btu

New York ISO (NYISO): The New York ISO manages NY's power grid and energy markets.

Glossary (2/2)

North American Electric Reliability Corporation (NERC): a not-for-profit international regulatory authority whose mission is to assure the effective and efficient reduction of risks to the reliability and security of the grid. NERC develops and enforces Reliability Standards; annually assesses seasonal and long-term reliability; monitors the bulk power system through system awareness; and educates, trains, and certifies industry personnel. NERC's area of responsibility spans the continental United States, Canada, and the northern portion of Baja California, Mexico.

Operational Flow Order (OFO): An Operational Flow Order is a mechanism to protect the operational integrity of the pipeline. Pacific Gas and Electric Company's California Gas Transmission may issue and implement System-Wide or Customer-Specific OFOs in the event of high or low pipeline inventory.

Peak Load: The highest hourly integrated Net Energy For Load within a Balancing Authority Area occurring within a given period (e.g., day, month, season, or year).

PJM Interconnection: PJM is a regional transmission organization (RTO) that coordinates the movement of wholesale electricity in all or parts of 13 states and the District of Columbia.

PNM: Public Service Company of New Mexico - New Mexico's largest electricity provider.

Real Time (RT): The Real-Time Energy Market lets market participants buy and sell wholesale electricity during the course of the operating day. The Real-Time Energy Market balances the differences between day-ahead commitments and the actual real-time demand for and production of electricity.

Renewable Portfolio Standards (RPS): An energy policy which specifies the proportion of the energy mix that must come from renewable resources for an electricity provider. Typically, an RPS will require a certain percentage of renewables be used (on a capacity or energy basis) by a certain year in the future. Such policies will typically specify interim percentage targets in addition to final goals for renewable generation.

Reserve Margin: Planning reserve margin is designed to measure the amount of generation capacity available to meet expected demand in planning horizon. Planning Reserve Margin equals the difference in Deliverable or Prospective Resources and Net Internal Demand, divided by Net Internal Demand.

Regional Transmission Organization (RTO): A regional transmission organization is electric power transmission system operator which coordinates, controls and monitors a multi-state electric grid. The transfer of electricity between states is considered interstate commerce and electric grids spanning multiple states are therefore regulated by the Federal Energy Regulatory Commission (FERC).

Security constrained economic dispatch (SCED): The operation of generation facilities to produce energy at the lowest cost to reliably serve consumers, recognizing any operational limits of generation and transmission facilities.

SMUD: Sacramento Municipal Utility District

Southwest Power Pool (SPP): oversees the bulk electric grid and wholesale power market in the central United States on behalf of a diverse group of utilities and transmission companies in 14 states.

Western Electricity Coordinating Council (WECC) promotes Bulk Electric System (BES) reliability in the Western Interconnection. WECC is the Regional Entity responsible for compliance monitoring and enforcement. In addition, WECC provides an environment for the development of Reliability Standards and the coordination of the operating and planning activities of its members as set forth in the WECC Bylaws.

Terawatt (TW): A GW is a unit for electric power equal to one trillion (10^12) watts.

Terawatt hour (TWh): A TWh is equal to 1 TW of electricity used continuously for one hour.

Experts with Impact ™

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Senior Director

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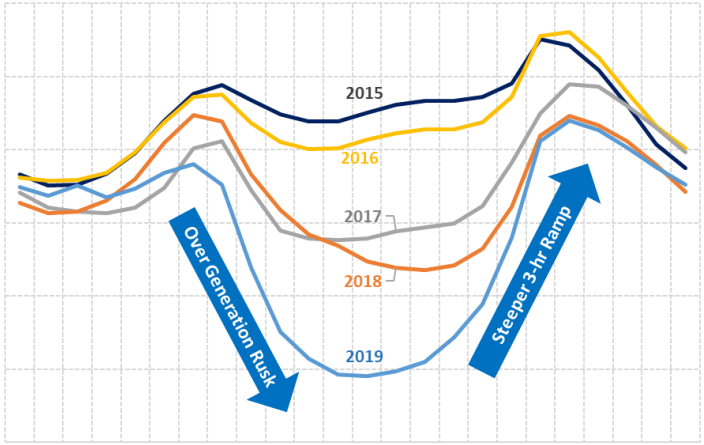
ATTACHMENT A

How does the evolving Western Interconnect effect NM and LAC

- Operational Changes
  - Reduced Bilateral market trading
- Services from PNM affected
  - Bandwidth calculation
- Reserve margin Risk-
  - Positive Reserve Margin in the LL hours
  - Negative Reserve Margin in the Duck Curve Ramp hours



LOS ALAMOS

In Conclusion

- Resource planning is ongoing and dynamic
- Due to load, generation profiles and market dynamics, DPU is currently pursuing two resource options
  - CFPP
  - ATC firm renewables
- DPU will continue to monitor all aspects of Resource Planning and report to BPU and County Council as required.

Questions?

Glossary

- ATC – Around the Clock
- Bandwidth – LAC has a +/- 2 MW bandwidth requirement under PNM's tariff. This means our scheduled power to serve our forecasted load must be within +/- 2 MW of our actual load. If were are above or below this bandwidth, PNM applies a penalty for that period.
- Block Power – A Power Purchase Agreement with a specified capacity over a specified period of time.
- CFPP – Carbon Free Power Project
- CT – Combustion Turbine
- Demand Side Resources – Roof-top solar
- DER – Distributed Energy Resource
- DOE-NNSA-LANL Department of Energy-National Nuclear Security Administration-Los Alamos National Laboratory
- ECA – Electric Coordination Agreement
- FER Committee – Future Energy Resource Committee
- HL – High Load
- IRP - Integrated Resource Plan
- JMEC – Jemez Mountain Electric Co-op
- LAC – Los Alamos County
- LAPP - Los Alamos Power Pool
- LCOE – Levelized Cost of Energy
- LL – Low Load
- LRS – Laramie River Station

Glossary

- MWh – Unit of Energy, 1 mega-watt over 1 hour
- NORA – Northern Rio Arriba Electric Co-op
- NTUA – Navajo Tribal Utility Authority
- Peak and Off Peak – market pricing during the high demand periods and low demand periods
- PNM - Public Service Company of New Mexico
- PPA – Power Purchase Agreement
- PV Solar – Photo Voltaic Solar
- SJGS – San Juan Generating Station
- SMR or SMNR – Small Modular Reactor or more specifically a Small Modular Nuclear Reactor
- Supply Side Resources – Utility Scale Power
- TA3 CC – LANL Tech Area 3 Combined Cycle
- TSGT – Tri-State Generation & Transmission
- WACM – Western Area Colorado Missouri
- WALC – Western Area Lower Colorado
- WAPA – Western Area Power Administration “Western”
- WECC – NM – Western Electricity Coordinating Council –New Mexico market pricing

County of Los Alamos

Staff Report

September 17, 2019

Los Alamos, NM 87544
www.losalamosnm.us

Agenda No.:	B.
Index (Council Goals):	* 2019 Council Goal - N/A
Presenters:	Carrie Walker, Chair of the Board of Public Utilities
Legislative File:	**11670-19**

Title

Briefing to Council by Carrie Walker, Chair of the Board of Public Utilities.

Body

Council leadership has requested that each Board/Commission Chair make a presentation to the Council once a year focused on what has been completed and what they are currently working on, and what challenges or opportunities they see coming up in the future.

Attachments

A - Board of Public Utilities Presentation to Council FY20

LOS ALAMOS
Department of Public Utilities

2019 COUNCIL PRESENTATION

Board of Public Utilities

Carrie Walker, Chair

September 17, 2019

ATTACHMENT A

BOARD MEMBERS

MEMBER	POSITION	TERM ENDS
Jeff Johnson	Vice-chair	2020
Kathleen Taylor	Member	2021
Carrie Walker	Chair	2022
Steve McLin	Member	2023
Steve Tobin	Member	2024

NEW UTILITIES MANAGER

In February 2019, Utilities Manager Timothy Glasco submitted a notice of retirement. Mr. Glasco served the County for nearly 25 years in the Department of Public Utilities, 5 of those as the Utilities Manager.

After a nation-wide recruitment and interviews conducted by multiple panels of staff, the Board and Council, the County Public Works Director, Philo S. Shelton, III, was selected. Mr. Shelton began as the Utilities Manager on June 30th.

SAFETY EMPLOYEE OF THE QUARTER

The Safety Employee of the Quarter program was developed by the DPU Safety Committee in 2014. The intent is to reward those who most clearly and effectively demonstrate DPU's safety culture vision.

FY18 Q4
Adam Cooper
Electric Production

FY19 Q1
Victor Tanuz
Water Production

FY19 Q2
Joel Martinez
Water Production

FY19 Q3
Dennis Segura
Engineering

Tyler Munis Enterprise Resource Planning

The County's go-live date was July 1st, 2018. The implementation of this new system has impacted processes throughout DPU, including those related to

- Financial systems and reporting
- Contract management
- Customer accounts
- Utility billing and integration with the customer app
- Consumption reporting
- Payroll and labor capture

Employees have worked hard to adapt to and refine processes using the new system. They continue to strive to find solutions to issues impacting DPU's efficiency and customer satisfaction.

The County has planned a Munis upgrade for October 2019. Testing will begin at that time with go-live scheduled for January 1st, 2020.

Advanced Metering Infrastructure (AMI)

In August 2018, the BPU approved an agreement with Ferguson Incorporated for system-wide deployment of AMI. Council approved execution of the agreement in March 2019.

Opt-Out

In February 2019, the Board adopted Rule GR-16, which allows customers to opt-out without any additional fees. For customers who opt-out, smart meter wireless transmission capabilities will be deactivated. **Customers can opt-out via an online form or by contacting Customer Care.**

Smart meter installations were originally scheduled to begin around September of 2019. However, coordinating meter installations with the upcoming Munis upgrade in October may require a revision to the original schedule. It could take up to 18 months to have the entire county upgraded to the new AMI.

Otowi #2 Water Supply Well

The drilling of Otowi Well #2 began on January 16, 2018. The operation was originally scheduled to take 60 days to complete the drilling and install the screen and casing; however, the driller encountered fissured basalt layers, which delayed progress and increased the contract amount from approximately $2.6 million to $4.2 million.

Drilling and testing was completed in May. According to the final engineering report, **the test results estimate the yield from the well to be above 1,000 gallons per minute. This will be one of the top producing wells in the water production system.**

This month, an RFP will be issued for engineering services to design the well house and equip the well. It is anticipated that the well will be online by the summer of 2020.

Renewal of the DOE Water Contract

With the lease of the water production system in 1998, the County entered into a contract with the Department of Energy (DOE) to provide water to Los Alamos National Laboratory. The contract includes provisions for access to County water facilities on DOE property, deals with security issues and provides for various environmental and other issues specific to working with LANL.

The period of the current contract is from October 1st, 2009 to September 30, 2019.

A one-year bridge contract is being negotiated that will be presented to the Board on September 18, and if approved then presented to Council on 9/24.

Management Audit & QNM Zia Application

Every 5 years, the Board is required by Charter to employ a qualified consultant to review, comment, and make recommendations as to the operation and condition of the County Utilities.

Additionally, the Department has a Board approved strategic objective to develop a culture of continuous improvement. As one way to achieve this, the management team defined a shorter-term initiative to **attain Malcolm Baldrige level recognition for performance excellence by 2025.**

The first step in attaining Baldrige recognition is to receive the highest level of state recognition, which is the Quality New Mexico Zia Award. Since 2008, the Department has received two Roadrunner awards, just one step below the Zia. A consultant was hired to assist with preparing a Zia application, and it was submitted to QNM in July.

The next step is for Quality New Mexico to conduct a site visit to verify the quality of operations as submitted in the application and provide a feedback report that will highlight strengths and opportunities for improvement in seven different comprehensive areas of performance.
This site visit and subsequent feedback report will serve to fulfill the management audit requirement.

ATTACHMENT A

Stabilizing Utilities Through Financial Policies

The Board adopted formal policies for financial targets in August of 2016. The purpose was to ensure adequate cash is available for effective and efficient operations of all County-owned utilities. For budgeting, rate-setting and operational planning purposes, the Department adheres to the policy in regards to cash reserves.

At this time, the Department has sufficient reserves to meet minimum requirements overall.

In June 2019, staff presented a financial plan update to assess progress toward financial goals and assist the Board in determining if revisions of the guidelines or targets was prudent at that time.

Staff will return to the Board at a later date to discuss options for the excess gas cash balance, strategies for funding future water system projects through reserve funds or bonds, and to discuss possible changes to clarify some of the language in the Financial policies.

Quarterly Utility System Updates

In 2017, the Board requested and began receiving updates on a separate utility system each quarter. These reports typically focus on the condition of the utility, capital improvement progress and planning, performance measures, operations and maintenance needs, financial health, budget concerns and any other major issues the Board needs to be aware of.

These assessments, along with the financial policies, provide a strong framework for informed decision-making throughout the year.

The recent presentations from October 2018 to August 2019 can be viewed online.

- 10/18/2018 – Gas
- 1/16/2019 – Water
- 4/17/2019 – Wastewater
- 7/17/2019 – Electric Production
- 8/22/2019 – Electric Distribution

The next quarterly update will be presented in October on the Gas Utility.

Rate Adjustments

From February to April 2019, the Board and Council considered and approved a rate adjustment for the potable and non-potable water rates.

The adjustment was in accordance with the long-range financial sustainability plan for the water utility and had been under discussion for the previous two years. The ten-year forecast for the water utility presented with the FY20 budget included a series of incremental rate increases to generate revenues needed for current operations and to build cash reserves necessary for future infrastructure needs.

This and future proposed rate actions should establish a cash flow that covers operations and maintenance, provides for a modest amount of annual capital replacement spending, and moves the DPU toward achieving long-term cash reserve goals. After these series of rate increases, future increases should be in alignment with inflation.

DPU PROPOSED INCREASES

	FY20	FY21	FY22
Water	5.00%	4.25%	4.00%
Sewer	6.00%	3.00%	2.00%

ATTACHMENT A

Rate Adjustments – Public Outreach

TUNE IN

Six opportunities to watch **LIQUID ASSETS: The Story of our Water Infrastructure**, a fascinating documentary that explores the critical role of our nation's water infrastructure on Los Alamos PAC 8.

Sun	9/22	6:00pm	**Sun**	9/29	6:00pm
Wed	9/25	6:00pm	**Wed**	10/2	6:00pm
Thu	9/26	12:00pm	**Thu**	10/3	12:00pm

ATTEND

Along with the two required ordinance public hearings for BPU and Council, several other meetings will be held to give the public an opportunity to get informed.

Wed	9/18	5:30pm	Chambers	BPU discussion
Mon	10/7	6:00pm	WR Library	Informational public meeting
Thu	10/10	6:00pm	Nature Center	Informational public meeting
Wed	10/16	5:30pm	Chambers	BPU public hearings
Tue	10/29	6:00pm	Chambers	Council introduction
Tue	11/26	6:00pm	Chambers	Council public hearings

Initiatives for Future Energy Resources

Board Adopted Strategic Objective

Be a carbon neutral electric energy provider by 2040.

The Future Energy Resources (FER) Committee (an ad hoc citizen committee) prepared a July 2015 report to recommend future energy generation resources for Los Alamos County. The Board adopted most of the recommendations.

Detailed updates on progress towards these recommendations and a timeline is available every quarter in the Department's Quarterly Performance Reports. These are sent to Council and are also available on the Department's online Reports & Documents Library.

FY19 EFFORTS:

- Carbon Free Power Project
  - Subscription @ 8.0 MW of 600 MW plant capacity
  - JUMP Resolution increases LAC share to 3.186 MW
- AMI Contract and Opt-Out
- Electric Distribution Grid Modeling
- Hydro Pumped Storage Research

FY20 EFFORTS:

- Carbon Free Power Project Consideration
- Utility Scale Solar Project Research
- Community Solar Garden Options
- EV Charging Station
- AMI Implementation
- Post 2025 Electric Coordination Agreement
- Unbundling Electric Rate Discussion (Delayed until AMI Implementation)

Other Focus Areas for FY20

- Engineering Design of the White Rock Waste Water Treatment Facility
- NM 502 Reconstruction Project
- Implementation of Advanced Metering Infrastructure & Public Education
- Upgrade of Tyler Munis & Subsequent Challenges
- Customer Account Mobile App
- Quality New Mexico Site Visit & Feedback Report
- Biennial Customer Service Survey
- International Brotherhood of Electrical Workers (IBEW) Collective Bargaining Agreement Expiration May 2020

FY2020 BUDGETED CIP

ELECTRIC PRODUCTION		**265,000**
Update Energy & Water Conservation Plan		25,000
Electric SCADA Upgrades (Modems,Switches & RTUS)		100,000
Abiquiu Jib Crane		140,000
ELECTRIC DISTRIBUTION		**1,400,000**
Los Alamos URD Replacement (cables, jboxes, pedestals)		100,000
White Rock URD Replacement (cables, jboxes, pedestals)		100,000
Overhead System Replacement (polex, xarms, transformers)		200,000
Townsite Circuit 15, 3 PHASE		
White Rock Circuit1, 3PHASE		
Los Alamos Substation LASS		850,000
Electric Vehicle Charging Stations		150,000
GAS DISTRIBUTION		**25,000**
Update Energy & Water Conservation Plan		25,000
WATER DISTRIBUTION		**0**
WATER PRODUCTION		**1,655,000**
Update Energy & Water Conservation Plan		25,000
NM 4 & Tsankawi Chlorination Building and Pipe Replacement		750,000
Replace Overlook Park Booster Station (NP-WTB)		880,000
WASTEWATER TREATMENT AND SEWER COLLECTION TOTAL		**0**
SEWER COLLECTION	**0**	
WASTEWATER TREATMENT	**0**	

Projects in addition to CIP deferred in or carried over from FY19

ATTACHMENT A

Board of Public Utilities
bpu@lacnm.us

Philo Shelton, Utilities Manager
philo.Shelton@lacnm.us
662-8148

Supplemental Materials

FY19 CIP Projects

			QTR1			QTR2			QTR3			QTR4		
Planning & Design Actual Construction		Budgeted	07/18	08/18	09/18	10/18	11/18	12/18	01/19	02/19	03/19	04/19	05/19	06/19
Electric Production		$305,000												
	Electric SCADA Server Consolidation	120,000	comp											
	Electric SCADA Replace Back-up	50,000	comp											
	Back-up Power Operation Center - Install an HVAC System	60,000	comp											
	Abiquiu & El Vado Transformer Oil and Bushings	75,000	def FY20											
Electric Distribution		$1,000,000												
	Los Alamos- Replace URD (cables, jboxes, pedestals)	300,000												
	White Rock - Replace URD (cables, jboxes, pedestals)	300,000												
	Replace Overhead System (poles, cross arms, transformers)	400,000												
	NM 502 - (Carryover $522,785)	0												
Natural Gas Distribution		$0												
	NM 502 - (Carryover $417,012)	0												

ATTACHMENT A

FY19 CIP Projects Cont.

			QTR1			QTR2			QTR3			QTR4		
Planning & Design Actual Construction		Budgeted	07/18	08/18	09/18	10/18	11/18	12/18	01/19	02/19	03/19	04/19	05/19	06/19
Water Distribution		$0												
	NM 502 - (Carryover $914,826)	0												
Water Production		$3,935,000												
	LA Reservoir Rd Mitigation ($1,222,500 FEMA/$407,500 LAC Match)	1,630,000												
	Otowi Well 2 Construction - Well House & Equipment	1,930,000	def FY20											
	Pajarito Well 5 MCC Replacement - Construction	275,000	def FY20											
	Auto Valves 10 and 11 Remove and Replace	100,000	def FY20											
	NM 502 - (Carryover $450,291)	0												
Sewer Collection		$0												
	NM 502 - (Carryover $101,830)	0												
Wastewater Treatment		$1,520,000												
	White Rock Replacement Wastewater Treatment Plant - Design	1,520,000												

ATTACHMENT A

Critical Infrastructure Protection

In July of 2016, new cyber security regulations, North American Electric Reliability Council Critical Infrastructure Protection Version 5 (CIP-5), were implemented that apply to the operators of electric transmission lines. The Los Alamos Power Pool comprised of DOE/LANL and Los Alamos County share responsibilities in operating "pool assets".

The Department contracted with Intellibind Technologies to provide CIP-5 comprehensive patch management services with the intention to transfer the electric Supervisory Controls and Data Acquisition (SCADA) system to LANL by January 2019. However, the schedule has moved out by two years, and LANL will not be ready to take over the system until 2021.

In May 2019, the Board and Council approved an extension of both the term and compensation for IntellIbind to account for the delay and to provide additional compliance and audit related services that were previously performed by a SCADA Technician who resigned.

This action ensures that the Department maintains a subject matter expert to advise on and assist with very important compliance and regulatory issues related to protecting our utility control systems.

Los Alamos, NM 87544
www.losalamosnm.us

County of Los Alamos

Staff Report

September 17, 2019

Agenda No.:	A.
Index (Council Goals):	
Presenters:	County Council - Work Session
Legislative File:	**12313-19**

Title

Discussion of Possible Comments to Santa Fe National Forest Draft Land Management Plan

Body

The Santa Fe National Forest (NF) has been revising its 1987 Land Management Plan to better address current issues and incorporate modern science. Since the plan revision process began, the Santa Fe NF has engaged over 3,200 people in roughly 250 public meetings and has collaborated with 13 cooperating agencies, 24 Federally Recognized Tribes, and 4 Tribal Councils. These engagements, along with input from Santa Fe NF resource specialists and the best available science, have formed the draft revised Land Management Plan and have shaped the desired conditions, objectives, guidelines, standards, and management approaches within the document. Additionally, a complete analysis of the proposed draft Plan and alternatives to the draft Plan are included in a three volume draft Environmental Impact Statement (DEIS).

Last month the USFS published a Notice of Availability (NOA) in the Federal Register which officially begins a 90-day comment period on these documents. This comment period is scheduled to close on November 7, 2019. Following the official release of these documents, the Santa Fe NF plans to hold numerous public meetings around the Forest to answer questions about the documents and resources, and help interested parties to develop substantive comments for submission during the 90-day comment window. Please refer to the Santa Fe NF planning website for more information (www.fs.usda.gov/goto/santafeforestplan <http://www.fs.usda.gov/goto/santafeforestplan>).

Council will discuss if County comments should be drafted during the comment period.