Electric Production Hydroelectric Facilities 2025 Annual Update

August 6, 2025

Board of Public Utilities

Work Session

Don Wichers

Hydroelectric Plant Supervisor

LOS ALAMOS

Abiquiu Hydro

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El Vado Hydro

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Overview

- EP Asset Management Team (AMT)
- Facilities
- Hydro Plants' Operations
- Community Education
- Asset Management
- 10-Year Capital Improvement Plan
- Federal Partners' Projects
- Performance Metrics
- Questions

Electric Production - AMT Members

Ben Olbrich, Deputy Utility Manager-Power Supply
James Alarid, Deputy Utility Manager-Engineering
Don Wichers, Hydroelectric Plant Supervisor
Matt Duggan, Sr. Hydroelectric Maintenance Technician
Austin Craig, Hydroelectric Maintenance Tech. Apprentice
Nick Nelson, Power Systems Supervisor
Tony Mateo, SCADA System Specialist
James Martinez, Senior Engineer
Lucas Montoya, Engineering Associate

Hydroelectric Plant Asset Management

- The hydroelectric plant operations, maintenance, regulatory compliance, stakeholder coordination and planning are administered through an Asset Management Team (AMT) that consists of the department manager, plant operation staff, a SCADA coordinator and an Engineering Department representative.
- The team meets quarterly to plan, coordinate resources and assess the plants' operational and equipment needs to optimize plant efficiency, prioritize efforts and justify operational and capital budgets annually, including a 10-year capital plan.
- Asset management tools used to schedule and track efforts consists of HydroAMP for assessment of major plant components, MPRO 2000 PLUS software for scheduling & tracking maintenance of equipment, daily walkthrough checklists and facility-specific maintenance schedules.
- Hydropower Asset Management Partnership (HydroAMP) is a structured two-tiered, public domain(1), risk-based condition assessment and economic analysis tool developed and used by the US Bureau of Reclamation, US Army Corps of Engineers, Bonneville Power and Hydro Quebec. The DPU implemented HydroAMP for asset management of the El Vado and Abiquiu hydroelectric plants in 2008. The industry acceptance, systematic approach and database management component aligned well with the DPU's asset management goals.

NOTES:

HydroAMP has since been absorbed (hosted) by CEATI International, Inc. and is now subscription-based. The EP AMT is considering joining for the valuable guides and data contained therein.

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Hydroelectric Power Plants

- The Incorporated County of Los Alamos Department of Public Utilities (DPU) owns and operates two run-of-the-river hydroelectric power plants; both located on the Rio Chama in Rio Arriba County in northern New Mexico.
- The El Vado hydroelectric plant is located approximately 14 miles southwest of Tierra Amarilla, NM on the El Vado Lake Dam, which is owned and operated by the U.S. Bureau of Reclamation.
- The Abiquiu hydroelectric plant is located approximately 9 miles northwest of Abiquiu, NM on the Abiquiu Lake Dam, which is owned and operated by the U. S. Army Corps of Engineers.

LAC Hydroelectric Generating Stations

Abiquiu: 3 Generating Units - 17.0 MW Combined Capacity

El Vado: 1 Generating Unit - 8.9 MW Capacity

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Hydroelectric Plants Federal Governance

- Los Alamos County operates both plants under the provisions set forth in a Memorandum of Agreement with the federal dam operator for each plant.
- The Federal Energy Regulatory Commission (FERC) has jurisdiction over both power plants.

El Vado

- The El Vado hydroelectric plant was commissioned in 1987 and began generating in 1988 under FERC Permit No. 5226.
- Characteristics of the El Vado hydroelectric plant are provided below:

El Vado	Unit 1
Type	Vertical Kaplan
RPM	300
Rated Head	105 Feet
Flow Range	200-1000 CFS
Turbine	Voith (Germany)
Commissioned	1987
Generator	National Industri (Norway)
Rated Power	8.9 MW
Rated Voltage	4160 VAC

Abiquiu

- The Abiquiu hydroelectric plant was commissioned in 1989 and began generating in 1990-91. A third low-flow unit was commissioned and brought online in 2011. The Abiquiu project is operated under FERC Permit No. 7396.
- Characteristics of the Abiquiu hydroelectric plant are provided below.

Abiquiu	Unit 1	Unit 2	Unit 3
Type	Vertical Francis	Vertical Francis	Horizontal Francis
RPM	400	400	514
Rated Head	175 Feet	175 Feet	170 Feet
Flow Range	235-550 CFS	235-550 CFS	75-235 CFS
Turbine	Harbin (China)	Harbin (China)	Andritz (Canada)
Commissioned	1989	1989	2011
Generator	Harbin (China)	Harbin (China)	Indar (Spain)
Rated Power	6.9 MW	6.9 MW	3.2 MW
Rated Voltage	4160 VAC	4160 VAC	4160 VAC

Hydroelectric Plant Operations

- The two hydroelectric plants are staffed with three full time LAC - DPU employees. They all serve equally as both operators & maintainers.
- All three operators support both plants and work between the two plants as needed. The plants are normally staffed from 6:00 a.m. to 4:30 p.m. Monday – Thursday (during pilot 4/10 period) and one plant operator is on-call after hours and on weekends.
- The plants are monitored and operated after hours from the Los Alamos County Power Operations Center (POC) located in Los Alamos, NM. Remote operation and monitoring capabilities exist through a Supervisory Controls And Data Acquisition (SCADA) system.
- The SCADA system has been transferred to DOE-NNSA since the bulk of cybersecurity compliance by the North American Electric Reliability Corporation (NERC) applies to the transmission system which is owned and operated by DOE-NNSA.
- Los Alamos County has responsibility for maintenance and emergency response to the SCADA system for both hydroelectric facilities.

Community Outreach

- The staff at the Plants have given numerous tours in the past several years.
- We have provided tours for Cub Scouts and Boy Scouts, the World College, LANL, PEEC, USACE, USBR, LAC interns, and even new councilmembers, just to name a few.
- Most tours last about 1.5 hrs. and we show people what is under that brown metal building in Abiquiu.
- Tours in El Vado are rare but do happen. It's 2 hours from Los Alamos and it takes up almost an entire day. However, it is a great boondoggle.
- What is fascinating is that the children will ask more questions than the adults.
- All of us enjoy giving the tours. It allows us to talk about our careers and what we do daily that almost no one, including many present, knows what we do.

Community Outreach

(letter from Cub Scouts)

All -

THANK YOU SO VERY MUCH for an absolutely wonderful time... it went great. We really appreciate that you came in on your day off to do this. The kids were talking about it the rest of the weekend and one of our families sent me a picture of their kiddos (age 4 and 8) on Sunday afternoon in a mud puddle in the backyard "building a hydroelectric dam". Thank you, Matt and Don, for sharing your Eagle experience - I think it was good for the kids to hear how important it is from someone other than their parents!!!

Adam, thank you for facilitating this... It made for a memorable summertime adventure!

Erica Reed
Cubmaster P409

Community Outreach

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El Vado
Equipment Condition Index

El Vado – HydroAMP Condition Assessment					
Equipment	**Manufacturer**	**Placed In Service**	**Condition Index (2008)**	**Condition Index (2012)**	**Condition Index (Today)**
PLANT					
Main Station Batteries	C&D	2017 Replaced	10.0 / GOOD	N/A	10.0 / GOOD
Compressed Air System - High Pressure Governor Air	Baur	1987	9.9 / GOOD	N/A	N/A
Compressed Air System – Low Pressure Station Service	Champion	1987	9.9 / GOOD	N/A	N/A
Crane - 60 Ton Overhead Crane	Gaffey	1998 Bridge 2015 Hoist	10.0 / GOOD	N/A	10.0 / GOOD
Crane - 5 Ton Jib Crane	Yale	1987	9.67 / GOOD	N/A	N/A
Main Transformer	Westinghouse	1987	10.0 / GOOD	6.57 / FAIR	10.0 / GOOD
UNIT					
Main Circuit Breaker (Air)	Siemens	2014 Replaced	10.0 / GOOD	N/A	10.0 / GOOD
Emergency Closure Valve - TSV Butterfly Valve	Kubota	1987	9.2 / GOOD	N/A	N/A
Emergency Closure Valve - PSV Butterfly Valve	Litostroj (Yugoslavia)	1985	8.2 / GOOD	N/A	N/A
Emergency Closure Valve - Draft Tube Gates		1987	9.2 / GOOD	N/A	N/A
Excitation System	Basler	2007 Digital Upgrade	10.0 / GOOD	N/A	N/A
Generator Rotor *(Note 1)*	National Industri	2015 Cleaned & Tested	Incomplete	4.32 / FAIR (POOR)	10.0 / GOOD
Generator Stator *(Note 1)*	National Industri	2015 Rewound	Incomplete	7.24 / GOOD (FAIR)	10.0 / GOOD
Governor	Voith	2008 Digital Upgrade	10.0 / GOOD	N/A	N/A
Turbine	Voith	2015 Refurbished	8.3 / GOOD	9.42 / GOOD	10.0 / GOOD

Condition Index (CI) LEGEND:
7 <= CI <= 10: GOOD
3 <= CI < 7: FAIR
0 <= CI < 3: POOR

Note (2012 K-P Assessment): Although the HydroAMP Condition index indicates that the rotor and stator are in fair to good condition, the extent of the oil/brush dust residue throughout the interior of the generator, and the possible adverse consequences from it, would actually indicate a “poor to fair” condition.
Note (Generator Rotor Assessment): The generator condition changed from "poor/fair" in 2012 to "good/good" today as a result of the generator rewind project completed in 2017.
Note (Main Transformer Assessment): The main transformer was replaced in 2023 with a brand new one.

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Abiquiu
Equipment Condition Index

Abiquiu – HydroAMP Condition Assessment					
Equipment	**Manufacturer**	**Placed In Service**	**Condition Index (2008)**	**Condition Index (2012)**	**Condition Index (Today)**
PLANT					
Main Station Batteries	C&D	2017 Replaced	10.0 / GOOD	N/A	10.0 / GOOD
Compressed Air System - Low Pressure Station Air	Gardner Denver	1989	9.9 / GOOD	N/A	N/A
Crane - 60 Ton Overhead	Gaffey	1997	10.0 / GOOD	N/A	N/A
Emergency Closure Gate - PRV Bypass Cone Valve #1	Kabota	1989	Pending	N/A	N/A
Emergency Closure Gate - PRV Bypass Cone Valve #2	Kabota	1989	Pending	N/A	N/A
Emergency Closure Gate - Penstock Tunnel Gate	ZWAG	1989	9.0 / GOOD	N/A	N/A
Main Transformer	ASEA Electric	1989	Incomplete	9.91 / GOOD	10.0 / GOOD
UNIT #1					
Main Circuit Breaker (Air) Unit #1	Siemens	2014 Replaced	7.37 / GOOD	N/A	10.0 / GOOD
Emergency Closure Valve - TSV Butterfly Valve - Unit #1	Harbin Equipment Package	1989	8.2 / GOOD	N/A	N/A
Emergency Closure Gate - Draft Tube Gate Unit #1	Telluride Iron Works	1989	8.5 / GOOD	N/A	N/A
Excitation System Unit #1	Basler	2005 Digital Upgrade	10.0 / GOOD	N/A	N/A
Generator Rotor Unit #1	Harbin	1989	Incomplete	9.02 / GOOD	N/A
Generator Stator Unit #1	Harbin	1989	Incomplete	8.42 / GOOD	N/A
Governor Unit #1	HPS	2003 Digital Upgrade	10.0 / GOOD	N/A	N/A
Turbine Unit #1	Harbin	1989	7.8 / FAIR	4.75 / FAIR	4.75 / FAIR
UNIT #2					
Circuit Breaker (Air) Unit #2	Siemens	2014 Replaced	7.37 / GOOD	N/A	10.0 / GOOD
Emergency Closure Valve - TSV Butterfly Valve - Unit #2	Harbin Equipment Package	1989	8.2 / GOOD	N/A	N/A
Emergency Closure Gate - Draft Tube Gate Unit #2	Telluride Iron Works	1989	8.5 / GOOD	N/A	N/A
Excitation System Unit #2	Basler	2005 Digital Upgrade	10.0 / GOOD	N/A	N/A
Generator Rotor Unit #2	Harbin	1989	Incomplete	9.02 / GOOD	N/A
Generator Stator Unit #2	Harbin	1989	Incomplete	8.42 / GOOD	N/A
Governor Unit #2	HPS	2003 Digital Upgrade	10.0 / GOOD	N/A	N/A
Turbine Unit #2	Harbin	1989	8.8 / GOOD	8.75 / GOOD	N/A

Condition Index (CI) LEGEND:
7 <= CI <= 10: GOOD
3 <= CI < 7: FAIR
0 <= CI < 3: POOR

Note: (Main Transformer): The main transformer was replaced in 2023 with a brand new one.

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Maintenance, Testing and Capital Projects

- The DPU has completed several major maintenance, testing and capital improvements over the years as either planned reliability improvements or due to equipment failure.
- Consideration of these improvements in assessing the condition of each plant, plant reliability and economic planning of future budgets is critical.
- The table below summarizes the major maintenance and capital improvements that have taken place at the Abiquiu Plant and the El Vado Plant.

Past 10-Year CIP & O&M

Column1	Column2	Column3	Column4
Facility	Year	Cost	Description
Abiquiu	2015	$194,077.00	Upgrade Mechanical Relays With Solid State Devices
El Vado	2015	$192,949.00	60 Ton Hoist for Existing Bridge Crane
El Vado	2015	$194,077.00	Upgrade Mechanical Relays With Solid State Devices
Both	2015	$89,157.00	River Gauging Stations VHF Radio Telemetry Upgrades
El Vado	2015	$8,989.00	Road Widening and Stabilization for Unit Transport/Refurbishment
Abiquiu	2017	$65,625.00	New 125 kW Propane Emergency Back-up Generator
El Vado	2017	$65,625.00	New 80 kW Diesel Emergency Back-up Generator
El Vado	2017	$4,587,174.00	Main Generator Rewind & Turbine Refurbishment Project
Abiquiu	2018	$336,979.00	Plant PLC & Digital Controls Upgrade
Abiquiu	2018	$36,299.00	Main Plant Control Batteries Replacement
Abiquiu	2018	$450,316.00	Main Dam Penstock Vent Shafts - Shutoff Valves Installation
El Vado	2018	$36,299.00	Main Plant Control Batteries Replacement
Both	2018	$31,519.00	POC SCADA Room Uninterruptable Power Supply (SCADA)
Both	2018	$31,964.00	POC SCADA Room HVAC Replacement (SCADA)
Abiquiu	2020	$107,757.00	PRV Chamber Gates 3-Ton Jib Crane Installation
El Vado	2021	$31,000.00	12 Miles 69kV Transmission Line Pole Inspections
El Vado	2021	$432,587.00	Purchase New Main Station Transformer
Both	2021	$369,541.00	Paint Hydro Decks, Floors, Railings, Cranes, Hatches etc.
Both	2021	$8,419.00	Dispose of Abandoned CO2 Bottles
Abiquiu	2022	$10,521.13	Repair Perimeter Fencing, add razor wire
El Vado	2022	$68,170.71	Replace Perimeter Fence with new & taller. Add razor wire.
Abiquiu	2023	$472,409.47	Install New Main Plant 69kV Transformer. Paint Tower.
El Vado	2023	$390,893.00	Install New Main Plant 69kV Transformer. Paint Tower.
El Vado	2024	$184,995.00	Replace Diesel UST for Emergency Genset
El Vado	2024	$444,532.51	Install 12 miles of new fiber to El Vado (SCADA)
Both	2025		Upgrades to SCADA system (Ongoing)
Abiquiu	2025	$359,000.00	Xfmr Firewall Upgrade and Office Expansion (Ongoing)
Abiquiu	2025		New Draft tube U3 due to irreparable cavitation damage (Ongoing)
Abiquiu	2025	$43,000	New HP and Station Service Air Compressors

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Current 10-Year CIP

Column1	Column2	Column3	Column4
Facility	Year	Cost	Description
Abiquiu	TBD	$2,000,000	USACE Main Dam Penstock Vent Shafts Repairs - 95% Design Completion Imminent
Abiquiu	HOLD	$300,000	USACE Main Penstock Tunnel Liner Repair - Tabled for now
Both	2024	$400,000	SCADA System Upgrades - Hardware, Software & Redundant Comm Path [IN DESIGN] (Equipment = ~$160k)
Both	2024	TBD	Establish "on-call" contract and budget for Eaton to perform critical electrical PM's on recurring basis
Both	2024	TBD	Perform Complete Arc Flash Study, complete all zone identifications and labeling [IN PROGRESS]
Abiquiu	2024	$50,000	Design Unit 3 Draft Tube Dissolved Oxygen Injection System Fix - Cavitation Damage
Abiquiu	2025	$450,000	Install Unit 3 Designed Draft Tube Repairs/Cavitation Remediation
Abiquiu	2025	$250,000	Perform Full Plant Condition Assessment (include Electrical Coordination Study)
El Vado	2025	$50,000	Perform Electrical Coordination Study (include Partial Condition Assessment only)
Abiquiu	2025	$350,000	Construct New Office Addition & Install Fire Barrier Wall near main Step Up Transformer (SAFETY/Insurance-Driven)
Abiquiu	2025	$85,000	Pour New Concrete Slab in Loading Area - Rated for Heavy Traffic
Abiquiu	2025	$50,000	Modify Emergency Generators' Propane Supply - More Capacity & Common Manifold or Single Large Tank.
Both	2026/27?	$150,000	Install Remote Controls on Abiquiu 60 ton Gantry and Jib Cranes & El Vado Jib Crane
Abiquiu	2026	$75,000	Install Roof Access Ladder on Exterior of 40' Metal Building
El Vado	TBD	$75,000	Install Double-Block Gate Valve on PSV Bypass Piping
Abiquiu	2026/27?	$200,000	Design-Build New Metal PRV Dissipation Chamber Gates and Gate Hanger
El Vado	TBD	$550,000	El Vado Controls Upgrade (Placeholder) - RFP to be papered up & shelved until El Vado Dam is operational again
Abiquiu	TBD	$400,000	Unit #1 Runner Repair or Replacement (TENTATIVE PLACEHOLDER)

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USBR & USACE Projects

USBR is in year 3 of a 6+ year project originally slated to perform extensive repairs on El Vado Dam (2022–2029.)

- Project under contract, experienced significant delays.
  - ✓ UPDATE: USBR ISSUED A FULL WORK STOPPAGE AND CONTRACT SUSPENSION IN THE SPRING OF 2024.
  - ✓ Early estimates are USBR engineers need 3-6 years to go back to the drawing board.
- LAC will see lost revenues, but not as substantial as first predicted.
  - ✓ In the spring of 2025, USBR raised El Vado to 6820’ MSL, up from construction level of 6785’ MSL, and is holding it there for rafting releases every weekend during the summer. El Vado Hydro has enough head height and flows on the weekends to generate during that time. We are producing just over 2 MW of power.

USACE has identified repair projects to their existing steel penstock liner and penstock air vent shafts.

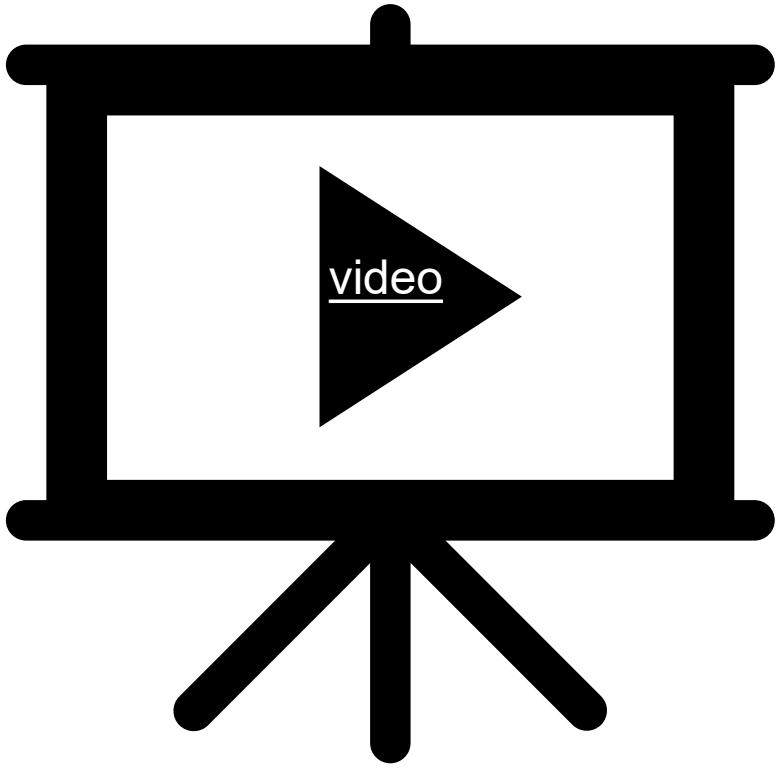
- USACE is nearing a design for vent shafts, tunnel liner tabled.
- LAC will see lost revenues and shared costs.

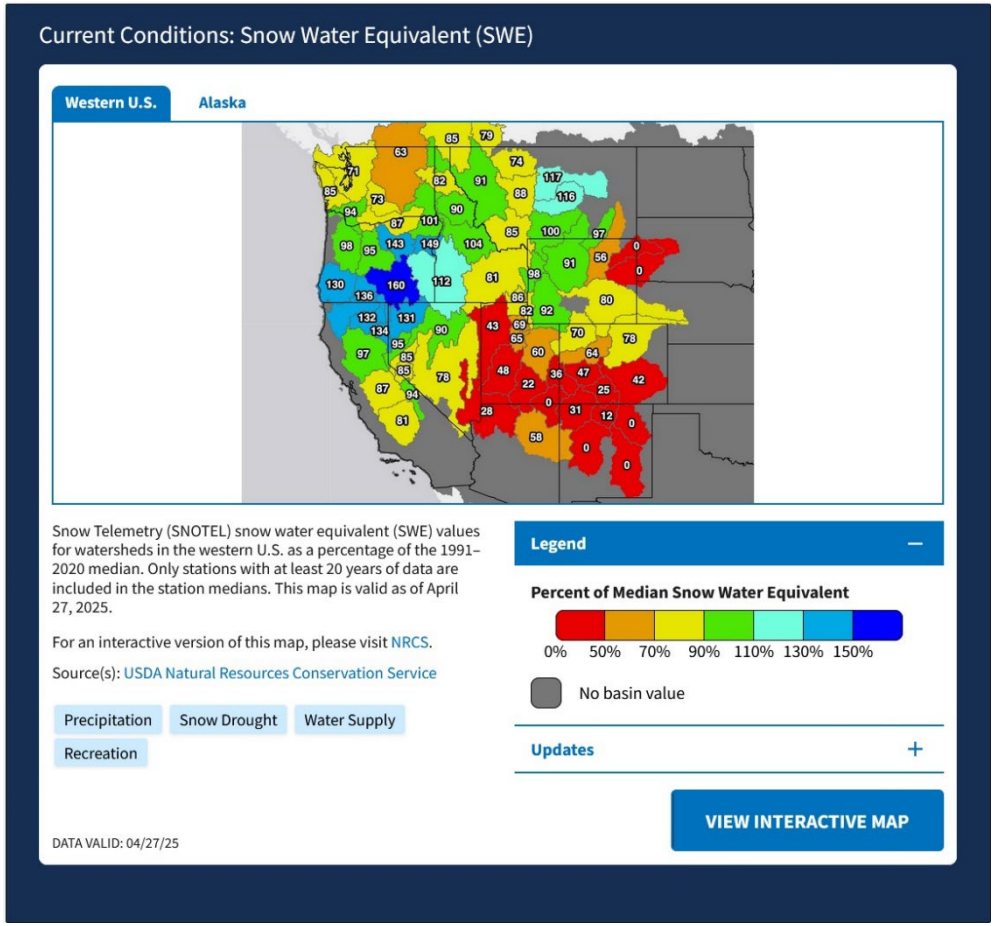
SW US Drought Conditions

- As everyone is aware, the SW US is experiencing substantial drought conditions.
- Below average snowpack and unseasonal temperatures and wind have affected spring runoff considerably.
- As a result, the hydroelectric power plants have suffered in electrical production.

Snowpack

Snow Water Equivalent
Winter 2024-2025





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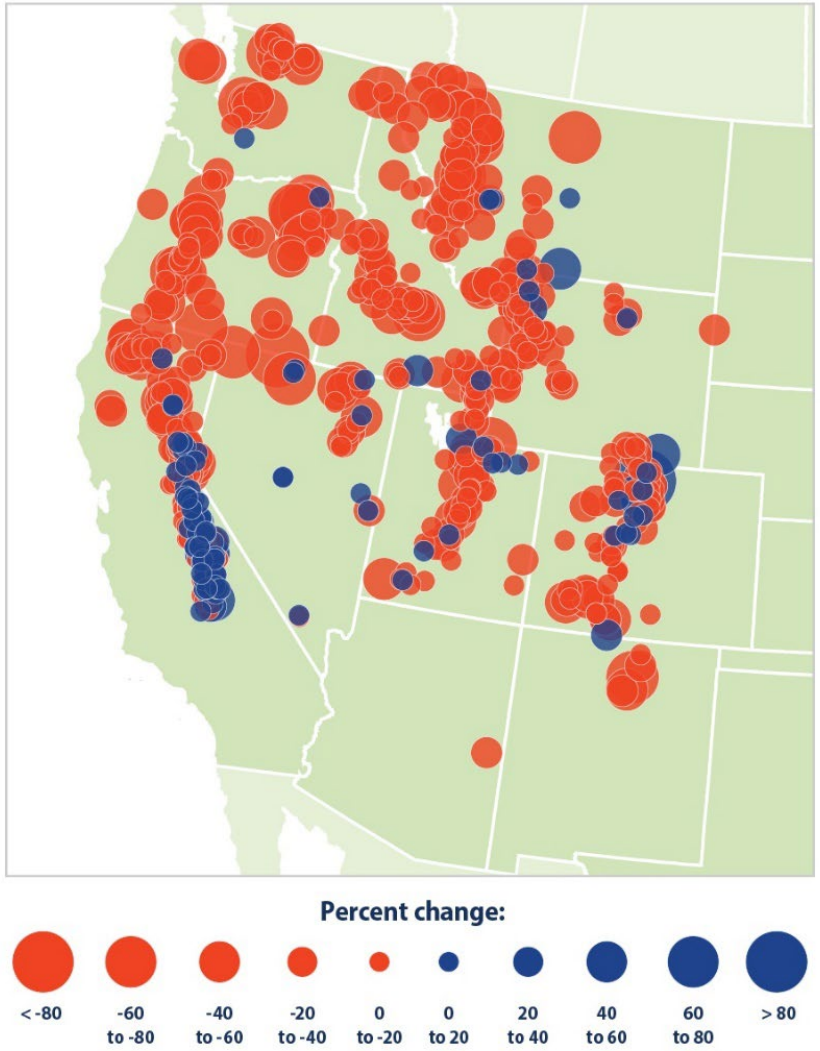
Snowpack



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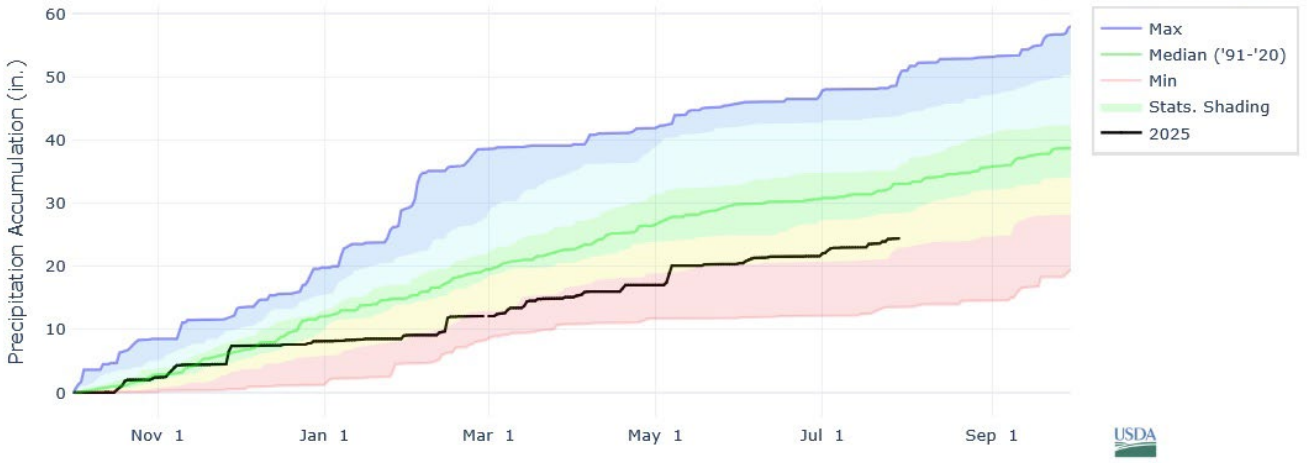
Snowpack

Cumbres Trestle SNOTEL 10,030 ft.

Water Year to Date Precipitation

74% of NRCS 1991-2020 Median

October 1, 2024 - July 28, 2025



- Parameters
- Station Metadata
- Data Reports

1991-2020 vs 1981-2010 Normals

30-year Normals Information

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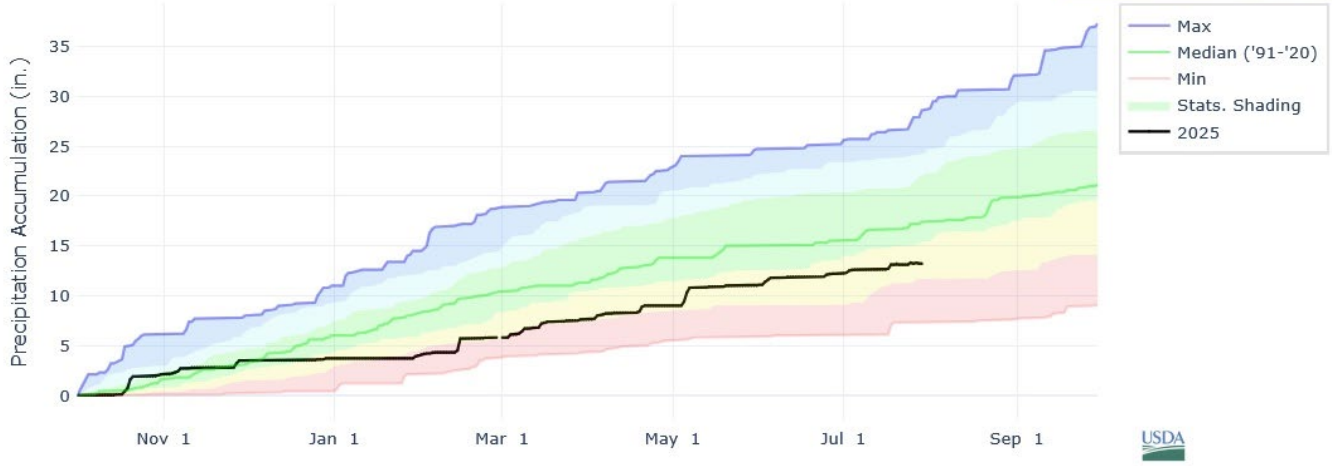
Snowpack

Chamita SNOTEL 8,370 ft.

Water Year to Date Precipitation

76% of NRCS 1991-2020 Median

October 1, 2024 - July 28, 2025



- Parameters
- Station Metadata
- Data Reports

1991-2020 vs 1981-2010 Normals

30-year Normals Information

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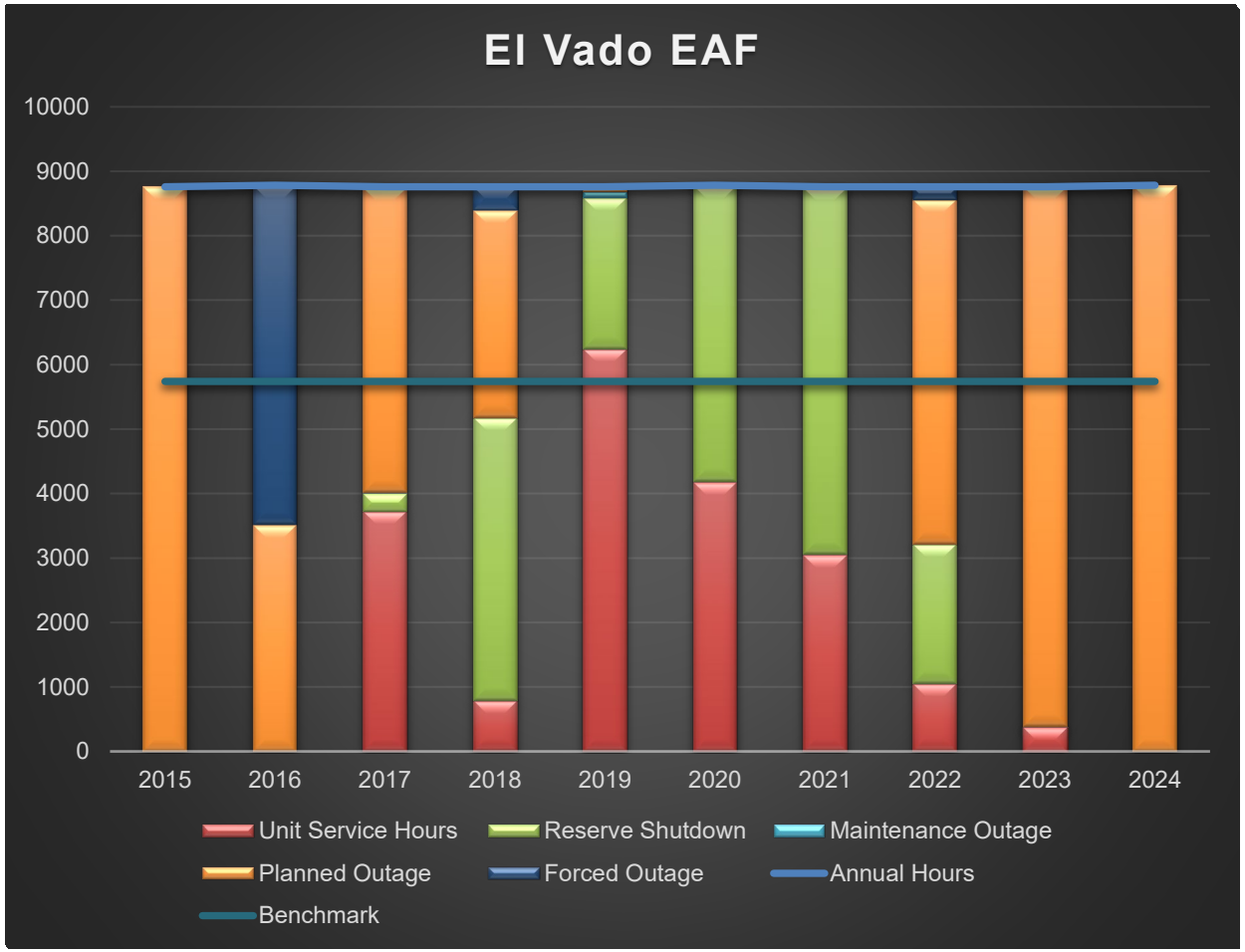
Performance Metrics

El Vado Ten-Year Availability Factor



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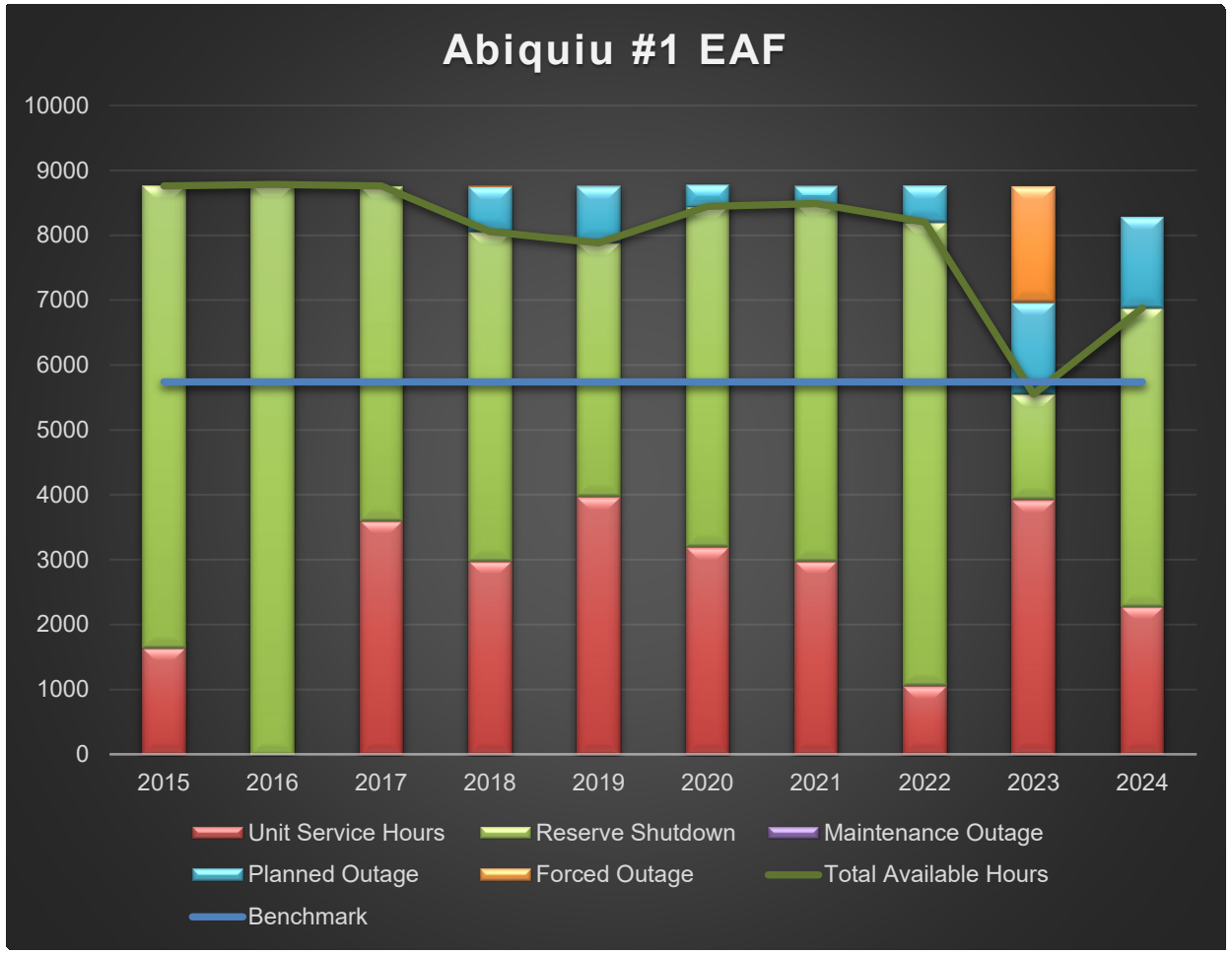
Performance Metrics

Abiquiu Unit 1 Ten-Year Availability Factor



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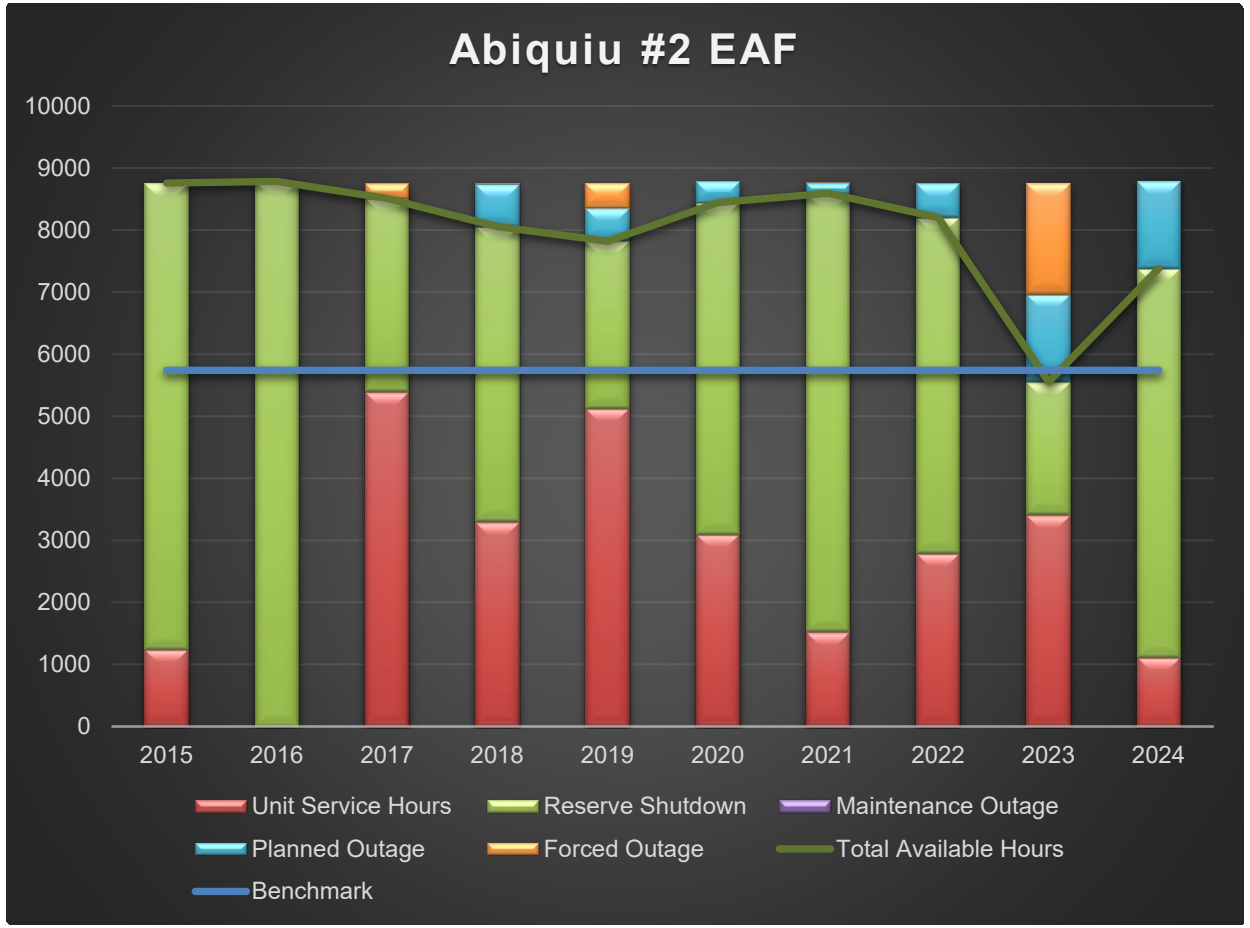
Performance Metrics

Abiquiu Unit 2 Ten-Year Availability Factor



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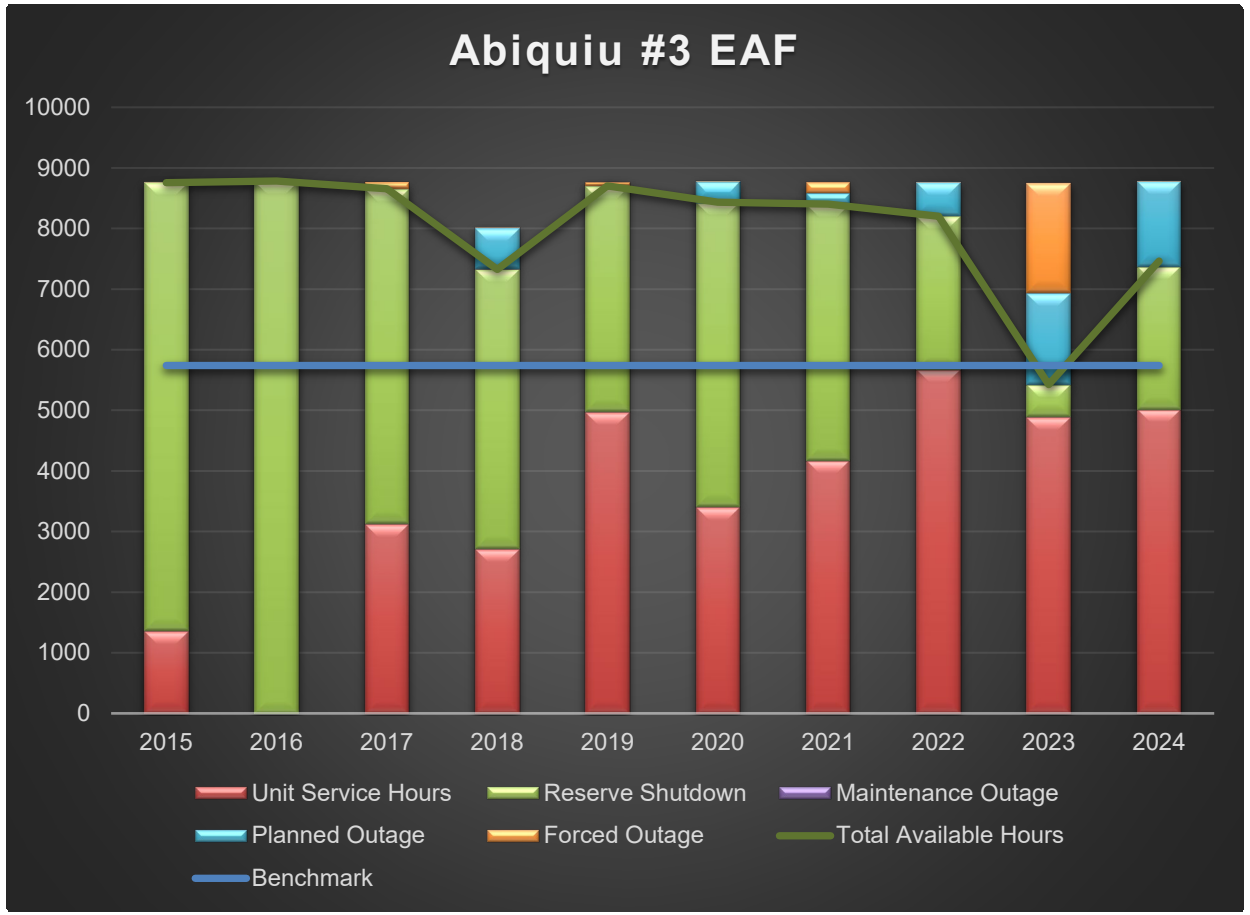
Performance Metrics

Abiquiu Unit 3 Ten-Year Availability Factor



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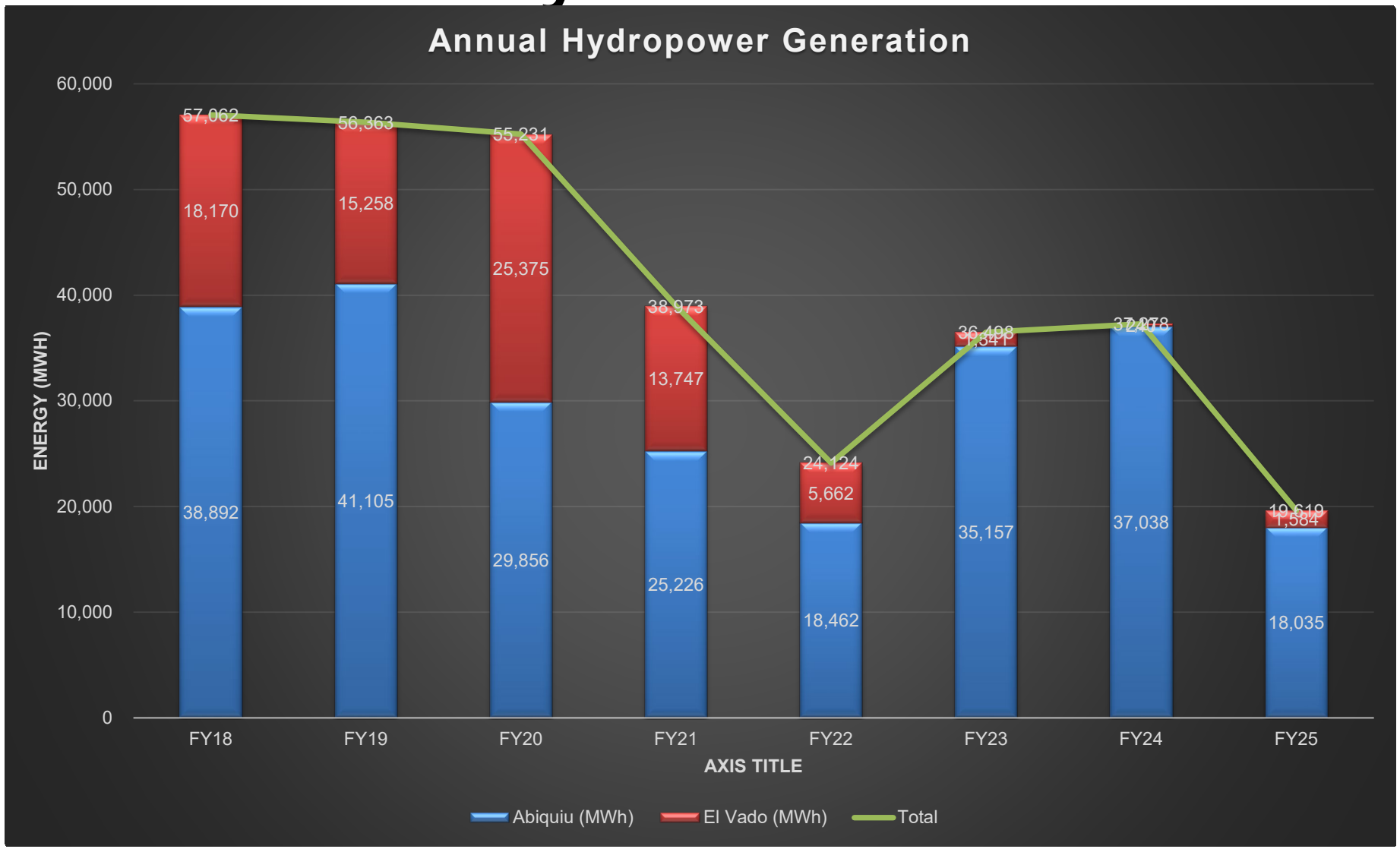
Annual Hydro Generation



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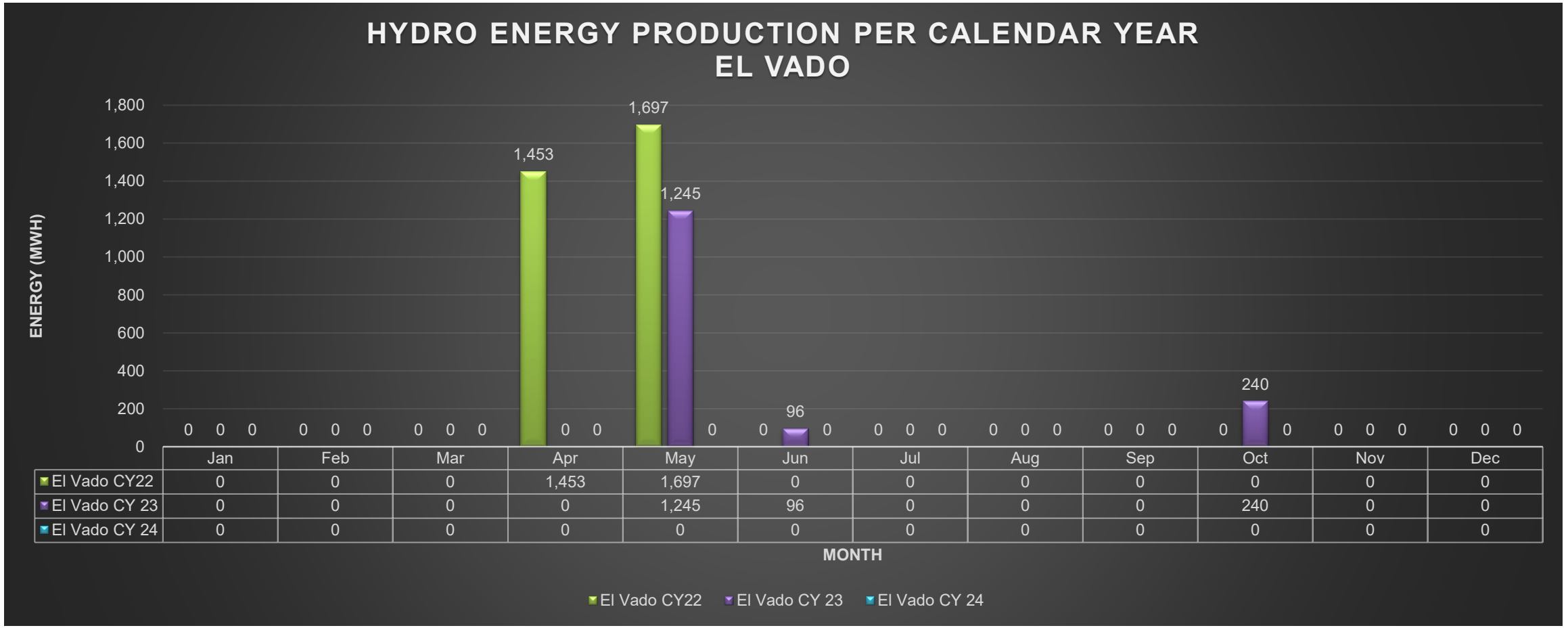
El Vado Two-Year Monthly Generation



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
El Vado CY22	0	0	0	1,453	1,697	0	0	0	0	0	0	0
El Vado CY 23	0	0	0	0	1,245	96	0	0	0	240	0	0
El Vado CY 24	0	0	0	0	0	0	0	0	0	0	0	0

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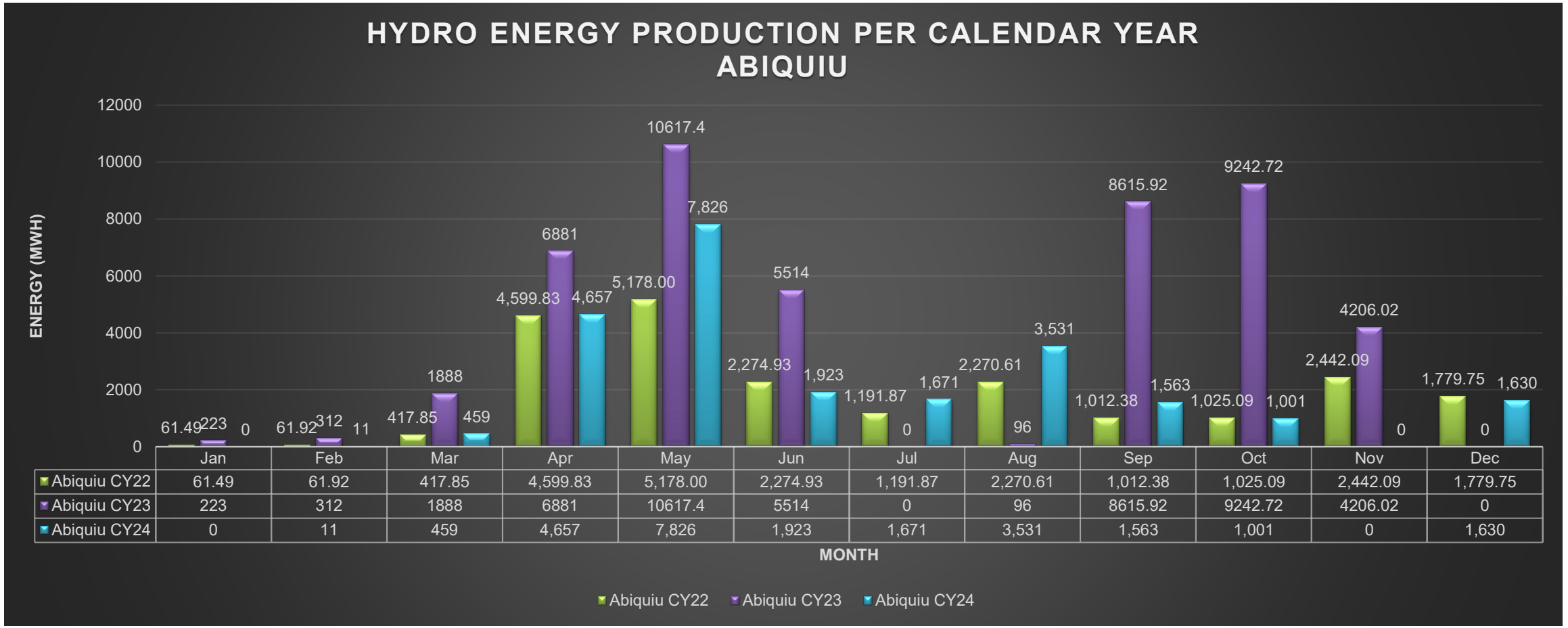
Abiquiu Two-Year Monthly Generation



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Abiquiu CY22	61.49	61.92	417.85	4,599.83	5,178.00	2,274.93	1,191.87	2,270.61	1,012.38	1,025.09	2,442.09	1,779.75
Abiquiu CY23	223	312	1888	6881	10617.4	5514	0	96	8615.92	9242.72	4206.02	0
Abiquiu CY24	0	11	459	4,657	7,826	1,923	1,671	3,531	1,563	1,001	0	1,630

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Questions