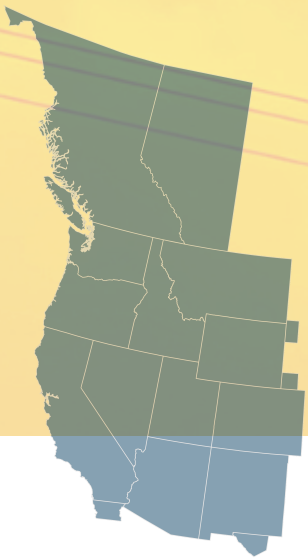
WESTERN ASSESSMENT
of Resource Adequacy

California and Mexico (CAMX)

This section covers the California and Mexico (CAMX) subregion, a summer-peaking area that includes most of California, parts of Nevada, and Baja California, Mexico.

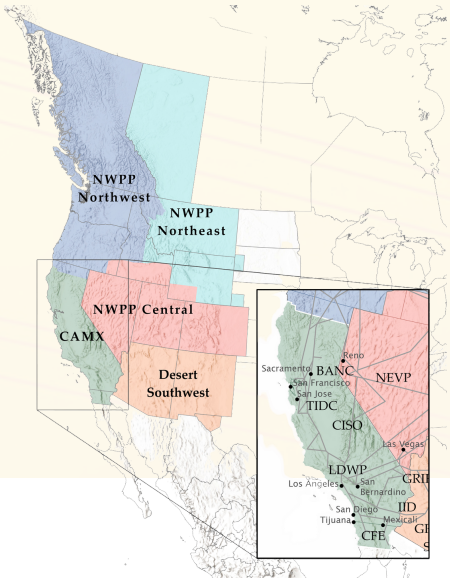
Demand-at-risk hours increase over the next eight years, due in large part to the retirement of more than 6 GW of resources. Around 2031, there are a large number of new resources planned, which decreases the demand-at-risk hours.

The variability in the CAMX subregion remains relatively flat over the next eight years. However, as new resources are added around 2031, and the demand-at-risk hours decrease, the variability increases. This is because most of the new resources are variable energy resources.



SUB-REGIONAL RISKS

The addition of almost 3,000 MW of new resources—most of which are battery storage—and the delayed retirement of some resources helped the CAMX subregion strengthen its resource availability in 2021–2022. These measures have helped the subregion remain resource adequate during the 2022 summer season. However, the delayed retirement of resources is only a temporary solution. Additional action will be necessary to ensure future resource adequacy to address increasing demand and resource variability. In addition, reliance on imports will continue to be a challenge for the subregion.



WECC

Electric Reliability and Security for the West

Western Assessment of Resource Adequacy Subregional Results

November 2022

The Western Assessment examines resource adequacy across the Western Interconnection and within each of five subregions:

- California-Mexico (CAMX)
- Desert-Southwest (DSW)
- Northwest Power Pool Northwest Central (NWPP-Central)
- NWPP Northeast (NWPP-NE)
- NWPP Northwest (NWPP-NW)

This part of the report provides information on each of the five subregions, including:

Drivers of Resource Adequacy Challenges in the West

This section describes some of the drivers of resource adequacy challenges in the West and the ways they factor into this assessment.

Demand And Risk Indicator (DRI)

This section provides information on each subregion's Demand at Risk Indicator (DRI). The DRI defines *resource adequacy risk* strictly as the number of hours in a year when demand is at risk, i.e., when the risk for loss of load exceeds the one-day-in-ten-years (ODITY) or 99.98% risk threshold. See the main report for more information on the DRI.

Planning Reserve Margin Indicator (PRMI)

This indicator is a measure of variability on the system. It defines resource adequacy risk by the reserve margin that entities need to account for variability on the system and meet an ODITY, or 99.98%, reliability threshold. See the main report for more information on the PRMI.

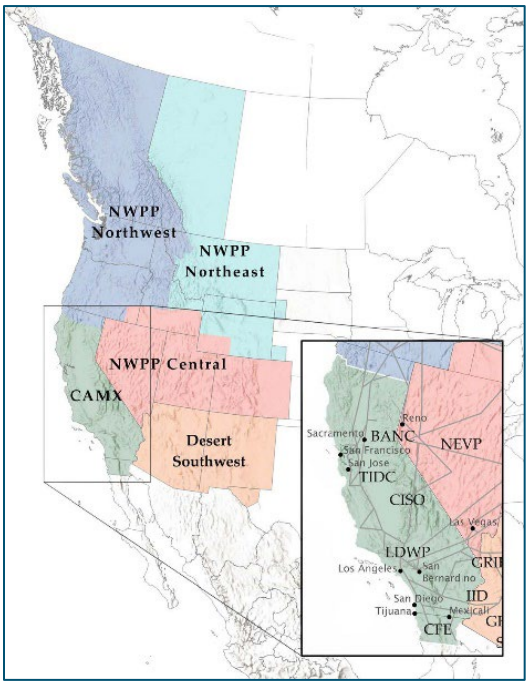
Resource Adequacy Risks

This section highlights the frequency, magnitude, and timing of demand-at-risk hours in each subregion. See the main report for more information.

California and Mexico Subregion

This section provides information on the California and Mexico (CAMX) subregion, a summer-peaking area that includes most of California, parts of Nevada, and Baja California, Mexico. This section covers four areas:

- Drivers of resource adequacy challenges in the West
- Demand at Risk Indicator (DRI)
- Planning Reserve Margin Indicator (PRMI)
- Resource Adequacy Risks



Risks to the Subregion

The addition of almost 3,000 MW of new resources, most of which are battery storage, and the delayed retirement of some resources helped the CAMX subregion strengthen its resource availability in 2021–2022. These measures have helped the subregion remain resource adequate during the 2022 summer season. However, the delayed retirement of resources is only a temporary solution. Additional action will be necessary to ensure future resource adequacy to address increasing demand and resource variability. In addition, reliance on imports will continue to be a challenge for the subregion.

Drivers of Resource Adequacy Challenges

Energy Policy

CA Assembly Bill 1279—The California Climate Crisis Act (September 2022)

Contains California's plan to reach economy-wide carbon neutrality by 2045.

CA Senate Bill 1020—Clean Energy, Jobs, and Affordability Act of 2022

Details California's plan to achieve 90% renewable energy, zero-carbon electricity by the end of 2035, and 95% zero-carbon electricity by the end of 2040—as milestones to reach a target of 100% by 2045.

CA Senate Bill 529/CA Senate Bill 1174—Electrification Senate Bills (September 2022)

These complementary senate bills should streamline transmission upgrade approvals and reduce bottlenecks to building new clean energy resources.

CA Assembly Bill 525—Energy: offshore wind generation (September 2021)

Directs the California Energy Commission to establish planning goals for offshore wind and a strategic plan to develop the resource in federal waters off the coast. As a result, on August 12, 2022, the Commission adopted offshore wind energy preliminary planning goals.

CA Senate Bill 846—Diablo Canyon powerplant: extension of operations (September 2022)

Extends the life of the Diablo Canyon nuclear plant's two units through the end of the decade.

Changing Resource Mix

According to current plans, the 2023 CAMX subregion resource portfolio will have more than 30% solar and wind due to the addition of 1.8 GW of solar and 1.2 GW of battery storage.

Over the next 10 years, entities plan to build almost 36 GW of resources; meaning, by 2032, wind, solar, and battery storage will make up half of the subregion's resource portfolio.

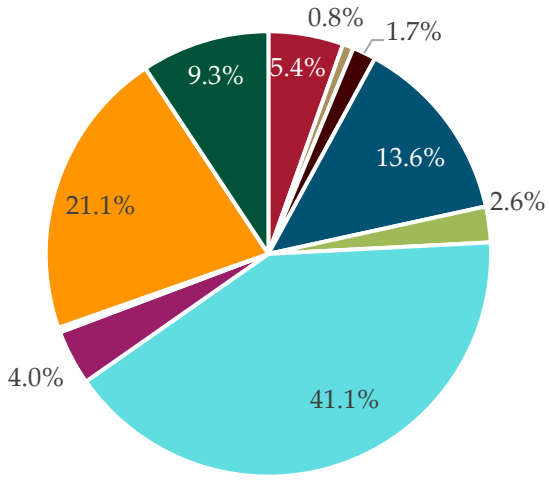


Figure 2: CAMX 2023 Resource Portfolio

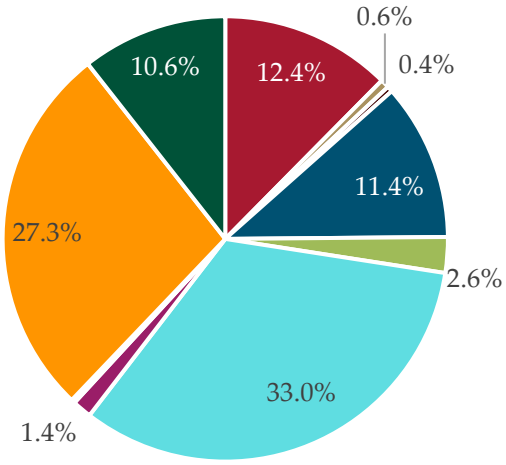


Figure 1: CAMX 2032 Resource Portfolio

Battery Coal Hydro Solar Wind Natural Gas Nuclear Geothermal Biomass Petroleum Other

There are plans for a large number of resources to come online in 2031. Most are resources that entities have added to their resource plans as placeholders for resources they need but have not yet specified. These resources will likely come on-line around 2031, not necessarily in that year.

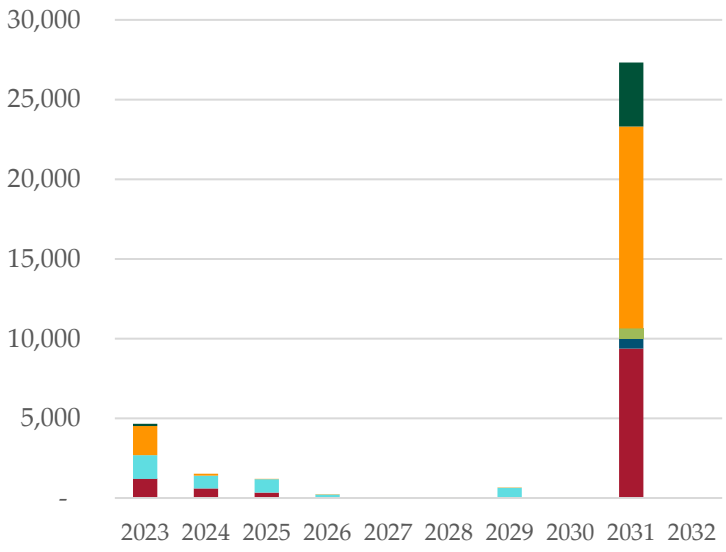


Figure 3: CAMX Planned Resources 2023-2032 (MW)

Unlike other subregions, which spread retirements out over the next five to 10 years, there are planned retirements in the CAMX subregion during the next three years. During that time, the region is expected to retire more than 6 GW of resources, split between natural gas (2.8 GW), nuclear (2.3 GW), and coal (1.2 GW).

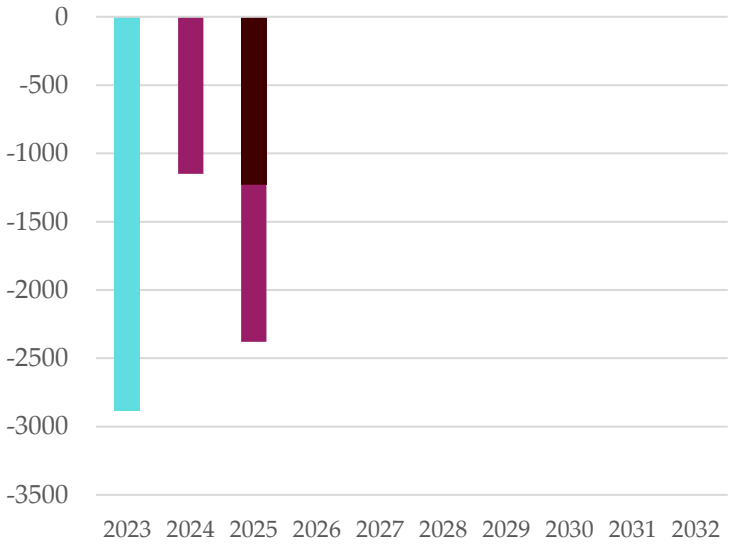
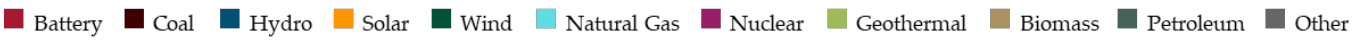
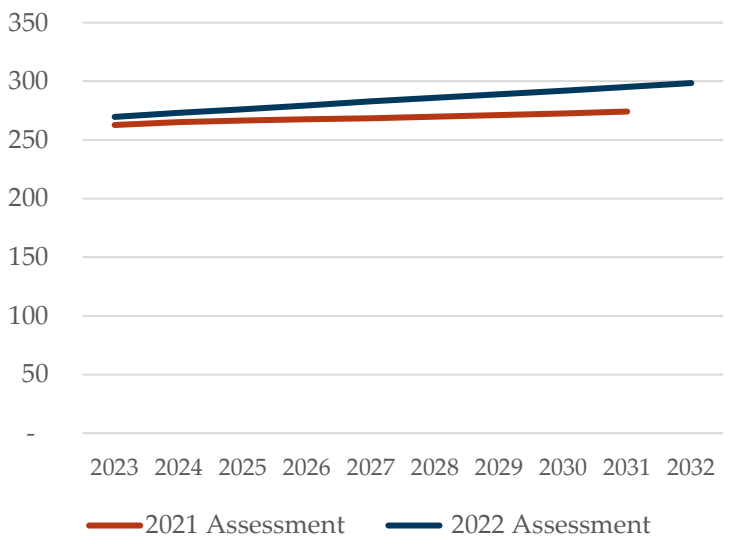


Figure 4: CAMX Planned Retirements 2023-2032 (MW)



Changing Load and Demand



Between 2023 and 2031, the total energy demand in the CAMX subregion is expected to grow by 10%. This growth is greater than the rate seen in last year's assessment, which contained a projected growth rate of 4% for the same period.

Figure 5: CAMX Annual Energy Demand 2023-2032 (TWh)

The peak hour demand for the CAMX subregion occurs in the summer. The subregion is expected to grow from about 58.3 GW in 2023 to 65.1 GW in 2032, nearly a 12% increase from the load growth rate seen in last year's assessment.

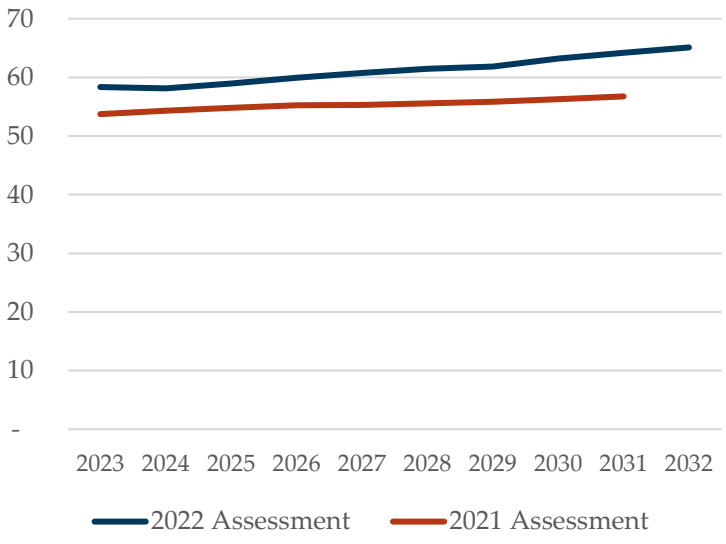
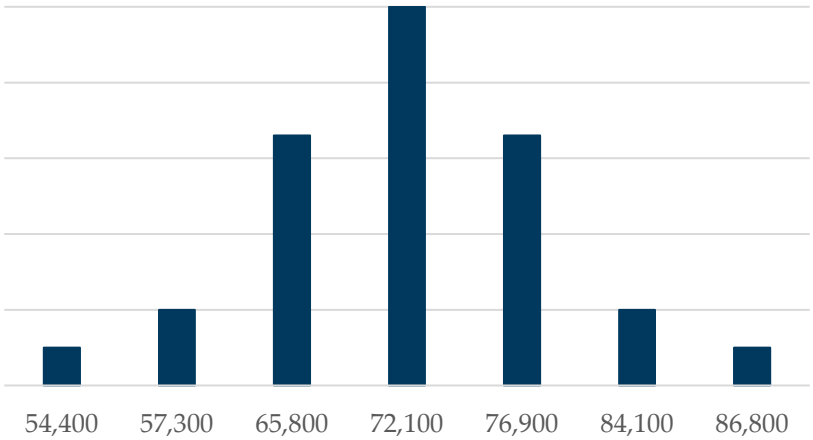


Figure 6: CAMX Peak Demand 2023-2032 (GW)

Resource Variability

Balancing Authorities in the CAMX subregion provided WECC with expected demand and resource numbers. Because demand and resources rarely occur as expected, WECC looks at the variability of both using a statistical range of resource availability and demand possibilities.

During 2023's peak hour, the resource availability in the CAMX subregion may deviate from expectations by as much as 18 GW.



	1-in-20	1-in-10	1-in-3	1-in-2	1-in-3	1-in-10	1-in-20
Baseload	46,400	47,400	49,700	50,800	51,600	52,700	53,100
Hydro	2,300	2,700	4,100	6,800	8,000	9,400	9,800
Solar	5,600	7,100	11,200	13,000	15,100	17,800	18,900
Wind	100	100	800	1,500	2,200	4,200	5,000

Figure 7: CAMX Peak Hour Resource Variability 2023 (MW)

On the demand side, in 2023, there is a one-in-33-year chance that peak demand in the subregion could exceed 72 GW, which is a 23% increase over the expected peak demand of 58.9 GW. Under extreme conditions that affect both demand and resource availability, such as a heat wave event, the system would need to import a large amount of power to remain resource adequate. A lack of available power to import could put the subregion at risk of load loss.

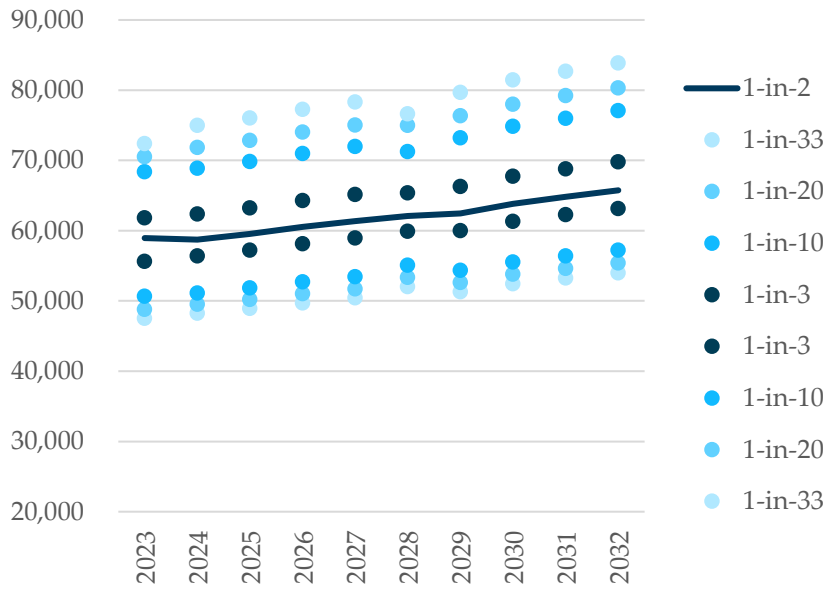


Figure 8: CAMX Peak Demand Variability 2023-2032 (MW)

Demand at Risk Indicator

WECC uses a measure called the *Demand at Risk Indicator* to measure and track the number of hours in a year when demand is at risk, assuming all planned resources are built, and imports are available.

The DRI for CAMX improved over last year's Western Assessment, but it grows until the planned addition of a large number of resources in 2031. This means that the hours at risk in the CAMX subregion will not abate until around 2031, underscoring the importance of these resources to maintaining resource adequacy in the subregion.

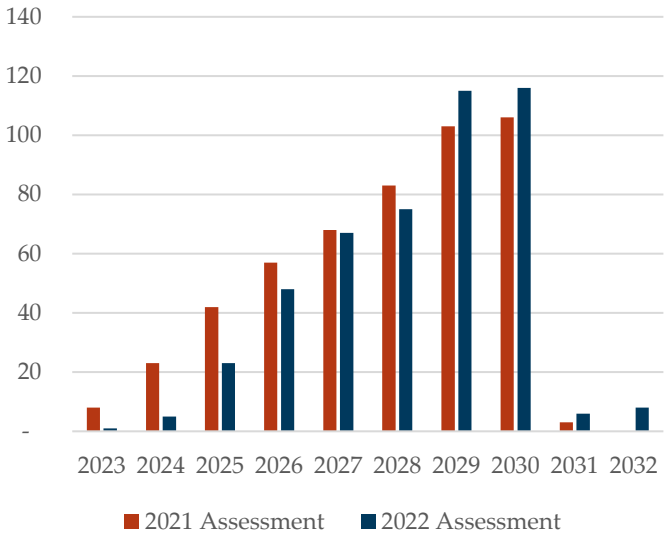


Figure 9: CAMX DRI 2023-2032 (No. of Hours)

Planning Reserve Margin Indicator

WECC uses the *Planning Reserve Margin Indicator* to measure and track variability on the system under different Planning Reserve Margin scenarios.

Given a planning reserve margin that is determined based on the peak demand hour ($PRMI_{Peak}$), the CAMX subregion has 32 demand-at-risk hours in 2023, assuming no imports from other subregions. The point at which the hours at risk fall below the one-day-in-ten-year threshold ($PRMI_{ODITY}$) is 21.6%. This means that there are 32 non-peak hours when the variability, and risk, are greater than on the peak demand hour.

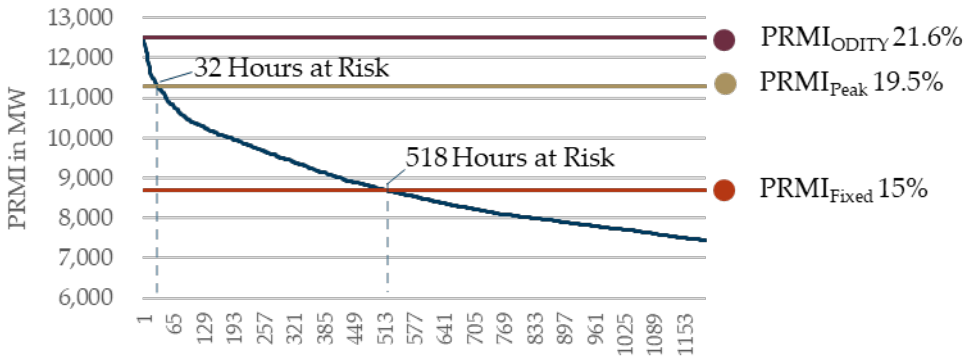


Figure 10: CAMX PRMI 2023

Resource Adequacy Risks

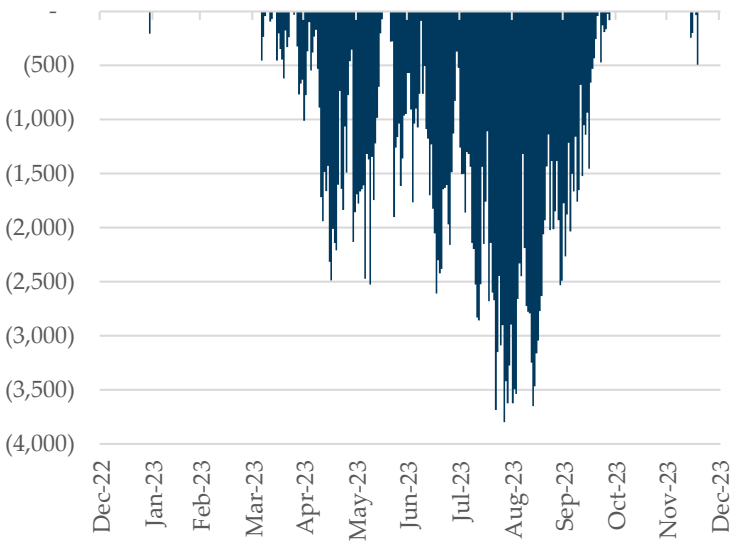


Figure 11: CAMX Demand-at-Risk Hours Magnitude and Timing with PRMI$_{Fixed}$ for 2023 (MW)

With a fixed planning reserve margin of 15%, most hours at risk occur in the summer months. However, there are still many demand-at-risk hours in the shoulder months. This will likely expand as variability increases, spreading the risk across more of the year.

There are significantly fewer hours at risk with a planning reserve margin of 19.5% because it covers the variability better. However, there are still hours at risk in the summer months, especially in late August and early September, corresponding to the subregion's recent heat waves.

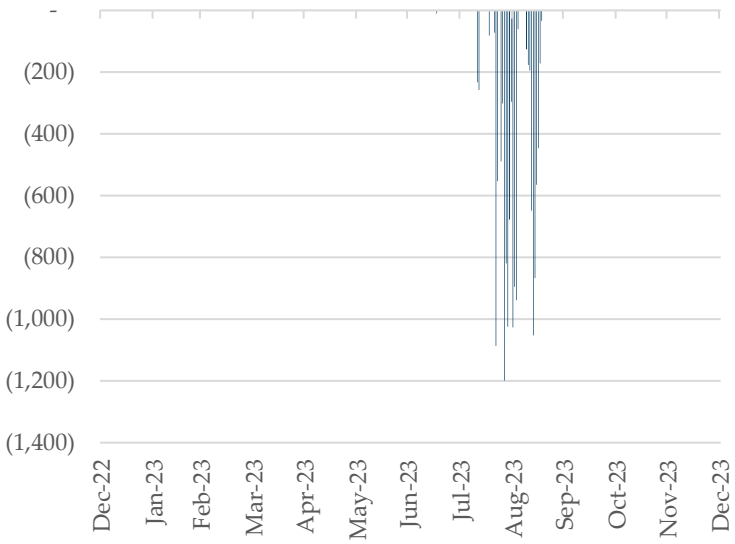


Figure 12: CAMX Demand-at-Risk Hours Magnitude and Timing with PRMI$_{Peak}$ for 2023 (MW)

The PRMIODITY for the CAMX subregion is 21.6% for 2023. This result is consistent with last year's assessment. As new resources and demand growth continue, the PRMI increases slightly until 2031, when the subregion plans to add a large amount of solar and battery storage. This addition causes a decrease in the DRI; however, the PRMI increases to almost 28% because of the added variability. In other words, while the demand-at-risk hours decrease with the resource additions in 2031, the level of reserves necessary to manage variability increases substantially because the majority of the new resources are variable.

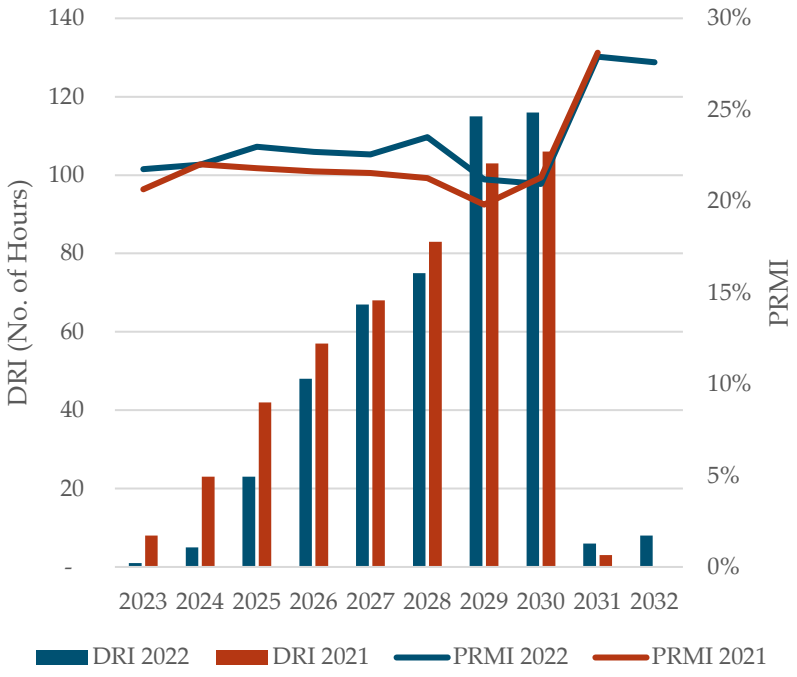


Figure 13: Comparison of CAMX DRI and PRMIODITY 2023-2032