CAISO Transmission Planning Process

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2023 Annual Western Interregional Coordination Meeting
March 9, 2023

2021 – 2022 TPP
(Update on competitive solicitation projects)

California ISO

Update on Projects Approve in 2021-2022 TPP Eligible for Competitive Solicitation Process:

- Policy-driven projects:
  - New Collinsville 500 kV substation
    - Awarded to LS Power Grid California (LSPGC)
  - New Manning 500 kV substation
    - Awarded to LS Power Grid California (LSPGC)

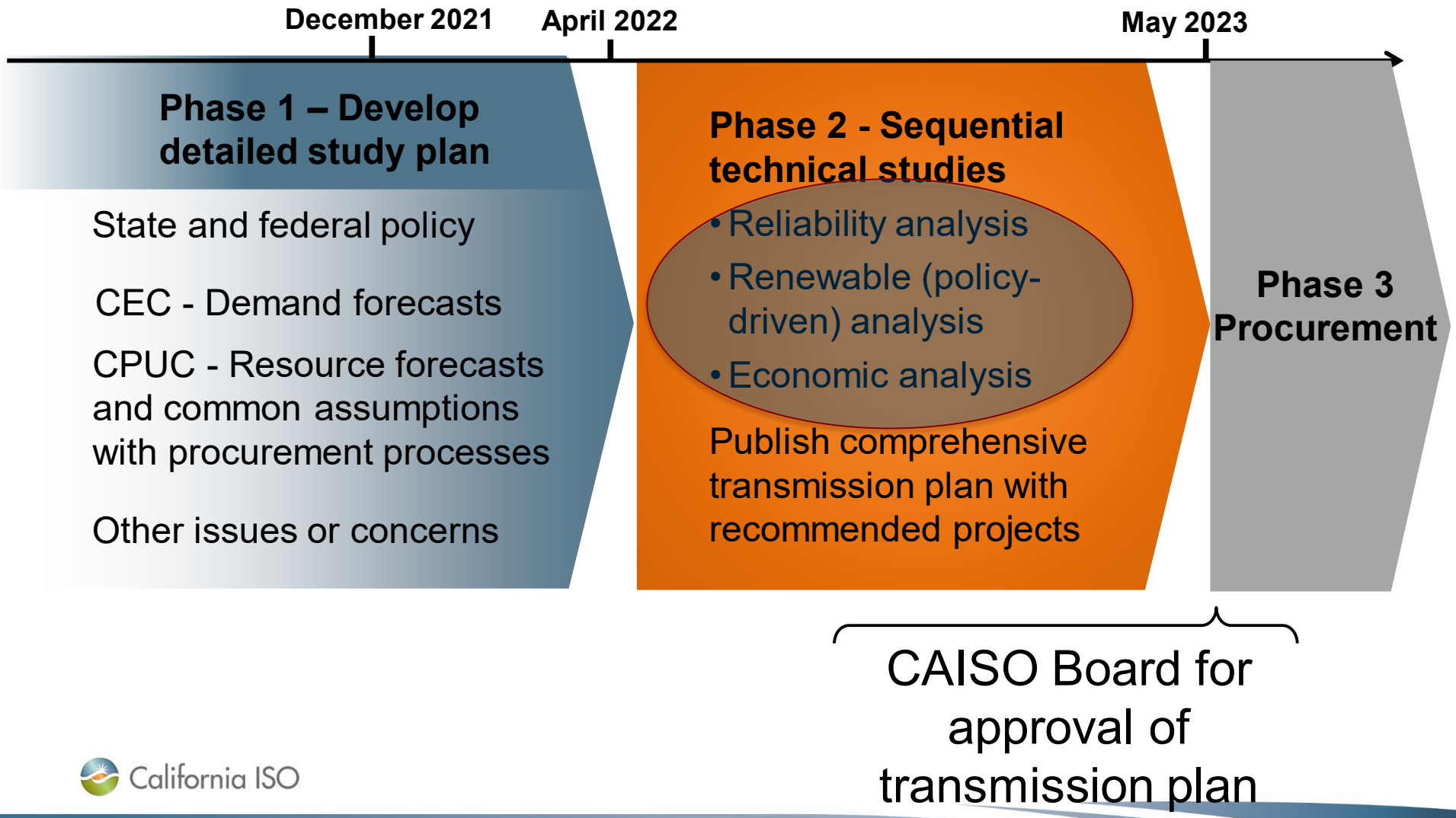
- Reliability-driven projects:
  - San Jose Area HVDC Lines (Newark to NRS)
    - Awarded to LS Power Grid California (LSPGC)
  - San Jose Area HVDC Line (Metcalf – San Jose)
    - Awarded to LS Power Grid California (LSPGC)

2022 – 2023 Transmission Planning Process

https://stakeholdercenter.caiso.com/RecurringStakeholderProcesses/2022-2023-Transmission-planning-process

California ISO

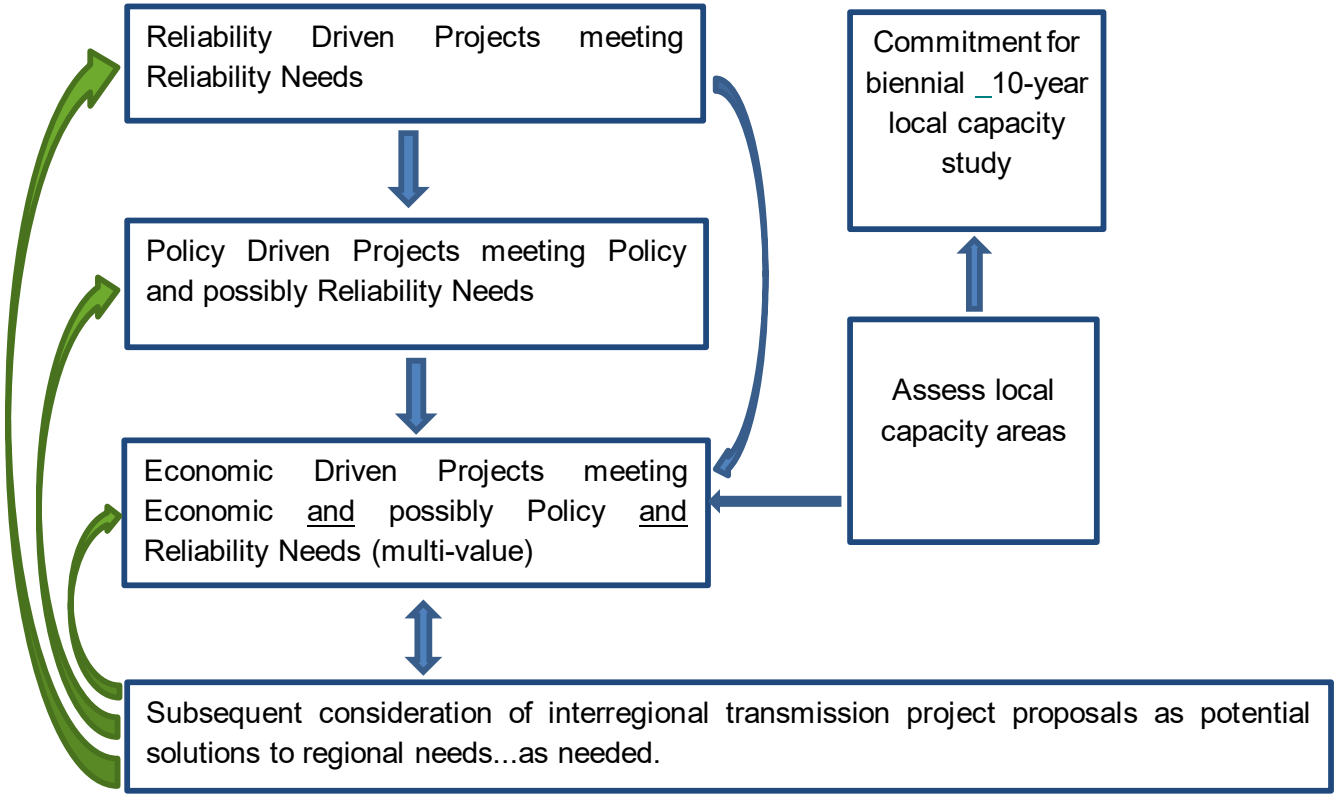
2022-2023 Transmission Planning Process



2022-2023 Transmission Plan Milestones

- Draft Study Plan posted on February 18
- Stakeholder meeting on Draft Study Plan on February 28
- Final Study Plan posted on March 31
- Stakeholder meeting July 6
- Preliminary reliability study results posted and open Request Window on August 15
- Stakeholder meeting on September 27 and 28
  - Comments to be submitted by October 12
- Request window closes October 15
- Preliminary policy and economic study results on November 17
- Comments to be submitted by December 5
- Draft transmission plan to be posted on March 31, 2023
- Stakeholder meeting in April 2023
- Comments to be submitted within two weeks after stakeholder meeting
- Revised draft for approval at May Board of Governor meeting

Studies are coordinated as a part of the transmission planning process



Coordination with state agencies is a critical aspect of the ISO's planning process:

- CPUC provided renewable generation "base" portfolio – based on 38 MMT GHG target to be used to determine transmission investments needed
  - Base case had an average of ~4,100 MW added installed capacity per year over 10 years. The average yearly built out of capacity were ~2,700 MW and ~1,000 MW is 2021-2022 and 2020-2021 TPPs respectively.
  - The sensitivity portfolio was a 2035 resource portfolio based on the CEC's high electrification load forecast and a 30 MMT GHG target
- The 2021 IEPR demand forecast utilizing the high electric vehicle assumptions

2022-2023 Transmission Planning Process
Reliability Assessment - Update

- ISO recommended projects have two paths for approval:
  - For management approval, reliability projects less than $50M can be presented at November stakeholder session
  - For Board of Governor approval of reliability projects over $50M and projects not presented for management approval, are included in draft plan to be issued for stakeholder comments by March 31, 2023

Reliability-driven transmission projects

- Six projects <$50 million have been approved by ISO management in the 2022-2023 transmission planning process
  - Banta Ring Bus Project ($18M)
  - Metcalf 230/115 kV Transformers Circuit Breaker Addition Project ($15M)
  - South Bay Area Limiting Elements Upgrade Project ($11M)
  - Bellota-Warnerville 230 kV reconductor (CCSF scope) ($1.6M)
  - Barre 230 kV Switchrack Conversion to BAAH Project ($45M)
  - Mira Loma 500 kV CB Upgrade Project ($10M)

- Additional reliability-driven projects to address the identified reliability constraints will be included in the draft 2022-2023 Transmission Plan

Policy Study Update

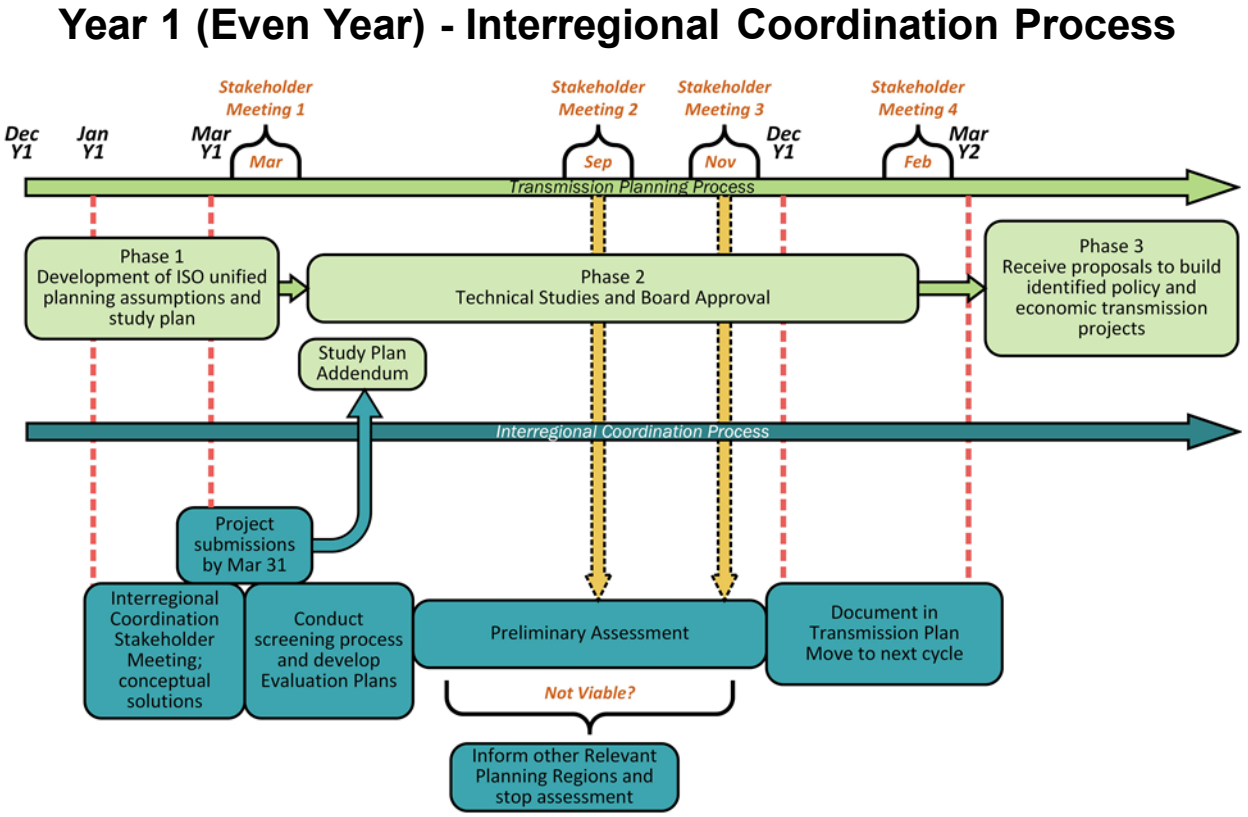
- CAISO presented preliminary policy assessment results and preliminary alternatives at the November 17 stakeholder call
- Transmission constraints in the SDG&E and SCE Eastern area affect generation in both areas
  - Mitigation options between these two areas are being considered
- In the PG&E area a number of the overloads identified are in very local areas on the 70 kV and 115 kV system
- In the sensitivity study for the Humboldt area offshore wind, the three alternatives identified in the 2021-2022 transmission planning process are being further reviewed
- The recommended transmission projects will in the draft 2022-2023 Transmission Plan to be posted on March 31

Aliso Canyon Special Study Update

- The ISO conducted a special study, for information only, to assess the reliability for the LA Basin and San Diego-Imperial Valley local capacity requirement areas with the gas-fired generation curtailment due to an absence of the Aliso Canyon gas storage facility
- The special study identified reliability constraints and evaluated potential transmission upgrade options
- The preliminary analysis was presented at the November 17 stakeholder
- The informational special study will be document in the draft 2022-2023 Transmission Plan to be posted on March 31

Interregional Transmission Coordination - Year 1 of 2

- Opened window (January 1 through March 31) for proposed interregional transmission projects to be submitted to the CAISO for consideration in the CAISO's 2022-2023 TPP planning cycle
- The CAISO hosted a joint western planning regions' stakeholder call on March 4, 2022.
- The CAISO and WestConnect hosted a joint stakeholder call on the evaluation plan



http://www.caiso.com/planning/Pages/InterregionalTransmissionCoordination/default.aspx

Interegional Project Submission Validation Results

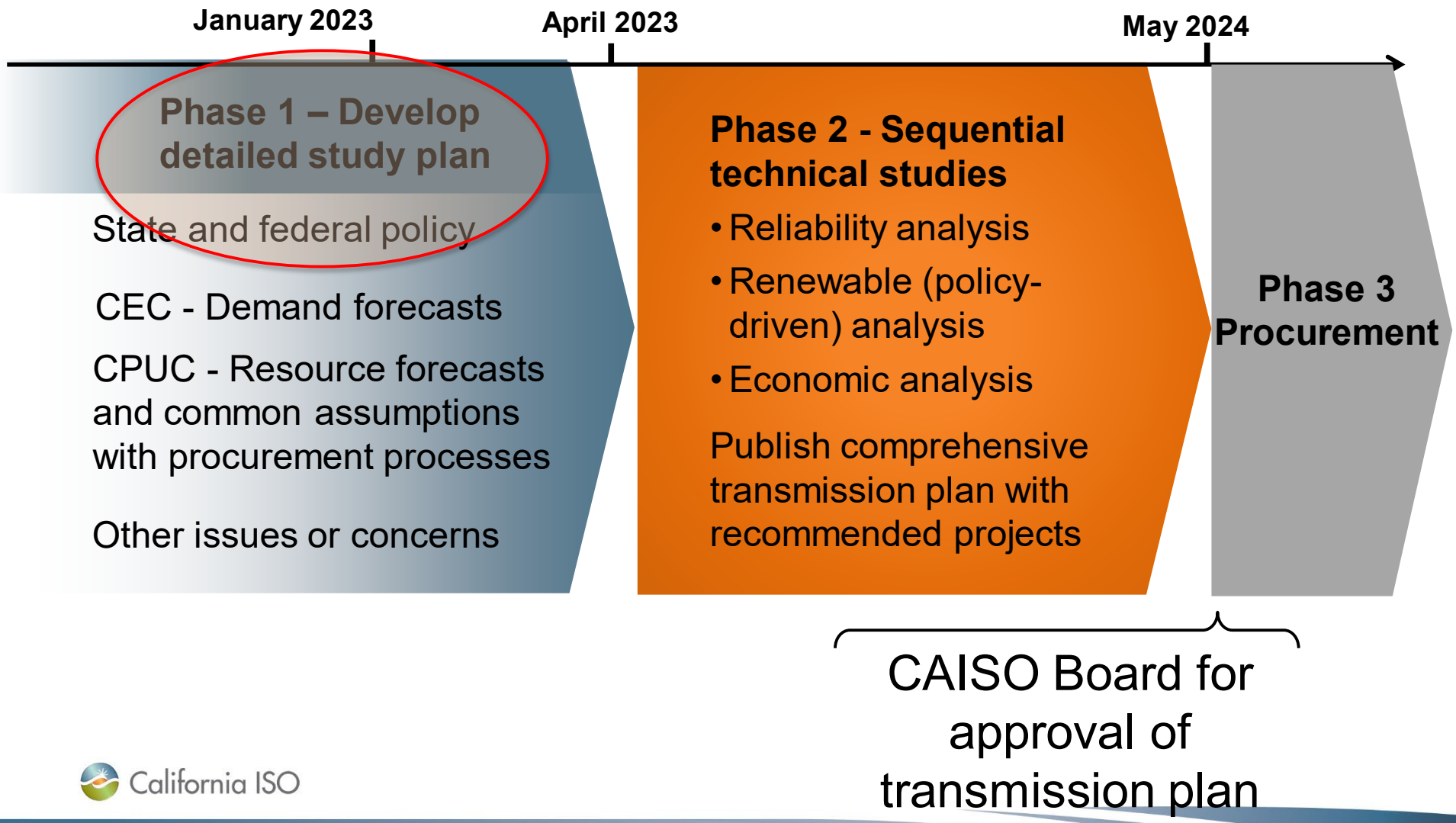
Project Name	Review Results
North Gila – Imperial Valley #2 (NGIV2)	Evaluation plan was jointly developed by WestConnect and the CAISO.
SWIP-North	NorthernGrid indicated that since the proposed transmission line is entirely within NorthernGrid system, it is not qualified as an Order 1000 interregional transmission project. The CAISO agrees with NorthernGrid's assessment.
Del Norte HVDC Transmission Collector	It is only submitted to CAISO and therefore is not qualified as an Order 1000 interregional transmission project.
Humboldt HVDC Transmission Collector	
Cape Mendocino HVDC Transmission Collector	
Diablo Canyon HVDC Transmission Collector	
Morro Bay HVDC Transmission Collector	

2023 – 2024 Transmission Planning Process Update

https://stakeholdercenter.caiso.com/RecurringStakeholderProcesses/2023-2024-Transmission-planning-process

California ISO

2023-2024 Transmission Planning Process



2023-2024 Transmission Planning Process – Draft Study Plan

- Posted on CAISO website on February 23, 2023: http://www.caiso.com/InitiativeDocuments/Draft-Study-Plan-2023-2024-Transmission-Planning-Process-Feb282023.pdf

- The presentations of the stakeholder call was held on February 28, 2023 is posted on CAISO website http://www.caiso.com/InitiativeDocuments/Presentation-2023-2024-Transmission-Planning-Process-%20Feb282023.pdf
  - Stakeholder comments are due March 14

- The draft study plan represents the CAISO's current assumptions for the 2023-2024 transmission planning process and will be finalized based upon comments by the end of March 2023

2023-2024 Transmission Plan Milestones

- Draft Study Plan posted on February 21
- Stakeholder meeting on Draft Study Plan on February 28
  - Comments to be submitted by March 14
- Final Study Plan to be posted on March 31
- Preliminary reliability study results to be posted on August 15
- Stakeholder meeting on September 26 and 27
  - Comments to be submitted by October 11
- Request window closes October 15
- Preliminary policy and economic study results on November 16
  - Comments to be submitted by December 4
- Draft transmission plan to be posted on March 31, 2024
- Stakeholder meeting in April
  - Comments to be submitted within two weeks after stakeholder meeting
- Revised draft for approval at May Board of Governor meeting

2023-2024 Transmission Planning Process Key Inputs

- CPUC adopted a base portfolio for 2033 and 2035 (30 MMT GHG target) and a sensitivity portfolio for 2035 (offshore wind) for use in the 2023-2024 TPP

  https://www.cpuc.ca.gov/industries-and-topics/electrical-energy/electric-power-procurement/long-term-procurement-planning/2022-irp-cycle-events-and-materials/portfolios-and-modeling-assumptions-for-the-2023-2024-transmission-planning-process

- 2022 IEPR California Energy Demand forecast adopted by the CEC on January 25, 2023

  https://www.energy.ca.gov/data-reports/reports/integrated-energy-policy-report/2022-integrated-energy-policy-report-update-2

2023-2024 TPP resources portfolios

- On February 23, 2023 CPUC adopted a base portfolio for 2033 and 2035 and a sensitivity portfolio for 2035 for use in the 2023-2024 TPP
- The base portfolio is based on a 30 MMT GHG target by 2030 and the 2021 CEC demand forecast utilizing the additional transportation electrification (ATE) assumptions.
- The sensitivity portfolio is based on the same GHG target and load forecast assumptions and is intended to test the transmission needs associated with 13.4 GW of offshore wind
- The portfolio data and modeling assumptions are available on the CPUC website[1] and include
  - Resource to substation bus mapping workbook complete with ISO transmission capability estimate exceedances
  - In-development resources list (includes some new online resources)
  - Retirement list of thermal generation units

1 https://www.cpuc.ca.gov/industries-and-topics/electrical-energy/electric-power-procurement/long-term-procurement-planning/2022-irp-cycle-events-and-materials/portfolios-and-modeling-assumptions-for-the-2023-2024-transmission-planning-process

Planning Assumptions

- Study Horizon
  - 12 years planning horizon
    - near-term: 2025 to 2028
    - longer-term: 2029 to 2035*
- Study Years
    - near-term: 2025 and 2028
    - longer-term: 2035*

* *A 12-year planning horizon, 2035 is selected as the long-term study year as the CEC's IEPR goes out to 2035, which is only 2 years beyond the typical 10-year horizon for the long-term study for this TPP cycle. Furthermore, the NERC TPL-001 Planning Standard allows any year beyond year five to be selected for the long-term planning horizon with the rational for selecting the year.*

Resource Portfolio

	2033			2035		
	Base	Hi OSW	Low OSW	Base	Hi OSW	Low OSW
Biomass	134	134	134	134	134	699
Geothermal	1,863	1,149	1,885	1,863	1,149	1,885
Wind	8,692	8,692	5,797	8,692	8,692	5,797
Offshore Wind	3,261	7,656	2,000	4,707	13,400	2,000
Solar	32,025	25,871	40,193	39,072	25,871	49,961
Battery Storage	21,738	20,072	23,741	28,381	23,553	30,713
Pumped Hydro	1,524	1,000	2,000	2,000	1,000	2,000
Demand Response	1,111	977	977	1,111	977	1,716
Advancec CCGT	0	0	0	128	0	0
Total Resources (MW)	**70,349**	**65,552**	**76,728**	**86,089**	**74,777**	**94,771**

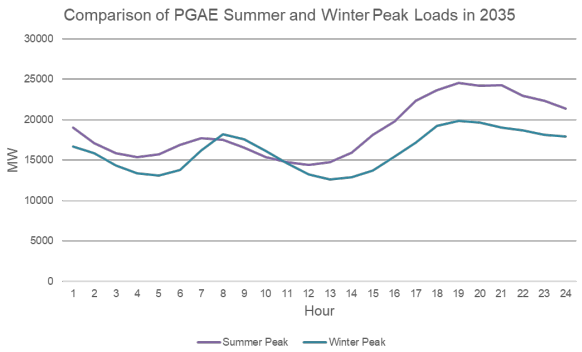
BTM-PV and BTM Storage Installed Capacity Forecast

	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Peak CAISO Baseline Consumption (MW)	53,409	54,328	55,137	55,969	56,852	57,716	58,621	59,519	60,496	61,428	62,368	63,250	64,092
CAISO BTM-PV Total (MW)	14,409	15,477	16,604	17,776	18,987	20,216	21,464	22,728	23,998	25,265	26,518	27,754	28,968
CAISO BTM Storage Total (MW)	1,040	1,306	1,580	1,862	2,152	2,449	2,754	3,067	3,389	3,717	4,053	4,396	4,746

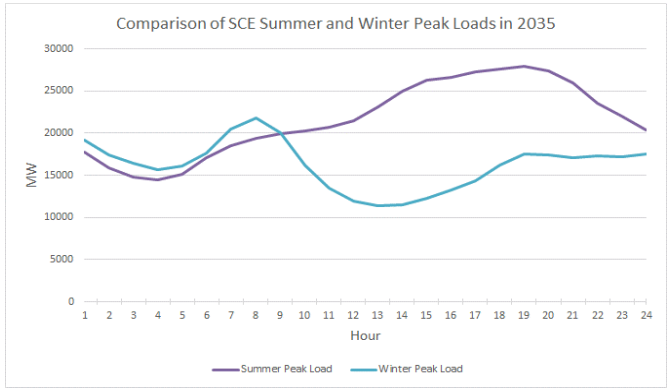
Winter Peak Demands in the Long Term Forecast

The winter peak loads associated with the Local Reliability hourly demand forecast increase over time compared to summer peak load in 2035.

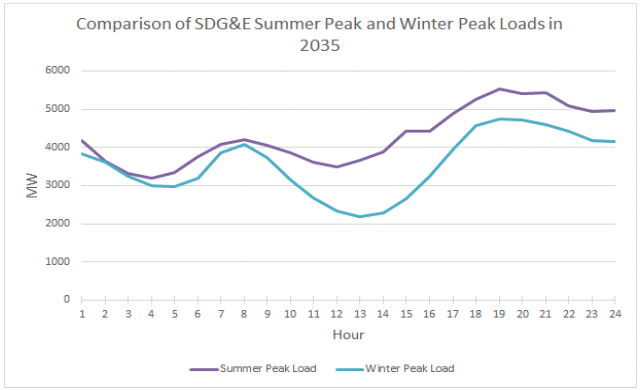
PG&E



SCE



SDG&E



https://www.energy.ca.gov/data-reports/reports/integrated-energy-policy-report/2022-integrated-energy-policy-report-update-2

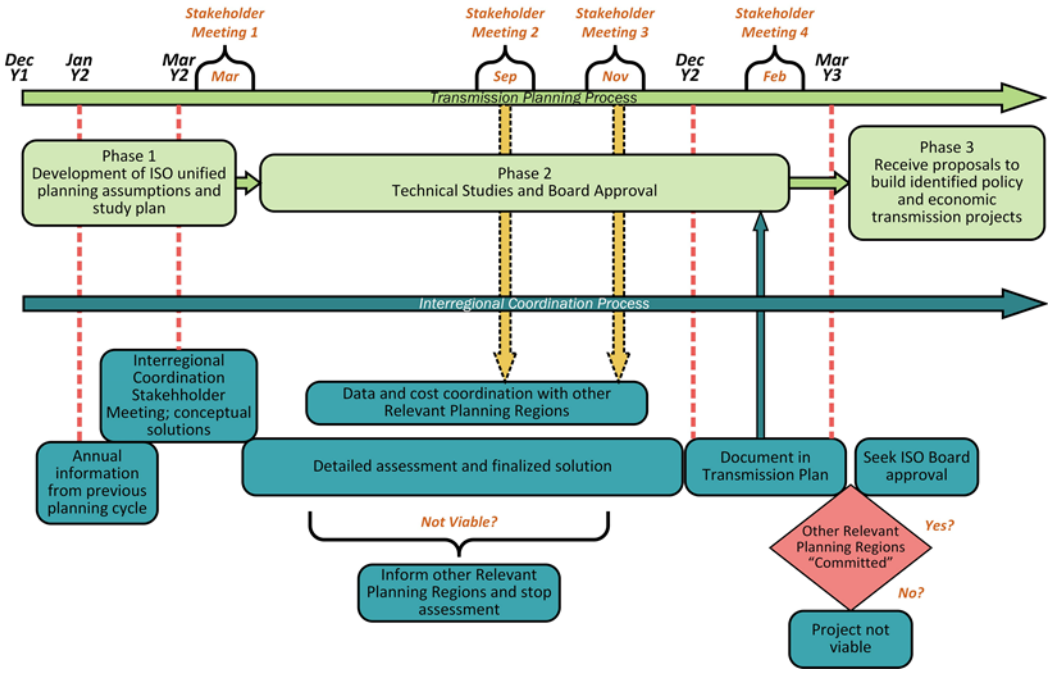
2023-2024 Transmission Plan Study Plan

- Reliability Assessment to identify reliability-driven needs
- Policy Assessment to identify policy-driven needs
- Economic Planning Study to identify needed economically-driven elements
- Other Studies
  - Maximum Import Capability expansion requests
  - Long-term Congestion Revenue Rights
  - Frequency response

Interregional Transmission Coordination - Year 2 of 2

- Participate in a western planning regions' stakeholder meeting.
- Based on the initial assessment of ITP in the previous year's TPP cycle, the ISO will determine whether to further evaluate the project during the odd year of the planning cycle.

Odd year Interregional Coordination Process



http://www.caiso.com/planning/Pages/InterregionalTransmissionCoordination/default.aspx

Special Studies

- The ISO has not identified any specials studies for the this planning cycle.
- The ISO is planning on conducting an update to the 20-Year Transmission Outlook in parallel with the 2023-2024 transmission planning process.