

DOCKETED

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Resource Portfolio Assumptions for the Next CAISO 20-Year Transmission Outlook

Joint Agency Staff Workshop – CEC, CPUC, and CAISO

Presenters: Erica Brand (CEC), Jared Ferguson (CPUC), Jeff Billinton (CAISO)

Date: June 23rd, 2023



Workshop Schedule

1. Introduction
2. 2040 SB 100 Starting Point Scenario, (CEC)
3. ISO 20-Year Transmission Outlook - Update, (CAISO)
4. Proposed Resource Portfolio for 2045 SB 100 20-Year Transmission Outlook Scenario, (CPUC)
5. Questions from the Public
6. Public Comment
7. Closing Remarks



Introduction and SB 100

Erica Brand



Title: 2040 SB 100 Starting Point Scenario

Presenter: Erica Brand, Siting, Transmission, and Environmental Protection Division

Date: June 23, 2023



Senate Bill 100

The 100 Percent Clean Energy Act of 2018

1. Sets a 2045 goal of powering all retail electricity sold in California with renewable and zero-carbon resources.
2. Updates the state's Renewables Portfolio Standard to ensure that by 2030 at least 60 percent of California's electricity is renewable.
3. Requires the California Energy Commission (CEC), California Public Utilities Commission (CPUC), and California Air Resources Board (CARB) to use programs under existing laws to achieve 100 percent clean electricity and issue a joint policy report on SB 100 by 2021 and every four years thereafter.



SB 100 Reports

CEC, CPUC, and CARB required to issue a joint agency report every four years.

Reports need to include the following:

- A. A review of the policy (technical, safety, affordability, reliability)
- B. Reliability benefits and impacts
- C. Financial costs/benefits
- D. Barriers/Benefits of achieving the policy
- E. Alternative scenarios and costs/benefits of each



2021 SB 100 Joint Agency Report

- Assessed various pathways to achieve SB 100 and an initial assessment of costs and benefits.
- One of the pathways studied was the “SB 100 Core Scenario.”

SB 100 Core Scenario Projected Mix of Resources

	Existing Resources		Projected New Resources	
	2019*	2030**	2030**	2045**
Solar (Utility-Scale)	12.5 GW	16.9 GW	69.4 GW	
Solar (Customer)	8.0 GW	12.5 GW	28.2 GW	
Storage (Battery)	0.2 GW	9.5 GW	48.8 GW	
Storage (Long Duration)	3.7 GW	0.9 GW	4.0 GW	
Wind (Onshore)	6.0 GW	8.2 GW	12.6 GW	
Wind (Offshore)	0 GW	0 GW	10.0 GW	
Geothermal	2.7 GW	0 GW	0.1 GW	
Biomass	1.3 GW	0 GW	0 GW	
Hydrogen Fuel Cells	0 GW	0 GW	0 GW	
Hydro (Large)	12.3 GW	N/A [†]	N/A [†]	
Hydro (Small)	1.8 GW	N/A [†]	N/A [†]	
Nuclear	2.4 GW	N/A [†]	N/A [†]	

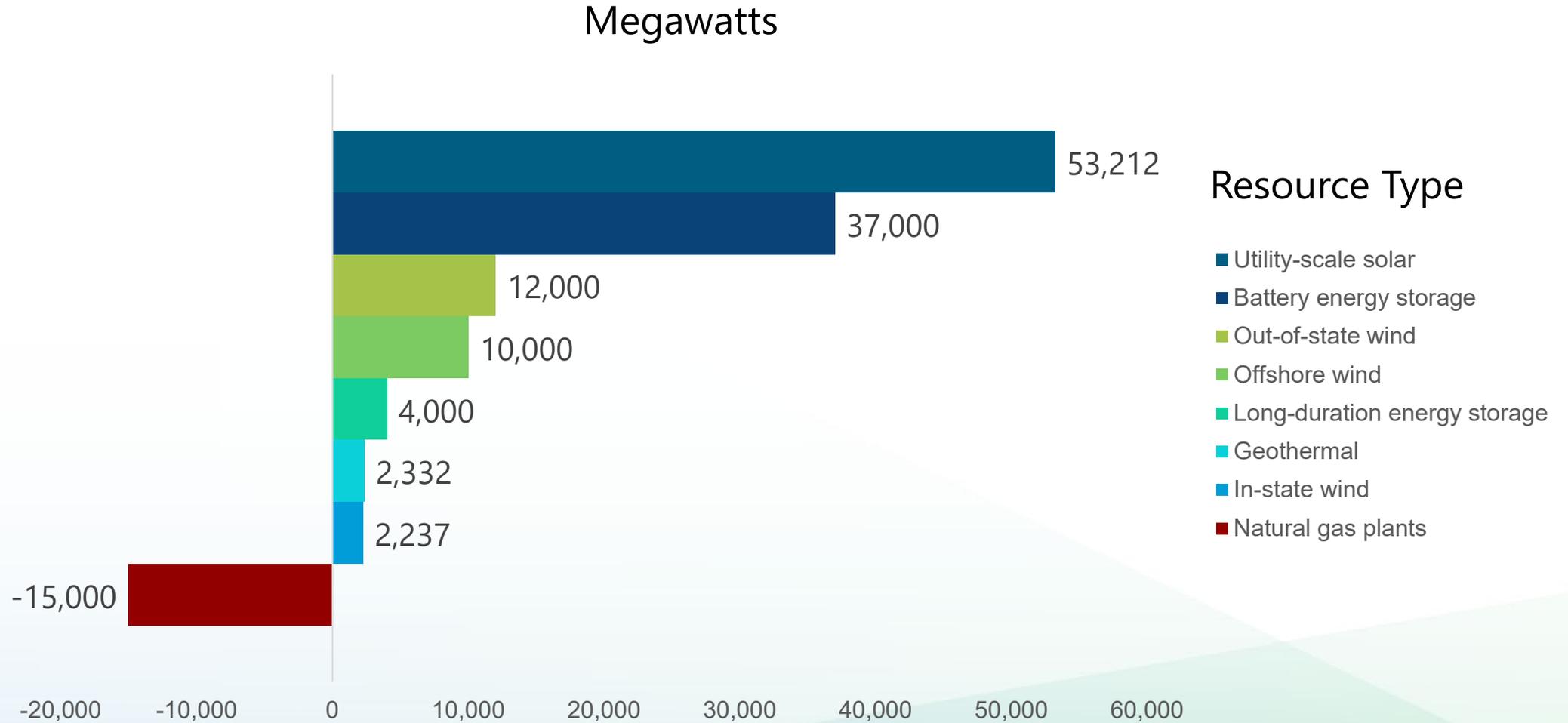


SB 100 Implementation Activities



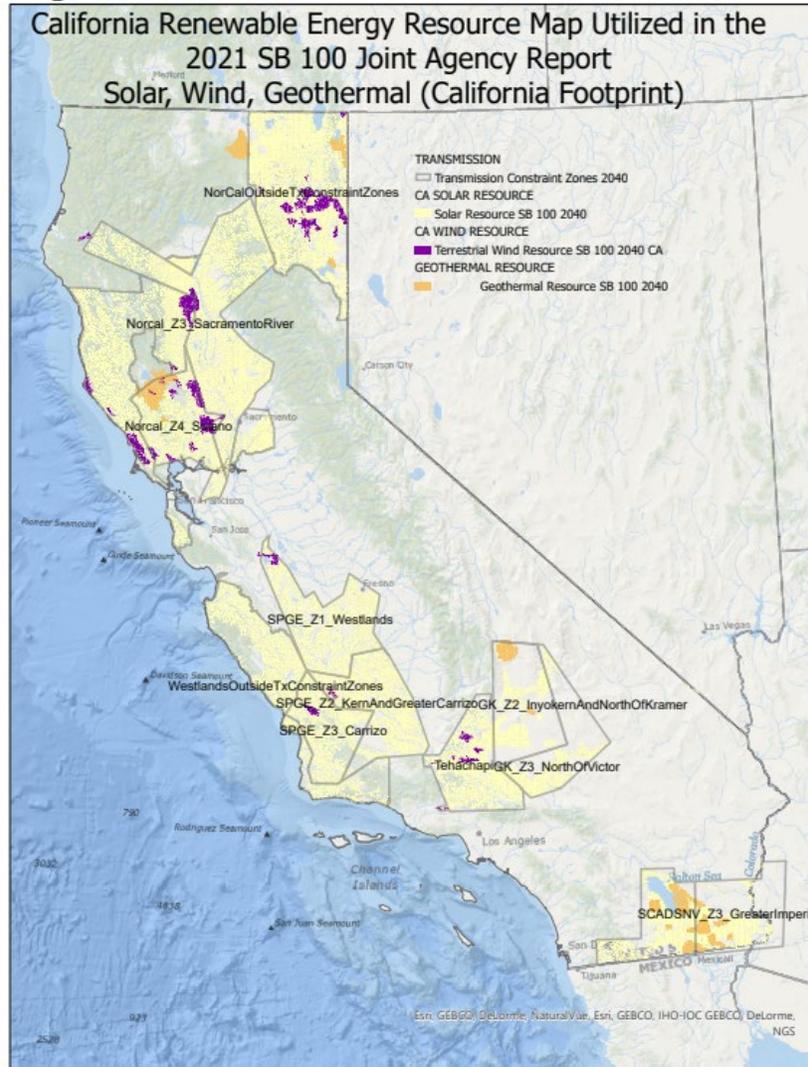


Starting Point Scenario (2040)





Starting Point Scenario: Geographic Allocation of Resources





Thank You





Jeff Billinton
California Independent System Operator



California ISO

ISO 20-Year Transmission Outlook - Update

Jeff Billinton, Director, Transmission Infrastructure Planning

Joint Agency Staff Workshop on Resource Portfolio

Assumptions for the Next CAISO 20-Year Transmission Outlook

June 23, 2023

20-Year Transmission Outlook

- The ISO has produced its first ever 20-Year Transmission Outlook focused on providing a longer term view of transmission needed to reliably meet state clean energy goals
- Issued in May 2022 and posted on the ISO website
<http://www.caiso.com/InitiativeDocuments/20-YearTransmissionOutlook-May2022.pdf>

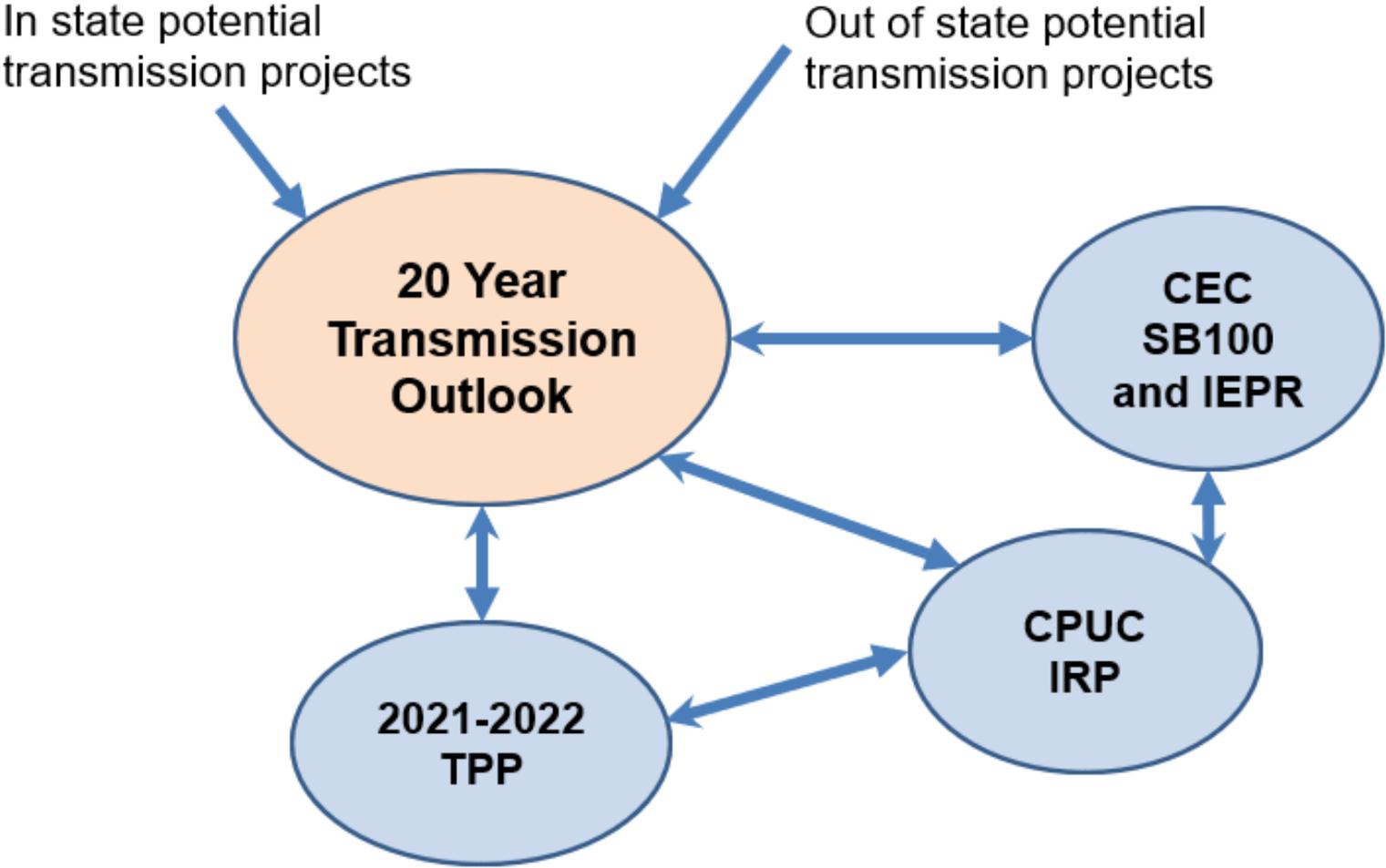
20 YEAR TRANSMISSION OUTLOOK



The 20-year transmission outlook provides a “baseline” architecture setting stage for future planning activities:

- Is intended to:
 - help the state to further refine resource planning,
 - scope the challenges we face,
 - and provide longer term context for decisions made in the 10 year transmission plan process.
- Includes high level technical studies to test feasibility of alternatives, focusing on the bulk transmission system
- Used a “Starting Point” scenario docketed that:
 - has diverse resources known to require transmission development such as offshore wind energy, out-of-state resources, and geothermal
 - gas power plant retirements that may require transmission development to reduce local area constraints.

Primary Paths for Coordination with Other Initiatives



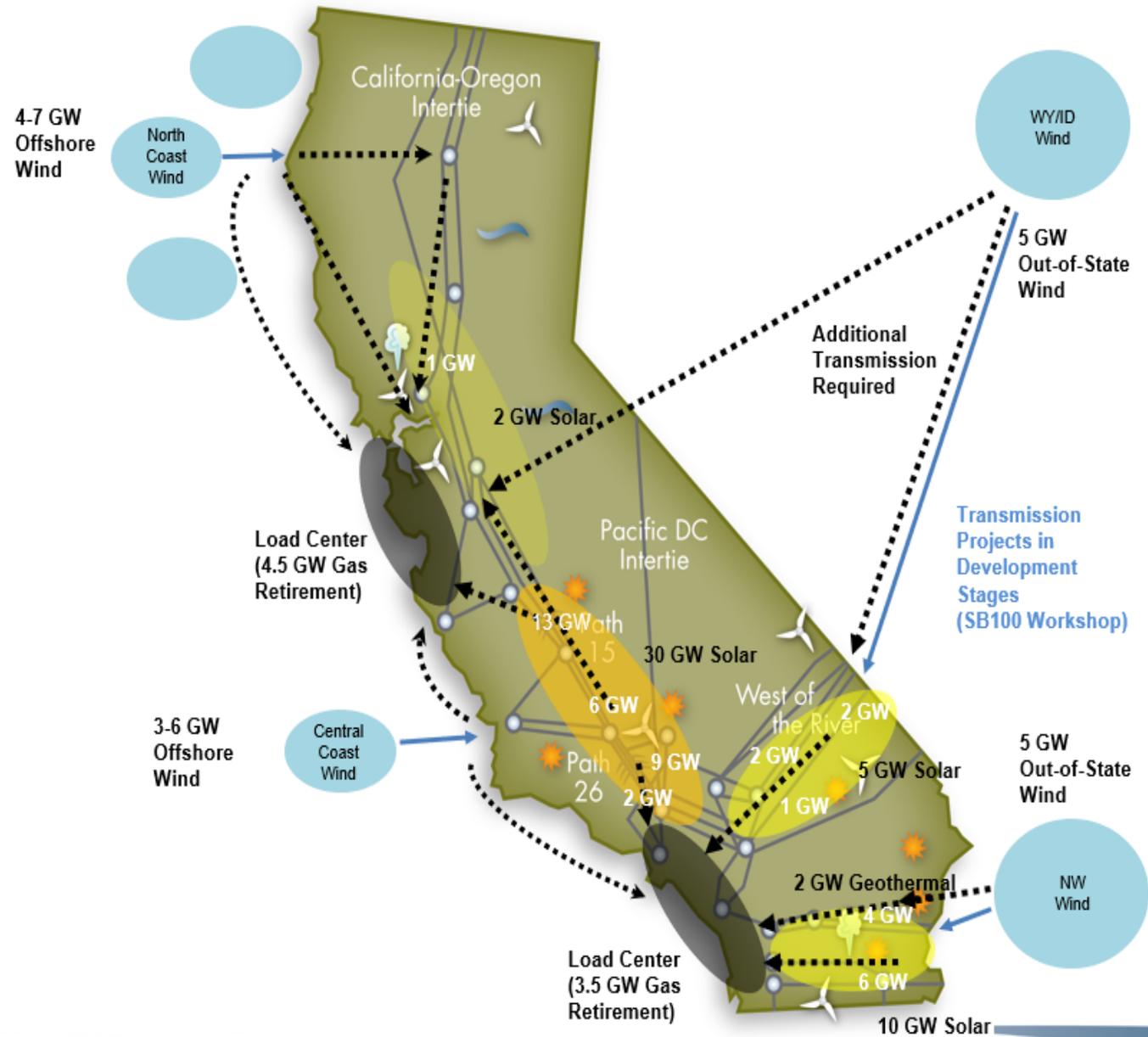
The 20-Year Transmission Outlook relied on collaboration with state agencies for key inputs:

- The SB 100 Starting Point scenario developed for the outlook totaled over 120 GW of new resources, including 53 GW grid-connected solar, 37 GW battery storage, 2.3 GW geothermal, 4 GW pumped hydro/long duration storage, 24 GW wind (split between in state, out of state, and offshore)
 - Wind generation was split into 2.2 GW in state, 12 GW out of state, and 10 GW offshore
 - The scenario also assumed retiring 15 GW of gas-fired generation
- SB 100 Core statewide high electrification load projection of 82 GW MW in 2040, reflecting 30 GW behind the meter solar, was used.

Transmission Planning Process - Portfolios

	2022-2023 Plan Base Portfolio (2032)	2022-2023 Plan 30 MMT Sensitivity Portfolio (2035)	2023-2024 Plan Base Portfolio (2035)	20-Year Outlook – May 2022 SB100 Starting Point Scenario (2040)
Solar	17,506	40,879	39,072	53,212
Wind	3,531 in state 1,500 OOS 1,708 offshore	3,797 in state 4,828 OOS 4,707 offshore	3,074 in state 5,618 OOS 4,707 offshore	2,237 in state 12,000 OOS 10,000 offshore
Battery storage	13,571	28,402	28,374	37,000
Gas-fired				
Biomass	134	134	134	
Geothermal	1,160	1,786	2,037	2,332
Pumped Hydro / Long Duration	1,000	2,000	2,000	4,000
Total	40,110	86,535	85,015	120,781
Gas retirements	~1,000	~1,000	~1,000	-15,000

Illustration of Transmission Development



Transmission upgrades to existing CAISO footprint

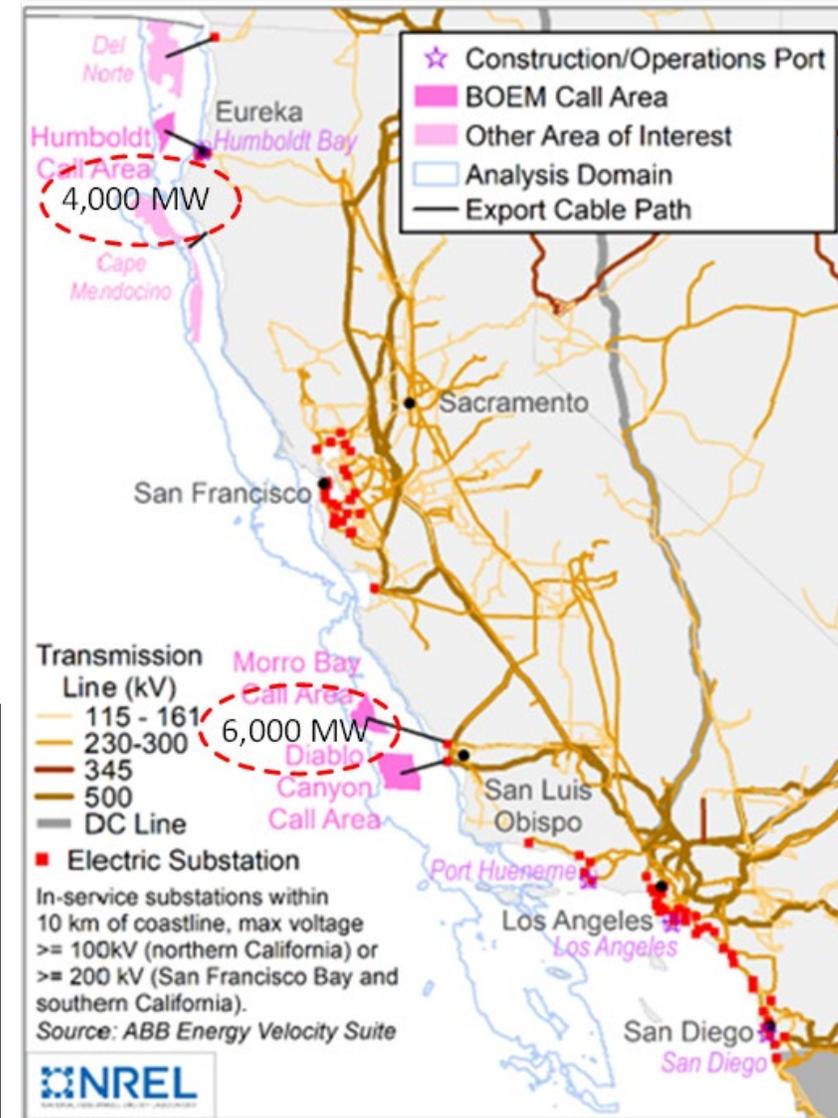


Transmission Development	Description	Cost Estimate
Upgrades to existing CAISO footprint		10.74
Eldorado – Lugo 500 kV line	- 180 mi of 500 kV line - Series compensation in number of locations	\$1 B
Colorado River – Devers 500 kV line	- Devers – Red Bluff 500 kV line - Ref Bluff – Colorado River 500 kV line	\$1.2 B
North Gila – Imperial Valley 500 kV line	- 85 mi of 500 kV line - Series compensation	0.5 B
Westland 500/230 kV station	- 50 mi of 500 kV line - New 500/230 kV substation with two transformers (\$200M)	0.5 B
Second Los Banos – Tracy 500 kV line	- 67 mi of 500 kV line	\$0.33 B
Third Collinsville – Pittsburg 230 kV cable	- 230 kV cable	\$0.14 B
Manning – Moss Landing 500 kV line	- 78 mi of 500 kV line - New 500/230 kV substation with two transformers (\$100M)	\$0.50 B
Devers – La Fresa HVDC	- 100 mi of DC cables - Two VSC HVDC converter	\$1.2 B
Lugo – LA Basin HVDC	- 80 mi of DC cables - Two VSC HVDC converter	\$1.0 B
Sycamore – Alberthill HVDC	- 82 mi of DC cables - Two VSC HVDC converter	\$1.0 B
Diablo – South HVDC	- Four VSC converter stations - 250 miles HVDC cables	\$1.85 B
Diablo – North HVDC	- Four VSC converter stations - 200 miles HVDC cables	\$1.60 B
Round Mountain 500/230 kV Transformer	- Add one 500/230 kV transformer	\$0.1 B
Lugo 500/230 kV Transformers	- Add one 500/230 kV transformer	\$0.1 B

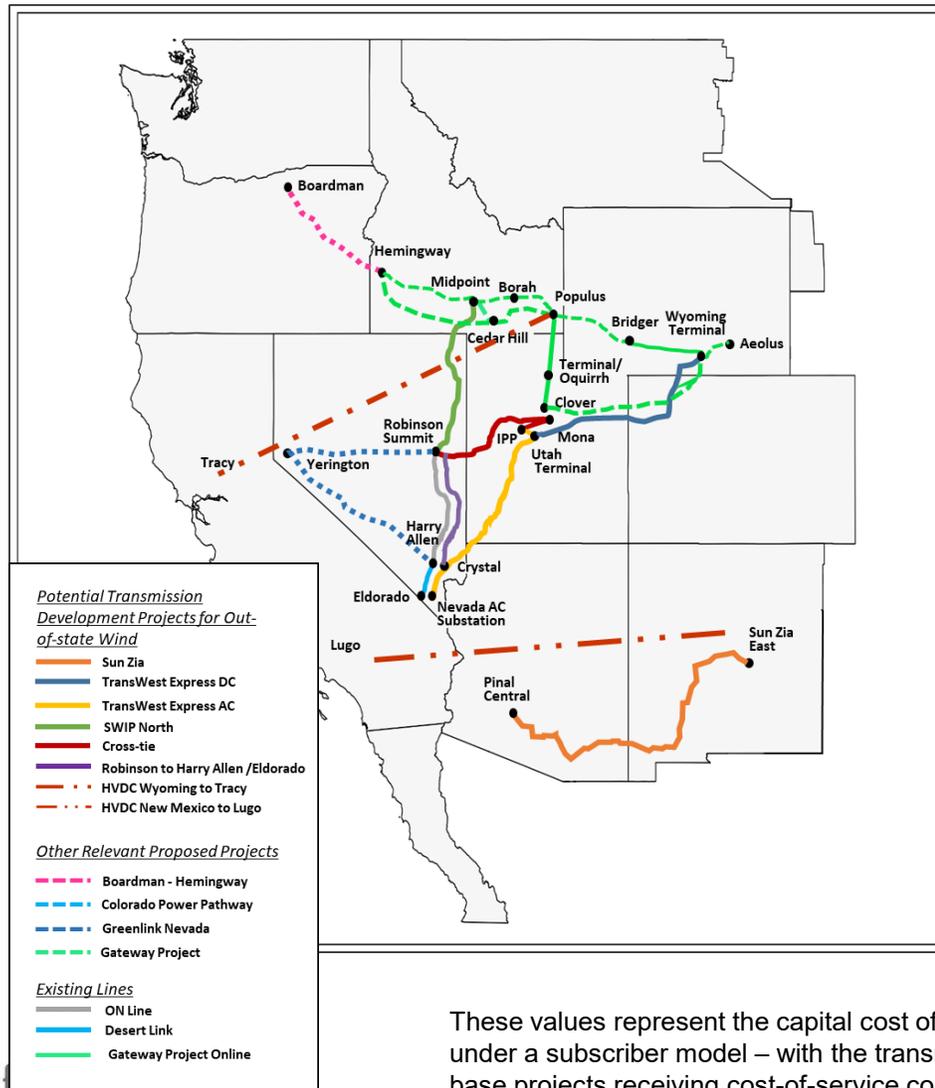
Offshore Wind

- 10 GW of offshore wind
 - 6 GW in central coast
 - 4 GW in north coast
- Current areas of environmental and leasing development at Bureau Ocean Energy Management (BOEM)
 - Humboldt call area
 - Morro Bay call area

Transmission Development	Description	Cost Estimate
Offshore Wind		\$8.11 B
Humboldt Bay Offshore wind area	Total of 4,000 MW offshore wind connected through two of the following options: - Option 1 (Fern Road): \$2.3 B - Option 2 (Bay Hub): \$4.0 B - Option 3 (Collinsville): \$3.0 B Facilities required to interconnect the transmission options connecting to the different offshore wind areas: \$0.5B-\$1.0 B.	\$5.8 B– \$8.0 B
Diablo – Morro Bay Offshore wind area	- Total of 6,000 MW offshore wind. Connected to Diablo 500 kV and the new Morro Bay 500 kV substation. - The cost estimate is only for a 500 kV switching station and looping in the existing Diablo – Gates 500 kV line into it.	0.11 B



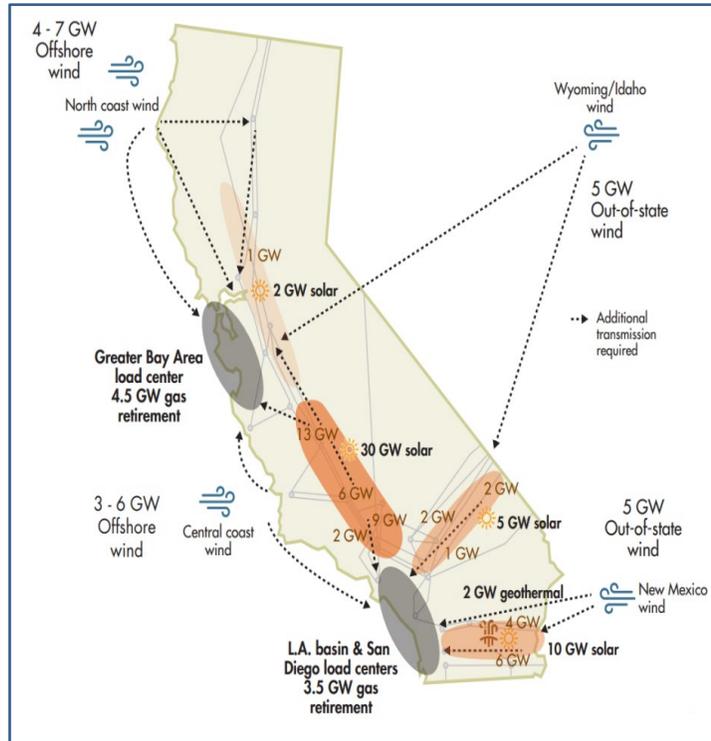
Transmission development for out-of-state wind



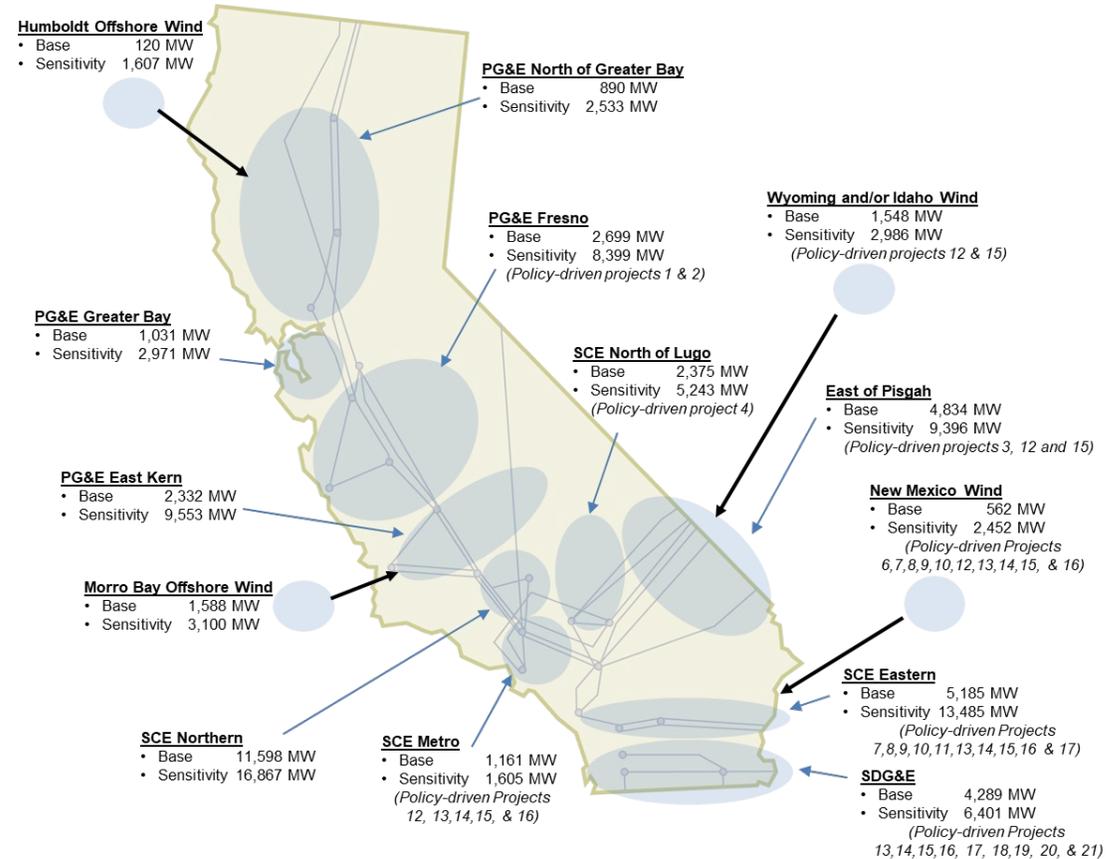
Transmission Development	Description	Cost Estimate
Out-of-State Wind		\$11.65 B
SWIP-North	275 mile 500 kV line from Midpoint to Robinson substation with upgrades to On Line from Robinson to Harry Allen to access Idaho wind resources	\$0.64 B
Cross-Tie	214 mile 500 kV line from Robinson to Mona/Clover to access Wyoming wind resources	\$0.67 B
Robinson-Eldorado	500 kV transmission line from Robinson to Harry Allen/Eldorado	\$0.64 B
TransWest Express	732 Mile transmission system consisting of HVDC and 500 kV facilities to access Wyoming wind. Project is designed to potentially provide 1500 MW to LADWP at the IPP facilities in Utah and 1500 MW to the CAISO at Harry Allen/Eldorado	\$2.1 B
SunZia	530 mile HVDC line and 35 mile 500 kV AC line plus scheduling rights on existing lines from Pinal Central to Palo Verde connecting to the CAISO system to access New Mexico wind resources	\$2.6 B
Additional transmission for additional wind resources from Wyoming/Idaho area	HVDC transmission line from the wind resource area to northern California (Tesla area)	\$2.5 B
Additional transmission for additional wind resources from New Mexico area	HVDC transmission line from the wind resource area to southern California (Lugo area)	\$2.5 B

These values represent the capital cost of the identified projects; several are currently being developed under a subscriber model – with the transmission costs incorporated into the energy costs – and not rate-base projects receiving cost-of-service cost recovery that would be added to CAISO transmission access charges.

2022-2023 transmission plan used a zonal approach which enables clear direction and prioritization



CAISO 20-year Transmission Outlook - 2022



CAISO 2022-2023 Transmission Plan

20-Year Transmission Outlook - Update

- The ISO will be undertaking an update of the 20-Year Transmission Outlook in parallel with ISO's 2023-2024 transmission planning process
- The update will be looking out to 2045 and will incorporate:
 - Updated portfolio
 - Updated load forecast
- Will include high level technical studies to test feasibility of alternatives, focusing on the bulk transmission system

20-Year Transmission Outlook - Update

- Joint agency workshop – June 23
- ISO looking at holding a stakeholder call in August after portfolio finalized
- The ISO will provide updates at the 2023-2024 transmission planning stakeholder meetings:
 - September 26 and 27
 - November 16
 - Additional may be added as required
- Draft 20-Year Transmission Outlook – March 31, 2024
- Finalize 20-Year Transmission Outlook – May 2024

Jeff Billinton
Director, Transmission Infrastructure Development
California ISO
jbillinton@caiso.com
(916) 608-7126



Jared Ferguson
California Public Utilities Commission

Proposed resource portfolio for 2045 SB 100 20-year transmission outlook scenario

June 23, 2023

Joint Agency Staff Workshop on Resource Portfolio Assumptions for the
Next CAISO 20-Year Transmission Outlook

Energy Division Staff Presentation



California Public
Utilities Commission

2045 SB 100 Portfolio Development

Approach for Developing the 2045 SB 100 20-year Outlook Scenario

- Similar method as used for the previous 20-year outlook Starting Point Scenario.
- Use the SB 100 Core Scenario and make manual changes to account for key policy goals:
 - Update load assumptions
 - Increase gas power plant retirements
 - Increase offshore wind in line with AB 525 study efforts.
- Account for additional retirements by adding renewables and storage utilizing high-level staff analysis that incorporates:
 - Other SB 100 Report scenarios,
 - Previous 20-year outlook, and
 - Past TPP portfolios and IRP analysis.

Resource Type		SB 100 Core Scenario			20-year Outlook (2021)
		2035	2040	2045	2040
	Study Year:				
Biomass	<i>MW</i>	-	-	-	-
Geothermal	<i>MW</i>	135	135	135	2,332
Onshore Wind	<i>MW</i>	2,837	2,837	2,837	2,837
OOS Wind New-Tx	<i>MW</i>	8,634	9,715	9,715	12,000
Offshore Wind	<i>MW</i>	-	5,256	10,000	10,000
Utility-Scale Solar	<i>MW</i>	36,550	53,212	69,640	53,212
Distributed Solar	<i>MW</i>	-	-	-	-
Total New Renewables	<i>MW</i>	48,156	71,156	92,327	80,381
Li_Battery	<i>MW</i>	16,162	32,093	48,813	37,000
Pumped Storage	<i>MW</i>	4,000	4,000	4,000	4,000
Total New Storage	<i>MW</i>	20,162	36,093	52,813	41,000
Shed DR	<i>MW</i>	-	-	-	-
Gas	<i>MW</i>	-	(4,722)	(4,722)	(15,000)
Total New Resources	<i>MW</i>	68,319	107,249	145,140	121,381

2021 SB 100 Joint Agency Report (<https://www.energy.ca.gov/publications/2021/2021-sb-100-joint-agency-report-achieving-100-percent-clean-electricity>) and CAISO's 20 Year Transmission Outlook (<http://www.caiso.com/InitiativeDocuments/20-YearTransmissionOutlook-May2022.pdf>)

Demand Assumptions for the 2045 SB 100 Scenario for the 20-year Outlook

- The previous 20-year outlook Starting Point scenario used the PATHWAYS High Electrification demand scenario, the demand assumptions implemented for the SB 100 Core Scenario.
- This scenario will use the CEC's 2021 Reference Case with the transportation load swapped for the 2022 IEPR Forecast results.
 - Update to this Reference Case captures changes in key energy demand drivers and historic data sets (i.e. fuel costs, behind-the-meter projections, climate change induced demand).
 - Using the 2022 IEPR transportation forecast captures recently adopted vehicle regulations and updated zero-emission vehicles forecasts.
 - Improves granularity of demand needs for implementation in transmission analysis.
 - Still has similar total system needs as the PATHWAYS High Electrification scenario.

Developing the 2045 SB 100 portfolio (1/3)

- Start with the 2045 SB 100 Core Scenario portfolio.
- **Increase gas power plant retirements to 15,000 MW.**
- **Increase offshore wind to 20 GW.**

Resource Type		SB 100 Core	Additions	Final Portfolio
Study Year:		2045		2045
Biomass	MW	-	-	-
Geothermal	MW	135	-	135
Onshore in CAISO Wind	MW	2,837	-	2,837
OOS, Out-of-CAISO Wind	MW	9,715	-	9,715
Offshore Wind	MW	10,000	10,000	20,000
Utility-Scale Solar	MW	69,640	-	69,640
Distributed Solar	MW	-	-	-
Total New Renewables	MW	92,327	10,000	102,327
Li_Battery	MW	48,813	-	48,813
LDES (Pumped Storage)	MW	4,000	-	4,000
Total New Storage	MW	52,813	-	52,813
Shed DR	MW	-	-	-
Gas	MW	(4,722)	(10,278)	(15,000)
Generic Clean Firm/LDES	MW	-	-	-
Total New Resources	MW	145,140	10,000	155,140

Developing the 2045 SB 100 portfolio (2/3)

- Start with the 2045 SB 100 Core Scenario portfolio.
- Increase gas power plant retirements to 15,000 MW.
- Increase offshore wind to 20 GW.
- Perform high-level analysis to offset increased retirements by also including:
 - **Additional renewable generation in line with:**
 - Recent 2023-24 TPP base portfolio
 - Previous 20-year outlook starting point scenario portfolio

Resource Type		SB 100 Core	Additions	Final Portfolio	1st 20-year Outlook	23-24 TPP Base Portfolio
		2045		2045	2040	2035
Study Year:		2045		2045	2040	2035
Biomass	MW	-	134	134	-	134
Geothermal	MW	135	2,197	2,332	2,332	2,037
Onshore in CAISO Wind	MW	2,837	237	3,074	2,837	3,074
OOS, Out-of-CAISO Wind	MW	9,715	2,285	12,000	12,000	5,618
Offshore Wind	MW	10,000	10,000	20,000	10,000	5,497
Utility-Scale Solar	MW	69,640	-	69,640	53,212	38,947
Distributed Solar	MW	-	125	125	-	125
Total New Renewables	MW	92,327	14,978	107,305	80,381	55,433
Li_Battery	MW	48,813	-	48,813	37,000	28,373
LDES (Pumped Storage)	MW	4,000	-	4,000	4,000	2,000
Total New Storage	MW	52,813	-	52,813	41,000	30,373
Shed DR	MW	-	-	-	-	1,111
Gas	MW	(4,722)	(10,278)	(15,000)	(15,000)	-
Generic Clean Firm/LDES	MW	-	-	-	-	-
Total New Resources	MW	145,140	14,978	160,118	121,381	86,916

Developing the 2045 SB 100 portfolio (3/3)

- Start with the 2045 SB 100 Core Scenario portfolio.
- Increase gas power plant retirements to 15,000 MW.
- Increase offshore wind to 20 GW.
- Perform high-level analysis to offset increased retirements by also including:
 - Additional renewable generation in line with:
 - Recent 2023-24 TPP base portfolio
 - Previous 20-year outlook starting point scenario portfolio
 - **Additional generic clean firm resources/long duration storage to account for remaining gas retirement MWs.**

Resource Type		SB 100 Core	Additions	Final Portfolio
		2045		2045
Study Year:		2045		2045
Biomass	MW	-	134	134
Geothermal	MW	135	2,197	2,332
Onshore in CAISO Wind	MW	2,837	237	3,074
OOS, Out-of-CAISO Wind	MW	9,715	2,285	12,000
Offshore Wind	MW	10,000	10,000	20,000
Utility-Scale Solar	MW	69,640	-	69,640
Distributed Solar	MW	-	125	125
Total New Renewables	MW	92,327	14,978	107,305
Li_Battery	MW	48,813	-	48,813
LDES (Pumped Storage)	MW	4,000	-	4,000
Total New Storage	MW	52,813	-	52,813
Shed DR	MW	-	-	-
Gas	MW	(4,722)	(10,278)	(15,000)
Generic Clean Firm/LDES	MW	-	5,000	5,000
Total New Resources	MW	145,140	19,978	165,118

2045 SB 100 Portfolio Resource Breakdown

Resource Type		Study Year:	SB 100 Core	Additions	Final Portfolio	1st 20-year Outlook	23-24 TPP Base Portfolio
			2045		2045	2040	2035
Biomass	MW		-	134	134	-	134
Geothermal	MW		135	2,197	2,332	2,332	2,037
Onshore in CAISO Wind	MW		2,837	237	3,074	2,837	3,074
OOS, Out-of-CAISO Wind	MW		9,715	2,285	12,000	12,000	5,618
Offshore Wind	MW		10,000	10,000	20,000	10,000	5,497
Utility-Scale Solar	MW		69,640	-	69,640	53,212	38,947
Distributed Solar	MW		-	125	125	-	125
Total New Renewables	MW		92,327	14,978	107,305	80,381	55,433
Li_Battery	MW		48,813	-	48,813	37,000	28,373
LDES (Pumped Storage)	MW		4,000	-	4,000	4,000	2,000
Total New Storage	MW		52,813	-	52,813	41,000	30,373
Shed DR	MW		-	-	-	-	1,111
Gas	MW		(4,722)	(10,278)	(15,000)	(15,000)	-
Generic Clean Firm/LDES	MW		-	5,000	5,000	-	-
Total New Resources	MW		145,140	19,978	165,118	121,381	86,916

Mapping the 2045 SB 100 Portfolio

Mapping the 2045 SB 100 Portfolio

- The 20-year outlook analysis is higher-level and more open-structured than the tariff-based TPP analysis.
 - Still requires downscaling of resources to the substation level.
- Previously conducted by CAISO staff, now joint CEC-CPUC-CAISO effort.
- 20-year outlook mapping effort has more limited analysis than the busbar mapping process for TPP portfolios.
 - Focused on high-voltage bulk transmission
 - Rely on mapping results from the 23-24 TPP base case to site resources
 - Implement limited land-use and other mapping analysis to site resources beyond the amounts in the 23-24 TPP base case
 - Utilize new CEC draft land-use screen
- Mapping results are summarized in subsequent slides.

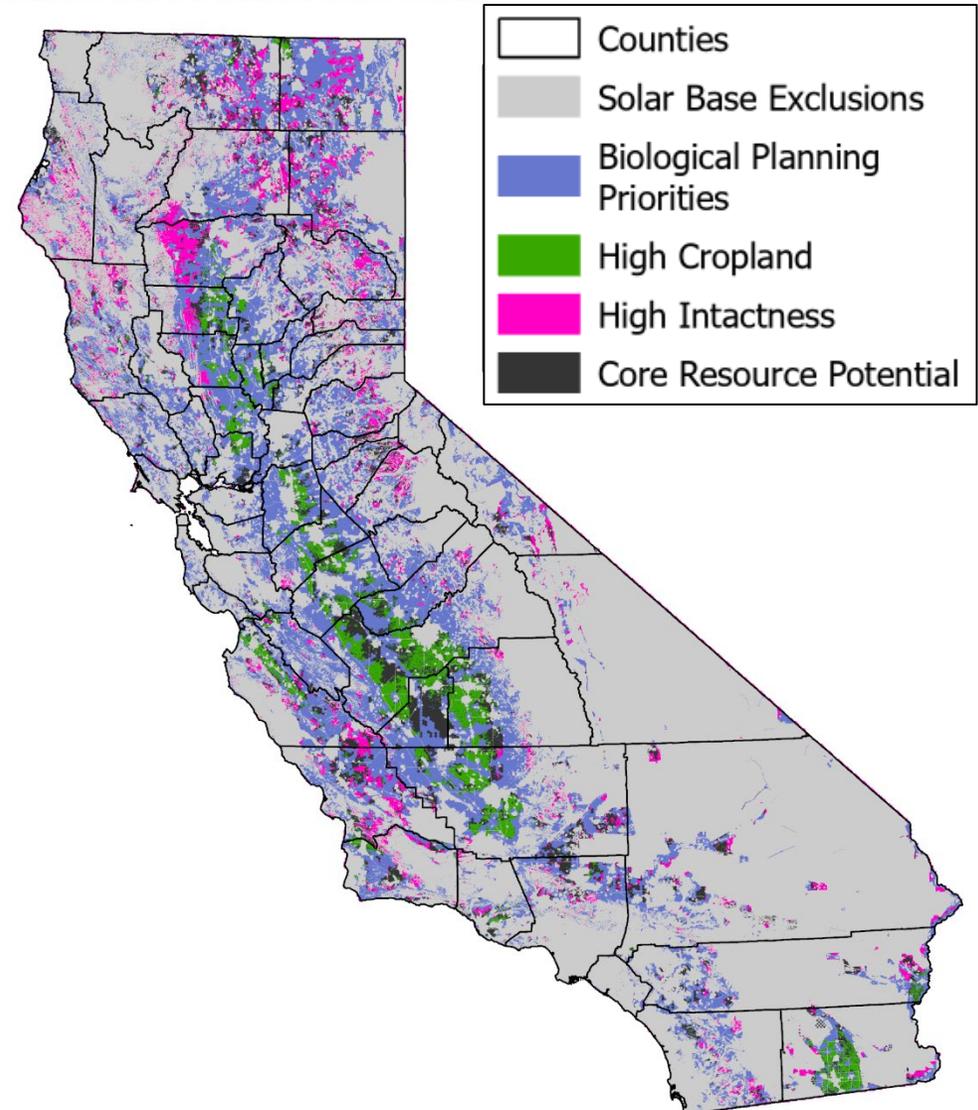


The Core Land-Use Screen

- Land-use screens are geospatial delineations of important environmental and physical characteristics of the land.

Components of the Core Screen:

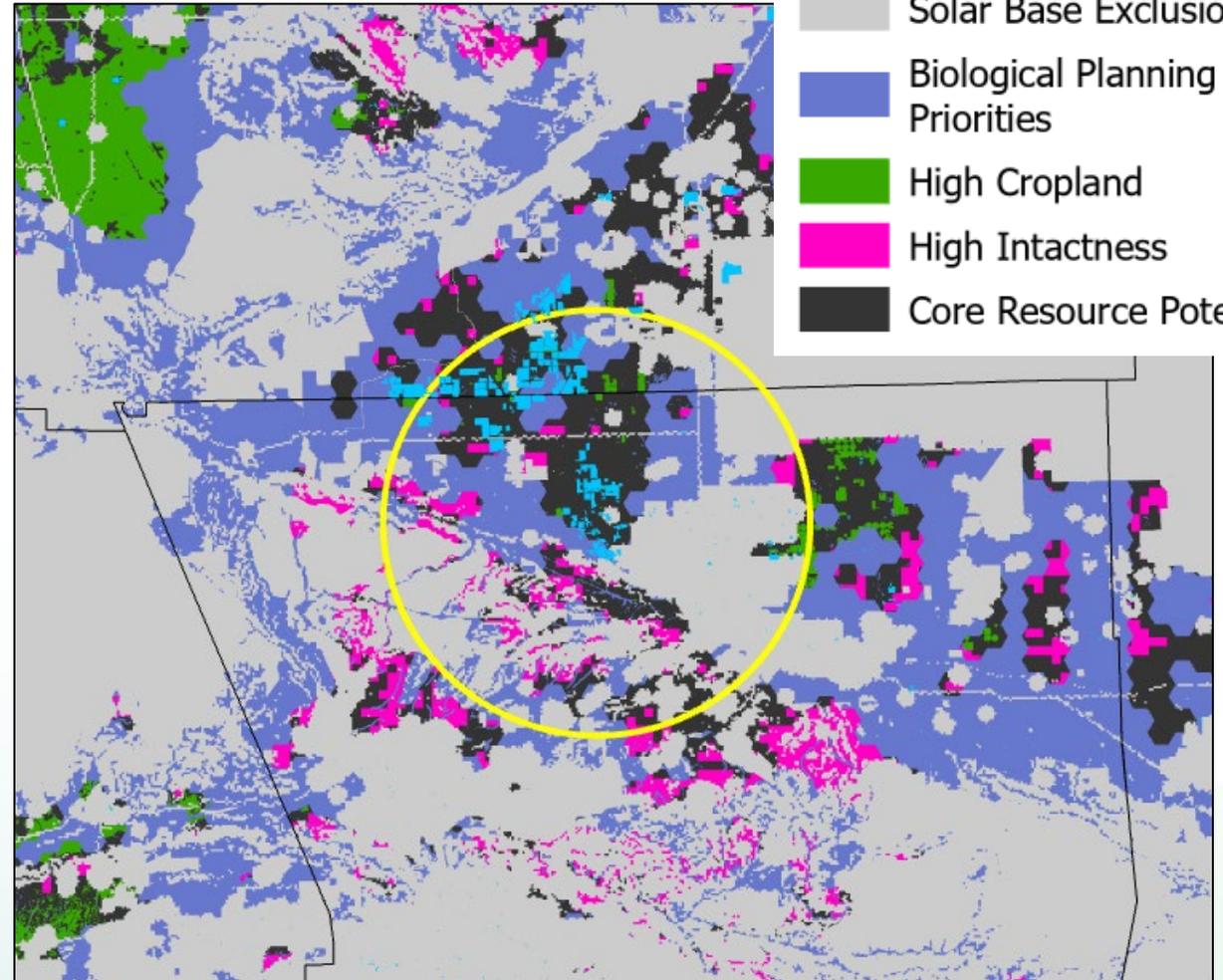
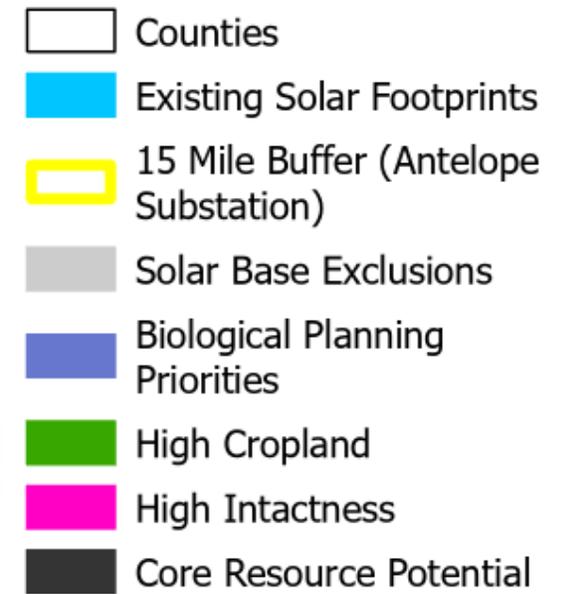
- **Base Exclusions:**
 - Techno-economic (CPUC)
 - Protected Areas
- **Biological Planning Priorities:**
 - ACE Biodiversity (Rank 5)
 - ACE Connectivity (Ranks 4 and 5)
 - ACE Irreplaceability (Ranks 4 and 5)
 - USFWS Critical Habitat
 - Wetlands
- **Terrestrial Landscape Intactness**
- **CEC Cropland Index Model (Solar Only)**





Land-use and Environmental Evaluation

- Additional 30,693 MW of solar needs to be downscaled to enter transmission network at plausible locations
- Land-use and environmental evaluation of 15-mile buffer around substations
- Total acreage of Core Resource Potential (area remaining outside of the Core Screen) minus the existing facility footprint is reported to the CPUC for CAISO preferred substations,* interconnection points in the CAISO Public Queue, and a few substations in the Imperial Irrigation District



Those substations studied in the 2021 Transmission Capability Estimate for use in the CPUC's Resource Planning Process White Paper, available at <http://www.caiso.com/Documents/WhitePaper-2021TransmissionCapabilityEstimates-CPUCResourcePlanningProcess.pdf>

2045 SB 100 Portfolio Mapping Summary

Gas Power Plant Retirements

- Portfolio assumes 15,000 MW of gas power plant retirements.
 - ~50% of natural gas plant capacity assumed in the SB 100 Report scenarios
 - Same assumption as previous 20-year outlook
- Retirements are prioritized as follows:
 - Assume the oldest natural gas power plants retire first
 - With a priority to those in and adjacent to disadvantaged communities
 - Gas plants that rely on the Aliso Canyon storage facility, up to 3,000 MW
- Recommend using same locations as identified for the previous outlook.

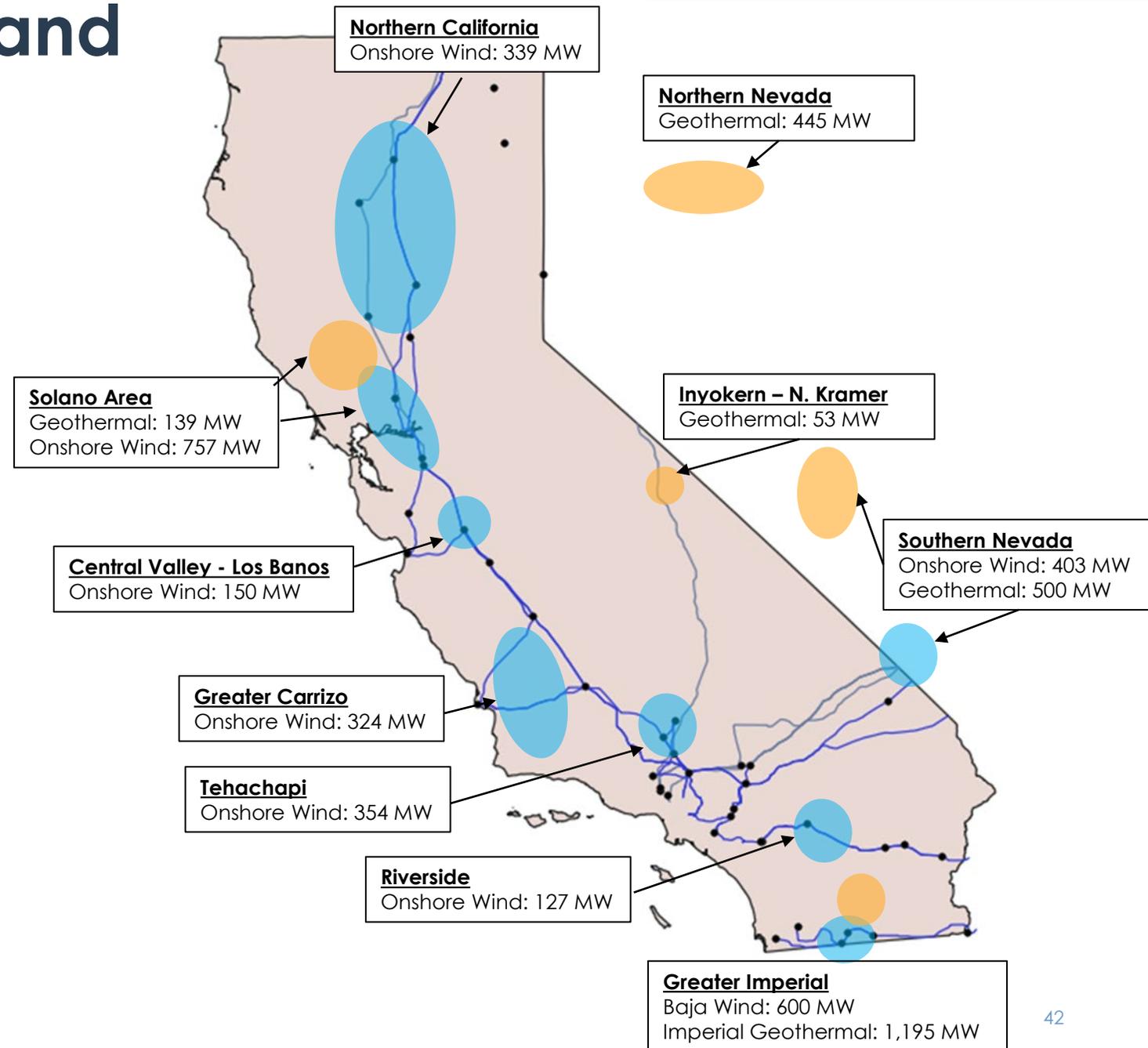
Local Capacity Area	Capacity (MW)
Greater Bay Area	4427
Sierra	153
Stockton	361
Fresno	669
Kern	407
LA Basin	3,632
Big Creek-Ventura	695
San Diego-IV	131
ISO System	3,933
Total	14,408

TABLE: Assumed gas-fired generation retired by local capacity area in previous 20-year study.

(<http://www.caiso.com/InitiativeDocuments/20-YearTransmissionOutlook-May2022.pdf>)

Onshore, In-State Wind and Geothermal

- Geographic breakdown of the in-state wind and geothermal
- Onshore in-state wind resources: 3,074 MW
 - Amount and locations are same as in the 23-24 TPP base case
 - Note: Does include some OOS wind (Southern Nevada and Baja California) that interconnect directly with existing CAISO system
- Geothermal resources: 2,332 MW
 - 2045 portfolio has 295 MW more geothermal than 23-24 TPP base case
 - Mapped additional geothermal to Imperial area



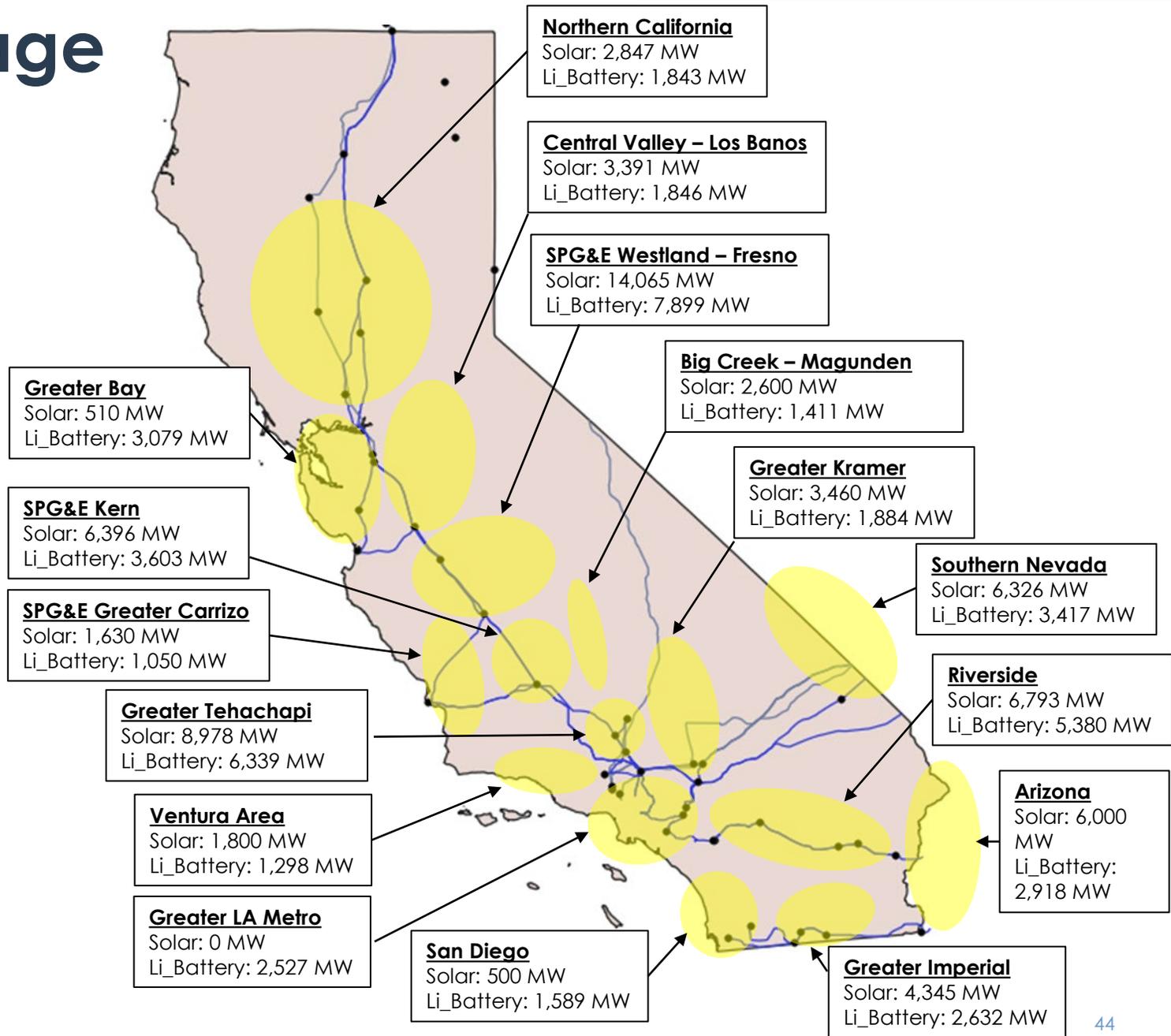
Solar and Battery Storage Mapping

- Significantly more solar and storage in 2045 portfolio than in 23-24 TPP base case.
- Mapping again builds on the solar and storage resources included in the 23-24 TPP base case.
- Implement high-level analysis to identify substations to map the additional resources.
 - Focus on substations included in the 23-24 TPP portfolios and the high-voltage (> 200 kV) transmission system
- Additional solar mapped utilizing:
 - New CEC land-use screens
 - CAISO interconnection queue through Cluster 14
- Additional storage mapped prioritizing:
 - Local areas to replace gas, within CAISO's MW recharging limits
 - Co-located with mapped solar

	Utility Solar (MW)	Li-Battery (MW)
20-year outlook (2045)	69,640	48,813
23-24 TPP base case (2035)	38,947	28,373
Additional resources mapped	30,693	20,440

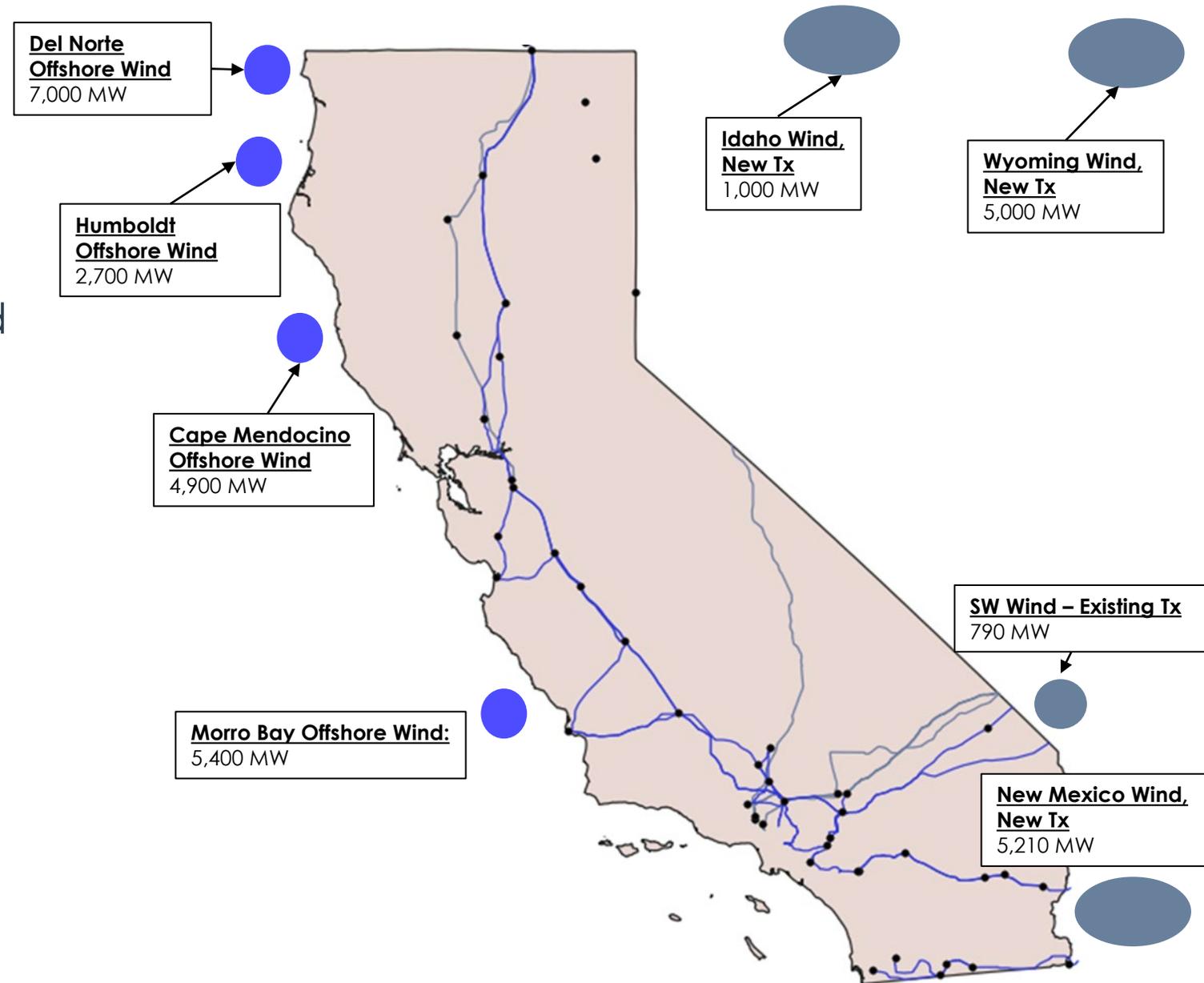
Solar and Battery Storage

- Geographic breakdown of the:
 - 69,640 MW of utility-scale solar
 - 48,813 MW of Li-battery storage
- Mapped solar deliverability breakdown:
 - FCDS: 24,850 MW (~35.7%)
 - EODS: 44,790 MW (~64.3%)
- Mapped battery storage co-located vs stand-alone breakdown:
 - Stand-alone: 9,100 MW
 - Co-located: 39,710 MW



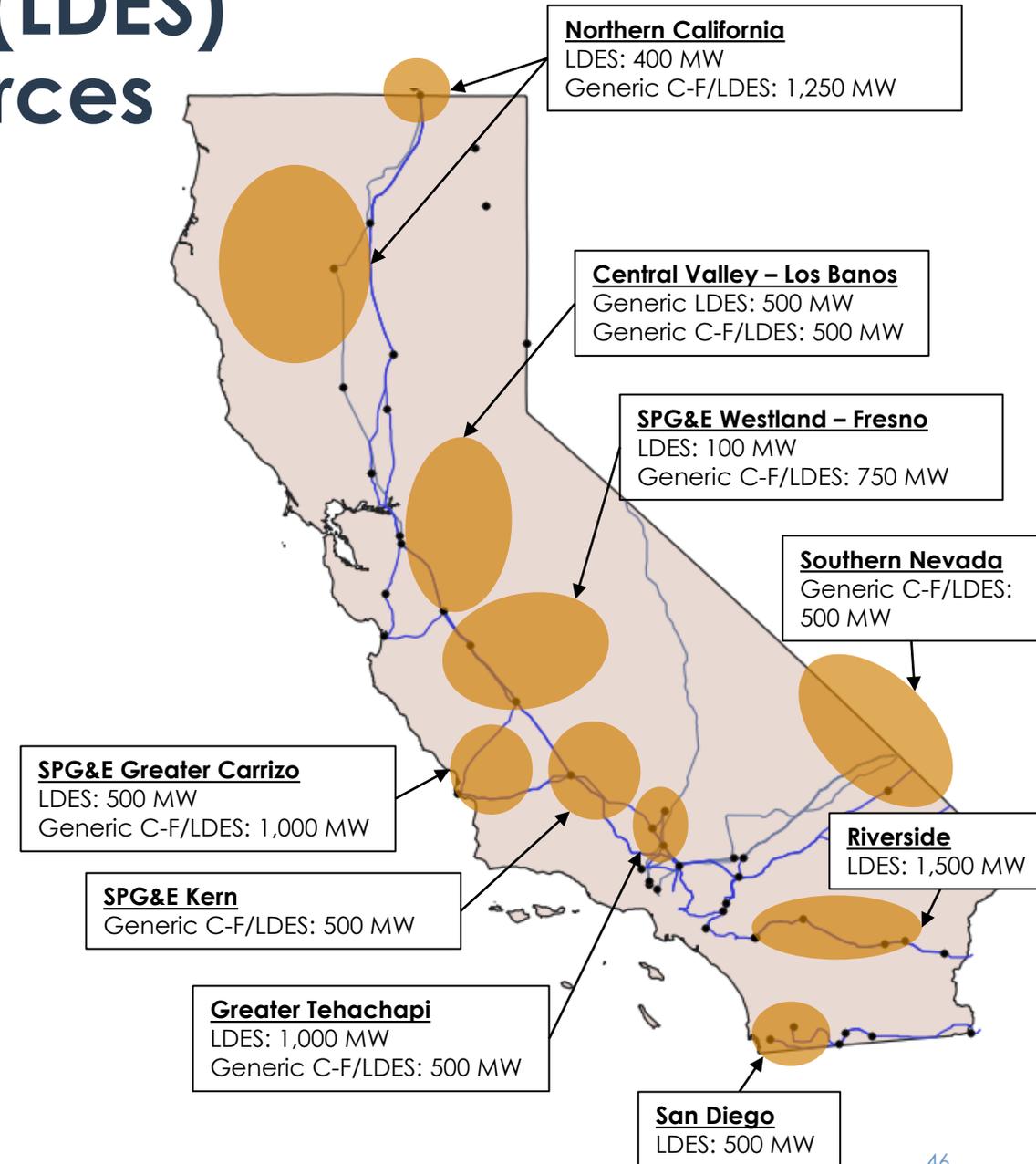
Out-of-State Wind and Offshore Wind

- Geographic breakdown of the:
 - 20 GW of offshore wind
 - 12 GW of OOS, out-of-CAISO wind
- Mapping the 20 GW of offshore wind guided by 23-24 TPP portfolios and ongoing North Coast analysis led by CEC for AB 525.
 - Morro Bay Wind Energy Area: 5.4 GW
 - Humboldt Wind Energy Area: 2.7 GW
 - Two hypothetical North Coast Areas:
 - Del Norte: 7.0 GW
 - Cape Mendocino: 4.9 GW
- Out-of-state wind mapping builds upon the 23-24 TPP base case locations.
 - Roughly doubling MWs mapped to Wyoming and New Mexico Wind.



Long-Duration Energy Storage (LDES) and Generic Clean Firm Resources

- 4,000 MW of portfolio selected LDES mapped in line with 23-24 TPP base case and identified interconnection queue interest.
 - Although modeled as pumped-storage in RESOLVE, mapping considered all technology types of LDES with comparable duration.
- 5,000 MW of additional generic clean firm (C-F)/LDES resources mapped specifically outside of local areas, near renewable generation.
 - Mapping these resources outside of the local reliability enables study of greater transmission needs into local areas.



For more information:
Jared.Ferguson@cpuc.ca.gov





Questions





Public Comments





Public Comment

Instruction

- 3 minutes or less per person
- 1 representative per organization

Zoom App/Online

- Click “raise hand”

Telephone

- Press *9 to raise hand
- Press *6 to (un)mute

When called upon

- Public Advisor will open your line
- Unmute, spell name, state affiliation, if any

Written Comments

- Due: June 30th, 2023 by 5:00 p.m.
- Docket Log: 21-SIT-01
- Submit Comments:
<https://efiling.energy.ca.gov/Ecomment/Ecomment.aspx?docketnumber=21-SIT-01>

3-MINUTE TIMER





Closing Remarks





Thank You!