



The Public
ADVOCATES
OFFICE

Prioritization of Policy-Driven Transmission Projects

A Proposed Framework for Identifying Critical and Efficient Transmission Solutions
Needed to Meet California's Climate and Clean Energy Goals

The Public Advocates Office | Electric Transmission Planning & Policy

January 2024

Overview

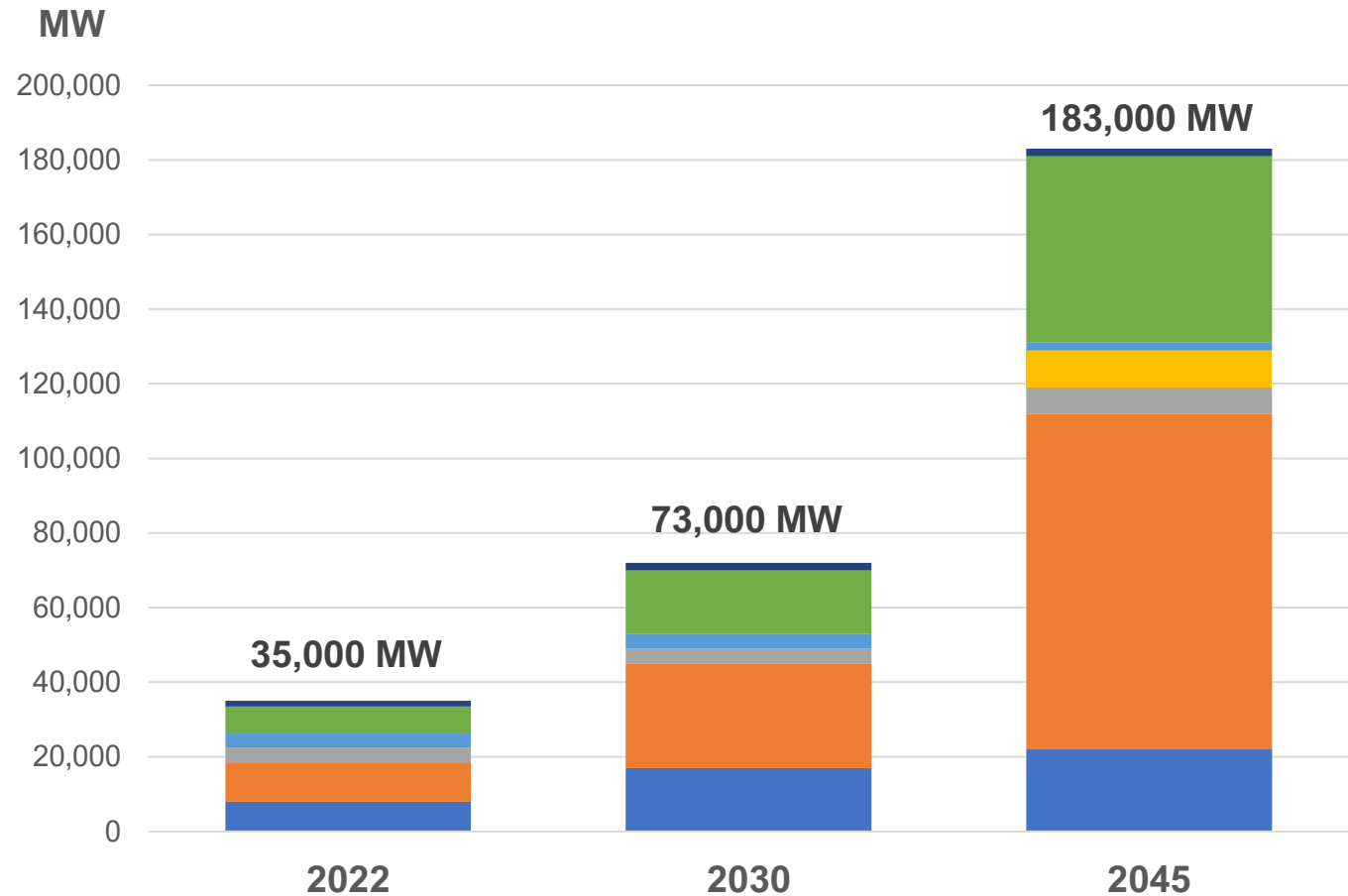
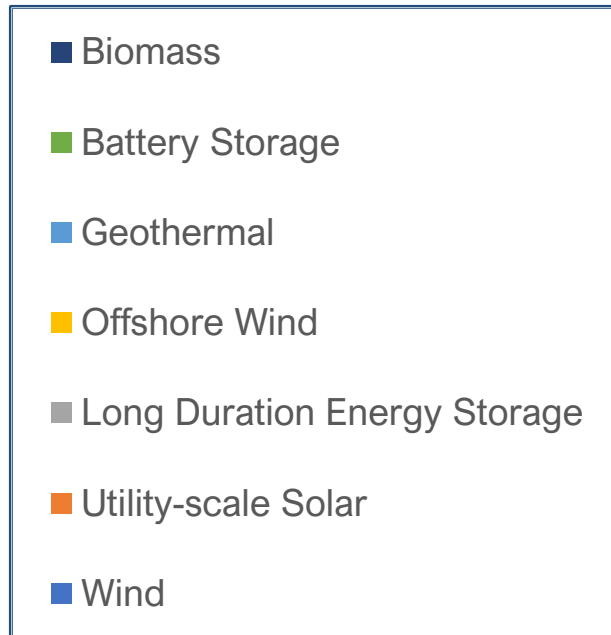
I. Background

II. **Proposal** - California should prioritize the permitting and construction of transmission projects that can cost-efficiently unlock access to renewable energy resources to help the state meet its climate change goals.

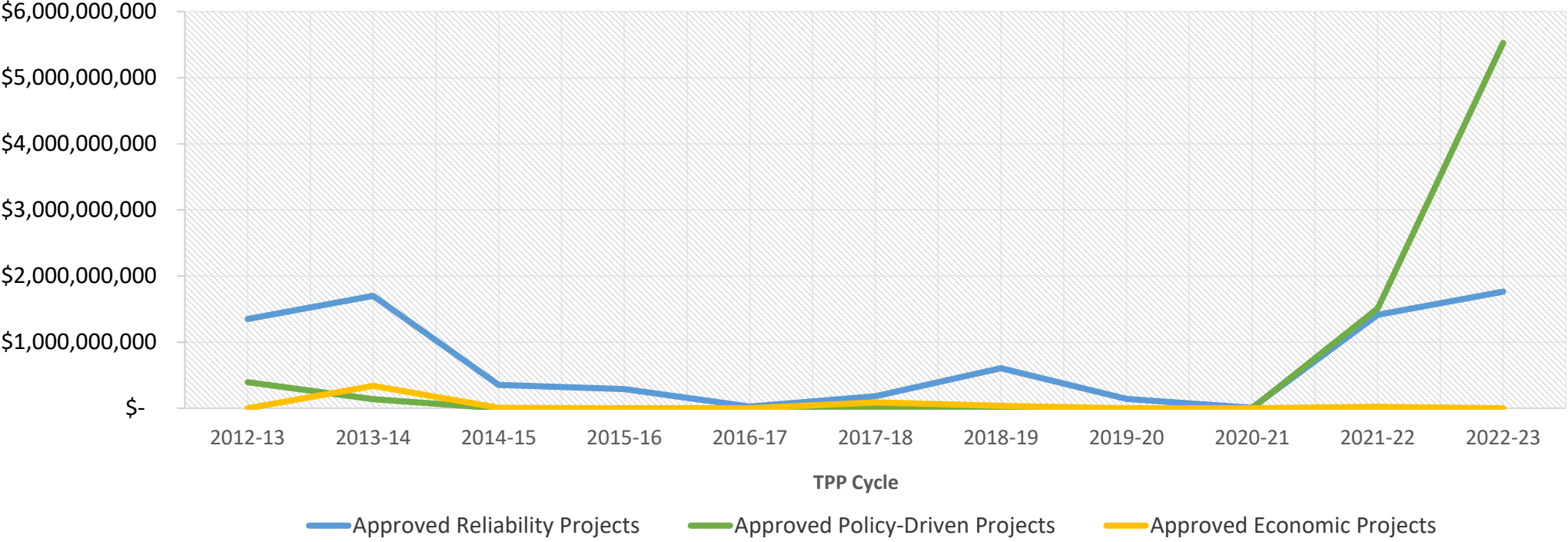
III. **Methodology** – Cal Advocates staff assessed the CAISO-approved policy-driven transmission projects and developed a framework to identify projects for prioritization eligibility.

IV. Discussion and Implementation

To provide 100% clean electricity by 2045, California will build an unprecedented amount of new utility-scale clean energy resources



The CAISO's recent Transmission Plans underscores the need for an unprecedented rate of transmission development



The CAISO-approved policy-driven transmission projects are needed to connect load centers with the IRP-prescribed portfolio of renewable energy resources in line with California's climate and clean energy goals

Source: CAISO. Transmission Plan 2012-13 through 2022-23.

Current transmission development timelines are inadequate to accommodate rapid renewable deployment

- The timeframe over which transmission projects are planned, permitted, sited, and built is 7 to 10 years on average.
- The pace of new clean energy development required to meet California's clean energy goals far outpaces the rate at which new transmission capacity is added to accommodate these resources.

Transmission Project Prioritization

- The state should identify and focus development of critical transmission projects to:
 - Strategically and cost-efficiently accelerate transmission development to access renewable energy; and
 - Ensure capacity is available when and where renewable energy resources are likely to be built.

Prioritization: Potential Implementation

- The **CAISO** could identify the relative need of policy-driven transmission projects in its Transmission Plans based on how efficiently they integrate renewable energy resources.
- The **utilities** could initiate projects in an order that favors projects that allow for the deliverability of new or expected renewable energy resources.
- The **CPUC** could make selected prioritized projects eligible for permitting streamlining.
 - Cal Advocates' prioritization proposal can be implemented in conjunction with an updated General Order 131-D (governing transmission project permitting).

Goals of Prioritization

- 1. A timely and efficient transmission build-out.**
 - Focus on expanding transmission capacity where it is most needed to access new renewable resources and provide reliability while considering the relative timing and costs of projects.
- 2. A systematic and step-wise transmission build-out.**
 - Enable dynamic assessment of the need of future transmission projects.
 - Distribute costs to ratepayers over time.
- 3. A structured and coordinated path to reach clean energy goals.**

Legislative Attempts to Prioritize Transmission Projects: SB 887

- SB 887 (Becker, 2022) – Requires that, in its 2022-2023 Transmission Plan, the CAISO “identify **the highest priority transmission facilities** that are needed to **allow for increased transmission capacity into local capacity areas** to deliver renewable energy resources that are expected to be developed by 2035.”
- Signed into law September 2022.

Legislative Attempts to Prioritize Transmission Projects: SB 887

- In response to SB 887, the CAISO identified one reliability project and 11 policy-driven projects from the 2022-2023 TPP that also reduce gas-fired generation local capacity requirements:
 - Line upgrades in the LA Basin area: “**The seven upgrades to four existing 500 kV lines and three 230 kV lines in the SCE Eastern area and the addition of the third cable to the Mesa-Mira Loma 500 kV section** will increase the 500 kV and 230 kV supply to the LA Basin.”
 - Three new substations and 200+ miles of new line: “**The Imperial Valley 500 kV Line and Substation, North of SONGS–Serrano 500 kV Line, and Serrano–Del Amo–Mesa 500 kV Reinforcement** projects... will increase the transmission capacity in the LA Basin.”

Legislative Attempts to Prioritize Transmission Projects: SB 887

- SB 887:
 - Only applied to the 2022-2023 TPP.
 - Only considers the projects' impact on gas-fired local capacity requirements.
 - Does not expedite the development of the prioritized projects.
- Cal Advocate's prioritization framework considers projects' impact on overall transmission capacity, cost, resource-effectiveness, and timing. The results of our analysis capture many of CAISO prioritized projects.

Cal Advocates' Proposal

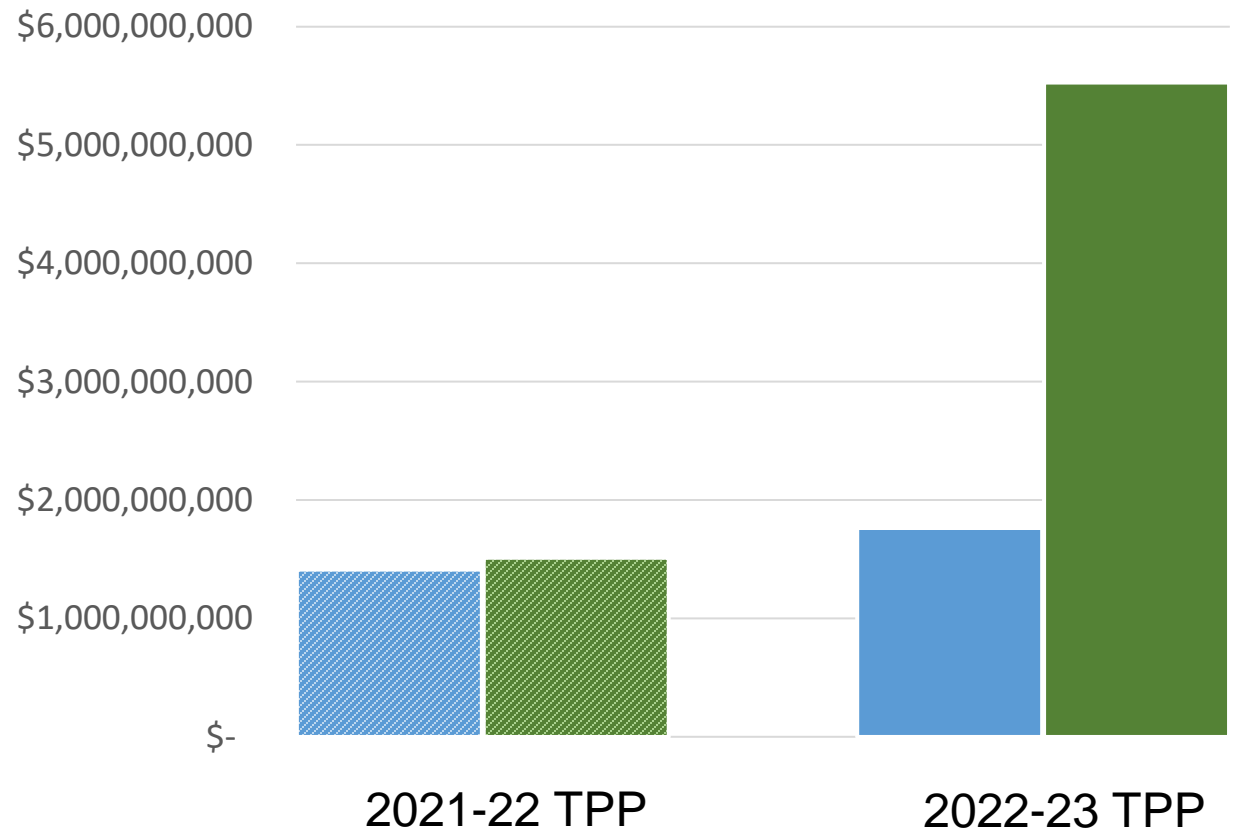
The CAISO-approved policy-driven transmission projects that unlock access to renewable energy resources in the most highly-constrained zones at the lowest cost and with minimal land-use impacts should be prioritized for an early and expedited development.

Prioritization Methodology

Overview of the CAISO Policy-Driven Projects

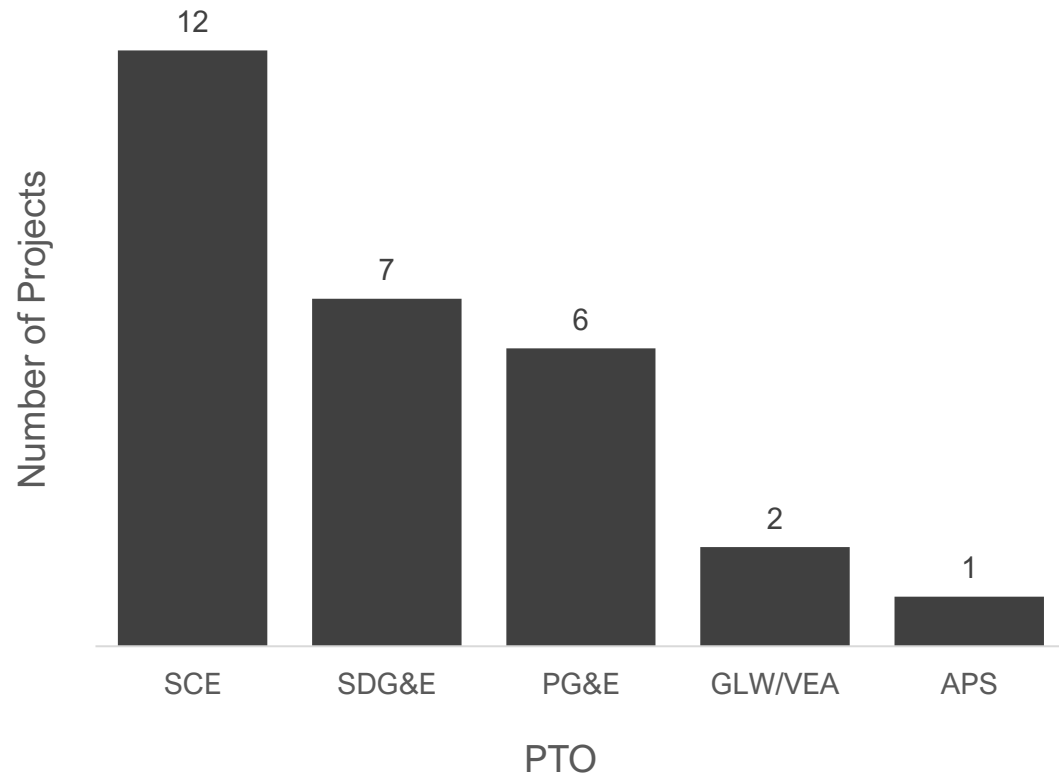
Transmission Investments Approved in the 2021-22 and 2022-23 TPP Projects by Project Type

- Policy-Driven Projects
- Reliability-Driven Projects

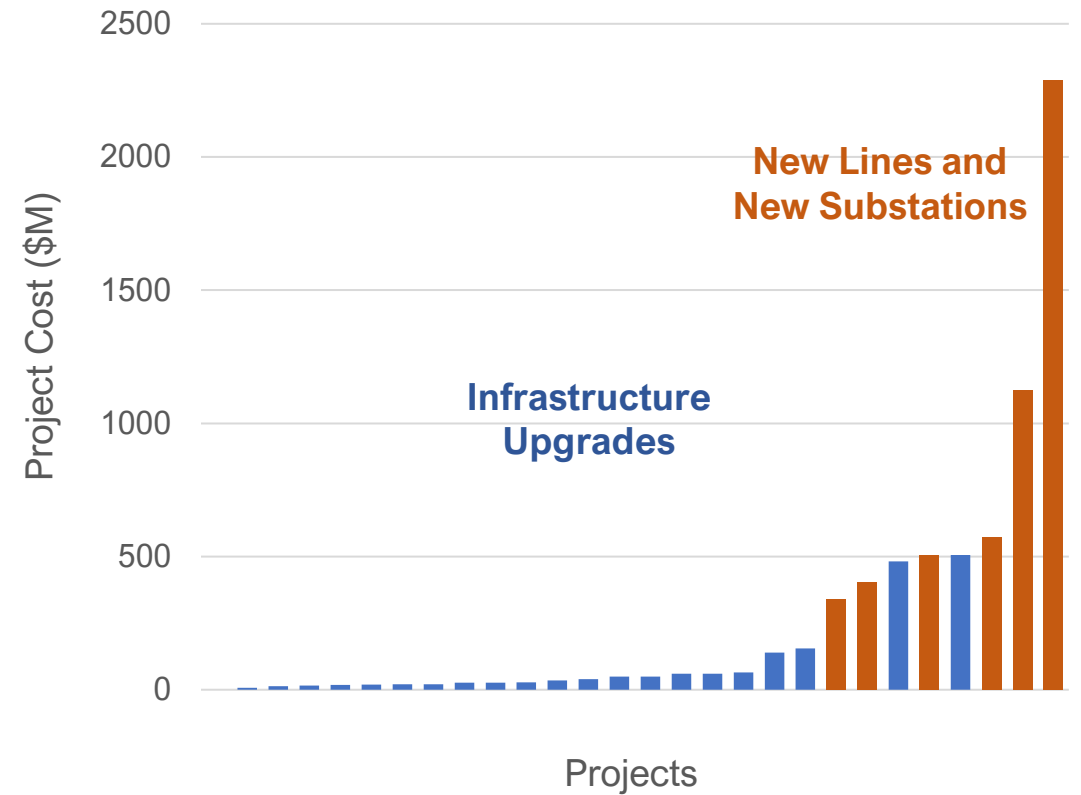


Overview of the CAISO Policy-Driven Projects

Geographic Distribution of 2021-22 and 2022-23 TPP Policy-driven Projects



Cost of 2021-22 and 2022-23 TPP Policy-driven Projects



Assessing Policy-Driven Projects

- Staff relied on data from the CAISO's 2021-22 and 2022-23 TPP to assess all 27 policy-driven projects approved in these TPPs according to five factors:
 1. Net contribution to renewable energy deliverability
 2. Cost-Efficiency
 3. Required and expected in service date; urgency
 4. Environmental and land-use impact; physical grid optimization
 5. Reliability and other co-benefits
- Using a *multi-dimensional priority index* framework, projects were assessed and ranked relative to each other according to all criteria simultaneously.

Criteria 1: Projects That Contribute to Mitigating the Largest Deliverability Constraints

- In the TPP, policy-driven projects are approved based on their ability to partially or fully mitigate one or more “deliverability constraints”.
- **Deliverability Constraint:** Locations in the transmission system that would become overly congested and result in high renewable energy curtailments given existing capacity, under the prescribed future resource portfolio.

Constraint	Portfolio	Portfolio MW behind the constraint	Energy storage portfolio MW behind the constraint	Deliverable Portfolio MW w/o mitigation	Total undeliverable baseline and portfolio MW	Mitigation
East of Miguel	Base	1,178	279	0	3,080	Southern area reinforcement
Bay Boulevard-Silvergate	Base	1,209	10	0	2,373	2 hour emergency rating on Silvergate-Bay Boulevard 230 kV line and south area reinforcement

Deliverability Constraint →

← Transmission Project Mitigating Deliverability Constraint

Source: CAISO. 2022-2023 Transmission Plan.

Criteria 1: Projects That Contribute to Mitigating the Largest Deliverability Constraints (cont.)

- Deliverability constraints were ranked by:
 - Total undeliverable baseline and portfolio resources (MW).
 - Relative portfolio resources deliverable without mitigation (%)
- Projects that mitigate large present and future deliverability constraints in zones least prepared to integrate renewable energy resources should be prioritized.

Constraint	Portfolio	Portfolio MW behind the constraint	Energy storage portfolio MW behind the constraint	Deliverable Portfolio MW w/o mitigation	Total undeliverable baseline and portfolio MW	Mitigation
East of Miguel	Base	1,178	279	0	3,080	Southern area reinforcement
Bay Boulevard-Silvergate	Base	1,209	10	0	2,373	2 hour emergency rating on Silvergate-Bay Boulevard 230 kV line and south area reinforcement

Source: CAISO. 2022-2023 Transmission Plan.

Criteria 2: Cost-Efficient Projects

- The proposed framework assesses the cost-efficiency of projects through simultaneously ranking projects by cost and impact on renewable energy deliverability.
- Low-cost projects that also contribute to mitigating large renewable resource deliverability constraints appear as high priority.

Criteria 3: Projects that are urgently needed

- Projects should be prioritized based on:
 - The date by which CAISO determines a project is needed.
 - The PTO-provided expected in-service date.
- Projects with an early CAISO-identified need date or a need date before its expected in-service date should be prioritized.

Criteria 4: Projects with minimized land-use impacts

- Brownfield projects should be prioritized over greenfield projects.
 - » Projects that upgrade or expand upon existing lines and substations, use existing rights of ways, or do not expand land footprint.
- Generally, relative to greenfield projects, these projects:
 - Optimize existing infrastructure to increase capacity
 - Have lesser environmental and land-use impacts.
 - Have lower construction costs.
 - Require less time and resources for planning and permitting.
- Optimal projects for expedited development.

Criteria 5: Projects with reliability and economic co-benefits

- CAISO-identified policy-driven projects also undergo a reliability and economic benefit assessment in the TPP.
- Projects with the following attributes are given preference for prioritization:
 - Have CAISO-identified reliability or economic co-benefits.
 - Unlock access to energy storage.

Criteria 5: Projects with reliability and economic co-benefits (cont.)

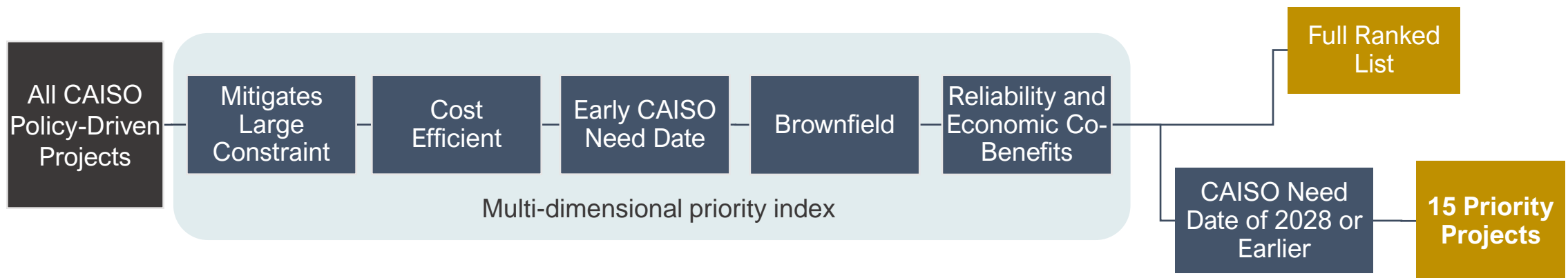
- The amount of energy storage resources mapped to a project provides system reliability benefits that are not captured elsewhere in our analysis.
 - Ex: SCE's Laguna Bell-Mesa 230 kV Line Rating Increase Project has 0 MW of portfolio renewable resources mapped to it but 500 MW of battery storage.

Summary of Prioritization Criteria

Attribute Assessed	Criteria
Net contribution to renewable energy deliverability	Project contributes to mitigating the largest transmission deliverability constraints
Cost-efficiency	Lowest cost projects that mitigate large deliverability constraints
Urgency; potential for expedited permitting and construction	Projects with earlier CAISO-identified project need date AND Projects with CAISO-identified need date earlier than utility-provided expected in-service date
Minimized environmental and land-use impact; physical grid optimization; potential for expedited permitting and construction	Brownfield projects (upgrades to existing facilities without expanding land footprint)
Reliability and other co-benefits	Projects with CAISO-identified reliability, economic, and reduced gas-fired generation capacity benefits AND Projects that unlock the most battery storage capability

Project Ranking Methodology

1. Data was collected from the 2021-22 and 2022-23 Transmission Plan for deliverability constraints and approved transmission projects.
2. Using the *multi-dimensional prioritization index* framework, all 27 policy-driven projects were assessed according to the five criteria simultaneously (qualitative reliability co-benefits assessed separately) to arrive at a ranked list.
3. Projects with a CAISO-identified need date of 2028 or earlier were proposed for prioritization irrespective of their ranks and included in final 15 projects .



Project Ranking Methodology

Mock Example

Project	Need Date (A)	Cost (\$ M) (B)	Land-Use Factor* (C)	Undeliver-able MW (D)	Combined Score $S=A*B*C*D$	Priority Rank (Ascending)
Project X	2030	300	2	5000		1
Individual Rank	2	9	1	4	$2*9*1*4 = \underline{72}$	
Project Y	2028	200	0	3000		2
Individual Rank	1	6	2	8	$1*6*2*8 = \underline{96}$	

*Land-Use Factor is 2 for brownfield projects, 1 for partial brownfield projects, and 0 for greenfield projects

Rank projects by single criteria ↴

• → Calculate product of rank values to obtain cumulative relative score ↴

• → Rank cumulative score to obtain priority rank

Note - This matrix only depicts how the overall methodology for ranking could be applied to the Ranking Framework.

Project No.	Project Name	TPP Year	Service Area	Project Need Date (D)	Rank by Need Date	Expected in Service Date	Years b/w Needed and Expected In Service Date	Rank by Need Date/ Expected Date Difference (D)	Average Project Cost (E)	Brownfield (2) / Partial Brownfield (1)/ Greenfield (0) (F)	Land Use Rank (F)	Total Undeliverable MW (A1)/Average Cost (E) [MW/\$(G2)	Rank G2	Total undeliverable baseline and portfolio MW (A1)	% of Portfolio Deliverable w/o Mitigation (B)	Energy Storage Portfolio MW behind the constraint (C1)	Rank (A1)	Rank (B)	Rank (C1)	Rank with constraints A1,B (M)	Overall Score PzMsC1	Overall Priority Rank
1	Laguna Bell-Mesa No.1 230 kV Line Rating Increase	2021-22	SCE	2023	1	2023	0	5	21	2	1	147.5	3	3098	100%	500	5	25	13	19	44460	7
2	Reconductor Delevan-Cortina 230kV Line	2021-22	PG&E	2028	3	2028	0	5	26.25	2	1	21.5	16	564	0%	0	22	1	23	16	1059840	20
3	New Collinsville 500 kV substation	2021-22	PG&E	2028	3	2028	0	5	575	0	24	2.2	25	1270	0%	16.2	17	1	22	14	33264000	24
4	Reconductor Rio Oso-SPI Jet-Lincoln 115kV	2021-22	PG&E	2028	3	2028	0	5	15.9	2	1	24.9	13	396	0%	0	23	1	23	17	914940	18
5	New Manning 500 kV substation	2021-22	PG&E	2028	3	2028	0	5	405	0	24	0.1	26	44	90%	0	26	24	23	25	64584000	27
6	GLW/VEA Area Upgrades	2021-22	GLW/VEA	2025	2	2027	2	3	506	1	19	2.9	23	1482	27%	248	15	19	19	20	996360	19
7	Borden-Storey 230 kV 1 and 2 Line Reconductor	2022-23	PG&E	2035	26	2032	-3	18	38	2	1	15.3	17	581	0%	139	21	1	20	15	2386800	21
8	Henrietta 230/115 kV Bank 3 Replacement	2022-23	PG&E	2035	26	2032	-3	18	16	2	1	11.9	18	191	100%	0	25	25	23	26	5037552	23
9	Beatty 230 kV	2022-23	GLW/VEA	2032	9	2027	-5	25	155	1	19	2.3	24	360	25%	40	24	18	21	24	51710400	26
10	Luqo-Victor-Kramer 230 kV Upgrade	2022-23	SCE	2028	3	2032	4	1	482	1	19	5.2	21	2432	0%	700	13	1	11	11	144837	15
11	Colorado River-Red Bluff 500 kV 1 Line	2022-23	SCE	2032	9	2028	-4	20	50	2	1	23.0	14	1150	83%	1404	18	23	4	23	231840	16
12	Devers-Red Bluff 500 kV 1 and 2 Line Upgrade	2022-23	SCE	2032	9	2028	-4	20	140	2	1	56.8	10	7956	0%	1404	3	1	4	3	21600	6
13	Devers-Valley 500 kV 1 Line Upgrade	2022-23	SCE	2032	9	2028	-4	20	40	2	1	68.3	7	2732	0%	769	8	1	6	6	45360	8
14	Serrano-Alberhill-Valley 500 kV 1 Line Upgrade	2022-23	SCE	2032	9	2028	-4	20	60	2	1	45.5	11	2732	0%	769	8	1	6	6	71280	13
15	San Bernardino-Etiwanda 230 kV 1 Line Upgrade	2022-23	SCE	2032	9	2031	-1	16	65	2	1	42.0	12	2732	0%	769	8	1	6	6	62208	11
16	San Bernardino-Vista 230 kV 1 Line Upgrade	2022-23	SCE	2032	9	2026	-6	26	18	2	1	151.8	2	2732	0%	769	8	1	6	6	16848	4
17	Vista-Etiwanda 230 kV 1 Line Upgrade	2022-23	SCE	2032	9	2031	-1	16	13	2	1	210.2	1	2732	0%	769	8	1	6	6	5184	1
18	Mira Loma-Mesa 500 kV Underground Third Cable	2022-23	SCE	2032	9	2026	-6	26	35	2	1	89.1	5	3120	77%	4701	4	22	1	18	21060	5
19	Imperial Valley-North of SONGS 500 kV Line and	2022-23	SDG&E	2030	8	2034	4	1	2288	0	24	4.8	22	11036	0%	1683	1	1	2	1	8448	2
20	North of SONGS-Serrano 500 kV line	2022-23	SDG&E/SC	2033	24	2034	1	4	503	0	24	21.9	15	11036	0%	1683	1	1	2	1	69120	12
21	Serrano-Del Amo-Mesa 500 kV Transmission Reinforcement	2022-23	SCE	2033	24	2033	0	5	1125	1	19	0.0	27	0	100%	0	27	25	23	27	38228760	25
22	North Gila-Imperial Valley 500 kV line	2022-23	SDG&E	2032	9	2028	-4	20	340	1	19	9.1	20	3080	0%	279	6	1	17	4	4651200	22
23	Upgrade series capacitors on HW-NG and HA-NG to 2739 MVA	2022-23	APS	2032	9	2032	0	5	27	2	1	114.1	4	3080	0%	279	6	1	17	4	12240	3
24	Rearrange TL23013 PQ-OT and TL6959 PQ-Mira Sorrento	2022-23	SDG&E	2032	9	2032	0	5	21	2	1	63.8	8	1339	0%	500	16	1	13	13	60840	10
25	Reconductor TL680C San Marcos-Melrose	2022-23	SDG&E	2032	9	2032	0	5	28	2	1	63.7	9	1784	0%	689	14	1	12	12	58320	9
26	3 ohm series reactor on Sycamore-Penasquito	2022-23	SDG&E	2032	9	2032	0	5	8	2	1	85.0	6	680	68%	310	19	20	15	21	85050	14
27	Upgrade TL13820 Sycamore-Chicarita 138 kV	2022-23	SDG&E	2032	9	2032	0	5	60	2	1	11.3	19	680	68%	310	19	20	15	21	269325	17

Note - This matrix only depicts how the overall methodology for ranking could be applied to the Ranking Framework.

Results

Preliminary List of Identified Priority Projects

1 through 10, in order of need date

TPP Year	Project Name	PTO	Region/CAISO Interconnection Area	Project Need Date	Expected Service Date	Estimated Project Cost	Potential Renewables Unlocked (MW)
2021-22	Laguna Bell-Mesa No.1 230 kV Line Rating Increase Project	SCE	SCE Metro	2023	2023	21	3098
2021-22	GLW/VEA Area Upgrades*	GLW/VEA	GLW/VEA	2025	2027	506	1482
2022-23	Lugo–Victor–Kramer 230 kV Upgrade	SCE	SCE North of Lugo	2028	2032	482	2492
2021-22	Reconductor Rio Oso-SPI Jct-Lincoln 115kV Line	PG&E	PG&E North of Greater Bay	2028	2028	15.9	396
2021-22	Reconductor Delevan-Cortina 230kV Line	PG&E	PG&E North of Greater Bay	2028	2028	26.25	564
2021-22	New Collinsville 500 kV substation	PG&E	Greater Bay Area	2028	2028	575	1270
2021-22	New Manning 500 kV substation	PG&E	Greater Central Valley	2028	2028	405	44
2022-23	Imperial Valley–North of SONGS 500 kV Line and Substation	SDG&E	SDG&E	2030	2034	2288	11036
2022-23	Vista-Etiwanda 230 kV 1 Line Upgrade	SCE	SCE Eastern	2032	2031	13	2732
2022-23	Upgrade series capacitors on HW-NG and HA-NG to 2739 MVA*	APS	APS	2032	2032	27	3080

CAISO-identified 2022-23 priority projects

Preliminary List of Identified Priority Projects

10 through 15, in order of need date

TPP Year	Project Name	PTO	Region / CAISO Interconnection Area	Project Need Date	Expected Service Date	Estimated Project Cost (\$ Mn)	Potential Renewables Unlocked (MW)
2022-23	San Bernardino-Vista 230 kV 1 Line Upgrade	SCE	SCE Eastern	2032	2026	18	2732
2022-23	Mira Loma-Mesa 500 kV Underground Third Cable	SCE	SCE Metro	2032	2026	35	3120
2022-23	Devers-Red Bluff 500 kV 1 and 2 Line Upgrade	SCE	SCE Eastern	2032	2028	140	7956
2022-23	Devers-Valley 500 kV 1 Line Upgrade	SCE	SCE Eastern	2032	2028	40	2732
2022-23	Reconductor TL680C San Marcos-Melrose Tap	SDG&E	SDG&E	2032	2032	28	1784

CAISO-identified 2022-23 priority projects

Discussion

Considerations and Limitations

Considerations

1. Our current assessment relies on the data that is currently available in the TPP and IRP.
 - a. This data provides us with the potential renewable MWs to be unlocked in the transmission zone that a project is located in but not the exact MWs unlocked by the specific project:
 - b. The lack of project-specific data requires us to make two determinations:
 - i. A small project that partially mitigates a large renewable resource deliverability constraint is prioritized over a large project that may fully mitigate a small or mid-sized renewable resource deliverability constraint.
 - ii. Low-cost projects that are mapped to large constraints should be prioritized.

Considerations (cont.)

2. Provided with project-specific deliverability data, the metric of *\$/MW-unlocked* may serve as a better measure of a project's cost-efficiency.
3. This framework is focused on identifying the projects needed to help meet the State's clean energy goals. Only the policy-driven projects approved in the 2021-2022 and 2022-2023 Transmission Plans have been assessed relative to each other.

Implementation

Transmission Project Prioritization in Practice

Transmission Project Prioritization Implementation


- Senate Bill 529 (Hertzberg, 2022) requires the CPUC to update **General Order 131-D** to exempt an extension, expansion, upgrade, or other modification of existing transmission facilities from a CPCN and to instead use the PTC process for these approvals.
- The author's intent of SB 529 is to expedite the permitting process to **“support the development of cost-effective, environmentally responsible transmission projects that can reliably deliver renewable resources throughout the state.”**
- Our proposed framework prioritizes projects considering these attributes.

Transmission Project Prioritization Implementation


- There currently does not appear to be a systematic or transparent method for determining the order in which PTOs initiate projects.
- **Proposal:**
 - To contribute to meeting California's clean energy goals, the CPUC should identify and approve a list of priority policy-driven transmission projects.
 - PTOs should be required to file applications for the prioritized projects within 6 months from when the CPUC has approved the prioritized list of projects.

Transmission Project Prioritization Implementation


1. The CPUC conducts a high-level assessment of projects from the most recent TPP and designates prioritized projects.



2. The PTO constructing the priority projects finalize the project design and cost estimate and files application within 6 months.



3. Prioritized projects are eligible for expedited permitting. CPUC conducts CEQA review, limited cost review, limited alternatives analysis. Project is exempt from need review.



4. CPUC issues permit.



5. PTO begins construction within 3 months of receiving permit.