

# Land Use Screens in CPUC Integrated Resource Planning

October 2022

CEC's IEPR Workshop on Land Use Screens

Energy Division Staff Presentation



California Public  
Utilities Commission

# Outline

- Overview of Integrated Resource Planning (IRP)
- 2021 Preferred System Plan (PSP) and 2022-2023 TPP portfolios summary
- Land use analysis within IRP process
  - RESOLVE – IRP's capacity expansion model
  - Busbar Mapping
- Incorporation of new land-use screens into the IRP

# Integrated Resource Planning (IRP) in California Today

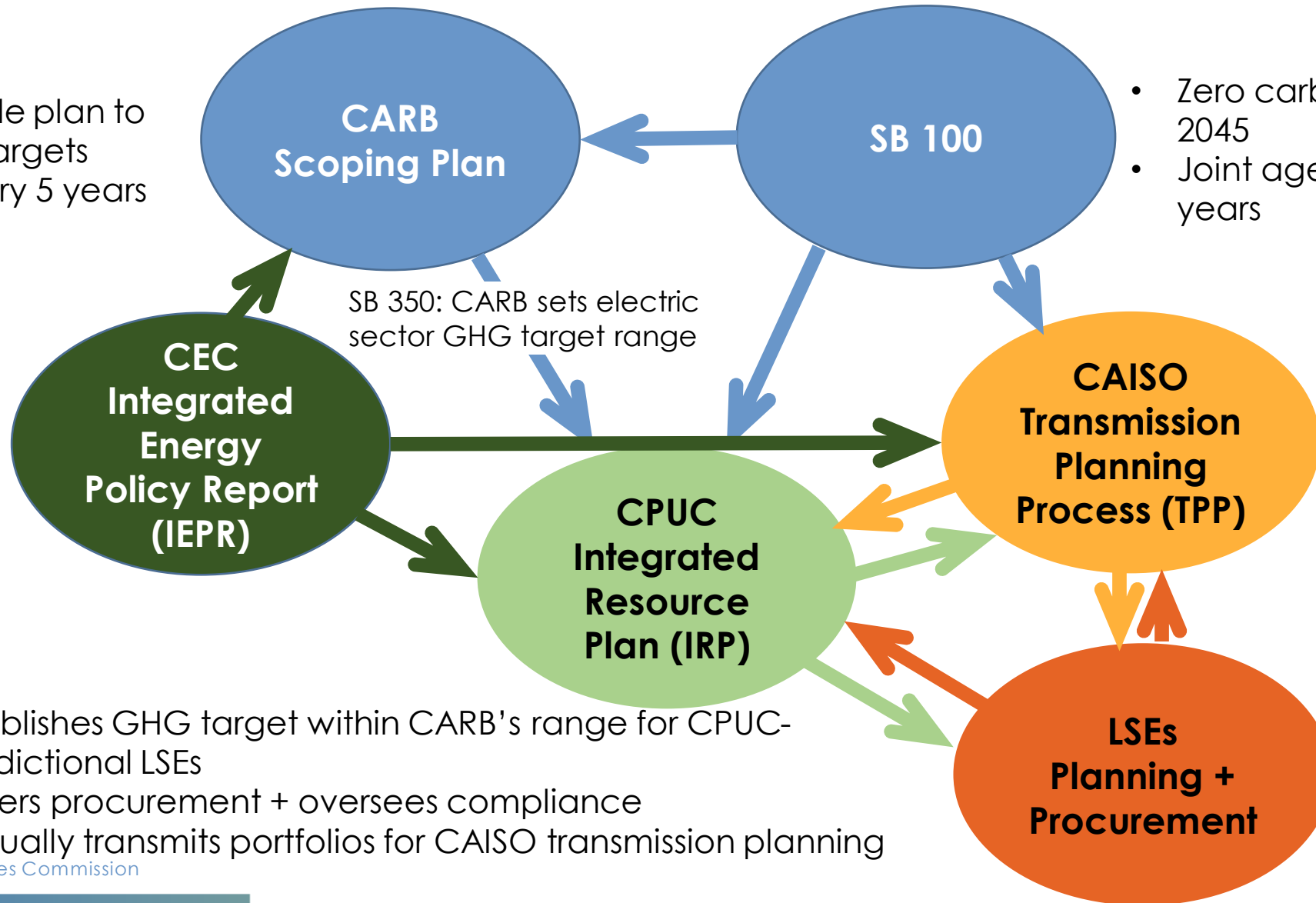
- The objective of IRP is to reduce the cost of achieving greenhouse gas (GHG) reductions and other policy goals by looking across individual LSE boundaries and resource types to identify solutions to reliability, cost, or other concerns that might not otherwise be found.
- Goal of the new 2022-23 IRP cycle is to ensure that the electric sector is on track, between now and 2035, to support California's economy-wide GHG reduction goals and achieve the SB 100 target of 100% renewable and carbon-free electricity by 2045.
- The IRP process has two parts:
  - First, it identifies an optimal portfolio for meeting state policy objectives and encourages the LSEs to procure towards that future.
  - Second, it collects and aggregates the LSEs collective efforts for planned and contracted resources to compare the expected system to the identified optimal system. The CPUC considers a variety of interventions to ensure LSEs are progressing towards an optimal future.

# IRP within California's Electricity Planning Ecosystem

- Economy-wide plan to reach GHG targets
- Updated every 5 years

- Demand forecast for infrastructure planning
- Updated annually

- Establishes GHG target within CARB's range for CPUC-jurisdictional LSEs
- Orders procurement + oversees compliance
- Annually transmits portfolios for CAISO transmission planning



- Zero carbon electricity by 2045
- Joint agency report, every 4 years

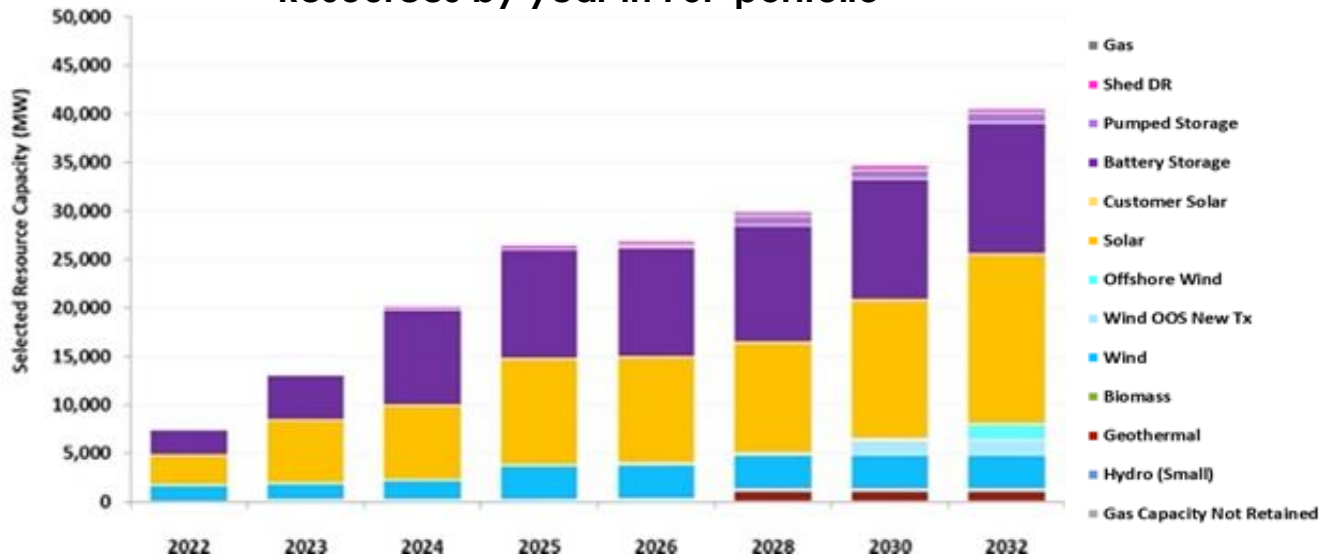
- Assess transmission needs
- Conceptually approves new projects
- Updated annually

- Plans filed per SB 350 + CPUC guidance
- Procurement in compliance w/ CPUC directives

# 2021 Preferred System Plan (PSP)

- PSP adopted in a [Decision](#) on February 10, 2022:
  - Lowers the 2030 GHG target to 38 million metric tons (MMT) from the previous 46 MMT target adopted for the Reference System Plan earlier in this last cycle.
  - Includes a PSP Portfolio for use in planning, procurement, and transmission planning.
- PSP portfolio includes approximately 25,500 MW (nameplate) of new supply-side renewables and 15,000 MW of new storage and demand response resources by 2032.
  - Includes aggregated LSE plans and assumes procurement in compliance with the Mid-Term Reliability (MTR) Decision 21-06-035

Resources by year in PSP portfolio

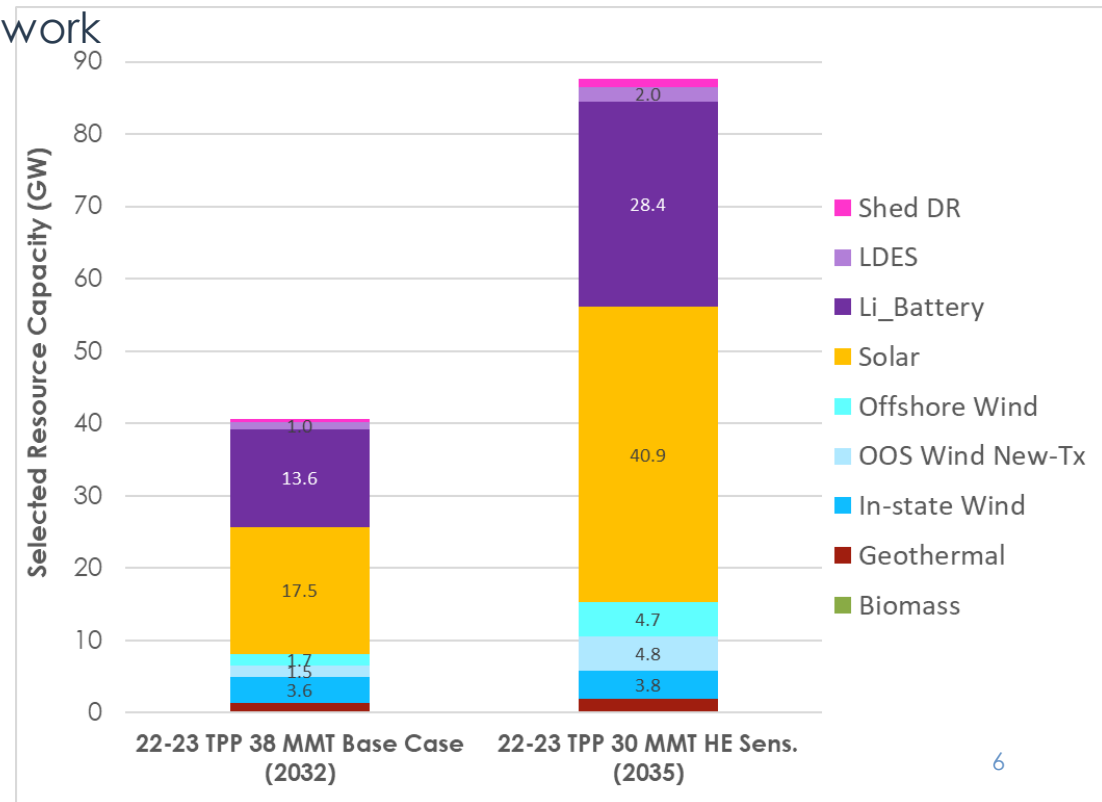


Resource Type	MW by 2032
Biomass	134
Geothermal	1,160
Wind	3,531
Wind OOS New Tx	1,500
Offshore Wind	1,708
Utility-Scale Solar	17,506
Battery Storage	13,571
Long-duration Storage	1,000
Shed Demand Response	441
<b>Total</b>	<b>40,551</b>

# 2022-2023 TPP Portfolios

- PSP Decision transmitted the PSP portfolio to the CAISO as the reliability and policy driven base case for the CAISO's 2022-23 Transmission Planning Process (TPP).
  - Base case portfolio -> used by the CAISO in the TPP assessment to identify transmission solutions that then go to the CAISO Board of Governors for approval
- CPUC also transmitted a 30 MMT GHG target, high-electrification sensitivity portfolio in July ([Transmittal Letter to CAISO, 7/1/2022](#))
  - Policy-Driven Sensitivity portfolio(s) -> used for study purposes and transmission solutions historically do not go for approval; results provide transmission information for future IRP work
  - Portfolio utilized the CEC's 2021 IEPR Additional Transportation Electrification grid planning scenario
  - Modeled out to a study year of 2035

		PSP Portfolio	30 MMT HE Sens.
Resource Type		2032	2035
Biomass	MW	134	134
Geothermal	MW	1,160	1,786
Solar	MW	17,506	40,754
Wind	MW	3,531	3,797
Wind OOS New Tx	MW	1,500	4,828
Offshore_Wind	MW	1,708	4,707
Shed DR	MW	441	1,115
Pumped_Hydro	MW	1,000	2,000
Li_Battery	MW	13,571	28,394
<b>Total</b>	<b>MW</b>	<b>40,551</b>	<b>87,515</b>



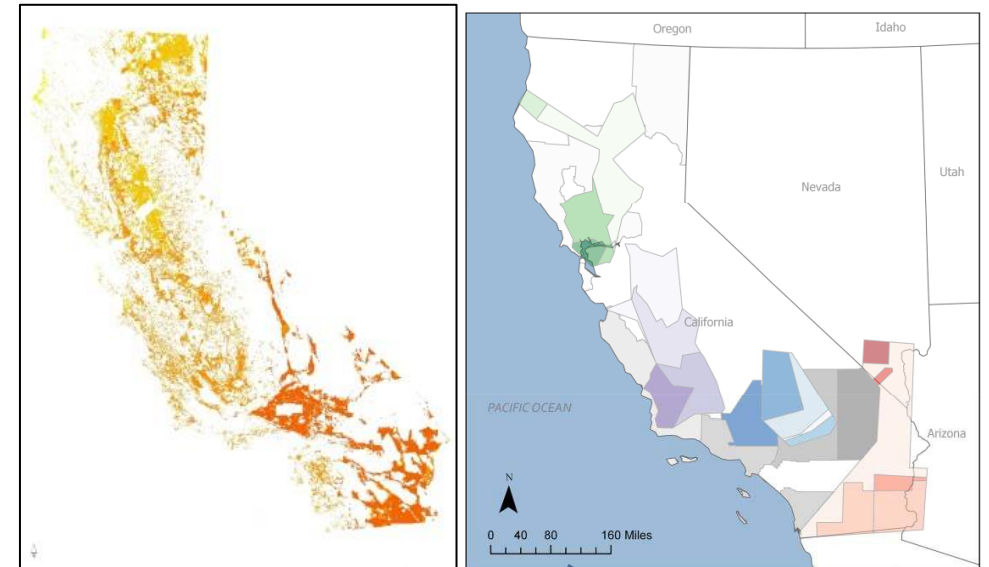
# Land Use Analysis in IRP

Two key points in the IRP for land-use /environmental data implementation:

- **Candidate Resource Screens in RESOLVE:** RESOLVE is used in the CPUC IRP process for capacity expansion modeling to create optimal least-cost portfolios that inform the resource types and quantities needed within specific time horizons.
  - Utilized to help develop the portfolios adopted in the Reference System and Preferred System Plans
  - Model informs generation + transmission infrastructure planning needs within the planning horizon (i.e. now through 2035)
- **Resource to Busbar Mapping** (“busbar mapping”): The process of refining the geographically coarse portfolios developed through IRP to specific interconnection locations (i.e. substations) for analysis in the CAISO’s annual Transmission Planning Process (TPP).
  - Joint effort by a working group comprised of CPUC, CEC, and CAISO staff.
  - Mapping based on stakeholder vetted methodology.

# Land Use Screens in RESOLVE

- RESOLVE model utilizes a broad array of inputs and assumptions:
  - Last developed at the start of the current IRP cycle in 2019 ([I&A Document for 2019-20 IRP](#))
  - Some additional updates since (e.g. new resource cost and transmission limits)
  - Assumptions includes resource potentials for the various resource types modeled in RESOLVE across various California and West wide areas.
- Update to the I&A for new 2022-23 IRP cycle is underway.
  - Modeling Advisory Group workshop held in September to kickoff effort: [LINK to workshop slides](#)
  - Update will include overhaul of the resource potentials in the RESOLVE resource areas
  - CPUC staff plan to utilize new CEC land-use screens for calculating RESOLVE resource potentials within California.



**Screened Solar Resource Potential**

**CAISO 2019 White Paper Transmission Zones**

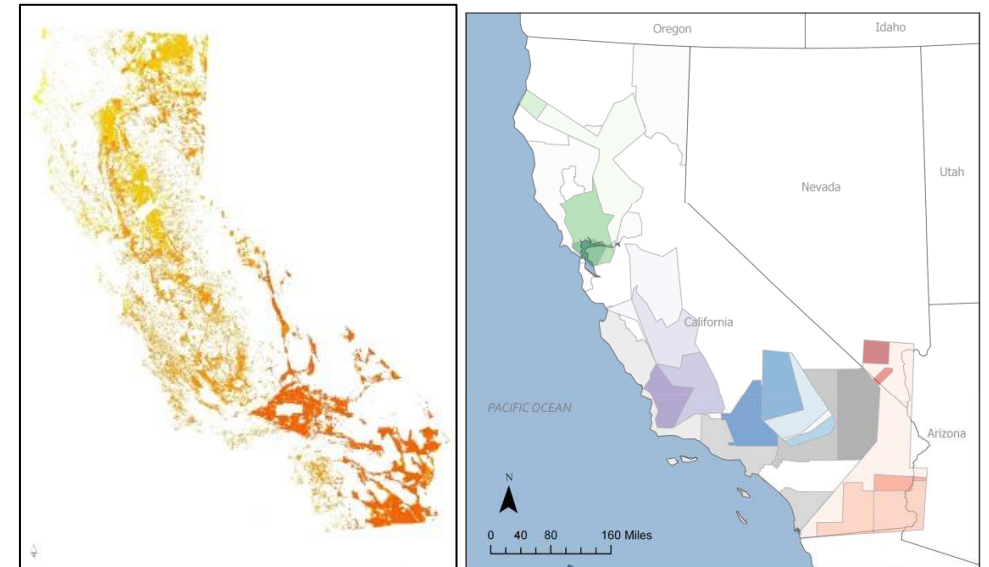
**Solar potential aggregated into areas based on Tx zones for RESOLVE to select as candidate resources**

RESOLVE Solar Resources	MW Potential
Tehachapi	4,801
Westlands	56,151
Kern & Greater Carizo	8,329
Greater Imperial	35,216
Sacramento River	23,484



# Land Use Screens in RESOLVE

- To identify amounts and locations of candidate renewable resources in RESOLVE, staff utilized CEC developed land use data and screens.
  - Worked with CEC staff to first implement screens in RESOLVE in 2016
  - Raw technical potentials were filtered through a set of environmental screens which
    - Excluded areas under Renewable Energy Transmission Initiative (RETI) Category 1 and 2 Lands
    - Included development areas identified in the Desert Renewable Energy Conservation Plan and San Joaquin Valley Solar Assessment
  - Resource potentials are aggregated into RESOLVE resources guided by CAISO's transmission zones.
- For I&A update, CPUC staff is refreshing the resource potentials
  - Utilize new CEC land-use screens to obtain resource potentials in California for solar, wind, and geothermal
  - Aggregated into restructured geographic resources areas based on updated CAISO transmission information.



**Screened Solar Resource Potential**

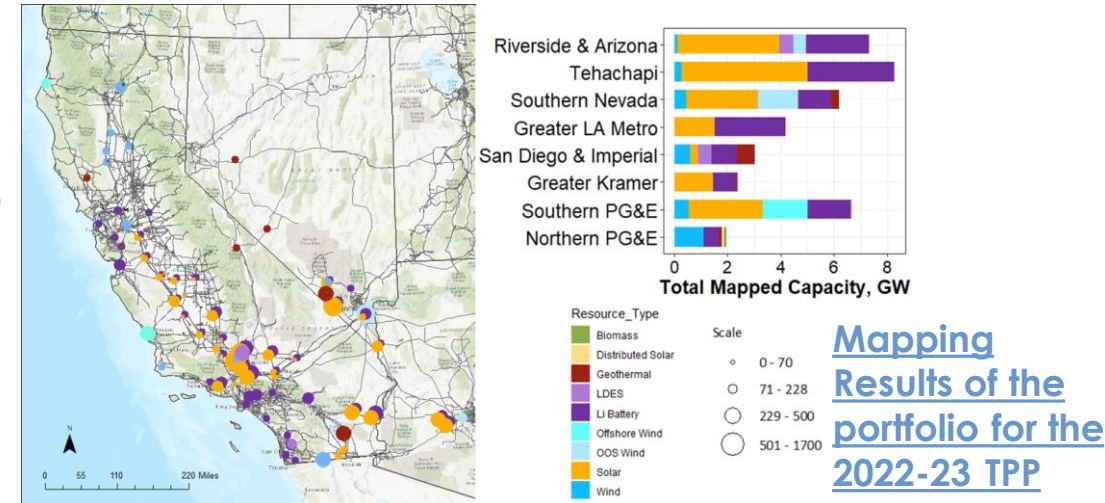
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# Land Use Screens in Busbar Mapping

- Busbar Mapping process is described in detail in the recent [Methodology Document](#) developed by the working group.
- Working group seeks to balance mapped resources' alignment with the following criteria:
  - Distance to transmission of appropriate voltage**
  - Transmission capability limits and cost-effective upgrades
  - Land use and environmental constraints**
  - Commercial development interest
  - Consistency with prior year's TPP mapping
- Additional criteria for stand-alone battery storage (i.e. prioritizing DACs and Non-attainment areas)
- CAISO staff produce transmission zone capability limits and upgrade cost estimates and provide feedback on transmission implications of mapping.
- CEC staff compile land-use and environmental data (*table right*) and implement screens to assess mapping's land use impact potential.

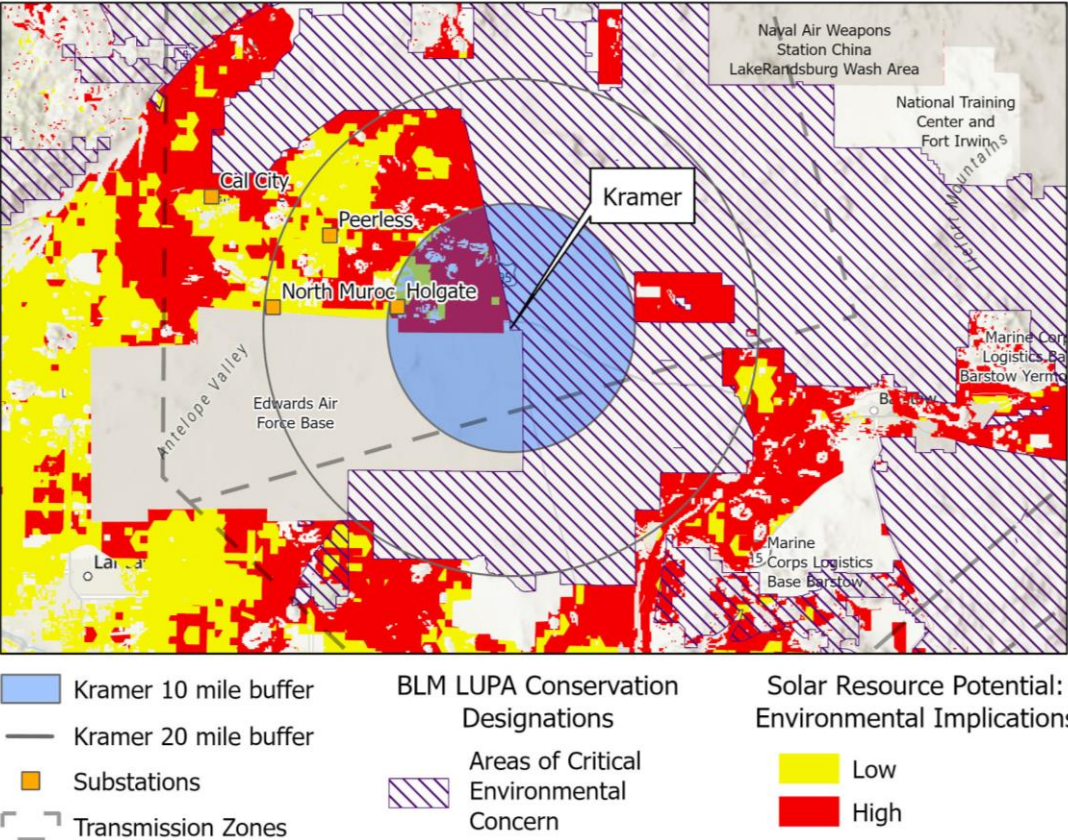


## Environmental and Land Use Data Sets Utilized in Busbar Mapping

- Terrestrial Landscape Intactness (California Energy Commission and Conservation Biology Institute, 2016)
- Areas of Conservation Emphasis, version 3.0 (ACE III) (California Department of Fish and Wildlife, 2018)
  - Terrestrial Connectivity
  - Biodiversity
  - Rarity
  - Native species
  - Irreplaceability
- California Agricultural Value (California Energy Commission and Conservation Biology Institute, 2018)
- Natural Landscape Blocks
- Wildfire Threat
- Western Electricity Coordinating Council (WECC) Environmental Risk Dataset (utilized for resources mapped outside of California)

# Land Use Screens in Busbar Mapping

- Implementation of Land Use and Environmental Data in busbar mapping:
  - Utilize geographic maps of resource potentials used by RESOLVE filtered to economical distances from existing and proposed substation.
  - Overlay environmental and land use information to identify potential implications.
- Criteria 3 (part a): Utilize a CEC developed environmental implications layer
  - Combines intactness, biodiversity, and connectivity datasets
  - Splits resource potential areas into high and low potential impact implications
- Criteria 3 (part b): Assess impacts from individual datasets
  - Produce percentage of resource potential area near substation with a higher impact potential for specific data set



(Above) Criteria 3a analysis: Kramer substation with 10- and 20-mile radii

(Below) Criteria 3b analysis: Kramer – 10-mile radius

Intactness	Biodiversity	Connectivity	Rarity	Native Species	Important Bird Areas (IBA)	Important habitat	Wildfire threat	Irreplaceability
39%	85%	13%	92%	68%	27%	20%	0%	0%



# Incorporation of New Land-use Screens in New IRP Cycle

Updates to IRP's Inputs and Assumptions (I&A) are currently ongoing:

- Includes planned refresh of the resource potentials and land-use screens used in RESOLVE utilizing CEC's land-use screens.
  - Staff plan to incorporate the CEC's multiple screens as options in RESOLVE to toggle for use.
- Staff expect to finalize the 2022 I&A document by end of 2022.

Busbar Mapping of TPP portfolios:

- Busbar mapping for the 2023-2024 TPP is already underway using existing land-use screens.
- Staff plan to work with CEC and the busbar working group to incorporate new land-use screens and update their implementation in the busbar mapping process for the next cycle, the 2024-2025 TPP.
- Expected timing of methodology updating is Q2 and Q3 of 2023.

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