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| **Document Title:** | CPUC Presentation for SB 100 Land Use Workshop |
| **Description:** | CPUC presentation for 02/01/2024 SB 100 Land Use Workshop<br><br>"Land Use Screens in CPUC's Integrated Resource Planning" by Jared Ferguson |
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# Land Use Screens in CPUC's Integrated Resource Planning

February 1, 2024

Energy Division Staff Presentation

California Public
Utilities Commission

# Integrated Resource Planning (IRP) in California Today

- **Objective:** Reduce the cost of achieving greenhouse gas (GHG) reductions, reliability, and other policy goals by looking across individual Load Serving Entity (LSE) boundaries and resources to identify solutions to reliability, cost, or other concerns that might not otherwise be found.
- **Goal of the 2022-23 IRP cycle:** Ensure that the electric sector is on track, between now and 2035, to support California's GHG reduction goals and to achieve SB 100's 2045 clean energy targets.
- **IRP Planning Track Results:**
  - Identifies optimal resources portfolios for meeting policy objectives and encourages the LSEs to plan and procure towards that future.
  - Results in adoption of a preferred system plan (PSP) and resource portfolio through Commission Decision for use in planning and procurement.
- **IRP Procurement Results:**
  - Over the past four years, the CPUC has ordered 18.8 GW (NQC) of new generation and storage resources through IRP procurement track actions.

# Where We Are in the Current IRP Cycle

## 1st Step of IRP Cycle

### 1. Set LSE Plan Filing Requirements

- Identify Optimal Portfolio
- CPUC conducts modeling to determine reliability, GHG, and other filing requirements
- Use CARB Scoping Plan to derive range of GHG emissions levels for electric sector
- CPUC issues Filing Requirements to encourage LSEs to procure towards that future

## 2nd Step of IRP Cycle

### 2. LSE Plan Development & Review

- LSE portfolios reflect state goals and Filing Requirements
- Stakeholders review LSE IRPs
- CPUC checks aggregated LSE plans for GHG, reliability, and cost goals

### 3. CPUC Creates Preferred System Plan

- CPUC validates GHG, cost, and reliability
- CPUC provides procurement and policy guidance

**Preferred System Plan Decision**

## End of IRP cycle and beyond

### 4. Procurement and Policy Implementation

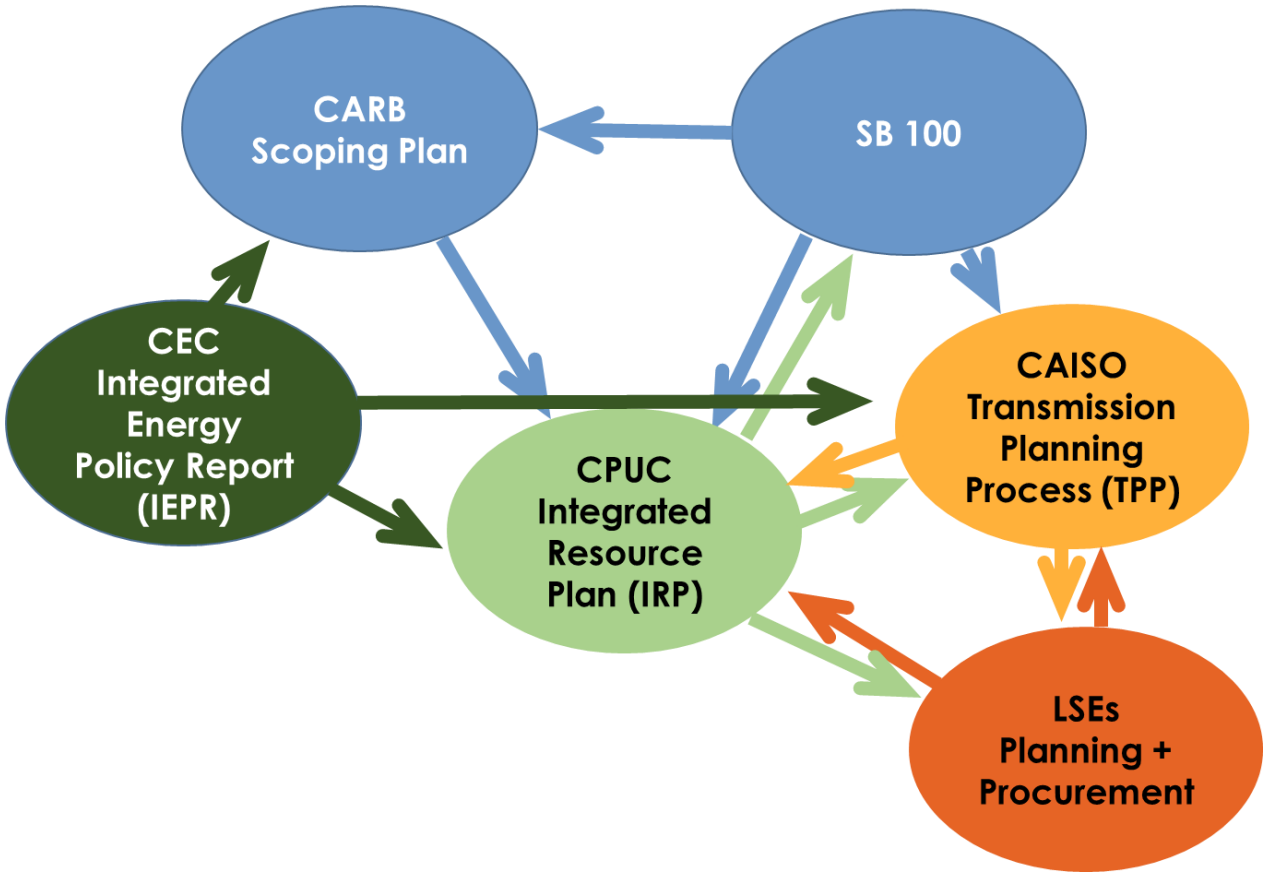
- LSEs conduct procurement
- CPUC monitors progress and decides if additional action is needed

**Portfolio(s) transmitted to CAISO for Transmission Planning Process**

# Key IRP Interagency Touch Points

- CARB Scoping Plan informs IRP's GHG emission targets.
- SB 100 Report and future SB 100 modeling informs IRP development and procurement decisions.
  - IRP procurement and modeling, in turn, inform future SB 100 analysis and guidance.
- CEC electricity demand forecasts and projections, through CEC's IEPR, inform IRP modeling and planning.
- IRP modeling and portfolios inform CAISO's Transmission Planning Process (TPP) which guides transmission development.
  - In turn, the TPP information on transmission upgrades informs IRP modeling.

IRP Interactions with the State Energy Planning Ecosystem



# Land Use Analysis in IRP

Two key points for land-use data and analysis implementation in CPUC's IRP:

- **Candidate Resources Potential in RESOLVE:** RESOLVE is the CPUC IRP capacity expansion model. It is a key tool used in the development of IRP portfolios.
  - Used 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 for the Preferred System Plan and the CAISO's TPP.
- **Resource to Busbar Mapping** ("busbar mapping"): The process of refining the geographically coarse portfolios developed through IRP modeling to specific interconnection locations (i.e., substations) for analysis in the CAISO's annual Transmission Planning Process (TPP).
  - Mapping results used to identify policy driven transmission upgrades in the CAISO's TPP.
  - Joint effort by a working group comprised of CPUC, CEC, and CAISO staff utilizing a stakeholder vetted methodology.
  - Incorporates an array of information, including land-use and environmental data, to identify likely locations for renewable resources identified in the IRP portfolios.

# Land Use Screens in RESOLVE

- RESOLVE model utilizes a broad array of inputs and assumptions:
  - Inputs & Assumptions for 2022-23 IRP cycle (2022-23 IRP I&A Document).
  - Includes application of land-use and environmental screens to develop estimates of available resource potentials of resources available.
- Screening Process for developing resource potential estimates:
  1. Begin with area-wide hypothetical potential based on NREL data for solar (insolation and capacity factors [CFs]) and wind (wind speed and CFs).
  2. Screen out areas limited by technological and economic factors including physical constraints (e.g., slope, existing infrastructure) and minimum CF threshold.
  3. **Screen out areas limited by land-use and environmental factors**
     - Exclude legally and administratively protected areas (rely on CEC screen for in-state areas).
     - Exclude areas of high potential environmental impacts or land-use conflict using the CEC's Core Land-use Screen released in 2023 for in-state areas.
     - For out-of-state resource CPUC staff implement similar exclusions using the Western Electricity Coordinating Council (WECC) Environmental Risk Dataset.

**Initial state-wide hypothetical potential**

**Potential after techno-economic screens are applied**

**Potential after additional land-use screens are applied**

# Land Use Screens in RESOLVE

- Remaining resource potential is aggregated into coarse geographical regions to serve as candidate resources in the RESOLVE modeling.

| Solar Resource Potential Totals(1) | GW(2) |
|---|---|
| Greater Kramer | 19.4 |
| Greater LA | 11.4 |
| Greater Imperial | 14.3 |
| Northern California | 115.2 |
| Riverside | 8.7 |
| Southern PG&E | 119.6 |
| Greater Tehachapi | 29.1 |

(1) Totals are inclusive of an 80% discount factor reflecting commercial feasibility limits (2) Assumes a land use factor of 30 MW/km2

# Busbar Mapping in IRP and TPP

- **Busbar Mapping:** The process of refining the geographically coarse portfolios developed through IRP to specific substations for analysis in the CAISO's annual Transmission Planning Process (TPP).
  - First conducted as "proof of concept" for the 2018-2019 TPP portfolio
  - Formalized into a joint effort by a working group comprised of CPUC, CEC, and CAISO staff.
- **Busbar Mapping Scope:** Mapping focuses on utility-scale generation and storage resources that are not already in baseline.

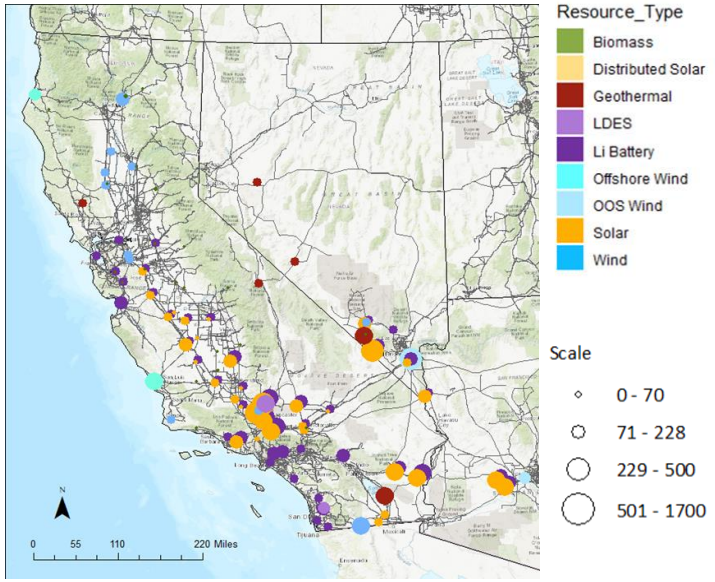
**Input: Portfolio developed from LSE plans & RESOLVE model results**

| 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 |
| **Total** | 40,551 |

| RESOLVE Resource Name | 2032 Total (MW) |
|---|---|
| Greater_LA_Solar | 1 |
| Northern_California_Solar | - |
| Southern_PGAE_Solar | 1,238 |
| Tehachapi_Solar | 2,969 |
| Greater_Kramer_Solar | 3,166 |
| Southern_NV_Eldorado_Solar | 7,382 |
| Riverside_Solar | 4,001 |
| Arizona_Solar | - |
| Imperial_Solar | - |

**Mapping Process**

**Output: Substation-level location for resources**

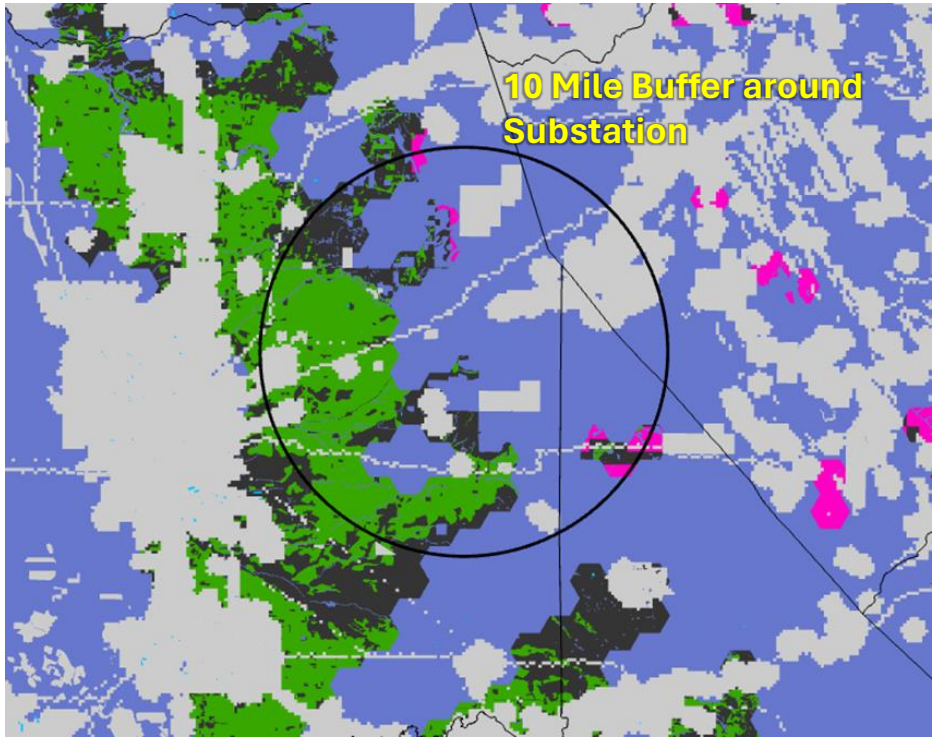


# Busbar Mapping Methodology & Criteria

- Busbar mapping is guided by the stakeholder vetted mapping methodology.
  - The document states guiding principles, establishes mapping criteria, and outlines the iterative inter-agency mapping process.
  - Current Mapping Methodology for the 24-25 TPP.
- Mapping effort relies on data, analysis, and expertise from CPUC, CEC, and CAISO staff through a joint mapping working group.
- Goal of the mapping process is to identify plausible locations for portfolio resources that aligns with the established busbar mapping criteria.
- The busbar mapping criteria are organized into seven categories:
  1. System level transmission capability
  2. Substation level interconnection viability
  3. **Land-use implications and feasibility factors**
  4. **Environmental (conservation and biological) impact factors**
  5. Community and environmental (societal) impact factors
  6. Commercial development interest
  7. Consistency with prior TPP portfolios

# Land Use Screens in Busbar Mapping

- Land use screens are applied to identified areas that have:
  - Less impact on conservation priorities and alternative land-use activities.
  - Characteristics more favorable for development of the mapped resources.
- Criteria are based on several CEC developed screens and existing datasets from other agencies, including:
  - CEC's Core Land-use Screen,
  - CEC Parcelization Model,
  - CEC Cropland Index Model,
  - CDFW's Areas of Conservation Emphasis (ACE) datasets,
  - Conservation Biology Institute's Terrestrial Landscape Intactness, and
  - Additional datasets
- Screens applied to resource potential on a substation level
  - Assess amount of resource potential acreage within a certain distance from each substation that aligns with the land-use and potential environmental impact criteria.




Excluded areas for solar

Solar potential with high biological conservation priorities (ACE data)

Solar potential with high cropland value

Potential with high Intactness value

Potential remaining after CEC's Core Screen

# Land Use Screens in Busbar Mapping

- Results of the criteria analysis aide in identifying the potential land-use and environmental implications of mapping resources to various substations.
- Sample results for solar mapped to two substations. Shows mapped resources alignment with the mapping criteria related to each dataset (1 -> Strong alignment, 5 -> Significant non-alignment).

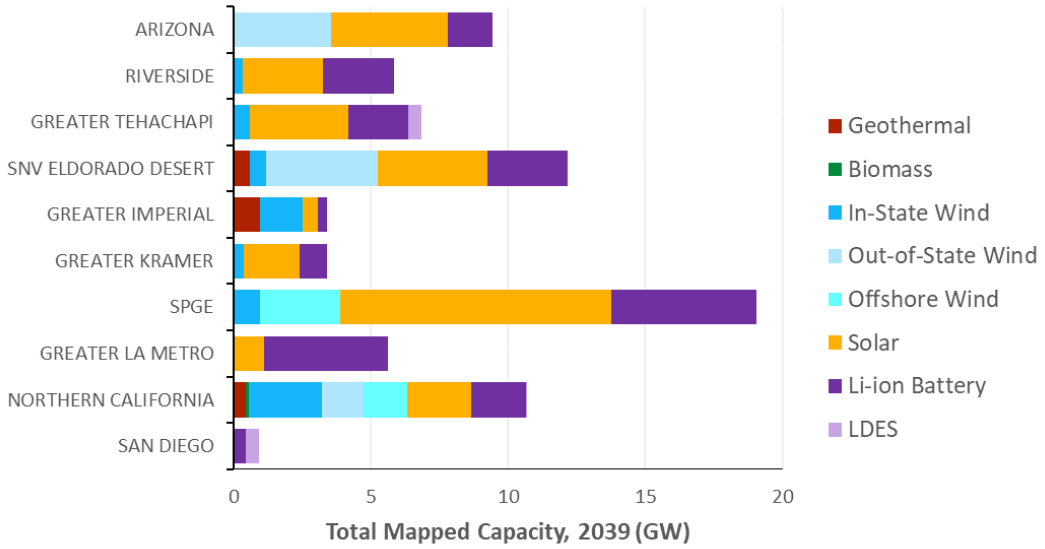
| | Solar Mapped (MW) | CEC Core Screen Criteria | Parcelization Criteria | Cropland Index Criteria | Overdrafted Basin Criteria | Fire Threat Criteria | ACE Connectivity Criteria | ACE Biodiversity Criteria | ACE Irreplaceability Criteria | Intactness Criteria | Wetlands Criteria |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Substation A** | 200 | 4 | 5 | 1 | 2 | 1 | 3 | 2 | 2 | 4 | 3 |
| **Substation B** | 750 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 1 |

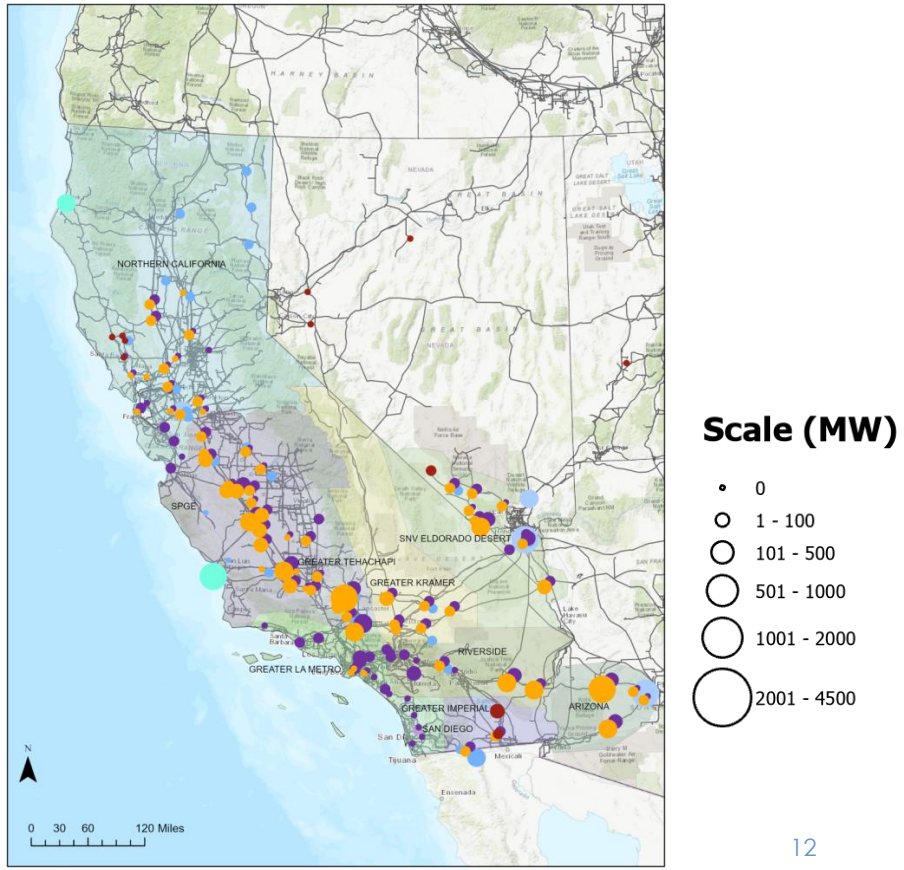
## 5. Community environmental impact factors

- Looks at datasets centered around seeking to map renewable resources and energy storage to bolster and benefit pollution-burdened and historically disadvantaged communities, particularly by seeking to reduce emissions and impacts of air-pollutant emitting fossil-fuel generators.
  - Proximity to existing fossil-fueled generators
  - Air Quality Standard Non-Attainment Areas – Ozone and PM2.5
  - Areas in or near disadvantaged communities (per SB 535 and CalEnviroScreen 4.0 dataset)
  - Areas in Inflation Reduction Act Energy Communities

# Current Mapping for the 2024-25 TPP

- **Current Mapping Effort:** Proposed Decision released January 10, 2024, if adopted would transmit mapped portfolios for the CAISO's upcoming 2024-2025 TPP.
  - Includes the proposed 2023 PSP as the base case portfolio and a high gas retirement sensitivity study portfolio.
  - Will be the time transmitting mapping results looking 15-years out, to 2039, in addition to the standard 10-year TPP analysis.
  - Full mapping results and criteria analysis for the base case are available at the CPUC's 2024-2025 TPP Assumptions webpage



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