DOCKETED	
Docket Number:	21-SIT-01
Project Title:	21-SIT-01, SB100 Implementation Planning for SB100 Resource Build
TN #:	239000
Document Title:	Presentations - July 22 SB100 Transmission Workshop - Session 2
Description:	Presentations from Session 2 of the July 22 SB100 Transmission Workshop
Filer:	Mary Dyas
Organization:	California Energy Commission
Submitter Role:	Commission Staff
Submission Date:	7/26/2021 1:58:21 PM
Docketed Date:	7/26/2021

Joint Agency Workshop: Next Steps to Plan for Senate Bill 100 Resource Build – Transmission

Session 2

July 22, 2021

Additional Planning and Financing for Transmission

- Integrating Land-Use and Environmental Impacts into Energy Planning
  - ✓**Erica Brand,** The Nature Conservancy
- Backbone Transmission for Central Coast Offshore Wind
  - ✓**V. John White and Jim Caldwell,** Center for Energy Efficiency & Renewable Technologies
- Transmission Infrastructure Program - Project Financing and Development Assistance
  - ✓**Tracey LeBeau,** Western Area Power Administration
  - ✓**Jennifer Rodgers,** Western Area Power Administration

POU/ Balancing Authority Discussion of Transmission Issues

- Los Angeles Department of Water and Power
  - ✓Simon Zewdu
  - ✓Jason Rondou
- Imperial Irrigation District
  - ✓Enrique Martinez

Public Comment Instructions

Rules

- 3 minutes per person
- 1 person per organization

Zoom

- Click “raise hand”

Telephone

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

When called upon

- Unmute, spell name, state affiliation, if any

Written Comments:

- Due: 8/11/2021 by 5:00 p.m.
- Docket: 21-SIT-01
- Submit at: https://efiling.energy.ca.gov/Ecomment/Ecomment.aspx?docketnumber=21-SIT-01

Agency Leadership Remarks

- **Karen Douglas**, CEC Commissioner
- **Siva Gunda**, CEC Commissioner
- **Marybel Batjer**, CPUC President
- **Cliff Rechtshaffen**, CPUC Commissioner
- **Darcie Houck**, CPUC Commissioner
- **Elliot Mainzer**, President and CEO, CAISO
- **Neil Millar**, Vice President, Transmission Planning & Infrastructure Development, CAISO

The Nature Conservancy
Erica Brand

SB100 Transmission Workshop

Presentation by The Nature Conservancy

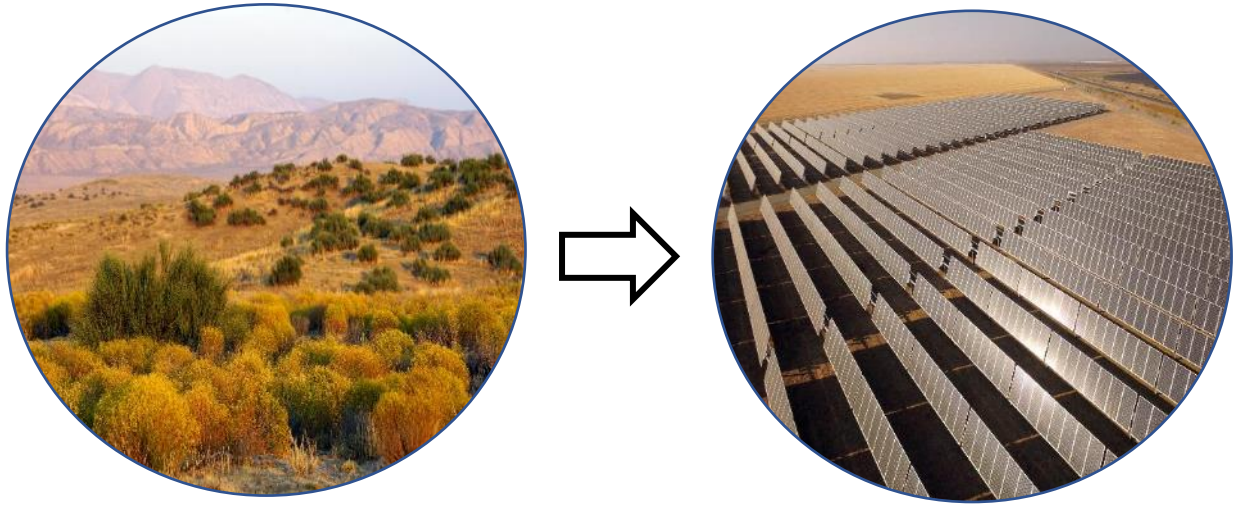
Integrating land-use and environmental impacts into energy planning

July 22, 2021

Erica Brand
California Energy Strategy Director
ebrand@tnc.org

Decarbonizing California through clean power and electrification will require significant land area for new electricity infrastructure

Integrating environmental and land use data *as a first step in* long term energy models yields multiple benefits



GEOSPATIAL ENVIRONMENTAL AND LAND USE DATA

ENERGY RESOURCE PORTFOLIOS

Development opportunity areas and constraint areas become visible much earlier in resource and transmission planning, improving projections and the policy decisions that flow from them.

Modeling partners: Energy and Environmental Economics (E3) & Montara Mountain Energy

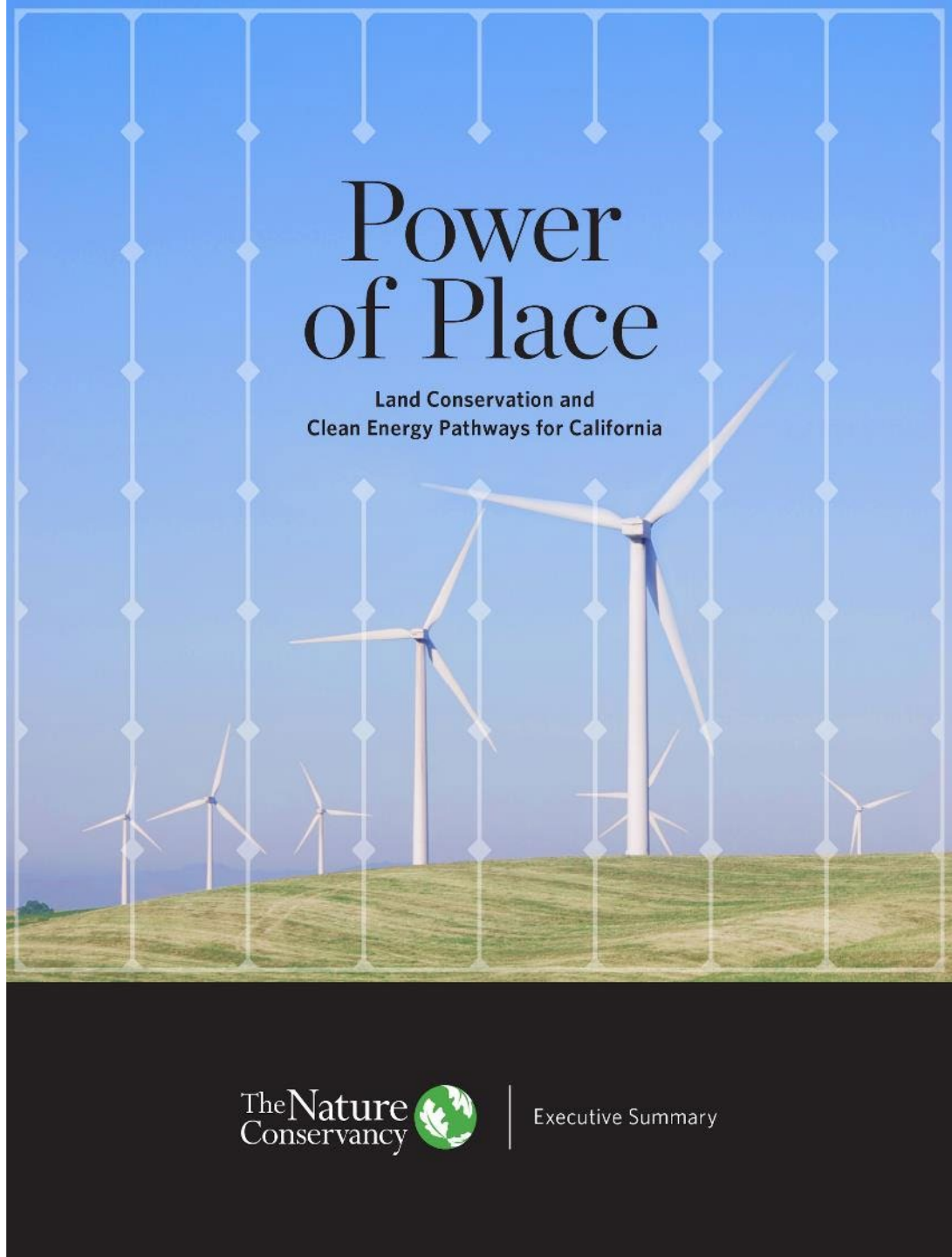
To help California implement its climate commitments, including SB100, our research team developed detailed technology, infrastructure, and land use pathways

61 scenarios. Two models: RESOLVE and ORB

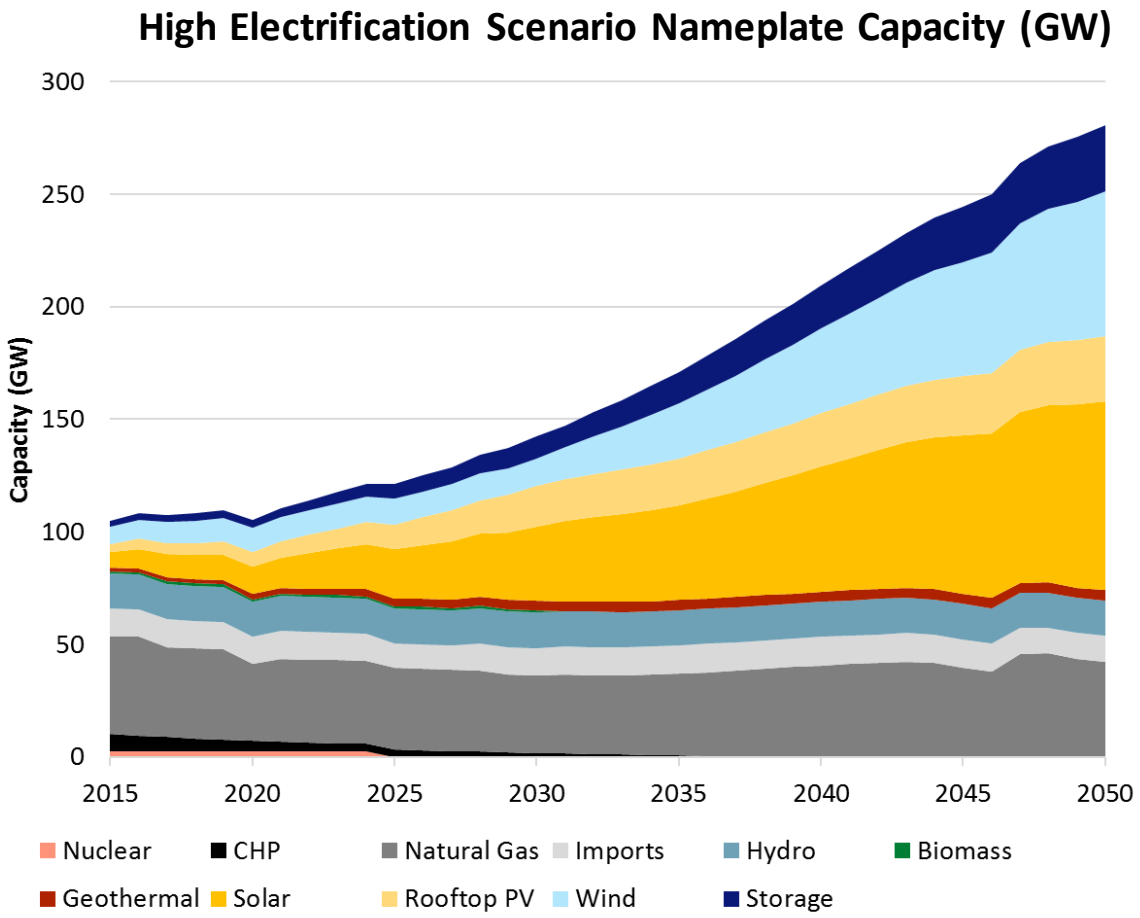
The findings highlight the significant scale of infrastructure that may be required to power the electric sector with renewable resources and electrify transportation and buildings

solar, wind, geothermal, transmission

Released in 2019



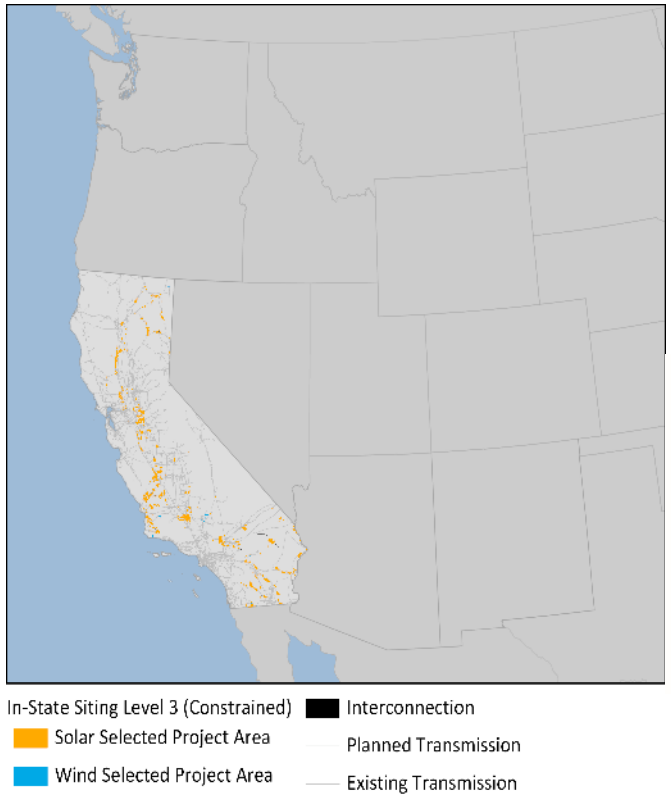
Statewide Modeling of California Goals



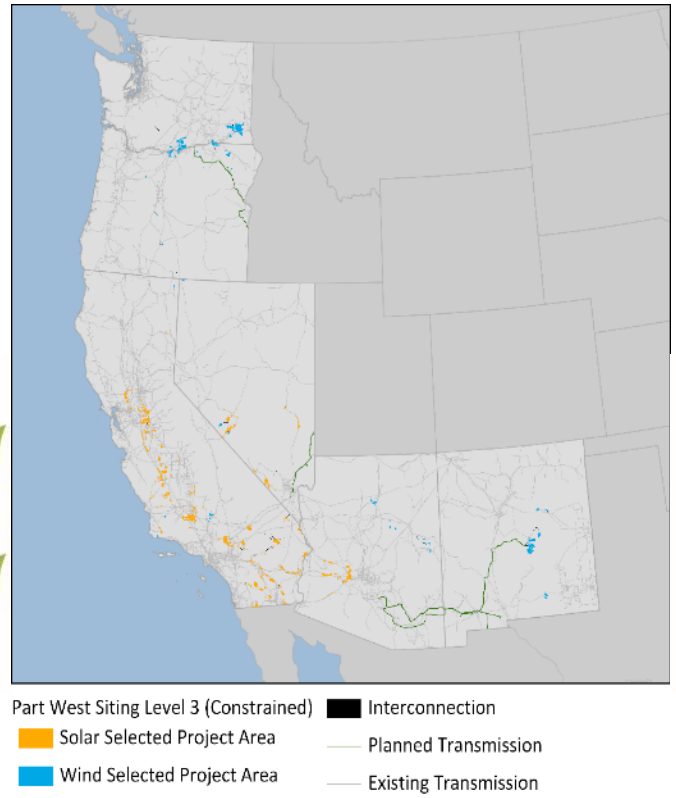
- The Power of Place California study builds upon the California Energy Commission EPIC project "Deep Decarbonization in a High Renewables Future", which considered multiple scenarios for achieving statewide emissions targets
- All scenarios incorporated high levels of vehicle and building electrification
- All scenarios met SB 100 targets of 100% of retail electricity sales with zero-carbon resources and 80 percent reduction in GHGs by 2050

Approach to Planned Bulk Transmission Across the West

The most cost-effective and least-conservation-impact scenario required a regional approach



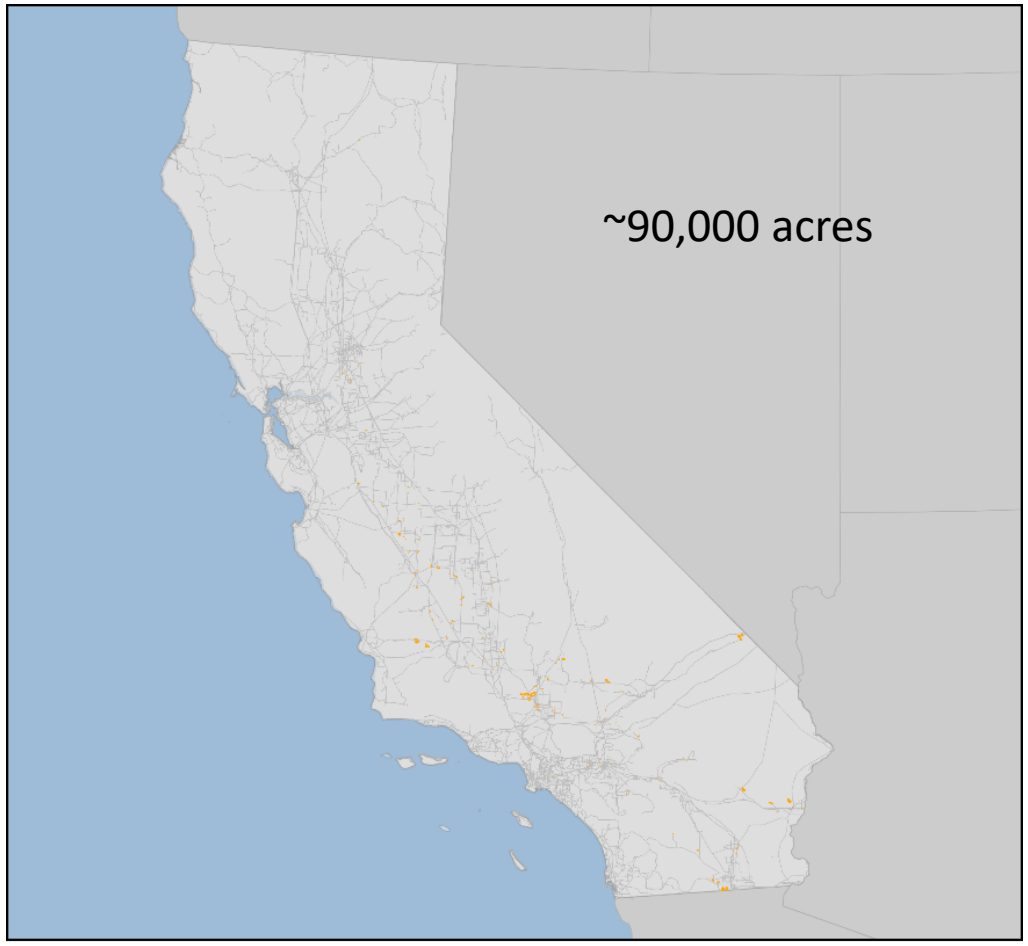
SL3



SL3

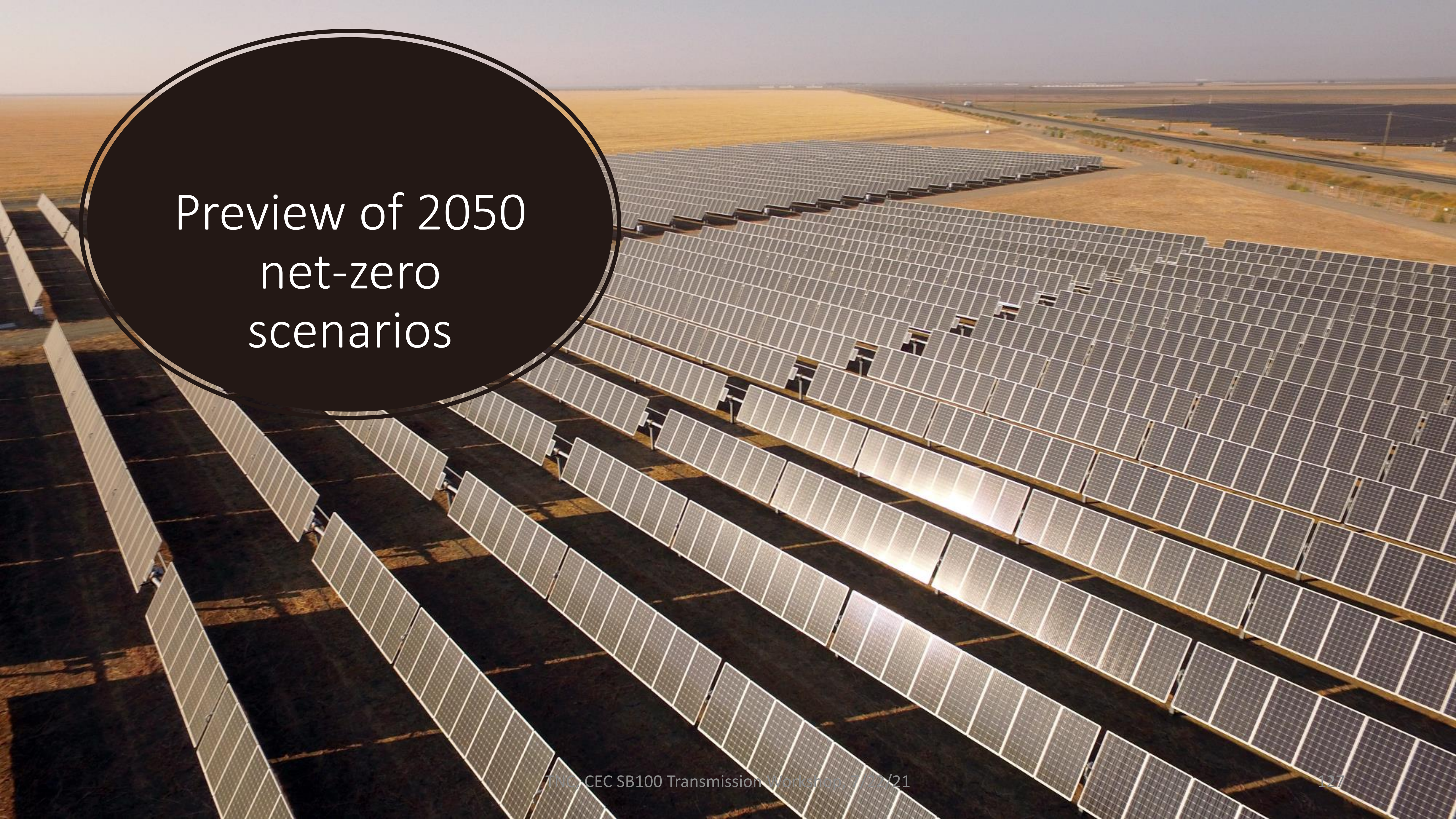
SL3

The results indicate that the land required for electricity infrastructure across the range of scenarios would double the recent historical rate of urbanization in California



Key Takeaways

- Investing in the transmission grid (upgrades + new lines) will play a key role in decarbonizing the electricity system and achieving SB100 goals.
- Gen-tie and bulk transmission land requirements are a small fraction of the total land area required (< 5%); however, transmission projects are known to have disproportionate siting impacts due to landscape fragmentation and have long lead times for permitting and construction.
- The technology mix, spatial build-out, and system costs are sensitive to land protections and availability of out-of-state renewable resources.
- Our research suggests that failure to consider land availability in energy and transmission planning could increase uncertainties, environmental impacts, and risks in meeting climate targets.



Preview of 2050 net-zero scenarios

Coming Soon

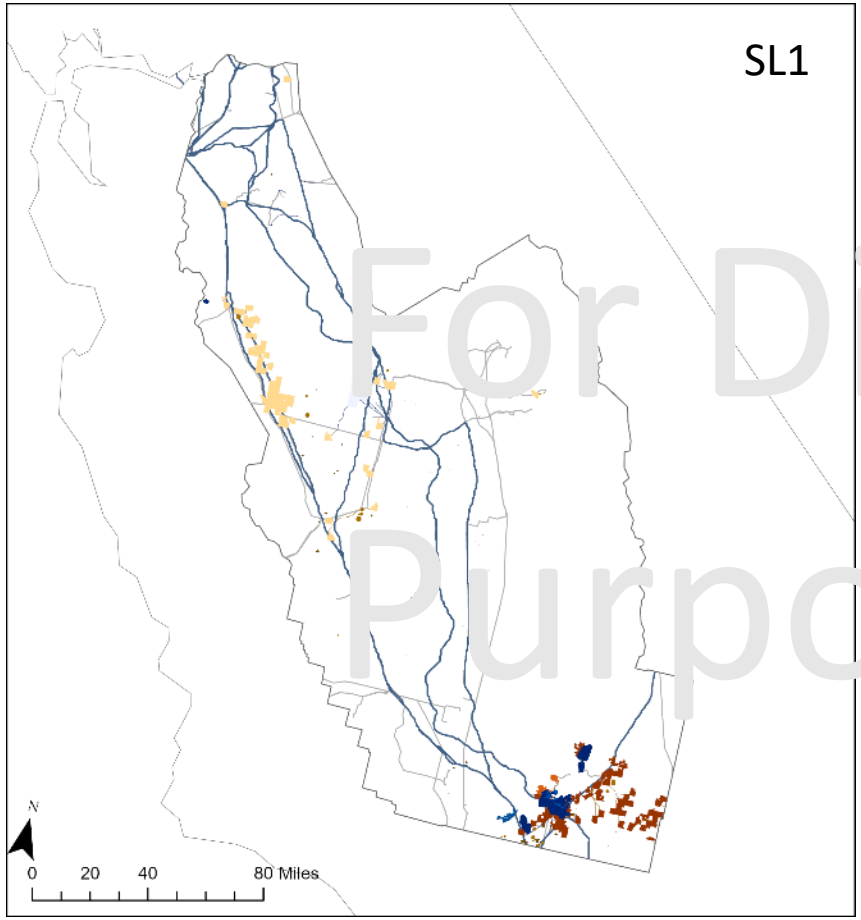
Modeling Partners: Evolved Energy Research & Montara Mountain Energy

Explores land use requirements associated with economy-wide net zero targets across the eleven Western States

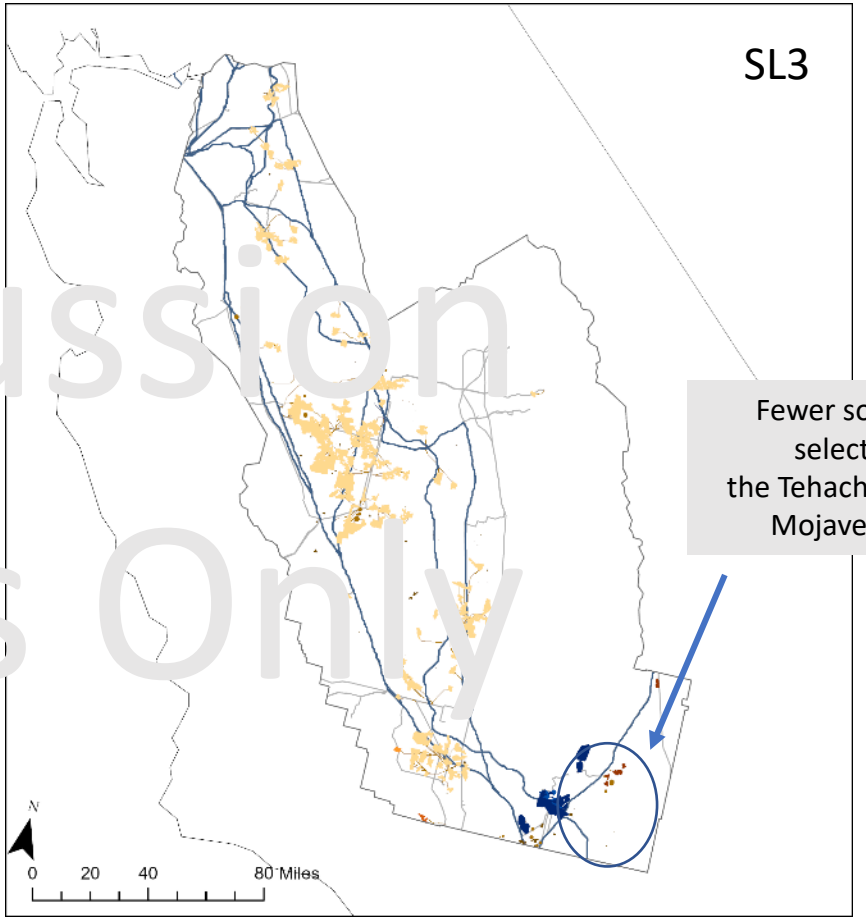
Transmission-related research will include planned transmission lines, interzonal transmission (upgrades + new), and spur lines for generation

Anticipated in late 2021

A preview of the San Joaquin Valley in a High-Electrification Scenario



Unpublished and preliminary results – do not circulate



Fewer solar sites selected in the Tehachapi / West Mojave region

Selected sites wind (CF)
- 0.31 - 0.34
- 0.34 - 0.38
- 0.38 - 0.42
- 0.42 - 0.46
- 0.46 - 0.51

Selected sites solar (CF)
- 0.16 - 0.25
- 0.25- 0.29
- 0.29 - 0.30
- 0.30 - 0.31
- 0.31 - 0.32

- Existing_electric_transmission
- Planned electric transmission
- Interzonal transmission (upgrade and new)
- Spur lines wind
- Spur lines solar

With the appropriate planning approaches

California can scale up the clean energy infrastructure (generation + transmission) needed to decarbonize while limiting impacts to natural and agricultural lands across the west

Thank you

For more information on Power of Place California, please visit:
https://www.scienceforconservation.org/products/power-of-place
Journal Article: https://iopscience.iop.org/article/10.1088/1748-9326/ab87d1

Center for Energy Efficiency & Renewable Technologies

V. John White and Jim Caldwell

Backbone Transmission for Central Coast Offshore Wind

July 22, 2021

CEC Inter-Agency SB 100 Workshop on Transmission

V. John White
Jim Caldwell
Center for Energy Efficiency and Renewable Technologies

Offshore Wind Push Gains Momentum in California

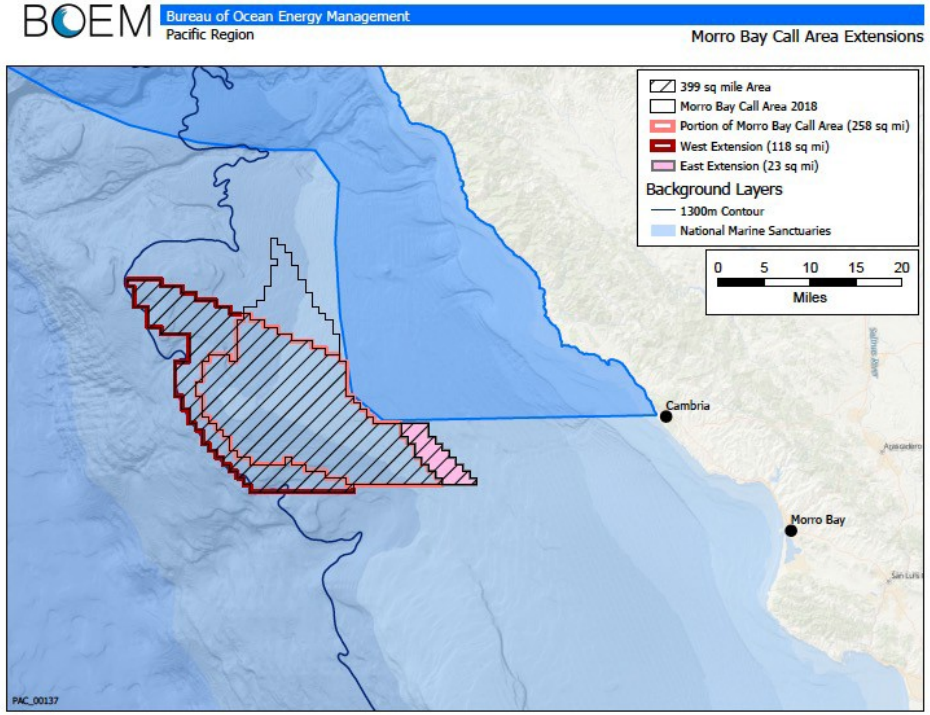
Lawmakers clear a proposal intended to jumpstart floating wind farms off the coast, saying the technology could prop the state's buckling power grid and create more than 10,000 new jobs.

Biden Administration Announces Offshore Wind Lease Sales

1. Announced upcoming lease area for up to 3 GW of Floating Offshore Wind Energy Northwest of Morro Bay, CA

2. Ongoing decommissioning of the Diablo Canyon Power Plant, projected for 2025

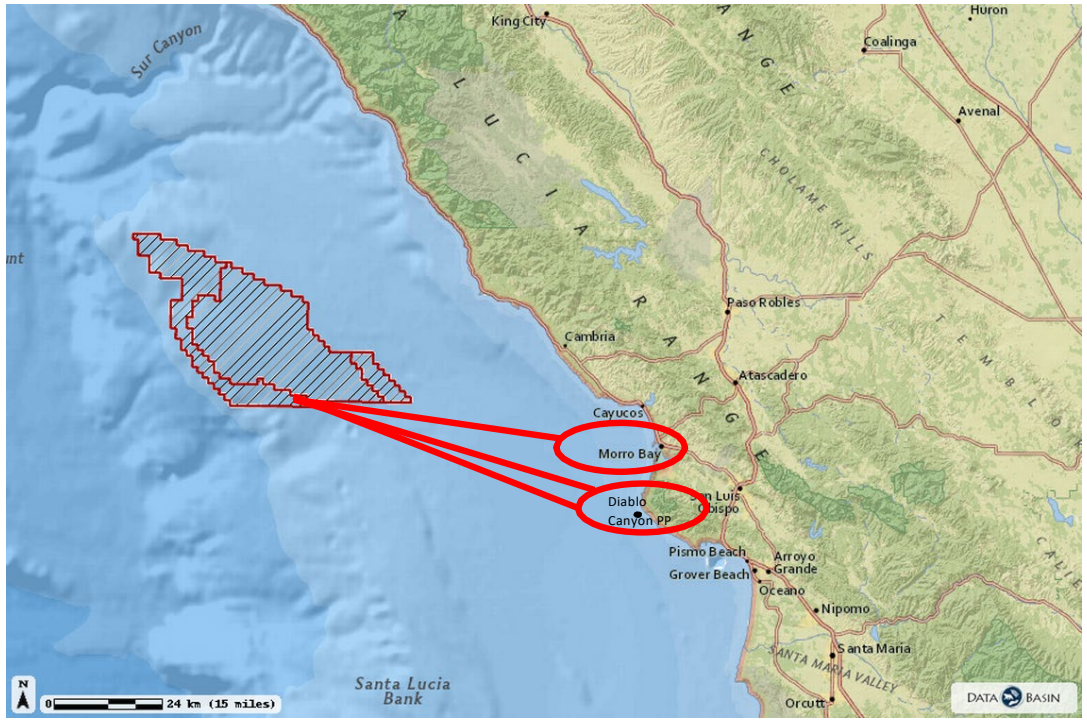
3. Large existing interest in repurposing existing assets, revitalizing area and ensuring economic growth in the Central Coast



Tehachapi Wind Resource Area

- In the early 2000's, as California began to implement the RPS, there was recognition that the Tehachapi Wind Resource Area held special promise for large-scale, cost-effective wind projects.
- But there was a lack of transmission access to the Southern California Edison system; and building transmission for Tehachapi would be a "generator interconnection" instead of a "network upgrade," which meant the cost of the new transmission line would be borne by the generators, and that no transmission would be built unless there were power purchase agreements in place.
- CPUC Commissioner Dian Grueneich convened the Tehachapi Collaborative Study Group, which included CAISO, utilities, wind developers and environmental groups, and was facilitated by CEERT Board Members Dave Olsen and Rich Ferguson.
- A new idea emerged, called a "renewable trunkline"; the line would be built by Southern California Edison in order to comply with state policy, i.e., the RPS; generators would pay back SCE and its customers as they used the line to send wind power to the SCE grid.
- This innovation in transmission planning was the first of its kind and enabled the transmission line to be built before power purchase agreements were signed. It was approved by FERC, and paved the way for billions in new investment and delivery of high-quality wind power to the California gird.
- CEERT believes the same principles can apply to building a backbone transmission line to connect Central Coast offshore wind resource to the California grid at the Diablo Canyon and Morro Bay power plant sites.

Interconnect possibilities – existing basic options



- The interconnect discussions for the Central Coast offshore wind area have been concentrated on:
  - Morro Bay, existing transmission for the old 650 MW power plant
  - Diablo Canyon, using existing transmission of DCPP 2 GW
- An emerging approach is that each project could connect directly to each Point of Interconnection and incorporate an export cable in each project's economics

Morro Bay Storage

- Vistra Energy Morro Bay Energy Storage project
- 600 MW Lithium-Ion Batteries
- Construction start 2022
- COD: 2024
- Timed for when the 1st unit of Diablo goes offline

The possibility of developing a synergetic Offshore Wind Transmission project to the Morro Bay Wind Resource Area

Concept:

- **3 GW HV line from Offshore Wind Areas to:**
  - Diablo Canyon Point of Interconnection
  - Possibly also Morro Bay, where there would be storage capabilities adding ability for better grid management
- **Wind projects connect offshore to HV line**

Near Term Launch of Offshore Wind

Rationale:

- Given that Morro Bay will already be building an energy storage facility and that it will have interconnection limitations, Diablo Canyon becomes the main natural choice for the region, given its existing high interconnection capacity (approx. 2 GW)
- The Diablo Canyon Economic proposition is a much more salient issue at this point and the repurposing topic attracts many allies and could open up multiple avenues of funding
- Building a single HV transmission line to connect the different leases can bring large economic savings, reduce dramatically the risk for the projects and improve their ultimate Power Purchase Agreement price
- It could also accelerate development by integrating the line within transmission plans and remove barriers for developers to concentrate on the wind projects themselves
- It is also compatible with other needed transmission expansions, to enable solar plus storage projects in the Central Valley, and increase North South transfer capacity

The opportunity

1. Develop the Central Coast Offshore Wind Hub in the most efficient and fast track way possible, saving time and money for California ratepayers
2. Encourage the focused development of an offshore transmission project to the Central Coast offshore wind lease area which could accelerate the launch of offshore wind projects and largely de-risk development of the wind leases.
3. California should explore alternative financing mechanisms for planned offshore transmission and allocation of costs between customers and generators, including the possibility of a public- private partnership with infrastructure investors, public ownership or jointly with utilities
4. Reutilize infrastructure @ Diablo Canyon, possibly for additional proposals for repurposing solutions and driving economic development quickly, post decommissioning: Time is running out for repurposing opportunities to be proposed, funded and captured
5. The Humboldt Offshore Wind Area is also constrained by the lack of transmission, and planning to meet the transmission needs of this region should be included in the public agencies' planning process

California's energy agencies should explore opportunities for a Public-Private solution, allowing the state to fund transmission expenses before costs reach ratepayers.

- The FERC-regulated Transmission Access Charge (TAC) grants a generous Rate of Return to the utility.
  - Results in an interest rate of ~18% to finance those investments (after taxes).
  - Tax-free, State-backed revenue bonds could yield an interest rate of ~5%.
- This is similar to a consumer refinancing credit card debt through a home equity loan to lower monthly payments.
- A private/public partnership between experienced private infrastructure developers, the State of California, CAISO, investors, and public owned utilities could be the model for an innovative, cost-effective, and timely approach to laying the foundation for the launch of California offshore wind industry.

Western Area Power Administration
Tracey LeBeau and Jennifer Rodgers

Investing in the Stronger Grid of the Future

Transmission Infrastructure Program

Overview for Joint Agency Workshop for California SB 100

July 2021

Western Area Power Administration

$3.25 Billion Loan Authority

The Transmission Infrastructure Program (TIP) manages WAPA's $3.25 Billion revolving loan program. A unique federal financing program, TIP has as its core a congressional mandate to support the development of projects that facilitate and optimize the delivery of reliable, affordable power generated by clean energy resources.

Program Goals

- Attract substantial private and other co-investment in transmission infrastructure and related projects
- Provide private developers with siting, permitting and development assistance to reduce project and schedule risks
- Contribute to lowering the cost of capital, making projects more competitive and beneficial to rate payers
- Assisting to help de-risk project finance during pre-construction and construction

Portfolio Management Fundamentals

- Diverse portfolio structured by loan & project types & in various markets
- Integrated approach to risk management, including loan portfolio controls linked to audit and oversight requirements and industry standards for underwriting
- Continuous improvement approach for rebalancing risks, engaging range of stakeholders, and tailoring approach for market relevance

Program Assistance Available

Financing

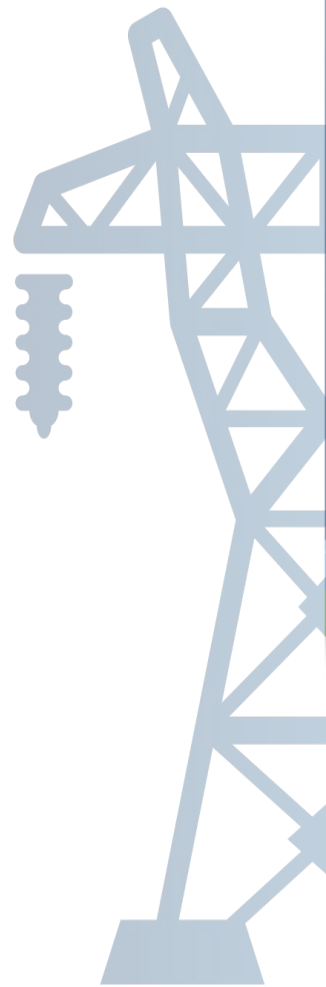
Eligible construction-ready projects may apply to TIP to borrow capital to construct new or upgrade existing grid infrastructure

Project Development

Prior to a loan application, eligible projects can request technical assistance on typical development activities. Applicants provide advance funding to cover costs.

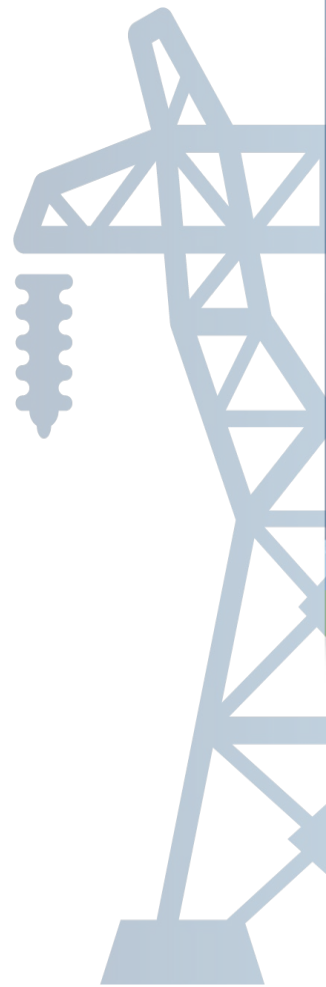
Statutory TIP Eligibility Criteria

- Transmission or related infrastructure (e.g., commercially deployed utility scale storage)
- Has one terminus within WAPA's 15-state service territory
- Facilitates the delivery of renewables
- Demonstrates reasonable expectation of repayment
- Will not adversely impact transmission system reliability or operations
- Is found to be in the public interest



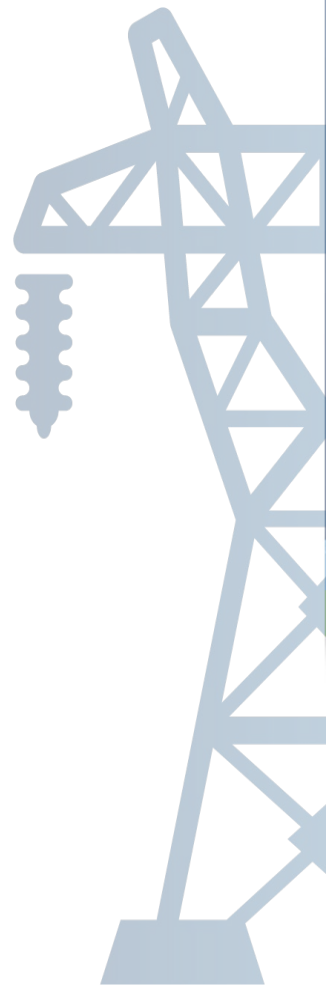
Benefits to Infrastructure Investor Developers

- WAPA can assist with navigating complex world of NEPA and other siting, permitting requirements, often acting as lead or cooperating agency
- WAPA is a valued partner by offering knowledgeable financial and utility sector risk mitigation during development and construction
- Developers leverage WAPA's project development knowledge, e.g., engineering and path rating work, interconnection expertise, financial and risk analysis specific to infrastructure, stakeholder engagement and navigating commercial market challenges
- Cost and timing of debt, targeted during construction, addresses a market challenge



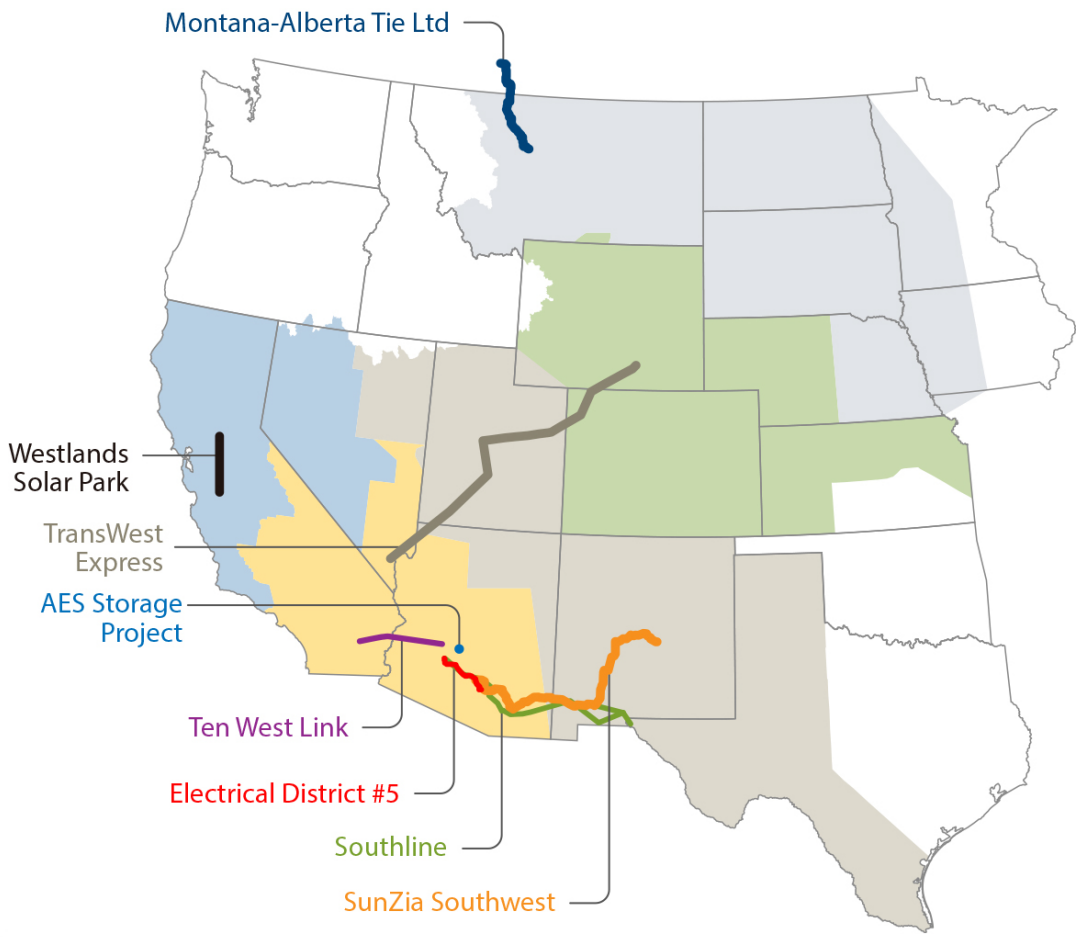
Types of Financing

Pre-Construction	• Not to exceed 1 year • Requires applicant to arrange for take out, long-term asset financing
Construction Only	• Formal program preferred • Requires applicant to arrange for take out, long-term asset financing • Typically, 2-4 years
Term	• Typically, not to exceed 10 years, but can coincide with length of off-take contract(s) • Requires applicant to arrange for take out, long-term asset financing



Representative TIP Projects

Operational, Repaid or Advance Funded Development Assistance



Financed

Electrical District 5 – Palo Verde Hub: $91M loan, In service January 2015; Loan in Repayment. 110-mile transmission line in solar rich Arizona serves customers in Arizona, S. California and Nevada

Montana Alberta Tie: $161M loan, In service 2013; construction loan fully repaid. 214-mile, 230-kV transmission line to deliver wind energy to interconnected markets.

TransWest Express: $25M loan, Under development; development loan repaid April 2019. (See Project Description Below)

Development/Pre-Financing

AES Storage Project: Proposed utility-scale 100MW battery energy storage project in Maricopa county Arizona.

Ten West: CAISO Project - 110 mi 500kV single circuit line from Delaney Substation (AZ) to Colorado River Substation (CA) and associated facilities.

TransWest: Proposed 725 mi 500kV HVDC transmission line from Wyoming to Nevada. 3000MW capacity. Phase I: 1500MW; Phase II 1500MW.

Southline: Proposed 360 mi 345kV and 230kV; upgrade of a double circuit AC line (Western's Parker Davis line) + new build AC line and associated facilities. Bi-directional flow planned.

SunZia: Federally permitted 515 mi 500kV AC transmission project; bidirectional.

Westlands: Proposed 154 mi 230kV transmission line from 3,000 MW solar park to Tracy Substation and associated facilities.

Contact Information

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Chief Administrative Officer
and Acting TIP Manager

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Phone: 720.962.7710

Webpage: www.wapa.gov/transmission/TIP

Los Angeles Department of Water and Power
Simon Zewdu

LA 100

The Los Angeles 100% Renewable Energy Study

LA City Council motions directed LADWP to evaluate:

- What are the **pathways and costs to achieve a 100% renewable electricity supply** while electrifying key end uses and maintaining the current high degree of reliability?
- What are the potential benefits to **the environment** and **health**?
- How might **local jobs** and the **economy** change?
- How can communities shape these changes to prioritize **environmental justice?**

Scenarios Based on Advisory Group Priorities

Each Scenario Evaluated Under Different Customer Demand Projections (different levels of energy efficiency, electrification, and demand response)

- Moderate
- High
- Stress

SB100

Evaluated under Moderate, High, and Stress Load Electrification

- 100% clean energy by **2045**
- Only scenario with a target based on retail sales, not generation
- Only scenario that allows up to 10% of the target to be natural gas offset by renewable electricity credits
- Allows existing nuclear and upgrades to transmission

Early & No Biofuels

Evaluated under Moderate and High Load Electrification

- 100% clean energy by **2035**, 10 years sooner than other scenarios
- No natural gas generation or biofuels
- Allows existing nuclear and upgrades to transmission

Limited New Transmission

Evaluated under Moderate and High Load Electrification

- 100% clean energy by **2045**
- Only scenario that does not allow upgrades to transmission beyond currently planned projects
- No natural gas or nuclear generation

Transmission Focus

Evaluated under Moderate and High Load Electrification

- 100% clean energy by **2045**
- Only scenario that builds new transmission corridors
- No natural gas or nuclear generation

LA100 Study

The 100 Percent Renewable Energy Study was completed and final report was released on March 24, 2021.

- 100% renewable energy is achievable through multiple pathways
- We can achieve 100% by 2035
- Rate impacts will approximately track inflation if we see building and transportation electrification
- Significant investment (approx. $50-80B) and job creation
- There will be significant growth in customer-facing programs like rooftop solar, storage, demand response and electric vehicles

Across All LA100 Scenarios

Electrification
Efficiency
Flexible Load

Customer
Rooftop Solar

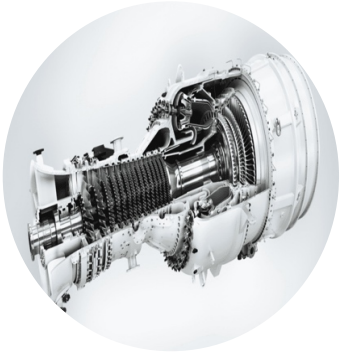
Renewable
Energy

Solar: + >5,700 MW
Wind: + >4,300 MW

Storage

+ >2,600 MW

Transmission,
Distribution



Renewably Fueled
Dispatchable
Turbines

+>2,600 MW
(in basin)

Much More

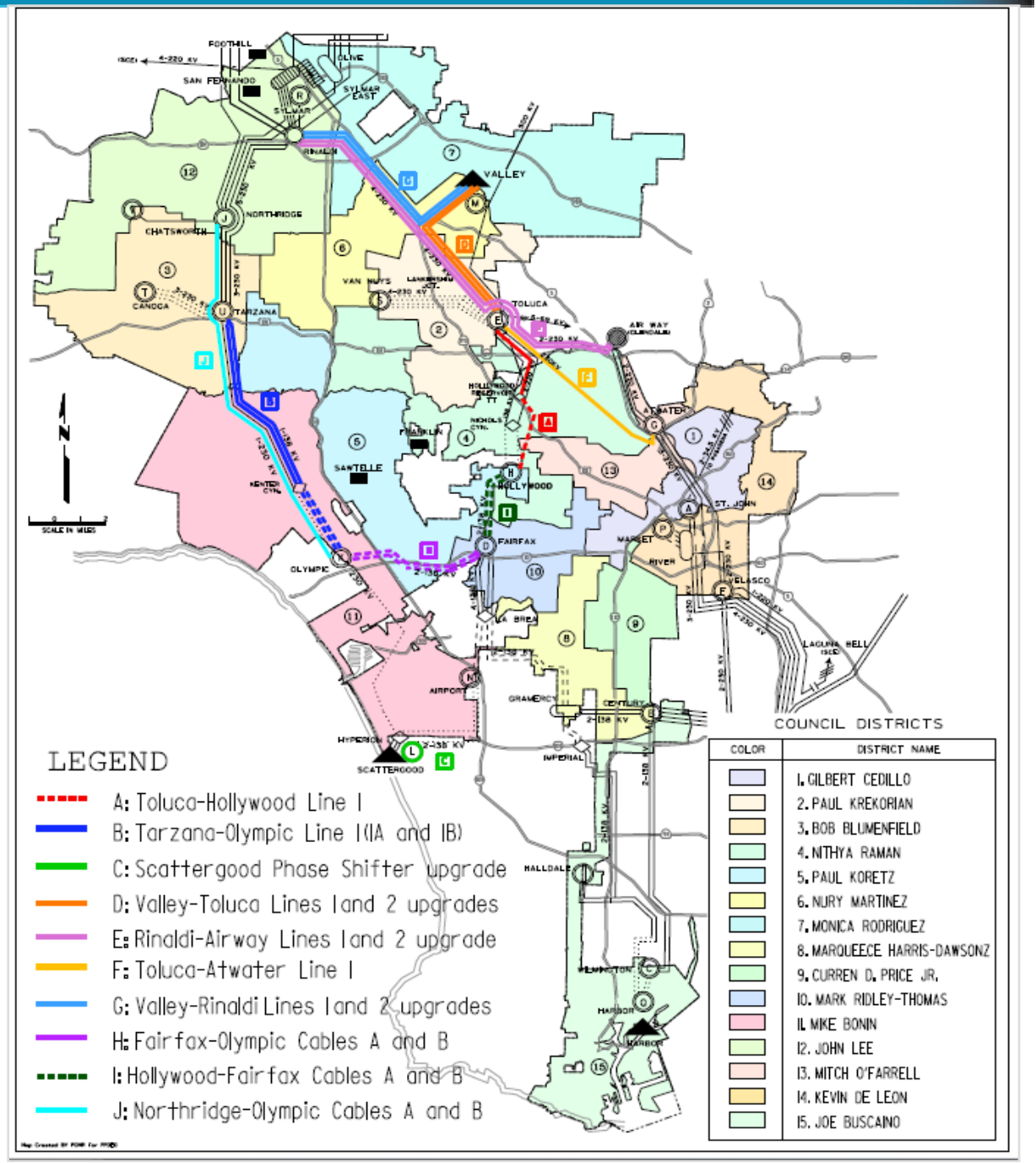
Natural gas → Biofuel/ hydrogen	
Today: Daily	**Future:** Infrequently

LA100 Transmission Needs

- LADWP Transmission studies have identified deficiencies in local transmission capacities
- Additional transmission capacities are needed to support LA100
- **The planning, design, and the timely delivery of such transmission capacities are critical**

Accelerate Local Transmission Projects

- 10 Transmission Projects over 10 years to bring renewable power where its needed within the City
- **Flexible generation capacity in-basin needed to complete transmission projects in time for 2035**



Clean Grid LA Plan Update
Aligning with LA100

LA100 Transmission Challenges

- Unprecedented number of transmission projects are needed
- How are we going to build those projects?
- Would existing State practices and policies help?

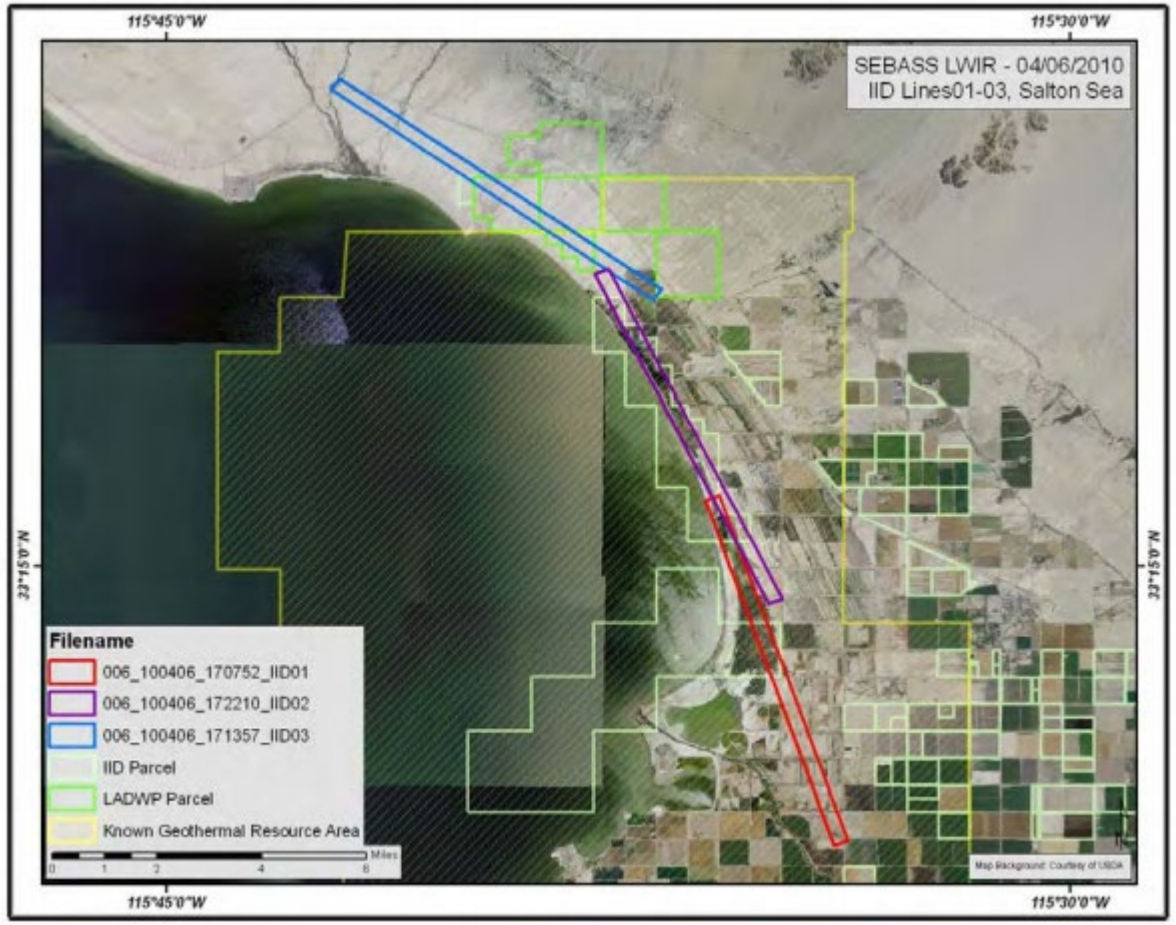
Items for Consideration

- Have targets for transmission development consistent with RPS/Decarbonization goals
- Provide relief in transmission permitting and siting
- Expedite transmission projects in California
- Collaboration – Conduct regularly joint studies among electric utilities and balancing authorities in California to achieve RPS goal of 100% in a manner that ensures system reliability
- Investigate Major Transmission Corridors that maximize energy transfer in and out of California and potential upgrade

Questions?

Imperial Irrigation District
Enrique Martinez

Geothermal Region



IID
A century of service.

Recent Events

- CTR – GM partnership
  - *Multi-million dollar partnership related to lithium mining*
  - *Waiting on details to emerge*

- CPUC Renewable Resource Order
  - *LSE to procure 1000MW of Geothermal*
  - *Required by 2025*

IID Geothermal Interconnections

- Over 600MW currently interconnected
- Multiple interconnection requests
  - *550MW of geothermal in queue*
  - *15MW of new geothermal waiting for COD*
  - *Regional interest from mineral resource miners*
- Geothermal exploration driven by both energy and mineral extraction

Requirements for Geothermal Expansion

- IID
  - New Transmission
    - *~75 miles from geothermal region to Path 42*
    - *Functional requirements scale with amount of geothermal influx*
    - *Likely to come as Network Upgrades from Interconnection Projects*
  - Upgrading existing transmission
    - *Limiting RAS penetration*
    - *Bottleneck elimination/underlying 92kV system*
    - *Upgrade existing infrastructure*
- CAISO
  - MIC into CAISO
    - *ATC on CAISO tie lines*
    - *CAISO-end upgrades*

California Municipal Utilities Association
Tony Braun

POU Collaborative Transmission Planning – Building on Past Success

Joint Agency Workshop,

July 22, 2021

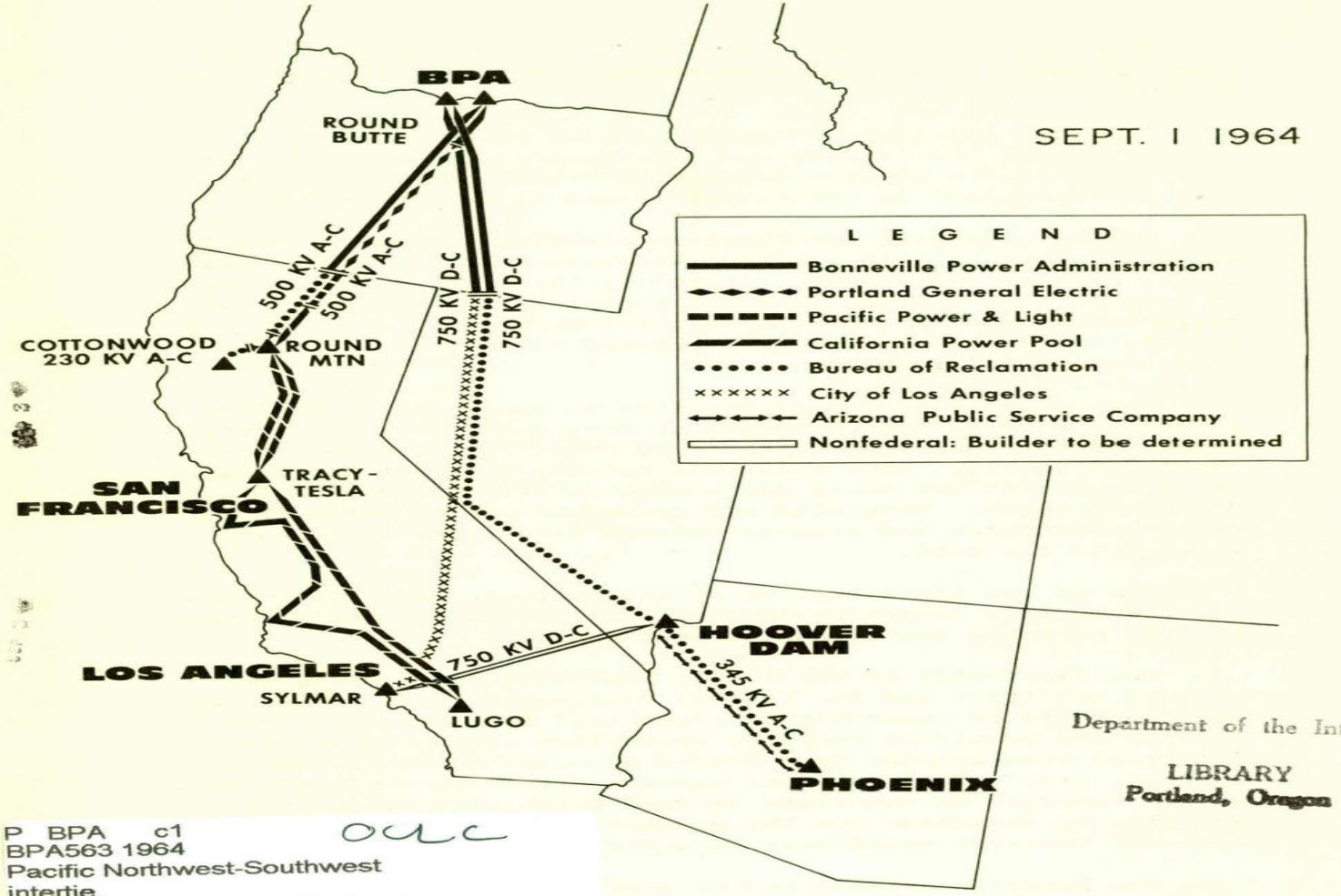
BB SW | Braun Blaising Smith Wynne

Look Back at Regional Transmission Planning and Possible Lessons Learned

- POUs Have a Strong History of Regional Transmission Development
- A Look at How and Why Major Projects Were Built
- Do Any Lessons Carry over to Today?

BB SW | Braun Blaising Smith Wynne

PACIFIC NORTHWEST - SOUTHWEST INTERTIE



Legend shows who will build power lines. Intertie would permit exchanges of power, open markets for NW seasonal surpluses, do much to keep NW power rates low. Total cost $700 million. Total benefits $2.6 billion.

Map

Title


Captain Jack
BA tie to BPA
PacifiCorp-West
BPA
USBR
(1220 MW)
Trinity PUD
Shasta Lake
Round Mountain
Redding
Electric Utility
(183 MW Gen)
Olinda
Cottonwood
Balancing Authority
of Northern California
Peak Loads
SMUD 3299 MW
MID 696 MW
Roseville 357 MW
WAPA 332 MW
Redding 253 MW
Shasta 35 MW
Trinity 24 MW
BANC Peak 4906 MW
BANC Generation 5196 MW
Sutter to SMUD
(258 MW)
NV Energy
Folsom
(200 MW)
Roseville Electric
(210 MW Gen)
UARP
(688 MW)
Lake
Nimbus
SMUD
Rancho Seco
CPP (500 MW)
New Melones
to BANC (380 MW)
Tracy
LLNL
Modesto Irrigation
District (471 MW Gen)
BA tie to TID
TID BA
500 kV Lines
230 kV Lines
500 kV Substation
230 kV Substation
115 kV Substation
BA Interties
BA Intertie to CAISO
Generation
Pseudo Tie

Major Regional Facilities in Which POUs Led or Jointly Developed

- COI/PACI, including COTP
- PDCI
- Mead Phoenix
- Mead Adelanto
- Southern Transmission System

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Existing Major Facilities Were Built Through Voluntary Regional Collaboration

- Accessing Sources of Economic Power/Seasonable Exchange/Sales
- Delivery of Long-Term Cost-Effective Power Sources
- Projects were the Product of Voluntary Collaboration and Mutual Agreement
- Key Question: How Can You Revive any Element of the Collaborative Dynamics?

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What Has Changed?

- Shifting Roles and Responsibilities
- Shift Toward Policy Driven Transmission Upgrades Replacing Historical Drivers
- Voluntary Collaboration Replaced with Regulatory Compliance

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What Remains Common?

- The Federal Government is a Major Transmission Owner/Operator/Facilitator
- Public Power Continues to Play Key Role
- Jointly Held Lines Still Work Today in Different Operational Paradigms
- The Reasons for Building Lines Remain Similar
  - Support Grid Reliability
  - Achieve Cost Savings and Efficiencies
  - Reach Desired Power Sources

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Possible Suggestions

- Create Bridges between Portfolio Planning to See if Collaboration is Possible
- Use this Process to Take a Serious Look at Highest Transmission Needs
- POU BAA Process Suggestions in Written Comments
  - Augment Workshops with Technical Teams
  - Focus on Reliability Assessment and Transmission Needs

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Session 2 Public Comment

Rules

- 3 minutes per person
- 1 person per organization

Zoom

- Click “raise hand”

Telephone

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

When called upon

- Unmute, spell name, state affiliation, if any

Written Comments:

- Due: 8/11/2021 by 5:00 p.m.
- Docket: 21-SIT-01
- Submit at: https://efiling.energy.ca.gov/Ecomment/Ecomment.aspx?docketnumber=21-SIT-01

3-MINUTE TIMER

Thank You