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Renewable Energy Transmission Initiative v2.0

Joint Agency Workshop

August 15, 2016

Workshop agenda and background

Brian Turner

RETI 2.0 Project Director

California Natural Resources Agency

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California Energy Commission

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Today's Agenda

1. Review of RETI 2.0 objectives, California renewable energy goals and potential, and identification of Transmission Assessment Focus Areas
2. Environmental and Land Use Technical Group
3. Transmission Technical Input Group
4. Western Outreach Project
5. Next steps
6. Public Comment

Review of RETI 2.0 objectives, California renewable energy goals and potential, and identification of Transmission Assessment Focus Areas

Renewable Energy Transmission Initiative v2.0

Objectives

- Statewide, non-regulatory planning effort to help meet statewide GHG and renewable energy goals.
- Explore combinations of renewable generation resources in California and throughout the West that can best meet goals
- Build understanding of transmission implications of renewable scenarios, and identify common transmission elements
- Identify land use and environmental opportunities and constraints to accessing these resources
- Accelerated, agency-driven, high-level assessment to inform future planning and regulatory proceedings

RETI 2.0 Policy Context

Executive Order B-30-15

- Established **40% GHG reduction goal by 2030**
- Mandates state agencies to **pursue with all statutory authority**
- New California **Air Resources Board Scoping Plan**

SB 350

- CPUC and CEC increase **Renewable Requirements** from 33% by 2020 to **50% by 2030**
- Require **resource optimization** and an **Integrated Resource Planning (IRP) process**
- Ensure **utility progress toward economy-wide 40% GHG reduction** goal by 2030
- Expresses intent for **regional expansion of the CAISO**
- Encourages **widespread Transportation Electrification**

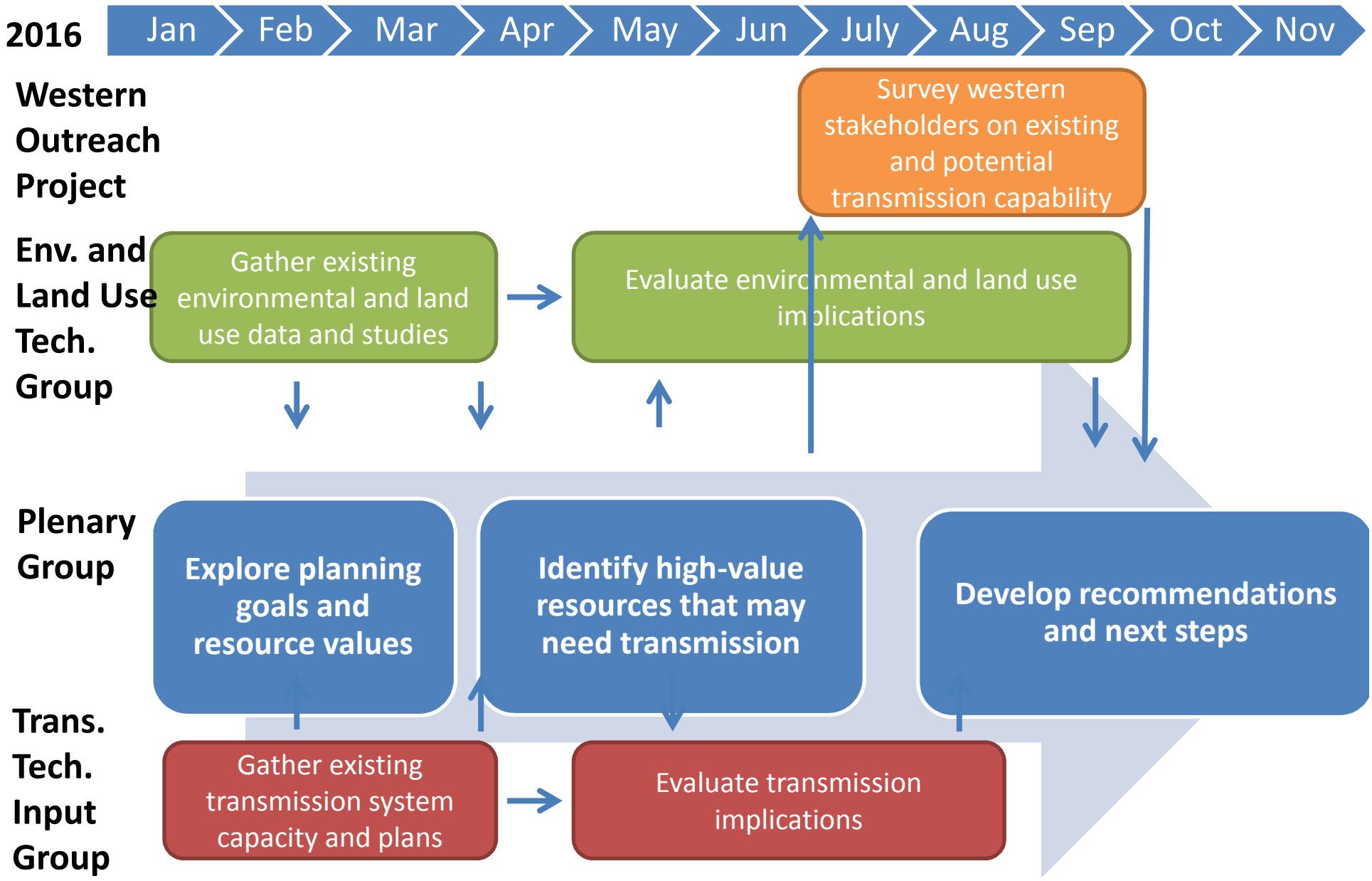
California Independent System Operator

- Regional expansion planning
- Transmission Planning complete for 33%; "considerable work" necessary to plan for 50%
- FERC Order 1000 Interregional Transmission Planning

Western developments

- FERC Order 1000 Interregional Transmission Planning
- Clean Power Plan
- Federal renewable energy tax credit extension
- State (OR, WA, NV, etc) RPS and GHG policy developments
- Mexico electricity sector reform

RETI 2.0 Process and Timeline



RETI 2.0 Activities to Date

Date	Group	Subject
September 10, 2015	**Joint Agency**	**Project introduction and kick-off**
November 2, 2015	Joint Agency	Organizational structure
November 23, 2015	ELUTG	Available data and plans
December 4, 2015	ELUTG	Available data and plans
December 18, 2015	**Plenary**	**2016 detailed work plan**
January 22, 2016	ELUTG	Proposed approach
January 22, 2016	TTIG	Planning status and existing studies
January 29, 2016	Plenary	Planning goals
March 16, 2016	Plenary	Renewable resources
April 18, 2016	Plenary	Renewable portfolios
May 2, 2016	**Joint Agency**	**Update and proposed TAFAs**
June 9, 2016	TTIG	Existing and planned capacity report
July 21, 2016	ELUTG	County land use
July 29, 2016	TTIG	TAFA assessment
August 12, 2016	WOP	Portland workshop
August 15, 2016	**Joint Agency**	**Progress update**

Renewable energy goals and potential and the identification of Transmission Assessment Focus Areas

Transmission Assessment Focus Area: Approach

Explore planning goals and resource values

1. How much renewables might we need?
2. Which resources might be important by 2030?

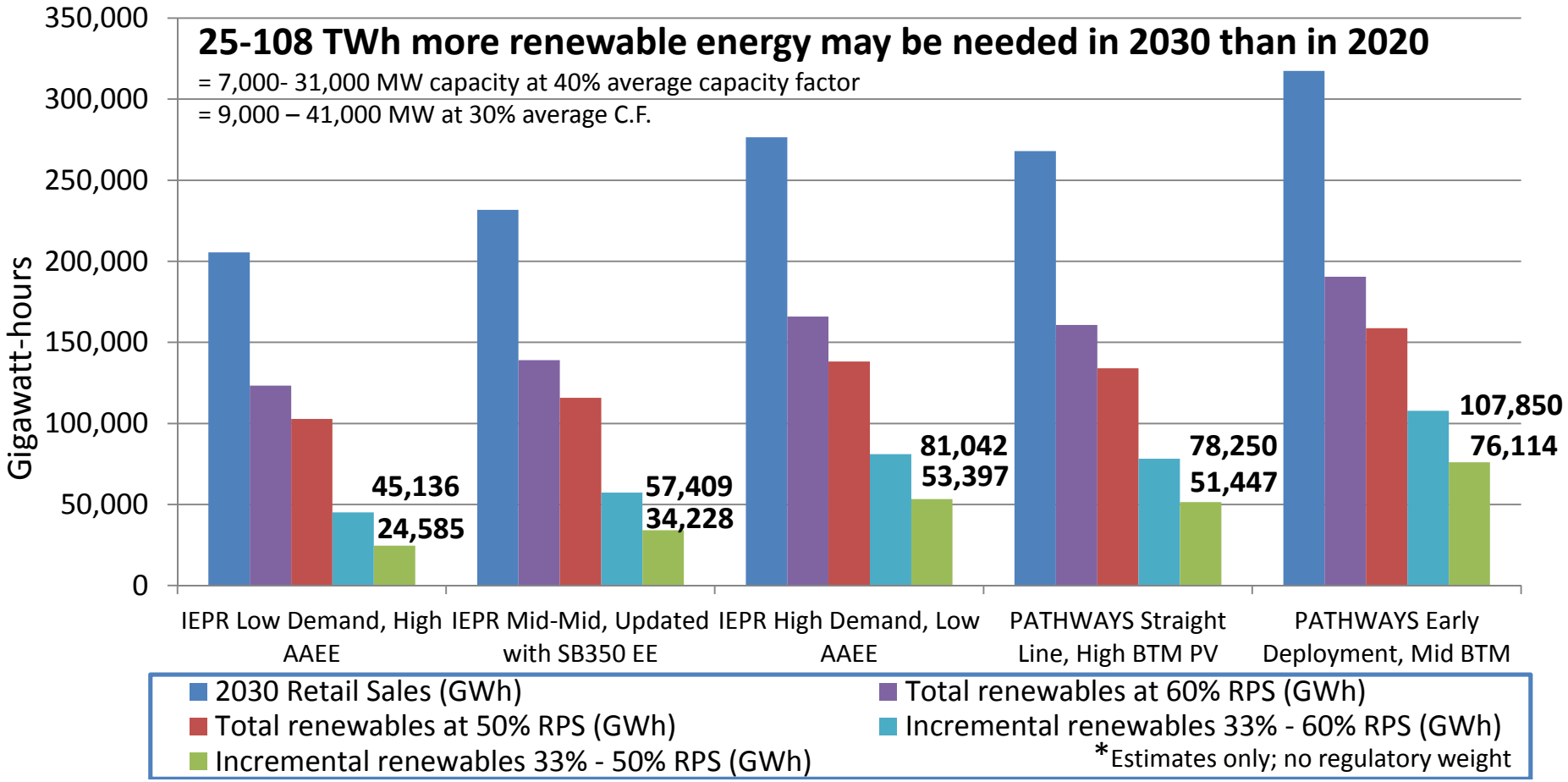
Identify high-value resources that may need transmission

3. How much renewables might come from different areas?
4. Might this level of renewables require new transmission?

How much renewable energy might California need to meet 2030 goals?

- Used projections of total statewide electricity demand, RPS compliance "net short", and GHG compliance scenarios to estimate *incremental renewable energy demand* by 2030 beyond the renewable energy projected to meet 33% in 2020
- No regulatory weight or status; Used to the scale the hypothetical renewable energy demand from individual Transmission Assessment Focus Areas
- Primary data sources:
  - California Energy Commission's Energy Demand Forecast, extrapolated to 2030 and adjusted to approximate SB 350 energy efficiency goals
  - California PATHWAYS modeling project performed for California agencies by Energy & Environmental Economics (E3) in 2014-15
- Critical variables:
  - Energy efficiency, behind-the-meter solar PV, electric vehicles and other electrification
  - 40% economy-wide GHG reduction could require equivalent of 55-60% RPS

Potential 2030 Renewable Energy Demand under different scenarios



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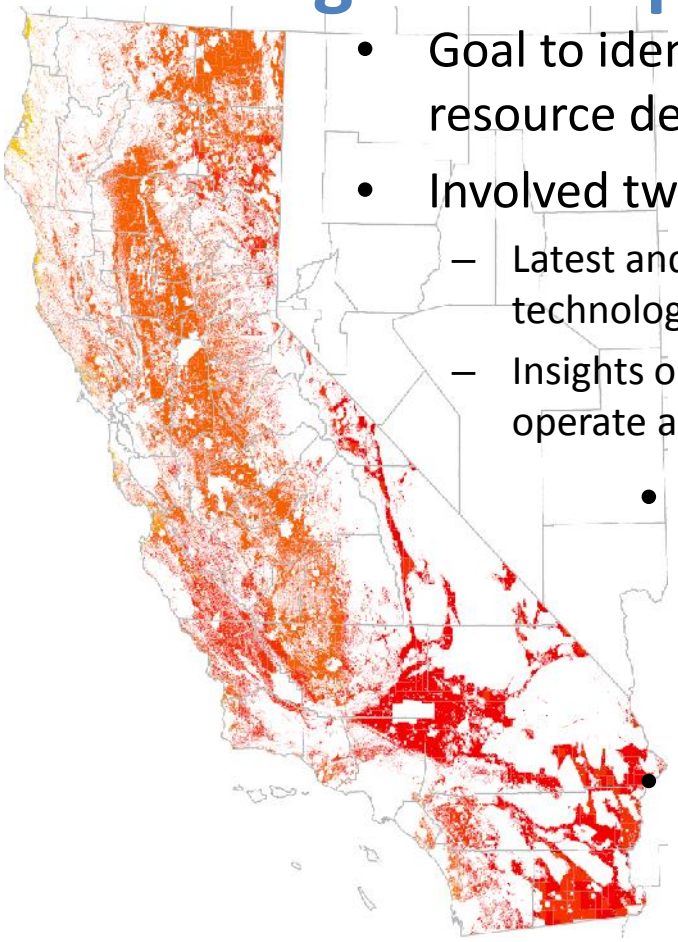
Which renewable resources, and where, might be important to reach 2030 goals?

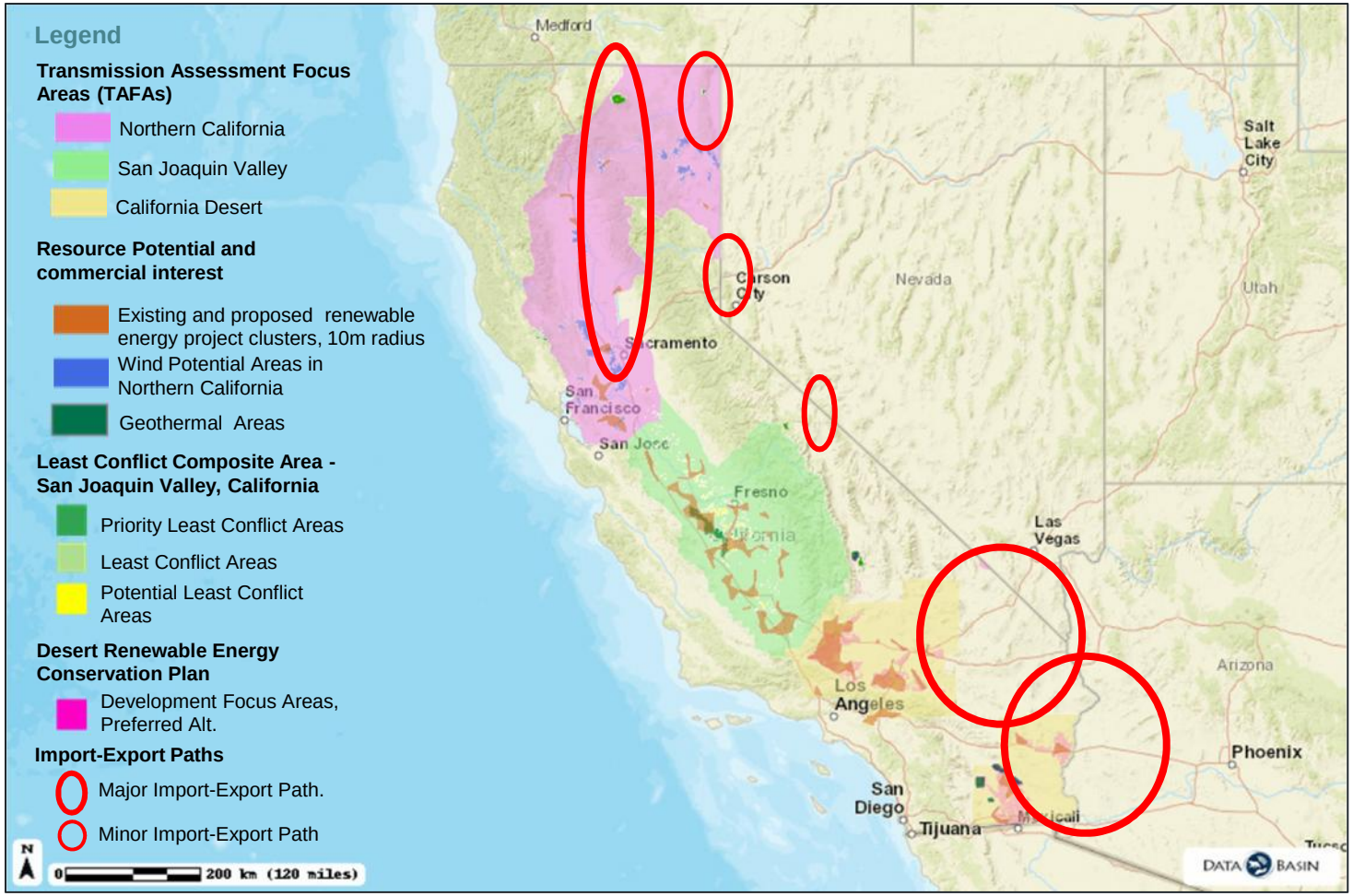


- Goal to identify locations of potential large-scale renewable resource development that could help meet 2030 need
- Involved two basic questions:
  - Latest and greatest on costs and value of different renewable technologies in different areas
  - Insights on the portfolio of different resources that may be necessary to operate a majority-renewables grid at lowest cost
- Collected data from:
  - Agency and academic databases
  - Commercial (developer and utility) interest
  - Analyses of long-term portfolios
- Built off of existing studies
  - 2014 Desert Renewable Energy Conservation Plan
  - 2016 San Joaquin Valley Solar Convening

Resource Conclusions

- Low cost solar is ubiquitous, but does raise long-term integration challenges
  - Many integration options, but resource and technology diversity and exports are among the cheapest
- Determining environmental feasibility and transmission access for remaining in-state wind may be a priority
- Geothermal may offer important benefits by 2030 but costs and benefits need further work
  - Transmission access one important component
- Environmental and land use constraints tend to favor in-state solar and out-of-state wind
- Broad support for further assessment of Out-of-state resources
  - High-quality, low-cost resources with complementary profiles
  - Quality and timeliness of data does not match in-state
  - Options for access by existing transmission largely un-assessed
  - Export options very important

Transmission Assessment Focus Area Map



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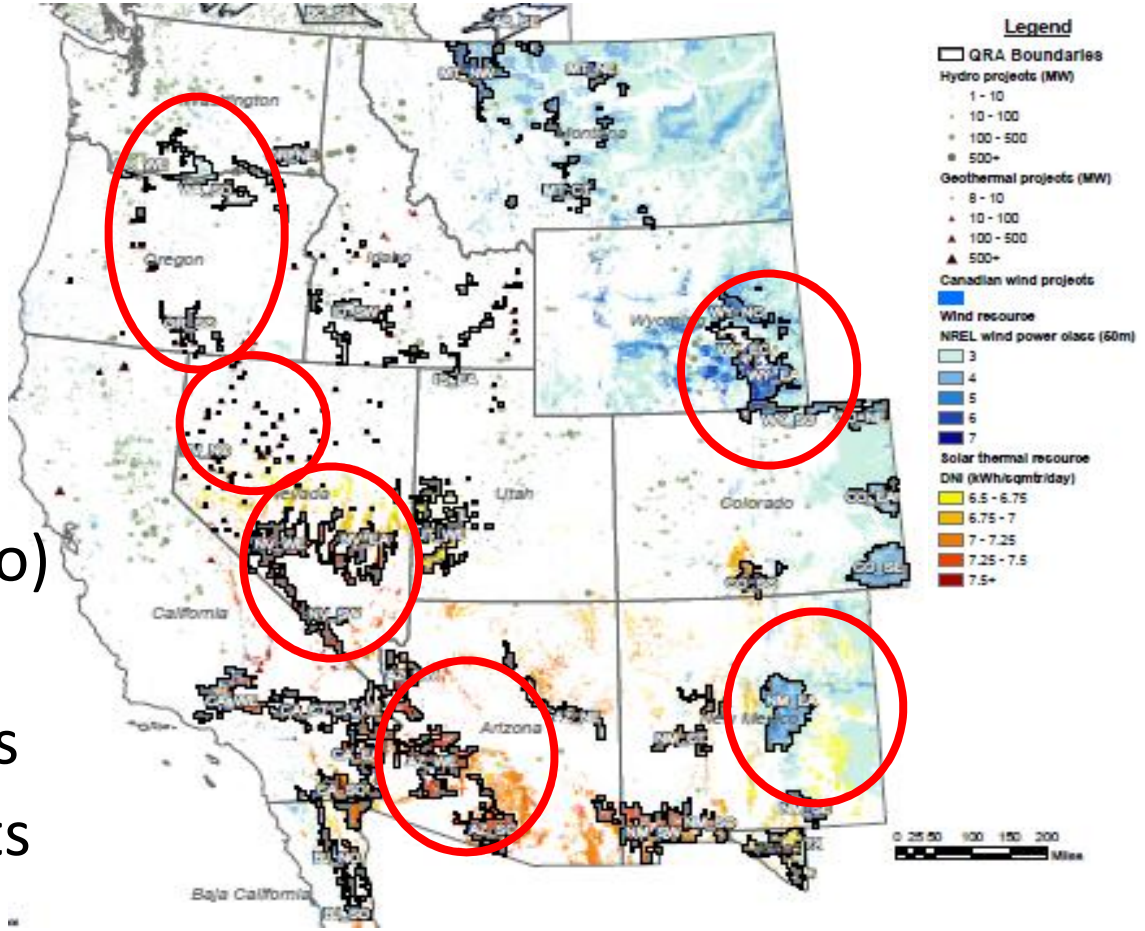
Transmission Assessment Focus Areas

Study Ranges Hypothetical additions of new renewable resources	
Delivery point or path	**Study Range of New Capacity (MW)**
Imperial Valley	Up to 5000
Riverside East	Up to 5000
Victorville/Barstow	Up to 5000
Tehachapi	Up to 5000
San Joaquin Valley	Up to 5000
Solano	1500-3000
Sacramento River Valley	1500-3000
Lassen / Round Mountain	1450-2450
Path 46 / Palo Verde / Delaney	Up to 3000
Path 46 / Eldorado / Marketplace	Up to 3000
Path 66 / California-Oregon Intertie	Up to 2000
Central/Northern Sierra (Path 76; Path 24; Path 52)	Up to 500

Western TAFAs

- WY and NM wind
- NV and AZ solar
- NV geothermal
- NW wind and geothermal
- Resource changes in other states (coal, hydro)
- Markets for CA surplus
- OOS “Delivery” projects
- OOS “Network” projects



TAFA multi-track assessment

- Environmental and Land Use Assessment – implications of generation and transmission scenarios
  - Environmental analysis: database with ecological and planning information
  - Land Use: survey of county and other land use planners
  - Tribal outreach: Land use, environmental, and cultural resources
  - Military consultation: potential impacts on military readiness; alignment with renewable development objectives
  - Federal coordination: US BLM West-wide Energy Corridor review
- Transmission Assessment – implications of generation scenarios
  - Technical Input Group: existing system capability; bulk system impacts of new generation/imports; potential mitigations and corridor options
- Western Outreach Project – capability of transmission outside of the state to deliver renewable energy to *and from* California
  - Western Interstate Energy Board workshops and survey