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Comment Received From: Beth Olhasso

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Comments on the Joint Agency Workshop to Introduce Renewable Transmission Initiative 2.0

Additional submitted attachment is included below.



September 24, 2015

California Energy Commission
Docket Office, MS-4
RE: Docket No. 15-IEPR-08
1516 Ninth Street
Sacramento, CA 95814-5512
Via e-comment

RE: Comments on the Joint Agency Workshop to Introduce Renewable Transmission Initiative 2.0

Dear Commissioners,

The Agricultural Energy Consumers Association (AECA) appreciates the opportunity to provide these comments and the attached report *Unlocking Renewables: Exploring the Clean Energy Potential in the San Joaquin Valley* as part of the Renewable Energy Transmission Initiative 2.0 (RETI 2.0).

AECA's interest in this proceeding will be focused on ensuring that statewide transmission planning necessary to meet California's expanding renewable energy and greenhouse gas requirements is done in an efficient and effective manner to minimize costs and maximize benefits for ratepayers. Additionally, AECA is interested in ensuring that the RETI 2.0 also closely coordinate with the San Joaquin Solar Convening (the Convening) effort that is being facilitated by Governor Jerry Brown's office. The Convening is focused on facilitating solar development in the San Joaquin Valley on marginal, least-conflict agricultural lands. The San Joaquin Valley has vast, and largely untapped renewable energy potential including solar, pumped storage and dairy and agricultural bioenergy that can help the state meet its renewable energy development and greenhouse gas reduction goals.

The attached report, *Unlocking Renewables: Exploring the Clean Energy Potential in the San Joaquin Valley*, was released last month. This important report outlines the opportunity to leverage the renewable energy potential of the San Joaquin Valley to ensure that the region benefits from the state's carbon reduction and renewable energy goals.

While rich in natural resources and clean energy opportunities, the San Joaquin Valley has largely been left behind in California's clean energy revolution. The overwhelming majority of the state's new transmission assets have been sited in other regions, particularly Southern California, and renewable energy investment, jobs, tax revenue and other benefits have followed grid access. As a result, the San Joaquin Valley has been disadvantaged because its renewable resources lack access to California's broader utility market.

As the state moves forward, few areas are better positioned and would benefit more from expanded clean energy and transportation objectives than the San Joaquin Valley. These benefits include improving air quality and expanding economic development and job creation in a region plagued by poor air quality, chronic double-digit unemployment, and high rates of poverty.

AECA looks forward to participating in this proceeding and helping to unlock the potential of the San Joaquin Valley.

Sincerely,

A handwritten signature in blue ink that reads "Michael Boccadoro". The signature is fluid and cursive, with the first name being more prominent.

Michael Boccadoro
Executive Director

UNLOCKING RENEWABLES



Exploring the Clean Energy Potential in the San Joaquin Valley

A Primer to the Valley Summit

Rhonda S. Mills

RISING TIDE STRATEGIES

Rey León

VALLEY LEAP

Dan Jacobson

ENVIRONMENT CALIFORNIA

With a Foreword by:

Michael Boccadoro and V. John White

AUGUST 12, 2015



UNLOCKING RENEWABLES: A VALLEY SUMMIT

ON AUGUST 12, UNLOCKING RENEWABLES: A VALLEY SUMMIT WILL EXPLORE THE POTENTIAL OF A DEVELOPING CLEAN ENERGY ECONOMY IN THE SAN JOAQUIN VALLEY AND THE STATE. THIS PRIMER TO THE SUMMIT IS DESIGNED TO OUTLINE POTENTIAL OPPORTUNITIES, PROVIDE BACKGROUND INFORMATION IN ADVANCE OF THE VALLEY SUMMIT, AND POSE A SERIES OF QUESTIONS TO BE DISCUSSED BY CONFERENCE PARTICIPANTS AND SPEAKERS. OUR HOPE IS THAT SUMMIT PARTICIPANTS WILL COALESCE AROUND DISCRETE PUBLIC POLICY RECOMMENDATIONS TO CREATE ENVIRONMENTAL AND ECONOMIC CONDITIONS TO EXPAND CLEAN ENERGY OPPORTUNITIES IN THE REGION. THESE PUBLIC POLICY RECOMMENDATIONS WILL BE INCLUDED IN A FINAL REPORT DESIGNED TO MOVE THE CLEAN ENERGY ECONOMY FORWARD IN THE VALLEY.



FOREWORD

By Michael Boccadoro and V. John White

California's energy sector is undergoing rapid and profound change. Much of the transformation is being driven by evolving regulation, expanding renewable energy mandates and increasing greenhouse gas reduction goals. However, the Golden State's clean energy future is far from clear. Consider the following:

- Unexpected closure of the San Onofre Nuclear Generating Station (SONGS) and uncertainty surrounding the future operation of the state's only remaining nuclear facility at Diablo Canyon
- Increased regulation and expected phasing out of the state's aging once-through cooling (OTC) natural gas generation facilities
- Rapid expansion of renewable energy resources
- Climactic changes and implications for the state's hydro power resources which currently provide over 12% of the state's electricity usage
- Increased development and reliance on distributed generation (rooftop solar, fuel cells, etc.) and energy storage resources
- Ongoing electrification and de-carbonization of our transportation sector

CALIFORNIA HAS AN OPPORTUNITY TO LEVERAGE THE RENEWABLE ENERGY POTENTIAL OF THE SAN JOAQUIN VALLEY TO ENSURE THAT THE REGION BENEFITS FROM THE STATE'S CARBON REDUCTION AND RENEWABLE ENERGY GOALS.

While rich in natural resources and clean energy opportunities, the San Joaquin Valley has largely been left behind in California's clean energy revolution. The overwhelming majority of the state's new transmission assets have been sited in other regions, particularly southern California, and renewable energy investment, jobs and benefits have followed grid access. As a result, the San Joaquin Valley has largely lost out on the promise of the clean energy economy and the benefits it can provide.

California's future will largely be determined over the next 15 years as state and national policy decisions are made and implemented. One issue that is clear is the increased importance of electric transmission planning and access. Timely investment and improved transmission access will allow the state to tap the most affordable clean energy assets and opportunities and achieve its renewable energy and climate change goals in the most efficient manner possible, while minimizing land use, cultural and environmental conflicts.

Unlocking the renewable energy potential of the San Joaquin Valley by providing more equitable investment in a clean energy economy should be a top priority of state policy makers. The region remains mired in chronic double-digit unemployment, unprecedented rates of poverty and poor air quality. Few areas are better positioned and would benefit more from the massive future investments that will be necessary to meet state and national policy objectives. As these future investment decisions are made, policy makers must ensure a sizeable share is targeted to improving air quality, expanding economic development and creating jobs in this severely distressed region of the state.

PURPOSE OF THE PRIMER FOR THE VALLEY SUMMIT



This Primer explores the clean energy potential and opportunities for inbound investments in the San Joaquin counties of Fresno, Kern, Kings, Madera, Merced, San Joaquin, Stanislaus and Tulare. The Primer examines the potential for building a clean energy economy in the San Joaquin Valley based on several factors:

- California's climate and energy goals;
- San Joaquin Valley's renewable fuel potential;
- Current and near-term transmission capacity and planning for transmission in the Valley;
- Land and environmental considerations;
- Employment, economic development and workforce development opportunities in clean energy economies

By unlocking the clean energy potential of the Valley, California will seize an opportunity to create economic development in the valley and help the state meet its climate and energy goals.

INTRODUCTION: CALIFORNIA'S CLEAN ENERGY ECONOMY

It's an understatement to say there is a thriving clean energy economy in California. No state has taken more steps to improve its environmental footprint or reduce its consumption of hydrocarbon-based energies as California. Consider the following:

"THE CALIFORNIA CLEAN ENERGY INDUSTRY WILL MORE THAN TRIPLE FROM 2012 TO 2020 WHEN IT WILL ACCOUNT FOR MORE THAN 5% OF THE STATE ECONOMY, UP FROM ABOUT 1.5% IN 2010."⁶

**California Air Resources Board,
Research Division**

- By the end of 2014, almost 19,000 MW of clean energy projects were operating in California¹.
- Large, wholesale renewable operating capacity (>20 MW) in California is triple the amount installed in 2001.
- There are more than 5,200 MW of onsite distributed generation projects operating in California (fuel cells, rooftop solar, etc.).
- Between 2011 and 2014 alone, 9,000 MW of utility-scale renewable generation was brought online in California², investments valued at about \$22 billion³.
- In addition to the projects already operating in California, another 11,400 MW⁴ have approved land use and other permits in place, but are awaiting interconnection into the CAISO grid.
- Nationwide, California has more installed solar capacity and solar jobs than any other state, it is first in total advanced energy investment, more electric vehicles are sold here than anywhere else, and California ranks second in installed energy efficiency measures⁵.

CALIFORNIA IS NOT SLOWING DOWN

California has never shied away from the most difficult challenges. With unique human capital and natural resources, California turns challenges into opportunity. No better example exists than California tackling climate change and turning this global challenge into an opportunity for a clean energy economy.

In his inaugural address in January 2015, Governor Jerry Brown announced California will accelerate its low carbon and clean energy goals. New initiatives and legislation are under consideration in the 2015-2016 Legislative Session to increase renewable energy penetration, expand GHG reduction goals and reduce dependence on the use of petroleum.

“I envision a wide range of initiatives: more distributed power, expanded rooftop solar, microgrids, an energy imbalance market, battery storage, the full integration of information technology and electric distribution and millions of electric and low-carbon vehicles.”

**– Governor Jerry Brown
Inaugural Address, January 5, 2015**

California is aggressively addressing climate change and air pollution through a series of regulations and statutes aimed at a low-carbon future. The Governor, State Legislature and regulating agencies have passed and/or launched several major initiatives in the last two years that will virtually transform the energy sector in California, and likely influence policy and the energy infrastructure throughout the Western United States, Canada and Mexico.

New and pending rules limiting climate pollutants, methane emissions and fossil fuel consumption are sparking a series of regulation and incentive programs across the power, transportation, building and industrial sectors. This effort touches many sectors of California's economy: electricity, natural gas, transportation, water, fuels, waste streams and the built environment.

CALIFORNIA'S GOALS:

- Increase renewable energy generation: 50% RPS by 2030;
- Increase Distributed Generation installations⁷: 12,000 MW by 2020 (fuel cells/cogen, solar, small wind and hydro);
- Increase solar PV rooftop installations: Bring 3,000 MW of PV online on homes and businesses by the end of 2016;
- Increase use of electric vehicles: 1.5 million electric vehicles on the road by 2025;
- Implement energy storage: Utility procurement mandates and rebates for batteries and other distributed-level energy storage technologies;
- Increase landfill diversion: 75% landfill diversion by 2020 (use as bioenergy feedstocks and secondary products);
- Develop a bioenergy sector: Programs and incentives to encourage renewable transportation fuels, anaerobic digestion projects, biomass electric power plants, and renewable natural gas for pipeline injection;
- Maximize energy efficiency in homes and buildings.

These efforts are supported by numerous state incentive programs, State and Federal tax credits, loan guarantee and grant programs.

^{1,2} Some renewable facilities are located outside California, but are electrically interconnected to the CAISO control grid. Source: CEC, “Summary of Renewable Energy Installations, Current and Planned, Revised Dec. 31, 2014”, http://www.energy.ca.gov/renewables/tracking_progress/documents/renewable.pdf.

³ Estimate based on the capital costs to build renewable energy power projects, as estimated in LAZARD's “Levelized Cost of Energy Analysis, Version 8.0”, published September 2014.

^{4,5} Advanced Energy Economy Institute, California Advanced Energy Employment Survey (December 2014)

⁶ “The Clean Energy Industry in California: An Economic Analysis Assessing the Current Market in the Global Economy”, State of California Air Resources Board Research Division, February 2011. <http://www.arb.ca.gov/cc/ejac/clean-energy-industry.pdf>

⁷ Distributed generation refers to technologies that are sited on a customer's property. Typical DG technologies include fuel cells, solar PV and small-scale wind turbines.

CALIFORNIA'S CLEAN ENERGY FUTURE

In the energy sector, affordable compliance with California's global warming and RPS laws—and other state and federal clean energy regulations—will hinge largely on the state's ability to dispatch power when and where it is needed. To comply with the myriad of laws governing California's electricity market, a robust, flexible transmission grid must be put in place in a timely manner.

IN THE NEXT 15 YEARS, \$700 BILLION WILL BE INVESTED IN THE CLEAN ENERGY SECTOR IN THE UNITED STATES.

Source: U.S. Department of Commerce-SelectUSA

In the first half of 2014, 42% of all new utility-scale electricity generation capacity put in place in the U.S. was from solar and wind power plants. Solar alone accounted for 26% of new power plan generation⁸. This investment did not happen by accident. The boom in clean energy electricity generation has benefitted from federal policies designed to encourage renewable resources. The American Recovery and Reinvestment Act (ARRA) of 2009 provided more funds for clean energy

than ever before. Likewise, continuation of the Federal Business Energy Investment Tax Credit, which provides a 30% tax credit to eligible renewable energy projects, also stimulated additional interest and development of renewable energy projects.

The energy sector is now the third largest industry in the U.S., and renewable energy projects have led the way. California has not stood idly by. In 2013, California ranked second in the nation in net electricity generation from renewable energy resources, and first as a producer of electricity from geothermal energy⁹. California has leveraged the clean energy economy through enactment of a number of programs that are designed to enhance, incentivize, facilitate, and in some cases, mandate clean energy projects. As a result, California's use of electricity from renewable energy sources has almost doubled its share of total electricity generation, increasing from roughly 11% in 2008 to 19% by 2013. In just the last three years California has built more than 9,000 MW of utility-scale renewable electricity generating facilities. The development alone resulted in over 10,200 well-paying construction jobs¹⁰. Going forward, policymakers will have significant opportunity to determine how and where these investments get made and equally important, where these jobs are created.



⁸ Environmental and Economic Benefits of Building Solar in California: Quality Careers—Cleaner Lives, UC Berkeley Labor Center, <http://laborcenter.berkeley.edu/environmental-and-economic-benefits-of-building-solar-in-california-quality-careers-cleaner-lives/>.

⁹ Energy Information Administration, California Energy Profile. Retrieved January 8, 2015. <http://www.eia.gov/state/?sid=CA>

¹⁰ Environmental and Economic Benefits of Building Solar in California: Quality Careers—Cleaner Lives, UC Berkeley Labor Center, <http://laborcenter.berkeley.edu/environmental-and-economic-benefits-of-building-solar-in-california-quality-careers-cleaner-lives/>.

PROTECTING THE VALLEY'S RESOURCES WHILE EXPANDING THE CLEAN ENERGY ECONOMY

Many factors and voices will affect the amount and pace of renewable energy developments possible in the San Joaquin Valley. Inbound investments could reach several billion dollars in a few short years, but land-use concerns must be settled, biological and environmental concerns must be addressed, and more transmission infrastructure must be built.

In mid-2015, the University of California at Berkeley and the Governor's Office of Planning and Research initiated a multi-party stakeholder convening to discuss ways that the clean energy economy could be realized using geospatial tools that identify areas of agreement for development. The stakeholder convening of industry, county planners, environmental/conservation and farming/agricultural groups are currently working to identify areas of mutual agreement that could be unlocked for solar development and the transmission lines necessary to connect these projects.

A 2015 survey¹¹ of interested stakeholders identified the major concerns that must be addressed for the region to increase clean energy developments in the San Joaquin Valley. The list makes clear the divergent views and concerns that must come together in order to expand the clean energy economy in the region.

Respondents identified the biggest challenges for clean energy in the San Joaquin Valley:

- Lack of transmission capacity in promising areas
- Protection of endangered species
- High cost of land or lack of available sites
- Lack of a statewide solar development plan; piecemeal siting and development practices
- Lack of comprehensive planning and mitigation measures for impacts
- Lack of consensus about what constitutes "least-conflict lands"
- Local concerns from agriculture and other interests
- Multiple permitting agencies and processes
- Property tax exemptions for solar that diminish local incentives to permit solar
- Williamson Act protections that limit development

The stakeholder convening represents an opportunity to use land use planning tools to help accelerate development of the clean energy economy without impacting prime farmlands, critical habitat areas or local planning practices.

¹¹ Survey: Solar and the San Joaquin Valley: Identification of Least-Conflict Lands, Ethan N. Elkind, UC Berkeley / UCLA Schools of Law, Published July 2015; Conservation Biology Institute's Data Basin geospatial tool is helping the four stakeholder groups identify areas for least conflict solar development (available at: <http://www.databasin.org>).

A NEW ENERGY ECONOMY

The energy sector is the third largest industry in the U.S. and renewables is a growing part. In 2013, California ranked second in the nation in net electricity generation from renewable energy resources, and first as a producer of geothermal power¹².

Utility Scale Generation

At the end of 2014, utility-scale, wholesale renewable operating capacity in California was 19,000 MW, more than triple the amount in 2001. In only three years

between 2011 and 2014, California added 9,000 MW¹³ of utility-scale renewable generation—investments totaling approximately \$22 billion¹⁴. Outside of Kern County, however, the San Joaquin Valley has not benefited from this repaid growth in renewable energy deployment.

As illustrated in the table below, despite major renewable energy potential in the San Joaquin Valley, it does not rank high on the list of installed projects in California counties.

LAST YEAR, 2,500 MW OF NEW UTILITY-SCALE RENEWABLES CAME ONLINE IN CALIFORNIA AND ANOTHER 11,000 MW WITH APPROVED PERMITS IS AWAITING INTERCONNECTION TO THE ELECTRIC GRID.

Figure: Top 10 California Counties by Renewable Energy Installations (in MW)¹⁵

COUNTY	WIND		SOLAR		BIOMASS, DIGESTER, LFG		GEOTHERMAL		TOTAL MW
	Total MW	Total Projects*	Total MW	Total Projects*	Total MW	Total Projects*	Total MW	Total Projects*	
1 KERN	3,104	51	775	8	94	3	0	0	3,973
2 RIVERSIDE	751	35	709	10	51	2	0	0	1,511
3 IMPERIAL	265	1	472	5	0	0	654	19	1,392
4 SONOMA	0	0	0	0	6.4	2	1,158	11	1,165
5 SAN BERNARDINO	9	5	965	41	5.75	4	0	0	980
6 SOLANO	972	13	2	1	0	0	0	0	974
7 SAN LUIS OBISPO	0	0	677.5	4	0	0	0	0	677
8 LAKE	0	0	2.2	1	0	0	444.8	7	447
9 ALAMEDA	369	16	2	2	21	3	0	0	392
10 INYO	0	0	0	0	0	0	302	3	221
TOTAL	5,489	122	3,956	99	453	34	2,558	40	11,732

In addition to the projects already operating in California, another 11,400 MW have approved land use and other permits in place, but are awaiting approval and access to interconnect to the CAISO grid. Not all of the 11,400 MW will become operational, as some projects typically fall out of the queue for varying reasons, including the schedule and costs for interconnection to the CAISO grid.

¹² Energy Information Administration, California Energy Profile. Retrieved January 8, 2015. <http://www.eia.gov/state/?sid=CA>

¹³ Some renewable facilities are located outside California, but are electrically interconnected to the CAISO control grid. They are included in the chart. Source: CEC, "Summary of Renewable Energy Installations, Current and Planned, Revised Dec. 31, 2014", http://www.energy.ca.gov/renewables/tracking_progress/documents/renewable.pdf.

¹⁴ Estimate based on the capital costs to build renewable energy power projects, as estimated in LAZARD's "Levelized Cost of Energy Analysis, Version 8.0", published September 2014.

¹⁵ Total MWs excludes hydroelectric resources. Source: California Energy Commission, California Operating Renewables 2014, Excel spreadsheet provided by the CEC, Siting, Transmission and Environmental Protection Division, January 8, 2015.

TOTAL RENEWABLE ENERGY CAPACITY (2014)¹⁷

TOTAL INSTALLED MW **24,000 MW**

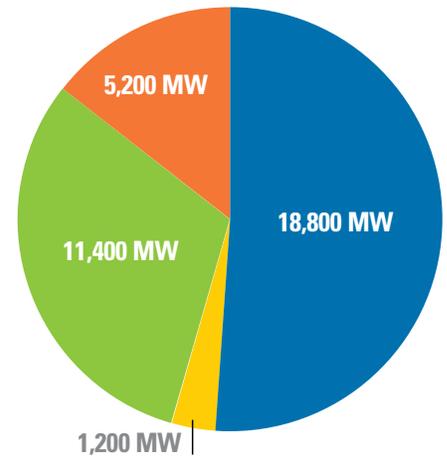
Large Utility-Scale Projects (Above 20 MW) **18,800 MW**

Renewable Distributed Generation (Below 20 MW)
Includes Self-Generation, Net-Metered and Wholesale DG Power **5,200 MW**

PENDING APPLICATIONS

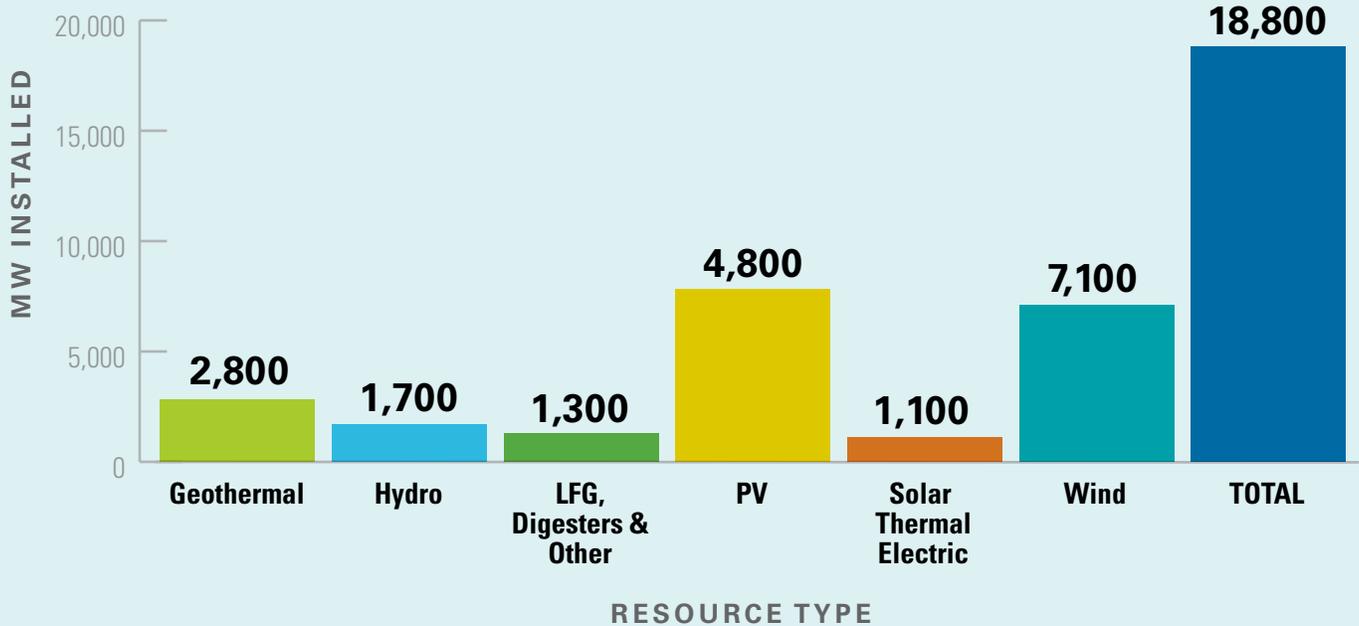
Large Utility-Scale Renewables with Approved Permits
(Not Built/Interconnected) **11,400 MW**

Pending Renewable DG Applications (<20 MW) **1,200 MW**



IN-STATE RENEWABLE CAPACITY ABOVE 20MW¹⁸

As of December, 10, 2014

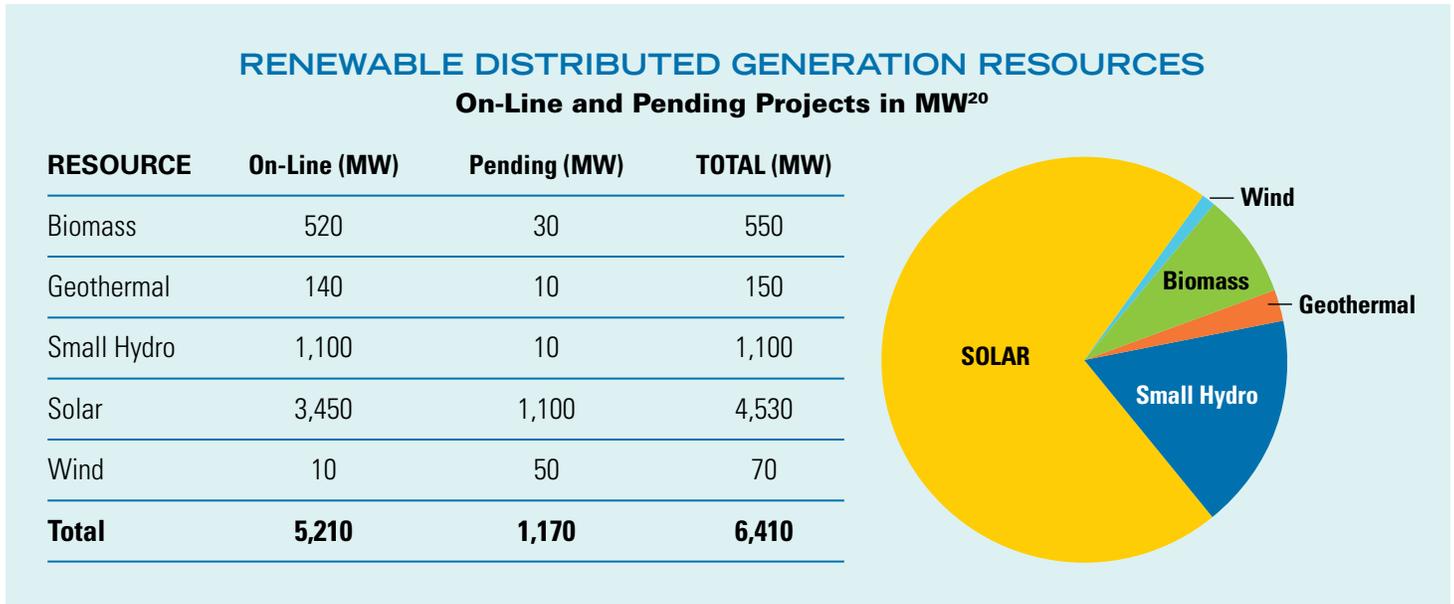


¹⁷ CEC "Summary of Renewable Energy Installations, Current and Planned, Revised December 31, 2014", http://www.energy.ca.gov/renewables/tracking_progress/documents/renewable.pdf.

¹⁸ California Energy Commission, "Tracking Progress", December 31, 2014. http://www.energy.ca.gov/renewables/tracking_progress/documents/renewable.pdf; CEC "Renewables Portfolio Standard Eligibility" (Fifth edition, 2012) (Hydro plants that are 30 MW or less in generating capacity are eligible for RPS).

Distributed Generation

Distributed generation (DG) projects under 20 MW (fuel cells, small-scale wind and hydro, biomass and solar plants) have boomed as well. There are 5,210 MW of renewable DG projects operating in California, with an additional 1,170 MW of DG projects pending¹⁹. Governor Brown’s goal to install 12,000 MW of DG by 2020 will continue to create growth in distributed generation.



Energy Storage (Batteries, Fly-Wheels, Ice Storage, etc.)

In 2013, the California Public Utilities Commission established the first energy storage mandate in the U.S. It requires investor-owned utilities to procure about 200 MW of small-scale energy storage annually. The procurement mandate increases to 1,300 MW by 2020. In late 2014, SCE selected the winning bidders of 264 megawatts of storage projects. By the end of 2015, PG&E will identify more than 72 MW of energy storage projects.



¹⁹ CEC, “Summary of Renewable Energy Installations, Current and Planned, Revised December 31, 2014”, http://www.energy.ca.gov/renewables/tracking_progress/documents/renewable.pdf

UNTAPPED RENEWABLE POTENTIAL

The San Joaquin Valley possesses significant clean energy potential. Solar, biomass, small hydropower, ultra-clean fuel cells, and energy storage facilities, like fly wheels and batteries, could be sited throughout the region. The Valley is blessed with very high solar and wind capacity and some of the highest biomass/biogas potential in the United States. The U.S. Department of Energy's National Renewable Energy Laboratory (NREL) publishes renewable energy potential maps for the United States by county.

Solar: NREL shows that solar potential in the San Joaquin Valley²¹ has the third highest rating on the solar potential scale—just lower than the potential of the desert. NREL estimates solar energy would produce enough energy to power up to 1,000,000 homes.

Biomass and Biogas: (Landfill Gas, Ag Biomass, Dairy Biogas, Biodiesel, etc.): The potential for renewable bioenergy products, such as renewable biogas for power plants, fuel cells and transportation fuels is also very high. NREL rates the biogas potential at the highest rating potential²² at greater than 10,000 tons per year.

Wind Power: The wind potential in the San Joaquin Valley is strongest in Kern County, where the wind resource is nearly built out. NREL estimates the wind potential is “fair” in the northwestern corner of the Valley and to some extent in Eastern Merced and Stanislaus counties.

Small Hydropower: Though not mapped by NREL, the small hydropower potential in the San Joaquin Valley is a potentially valuable untapped resource.

Fuel Cells and Energy Storage: The potential for fuel cell generators and energy storage technologies, such as batteries, fly wheels, pumped storage and other emerging technologies is also very strong for the San Joaquin Valley. These fuel cell and energy storage projects have small physical footprints and can be scaled from small onsite facilities up to utility-scale projects built to provide grid support, renewable integration and reliability.

Bioenergy

Bioenergy is renewable energy produced from biomass wastes including forest and other wood waste, dairy and other animal agricultural waste, food processing wastes, urban organic waste, emissions from water treatment facilities, landfill gas and other organic waste sources.

A number of large biomass generating plants dot the regions landscape producing several hundred megawatts of baseload renewable energy. These facilities utilize forest, agricultural and urban wood wastes to produce renewable baseload electricity. These facilities provide significant environmental and waste reduction benefits and their continued operation is important to the region.

The San Joaquin Valley also has significant untapped bioenergy potential. The region is home to numerous large dairy herds and food processing facilities that can create biogas through anaerobic digestion. Wastewater treatment facilities, landfills and expanding urban organic waste diversion projects also present significant bioenergy potential. Finally, abundant forest and agricultural biomass resources can be converted to bioenergy.

Biomass and biogas are flexible renewable energy resources and can be converted into renewable electricity, cleaned and conditioned into biomethane for use as renewable natural gas (RNG) or upgraded for use as transportation fuel (RCNG) for use in heavy duty and other natural gas vehicles.

CENTRAL VALLEY COMPETITIVE RENEWABLE ENERGY ZONES

Based on these fuel potentials, portions of the San Joaquin Valley have been identified as good sites for transmission in the state's Renewable Energy Transmission Initiative (RETI)²³. Additionally, the CEC identified the region as an economic and viable resource region in its 2013 Integrated Energy Policy Report (IEPR)²⁴.

²¹ See “Photovoltaic Solar Resource of the United States” map in Appendix X, and at http://www.nrel.gov/gis/images/eere_pv/national_photovoltaic_2012-01.jpg

²² See “Methane Potential from Biogas Sources” map in Appendix X, and at http://www.nrel.gov/gis/images/biomass_2014/National-Biomass-Biogas-2014-01.jpg. The map illustrates the methane generation potential by county from landfills, animal manure; wastewater treatment; and industrial, institutional, and commercial organic waste.

²³ Renewable Energy Transmission Initiative, Phase 2B Final Report at page 5-9, available at <http://www.energy.ca.gov/2010publications/RETI-1000-2010-002/RETI-1000-2010-002-F.PDF>. RETI is a

²⁴ CEC 2013 Integrated Energy Policy Report, page 176, “Applying the Desert Renewable Energy Conservation Plan Model to the San Joaquin Valley and Other Areas”, <http://www.energy.ca.gov/2013publications/CEC-100-2013-001/CEC-100-2013-001-CMF-small.pdf>

²⁵ Renewable Energy Transmission Initiative, RETI, Phase 2B-2010 Final Report

ILLUSTRATING THE RESOURCE POTENTIAL: NUMEROUS INTERCONNECTION APPLICATIONS

Transmission Queue Applications

In the San Joaquin Valley, over 10,758 MW of solar, wind and battery storage projects are awaiting interconnection to the CAISO-controlled transmission grid. Fresno, Merced, Madera, San Joaquin and Tulare counties have 98 project interconnection applications for 5,092 MW; Kern County has another 57 projects pending for over 5,666 MW²⁶.

These 149 clean energy interconnection applications are essentially awaiting word on whether they can be interconnected to the electric grid, how much it will cost to do so, and importantly, how long it will take for the CAISO to facilitate the interconnection. The decision process can take several years and dramatically impact the ability of projects to proceed. Without access to transmission interconnection, projects cannot effectively negotiate power purchase agreements.

Land Use Permits

The renewable resource potential of the San Joaquin Valley is also evidenced by the vast number of pending and recently approved applications for land use and construction approvals, although the number has dramatically decreased in the last 24 months due to changes in interconnection and procurement rules. Fresno and Madera counties have 14 Conditional Use Permits (CUP) awaiting approval totaling 43 MW; San Joaquin County has 7 permits in application for over 27 MW; Kern has 22 projects in permitting for a total of 3,390 MW. The Westlands Solar Project is currently permitting another 2,400 MW of solar energy in Kings County which will also require transmission capacity.²⁷ Though many projects fail before approvals or do not receive them, the significant activity illustrates the clean energy potential trying to occur in the region.

SAN JOAQUIN VALLEY PROJECTS IN CAISO QUEUE (by county)

COUNTY	TOTAL MWs (rounded approximate total)	NUMBER OF PROJECTS	TYPE	RANGE OF YEARS FOR APPLICATIONS IN QUEUE
Fresno/Madera	2,821	51	PV, Batteries, Flywheels	2009-2015
Kings	1,190	20	PV, Batteries	2007-2015
Merced	570	7	PV	2010-2015
San Joaquin	171	8	PV, Batteries, Wind	2014-2015
Stanislaus	320	2	PV	2009
Tulare	20	5	PV, Batteries	2015
Total Excluding Kern	5,092	98	PV, Batteries, Wind and Flywheels	2007-2015
Kern	5,666	57	PV, Batteries, Wind	2003-2015
Total Including Kern	10,758	149	PV, Batteries, Wind and Flywheels	2003-2015

SOURCE: Transmission Planning for Renewable Generation, California ISO, presentation, CEC IEPR Workshop, Aug. 3, 2015.

²⁶ ISO Generator Interconnection Queue, December 19, 2014, accessed December 24, 2014, <http://www.caiso.com/planning/Pages/GeneratorInterconnection/Default.aspx>.

²⁷ Westland Solar Park, available at <http://www.westlandssolarpark.com>.

INCREASED IMPORTANCE OF TRANSMISSION PLANNING

The electric transmission system is the backbone of the electric sector and provides broad benefits beyond the transportation of electric power from generators to customers. These benefits include, but are not limited to, the following:

- Environmental benefits through expanded dispatch of California resources
- Generation cost savings through the enhanced dispatch of state renewable resources;
- Reliability and resource adequacy through increased flexibility;
- Increased competition by expanding the number of market participants;
- Employment and economic development through increased investment and enhanced renewable energy development;
- Insurance against uncertain future events and the cost of such unforeseen events on customers.

California's energy sector is in the midst of a major transition. Public policy decisions are increasingly driving changes in how the transmission system needs to be planned and utilized. Dealing with the complexities of this transition will require more forward looking, flexible planning and investment in new transmission facilities. California must plan for, permit, and develop necessary transmission upgrades that will enable it to provide efficient, reliable and non-discriminatory transmission service. New transmission investment will further enable consumer choice, support renewable market development, enable deployment of new technologies such as energy storage and improve access to a broader range of available energy resources. A more flexible and robust transmission grid also provides a fundamental hedge against uncertainties surrounding the nature and timing of new technology development and shifting patterns of supply and demand. Stated simply, additional investment in transmission facilities provides adaptability, optionality and flexibility as California heads into an ambitious but highly uncertain clean energy future.



Strategically planned additions to the high voltage grid will be necessary to accommodate the shift in the energy sector’s evolving resource mix including the expected growth in renewable resources, expanding de-carbonization regulation and the prospect of a surge in the use of electric vehicles. In recent comments²⁸ before the CPUC, the Natural Resources Defense Council recognized the importance of transmission planning to realizing the state’s clean energy goals. To the extent feasible and consistent with state and federal laws and regulations, California should utilize existing rights-of-way to limit environmental impacts and state-federal and public-private partnerships that optimize transmission opportunities and enhance grid function.

The Energy Imbalance Market and Integrating Participating Transmission Operators with CAISO

In 2014, California launched an important electricity market trading mechanism, the kind other U.S. and international regions have used for years to balance supply and demand across large regions. Known as

“TRANSMISSION UP THE VALLEY WOULD EASE REGIONAL CONGESTION AND BOLSTER CONNECTIONS BETWEEN SOUTHERN AND NORTHERN CALIFORNIA, PROVIDING SUBSTANTIAL SYSTEM RELIABILITY BENEFITS AND REGIONAL ENERGY EXPORT OPPORTUNITIES.”

**Carl Zichella,
Natural Resources Defense Council**

an Energy Imbalance Market (EIM), the EIM gives system operators real-time visibility across neighboring grids, so regions can share resources, reduce costs and emissions, and limit energy curtailments that happen when a region is generating more power than it needs. The EIM uses software to automatically balance demand every five minutes with the lowest cost energy available across the combined grid. In the West, low-cost power is increasingly renewable.

PacifiCorp joined the energy imbalance market in November 2014. NV Energy is expected to join the market in October 2015, while Puget Sound Energy and Arizona Public Service intend to join the market in October 2016. In addition, the California ISO and PacifiCorp announced in April 2015 that they have signed a memorandum of understanding indicating that PacifiCorp will explore full participation in the ISO as a Participating Transmission Owner. The memorandum paves the way for performing a joint study on the feasibility and benefits of PacifiCorp joining the only competitive wholesale market in the West.

A Key Transmission Corridor in the West

The San Joaquin Valley is a significant transmission corridor for California and the whole Western U.S. region. High voltage transmission lines run north to south through the Valley, carrying power to and from Oregon and Southern California and from various regions around the state and up into the Pacific Northwest. The backbone of the transmission system is formed by Path 15, which parallels Interstate-5 freeway and carries enormous volumes of power for Western states.



²⁸ Realigning Transmission Planning to Meet the State Climate Mitigation and Renewable Energy Goals

Path 15

Path 15 is an 84-mile stretch of electrical transmission lines in the heart of the San Joaquin Valley connecting Southern California with the northern part of the state. Path 15 forms a crucial intertie between vast hydroelectric resources in the north with fossil fuel and renewable resources in the south and is the backbone of California's transmission grid. As a result, Path 15 plays an important role in maintaining regional electric system reliability and market efficiency. Path 15 is fully integrated into the CAISO grid and provides access to several California load centers. Completed in 2004, the Path 15 Upgrade project launched the competitive transmission industry by using private capital to fund much-needed new transmission infrastructure. The project also benefited from public-private partnerships between private sector utilities and Western Area Power Administration. Growing electric demand and renewables development, combined with the State's new carbon goals and system scheduling issues will necessitate greater transmission capacity and flexibility on the high voltage transmission system that includes Path 15.

Gates-Gregg Project

One additional transmission line that will benefit the Valley was approved in March 2013. The Gates-Gregg project is a 68-mile line spanning Fresno, Madera and Kings counties to be constructed as a double circuit 230 kV line with one side strung between the PG&E owned Gates and Gregg 230 kV substations. The project

was approved primarily as a reliability project, with some economic and policy benefits. The double circuit potential allows for future expansion to supply load or integrate renewable generation in the immediate area while minimizing future right-of-way requirements. That project is being built primarily to reduce the number and duration of power outages on the grid and to address the growing electricity demand in the greater Fresno region. The Gates-Gregg project is scheduled to be operational by 2023.

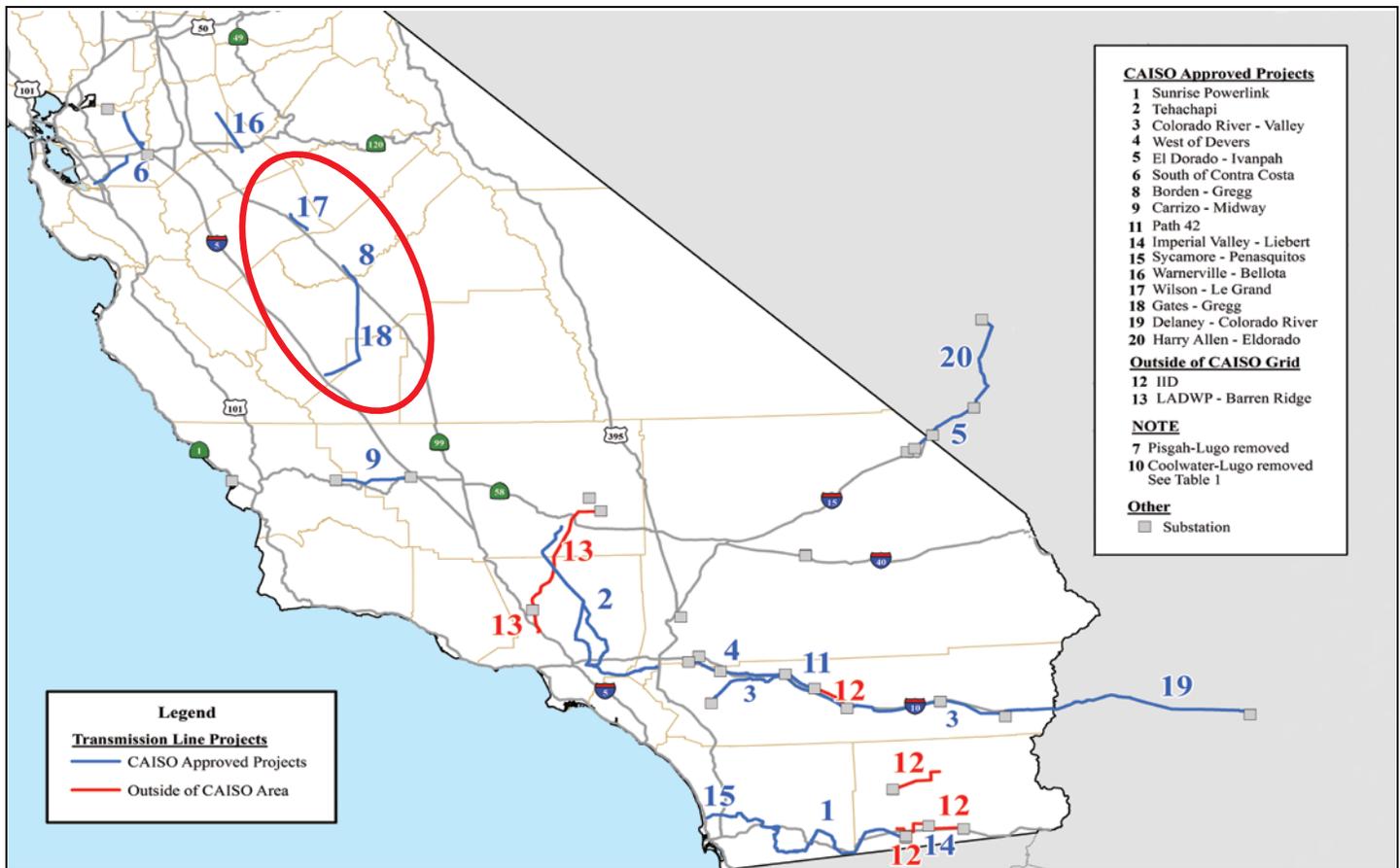
San Luis Transmission Project (SLTP)

Another proposed San Joaquin Valley transmission expansion is the San Luis Transmission Project (SLTP) immediately north of Path 15. The Western Area Power Administration²⁹ is proposing to build a new 62-mile high-voltage electric transmission line to connect Western's existing transmission system near Tracy with the Bureau of Reclamation's San Luis Unit water pumping plants near Los Banos. The line is designed to enhance delivery of low-cost Western power for use to transport federal Central Valley Project (CVP) water into the San Joaquin Valley, central coast and to Bay Area water agencies and farms. Federal water customers require only a 230 kV line but the project could be right-sized at 500 kV to take full advantage of the existing corridor. Rightsizing the project to 500 kV will provide multiple benefits and better position the San Joaquin Valley for renewable energy expansion.

RETI is a statewide planning process to identify the transmission projects needed to accommodate California's renewable energy goals and to designate certain "Competitive Renewable Energy Zones" (CREZs). The CREZ are areas that hold the greatest potential for cost-effective and environmentally responsible transmission and renewable development. RETI is coordinated by a committee of the California Independent System Operator (CAISO), California Public Utilities Commission (CPUC), California Energy Commission (CEC), the investor- and publicly-owned utilities, and others.

²⁹ Western is one of four power marketing administrations within the U.S. Department of Energy. It markets and transmits wholesale electricity from multi-use water projects, such as the Central Valley Project in California. The WAPA service area encompasses a 15-state region of the central and western U.S. It has 17,000 miles of transmission lines carrying power from 56 hydropower plants operated by the Bureau of Reclamation, U.S. Army Corps of Engineers and the International Boundary and Water Commission.

CAISO APPROVED TRANSMISSION PROJECTS IN THE VALLEY³¹



PLANNING RENEWABLY-INSPIRED TRANSMISSION IN THE VALLEY

Expanding transmission in the region will unlock the renewable energy potential of the Valley as has been done in other areas of the state. Some areas in California have seen billions of renewable energy dollars invested over the last ten years because of state decisions and new renewably-inspired transmission unlocked clean power potential. The Tehachapi Mountains, Imperial Valley and the Mohave Desert are regions where the state made policy and infrastructure decisions that sparked major clean energy development.

Tehachapi Renewable Transmission Project

The Tehachapi Renewable Transmission Project contains 250 miles of transmission lines for interconnecting 4,500 MW of renewable generation, enough to supply nearly 3 million homes at peak output³². It serves load growth in the Antelope Valley and eases transmission constraints in the Los Angeles basin. The \$2.9 billion

multi-phased project began construction in 2012 and is expected to be completed by 2016. Tehachapi is an example of a public policy driven transmission project designed to integrate large amounts of wind into the California transmission grid.

Delays in transmission approvals and construction timelines increase the price of power and transmission projects, and in the case of the San Joaquin Valley, prevents the development of high-value renewable energy resources in the region. California's climate and energy mandates oblige the State to consider a broader set of transmission planning objectives than the short, ten-year planning period and the portfolio-based approach currently used by the CAISO.

Advanced, prudent transmission planning can help the state achieve its renewable energy goals by ensuring that the grid remains flexible enough to meet the future needs of the state. Past transmission investments have helped to unlock renewable energy in many regions of the state.

³¹ California Energy Commission, "Tracking Progress, Transmission Expansion Projects for Renewables, June 18, 2014". Retrieved January 5, 2015, http://www.energy.ca.gov/renewables/tracking_progress/documents/transmission_expansion_projects.pdf.

³² "Greening the Grid, Celebrating California's Progress in Renewable Energy The Tehachapi Renewable Transmission Project", March 2010, <http://www.transmissionhub.com/documents/2011/10/overview-tehachapi-renewable-transmission-project-sce-pdf.pdf>.

TEHACHAPI RENEWABLE TRANSMISSION PROJECT SYSTEM³³

Southern California Edison is leading the way in increasing California's use of electricity produced from renewable energy sources.



³³ "Greening the Grid, Celebrating California's Progress in Renewable Energy The Tehachapi Renewable Transmission Project", March 2010, <http://www.transmissionhub.com/documents/2011/10/overview-tehachapi-renewable-transmission-project-sce.pdf>.

SAN JOAQUIN VALLEY ECONOMIC DEVELOPMENT POTENTIAL

While agriculture and food production will continue to be the backbone of the San Joaquin Valley economy, new non-farm economic development will be important to reverse the chronic double digit unemployment and extreme rates of poverty in the region.

Agricultural production and food and fiber processing still account for a significant share of the San Joaquin Valley economy. Ongoing water scarcity, however, will make it difficult for these industries to continue to expand. The state's housing crisis also took its toll on local

construction jobs and the Valley has been slow to recover from the Great Recession.

Unlocking the clean energy potential of the San Joaquin Valley will not happen overnight and it will not happen by itself. Foresight, planning, and investment in a clean energy economy will be needed to allow the Valley's vast renewable resources to be effectively and efficiently tapped.

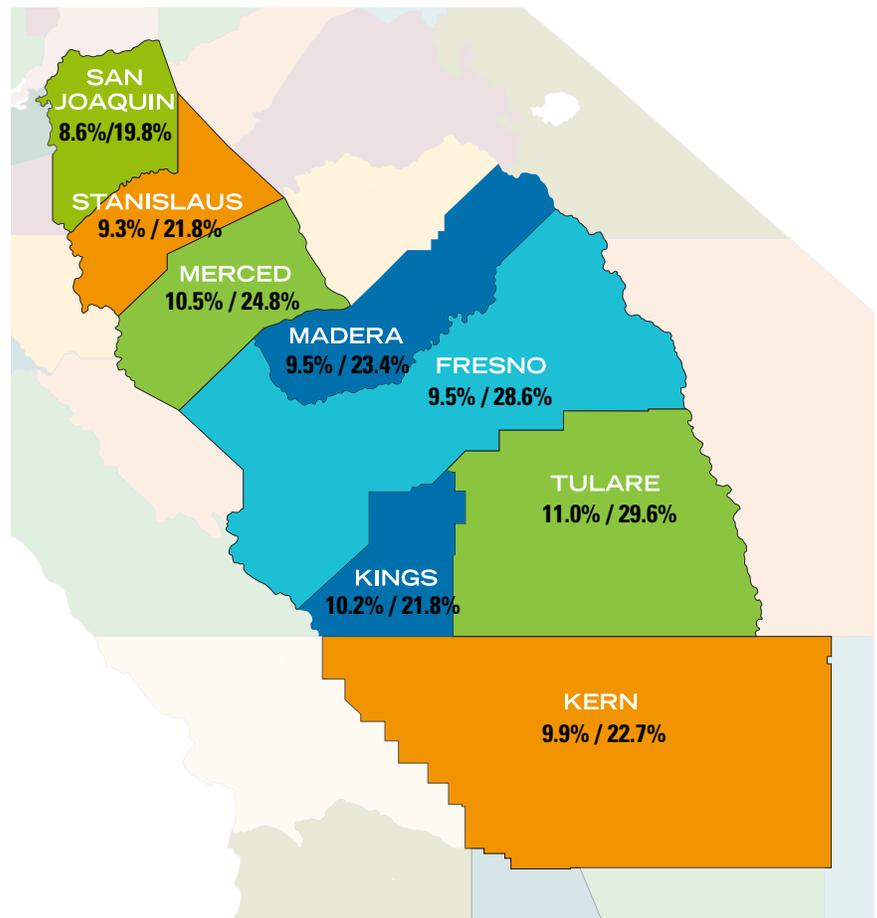
Perhaps no other region in the State is in greater need of new employment opportunities.

RENEWABLES CAN'T SOLVE ALL OF THE VALLEY'S PROBLEMS

County	Unemployment Rate <i>As of July 2015</i>	Poverty Rate <i>As of 2013</i>
Fresno	9.5%	28.6%
Kern	9.9%	22.7%
Kings	10.2%	21.8%
Madera	9.5%	23.4%
Merced	10.5%	24.8%
San Joaquin	8.6%	19.8%
Stanislaus	9.3%	21.8%
Tulare	11.0%	29.6%
Statewide	6.2%	16.8%
Unites States		15.8%

SOURCE: CA EDD, Labor Market Information Division, Retrieved, July 17, 2015 (Unemployment Rate)

SOURCE: USDA – Economic Research Service, 2013 (Poverty Rate)



Unemployment Rate % / Poverty Rate %

³⁴ Clean Energy Jobs Plan, by California Governor Jerry Brown, available at http://gov.ca.gov/docs/Clean_Energy_Plan.pdf (last visited June 10, 2014).

³⁵ "The Clean Energy Industry in California: An Economic Analysis Assessing the Current Market in the Global Economy", State of California Air Resources Board Research Division, February 2011, available at <http://www.arb.ca.gov/cc/ejac/clean-energy-industry.pdf>.

NEW WORKFORCE OPPORTUNITIES

Significant new job development opportunities for residents of the San Joaquin Valley lie in the potential to design, install and operate clean energy technologies. The technologies described in this Primer rely on workforces with a wide range of skills, including professional occupations, construction trades, scientists and engineers, permitting specialists, administrators, sales and project managers, accountants, legal professionals and more. Many employed in the clean energy field have backgrounds in the military, oil and gas, conventional power technologies, building and construction occupations, banking and finance, real estate and telecom. These skills transfer well into the clean energy sector.

JOB CREATION IN THE CLEAN ENERGY ECONOMY

Direct – Workers employed on projects (construction, operations and maintenance)

Indirect – Employment spurred by projects and their direct employment (restaurants, gas stations, local hotels, retail stores, etc.)

Induced – Local businesses that receive direct or indirect employment or sales from projects (suppliers, delivery, support businesses, etc.)

Retraining Unemployed Farm Workers for the Green Economy

A \$6.4 million grant from the California Employment Development Department (EDD) will retrain 1,187 jobless farm workers for positions in green and renewable energy. The grant was awarded to La Cooperativa Campesina de California to provide employment and retraining services in the green efficient and renewable energy, industrial maintenance, and other fields to give workers skills to compete for new job opportunities¹.

“California is committed to moving down a path of aligning our economy and our way of life with the demands of nature³⁸”

– Governor Jerry Brown, 2015

Jobs in the advanced energy sector³⁷ grew by 5 percent in 2014, according to AEE Institute. The Institute found optimism among California advanced energy employers, with about half of all firms expecting to add employees in 2015—about 70,000 new jobs.

As the State contemplates increasing the Renewable Portfolio Standard and as it decides where cap and trade revenues should be spent, the San Joaquin Valley stands out as a region deserving investments.



³⁷ The AEE Institute defines the “advanced energy sector”, as firms being directly involved with researching, developing, producing, manufacturing, distributing, selling, or implementing components, goods or services related to alternative fuels and vehicles; energy efficiency; renewable, nuclear, and natural gas electricity generation; smart grid; and other related technologies, including supporting services such as consulting, finance, tax, and legal services related to advanced energy. It does not include farm workers involved in growing feedstock (corn, soy, etc.) for advanced fuels. Advanced energy employees are defined as full-time and part-time permanent employees who support the advanced energy portion of the business, including administrative staff, excluding interns and other temporary workers.

³⁸ “Reducing Short-Lived Climate Pollutants in California”, published by the California Air Resources Board. Retrieved June 10, 2015.

The AEE Institute's Findings on California's Advanced Energy Sector

California employs over 430,000 advanced energy workers

California has a significant advanced energy industry, employing 431,834 workers at 43,673 businesses in 2014. This is more than California's employment in the motion picture, television, and radio industries (266,358 jobs); mining and quarrying (28,966); semiconductors (50,864); and aerospace (170,695). Advanced energy employment represents approximately 2.4% of California's overall workforce.

Seven out of 10 California advanced energy workers (301,326) devote at least half of their work time to advanced energy, and 226,036 (52%) spend all of their time on advanced energy.

California ranks first in absolute size of employment in advanced energy and is tied with Massachusetts for second in percentage of total employment (2.4%), behind only Vermont (4.3%).

Advanced energy employment growth outpaces state and national averages

The advanced energy industry added jobs at a 5% rate in California from 2013 to 2014, more than double the rate of overall state job growth of 2.2% and about three times faster than the national job growth rate of 1.6%.

When asked if they expected to hire more or fewer workers over the next 12 months, only 1% expected any reduction in staff size. Nearly half (49%) expected to add jobs over the coming 12 months, projecting net growth of more than 70,000 jobs. Nearly one third of firms surveyed have current openings that they are actively trying to fill.

The projected overall growth of 17% would push 2015 advanced energy employment over 500,000 jobs. By comparison, overall employment growth in California is only expected to be in the neighborhood of 1.8%.

SOURCE: Advanced Energy Economy Institute, California Advanced Energy Employment Survey (December 2014)

ADVANCED ENERGY EMPLOYMENT BY REGION

Nearly two-thirds of California's advanced energy employment is in Southern California and the Greater San Francisco Bay area, the two most-populous regions of the state. When adjusted for population and the number of total jobs in the region, however, the Inland Empire shows the highest concentration of advanced energy workers.

REGION	POPULATION	ADVANCED ENERGY JOBS	TOTAL JOBS	% OF TOTAL JOBS
Southern California	16,388,822	172,400	8,028,889	2.1%
Inland Empire	4,516,614	55,300	1,471,736	3.8%
Central Coast	2,001,606	18,600	905,006	2.1%
Greater San Francisco Bay	7,448,810	104,500	3,921,367	2.7%
Greater Sacramento	2,405,593	15,000	1,034,997	1.5%
Rest of California	5,947,967	65,900	2,578,705	2.6%
California Total	38,709,412	431,800	17,940,700	2.4%

SOURCE: Advanced Energy Economy Institute, California Advanced Energy Employment Survey, December 2014

“THE GOLDEN STATE IS HOME TO MORE THAN 40,000 BUSINESSES SERVING ADVANCED ENERGY MARKETS, SPANNING THE ENTIRE VALUE CHAIN AND INCLUDING A WIDE RANGE OF ENERGY TECHNOLOGIES THAT ADDRESS BOTH SUPPLY AND DEMAND.”

Advanced Energy Economy Institute,
December 2014

SELECT ANNUAL SALARIES IN THE RENEWABLE ENERGY AND TRANSMISSION SECTORS³⁹

JOB TYPE	MEAN ANNUAL WAGE
Cement Masons	\$ 49,160
Civil Engineers	\$ 90,210
Construction Laborers	\$ 41,760
Crane and Tower Operators	\$ 70,140
Electrical Engineers	\$ 89,880
First-Line Supervisors of Construction Trades and Extraction Workers	\$ 77,300
Operating Engineers	\$ 66,100
Pile Driver Operators	\$ 70,120
Power Plant Operators, Distributors, and Dispatchers	\$ 72,870
Secretaries and Administrative Assistants	\$ 43,140
Solar Photovoltaic Installers	\$ 43,280
Structural Iron and Steel Workers	\$ 63,890
Surveyors and Cartographers	\$ 69,180
Utility System Construction	\$ 62,650
Wind Turbine Service Technician	\$ 48,780

³⁹ Occupational Employment Statistics, National Occupational Employment and Wage Estimates United States, accessed at http://www.bls.gov/oes/current/oes_nat.htm#17-0000, retrieved, July 2, 2015.

The chart below illustrates the types and number of jobs created by distributed generation solar PV projects.

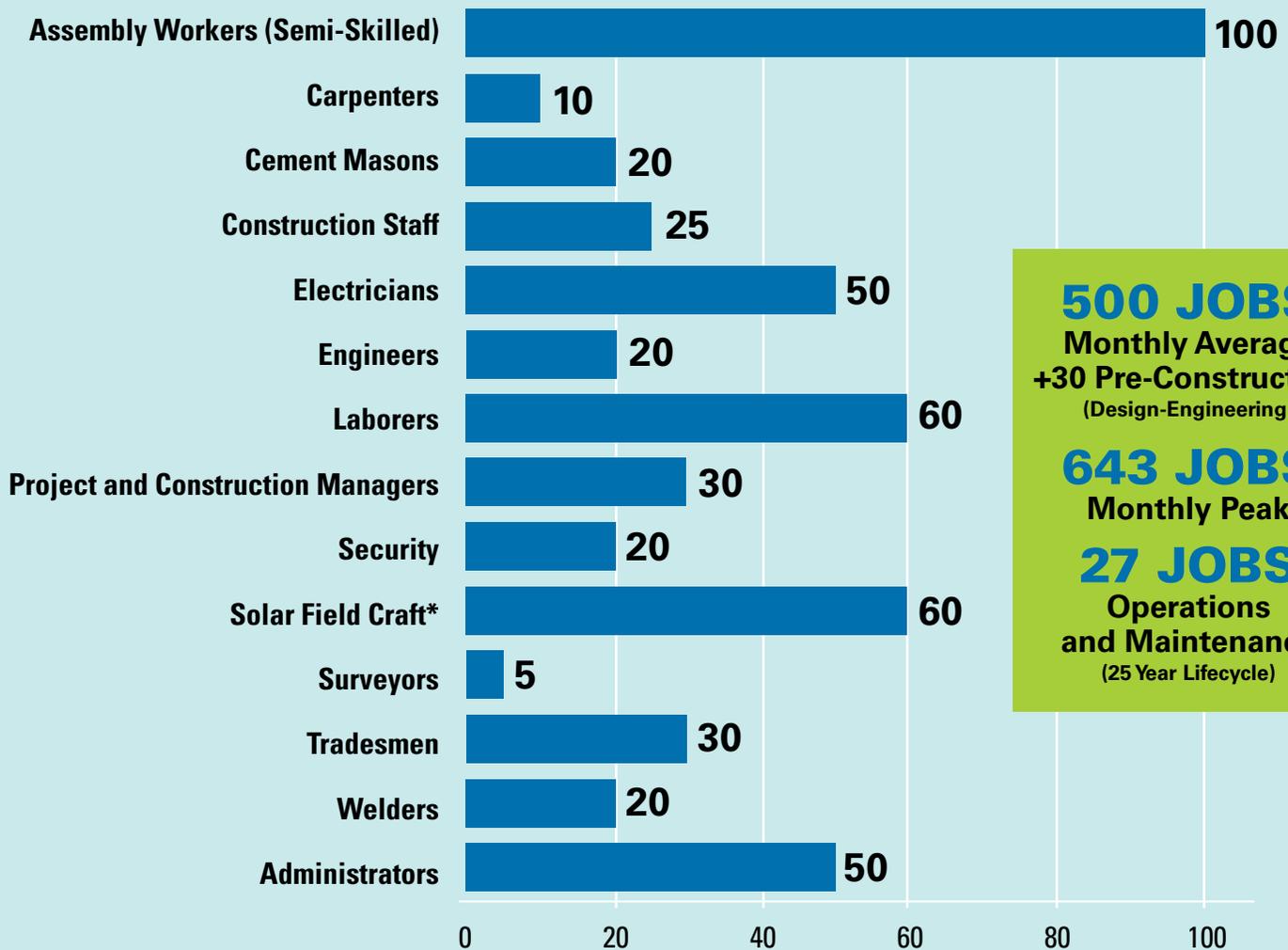
DG-SCALE PV: MONTHLY CONSTRUCTION JOBS ESTIMATES

In Full-Time Equivalent Jobs (FTEs)

10 PV Projects – 30 MW Total

Rooftops/Carports

Length of Construction: 6 Months



Data Source: Jobs Survey Update, R.Mills, 7/15; PermaCity Solar, Inc.

**EVERY 1,000 MW OF DISTRIBUTED SOLAR PV INSTALLATIONS,
APPROXIMATELY 16,500 JOBS COULD BE CREATED.**

WILL CALIFORNIA SEIZE THE OPPORTUNITY FOR THE VALLEY?

Unlocking Renewables: A Valley Summit seeks to answer the question of how the San Joaquin Valley can join California's clean energy economy. California's climate (80% reduction in GHG emissions from 1990 levels by 2050) and clean energy (50% RPS by 2030) goals will require significant renewable energy development. The Summit will engage stakeholders on these important questions.

"We believe meeting these goals will require the state and its agencies to consider a greater variety of goals and objectives than the current portfolio based approach which artificially delays or even prevents the development of high-value renewable energy resource areas of California, in particular the San Joaquin Valley."

**- Natural Resources Defense Council
Comments before the CPUC**

QUESTIONS FOR SUMMIT PARTICIPANTS:

What role can the San Joaquin Valley play in the emerging clean energy economy?

What clean energy resources are abundant in the San Joaquin Valley and what is the associated clean energy potential?

How can the clean energy economy help address key issues in the San Joaquin Valley?

- Unemployment and poverty?
- Air and water quality?
- Environmental justice issues?

How do we maximize clean energy development while ensuring environmental protection (Williamson Act)?
How do we also protect prime farmland?

What is the role of transmission? How do we improve and expedite transmission planning to encourage renewable energy development in the region?

How does bioenergy fit in? What are the benefits of biomass, biogas and renewable transportation fuel?

What can legislators and local elected officials do to position the region as a leader in renewable energy?

What programs and incentives are needed to increase clean energy installations in the San Joaquin Valley?

What infrastructure and investments are necessary? What programs and incentives are needed?

What regulations or policy efforts or changes would help expand the clean energy economy in the San Joaquin Valley?

What more do we need to do to make sure the San Joaquin Valley's workforce is trained and ready?

What is the role of the Valley's academic and workforce training institutions? How do UC Merced, CSU Fresno, community colleges and the regional Workforce Investment Boards facilitate this opportunity?

A companion report with policy recommendations will be posted to RenewablesInTheValley.org later this year.

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