Modeling the Impact of Decarbonization on Labor in California's Central Coast

Technical Documentation

A capstone project submitted in partial satisfaction of the requirements for the degree
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ABSTRACT

This project models the labor impacts of decarbonization in California's Central Coast. The transition away from fossil fuels toward clean energy will inevitably affect many California residents, both directly through employment and indirectly through supply chain development. Specifically, this work analyzes job creation associated with the development and deployment of floating offshore wind, rooftop and utility-scale solar, and land-based wind. Projections are based on state-level and county-level clean energy development goals. In addition, the study estimates job creation from capping all idle oil and gas wells in the region and quantifies expected job losses resulting from the phaseout of fossil fuels. The findings are presented in an interactive dashboard, allowing users to input custom transition scenarios and view the corresponding economic impacts. Overall, this project highlights the potential for decarbonization to stimulate the Central Coast economy and outlines strategies for policymakers and labor advocates to support energy workers throughout the transition.

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EXECUTIVE SUMMARY

I. PROJECT BACKGROUND AND MOTIVATION

In December 2022, Equinor, Golden State Wind, and Even Keel Energy (Invenergy) won the rights to develop floating offshore wind farms off the coast of San Luis Obispo County. The clean energy output could power 3.5 million homes, marking a significant step towards California's carbon neutrality goals. It will also lead to the creation of a new economy around clean energy in the region. At the same time, the Central Coast stands to lose reliable, unionized fossil fuel jobs as the region shifts to a decarbonized energy supply. To this end, these three companies have committed $27 million for community benefits and an additional $66 million for local workforce and supply chain development. Community organizers need up-to-date information to ensure that this funding benefits the maximum number of residents, that people from the most disadvantaged communities can access clean energy jobs, and that the new jobs provide great social and economic benefits. Estimates of where, how many, and what type of energy jobs will be gained and lost during this transition will inform these conversations and decisions.

With these energy companies investing in the local workforce, The 2035 Initiative and UCSB's Community Labor Center are working to ensure that funding is allocated equitably to support communities in California's Central Coast and ensure a just transition. The 2035 Initiative is UCSB's think-and-do tank, focused on creating actionable roadmaps for slashing climate pollution and building a more equitable, resilient future. Their research centers on climate policy and action. The Community Labor Center, part of the Blum Center at UCSB, is a key player in the Central Coast Regional Equity Initiative and advocates for labor equity in the region.

The concept of a "just transition" was introduced in the early 1990s by Tony Mazzocchi, leader of the Oil, Chemical, and Atomic Workers union. Mazzocchi proposed a fund for fossil fuel workers to provide financial support and higher education opportunities to those who were displaced by newly implemented environmental policies. Several principles were outlined on the basis of labor equity, with the main point that no worker should have to pay a disproportionate tax in the form of losing their job. Many unions endorsed this transition in the following years, as just transition language and policy spread throughout the global labor movement. The International Trade Union Confederation, representing 170 million workers, stated that the just transition can be achieved "through socially responsible and green investment, low-carbon development strategies, and by providing decent work and social protection for those whose livelihoods, incomes and employment are affected by the need to adapt to climate change and by

the need to reduce emissions to levels that avert dangerous climate change."[1] Core elements of a just transition include major public and private investments to create green jobs, social protections, training for new careers, wide consultation among stakeholders, and more.

The goal of this project is to provide a tool for the 2035 Initiative, UCSB Community Labor Center, and other local labor advocates to support fossil fuel workers in California's Central Coast through a just transition. By providing projections of where, how many, and what types of jobs will be created by decarbonization, labor advocates will have key data to inform their efforts.

Decarbonization refers to the reduction or elimination of carbon dioxide emissions from processes like manufacturing or energy production. This transition can be achieved through the deployment of cleaner energy sources and phasing out fossil fuels, such as oil and gas. While this shift will create substantial demand for skilled labor to construct and operate new clean energy infrastructure, it will also leave many workers in the oil and gas industries without jobs. There will, however, be some job growth in the short term associated with phasing out fossil fuels resulting from the need to cap and plug oil wells.

Economic changes driven by decarbonization will impact the labor markets across the Central Coast. While floating offshore wind development is a primary motivation for this project, other key developments like utility-scale and rooftop solar, and land-based wind will also play a role in job creation and will be included in these projections. Due to time and resource constraints, this project does not cover other energy developments such as battery storage, electrification, nuclear, or geothermal energy which will also play a role in generating clean energy jobs. Similarly, it does not consider job losses in sectors like gas station work, which may decline with the rise of electric vehicles, or the reduction in natural gas infrastructure.

This project is not only intended to inform discussions about offshore wind and other renewable energy jobs to advocate for a just transition but also to serve as a model for how research can support just transitions in energy communities across the United States.

II. PROBLEM STATEMENT

Currently, there is no comprehensive data source on the potential local job creation due to expanding clean energy sources and potential local job losses due to phasing out fossil fuels. This lack of data leaves labor advocates and community organizers without the necessary tools to quantify these labor impacts, making it difficult to effectively advocate for job creation within San Luis Obispo, Santa Barbara, and Ventura Counties. This project seeks to fill that gap by providing labor projections that cover direct, indirect, and induced job impacts under various

[1] "'Just Transition' – Just What Is It? - Labor Network for Sustainability." *Labor Network for Sustainability - Making a Living on a Living Planet*, 12 Aug. 2016, www.labor4sustainability.org/uncategorized/just-transition-just-what-is-it/.

clean energy deployment scenarios. It includes an analysis of jobs created from reaching defined statewide capacity goals, as well as a tool for exploring job creation under alternate capacity targets. Given the inherent uncertainty surrounding the development of clean energy, this tool will allow for flexible projections based on any capacity generation scenario provided by the user, not just those that are explored in the analysis. While the future landscape is uncertain, this recourse will empower stakeholders to advocate for local job growth, ensuring a just transition to a clean energy economy that prioritizes the local workforce.

III. OBJECTIVES

The project objectives are to:

1. Project job creation from reaching defined state goals for floating offshore wind, utility-scale and rooftop solar, land-based wind, and onshore oil well capping in San Luis Obispo, Santa Barbara, and Ventura Counties. Contextualize these projections with potential job loss from phasing out crude oil under different policy scenarios.
2. Develop a tool that projects job creation under any given capacity goal, allowing for flexibility to adjust for an uncertain energy landscape.
3. Provide data-driven insights to community organizers and clean energy advocates, helping them understand the potential impacts of decarbonization on fossil fuel workers and inform a just transition.

IV. DESCRIPTION OF PRODUCTS AND DELIVERABLES

1. **Job projection models:** A reproducible, updateable workflow built in R, consisting of a series of functions that return a data frame with annual job projections under varying energy capacity scenarios.
2. **Results report:** A written summary with the findings of our analysis, based on the state's defined energy capacity targets.
3. **Dashboard:** An interactive dashboard, built with RShiny, that allows users to explore job projections under different capacity targets and visualize the impacts of decarbonization in the Central Coast.

V. SUMMARY OF METHODS, RESULTS, AND CONCLUSIONS

This analysis estimates clean energy job creation and fossil fuel job loss in California's Central Coast through 2045 using a combination of existing economic models and empirical datasets. The Jobs and Economic Development Impact (JEDI) models, developed by the National Renewable Energy Laboratory, estimate direct, indirect, and induced employment impacts from renewable energy deployment. JEDI incorporates economic multipliers from IMPLAN, which quantify the broader economic effects of industry activity in specific regions. Using county-level IMPLAN multipliers in JEDI's User Add-in Location feature allowed for analysis at the county-level rather than the default state-level.

JEDI models for floating offshore wind, utility-scale and rooftop solar, and land-based wind technologies were used to estimate construction and operations and maintenance jobs created per 1 unit of energy capacity (GW for wind, MW for solar). These estimates were then scaled against statewide energy capacity goals to project the potential for job creation from reaching state targets. Job creation estimates from oil well capping were based on an assumed 0.25 full-time equivalent (FTE) jobs per well, applied to all idle and active wells in the region, and distributed evenly over a 20-year period (2024-2045).

Fossil fuel job loss projections were taken from a county-level empirical model developed by Deshmukh *et. al*., supplemented by the previous MEDS capstone project, Investigating the Social and Environmental Impacts of Supply Side Oil and Gas Policies in California, and validated against Bureau of Labor Statistics data.

Our analysis revealed that solar expansion has the greatest potential for job creation in the Central Coast.We estimate that a total of 63,706 full-time equivalent direct, indirect, and induced construction and operations and maintenance jobs would be created in the Central Coast by reaching rooftop solar state goals by 2045. By reaching statewide utility-scale solar goals, the estimates project a total of 43,887 full-time equivalent direct, indirect, and induced construction and operations and maintenance jobs. These estimates assume that the statewide solar capacity targets will be distributed evenly across all counties in California, with each county's share of the expansion being proportional to its current utility-scale and rooftop solar capacities. This is a limitation of this study as counties with already high solar capacity, such as San Luis Obispo utility solar, may not experience the same rate of capacity expansion as other counties with lower current levels.

Floating offshore wind also has potential for significant job creation. The estimates project that 57,235 full-time equivalent direct, indirect, and induced construction and operations and maintenance jobs would be created should the Central Coast develop 15 GW of California’s 25 GW statewide goal by 2045. These jobs are contingent upon the development of specialized wind ports, and job creation would be centralized around these hubs. For the Central Coast to fully realize the potential job growth from floating offshore wind, the development of local wind ports is essential.

Given the uncertainty around county-specific solar and land-based wind capacity targets and floating offshore wind development, this project has developed an interactive dashboard that allows users to project job creation for any given energy capacity target. This tool provides flexibility for modeling different scenarios and can be customized based on varying assumptions related to regional energy capacity developments.

APPROACH

This project proceeded in two parts. First, job growth was projected for development of floating offshore wind and expansion of rooftop solar, utility-scale solar, land-based wind, and oil well capping, and jobs loss was projected with the phaseout of crude oil. Second, an interactive dashboard was built to model job growth and loss under varying capacity target scenarios. Details of the project workflow is outlined below in Figure 1. The in-depth methodology for accomplishing each of these tasks is detailed in the Methods section.

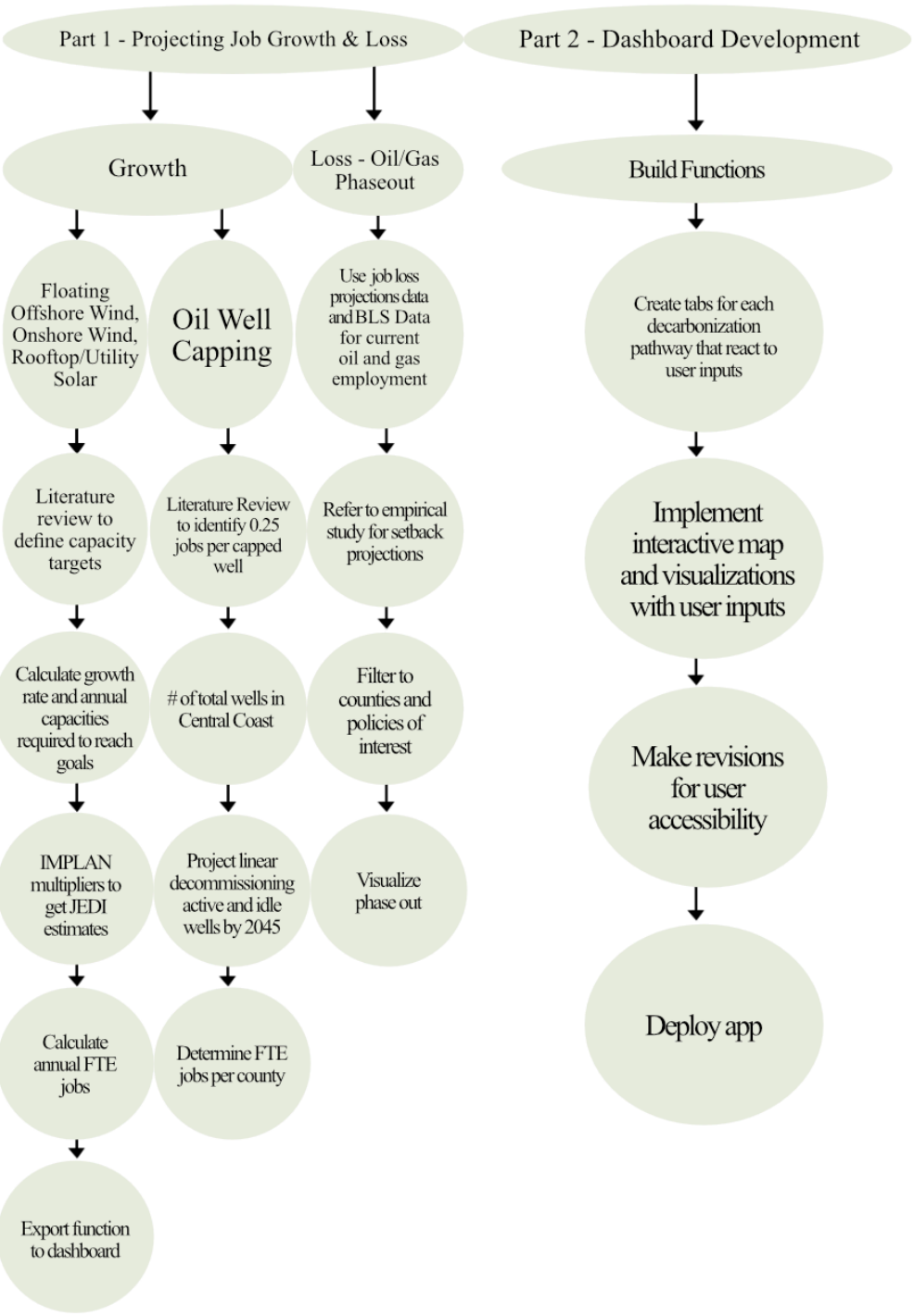

Figure 1. Flow Chart Summary

METHODS

MODELING AND ANALYSIS

i. Model Choice: JEDI and IMPLAN

The Jobs and Economic Development (JEDI) models are static input-output models developed by the National Renewable Energy Laboratory.[2] JEDI estimates the state-level economic impacts of constructing and operating power generation and biofuel plants, using built-in economic multipliers from the economic development software IMPLAN. These multipliers are rates of change that describe how a given change in a particular industry generates impact in the overall economy.[3]

IMPLAN supplies multipliers for 528 pre-defined industries and 4 different variables: the output multiplier, which describes the total output generated as a result of 1 dollar of output in the target industry; employment multipliers, which describe the total jobs generated as a result of 1 job in the target industry; labor income multipliers, which describe the dollars of labor income generated as a result of one dollar of labor income in the target industry; and value added multipliers, which describe the total dollars of value added generated as a result of one dollar of value added in the target industry.[4]

JEDI uses all 4 of these multiplier variables within its framework to estimate the number of jobs and associated economic impacts for direct, indirect, and induced effects. Direct effects consist of on-site labor and professional services results including project developers, environmental and permitting consultants, road builders, concrete-pouring companies, construction companies, tower erection crews, crane operators, and operations and maintenance (O&M) personnel. Indirect effects consisting of local revenues and supply chain results include construction material and component suppliers, analysts and attorneys who assess project feasibility and negotiate contract agreements, banks financing the projects, all equipment manufacturers (e.g., blade manufacturers), and manufacturers of replacement and repair parts. Lastly, induced effects are driven by reinvestment and spending of earnings by direct and indirect beneficiaries. Induced results are often associated with increased business at local restaurants, hotels, and retail establishments, but also include child care providers and any other entity affected by increased economic activity and spending occurring at the first two categories. [5]

JEDI model results are displayed in two different time periods: construction and operations. Construction-period results are inherently short term. Construction jobs are defined as full-time equivalents (FTE), or 2,080-hour units of labor (one construction period job equates to one full-time job for 1 year). Operations-period results are long term, for the life of the project, and

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[2] Lantz, E., Goldberg, M., Keyser, M. Jobs and Economic Development Impact (JEDI) Model: Offshore Wind User Reference Guide. National Renewable Energy Laboratory. www.nrel.gov/publications.
[3] Demski, J. Understanding IMPLAN: Multipliers in Input-Output Analysis. IMPLAN Blog. April 18, 2025. https://blog.implan.com/understanding-implan-multipliers.
[4] Demski, J. Understanding IMPLAN: Multipliers in Input-Output Analysis. IMPLAN Blog. April 18, 2025. https://blog.implan.com/understanding-implan-multipliers.
[5] National Renewable Energy Laboratory. Interpreting JEDI Results. April 21, 2025. https://www.nrel.gov/analysis/jedi/results#fn2.

are reported as annual full-time-equivalent jobs which continue to occur throughout the operating life of the facility.[6]

In this project, JEDI's photovoltaic, offshore wind, and land-based wind models were used to estimate the number of direct, indirect, and induced construction jobs and operations and maintenance jobs created by the development of 1 unit of power generation capacity (MW for photovoltaic, GW for wind). County-level IMPLAN multipliers, aggregated using technology-specific industry aggregation schemes supplied by JEDI, were used in JEDI's User Add-in Location feature.[7] This allowed us to estimate job projections at the county-level, rather than the default state level. Other JEDI inputs include many details regarding project size, costs, and local shares. All JEDI inputs and assumptions made in this project are documented in the appendix.

ii. Model Assumptions

JEDI is a static model. As such, it relies on inter-industry relationships and personal consumption patterns existing in the year of the multipliers. For this analysis, multipliers were for the year 2025. The model does not account for shifts in industry inputs or changes in consumption patterns that could result from changes in prices. Similarly, the model does not automatically take into account industry productivity improvements that may occur over time or changes that may occur in the construction or operations processes.[8]

iii. Analysis

This analysis has two purposes. First is to provide estimates of jobs created from reaching defined state capacity goals from different clean energy sources, informing how the labor landscape could look in the Central Coast from meeting California's decarbonization goals. Second, is to build a flexible model that projects the number of jobs created given any capacity target. This allows the analysis to adapt to changing policy and energy deployment goals.

Floating Offshore Wind, Utility Solar, Rooftop Solar, and Onshore Wind Models:

1. *Establishing Regional Capacity Goals:*
   The California Energy Commission's Strategic Plan for Offshore Wind has established a statewide goal of 25 GW of floating offshore wind capacity by 2045.[9] This capacity will

[6] National Renewable Energy Laboratory. Interpreting JEDI Results. April 21, 2025. https://www.nrel.gov/analysis/jedi/results#fn2.
[7] National Renewable Energy Laboratory. JEDI for Advanced Users. April 21, 2025. https://www.nrel.gov/analysis/jedi/advanced.
[8] Lantz, E., Goldberg, M., Keyser, M. Jobs and Economic Development Impact (JEDI) Model: Offshore Wind User Reference Guide. National Renewable Energy Laboratory. www.nrel.gov/publications.
[9] California Energy Commission. Analytical Guidance and Benefits Assessment for AB 525 Strategic Plan Seaport and Workforce Development for Floating Offshore Wind in California: Presentation for the May 23, 2023 AB 525 Workshop. www.energy.ca.gov/publications.

be split between two regions slated for offshore wind development, two projects in Humboldt Bay and three in the Central Coast.[10] In this analysis, the 25 GW capacity is split between these two sites based on the proposed projects, estimating that 60%, or 15 GW capacity by 2045, would be the Central Coast's contribution to this goal.

Santa Barbara, San Luis Obispo, and Ventura counties do not have publicly available, clearly defined capacity goals for utility-scale or rooftop solar. County-level growth projections are based on state-level targets outlined by the California Air Resources Board's 2022 Scoping Plan for Achieving Carbon Neutrality.[11] Using the current utility-scale and rooftop solar capacities in the state, the percent increase in capacity was calculated to reach state goals. Then, this percent increase is applied to the current capacities in each of the three Central Coast Counties.[12, 13] From this scaling, the following capacity goals were established:

- Rooftop solar:
  - Ventura County: 3,026 MW by 2045
  - Santa Barbara County: 1,293 MW by 2045
  - San Luis Obispo County: 1,844 MW by 2045

- Utility-scale solar:
  - Ventura County: 44 MW by 2045
  - Santa Barbara County: 722 MW by 2045
  - San Luis Obispo County: 10,525 MW by 2045

Similarly, land-based wind lacks county-specific capacity goals in the Central Coast. Currently, Santa Barbara County is the only Central Coast county with land-based wind capacity, 98.14 MW from the Strauss Wind Farm.[14] Given the spatial requirements for land-based wind, the project team did not find it appropriate to scale statewide capacity targets to each county as was done for the solar scenarios. As such, job projections based on established capacity targets are not included in this analysis.

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[10] Bureau of Ocean Energy Management. California Proposed Lease Sale Lease Area Maps. https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/CA%20PSN%20Lease%20Area%20Maps.pdf.
[11] California Air Resources Board. 2022 Scoping Plan for Achieving Carbon Neutrality. December 2022. https://ww2.arb.ca.gov/sites/default/files/2023-04/2022-sp.pdf.
[12] California State Geoportal. Utility Renewable Capacity by Type and County: 2023. California Energy Commission. July 2, 2024. https://gis-california.opendata.arcgis.com/documents/0e04286d36a04acc82978f946c4fcdc3/about.
[13] California Public Utilities Commission. California Solar Initiative Charts. California Distributed Generation Statistics. https://www.californiadgstats.ca.gov/charts/csi/.
[14] Santa Barbara County Planning & Development. Strauss Wind Energy Project. https://www.countyofsb.org/912/Strauss-Wind-Energy-Project.

2. *Calculating Rate to Meet Capacity Targets:*
   Using existing capacity and target capacity, the compounding growth equation was used to calculate the growth rate needed to meet capacity targets by 2045:

$$Final\ Capacity\ =\ Initial\ Capacity\ *\ (1\ +\ growth\ rate)^{\#\ of\ years}$$

   Once growth rate was determined, this formula was applied again to project the total capacity at each intermediate year.

3. *Projecting Operations & Maintenance (O&M) Jobs:*
   Annual direct, indirect, and induced O&M jobs are calculated by multiplying JEDI estimates of jobs per unit capacity by the total capacity at each year. This method assumes that O&M jobs scale proportionally to capacity.

4. *Projecting Construction Jobs:*
   Annual direct, indirect, and induced construction jobs are calculated by multiplying JEDI estimates of jobs per unit capacity by the difference between the current year's capacity and the previous year's capacity. This method assumes that construction jobs scale proportionally to capacity, and that construction lasts one year or less.

5. *Technology Specific Adjustments:*
   Floating offshore wind:
   - It is assumed that, on average, floating offshore wind construction projects last 5 years. Since JEDI estimates for construction jobs are given in terms of the lifetime of construction, these estimates were divided by 5 to convert them to annual estimates and distribute across the construction period. Total annual construction jobs were then calculated in two steps. First, new jobs created each year were calculated by multiplying JEDI estimates by the newly added capacity that year. Second, total annual jobs were calculated by using a rolling sum of new jobs over 5 years. This accounts for construction jobs lasting the average 5 year construction period.

   Rooftop solar:
   - JEDI estimates rooftop solar jobs in two categories: residential and commercial. On average, in the Central Coast, 40% of rooftop solar capacity is residential and 60% is commercial.[15] Residential and commercial JEDI estimates were aggregated into a single rooftop solar estimate using:

$$(JEDI\ residential\ estimate\ *\ 0.4)\ +\ (JEDI\ commercial\ \ estimate\ *\ 0.6)$$

[15] Solar Energy Industries Association. California Solar Policy Overview. March 2025. https://seia.org/state-solar-policy/california-solar/.

Onshore Oil Well Capping Model:

To project potential job creation from onshore oil well capping between 2025 and 2045, the average number of jobs created per well was multiplied by the total number of idle and active wells in California's Central Coast. Using a dataset from Deshmukh *et. al.* that catalogs all wells in California, the number of idle and active oil and gas wells in Ventura, Santa Barbara, and San Luis Obispo Counties was quantified.

According to Raimi *et. al.*, capping a single oil well generates an average of 0.25 FTE jobs.[16] By multiplying the total number of wells in each county by this factor, we estimate the total number of potential jobs created. To determine annual job creation, this total is divided by 20 years.

This model has several assumptions:

1. All active wells will become idle and ready for capping by 2045, consistent with the typical 15–20 year lifespan of an oil well.
2. Well capping will occur at an exponential rate, similar to other technologies.
3. The number of new wells drilled in the Central Coast between 2025 and 2045 will be negligible.

Fossil Fuel Phaseout Job Loss Projections:

Deshmukh *et. al.* developed an empirical model projecting job losses by county in California under various decarbonization policy scenarios. This analysis incorporates these projections, along with additional estimates from the previous MEDS capstone project, Investigating the Social and Environmental Impacts of Supply Side Oil and Gas Policies in California, to model job loss as California transitions away from fossil fuels. The model's 2025 employment projections were validated against current Bureau of Labor Statistics data to ensure continued accuracy and relevance.

All scenarios from Deshmukh *et. al.* will be visualized in the dashboard to provide context for the broader implications of California's decarbonization transition.

TOOLS, LIBRARIES, AND INFRASTRUCTURE

[16] Raimi, D., Nerurkar, N., Bordoff, J. Green Stimulus for Oil and Gas Workers: Considering a Major Federal Effort to Plug Orphaned and Abandoned Wells. Columbia Center on Global Energy Policy & Resources for the Future. July 2020. https://media.rff.org/documents/Raimi_et_al_-_Abandoned_Wells.pdf.

i. Programming Languages

This analysis was conducted in R Studio 3.6.0 primarily using {tidyverse} together with the {here}, {janitor}, and {stringr} packages. JEDI models are based in Microsoft Excel.

ii. Version Control

Git and GitHub were used for version control, and the code for this project is hosted in the GitHub organization DeCCCarb. This organization is organized into 3 repositories:

1. implan-multiplier-reformatting hosts the code used to organize and normalize IMPLAN multipliers to prepare for input into JEDI models.
2. workforce-development-models hosts the code for all job projection analyses.
3. shiny-dashboard hosts the code for the interactive dashboard.

iii. Quality Control

Code checks and peer validation were utilized frequently throughout the project to ensure model accuracy and validity.

iv. Dashboard Functionality Testing

User testing was conducted with individuals unfamiliar with the project during and after the dashboard development process. Insights gained from these tests were used to enhance the usability and functionality of the dashboard.

REPRODUCIBILITY AND DOCUMENTATION

The models developed for this project are designed to be reproducible and flexible, ensuring that the analysis can be easily updated as new data becomes available. All code for the project is hosted in the deCCCarb GitHub organization. Documentation for the job projection models can be accessed within the workforce-development-models repository README, and throughout the modeling-jobs.qmd.

These models operate under a number of assumptions as outlined above in the Methods section. Should new or improved data become available, aspects of the workflow that could be adapted include:

1. **Improved estimates for per-unit FTE job requirements:**
   JEDI estimates per-unit FTE job requirements based on local content requirements and project costs. If more specific or updated data becomes available, such as more detailed information on local content or project-specific factors, these per-unit job estimates can be updated. It is also possible that these per-unit estimates can come from sources other than JEDI, such as insights from on-the-ground energy projects, allowing for a more comprehensive view of the job impacts. These parameters are passed directly to the job projection functions, meaning updates can be made without altering the underlying model.

2. **Alternate projections for capacity growth:**
   The current capacity growth projections use a compounding growth formula. Should a user wish to explore alternate growth scenarios, such as a linear growth projection or other formula, these adjustments can be made within the code for the job projection functions.

While the improvements mentioned above are our anticipated areas for updates, other components of the models can also be modified. The models are thoroughly documented using Roxygen structure and inline code comments, providing clear descriptions. This documentation ensures that users can easily understand how the models were built and make modifications as needed to adapt to new data or insights.

These models are the backbone of the interactive dashboard. If changes within these models are desired to be applied to the dashboard for visualization, the relevant functions can be updated in the Global.R file in the shiny-dashboard repository. This flexible and modular structure allows for easy adaptation to new information, ensuring that this analysis can stay up-to-date as California moves through the energy transition.

RESULTS REPORT

JEDI JOBS PER UNIT CAPACITY RESULTS

These tables show the total full time equivalent jobs that come from the development of 1 MW of solar energy and 1 GW of wind energy.

Table 1. Utility Solar - Construction FTE Jobs per MW

	Direct	Indirect	Induced
Santa Barbara	2.69	0.93	0.5
San Luis Obispo	2.76	1.09	0.51
Ventura	2.73	0.91	0.5

Table 2. Utility Solar - Operations & Maintenance FTE Jobs per MW

	Direct	Indirect	Induced
Santa Barbara	0.18	0.02	0.01

San Luis Obispo	0.18	0.02	0.01
Ventura	0.18	0.02	0.01

Table 3. Rooftop Solar - Construction FTE Jobs per MW

	Direct	Indirect	Induced
Santa Barbara	5.688	4.028	2.05
San Luis Obispo	6.042	4.564	1.91
Ventura	5.906	3.964	2.026

Table 4. Rooftop Solar - Operations & Maintenance FTE Jobs per MW

	Direct	Indirect	Induced
Santa Barbara	0.22	0.028	0.014
San Luis Obispo	0.22	0.028	0.014
Ventura	0.22	0.028	0.014

Table 5. Floating Offshore Wind - Construction FTE Jobs per GW

	Direct	Indirect	Induced
Tri-Counties	82	2,571	781

Table 6. Floating Offshore Wind - Operations & Maintenance FTE Jobs per GW

	Direct	Indirect	Induced
Tri-Counties	127	126	131

Table 7. Land-based Wind - Construction FTE Jobs per GW

	Direct	Indirect	Induced
Santa Barbara	139	354	139
San Luis Obispo	25	207	113
Ventura	140	345	139

Table 8. Land-based Wind - Operations & Maintenance FTE Jobs per GW

	Direct	Indirect	Induced
Santa Barbara	14	23	8
San Luis Obispo	14	21	7
Ventura	14	24	8

MODELED JOB PROJECTIONS

These tables show the total full-time equivalent jobs that come from the scaling up the FTE jobs per unit of energy to the projected county-level capacity goals. For construction, the FTE job-years summed from 2025 - 2045 are reported. For operations and maintenance, the FTE job-years required to meet the full capacity goal in 2045 are reported.

Table 9. Utility Solar - Construction

County	Capacity Goal (MW)	Direct Jobs	Indirect Jobs	Induced Jobs
Santa Barbara	433.25	867.24	299.82	161.21
	722.08	1,644.23	568.42	305.62
San Luis Obispo	6,314.91	12,969.59	5,122.05	2,396.58
	10,524.86	24,588.99	9,710.87	4,543.6
Ventura	26.26	53.32	17.77	9.79

	43.76	101.07	33.7	18.5

Table 10. Utility Solar - Operations & Maintenance

County	Capacity Goal (MW)	Direct Jobs	Indirect Jobs	Induced Jobs
Santa Barbara	433.25	77.98	8.67	4.33
	722.08	129.97	14.44	7.22
San Luis Obispo	6,314.91	1,136.68	126.3	63.15
	10,524.86	1,894.47	210.5	105.25
Ventura	26.26	4.73	0.53	0.26
	43.76	7.88	0.88	0.44

Table 11. Rooftop Solar - Construction

County	Capacity Goal (MW)	Direct Jobs	Indirect Jobs	Induced Jobs
Santa Barbara	776.36	3,039.26	2,152.28	1,095.38
	1,293.94	5,983.32	4,237.13	2,156.44
San Luis Obispo	1,106.22	4,600.39	3,475.03	1,454.28
	1,843.69	9,056.01	6,840.7	2,862.79
Ventura	1,815.83	8,218.98	5,516.42	2,819.43
	3,026.38	15,368.35	10,314.94	5,271.98

Table 12. Rooftop Solar - Operations & Maintenance

County	Capacity Goal (MW)	Direct Jobs	Indirect Jobs	Induced Jobs
Santa Barbara	776.36	170.8	21.74	10.87
	1,293.94	284.67	36.23	18.12

San Luis Obispo	1,106.22	243.37	30.97	15.49
	1,843.69	405.61	51.62	25.81
Ventura	1,815.83	399.48	50.84	25.42
	3,026.38	665.8	84.74	42.37

Table 13. Offshore Wind - Construction

County	Capacity Goal (GW)	Direct Jobs	Indirect Jobs	Induced Jobs
Tri-Counties	6	759.46	753.48	783.38
	15	1,229.18	38,539.29	11,707.19

Table 14. Offshore Wind - Operations & Maintenance

County	Capacity Goal (GW)	Direct Jobs	Indirect Jobs	Induced Jobs
Tri-Counties	6	762	756	786
	15	1,905	1,890	1.965

Table 15. Oil Well Capping

	Idle & active oil & gas wells	Annual FTE jobs	Total jobs in 20 year capping period
Santa Barbara	1,977	25	494
San Luis Obispo	337	4	84
Ventura	3,188	40	797

DISCUSSION OF RESULTS

This analysis revealed that solar has the greatest potential for job creation in the Central Coast. We estimate that a total of 63,706 full-time equivalent direct, indirect, and induced construction and operations and maintenance jobs would be created in the Central Coast by reaching rooftop

solar state goals by 2045. By reaching statewide utility-scale solar goals, the estimates project a total of 43,887 full-time equivalent direct, indirect, and induced construction and operations and maintenance jobs. These estimates assume that the statewide solar capacity targets will be distributed evenly across all counties in California, with each county's share of the expansion being proportional to its current utility-scale and rooftop solar capacities. This is a limitation of this study as counties with already high solar capacity, such as San Luis Obispo utility solar, may not experience the same rate of capacity expansion as other counties with lower current levels. After discussion with representatives from the regional labor coalition, there was general agreement that county level expansion is unlikely to align perfectly with state-level targets. Nonetheless, we've included these results to highlight the significant potential that solar energy holds for job growth in the Central Coast.

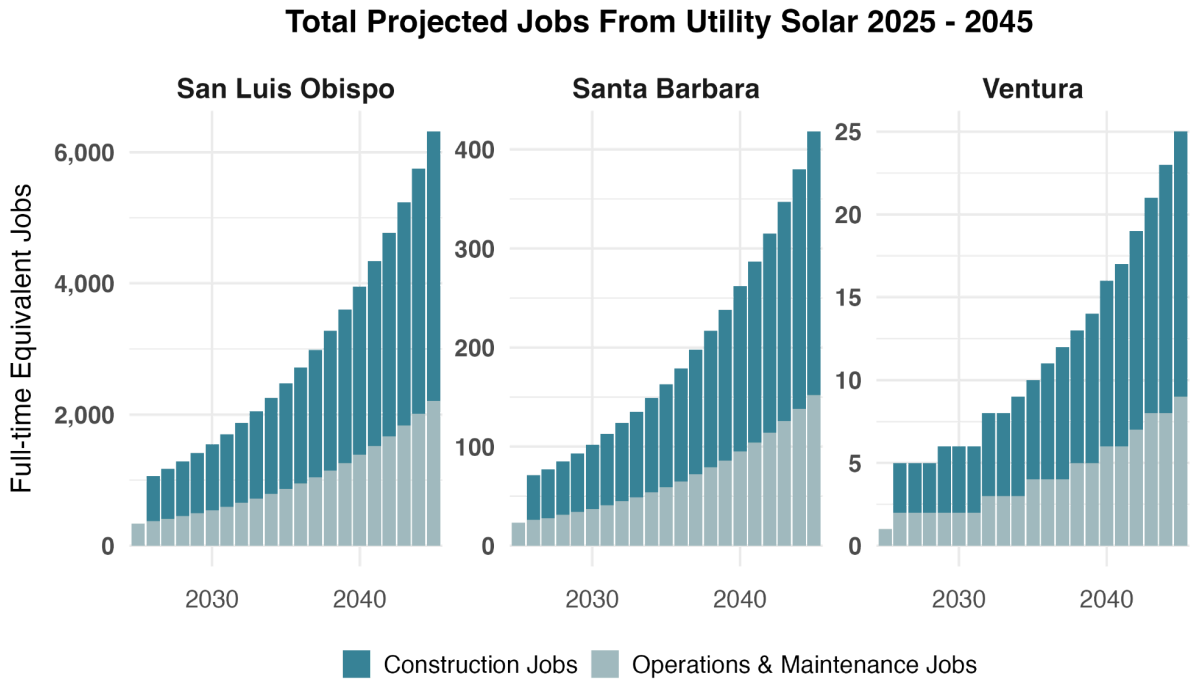

Figure 2. Total Projected Jobs From Utility Solar 2025-2045

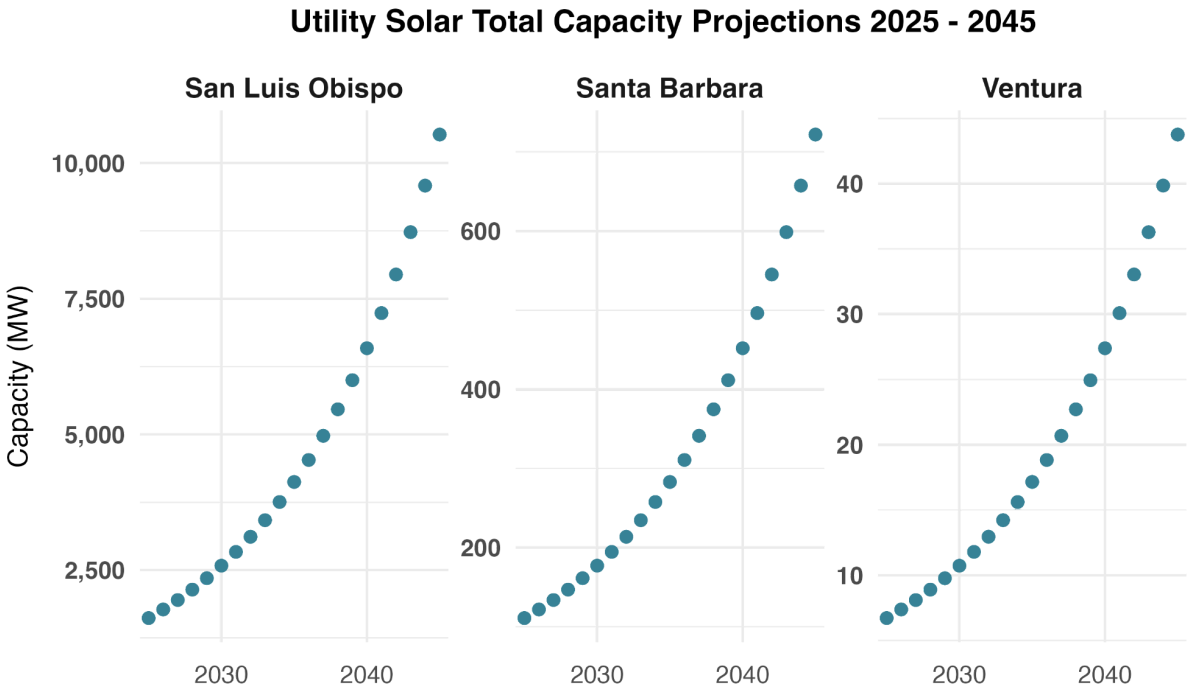

Figure 3. Utility Solar Total Capacity Projections from 2025 to 2045.

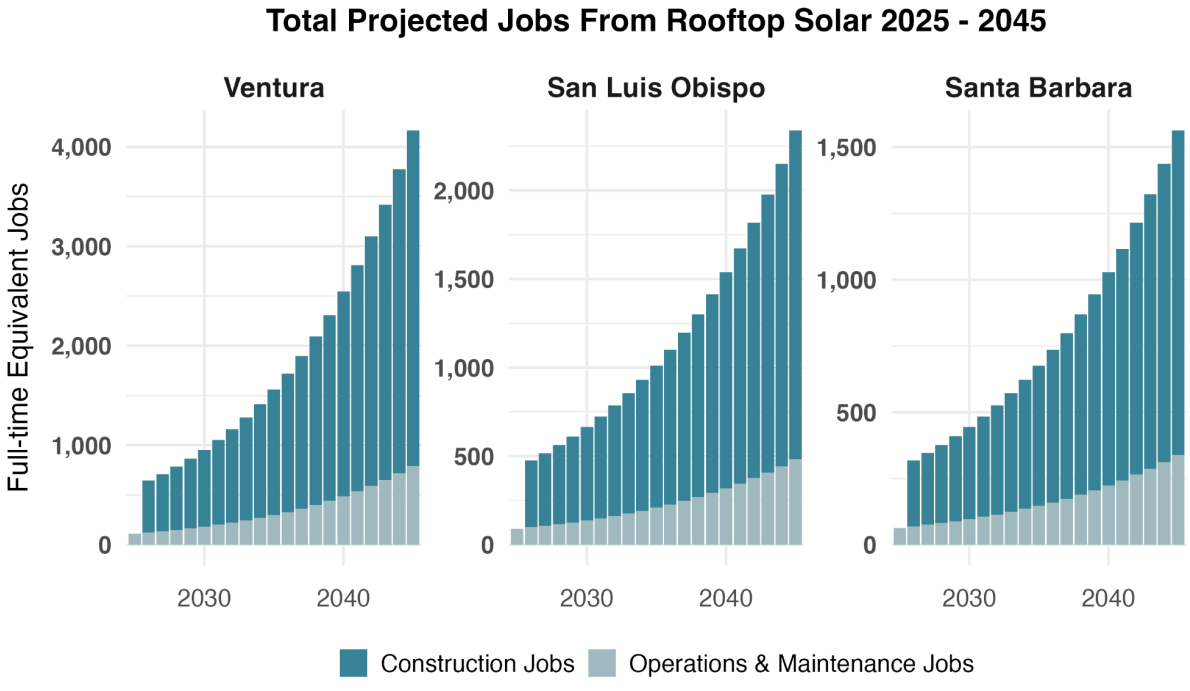

Figure 4. Total Projected Jobs from Rooftop Solar 2025-2045

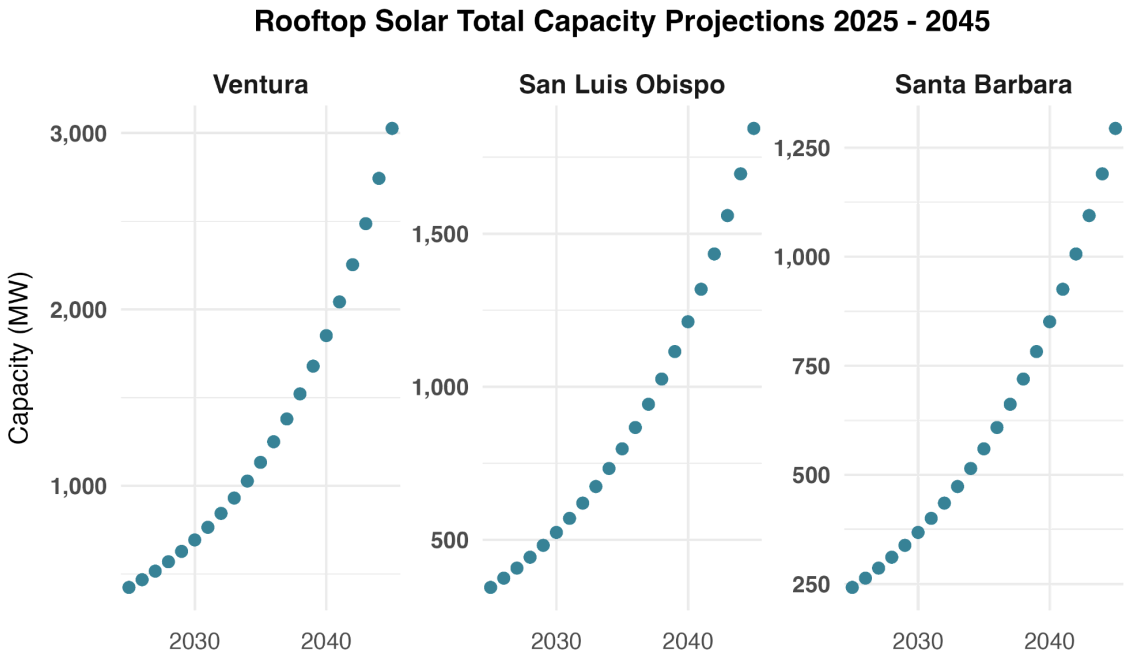

Figure 5. Rooftop solar total capacity projections from 2025 to 2045

Floating offshore wind also has potential for significant job creation. This analysis estimates that 57,235 full-time equivalent direct, indirect, and induced construction and operations and maintenance jobs would be created should the Central Coast develop 15 GW of California's 25 GW statewide goal by 2045. These jobs are contingent upon the development of specialized wind ports, and job creation would be centralized around these hubs. For the Central Coast to fully realize the potential job growth from floating offshore wind, the development of local wind ports is essential. In particular, wind ports serve as the logistical backbone of floating offshore wind development, enabling the staging and maintenance of the turbines. Without these ports, many of the high-skill, high-wage jobs associated with construction, assembly, and operations would likely be located outside the region, resulting in missed economic opportunities for the Central Coast. With investments in port infrastructure, the Central Coast has an opportunity to become a leading hub for the floating offshore wind industry, creating a major foundation for clean energy progress in the state.

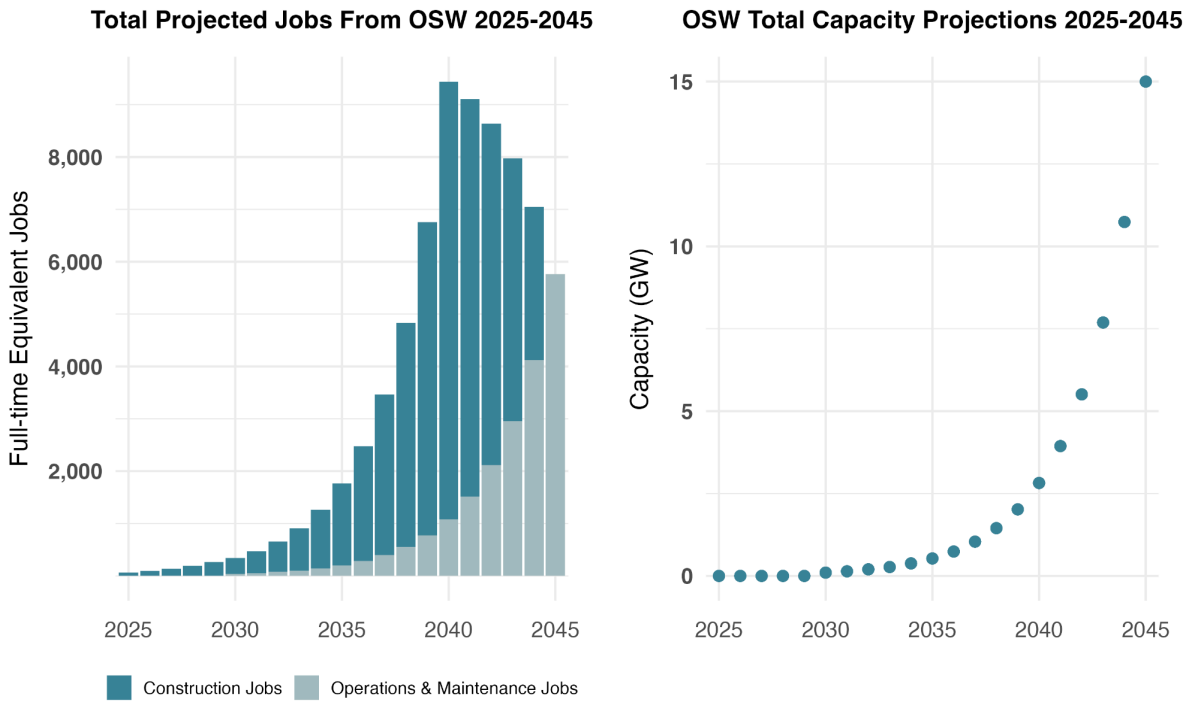

Figure 6. Total Projected and Total Capacity Projections from 2025-2045.

Capping oil wells is a crucial step in effective decarbonization. Idle wells pose health risks and environmental hazards, emitting pollutants long after production ends. While job creation from well capping is more modest compared to solar or floating offshore wind, it remains an essential component of the region's transition. In Ventura County, capping the 3,188 active and idle wells would create an estimated 797 FTE jobs, approximately 40 jobs per year from 2025 to 2045. Santa Barbara's 1,977 wells would yield 494 FTE jobs, or 25 jobs per year, and San Luis Obispo's 337 wells would yield 84 FTE jobs, or 4 jobs per year. Though these figures are smaller in scale, they represent vital work that supports public health.

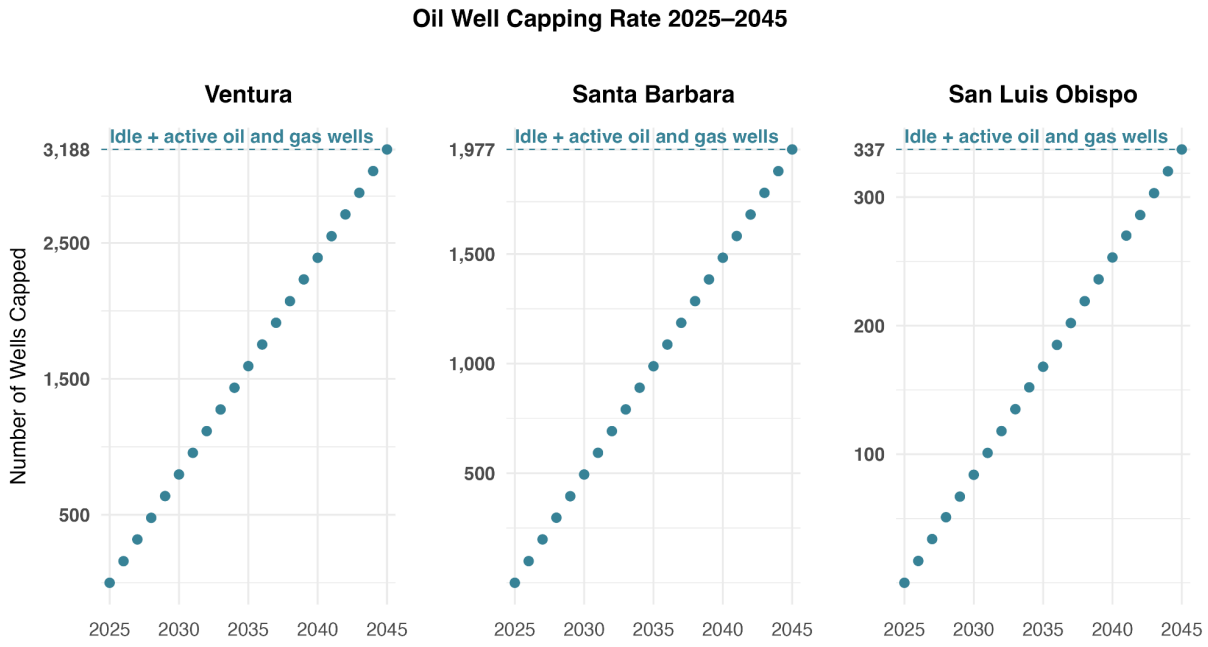

Figure 7. Total number of active and idle oil and gas wells to be capped by 2045.

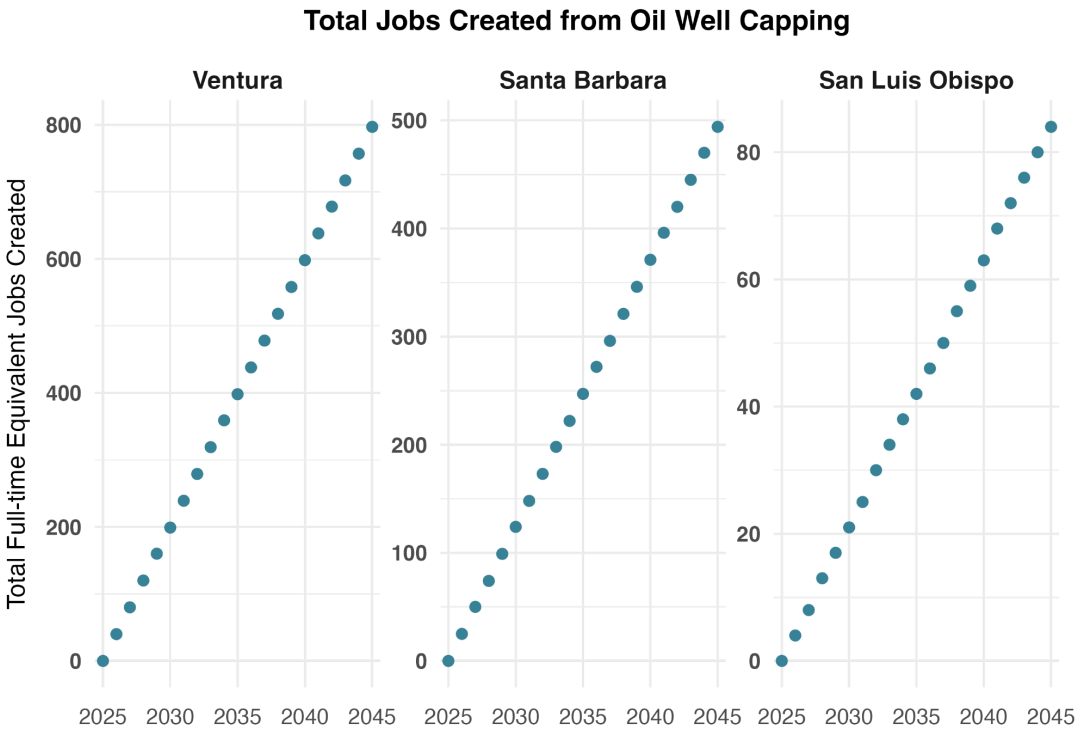

Figure 8. Total jobs created from oil well capping projected linearly.

Job growth due to clean energy expansion and oil well capping positions the Central Coast for a resilient and diverse economic future. As California advances toward its climate goals, the

decline of fossil fuel employment is expected. Under the state's current 3,200-foot setback policy for new oil wells, Ventura County is projected to see a 47.4% reduction in fossil fuel employment by 2045, shrinking from 1,085 current jobs to 514. San Luis Obispo and Santa Barbara Counties are also expected to experience fossil job losses of 25.5% and 23.2%, respectively. Even in the absence of setback policies, fossil fuel employment is likely to decline across counties as clean energy sources become more prominent.

These projections focus on a select set of technologies and policies, but they only scratch the surface of the region's clean energy potential. Other sectors, like battery storage, electric vehicle infrastructure, and advanced grid systems, will also play critical roles in decarbonization and could offer additional pathways to high-quality, local jobs. Continued research, investment, planning, and infrastructure development will be necessary to fully realize these opportunities.

The Central Coast stands at a crossroads. With bold action and careful coordination, the region can become a national leader in clean energy development, workforce development, and environmental adaptation. Policymakers, industry leaders, and community stakeholders can come together to ensure that this coming energy transition is not only ambitious, but also equitable, inclusive, and rooted in the needs and strengths of our local communities.

PRODUCT DESCRIPTION

This interactive dashboard is a public-facing tool designed for labor advocates, community organizers, and stakeholders to explore the job impacts of decarbonization in California's Central Coast region. It offers a user-friendly platform for visualizing and comparing employment projections across multiple decarbonization technologies and scenarios.

The dashboard consists of 8 main tabs:

- **Project Overview**: The landing page introduces the goals and scope of the project, outlining the decarbonization pathways under study. It directs users to explore individual technology tabs for detailed analysis.
- **Technical Documentation**: Detailed information about underlying model calculations and assumptions.
- Technology Specific Tabs: Each technology tab allows users to input development parameters such as project start and end years, installed capacity targets, and job type. Inputs vary by technology and come with literature-based default values. Outputs include interactive Plotly charts (showing annual jobs) and Leaflet maps (visualizing spatial distribution of total jobs).
    - **Floating Offshore Wind**
    - **Utility Solar**

- **Rooftop Solar**
- **Onshore Oil Well Capping**
- **Crude Oil Phaseout**

The first technology tab is for floating offshore wind. When the user clicks on this tab, there will be inputs for year beginning and end, capacity targets at the start and end of development, as well as defaults for each of these inputs. The defaults are different for each technology and scenario, all backed by the literature. There is a guided tutorial on each tab that walks the user through the steps to use the tool (Figure 9).

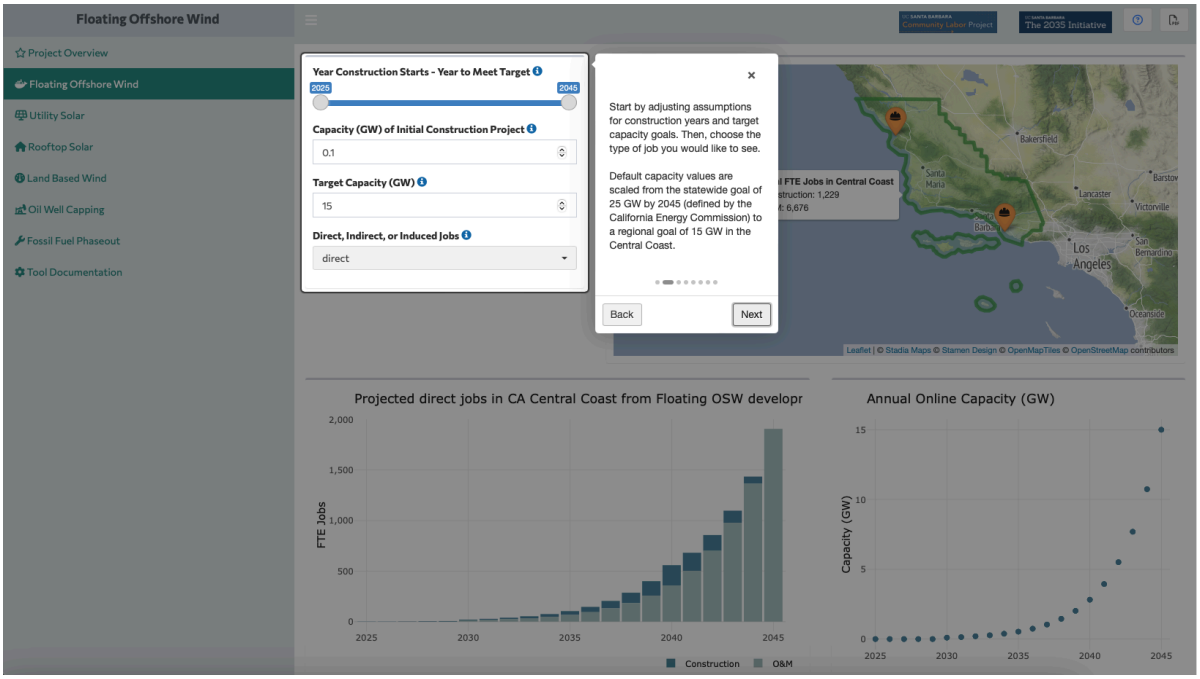

Figure 9. Floating Offshore Wind tab tutorial button for defining project timeline, capacity targets, and job types. These outputs show the regional goal for 15 GW of floating offshore wind by 2045 as deduced from the California Energy Commission's statewide goal of 25 GW by 2045.

The Plotly outputs and Leaflet map will react to the user inputs, reflecting the projections annual and total jobs respectively. The tutorial button is available in the top right corner. The user will be able to select different scenarios for each of these tabs, and can export the final results of every tab in the cumulative impact tab. This will allow the user to export all the results as a pdf for their own advocacy usage (Figure 3). The leaflet map is reactive to the installed capacity inputs, showing total jobs for the entire timeline as defined by the user. The two proposed ports, Port Hueneme and Port San Luis Obispo, are noted on the map and the user can infer that projected jobs are likely to be central to these port locations if developed (Figure 4).

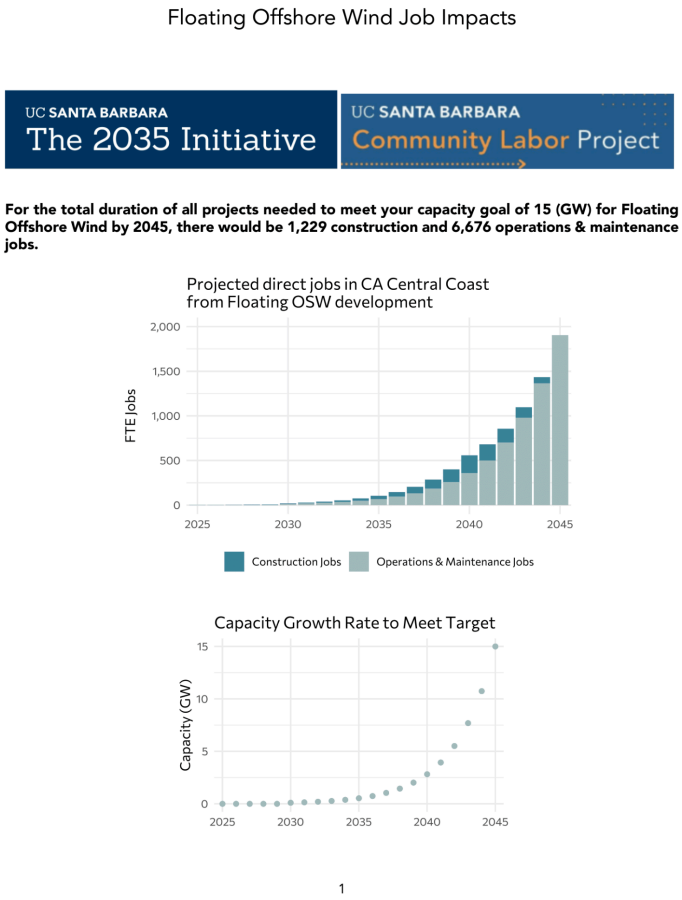

Figure 10. Floating Offshore Wind PDF downloadable with user inputs.

Figure 11. The Central Coast conglomerate region is pictured with Port Hueneme and Port San Luis pictured for potential considerations of offshore wind port location.

There are tabs for both rooftop and utility solar. This follows a similar format as the floating offshore wind tabs with similar functionality. The capacity inputs for both solar tabs are in MW as opposed to GW for floating offshore wind. See Tables 1-4 above to see the JEDI jobs per unit capacity results that were accounted for in the job projection functions.

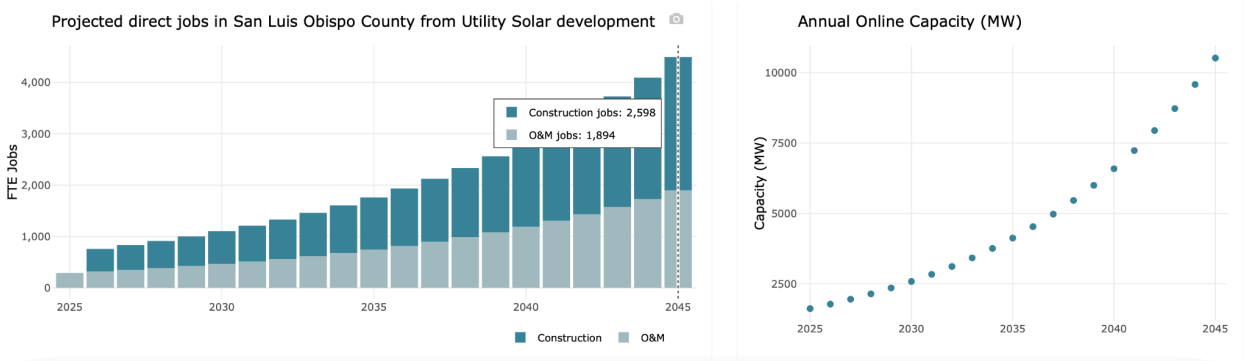

Figure 12. Snapshot from dashboard of utility solar outputs for projected jobs in SLO County to reach 10524.86 MW by 2045.

The oil well capping tab visualizes the total number of jobs to cap all wells within each county. This assumes that job growth will happen exponentially to cap all wells. Depending on the county, the cumulative job years will match the capping projection as the rate of capping wells increases. This assumes that in the first year of capping wells, a minimum of 4 job years will be required to cap all wells in each county.

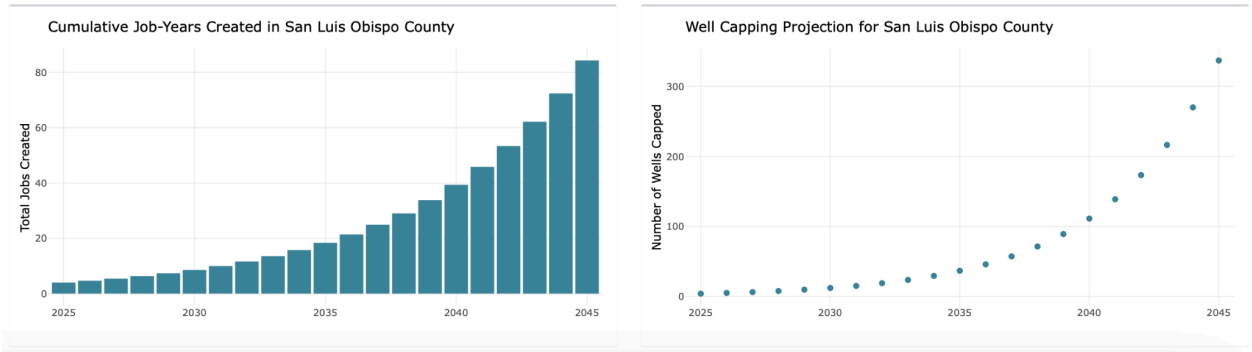

Figure 13. Oil well capping job projections and rate to cap all wells in San Luis Obispo County from dashboard

The crude oil phaseout tab on the dashboard uses findings from Deshmukh et al. to allow users to project different job loss by county and setback policy. The default values are a 3,200 ft setback distance applied to only new wells, which matches the state's current setback policy distance.

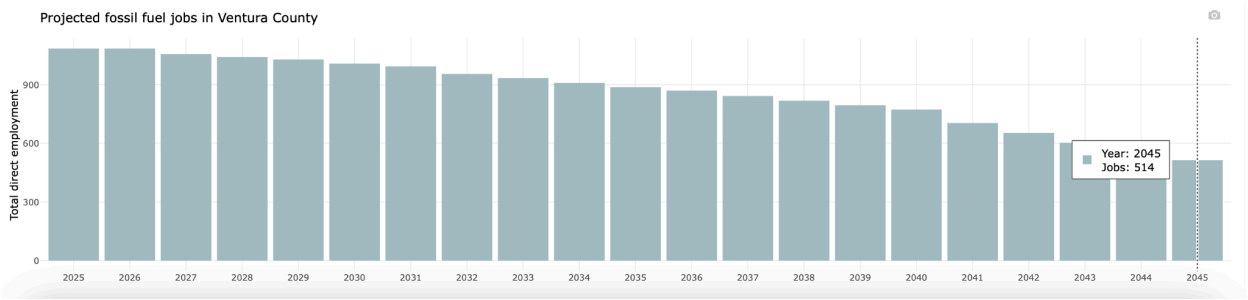

Figure 14. Projected fossil fuel jobs in Ventura County with 3200 ft setback distance applied to only new wells.

The final tab on the dashboard is the tool documentation. This tab echoes the information written in this document for user transparency on the methods used for each tab. This tab discusses JEDI and IMPLAN, and also states how the default values were decided in each tab. This document is linked on the tab for an in depth look at the methods for projecting job loss and job growth.

USER MANUAL

When navigating tabs on the dashboard, the user will be greeted with a step by step tutorial describing the intended use of the tool. The tutorial will walk the user through all of the necessary inputs, as well as the outputs of the analysis.

The user can begin by getting a project overview on the landing page. This tab defines the different decarbonization pathways of interest. This tool is intended for ease of use and understandability for community organizers, labor unions, and audiences interested in economic developments from decarbonization on the California Central Coast. For more information on the clients, the 2035 Initiative and UCSB Community Labor Center logos are linked in the headers that will direct the user to their respective websites. The tool is documented in its own tab, where it gives the user insight into how the tool works.

ARCHIVE ACCESS

Models and data produced throughout this project can be accessed in the deCCCarb GitHub organization.

REFERENCES

[1] "'Just Transition' – Just What Is It? - Labor Network for Sustainability." *Labor Network for Sustainability - Making a Living on a Living Planet*, 12 Aug. 2016, www.labor4sustainability.org/uncategorized/just-transition-just-what-is-it/.

[2, 8] Lantz, E., Goldberg, M., Keyser, M. Jobs and Economic Development Impact (JEDI) Model: Offshore Wind User Reference Guide. National Renewable Energy Laboratory. www.nrel.gov/publications.

[3, 4] Demski, J. Understanding IMPLAN: Multipliers in Input-Output Analysis. IMPLAN Blog. April 18, 2025. https://blog.implan.com/understanding-implan-multipliers.

[5, 6] National Renewable Energy Laboratory. Interpreting JEDI Results. April 21, 2025. https://www.nrel.gov/analysis/jedi/results#fn2.

[7] National Renewable Energy Laboratory. JEDI for Advanced Users. April 21, 2025. https://www.nrel.gov/analysis/jedi/advanced.

[9] California Energy Commission. Analytical Guidance and Benefits Assessment for AB 525 Strategic Plan Seaport and Workforce Development for Floating Offshore Wind in California: Presentation for the May 23, 2023 AB 525 Workshop. www.energy.ca.gov/publications.

[10] Bureau of Ocean Energy Management. California Proposed Lease Sale Lease Area Maps. https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/CA%20PSN%20Lease%20Area%20Maps.pdf.

[11] California Air Resources Board. 2022 Scoping Plan for Achieving Carbon Neutrality. December 2022. https://ww2.arb.ca.gov/sites/default/files/2023-04/2022-sp.pdf.

[12] California State Geoportal. Utility Renewable Capacity by Type and County: 2023. California Energy Commission. July 2, 2024. https://gis-california.opendata.arcgis.com/documents/0e04286d36a04acc82978f946c4fcdc3/about.

[13] California Public Utilities Commission. California Solar Initiative Charts. California Distributed Generation Statistics. https://www.californiadgstats.ca.gov/charts/csi/.

[14] Santa Barbara County Planning & Development. Strauss Wind Energy Project. https://www.countyofsb.org/912/Strauss-Wind-Energy-Project.

[15] Solar Energy Industries Association. California Solar Policy Overview. March 2025. https://seia.org/state-solar-policy/california-solar/.

[16] Raimi, D., Nerurkar, N., Bordoff, J. Green Stimulus for Oil and Gas Workers: Considering a Major Federal Effort to Plug Orphaned and Abandoned Wells. Columbia Center on Global

Energy Policy & Resources for the Future. July 2020. https://media.rff.org/documents/Raimi_et_al_-_Abandoned_Wells.pdf.

Appendix

Table 16. JEDI Inputs San Luis Obispo - Residential Solar

Photovoltaic - Project Data Summary based on User modifications to default values	
Project Location	San Luis Obispo
Year of Construction or Installation	2030
Average System Size - DC Nameplate Capacity (KW)	10
Number of Systems Installed	1000
Total Project Size - DC Nameplate Capacity (KW)	10000
System Application	Residential
Solar Cell/Module Material	Crystalline Silicon
System Tracking	Fixed Mount
Base Installed System Cost ($/KWDC)	$2,862
Annual Direct Operations and Maintenance Cost ($/kW)	$32.80
Money Value - Current or Constant (Dollar Year)	2030
Project Construction or Installation Cost	$28,620,930
Local Spending	$21,997,674
Total Annual Operational Expenses	$3,576,000
Direct Operating and Maintenance Costs	$328,000
Local Spending	$298,261
Other Annual Costs	$3,248,000
Local Spending	$0
Debt Payments	$0
Property Taxes	$0

Detailed PV Project Data Costs			
		Purchased	**Manufactured**
Installation Costs	**Cost**	**Locally (%)**	**Locally (Y or N)**
Materials & Equipment			
Mounting (rails, clamps, fittings, etc.)	$1,023,256	100%	N
Modules	$3,255,814	100%	N
Electrical (wire, connectors, breakers, etc.)	$2,232,558	100%	N
Inverter	$1,767,442	100%	N
Subtotal	$8,279,070		
Labor			
Installation	$2,790,698	100%	
Subtotal	$2,790,698		

Subtotal	$11,069,767		
Other Costs			
Permitting	$3,720,930	100%	
Other Costs	$7,069,767	100%	
Business Overhead	$6,139,535	100%	
Subtotal	$16,930,233		
Subtotal	$28,000,000		
Sales Tax (Materials & Equipment Purchases)	$620,930	100%	
Total	$28,620,930		
PV System Annual Operating and Maintenance Costs	**Cost**	**Local Share**	
Labor			
Technicians	$179,307	100%	
Subtotal	$179,307		
Materials and Services			
Materials & Equipment	$148,693	100%	
Services	$0	100%	
Subtotal	$148,693		
Sales Tax (Materials & Equipment Purchases)	$0	100%	
Average Annual Payment (Interest and Principal)	$3,248,000	0%	
Property Taxes	$0	100%	
Total	$3,576,000		
Other Parameters			
Financial Parameters			
Debt Financing			
Percentage financed	80%	0%	
Years financed (term)	10		
Interest rate	10%		
Tax Parameters			
Local Property Tax (percent of taxable value)	0%		
Assessed Value (percent of construction cost)	0%		
Taxable Value (percent of assessed value)	0%		
Taxable Value	$0		
Property Tax Exemption (percent of local taxes)	100%		
Local Property Taxes	$0	100%	
Local Sales Tax Rate	7.50%	100%	
Sales Tax Exemption (percent of local taxes)	0.00%		

Payroll Parameters	Wage per hour	Employer Payroll Overhead	
Construction and Installation Labor			
Construction Workers / Installers	$21.39	45.6%	
O&M Labor			
Technicians	$21.39	45.6%	

Table 17. San Luis Obispo JEDI Inputs - Commercial Solar

Photovoltaic - Project Data Summary based on User modifications to default values	
Project Location	San Luis Obispo
Year of Construction or Installation	2030
Average System Size - DC Nameplate Capacity (KW)	100
Number of Systems Installed	100
Total Project Size - DC Nameplate Capacity (KW)	10000
System Application	Commercial
Solar Cell/Module Material	Crystalline Silicon
System Tracking	Fixed Mount
Base Installed System Cost ($/KWDC)	$1,906
Annual Direct Operations and Maintenance Cost ($/kW)	$19.93
Money Value - Current or Constant (Dollar Year)	2030
Project Construction or Installation Cost	$19,055,000
Local Spending	$13,135,000
Total Annual Operational Expenses	$2,345,300
Direct Operating and Maintenance Costs	$199,300
Local Spending	$183,356
Other Annual Costs	$2,146,000
Local Spending	$0
Debt Payments	$0
Property Taxes	$0

Detailed PV Project Data Costs			
		Purchased	**Manufactured**
Installation Costs	**Cost**	**Locally (%)**	**Locally (Y or N)**
Materials & Equipment			
Mounting (rails, clamps, fittings, etc.)	$1,500,000	100%	N
Modules	$3,500,000	100%	N
Electrical (wire, connectors, breakers, etc.)	$1,400,000	100%	N
Inverter	$1,000,000	100%	N

Subtotal	$7,400,000		
Labor			
Installation	$1,300,000	100%	
Subtotal	$1,300,000		
Subtotal	$8,700,000		
Other Costs			
Permitting	$1,500,000	100%	
Other Costs	$1,500,000	100%	
Business Overhead	$6,800,000	100%	
Subtotal	$9,800,000		
Subtotal	$18,500,000		
Sales Tax (Materials & Equipment Purchases)	$555,000	100%	
Total	$19,055,000		
PV System Annual Operating and Maintenance Costs	**Cost**	**Local Share**	
Labor			
Technicians	$119,580	100%	
Subtotal	$119,580		
Materials and Services			
Materials & Equipment	$79,720	100%	
Services	$0	100%	
Subtotal	$79,720		
Sales Tax (Materials & Equipment Purchases)	$0	100%	
Average Annual Payment (Interest and Principal)	$2,146,000	0%	
Property Taxes	$0	100%	
Total	$2,345,300		
Other Parameters			
Financial Parameters			
Debt Financing			
Percentage financed	80%	0%	
Years financed (term)	10		
Interest rate	10%		
Tax Parameters			
Local Property Tax (percent of taxable value)	0%		
Assessed Value (percent of construction cost)	0%		
Taxable Value (percent of assessed value)	0%		
Taxable Value	$0		

Property Tax Exemption (percent of local taxes)	100%		
Local Property Taxes	$0	100%	
Local Sales Tax Rate	7.50%	100%	
Sales Tax Exemption (percent of local taxes)	0.00%		
Payroll Parameters	**Wage per hour**	**Employer Payroll Overhead**	
Construction and Installation Labor			
Construction Workers / Installers	$21.39	45.6%	
O&M Labor			
Technicians	$21.39	45.6%	

Table 18. JEDI Inputs San Luis Obispo - Utility Solar

Photovoltaic - Project Data Summary based on User modifications to default values	
Project Location	San Luis Obispo
Year of Construction or Installation	2030
Average System Size - DC Nameplate Capacity (KW)	1000
Number of Systems Installed	10
Total Project Size - DC Nameplate Capacity (KW)	10000
System Application	Utility
Solar Cell/Module Material	Crystalline Silicon
System Tracking	Fixed Mount
Base Installed System Cost ($/KWDC)	$1,080
Annual Direct Operations and Maintenance Cost ($/kW)	$19.93
Money Value - Current or Constant (Dollar Year)	2030
Project Construction or Installation Cost	$10,796,026
Local Spending	$4,182,342
Total Annual Operational Expenses	$1,394,100
Direct Operating and Maintenance Costs	$199,300
Local Spending	$183,356
Other Annual Costs	$1,194,800
Local Spending	$0
Debt Payments	$0
Property Taxes	$0

Detailed PV Project Data Costs			
		Purchased	**Manufactured**
Installation Costs	**Cost**	**Locally (%)**	**Locally (Y or N)**

Materials & Equipment			
Mounting (rails, clamps, fittings, etc.)	$1,084,211	100%	N
Modules	$3,794,737	100%	N
Electrical (wire, connectors, breakers, etc.)	$1,084,211	100%	N
Inverter	$650,526	100%	N
Subtotal	$6,613,684		
Labor			
Installation	$1,409,474	100%	
Subtotal	$1,409,474		
Subtotal	$8,023,158		
Other Costs			
Permitting	$650,526	100%	
Other Costs	$433,684	100%	
Business Overhead	$1,192,632	100%	
Subtotal	$2,276,842		
Subtotal	$10,300,000		
Sales Tax (Materials & Equipment Purchases)	$496,026	100%	
Total	$10,796,026		
PV System Annual Operating and Maintenance Costs	**Cost**	**Local Share**	
Labor			
Technicians	$119,580	100%	
Subtotal	$119,580		
Materials and Services			
Materials & Equipment	$79,720	100%	
Services	$0	100%	
Subtotal	$79,720		
Sales Tax (Materials & Equipment Purchases)	$0	100%	
Average Annual Payment (Interest and Principal)	$1,194,800	0%	
Property Taxes	$0	100%	
Total	$1,394,100		
Other Parameters			
Financial Parameters			
Debt Financing			
Percentage financed	80%	0%	
Years financed (term)	10		
Interest rate	10%		

Tax Parameters			
Local Property Tax (percent of taxable value)	0%		
Assessed Value (percent of construction cost)	0%		
Taxable Value (percent of assessed value)	0%		
Taxable Value	$0		
Property Tax Exemption (percent of local taxes)	100%		
Local Property Taxes	$0	100%	
Local Sales Tax Rate	7.50%	100%	
Sales Tax Exemption (percent of local taxes)	0.00%		
Payroll Parameters	**Wage per hour**	**Employer Payroll Overhead**	
Construction and Installation Labor			
Construction Workers / Installers	$21.39	45.6%	
O&M Labor			
Technicians	$21.39	45.6%	

Table 19. Santa Barbara JEDI Inputs - Residential Solar

Photovoltaic - Project Data Summary based on User modifications to default values	
Project Location	Santa Barbara
Year of Construction or Installation	2030
Average System Size - DC Nameplate Capacity (KW)	10
Number of Systems Installed	1000
Total Project Size - DC Nameplate Capacity (KW)	10000
System Application	Residential
Solar Cell/Module Material	Crystalline Silicon
System Tracking	Fixed Mount
Base Installed System Cost ($/KWDC)	$2,862
Annual Direct Operations and Maintenance Cost ($/kW)	$32.80
Money Value - Current or Constant (Dollar Year)	2030
Project Construction or Installation Cost	$28,620,930
Local Spending	$21,997,674
Total Annual Operational Expenses	$3,576,000
Direct Operating and Maintenance Costs	$328,000
Local Spending	$298,261
Other Annual Costs	$3,248,000
Local Spending	$0
Debt Payments	$0

Property Taxes	$0

Detailed PV Project Data Costs			
		Purchased	**Manufactured**
Installation Costs	**Cost**	**Locally (%)**	**Locally (Y or N)**
Materials & Equipment			
Mounting (rails, clamps, fittings, etc.)	$1,023,256	100%	N
Modules	$3,255,814	100%	N
Electrical (wire, connectors, breakers, etc.)	$2,232,558	100%	N
Inverter	$1,767,442	100%	N
Subtotal	$8,279,070		
Labor			
Installation	$2,790,698	100%	
Subtotal	$2,790,698		
Subtotal	$11,069,767		
Other Costs			
Permitting	$3,720,930	100%	
Other Costs	$7,069,767	100%	
Business Overhead	$6,139,535	100%	
Subtotal	$16,930,233		
Subtotal	$28,000,000		
Sales Tax (Materials & Equipment Purchases)	$620,930	100%	
Total	$28,620,930		
PV System Annual Operating and Maintenance Costs	**Cost**	**Local Share**	
Labor			
Technicians	$179,307	100%	
Subtotal	$179,307		
Materials and Services			
Materials & Equipment	$148,693	100%	
Services	$0	100%	
Subtotal	$148,693		
Sales Tax (Materials & Equipment Purchases)	$0	100%	
Average Annual Payment (Interest and Principal)	$3,248,000	0%	
Property Taxes	$0	100%	
Total	$3,576,000		
Other Parameters			

Financial Parameters			
Debt Financing			
Percentage financed	80%	0%	
Years financed (term)	10		
Interest rate	10%		
Tax Parameters			
Local Property Tax (percent of taxable value)	0%		
Assessed Value (percent of construction cost)	0%		
Taxable Value (percent of assessed value)	0%		
Taxable Value	$0		
Property Tax Exemption (percent of local taxes)	100%		
Local Property Taxes	$0	100%	
Local Sales Tax Rate	7.50%	100%	
Sales Tax Exemption (percent of local taxes)	0.00%		
Payroll Parameters	**Wage per hour**	**Employer Payroll Overhead**	
Construction and Installation Labor			
Construction Workers / Installers	$21.39	45.6%	
O&M Labor			
Technicians	$21.39	45.6%	

Table 20. Santa Barbara JEDI Inputs - Commercial Solar

Photovoltaic - Project Data Summary based on User modifications to default values	
Project Location	Santa Barbara
Year of Construction or Installation	2030
Average System Size - DC Nameplate Capacity (KW)	100
Number of Systems Installed	100
Total Project Size - DC Nameplate Capacity (KW)	10000
System Application	Commercial
Solar Cell/Module Material	Crystalline Silicon
System Tracking	Fixed Mount
Base Installed System Cost ($/KWDC)	$1,906
Annual Direct Operations and Maintenance Cost ($/kW)	$19.93
Money Value - Current or Constant (Dollar Year)	2030
Project Construction or Installation Cost	$19,055,000

Local Spending	$13,135,000
Total Annual Operational Expenses	$2,345,300
Direct Operating and Maintenance Costs	$199,300
Local Spending	$183,356
Other Annual Costs	$2,146,000
Local Spending	$0
Debt Payments	$0
Property Taxes	$0

Detailed PV Project Data Costs			
		Purchased	**Manufactured**
Installation Costs	**Cost**	**Locally (%)**	**Locally (Y or N)**
Materials & Equipment			
Mounting (rails, clamps, fittings, etc.)	$1,500,000	100%	N
Modules	$3,500,000	100%	N
Electrical (wire, connectors, breakers, etc.)	$1,400,000	100%	N
Inverter	$1,000,000	100%	N
Subtotal	$7,400,000		
Labor			
Installation	$1,300,000	100%	
Subtotal	$1,300,000		
Subtotal	$8,700,000		
Other Costs			
Permitting	$1,500,000	100%	
Other Costs	$1,500,000	100%	
Business Overhead	$6,800,000	100%	
Subtotal	$9,800,000		
Subtotal	$18,500,000		
Sales Tax (Materials & Equipment Purchases)	$555,000	100%	
Total	$19,055,000		
PV System Annual Operating and Maintenance Costs	**Cost**	**Local Share**	
Labor			
Technicians	$119,580	100%	
Subtotal	$119,580		
Materials and Services			
Materials & Equipment	$79,720	100%	
Services	$0	100%	

Subtotal	$79,720		
Sales Tax (Materials & Equipment Purchases)	$0	100%	
Average Annual Payment (Interest and Principal)	$2,146,000	0%	
Property Taxes	$0	100%	
Total	$2,345,300		
Other Parameters			
Financial Parameters			
Debt Financing			
Percentage financed	80%	0%	
Years financed (term)	10		
Interest rate	10%		
Tax Parameters			
Local Property Tax (percent of taxable value)	0%		
Assessed Value (percent of construction cost)	0%		
Taxable Value (percent of assessed value)	0%		
Taxable Value	$0		
Property Tax Exemption (percent of local taxes)	100%		
Local Property Taxes	$0	100%	
Local Sales Tax Rate	7.50%	100%	
Sales Tax Exemption (percent of local taxes)	0.00%		
Payroll Parameters	**Wage per hour**	**Employer Payroll Overhead**	
Construction and Installation Labor			
Construction Workers / Installers	$21.39	45.6%	
O&M Labor			
Technicians	$21.39	45.6%	

Table 21. Santa Barbara JEDI Inputs - Utility Solar

Photovoltaic - Project Data Summary based on User modifications to default values	
Project Location	Santa Barbara
Year of Construction or Installation	2030
Average System Size - DC Nameplate Capacity (KW)	1000
Number of Systems Installed	10
Total Project Size - DC Nameplate Capacity (KW)	10000

System Application	Utility
Solar Cell/Module Material	Crystalline Silicon
System Tracking	Fixed Mount
Base Installed System Cost ($/KWDC)	$1,080
Annual Direct Operations and Maintenance Cost ($/kW)	$19.93
Money Value - Current or Constant (Dollar Year)	2030
Project Construction or Installation Cost	$10,796,026
Local Spending	$4,182,342
Total Annual Operational Expenses	$1,394,100
Direct Operating and Maintenance Costs	$199,300
Local Spending	$183,356
Other Annual Costs	$1,194,800
Local Spending	$0
Debt Payments	$0
Property Taxes	$0

Detailed PV Project Data Costs			
		Purchased	**Manufactured**
Installation Costs	**Cost**	**Locally (%)**	**Locally (Y or N)**
Materials & Equipment			
Mounting (rails, clamps, fittings, etc.)	$1,084,211	100%	N
Modules	$3,794,737	100%	N
Electrical (wire, connectors, breakers, etc.)	$1,084,211	100%	N
Inverter	$650,526	100%	N
Subtotal	$6,613,684		
Labor			
Installation	$1,409,474	100%	
Subtotal	$1,409,474		
Subtotal	$8,023,158		
Other Costs			
Permitting	$650,526	100%	
Other Costs	$433,684	100%	
Business Overhead	$1,192,632	100%	
Subtotal	$2,276,842		
Subtotal	$10,300,000		
Sales Tax (Materials & Equipment Purchases)	$496,026	100%	
Total	$10,796,026		
PV System Annual Operating and	**Cost**	**Local Share**	

Maintenance Costs			
Labor			
Technicians	$119,580	100%	
Subtotal	$119,580		
Materials and Services			
Materials & Equipment	$79,720	100%	
Services	$0	100%	
Subtotal	$79,720		
Sales Tax (Materials & Equipment Purchases)	$0	100%	
Average Annual Payment (Interest and Principal)	$1,194,800	0%	
Property Taxes	$0	100%	
Total	$1,394,100		
Other Parameters			
Financial Parameters			
Debt Financing			
Percentage financed	80%	0%	
Years financed (term)	10		
Interest rate	10%		
Tax Parameters			
Local Property Tax (percent of taxable value)	0%		
Assessed Value (percent of construction cost)	0%		
Taxable Value (percent of assessed value)	0%		
Taxable Value	$0		
Property Tax Exemption (percent of local taxes)	100%		
Local Property Taxes	$0	100%	
Local Sales Tax Rate	7.50%	100%	
Sales Tax Exemption (percent of local taxes)	0.00%		
Payroll Parameters	**Wage per hour**	**Employer Payroll Overhead**	
Construction and Installation Labor			
Construction Workers / Installers	$21.39	45.6%	
O&M Labor			
Technicians	$21.39	45.6%	

Table 22. Ventura JEDI Inputs - Residential Solar

Photovoltaic - Project Data Summary based on User modifications to default values	
Project Location	Ventura
Year of Construction or Installation	2030
Average System Size - DC Nameplate Capacity (KW)	10
Number of Systems Installed	1000
Total Project Size - DC Nameplate Capacity (KW)	10000
System Application	Residential
Solar Cell/Module Material	Crystalline Silicon
System Tracking	Fixed Mount
Base Installed System Cost ($/KWDC)	$2,862
Annual Direct Operations and Maintenance Cost ($/kW)	$32.80
Money Value - Current or Constant (Dollar Year)	2030
Project Construction or Installation Cost	$28,620,930
Local Spending	$21,997,674
Total Annual Operational Expenses	$3,576,000
Direct Operating and Maintenance Costs	$328,000
Local Spending	$298,261
Other Annual Costs	$3,248,000
Local Spending	$0
Debt Payments	$0
Property Taxes	$0

Detailed PV Project Data Costs			
		Purchased	**Manufactured**
Installation Costs	**Cost**	**Locally (%)**	**Locally (Y or N)**
Materials & Equipment			
Mounting (rails, clamps, fittings, etc.)	$1,023,256	100%	N
Modules	$3,255,814	100%	N
Electrical (wire, connectors, breakers, etc.)	$2,232,558	100%	N
Inverter	$1,767,442	100%	N
Subtotal	$8,279,070		
Labor			
Installation	$2,790,698	100%	
Subtotal	$2,790,698		
Subtotal	$11,069,767		
Other Costs			
Permitting	$3,720,930	100%	
Other Costs	$7,069,767	100%	

Business Overhead	$6,139,535	100%	
Subtotal	$16,930,233		
Subtotal	$28,000,000		
Sales Tax (Materials & Equipment Purchases)	$620,930	100%	
Total	$28,620,930		
PV System Annual Operating and Maintenance Costs	**Cost**	**Local Share**	
Labor			
Technicians	$179,307	100%	
Subtotal	$179,307		
Materials and Services			
Materials & Equipment	$148,693	100%	
Services	$0	100%	
Subtotal	$148,693		
Sales Tax (Materials & Equipment Purchases)	$0	100%	
Average Annual Payment (Interest and Principal)	$3,248,000	0%	
Property Taxes	$0	100%	
Total	$3,576,000		
Other Parameters			
Financial Parameters			
Debt Financing			
Percentage financed	80%	0%	
Years financed (term)	10		
Interest rate	10%		
Tax Parameters			
Local Property Tax (percent of taxable value)	0%		
Assessed Value (percent of construction cost)	0%		
Taxable Value (percent of assessed value)	0%		
Taxable Value	$0		
Property Tax Exemption (percent of local taxes)	100%		
Local Property Taxes	$0	100%	
Local Sales Tax Rate	7.50%	100%	
Sales Tax Exemption (percent of local taxes)	0.00%		
Payroll Parameters	**Wage per hour**	**Employer Payroll Overhead**	

Construction and Installation Labor			
Construction Workers / Installers	$21.39	45.6%	
O&M Labor			
Technicians	$21.39	45.6%	

Table 23. Ventura JEDI Inputs - Commercial Solar

Photovoltaic - Project Data Summary based on User modifications to default values	
Project Location	Ventura
Year of Construction or Installation	2030
Average System Size - DC Nameplate Capacity (KW)	100
Number of Systems Installed	100
Total Project Size - DC Nameplate Capacity (KW)	10000
System Application	Commercial
Solar Cell/Module Material	Crystalline Silicon
System Tracking	Fixed Mount
Base Installed System Cost ($/KWDC)	$1,906
Annual Direct Operations and Maintenance Cost ($/kW)	$19.93
Money Value - Current or Constant (Dollar Year)	2030
Project Construction or Installation Cost	$19,055,000
Local Spending	$13,135,000
Total Annual Operational Expenses	$2,345,300
Direct Operating and Maintenance Costs	$199,300
Local Spending	$183,356
Other Annual Costs	$2,146,000
Local Spending	$0
Debt Payments	$0
Property Taxes	$0

Detailed PV Project Data Costs			
		Purchased	**Manufactured**
Installation Costs	**Cost**	**Locally (%)**	**Locally (Y or N)**
Materials & Equipment			
Mounting (rails, clamps, fittings, etc.)	$1,500,000	100%	N
Modules	$3,500,000	100%	N
Electrical (wire, connectors, breakers, etc.)	$1,400,000	100%	N
Inverter	$1,000,000	100%	N
Subtotal	$7,400,000		

Labor			
Installation	$1,300,000	100%	
Subtotal	$1,300,000		
Subtotal	$8,700,000		
Other Costs			
Permitting	$1,500,000	100%	
Other Costs	$1,500,000	100%	
Business Overhead	$6,800,000	100%	
Subtotal	$9,800,000		
Subtotal	$18,500,000		
Sales Tax (Materials & Equipment Purchases)	$555,000	100%	
Total	$19,055,000		
PV System Annual Operating and Maintenance Costs	**Cost**	**Local Share**	
Labor			
Technicians	$119,580	100%	
Subtotal	$119,580		
Materials and Services			
Materials & Equipment	$79,720	100%	
Services	$0	100%	
Subtotal	$79,720		
Sales Tax (Materials & Equipment Purchases)	$0	100%	
Average Annual Payment (Interest and Principal)	$2,146,000	0%	
Property Taxes	$0	100%	
Total	$2,345,300		
Other Parameters			
Financial Parameters			
Debt Financing			
Percentage financed	80%	0%	
Years financed (term)	10		
Interest rate	10%		
Tax Parameters			
Local Property Tax (percent of taxable value)	0%		
Assessed Value (percent of construction cost)	0%		
Taxable Value (percent of assessed value)	0%		
Taxable Value	$0		
Property Tax Exemption (percent of local	100%		

taxes)			
Local Property Taxes	$0	100%	
Local Sales Tax Rate	7.50%	100%	
Sales Tax Exemption (percent of local taxes)	0.00%		
Payroll Parameters	**Wage per hour**	**Employer Payroll Overhead**	
Construction and Installation Labor			
Construction Workers / Installers	$21.39	45.6%	
O&M Labor			
Technicians	$21.39	45.6%	

Table 24. Ventura JEDI Inputs - Utility Solar

Photovoltaic - Project Data Summary based on User modifications to default values	
Project Location	Ventura
Year of Construction or Installation	2030
Average System Size - DC Nameplate Capacity (KW)	1000
Number of Systems Installed	10
Total Project Size - DC Nameplate Capacity (KW)	10000
System Application	Utility
Solar Cell/Module Material	Crystalline Silicon
System Tracking	Fixed Mount
Base Installed System Cost ($/KWDC)	$1,080
Annual Direct Operations and Maintenance Cost ($/kW)	$19.93
Money Value - Current or Constant (Dollar Year)	2030
Project Construction or Installation Cost	$10,796,026
Local Spending	$4,182,342
Total Annual Operational Expenses	$1,394,100
Direct Operating and Maintenance Costs	$199,300
Local Spending	$183,356
Other Annual Costs	$1,194,800
Local Spending	$0
Debt Payments	$0
Property Taxes	$0

Detailed PV Project Data Costs			
		Purchased	**Manufactured**

Installation Costs	**Cost**	**Locally (%)**	**Locally (Y or N)**
Materials & Equipment			
Mounting (rails, clamps, fittings, etc.)	$1,084,211	100%	N
Modules	$3,794,737	100%	N
Electrical (wire, connectors, breakers, etc.)	$1,084,211	100%	N
Inverter	$650,526	100%	N
Subtotal	$6,613,684		
Labor			
Installation	$1,409,474	100%	
Subtotal	$1,409,474		
Subtotal	$8,023,158		
Other Costs			
Permitting	$650,526	100%	
Other Costs	$433,684	100%	
Business Overhead	$1,192,632	100%	
Subtotal	$2,276,842		
Subtotal	$10,300,000		
Sales Tax (Materials & Equipment Purchases)	$496,026	100%	
Total	$10,796,026		
PV System Annual Operating and Maintenance Costs	**Cost**	**Local Share**	
Labor			
Technicians	$119,580	100%	
Subtotal	$119,580		
Materials and Services			
Materials & Equipment	$79,720	100%	
Services	$0	100%	
Subtotal	$79,720		
Sales Tax (Materials & Equipment Purchases)	$0	100%	
Average Annual Payment (Interest and Principal)	$1,194,800	0%	
Property Taxes	$0	100%	
Total	$1,394,100		
Other Parameters			
Financial Parameters			
Debt Financing			
Percentage financed	80%	0%	
Years financed (term)	10		

Interest rate	10%		
Tax Parameters			
Local Property Tax (percent of taxable value)	0%		
Assessed Value (percent of construction cost)	0%		
Taxable Value (percent of assessed value)	0%		
Taxable Value	$0		
Property Tax Exemption (percent of local taxes)	100%		
Local Property Taxes	$0	100%	
Local Sales Tax Rate	7.50%	100%	
Sales Tax Exemption (percent of local taxes)	0.00%		
Payroll Parameters	**Wage per hour**	**Employer Payroll Overhead**	
Construction and Installation Labor			
Construction Workers / Installers	$21.39	45.6%	
O&M Labor			
Technicians	$21.39	45.6%	

Table 25. San Luis Obispo JEDI Inputs - Land Based Wind. The Detailed Wind Farm Project Data Costs remains the same for all three counties.

Wind Farm - Project Data Summary based on User modifications to default values	
Project Location	San Luis Obispo
Year of Construction	2025
Total Project Size - Nameplate Capacity (MW)	1000
Number of Projects (included in total)	1
Turbine Size (kW)	2300
Number of Turbines	435
Installed Project Cost ($/kW)	$462
Annual Direct O&M Cost ($/kW)	$11.95
Money Value (Dollar Year)	2025
Installed Project Cost	$461,914,567
Local Spending	$67,687,469
Total Annual Operational Expenses	$82,224,335
Direct Operating and Maintenance Costs	$11,948,976
Local Spending	$1,958,830
Other Annual Costs	$70,275,359

Local Spending	$3,550,477
Debt and Equity Payments	$0
Property Taxes	$0
Land Lease	$3,001,500

Detailed Wind Farm Project Data Costs		**MYCOUNTY**	
Construction Costs		**Cost**	**Local Share**
Equipment Costs			
Turbines		$194,242,638	0%
Blades		$45,474,865	0%
Towers		$50,347,172	0%
Transportation		$34,755,790	0%
Equipment Subtotal		$324,820,465	
Balance of Plant			
Materials			
Construction (concrete rebar, equip, roads and site prep)		$46,936,558	83%
Transformer		$5,309,498	0%
Electrical (drop cable, wire,)		$5,596,569	0%
HV line extension		$10,223,065	0%
Materials Subtotal		$68,065,690	
Labor			
Foundation		$3,100,352	27%
Erection		$3,511,589	6%
Electrical		$5,117,443	13%
Management/supervision		$2,655,450	0%
Misc.		$16,564,200	0%
Labor Subtotal		$30,949,034	
Development/Other Costs			
HV Sub/Interconnection			
Materials		$3,225,770	0%
Labor		$988,117	0%
Engineering		$4,389,466	0%
Legal Services		$2,392,259	0%
Land Easements		$0	100%
Site Certificate		$1,119,314	100%
Other Subtotal		$12,114,926	

Balance of Plant Total		$111,129,650	
Sales Tax (Materials & Equipment Purchases)		$25,964,452	100%
Total Project Costs		$461,914,567	
Wind Farm Annual Operating and Maintenance Costs			
		Cost	**Local Share**
Labor			
Personnel			
Field Salaries		$869,373	100%
Administrative		$82,429	100%
Management		$154,555	100%
Labor/Personnel Subtotal		$1,106,357	
Materials and Services			
Vehicles		$294,062	91%
Site Maint/Misc. Services		$114,684	12%
Fees, Permits, Licenses		$57,342	100%
Utilities		$229,368	100%
Insurance		$2,205,466	0%
Fuel (motor vehicle gasoline)		$114,684	100%
Consumables/Tools and Misc. Supplies		$745,447	23%
Replacement Parts/Equipment/ Spare Parts Inventory		$6,532,589	0%
Materials and Services Subtotal		$10,293,642	
Sales Tax (Materials & Equipment Purchases)		$548,977	100%
Other Taxes/Payments		$0	100%
Total (with Sales Tax and Other Taxes/Payments)		$11,948,976	
Debt Payment (average annual)		$50,923,547	0%
Equity Payment - Individuals		$0	100%
Equity Payment - Corporate		$16,350,313	0%
Property Taxes		$0	100%
Land Lease		$3,001,500	100%
Total Annual Operating and Maintenance Costs		$82,224,335	
Other Parameters			

Financial Parameters			
Debt Financing			
Percentage financed		80%	0%
Years financed (term)		10	
Interest rate		6%	
Equity Financing			
Percentage equity		20%	
Individual Investors (percent of total equity)		0%	100%
Corporate Investors (percent of total equity)		100%	0%
Return on equity (annual interest rate)		12%	
Repayment term (years)		10	
Tax Parameters			
Local Property Tax Rate (avg millage rate - $/$1,000)		NA	
Assessed value (percent of construction cost)		NA	
Taxable Value		NA	
Taxes per MW		NA	
Local Taxes		$0	100%
Local Sales Tax Rate		7.3%	100%
Land Lease Parameters			
Land Lease Cost (per turbine)		$6,900	
Land Lease (total cost)		$3,001,500	
Lease Payment recipient (F = farmer/household, O = Other)		F	100%
Payroll Parameters			
Construction Labor		**Average Wage per hour**	**Employer Payroll Costs**
Foundation		$20.61	37.6%
Erection		$23.34	37.6%
Electrical		$30.93	37.6%
Management/Supervision		$42.04	37.6%
O&M Labor		**Average Wage per hour**	**Employer Payroll Costs**
Field Salaries (technicians, other)		$28.12	37.6%
Administrative		$18.00	37.6%
Management		$45.00	37.6%

Table 26. Santa Barbara JEDI Inputs - Land Based Wind

Wind Farm - Project Data Summary based on User modifications to default values	
Project Location	Ventura
Year of Construction	2025
Total Project Size - Nameplate Capacity (MW)	1000
Number of Projects (included in total)	1
Turbine Size (kW)	2300
Number of Turbines	435
Installed Project Cost ($/kW)	$462
Annual Direct O&M Cost ($/kW)	$11.95
Money Value (Dollar Year)	2025
Installed Project Cost	$461,914,567
Local Spending	$101,914,978
Total Annual Operational Expenses	$82,224,335
Direct Operating and Maintenance Costs	$11,948,976
Local Spending	$2,769,659
Other Annual Costs	$70,275,359
Local Spending	$3,550,477
Debt and Equity Payments	$0
Property Taxes	$0
Land Lease	$3,001,500

Table 27. Ventura JEDI Inputs - Land Based Wind

Wind Farm - Project Data Summary based on User modifications to default values	
Project Location	Ventura
Year of Construction	2025
Total Project Size - Nameplate Capacity (MW)	1000
Number of Projects (included in total)	1
Turbine Size (kW)	2300
Number of Turbines	435
Installed Project Cost ($/kW)	$462
Annual Direct O&M Cost ($/kW)	$11.95
Money Value (Dollar Year)	2025
Installed Project Cost	$461,914,567

Local Spending	$101,914,978
Total Annual Operational Expenses	$82,224,335
Direct Operating and Maintenance Costs	$11,948,976
Local Spending	$2,769,659
Other Annual Costs	$70,275,359
Local Spending	$3,550,477
Debt and Equity Payments	$0
Property Taxes	$0
Land Lease	$3,001,500

Table 28. Tri-county conglomerate JEDI Inputs - Floating Offshore Wind Project Data

Category	Units	Input Value
Project Parameters		
Project Name		CCC Scenario
Economic Analysis Area	State, Region	Define Region
Wind Plant Project Area	State, Region	Define Region
Year Construction Starts	year	2025
Money Value (Dollar Year)	year	2025
Plant Characteristics		
Plant Capacity	MW	996
Number of Turbines		83
Array Layout		Grid
Row Spacing	# Rotor Diameters	7
Turbine Spacing	# Rotor Diameters	7

Turbine Design		
Turbine Selector		12MW Generic
Turbine Rating	MW	12
Rotor Diameter	m	215
Hub Height	m	132
Rated Wind Speed	m/s	11
Blade Mass	tonnes	54
Blade Deck Space	m^2	385
Blade Length	m	107
Nacelle Mass	tonnes	604
Nacelle Deck Space	m^2	203
Tower Mass	tonnes	399
Tower Deck Space	m^2	50
Tower Length	m	132
# of Tower Sections		2
Site Characteristics		
Site Depth	m	1013
Mean Windspeed	m/s	9
Distance: Port to Site	km	55.5
Distance: Site to Offshore Substation	km	2

Distance: Offshore Substation to Landfall	km	42
Distance: Landfall to Interconnection	km	10
Landfall Trench Length	km	3
Substructure Design		
Substructure Type		Semisubmersible
Foundation Type		Floating
Mooring Anchor Type		Drag Embedmer
# Mooring Lines		4
Scour Protection	$/tonne	40
Electrical Infrastructure		
Export Cable Selector		PE 1000m 220
AC Resistance	ohms/km	0.03
Capacitance	F/km	300
Conductor Size	mm^2	1000
Current Capacity	A	900
Inductance	MHz/km	0.35
Linear Density	tonnes/km	90
Rated Voltage	kV	220

Cost	$/km	$850,000
Redundant Export Cable	cables	0
Additional Export Cable Length	%	0.00%
Array Cable Selector		LPE 185mm 66k
AC Resistance	ohms/km	0.128
Capacitance	F/km	163
Conductor Size	mm^2	185
Current Capacity	A	445
Inductance	MHz/km	0.443
Linear Density	tonnes/km	26.1
Rated Voltage	kV	66
Cost	$/km	$200,000
Second Array Cable Selector		None
AC Resistance	ohms/km	-
Capacitance	F/km	-
Conductor Size	mm^2	-
Current Capacity	A	-
Inductance	MHz/km	-
Linear Density	tonnes/km	-
Rated Voltage	kV	-
Cost	$/km	-
Additional Array Cable Length	%	0.00%

# Offshore Substations		1
Port Characteristics		
Port Name		Port Name
Port Rate	$/month	$2,000,000
# Cranes		1
Vessel Deployment		
Floating Installation	Support Vessel	
	# Vessels	1
	Day Rate	$100,000
	Towing Vessel	
	# Vessels	1
	Day Rate	$30,000
	# Towing Groups	1
Offshore Substation Installation	Floating Heavy Lift	
	# Vessels	1
	Day Rate	$500,000
	Floating Barge	
	# Vessels	1
	Day Rate	$120,000
Cabling Installation	Array Cable Installation Vessel	
	# Vessels	1
	Day Rate	$120,000
	Export Cable Installation Vessel	

	# Vessels	1
	Day Rate	$120,000

Project Cost

CAPITAL EXPENDITURES (CapEx)						
Category	Cost	Breakdown	Cost Per kW	% of Total Cost		
Turbine Component Costs				**48.08%**		
Nacelle/Drivetrain	**$774,900,000**		**$861**	**31.82%**		
Materials	**$688,989,070**	**89%**	**$766**			
Labor	**$85,910,930**	**11%**	**$95**			
Blades	**$232,200,000**		**$258**	**9.53%**		
Materials	**$191,829,710**	**83%**	**$213**			
Labor	**$40,370,290**	**17%**	**$45**			
Towers	**$163,800,000**		**$182**	**6.73%**		
Materials	**$140,248,988**	**86%**	**$156**			
Labor	**$23,551,012**	**14%**	**$26**			
Balance of System Costs						
Substructure and Foundation	**$376,660,239**		**$419**	**15.47%**		
Monopile	**$363,232,239**		**$404**	**14.91%**		

Monopile Materials	$311,007,046	86%	$346			
Monopile Labor	$52,225,193	14%	$58			
Scour Protection	$13,428,000		$15	0.55%		
Scouring Protection Materials	$11,570,450	86%	$13			
Scouring Protection Labor	$1,857,550	14%	$2			
Spar	$0		$0	0.00%		
Spar Materials	$0	86%	$0			
Spar Labor	$0	14%	$0			
Semisubmersible	$0		$0	0.00%		
Semisubmersible Materials	$0	86%	$0			
Semisubmersible Labor	$0	14%	$0			
Mooring System	$0		$0	0.00%		
Mooring System Materials	$0	86%	$0			
Mooring Systems Labor	$0	14%	$0			
Electrical Infrastructure Components	**$239,352,982**		**$266**	**9.83%**		
Array Cable System	$45,708,307		$51	1.88%		
Materials	$39,136,409	86%	$43			
Labor	$6,571,898	14%	$7			
Export Cable System	$76,557,375		$85	3.14%		
Materials	$65,550,027	86%	$73			

Labor	$11,007,348	14%	$12			
Offshore Substation	$117,087,300		$130	4.81%		
Materials	$100,548,039	86%	$112			
Labor	$16,539,261	14%	$18			
Assembly and Installation	$96,673,035		$107	3.97%		
Foundation	$23,642,555		$26	0.97%		
Vessel	$19,683,952	83%	$22			
Labor	$3,958,604	17%	$4			
Mooring System	$0		$0	0.00%		
Vessel	$0	83%	$0			
Labor	$0	17%	$0			
Turbine	$42,802,500		$48	1.76%		
Vessel	$35,635,841	83%	$40			
Labor	$7,166,659	17%	$8			
Array Cable	$14,770,982		$16	0.61%		
Vessel	$12,297,795	83%	$14			
Labor	$2,473,187	17%	$3			
Export Cable	$2,540,511		$3	0.10%		
Vessel	$2,115,140	83%	$2			
Labor	$425,372	17%	$0			

Offshore Substation	**$2,486,486**		**$3**	**0.10%**		
Vessel	**$2,070,160**	**83%**	**$2**			
Labor	**$416,326**	**17%**	**$0**			
Scour Protection	**$10,430,000**		**$12**	**0.43%**		
Vessel	**$8,683,647**	**83%**	**$10**			
Labor	**$1,746,353**	**17%**	**$2**			
Ports and Staging	**$38,328,033**		**$43**	**1.57%**		
Foundation	**$8,176,276**		**$9**	**0.34%**		
Mooring System	**$0**		**$0**	**0.00%**		
Turbine	**$15,175,342**		**$17**	**0.62%**		
Array Cable	**$7,995,059**		**$9**	**0.33%**		
Export Cable	**$1,194,801**		**$1**	**0.05%**		
Offshore Substation	**$170,117**		**$0**	**0.01%**		
Scour Protection	**$5,616,438**		**$6**	**0.23%**		
Development and Other Project Costs	**$257,032,538**		**$286**	**10.55%**		
Site Auction Price	**$45,000,000**		**$50**	**1.85%**		
BOEM Review	**$0**		**$0**	**0.00%**		
Construction Operations Plan	**$1,000,000**		**$1**	**0.04%**		
Design Install Plan	**$250,000**		**$0**	**0.01%**		
Site Assessment Plan	**$500,000**		**$1**	**0.02%**		
Site Assessment Activities	**$50,000,000**		**$56**	**2.05%**		

Onshore Transmission	**$160,282,538**		**$178**	**6.58%**		
Engineering and Management	**$63,000,000**		**$70**	**2.59%**		
Construction Operations	**$63,000,000**		**$70**	**2.59%**		
Other/Miscellaneous	**$0**		**$0**	**0.00%**		
Soft Costs						
Commissioning	**$13,200,000**		**$15**	**0.54%**		
Construction Finance	**$54,900,000**		**$61**	**2.25%**		
Construction Insurance	**$13,200,000**		**$15**	**0.54%**		
Contingency	**$94,800,000**		**$105**	**3.89%**		
Decommissioning	**$17,400,000**		**$19**	**0.71%**		
Other/Miscellaneous	**$0**		**$0**	**0.00%**		

ANNUAL OPERATIONAL EXPENDITURES (OpEx)					
Category	**Cost**	**Cost Per kW**	**% of Total Cost**		**Note**
Total OpEx	**$106,988,449**	**$118.88**	**100%**		i
Maintenance	**$73,766,295**	**$81.96**	**69%**		i
Offshore Maintenance	$73,219,878	$81.36			
Technicians (Labor)	$7,212,704	$8.01	7%		
Spare Parts	$21,419,546	$23.80	20%		
Vessels	$44,587,627	$49.54	42%		
Onshore Electric Maintenance	$546,417	$0.61	1%		
Operations	**$33,222,154**	**$36.91**	**31%**		

Operation, Management and General Administration	$3,059,935	$3.40	3%		i
Operating Facilities	$1,420,684	$1.58	1%		
Environmental, Health, and Safety Monitoring	$546,417	$0.61	1%		
Insurance	$22,949,514	$25.50	21%		
Annual leases and fees not included in "Financial Parameters" section	$5,245,603	$5.83	5%		i

FINANCIAL PARAMETERS					
Category	**Unit**	**Input Value**			
Debt Financing					
Debt financing (percent)	%	70%			
Interest rate	%	5.00%			
Years financed (term)	years	15			
Bank fees (percent of debt)	%	3.00%			
Equity Financing/Repayment					
Equity financing	%	30%			

(percentage)					
Return on equity (annual percent rate)	%	10.00%			
Repayment term (years)	years	5			
Individual Investors (percent of total equity)	%	50%			
Corporate Investors (percent of total equity)	%	50%			
Sales Taxes					
Capital/construction sales and use tax rate on materials	%	1.00%			
Operations and maintenance sales and use tax rate on materials	%	1.00%			
Other					
Assumed project life	years	20			
LABOR PARAMETERS					
Category	**Annual**				
CapEx Salaries by Occupation					
Foundation	$99,000				
Scour	$99,000				

Mooring	$60,000				
Turbine	$64,000				
Cabling	$99,000				
Offshore Substation	$99,000				
OpEx Salaries by Occupation					
Management	$100,000				
Technician	$75,000				

Local Share

Category	Local Content
Turbine Component Costs	
Nacelle/Drivetrain	
Materials	0%
Labor	0%
Blades	
Materials	50%
Labor	50%
Towers	
Materials	50%
Labor	50%
Other/Miscellaneous	0%
Balance of System Costs	
Substructure and Foundation	
Monopile	0%
Monopile Materials	
Monopile Labor	
Scour Protection	0%
Scouring Protection Materials	
Scouring Protection Labor	

Spar	0%
Spar Materials	
Spar Labor	
Semisubmersible	20%
Semisubmersible Materials	
Semisubmersible Labor	
Mooring System	20%
Mooring System Materials	
Mooring Systems Labor	
Electrical Infrastructure Components	
Array Cable System	0%
Materials	
Labor	
Export Cable System	0%
Materials	
Labor	
Offshore Substation	0%
Materials	
Labor	
Assembly and Installation	
Foundation	
Vessel	20%
Labor	20%
Mooring System	
Vessel	0%
Labor	0%
Turbine	
Vessel	50%
Labor	50%
Array Cable	

Vessel	50%
Labor	50%
Export Cable	
Vessel	50%
Labor	50%
Offshore Substation	
Vessel	50%
Labor	50%
Scour Protection	
Vessel	0%
Labor	0%
Ports and Staging	
Foundation	100%
Mooring System	100%
Turbine	100%
Array Cable	100%
Export Cable	100%
Offshore Substation	100%
Scour Protection	100%
Development and Other Project Costs	
Site Auction Price	0%
BOEM Review	0%
Construction Operations Plan	50%
Design Install Plan	50%
Site Assessment Plan	50%
Site Assessment Activities	50%

Onshore Transmission	100%
Engineering and Management	
Construction Operations	50%
Other/Miscellaneous	
Soft Costs	
Commissioning	50%
Construction Finance	0%
Construction Insurance	0%
Contingency	0%
Decommissioning	50%
Other/Miscellaneous	50%
Local Content for Annual OpEx	
Category	**Local Content**
Total OpEx	
Maintenance	
Offshore Maintenance	
Technicians (Labor)	100%
Spare Parts	50%
Vessels	50%
Onshore Electric Maintenance	50%
Operations	
Operation, Management and General Administration	100%
Operating Facilities	21%

Environmental, Health, and Safety Monitoring	100%
Insurance	0%
Annual Leases and Fees	0%

FINANCIAL PARAMETERS	Input Value
Category	
Debt Financing	
Local financial institutions that receive interest	0%
Local banks that receive fees	0%
Equity Financing/Repayment	
Percentage of local individual investors	0%
Percentage of local corporate investors	0%
Sales Taxes	
Governments that receive sales/use taxes on construction/CapEx	0%
Governments that receive sales/use taxes on O&M/OpEx	0%