

Western RTO Economic Impact Study

California Results

Prepared for Advanced Energy Economy (now Advanced Energy United)
by Energy Strategies, LLC, and Peterson & Associates
November 2022



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December 2022**

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Executive Summary

In July 2022, Advanced Energy Economy (now Advanced Energy United) released the [Western Regional Transmission Organization \(RTO\) Economic Impact Study: Region Wide Analysis](#). That report provides a summary of the methodology and assumptions used to assess the non-energy economic impacts that might accrue to the West due to the development of a broad, West-wide organized electricity market or RTO. The report, prepared by Energy Strategies and Peterson & Associates, filled a research gap on the broader economic impacts that might result from the electricity cost savings and structural changes brought about by a potential RTO operating across the West. The region-wide analysis summarizes the total, combined economic impacts for the 11 Western states that were evaluated as part of the study effort.

This summary document provides the high-level economic impacts expected to accrue to California, specifically, from the development of a West-wide RTO which would include not only other Western states but also the portions of California that do not currently participate in an organized market (i.e., those that are not part of the California Independent System Operator or “CAISO”). It demonstrates that operation of a West-wide RTO can bring substantial economic growth, including new jobs, new indirect business taxes, and increases to Gross State Product (GSP) to California.¹ This study focused on evaluating two broad categories of economic impacts that may result to California from an RTO:

1. The economic impacts to California from **increased spending power for households** that would occur due to electricity prices being lower under an RTO than under the status quo for electricity markets in the region, and
2. The economic impacts from **new or expanded business activity** due to RTO development, including both:
 - a. The impact of lower electricity prices for businesses, incentivizing them to expand in or locate to California, and
 - b. Structural changes to the electricity market enabling new renewable energy development contracts to meet corporate clean energy demand, which is currently taking place primarily in regions with RTOs and which would be expected to expand in California if the entirety of the state were to be located in an RTO footprint.

Studying the potential impacts of an RTO resulted in a range of forecasted economic impacts to California. This range reflects the uncertainty in how sensitive firms ultimately are to electricity prices and on how much additional clean electricity generating capacity would be built due to the new contracting structures enabled by an RTO that covers all load serving entities in the state. While the range of impacts is fairly wide, the results demonstrate that, even on the low-end, the economic

¹ All of the caveats, considerations, assumptions, and disclaimers discussed in the [Western RTO Economic Impact Study: Region Wide Analysis](#) also apply to this summary document. Readers looking for more detailed information, and to understand the qualifications of this study work, should refer to that report.



benefits of a West-wide RTO to California are expected to be substantial. The range of economic impacts to California, in the 2030 timeframe, is illustrated below in Figure 1.

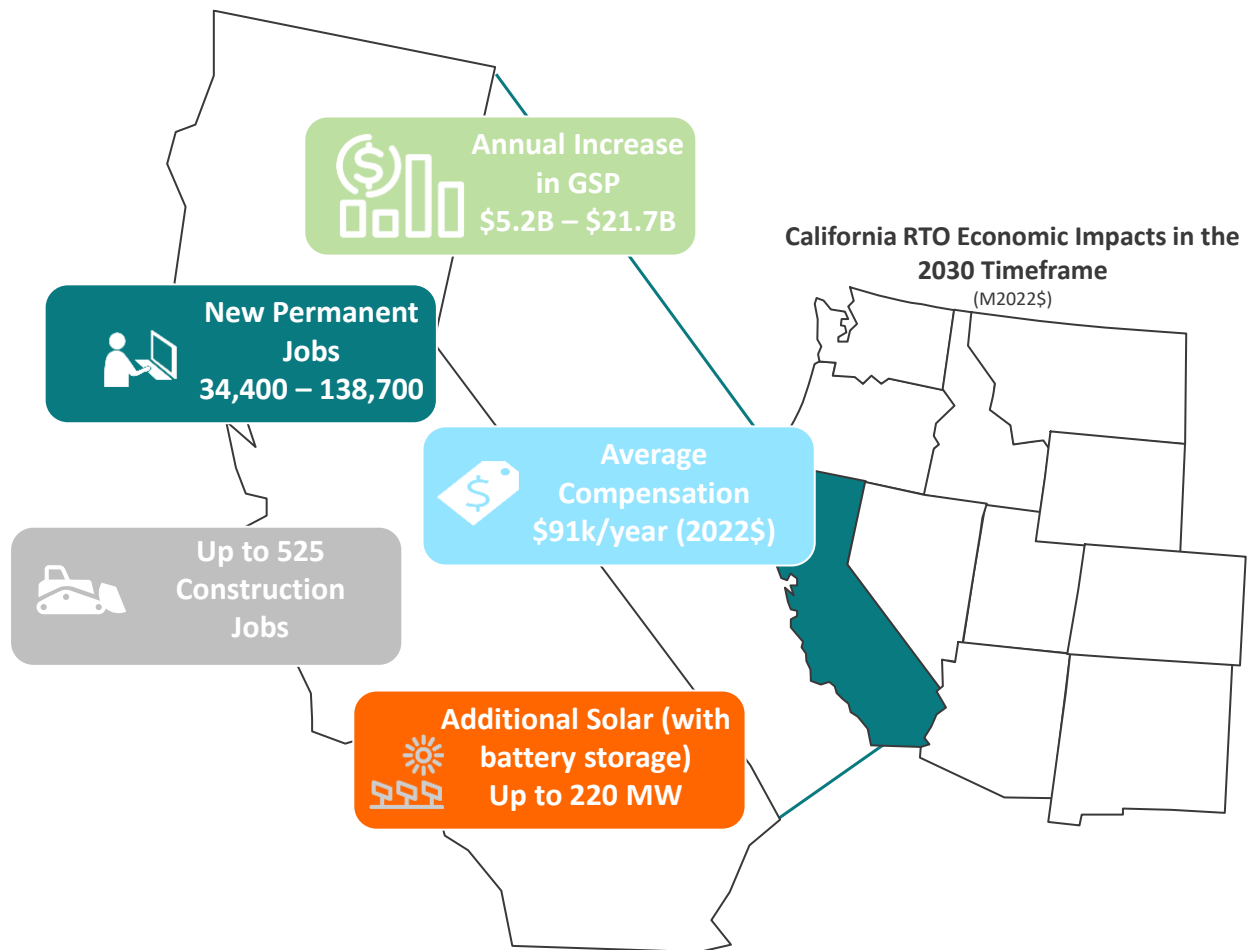
In summary, the creation of a West-wide RTO is expected to:

- △ Result in about \$563 million per year in electricity cost savings for California compared to operation of the electrical grid without a west-wide RTO (after taking into account likely reductions in overall RTO operational costs for California associated with economies of scale in the operation of an organized market over a larger footprint)²
- △ Provide between 34,400 and 138,700 permanent jobs across the state, with those jobs averaging total compensation (payroll plus benefits) of roughly \$91,000 per year
- △ Generate between \$5.2 and \$21.7 billion in additional GSP per year across the state (equivalent to 0.2% to 0.7% of California's current GSP)
- △ Produce incremental state and local tax contributions ranging between \$167 million and \$652 million per year
- △ Create up to 525 temporary construction jobs in 2030 from the development of additional clean energy resources to meet corporate demand, resulting in up to an additional \$66 million in GSP in 2030 on a temporary basis; and
- △ If the expanded RTO facilities were to be located in California, the incremental direct investments (in the form of hardware/software, office space and staffing to support the RTO's operations), would result in additional economic benefits to the state, the range of which is summarized in Appendix A of the Western RTO Economic Impact Study: Region Wide Analysis

² This calculation of electricity cost savings does not account for **all** potential benefits or costs of RTO formation/operation that might affect individual utilities or states. The quantified RTO benefits include only a subset of potential benefit categories and do not account for, for instance, the benefits of centralized transmission planning or enhanced reliability offered by an RTO. The RTO operational costs also do not account for all cost impacts from RTOs. For instance, utility-level investments and staffing costs that may be required to participate in an RTO are highly dependent on the specifics of a utility's situation and have not been analyzed and netted from gross benefits in this study. Additionally, transmission cost shifts that may occur due to RTO formation (eliminating the need for one utility to pay another utility to utilize their transmission system) have not been evaluated in the context of this study.



Figure 1 Summary Range of California’s Non-Energy Economic Impacts Associated with RTO Formation



These benefits to the California economy would be driven by lower electricity prices (in comparison to a case without an RTO) for households and businesses, additional clean energy development across the state, and expansion of existing or attraction of new businesses to California, which may decide to locate or expand in the state from the competitive advantage gained from lower electricity prices. The industries affected by this advantage include those crucial to the state’s long-term economic strategy, including the potential to expand data center-type activities along with computer equipment manufacturing and information technology. The direct growth that may occur in various industries will also have indirect and induced effects (also called “multiplier” effects”) as the increased direct economic activity flows through the California economy.



Electricity Price Benefits, including RTO Operational Cost Savings for California

Table 1 illustrates the assumed gross RTO benefits for California,³ the estimated savings in RTO operational costs for California from today’s levels (due to economies of scale in operating a larger market compared to the current market operated by CAISO), and the total benefits of RTO operation including reduced operational costs. The assumed levels of savings associated with RTO operation were a key input into this study’s economic impact analysis.

Table 1 Calculation of Total Annual RTO Benefits for California

California (Millions 2022\$)	2025	2030	2035
Gross RTO Benefits	\$426	\$521	\$521
Additional RTO Administrative Cost Savings	(\$46)	(\$42)	(\$38)
Total Benefits of RTO Operation	\$471	\$563	\$560

Economic Impact to California from Increased Spending Power for Households

Table 2 presents the economic impacts to California from increased spending power for households due to lower electricity prices afforded by a West-wide RTO. These results factor in the “leakage” that is expected out of the economy,⁴ as well as the impact of the direct and multiplier effects attributed to an increase in household expenditures that can occur when electricity prices in California are lower with a West-wide RTO than they otherwise would have been.

³ These data points were generally taken from the “State-Led Market Study” (*Exploring Western Organized Market Configurations: A Western State’s Study of Coordinated Market Options to Advance State Energy Policies*) dated July 30, 2021 which includes two companion reports: [Technical Report](#), [Market and Regulatory Review](#).

⁴ Leakage accounts for the fact that some of the increased spending for goods and services will leave the economy and will not recirculate within it (for instance, it may be spent on goods overseas).

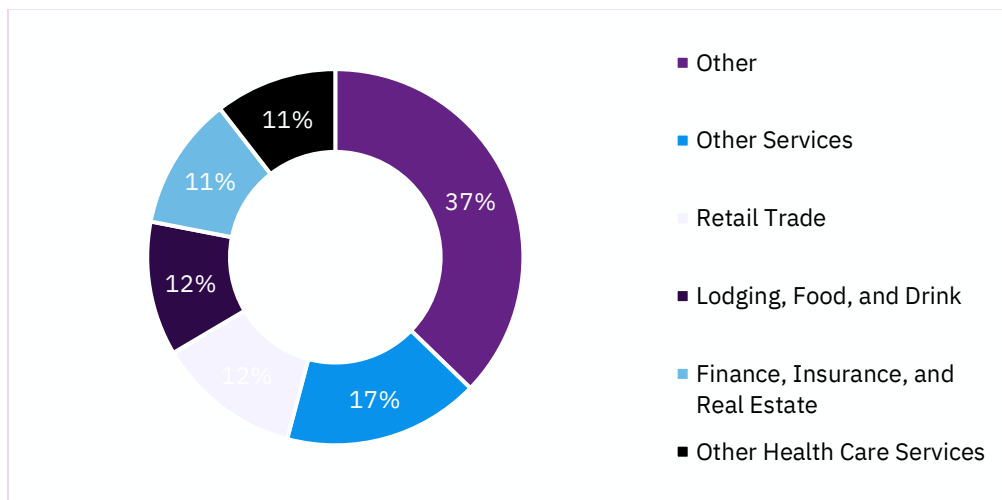


Table 2 Annual Economic Impact to California from Increased Spending Power for Households due to an RTO

California Economic Impacts from Increased Spending Power for Households	2025	2030	2035
Pre-Leakage Electricity Cost Savings (Millions 2022\$)	\$471	\$563	\$560
Post-Leakage Electricity Cost Savings (Millions 2022\$)	\$351	\$419	\$416
Gross State Product (Millions 2022\$)	\$475	\$568	\$565
Total Compensation (Millions 2022\$)	\$284	\$339	\$337
Total New Ongoing Jobs (FTEs)	4,193	5,010	4,979
Total Indirect Taxes (Millions 2022\$)	\$25.8	\$30.8	\$30.7

Figure 2 shows the top industries in California that are expected to be affected by increased spending power for households and which see new employment created in the state.⁵

Figure 1 Jobs Created in California (2030) from Increased Spending Power for Households due to an RTO



⁵ Industry names are reflective of the North American Industry Classification System (NAICS) two- and three-digit codes.



Economic Impact to California Associated with Expanded Business Activity and Clean Energy Investment

New and Expanded Business Activity from Lower Electricity Prices

The [Western RTO Economic Impact Study: Region Wide Analysis](#) discussed the potential for increased economic activity from additional and expanded business activity associated with the competitive advantages offered by lower electricity costs. Figure 3 and Table 3 illustrate the range of potential direct employment impacts in California, by industry, from the West-wide RTO’s ability to lower electricity prices from what they otherwise would be which, in turn, can increase business formation and business growth within California. Table 3 includes both low-end and high-end bookend values for 2030, along with the current employment and compensation by industry for context.

Figure 2 Composition of Direct Job Growth in California, by Industry, from Additional Business Activity

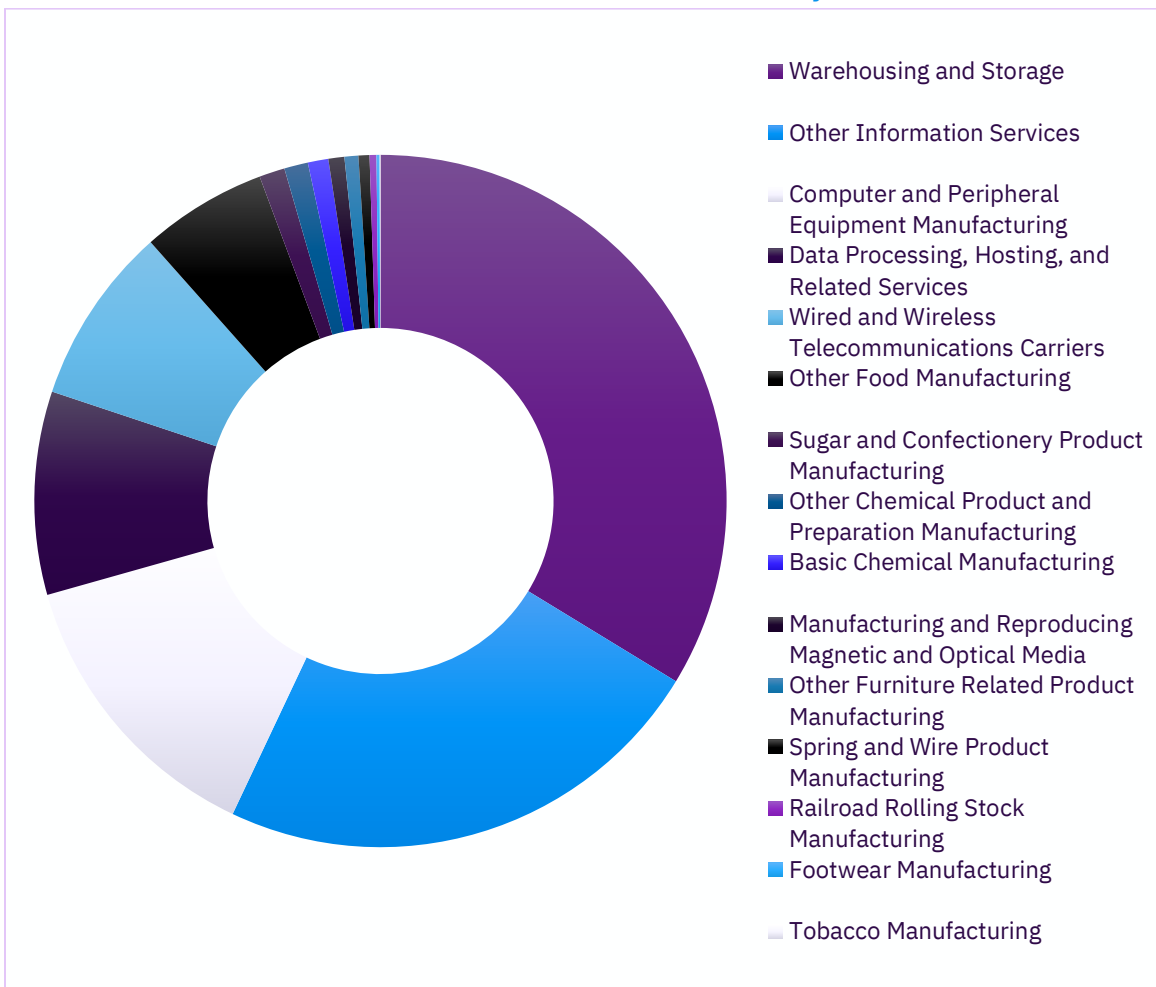


Table 3 Key Industries Expected to Grow or Locate in California
Due to Lower Electricity Prices from an RTO



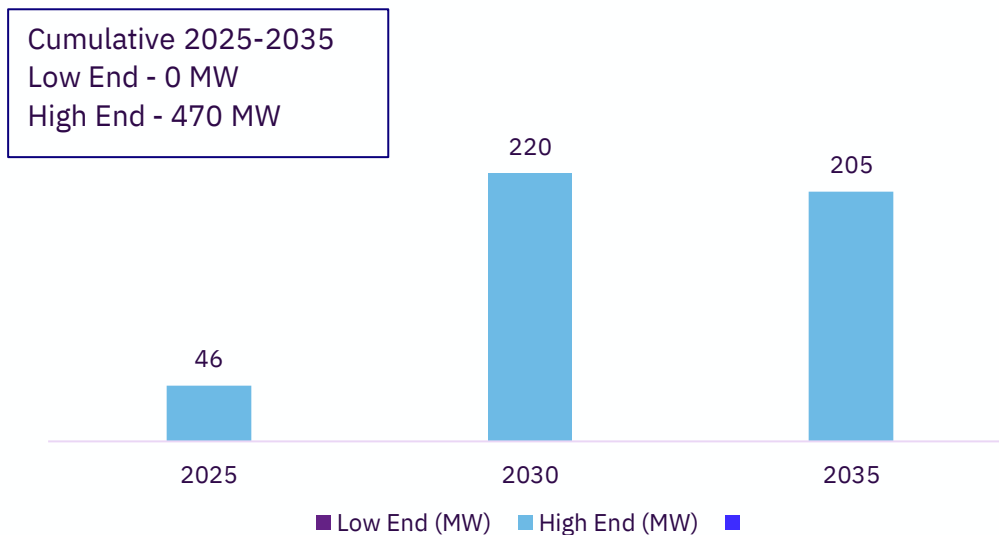
	Industry	Low Direct Growth FTE (2030)	High Direct Growth FTE (2030)	Current Employment (2022)	Average Annual Payroll and Benefits
1	Warehousing and Storage	2,746	12,479	195,372	\$60,951
2	Other Information Services	1,898	8,623	134,086	\$429,660
3	Computer and Peripheral Equipment Manufacturing	1,108	5,034	80,645	\$424,646
4	Data Processing, Hosting, and Related Services	773	3,512	55,466	\$270,791
5	Wired and Wireless Telecommunications Carriers	678	3,081	53,462	\$140,441
6	Other Food Manufacturing	479	2,178	35,058	\$76,565
7	Sugar and Confectionery Product Manufacturing	97	442	7,236	\$75,126
8	Other Chemical Product and Preparation Manufacturing	91	411	6,713	\$95,507
9	Basic Chemical Manufacturing	78	354	5,746	\$127,372
10	Manufacturing and Reproducing Magnetic and Optical Media	61	275	4,720	\$190,942
11	Other Furniture Related Product Manufacturing	53	240	4,073	\$62,813
12	Spring and Wire Product Manufacturing	42	190	3,131	\$77,545
13	Railroad Rolling Stock Manufacturing	26	118	1,811	\$104,878
14	Footwear Manufacturing	12	55	892	\$107,469
15	Tobacco Manufacturing	3	13	231	\$90,545
	Total Employment in Directly Affected Industries	8,144	37,007	588,643	\$225,265



Incremental Clean Electricity Resource Investment

Development of a West-wide RTO may also result in increased clean electricity resource development in the West, including in California. This analysis assumed that the additional demand would be driven by voluntary corporate clean energy contracting, which is currently taking place primarily in regions with RTOs. Figure 4 shows the new clean electricity investments (in MW) in California for the low end and high-end cases by year. Because most of California is already in the CAISO footprint, the low-end case assumes no incremental clean energy development in the state, whereas the high-end case shows that some incremental development could occur because the organized market footprint would expand to cover the entirety of California (which is not the case today). The structural changes to the electricity market resulting from an RTO operating across the entire state and broader Western region would provide greater opportunities for meeting corporate clean energy demand and activity in California may increase if the entirety of the state were to be operating within an RTO.

Figure 3 Additional Clean Electricity Construction Estimate in California with an RTO



Combined Results from New/Expanded Business Activity and Incremental Clean Electricity Investments

Tables 4 and 5 report the economic impacts from the new business activity and new clean energy investments broken out by year and by permanent or temporary construction impacts. Note that Tables 4 and 5, do *not* include the impacts from lower electricity prices on households, which are included later in the document (in Tables 6 and 7).



Table 4 Low-End Economic Impact from New/Expanded Business Activity and Clean Electricity Investments in California

California Low-End New Business Economic Impacts	Type	2025	2030	2035
Gross State Product (Million 2022\$)	Permanent	\$3,815	\$4,653	\$4,636
	Construction/Temporary	\$0	\$0	\$0
Total Compensation (Million 2022\$)	Permanent	\$2,287	\$2,789	\$2,779
	Construction/Temporary	\$0	\$0	\$0
Total Jobs (FTE)	Permanent	24,124	29,422	29,314
	Construction/Temporary	0	0	0
Total Indirect Taxes (Million 2022\$)	Permanent	\$112	\$136	\$136
	Construction/Temporary	\$0	\$0	\$0

Table 5 High-End Economic Impact from New/Expanded Business Activity and Clean Electricity Investments in California

California High-End New Business Economic Impacts	Type	2025	2030	2035
Gross State Product (Million 2022\$)	Permanent	\$17,338	\$21,151	\$21,078
	Construction/Temporary	\$20	\$66	\$59
Total Compensation (Million 2022\$)	Permanent	\$10,392	\$12,676	\$12,632
	Construction/Temporary	\$12	\$40	\$35
Total Jobs (FTEs)	Permanent	109,624	133,716	133,245
	Construction/Temporary	161	525	464
Total Indirect Taxes (Million 2022\$)	Permanent	\$509	\$621	\$620
	Construction/Temporary	\$0.2	\$0.7	\$0.6



Range of Total Economic Impacts for California

This section provides the **total** range of anticipated economic impacts, including impacts from increased household spending power and impacts to businesses (both new/expanded business activity from more competitive electricity prices and new clean electricity resource development).

Table 6 illustrates the low-end total economic impacts, by year and Table 7 illustrates the high-end impacts.

Table 6 Low-End Total Economic Impacts Results for California
Attributed to RTO Formation

California Low-End TOTAL Economic Impacts	Type	2025	2030	2035
Gross State Product (Millions 2022\$)	Permanent	\$4,291	\$5,221	\$5,201
	Construction/Temporary	\$0	\$0	\$0
Total Compensation (Millions 2022\$)	Permanent	\$2,571	\$3,128	\$3,116
	Construction/Temporary	\$0	\$0	\$0
Total Jobs (FTEs)	Permanent	28,318	34,432	34,293
	Construction/Temporary	0	0	0
Total Indirect Taxes (Millions 2022\$)	Permanent	\$138	\$167	\$167
	Construction/Temporary	\$0	\$0	\$0

Table 7 High-End Total Economic Impact Results for California
Attributed to RTO Formation

California High-End TOTAL Economic Impacts	Type	2025	2030	2035
Gross State Product (Millions 2022\$)	Permanent	\$17,814	\$21,719	\$21,643
	Construction/Temporary	\$20	\$66	\$59
Total Compensation (Millions 2022\$)	Permanent	\$10,676	\$13,015	\$12,969
	Construction/Temporary	\$12	\$40	\$35
Total Jobs (FTEs)	Permanent	113,817	138,726	138,224
	Construction/Temporary	161	525	464
Total Indirect Taxes (Millions 2022\$)	Permanent	\$534	\$652	\$650
	Construction/Temporary	\$0.2	\$0.7	\$0.6



The charts below (Figures 5, 6, and 7) illustrate the range of economic impacts that might be expected to accrue to California based on the low-end and high-end cases assessed in the study. They represent, in chart format, the same information that can be found in Tables 6 and 7. Figure 5 illustrates, by representative year, the expected increases in **ongoing** GSP, total compensation (payroll and benefits,) and indirect business taxes that could be added in the state due to the existence of a West-wide RTO. Figure 6- illustrates the **construction/temporary** economic impacts, based on the year in which the construction is expected to take place. And Figure 7 shows the range of both **permanent and temporary jobs** that could be created in the state.

Figure 4 Permanent Economic Impacts to California from an RTO

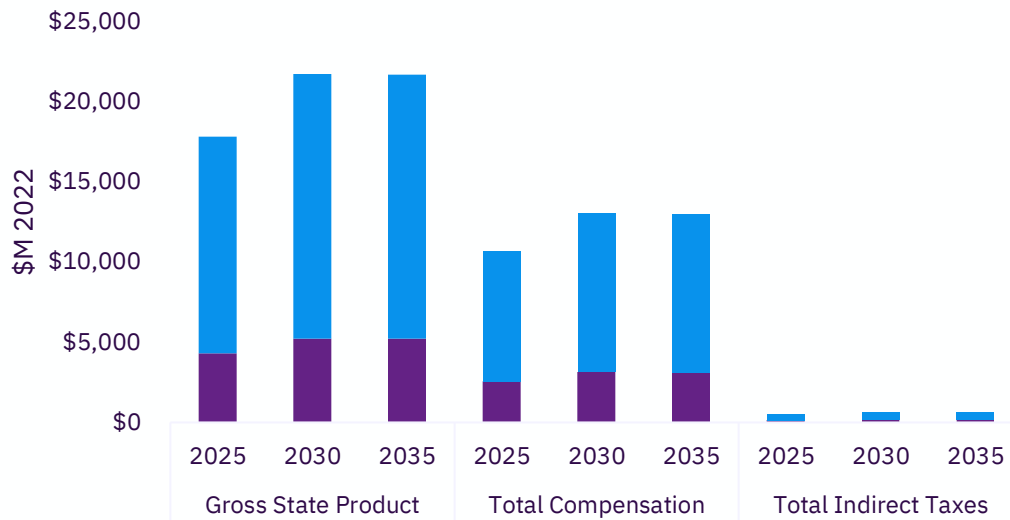


Figure 5 Construction/Temporary Economic Impacts to California from an RTO

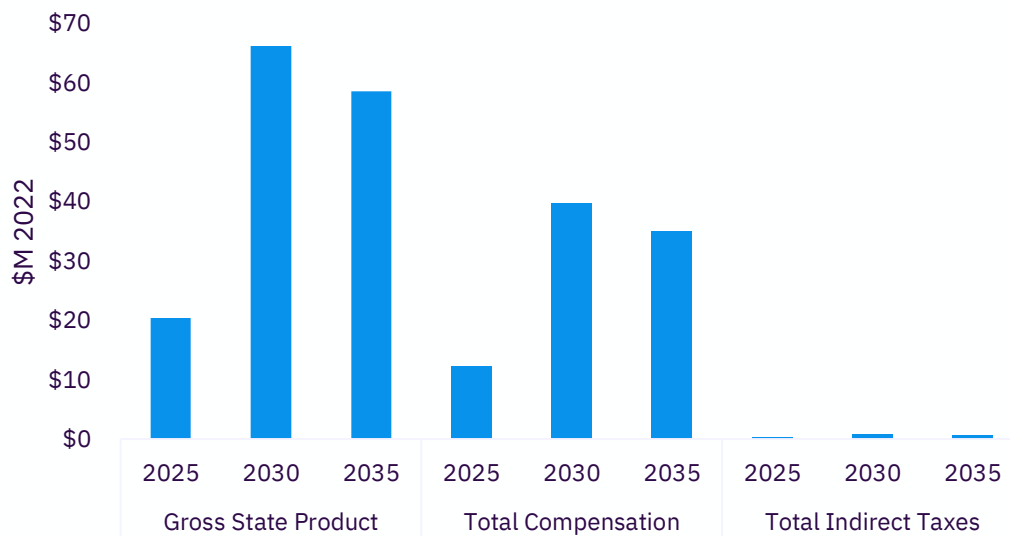
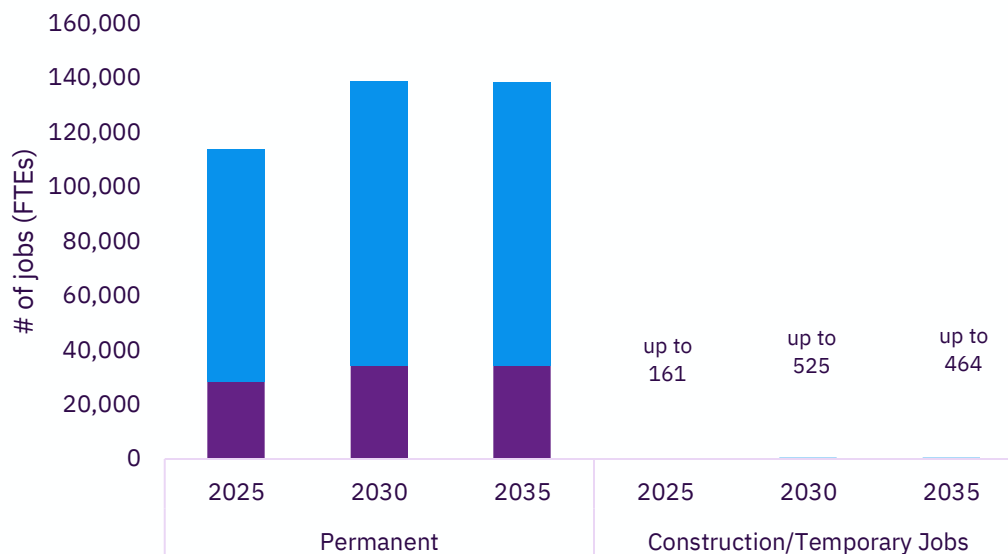


Figure 6 Permanent and Temporary California Jobs (FTEs) Created by an RTO



Additional Impacts from Direct RTO Investments

Additional, positive economic impacts could also result if incremental RTO investments, to run a West-wide RTO, were to take place in California. While no attempt was made to identify in which state(s) these investments would occur, the West-wide report provides a general range for the magnitude and types of impacts that a state such as California might expect if the incremental RTO investments needed for a west-wide RTO were to occur in the state.

Conclusion

Based on the results of this study work, the State of California can expect significant economic benefits from a West-wide RTO. Benefits to the economy are anticipated to be driven by:

- △ Electricity cost savings providing higher levels of disposable income for households than they would have in a continuation of the current electricity market structure;
- △ Expansion of existing or attraction of new businesses to the Western states, including California; and
- △ The potential for additional clean electricity resource development in the state to meet corporate demand.

The sooner West-wide RTO development occurs, the sooner California can begin to realize these economic benefits.

