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Utah Transmission Study Economic Impact Analysis

For: Energy Strategies

From: Points Consulting

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Contents

About the Project

Points Consulting (PC) partnered with Energy Strategies to deliver this economic impact analysis (EIA) in January, 2021. Energy Strategies provided the project background and assumptions upon which PC created impact scenarios. Information provided by Energy Strategies included total capital expenditures, megawatt production, and geographic location of investment. Scenarios were provided for three-time horizons (2025, 2030, and 2040), three levels of intensity (base, mid, and high) and across five energy generation and transmission fields. Though Energy Strategies provided these inputs and answered questions about the project, all analysis and conclusions are an independent third-party assessment by Points Consulting.

EIA Summary Tables

Summary of EIA results for the three investment scenarios are included in the tables below. Tables are split into two series. The first contains the same data as the "Deliverable Example" worksheet. The second contains further statistics on the same scenarios, namely, Labor Income, Gross State Product, and Output. Detailed tables for each unique field of energy and timeframe are contained in Appendix A.

The structure of Tables 1 through 3 are all the same. Following the title column, column two represents the total gross direct investment, or the overnight capital costs, for each project scenario. Column three represents the net investment (i.e., expenditures) that occurs in Utah. These net expenditures are the key input into the economic model. Column four represents the (temporary) construction jobs arising from the energy projects, including the multiplier effects. Column five reports the state and local tax revenues created from construction expenditures, including the multiplier effects. Column six represents the permanent jobs from the power plant operations and are reported annually, including the multiplier effects. Column six reports the state and local tax revenues from the annual operations of the power plants, including the multiplier effects. The tax contributions do not include federal taxes.

Tables 4 thorough 6, likewise are all formatted the same, displaying Labor Income, Gross State Product, and Output, in succession. Results are displayed for both construction (i.e.: Temporary) and operations (i.e. Permanent) scenarios. Definitions of each of these terms are contained in the following Economic Impact Methodology & Terminology section.

Table 1: 2025 Scenario, Summary Statistics

Case	Total Investment by 2025 ($M)	Local Investment in Utah ($M)	Temporary Contributions		Permanent Contributions	
			New Temporary Utah Jobs (FTE)	New Temporary Tax Revenue ($M)	New Permanent Utah Jobs (FTE)	New Permanent Tax Revenue ($M)
Base Case	$2,825.08	$1,091.82	10,910	$136.44	257	$9.19
Mid Case	$2,780.76	$1,094.93	11,763	$147.38	278	$9.50
High Case	$2,919.40	$1,146.35	12,315	$154.72	292	$10.04

Table 2: 2030 Scenario, Summary Statistics [1]

Case	Total Investment by 2025 ($M)	Local Investment in Utah ($M)	Temporary Contributions		Permanent Contributions	
			New Temporary Utah Jobs (FTE)	New Temporary Tax Revenue ($M)	New Permanent Utah Jobs (FTE)	New Permanent Tax Revenue ($M)
Base Case	$4,839.69	$1,857.84	19,981	$256.41	485	$16.03
Mid Case	$5,423.91	$2,080.34	22,323	$287.13	546	$18.51
High Case	$6,772.91	$2,535.59	27,216	$358.31	689	$22.76

Table 3: 2040 Scenario, Summary Statistics

Case	Total Investment by 2025 ($M)	Local Investment in Utah ($M)	Temporary Contributions		Permanent Contributions	
			New Temporary Utah Jobs (FTE)	New Temporary Tax Revenue ($M)	New Permanent Utah Jobs (FTE)	New Permanent Tax Revenue ($M)
Base Case	$6,347.19	$2,439.51	26,281	$336.43	641	$20.70
Mid Case	$7,862.13	$3,023.00	32,437	$416.16	798	$26.56
High Case	$9,643.38	$3,651.23	39,198	$510.29	988	$32.67

[1] The 2030 scenario is the most comprehensive of the three scenarios in that it measures not only the impact of energy production but also energy transmission.

Table 4: 2025 Scenario, Detailed Statistics ($M)

Case	Temporary Contributions			Permanent Contributions		
	Labor Income	Gross State Product	Output	Labor Income	Gross State Product	Output
Base Case	$630.7	$996.6	$1,886.8	$22.8	$62.3	$115.0
Mid Case	$679.9	$1,074.7	$2,034.3	$24.6	$67.5	$124.7
High Case	$711.8	$1,125.5	$2,130.0	$25.9	$71.1	$131.5

Table 5: 2030 Scenario, Detailed Statistics, ($M)

Case	Temporary Contributions			Permanent Contributions		
	Labor Income	Gross State Product	Output	Labor Income	Gross State Product	Output
Base Case	$1,153.6	$1,839.8	$3,441.0	$42.6	$114.0	$211.4
Mid Case	$1,288.8	$2,054.3	$3,849.1	$48.0	$130.6	$242.8
High Case	$1,569.8	$2,519.1	$4,677.1	$59.7	$160.2	$297.8

Table 6: 2040 Scenario, Detailed Statistics, ($M)

Case	Temporary Contributions			Permanent Contributions		
	Labor Income	Gross State Product	Output	Labor Income	Gross State Product	Output
Base Case	$1,517.9	$2,413.3	$4,524.7	$55.7	$147.9	$270.7
Mid Case	$1,873.3	$2,977.6	$5,592.9	$69.4	$188.1	$346.0
High Case	$2,262.6	$3,607.5	$6,749.4	$85.1	$230.5	$423.3

Results Description

Five output metrics that measure economic contribution are contained in this report: 1) Sales (output), 2) Gross state product, 3) Labor Income, 4) Jobs, and 5) Taxes.

Sales (e.g.: output) is the broadest measure of impacts and is considered a gross measure of economic contributions. Gross state product is a subset of sales, and is considered a net measure of economic contributions. Labor income is a subset of GSP. Mostly, taxes are a subset of GSP as well (formally, indirect business taxes). (Further details are included in the Economic Impact Methodology & Terminology section).

Jobs

- The temporary (construction) job contributions range from 10,910 job-years in the 2025 Base Case to 39,198 job-years in the 2040 High Case.

- Permanent job contributions (I.e., from operations) range from 257 jobs in the 2025 Base Case to 988 jobs in the 2040 High Case.

Taxes

- The temporary (construction) tax contributions range from $136.4 million in the 2025 Base Case to $3.65 billion in the 2040 High Case.
- Permanent tax contributions (I.e., from operations) range from $9.19 million in the 2025 Base Case to $32.67 million in the 2040 High Case.

Labor Income

- The temporary (construction) labor income contributions range from $630.7 million in the 2025 Base Case to $2.26 billion in the 2040 High Case.
- Permanent labor income contributions (I.e., from operations) range from $22.78 million in the 2025 Base Case to $85.14 million in the 2040 High Case.

Gross state product (GSP)

- The temporary (construction) GSP tax contributions range from $996.56 million in the 2025 Base Case to $3.65 billion in the 2040 High Case.
- Permanent GSP contributions (I.e., from operations) range from $62.29 million in the Base Case to $230.48 million in the 2040 High Case.

Sales (output)

- The temporary (construction) sales (output) range from $1.87 billion in the 2025 Base Case to $3.65 billion in the 2040 High Case.
- Permanent sales (output) contributions (I.e., from operations) range from $62.29 million in the Base Case to $230.48 billion in the 2040 High Case.

Economic Impact Methodology & Terminology

To generate this EIA, PC used the IMPLAN input-output (I-O) model. IMPLAN is a subscription-based tool that utilized data from a wide variety of public-sector sources to measure economic activities for all 3,000+ counties in the United States. IMPLAN uses annual, regional data to map businesses' and households' buying/selling relationships in order to predict how specific economic changes will impact a regional economy. With the model users are allowed to change metrics such as employment, earnings, and output (or sales) for any of 546 sectors, and see how those changes would ripple across all sectors of the regional economy. The IMPLAN model includes numerous built-in metrics for industries, such as employment, output, local spending coefficients, industry-specific spending patterns, payroll, exports and imports, profit margins, and so on. In this case, PC evaluated IMPLAN's default assumptions and made adjustments where necessary to ensure that each scenario most closely matches the scenarios outlined by Energy Strategies.

PC used the standard three channels of impact that are included in any EIA. Added together these channels result in the total economic impact to a region. These channels are identified as follows:

- Direct effect – effects directly upon a given industry/industries selected by the user. In this case, industries include various types of energy production and energy transmission.
- Indirect effect – effects upon the selected industries' supply-chains. In other words, how changes in production at the direct level affect purchase of required product and service inputs. Indirect effects measure not only first-round supply chain affects but also effects on industries that sell to those industries (i.e., secondary and tertiary supply chain impacts). Indirect effects are the first component of "multiplier effects."
- Induced effect – effects of increased spending of households' wages on locally produced goods and services. Induced effects are the second component of "multiplier effects."

One issue that occasionally causes confusion for users of EIA are the duration of impacts. Categories tabulated for the construction phase are one-time, based on the duration of the project. In other words, impacts will be the same regardless of whether construction requires 6 months or 30 months. Alternatively, metrics related to the operations phase exist annually, as long as the facility continues operating at the same scale.

EIA Terminology

For each given channel, IMPLAN provides many metrics that explain the extent of impacts. PC limited our reporting to metrics of interest to Energy Strategies including: local investment, employment, labor income, gross state product, and state/local tax revenue. The following definitions provide greater details related to these metrics:

- Gross inputs – represents the total capital investment of energy companies to set-up and construct a facility for the level of megawatt production estimated by Energy

Strategies. This value includes both construct[2]ion services and capital equipment purchases.[3]

- Net inputs – gross inputs are adjusted according to the estimated level of in-state purchases during the construction phase. Level of in-state purchases were determined uniquely for each field of energy production/transmission using a combination of IMPLAN and JEDI.
- Employment (or Jobs) – jobs created or sustained in each scenario. IMPLAN's employment estimates are in terms of full-time equivalent positions. For construction jobs, employment is in terms of job-years (i.e.: equivalent number of full-time persons employed over the course of one-year).
- Labor Income – represents wages, salary, and benefits collected by employees, contractors, and other paid workers to support the given project. This category excludes income accrued to owners and investors.
- Gross State Product (GSP) –GSP is a more conservative, and accurate, measure of impact than Output because it only quantifies the value-added by companies to the inputs that they received. Technically speaking, GSP includes employee compensation, proprietor income, taxes on production and imports and other property income, and excludes the value of intermediate inputs.
- Output – also sometimes referred to as "sales," output refers to the economic value of a good or service rendered in the marketplace. Wholesale and retail sectors are treated slightly differently, in that industry specific margins are taken into account.
- Taxes- For this study, taxes are inclusive of property, sales/excise and income at the state and local levels. IMPLAN's model accounts for many state specific nuances in tax collections. Given that the energy sector is regularly subject to sales tax exemptions specific to alternative energy, gross sales estimates were significantly discounted by PC in this study.

[2] For example, if a project were to be equally spread over two years and there were a total of 100 job-years, then there would be 50 job-years reported for each of the two years.
[3] Please note, gross input values used by PC directly match those provided by Energy Strategies in the provided "Total Investment" worksheet.

Project-Specific Methodology Notes

Data Sources

Energy Strategies provided the key input metrics for the analyses which included the total overnight construction costs of each proposed installation by energy type and the installed cumulative megawatt capacity. They also provided data on the overnight costs of the transmission grid expansion.

Detailed construction and operations budgets were obtained from the JEDI energy models: *Jobs & Economic Development Impact Models* (Jobs and Economic Development Impact (JEDI) Models | NREL), produced by the National Renewable Energy Laboratory (NREL). Specifically, PC reviewed the JEDI Natural Gas Model, Wind Model, Concentrating Solar Power Model, and the Transmission Line Model. The most important metric in these models was the detailed construction and operations budgets.

A 2019 IMPLAN (Economic Impact Analysis for Planning | IMPLAN) model for Utah State was constructed to calculate the economic impacts. Additionally, the Emsi database (Emsi: Labor Market Analytics (economicmodeling.com) was also available to assist with results validation. Lastly, at the request of Energy Strategies, all of the results of this study are reported in constant 2018 dollars (both inputs and outputs).

Analyses

There were four basic analyses address within the study. These four were ultimately adjusted within spreadsheets using linear scaling techniques to arrive at the end results.

- First, were the construction contributions of the powerplants. These contributions are temporary and are assumed to have a one-year duration for each project.
- The second analysis measures the contributions from the construction of the transmission grid. These contributions are temporary and the jobs are also reported in job-years.
- The third analysis measures the contributions of the operations of the power plants which are reported annually.
- The fourth analysis measures the contributions of the operations of the transmission grid which also occur annually.

Individual analyses were conducted for the construction and operations by energy type, by case, and by scenario. Overall, PC completed 41 construction model runs and 41 operation runs, for a total of 82 individual analyses.

Economic Base Assumption

This analysis is founded on economic base theory. A local or regional economy has two types of industries: base industries and non-base industries. Any economic activity that brings money in to the local economy from the outside is considered a base industry. A base industry is sometimes identified as an export industry, which is defined as any economic activity that brings new monies in to the community from outside. For example, base industries can include high-technology companies, federal government operations, and

other manufacturing and service firms. Firms providing services to individuals living outside the region's trade center, such as medical and legal services, are included in the region's economic base. Payments from state and federal governments (including Social Security, Medicare, university funding, retirement accounts, and welfare payments) are sources of outside income to businesses and residents. These are counted as part of the economic base.

Non-base industries are defined as economic activity within a region that support local consumers and businesses within the base sector. They re-circulate incomes generated within the region from the base industries. Such activities include, but are not limited to, shopping malls that serve the local population, business and personal services consumed locally, barbers, medical services consumed locally, and local construction contracts. Non-base industries support the base industries.

Base industries are sometimes confused with non-base industries. For example, some county economies have large retail trade sectors that produce a paradox: they employ a substantial percentage of the workforce but actually contribute little to the local economy because most of the retail sales are local. They bring little new money into the community. Thus, it appears from the size effect that the retail trade sector contributes a large amount of employment and earnings to the economy. Most of this employment and earning activity is allocated or attributed to other local "export" industries that bring revenues into the community from outside sales. From an economic base perspective, which determines the economic "drivers" of the economy, the retail trade sector is much smaller. Only the retail trade activities serving visitors from outside the area can be counted as economic base activity.

Economic base analysis is important for identifying the vital export industries of a region. Non-base industries, on the other hand, are important for keeping money within a region and stimulating local economic activity for residents. In this respect, non-base industries are said to deepen the economy while export industries are said to broaden it. For example, suppose a Utah patient elects surgery at a Salt Lake City hospital instead of traveling to a medical center in San Francisco, California. The substitution of local services for an imported service represents an increase in the demand for local business services. Keeping income in the community enhances the multiplier effects of the export industries. The overall effect of import substitution can be viewed as an analogous increase in demand for an export industry.

Expenditure-Driven Approach

Electricity markets are regionally vast and not limited to political boundaries, such as Utah's state border. Electricity produced from a specific power plant tends to be diffused across large regional markets. Identification of the specific geographical location of the end-use of revenues and expenditures from electrical power plants can be problematic and was outside the scope of this study. The approach of this analysis is to focus on the expenditures generated within Utah that could be reasonably validated.

Identifying Utah Construction Expenditures

This study focused on evaluating the key input drivers of the economic contribution analysis for the energy projects. The most important metric was the determination of the portion of construction and operating expenditures that occurred in Utah and the portion that occurred out-of-state. Only in-state expenditures are counted towards the calculations of the economic contributions. For energy projects, a substantial portion of the plant and equipment are manufactured out-of-state and are not included in the calculation of the economic contributions. Out-of-state imports are, however, still taxed at the standard Utah sales tax rate, so they are considered within that section of our analysis.

In Table 4, the total overnight construction costs are situated in the column labeled Gross Inputs. Adjacent to this column are the Net Inputs which represents the estimated dollar expenditures occurring in Utah state. Net inputs include both the direct labor expenses and the materials and supplies purchased in Utah. The percentage of in-state expenditures per project ranges from a low of 24% for wind energy projects to 42% for solar projects. This is consistent with other energy related projects conducted by the principal investors of this project.

Identifying Utah Labor Expenditures

Several important assumptions were made in this analysis with regards to direct labor. It was assumed that the general contractors would largely be from Utah-based companies and the suppliers and contractors in the supply chain would give preference to Utah-based companies. The labor needed for energy projects would be mostly drawn from the Utah labor market. This would be partially dependent on the projects' location within the state. Utah has an excellent interstate and highway system, making most construction sites accessible to commuting workers. PC estimate that about 88% of all construction labor would be drawn within the Utah labor market. If the general contractor were chosen outside the state, then the labor component would be reduced accordingly. It was also assumed that most of the professional expertise needed for the projects would be acquired in Utah.

Construction Inputs to IMPLAN

IMPLAN has thirteen construction sectors in the model. The sector most applicable is IMPLAN *Sector 52: Construction of new power and communication structures.* The sector has a detailed production function that tracks the backward linkages of energy construction expenditures throughout all other sectors in the economy. Where more detailed sector data was available, it was utilized in the calculation of the economic impacts. Some professional services were identified separately in the budgets and they were entered into the IMPLAN *Sector 457: Architectural, engineering, and related services.* Management services (where identified) were entered into *Sector 462: Management consulting services.* Retail trade was reported separately in some cases and entered into the IMPLAN *Sector 405 Retail - Building material and garden equipment and supplies stores.*

The IMPLAN model is very robust, allowing for both high level analyses when data is limited and much more granular results when greater data is available. Our team used a mix of both levels of detail in this analysis.

Operating Expenditure Inputs to IMPLAN

The JEDI models report operating revenue and expenditure budgets. PC utilized the data from these budgets in calculating the economic contributions from the operations of the energy plants. PC included only the operating contributions created by the expenditure flows from actual plant and transmission operations. The results exclude the majority of the financing and owner return expenditures which are assumed to largely flow out-of-state.

Multipliers

The average employment multiplier for temporary (construction) projects was 1.85, in other words, for every one direct construction job an additional 0.85 jobs are created or retained. The average labor income multiplier was 1.67. The gross state product multiplier was 1.75. The average sales (output) multiplier was 1.82. These multipliers are in the standard range for construction projects in a state economy the size of Utah.

The average employment multiplier for permanent operations jobs was 4.26, in other words, for every direct operations job, a total of 4.26 jobs are created in the economy (including the multiplier effects). The average multiplier for labor income was 2.15. The gross state product multiplier was 1.72. The average sales (output) multiplier was 1.84. These are in the standard range for energy generation in a state economy the size of Utah.

Appendix A: Detailed EIA Scenario Tables

Detailed tables for each of the scenarios provided by Energy Strategies are provided in the following tables. All data can be cross-referenced across Tables 4 through 6 using the first three columns of information (Type, Year, and Case/Scenario). Please note, in interest of preserving space, all monetary values are in $M.

Table 7: Construction Phase: Model Inputs and Percent In-State Spending Capture

Type	Year	Case/Scenario	Net Inputs	Gross Inputs	In-State %
Transmission	NA	Base/ Mid Case	$100.5	$325.0	31%
Transmission	NA	High Case	$178.6	$577.8	31%
Wind	25	Base Case	$43.9	$179.5	24%
Wind	30	Base Case	$73.9	$302.2	24%
Wind	40	Base Case	$109.0	$445.4	24%
Wind	25	Mid Case	$50.7	$207.1	24%
Wind	30	Mid Case	$110.7	$452.5	24%
Wind	40	Mid Case	$178.1	$727.9	24%
Wind	25	High Case	$57.4	$234.8	24%
Wind	30	High Case	$150.5	$615.0	24%
Wind	40	High Case	$255.6	$1,044.7	24%
Solar + Storage	25	Base Case	$958.9	$2,364.0	41%
Solar + Storage	30	Base Case	$1,581.2	$3,898.2	41%
Solar + Storage	40	Base Case	$2,036.5	$5,020.8	41%
Solar + Storage	25	Mid Case	$1,006.5	$2,481.5	41%
Solar + Storage	30	Mid Case	$1,707.7	$4,210.3	41%
Solar + Storage	40	Mid Case	$2,250.8	$5,549.2	41%
Solar + Storage	25	High Case	$1,048.2	$2,584.2	41%
Solar + Storage	30	High Case	$1,851.6	$4,565.0	41%
Solar + Storage	40	High Case	$2,520.0	$6,212.9	41%
Solar	25	Base Case	-	-	
Solar	30	Base Case	-	-	
Solar	40	Base Case	-	-	
Solar	25	Mid Case	$9.2	$21.9	42%
Solar	30	Mid Case	$41.0	$97.1	42%
Solar	40	Mid Case	$160.1	$379.1	42%
Solar	25	High Case	-	-	
Solar	30	High Case	$63.6	$150.5	42%
Solar	40	High Case	$134.4	$318.1	42%
Battery	25	Base Case	$12.2	$30.1	41%
Battery	30	Base Case	$25.5	$62.8	41%

Type	Year	Case/Scenario	Net Inputs	Gross Inputs	In-State %
Battery	40	Base Case	$100.9	$248.7	41%
Battery	25	Mid Case	$28.5	$70.3	41%
Battery	30	Mid Case	$68.3	$168.3	41%
Battery	40	Mid Case	$265.5	$654.5	41%
Battery	25	High Case	$40.7	$100.4	41%
Battery	30	High Case	$110.3	$272.0	41%
Battery	40	High Case	$443.8	$1,094.2	41%
Natural Gas	25	Base Case	$76.8	$251.4	31%
Natural Gas	30	Base Case	$76.8	$251.4	31%
Natural Gas	40	Base Case	$193.2	$632.2	31%
Natural Gas	25	Mid Case	-	-	
Natural Gas	30	Mid Case	$52.1	$170.6	31%
Natural Gas	40	Mid Case	$168.5	$551.4	31%
Natural Gas	25	High Case	-	-	
Natural Gas	30	High Case	$181.1	$592.7	31%
Natural Gas	40	High Case	$297.4	$973.5	31%

Table 8: Construction Phase: Model Outputs and Taxes

Type	Y	Case/Scenario	Jobs	Labor Income	Gross State Product	Output	Prop-erty	Sales/Ex cise	Income	Total
Trans-mission	N A	Base/ Mid Case	1,065	$60.6	$107.1	$177.7	$1.4	$13.3	$2.4	$17.1
Trans-mission	N A	High Case	1,893	$107.8	$190.4	$315.8	$2.4	$23.6	$4.3	$30.3
Wind	25	Base Case	435	$24.6	$43.1	$76.0	$0.61	$7.65	$0.98	$9.25
Wind	30	Base Case	733	$41.4	$72.6	$128.0	$1.03	$12.88	$1.65	$15.57
Wind	40	Base Case	1,080	$61.0	$107.0	$188.7	$1.52	$18.99	$2.43	$22.94
Wind	25	Mid Case	502	$28.4	$49.8	$87.7	$0.71	$8.83	$1.13	$10.67
Wind	30	Mid Case	1,097	$62.0	$108.7	$191.7	$1.55	$19.29	$2.47	$23.31
Wind	40	Mid Case	1,765	$99.7	$174.9	$308.3	$2.49	$31.03	$3.97	$37.49
Wind	25	High Case	569	$32.1	$56.4	$99.4	$0.80	$10.01	$1.28	$12.09
Wind	30	High Case	1,491	$84.2	$147.8	$260.5	$2.10	$26.22	$3.35	$31.68
Wind	40	High Case	2,533	$143.1	$251.1	$442.5	$3.57	$44.54	$5.70	$53.81
Solar + Storage	25	Base Case	10,343	$598.5	$941.4	$1,788.0	$12.53	$90.13	$22.94	$125.59
Solar + Storage	30	Base Case	17,056	$986.9	$1,552.4	$2,948.4	$20.66	$148.62	$37.82	$207.10
Solar + Storage	40	Base Case	21,968	$1,271.1	$1,999.5	$3,797.5	$26.61	$191.42	$48.72	$266.74
Solar + Storage	25	Mid Case	10,857	$628.2	$988.2	$1,876.8	$13.15	$94.60	$24.08	$131.83

Type	Y	Case/Scenario	Jobs	Labor Income	Gross State Product	Output	Property	Sales/Excise	Income	Total
Solar + Storage	30	Mid Case	18,421	$1,065.9	$1,676.7	$3,184.5	$22.31	$160.52	$40.85	$223.68
Solar + Storage	40	Mid Case	24,279	$1,404.8	$2,209.9	$4,197.1	$29.41	$211.56	$53.84	$294.82
Solar + Storage	25	High Case	11,307	$654.2	$1,029.1	$1,954.6	$13.70	$98.52	$25.07	$137.29
Solar + Storage	30	High Case	19,973	$1,155.7	$1,817.9	$3,452.7	$24.19	$174.04	$44.29	$242.53
Solar + Storage	40	High Case	27,183	$1,572.8	$2,474.2	$4,699.1	$32.93	$236.86	$60.28	$330.07
Solar	25	Base Case	-	-	-	-	-	-	-	-
Solar	30	Base Case	-	-	-	-	-	-	-	-
Solar	40	Base Case	-	-	-	-	-	-	-	-
Solar	25	Mid Case	96	$5.5	$8.7	$16.5	$0.12	$0.82	$0.21	$1.14
Solar	30	Mid Case	425	$24.6	$38.7	$73.5	$0.51	$3.62	$0.94	$5.08
Solar	40	Mid Case	1,658	$96.0	$151.0	$286.7	$2.01	$14.14	$3.68	$19.83
Solar	25	High Case	-	-	-	-	-	-	-	-
Solar	30	High Case	658	$38.1	$59.9	$113.8	$0.80	$5.61	$1.46	$7.87
Solar	40	High Case	1,392	$80.5	$126.7	$240.6	$1.69	$11.87	$3.09	$16.64
Battery	25	Base Case	132	$7.6	$12.0	$22.8	$0.16	$1.15	$0.29	$1.60
Battery	30	Base Case	275	$15.9	$25.0	$47.5	$0.33	$2.39	$0.61	$3.34
Battery	40	Base Case	1,088	$63.0	$99.0	$188.1	$1.32	$9.48	$2.41	$13.21
Battery	25	Mid Case	307	$17.8	$28.0	$53.2	$0.37	$2.68	$0.68	$3.73
Battery	30	Mid Case	736	$42.6	$67.0	$127.3	$0.89	$6.42	$1.63	$8.94
Battery	40	Mid Case	2,864	$165.7	$260.7	$495.0	$3.47	$24.95	$6.35	$34.77
Battery	25	High Case	439	$25.4	$40.0	$75.9	$0.53	$3.83	$0.97	$5.33
Battery	30	High Case	1,190	$68.9	$108.3	$205.7	$1.44	$10.37	$2.64	$14.45
Battery	40	High Case	4,787	$277.0	$435.8	$827.6	$5.80	$41.72	$10.62	$58.13
Natural Gas	25	Base Case	-	$0.0	$0.0	$0.0	$0.00	$0.00	$0.00	$0.00
Natural Gas	30	Base Case	853	$48.9	$82.6	$139.4	$1.07	$10.34	$1.92	$13.34
Natural Gas	40	Base Case	2,145	$122.8	$207.7	$350.5	$2.69	$26.01	$4.83	$33.53
Natural Gas	25	Mid Case	-	-	-	-	-	-	-	-
Natural Gas	30	Mid Case	579	$33.2	$56.1	$94.6	$0.73	$7.02	$1.30	$9.05
Natural Gas	40	Mid Case	1,871	$107.1	$181.2	$305.7	$2.35	$22.69	$4.22	$29.25
Natural Gas	25	High Case	-	-	-	-	-	-	-	-
Natural Gas	30	High Case	2,011	$115.2	$194.7	$328.5	$2.52	$24.38	$4.53	$31.44
Natural Gas	40	High Case	3,303	$189.1	$319.8	$539.6	$4.14	$40.05	$7.44	$51.63

Table 9: Operations Phase: Model Outputs and Taxes

Type	Y	Case/Scenario	Jobs	Labor Income	Gross State Product	Output	Property	Sales/Excise	Income	Total
Trans-mission	NA	Base/ Mid Case	32	$2.8	$7.2	$15.2	$0.3	$0.6	$0.1	$1.1
Trans-mission	NA	High Case	57	$5.0	$12.8	$27.1	$0.6	$1.1	$0.2	$1.9
Wind	25	Base Case	24	$1.8	$7.0	$13.6	$0.39	$0.69	$0.10	$1.18
Wind	30	Base Case	41	$3.1	$11.8	$22.9	$0.66	$1.16	$0.16	$1.98
Wind	40	Base Case	61	$4.5	$17.4	$33.7	$0.97	$1.70	$0.24	$2.92
Wind	25	Mid Case	28	$2.1	$8.1	$15.7	$0.45	$0.79	$0.11	$1.36
Wind	30	Mid Case	61	$4.6	$17.6	$34.2	$0.99	$1.73	$0.24	$2.96
Wind	40	Mid Case	99	$7.4	$28.4	$55.1	$1.59	$2.78	$0.39	$4.76
Wind	25	High Case	32	$2.4	$9.2	$17.8	$0.51	$0.90	$0.13	$1.54
Wind	30	High Case	84	$6.3	$24.0	$46.5	$1.34	$2.35	$0.33	$4.03
Wind	40	High Case	142	$10.7	$40.7	$79.1	$2.28	$4.00	$0.56	$6.84
Solar + Storage	25	Base Case	229	$20.7	$54.6	$100.2	$2.38	$4.17	$0.93	$7.48
Solar + Storage	30	Base Case	378	$34.1	$90.0	$165.2	$3.92	$6.88	$1.54	$12.34
Solar + Storage	40	Base Case	487	$43.9	$115.9	$212.7	$5.05	$8.86	$1.98	$15.90
Solar + Storage	25	Mid Case	241	$21.7	$57.3	$105.1	$2.50	$4.38	$0.98	$7.86
Solar + Storage	30	Mid Case	409	$36.8	$97.2	$178.4	$4.24	$7.43	$1.66	$13.33
Solar + Storage	40	Mid Case	538	$48.6	$128.2	$235.1	$5.58	$9.79	$2.19	$17.57
Solar + Storage	25	High Case	251	$22.6	$59.7	$109.5	$2.60	$4.56	$1.02	$8.18
Solar + Storage	30	High Case	443	$40.0	$105.4	$193.4	$4.59	$8.06	$1.80	$14.45
Solar + Storage	40	High Case	603	$54.4	$143.5	$263.2	$6.25	$10.97	$2.45	$19.67
Solar	25	Base Case	-	-	-	-	-	-	-	-
Solar	30	Base Case	-	-	-	-	-	-	-	-
Solar	40	Base Case	-	-	-	-	-	-	-	-
Solar	25	Mid Case	2	$0.2	$0.5	$0.9	$0.02	$0.04	$0.01	$0.07
Solar	30	Mid Case	9	$0.8	$2.2	$4.1	$0.10	$0.17	$0.04	$0.31
Solar	40	Mid Case	37	$3.3	$8.8	$16.1	$0.38	$0.67	$0.15	$1.20
Solar	25	High Case	-	-	-	-	-	-	-	-
Solar	30	High Case	15	$1.3	$3.5	$6.4	$0.15	$0.27	$0.06	$0.48
Solar	40	High Case	31	$2.8	$7.3	$13.5	$0.32	$0.56	$0.13	$1.01
Battery	25	Base Case	3	$0.3	$0.7	$1.3	$0.03	$0.05	$0.01	$0.10
Battery	30	Base Case	6	$0.5	$1.5	$2.7	$0.06	$0.11	$0.02	$0.20
Battery	40	Base Case	24	$2.2	$5.7	$10.5	$0.25	$0.44	$0.10	$0.79
Battery	25	Mid Case	7	$0.6	$1.6	$3.0	$0.07	$0.12	$0.03	$0.22

Type	Y	Case/Scenario	Jobs	Labor Income	Gross State Product	Output	Property	Sales/Excise	Income	Total
Battery	30	Mid Case	16	$1.5	$3.9	$7.1	$0.17	$0.30	$0.07	$0.53
Battery	40	Mid Case	64	$5.7	$15.1	$27.7	$0.66	$1.16	$0.26	$2.07
Battery	25	High Case	10	$0.9	$2.3	$4.3	$0.10	$0.18	$0.04	$0.32
Battery	30	High Case	26	$2.4	$6.3	$11.5	$0.27	$0.48	$0.11	$0.86
Battery	40	High Case	106	$9.6	$25.3	$46.4	$1.10	$1.93	$0.43	$3.46
Natural Gas	25	Base Case	-	$0.0	$0.0	$0.0	$0.13	$0.23	$0.08	$0.44
Natural Gas	30	Base Case	27	$2.0	$3.5	$5.5	$0.13	$0.23	$0.08	$0.44
Natural Gas	40	Base Case	69	$5.0	$8.9	$13.8	$0.33	$0.57	$0.20	$1.10
Natural Gas	25	Mid Case	-	-	-	-	-	-	-	-
Natural Gas	30	Mid Case	19	$1.4	$2.4	$3.7	$0.09	$0.16	$0.05	$0.30
Natural Gas	40	Mid Case	60	$4.4	$7.7	$12.0	$0.29	$0.50	$0.17	$0.96
Natural Gas	25	High Case	-	-	-	-	-	-	-	-
Natural Gas	30	High Case	64	$4.7	$8.3	$12.9	$0.31	$0.54	$0.18	$1.03
Natural Gas	40	High Case	106	$7.8	$13.7	$21.2	$0.50	$0.88	$0.30	$1.69

Appendix B: About Points Consulting

At Points Consulting (PC) we believe in the power of peoples' interests, passions, and behaviors to shape the world arounds us. Now more than ever, people are the primary factor in the success of businesses, organizations and communities. For that reason, our work is focused not only on how people impact communities and organizations, but how to align their potential to create more successful outcomes for all.

We partner with a variety of industries including state and local government agencies, higher education, not-for-profits, real estate developers, and private companies to understand and unleash the power of the workforce in our midst. Built on our experience advising hundreds of high performing organizations, Points Consulting strives to answer complex economic questions and recommend workable solutions. In summary, at Points Consulting we believe in "Improving Economies. Optimizing Workforce."

PC has 13+ years' experience conducting economic impact analysis (EIA), as well as other regional market and industry analyses. Much or our work is focused on issues specific to rural western communities in state such as Washington, Wyoming, Utah and Idaho. Specifically related to EIA, our team has conducted 30+ boutique economic impact analyses over the past 10-years including recent engagements with institutions such as the Kentucky Cabinet for Economic Development, Cal Poly- San Luis Obispo, and Purdue University.