
Revised Report

Economic Impact Analysis for the Teanaway Solar Reserve Kittitas County, Washington

Prepared for
Teanaway Solar Reserve, LLC

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Executive Summary

Teaway Solar Reserve, LLC (Applicant) proposes to construct and operate a solar energy project known as the Teaway Solar Reserve project (project) on private land in an unincorporated area of Kittitas County, Washington. The project will generate up to 75 direct current megawatts (dcMW) of photovoltaic (PV) solar energy on approximately 580 acres of land within the 982-acre proposed project boundary. Although project construction is expected to occur over a 2- to 3-year period, the analysis presented in this report assumes that construction would occur over a 3-year period. A summary of the estimated development costs for the project is provided in Table ES-1.

TABLE ES-1
Estimated Development Costs of the Proposed Teaway Solar Reserve, 2009 Million Dollars

	Total Capital Cost	Total Materials Expenditure	Total Construction Payroll
Out of County	\$150 - \$200	\$142.5 - \$190	\$7.5 - \$10
In-County (local)	\$150	\$97.5	\$52.5
Total	\$300 - \$350	\$240 - \$287.5	\$60 - \$62.5

Source: CH2M HILL, 2009.

This report provides a screening-level economic analysis of the project's impacts on Kittitas County and a regional economic analysis of the project's benefits to the County. The amounts shown are based on current estimates and are subject to change as the project definition evolves.

Property and Sales Tax Effects

Kittitas County will benefit from substantial property and sales taxes collected during construction and operation of the project.

The total value of goods and services that will be purchased locally (within Kittitas County) during the three construction seasons is estimated to be \$97.5 million. The total value of goods and services that will be purchased locally during operation is estimated to be \$525,510 per year. Table ES-2 shows the resulting sales tax revenue in Kittitas County during construction and operation of the project.

TABLE ES-2
 Estimated Annual Sales Tax Revenue on Goods and Services During Construction and Operation

	Construction	Operations
State	\$2,112,500	\$34,160
County	\$487,500	\$7,880
Total Annual Sales Tax Revenue from Project	\$2,600,000	\$42,040
Percent Increase in County Sales Tax Revenues*	13.3%	0.2%

Sources: CH2M HILL, 2009; Kittitas County, 2009b.

* Kittitas County fiscal year 2008-09 amended budget sales taxes were \$3,679,244.

In addition to the sales tax revenue generated during construction and operation, the project also provides property tax revenues. The property tax rate is assumed to be \$5.20134 per \$1,000 of assessed value and does not include a fire district levy because the property is currently undeveloped. Of the total annual property tax revenues of \$1,560,470 to \$1,820,470 generated by the project, \$267,610 to \$312,210 goes to the County while the remaining \$1,292,800 to \$1,508,260 goes to the various taxing districts within the county. The \$267,610 to \$312,210 that goes to the County constitutes between 5.4 and 6.3 percent of the total 2008 County property tax revenues. Table ES-3 shows the distribution of the estimated annual property tax revenue between the various taxing districts in Kittitas County.

TABLE ES-3
 Estimated Annual Property Tax Revenue During Operation

Taxing Districts	Operation (assuming \$300M capital cost)	Operation (assuming \$350M capital cost)
State (Public Schools)	\$605,530	\$706,460
County Funds	\$267,610	\$312,210
Road District No. 1	\$330,880	\$386,030
School District No. 404, Cle Elum-Roslyn Bond	\$263,680	\$307,630
Hospital District #1	\$92,700	\$108,150
Total Annual Property Tax Revenue from Project	\$1,560,400	\$1,820,470
Percent Increase in County Property Tax Revenues*	5.4%	6.3%

Sources: CH2M HILL, 2009; Kittitas County, 2009b.

* Kittitas County fiscal year 2008-09 amended budget property taxes were \$4,985,000.

Regional Income Effects

During the 3-year construction phase of the project, it is estimated that \$44.75 million in income will be directly generated in Kittitas County from spending for construction of the project annually. In addition, it is estimated that another \$19.3 million in secondary

(indirect¹ and induced²) income will be generated annually for the County. Similarly, during operations, the annual operations and maintenance expenditures of \$2,368,660 will generate \$397,700 in secondary income for the County. Table ES-4 provides an overall summary of project effects on income in the County.

TABLE ES-4
Summary of Income Effects on Kittitas County

	Construction	Operations
Direct Income	\$44,750,000	\$2,368,660
Indirect Income	\$14,814,500	\$45,630
Induced Income	\$4,504,400	\$352,070
Total Income	\$64,068,870	\$2,766,360
Income Multiplier	1.4	1.1

Employment Effects

As shown in Table ES-5, the direct average employment in Kittitas County during each of the three 7-month construction periods is estimated at 225 workers³. Secondary (indirect and induced) employment in the County is estimated at 563 employees. Construction of the project will generate a total of about 789 jobs per year during the 3-year construction period.

In addition to the direct employment of 35 staff, the operational phase of the project will result in secondary employment within Kittitas County of 14 jobs. The project is anticipated to create a total of 49 long-term jobs in the County.

The employment multiplier associated with construction employment is calculated to be 3.5. This means that for every one construction job provided by the project, more than two additional jobs are created in a support capacity. Similarly, the annual operation of the project will generate 49 long-term jobs in the County, with an employment multiplier of 1.4, or for every permanent job created by the project there will be just less than one permanent job created for support services.

¹ Indirect project impacts on the economy include income and employment impacts that result when entities that receive direct purchases from a project in turn purchase goods and services from their own suppliers and additional rounds of expenditures from suppliers continue to occur.

² Induced project impacts on the economy include income and employment impacts from employees directly or indirectly receiving income from the project and responding the income within the economy.

³ Data are calculated on an average annual basis. Because three 7-month construction periods over 3 years are anticipated, the actual number of workers will be proportionally higher based on the actual construction period.

TABLE ES-5
Summary of Employment Impacts to Kittitas County

	Construction	Operations
Direct Employment	225	35
Indirect Employment	403	1
Induced Employment	160	13
Total Employment	789	49
Employment Multiplier	3.5	1.4

Note:

Numbers may not add as a result of rounding.

1.0 Introduction

Teaway Solar Reserve, LLC (Applicant) proposes to construct and operate a solar energy project known as Teaway Solar Reserve (project) on private land in an unincorporated area of Kittitas County, Washington. The project will generate up to 75 direct current megawatts (dcMW) of photovoltaic (PV) solar energy on approximately 580 acres of land within the 982-acre proposed project boundary.

This report provides a fiscal and regional economic analysis of the proposed project's effects on Kittitas County, Washington. Although, construction of the project is expected to occur over a 2- to 3-year construction period, the analysis presented in this report assumes that construction would occur over a 3-year period.

2.0 Economic Setting

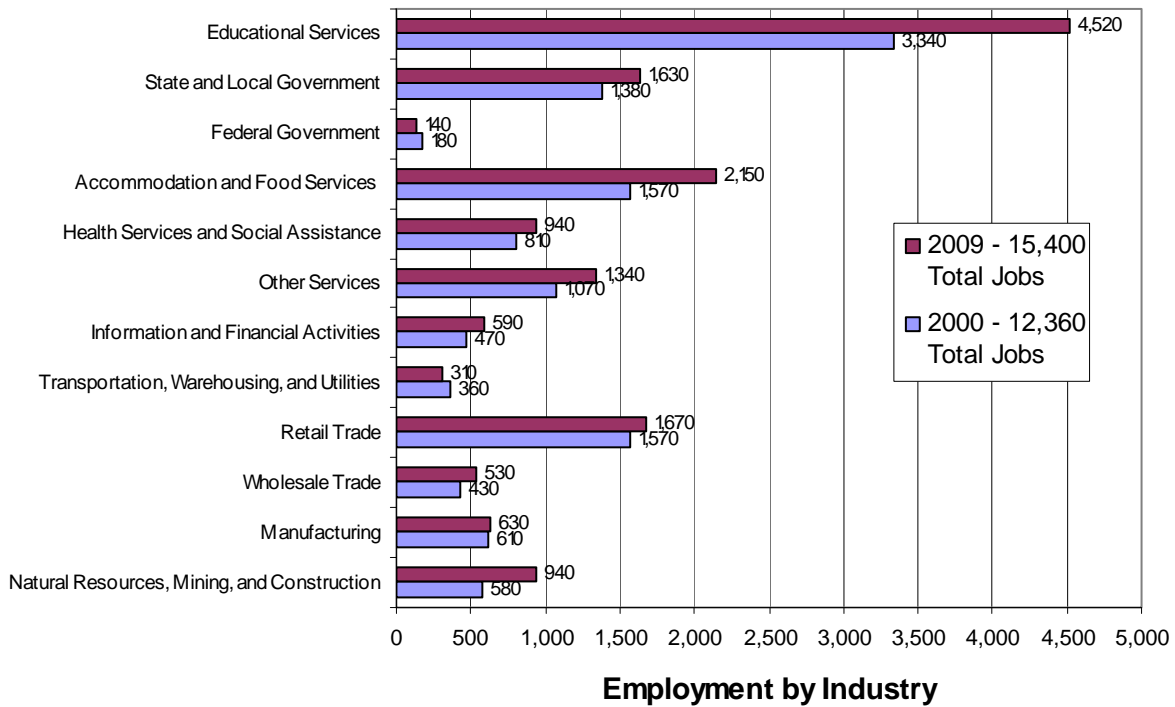
This section describes the existing economic setting in Kittitas County. Employment, income, and fiscal resources are addressed. For purposes of this analysis, the regional area of influence is defined as Kittitas County.

2.1 Existing Economy and Employment

2.1.1 Employment by Industry

Figure 1 displays average employment by industry for Kittitas County. In 2000, an estimated 12,360 people were employed in the County. By 2009, average annual employment had increased nearly 25 percent to 15,400. Employment in the County is concentrated in the educational services, accommodation and food services, state and local government, and retail trade sectors. The educational services sector is dominated by activities at Central Washington University and accounts for approximately 29 percent of total employment in the county. Accommodation and food services represent 14 percent while the retail trade and local and state government sectors each account for approximately 11 percent of total employment.

FIGURE 1
 Average Annual Employment by Industry Sector, 2000 and 2009

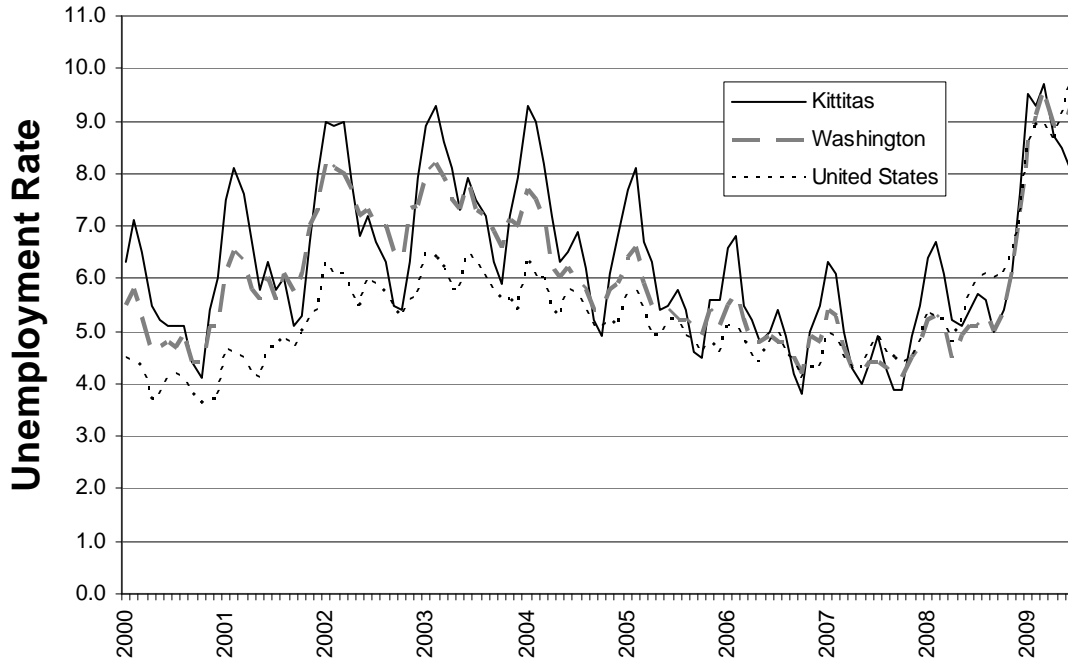


Source: Washington State Employment Security Department (WSES), 2009a.

2.1.2 Unemployment

Recent unemployment rate trends for Kittitas County, Washington State, and the United States are shown in Figure 2. In general, the County’s unemployment rate has trended higher than the state’s average, and has experienced greater volatility. By the end of 2000, the average unemployment rate for the County exceeded the State’s rate by more than 2 percentage points, 6.0 percent versus 3.7 percent. During the strong economic growth period in 2005-2006, the County’s unemployment rate dipped below the state’s average for a short period of time. With the recent national economic recession, unemployment has risen in both the County and State. The June 2009 unemployment rate was 8.1 percent in Kittitas County, 9.2 percent in Washington State, and 9.7 percent in the United States.

FIGURE 2
Unemployment Rate for Kittitas County, Washington State, and the United States

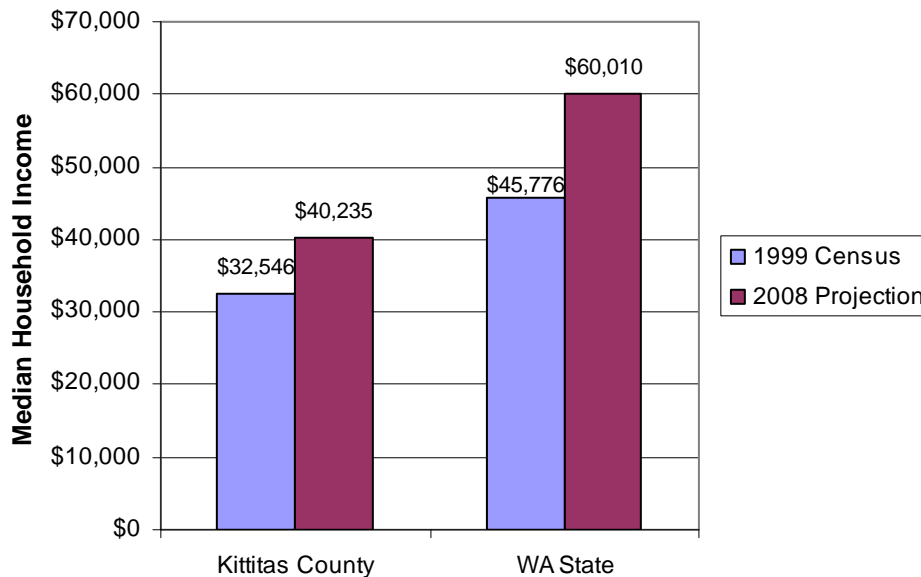


Source: Washington State Employment Security Department (WSES), 2009b.

2.2 Median Household Income

Figure 3 presents median household income data for Kittitas County and Washington State. From 1999 to 2008, median household income in the County increased approximately 24 percent from \$32,546 to \$40,235. Over the same time period, median household income in Washington increased approximately 31 percent from \$45,776 to \$60,010.

FIGURE 3
Median Household Income



Source: Washington State Office of Financial Management (OFM), 2009.

2.3 Existing Fiscal Resources

This section describes the historical and current general fund revenues and expenditures of Kittitas County for the years 2004-2009. Assessed value and sales tax revenues are addressed.

2.3.1 General Fund Revenues and Expenditures

Kittitas County is the local agency with taxing power over the project. Revenues from property taxes are used to fund Kittitas County government, local school districts, county roads, local fire departments, libraries, and emergency medical services. These property tax revenues are also a major source of revenue for the local governments. Incorporated into the consolidated tax levy are local levies collected by the County Assessor and returned to the local jurisdictions as general fund revenues.

Table 1 presents actual revenues and expenses for the Kittitas County general fund from 2004 to 2007. In each year, revenues have exceeded expenditures. In 2007, the Kittitas County general fund had revenues of about \$20 million and expenses of approximately \$18.2 million. Approximately 48 percent of the revenue in 2007 came from taxes. Other sources of revenue include licenses and permits, fines and forfeits, and intergovernmental transfers. Sales taxes were the largest contributors to revenues in 2007. Sales taxes generated about \$5.0 million in revenues. Property taxes, including real and personal property, totaled approximately \$4.3 million in 2007, providing approximately 21 percent of total revenues for the general fund.

TABLE 1
General Fund Revenues and Expenditures, 2004-2007

	2004	2005	2006	2007
Beginning Fund Balance	\$2,533,530	\$3,799,548	\$4,773,644	\$7,150,020
Revenues				
Taxes	\$7,038,968	\$7,757,197	\$9,212,673	\$9,750,240
Licenses and Permits	\$1,018,938	\$1,311,638	\$1,807,461	\$2,091,382
Intergovernmental	\$2,272,802	\$3,102,970	\$3,096,941	\$2,481,261
Charges for Services	\$1,804,983	\$2,003,743	\$2,260,212	\$2,419,214
Fines and Forfeits	\$1,462,387	\$1,248,953	\$1,422,409	\$1,584,200
Miscellaneous	\$705,529	\$1,058,992	\$1,510,483	\$1,864,709
Total Revenue	\$14,303,607	\$16,483,493	\$19,310,179	\$20,191,006
Expenditures				
General Governmental	\$3,321,550	\$4,601,377	\$5,178,409	\$5,820,867
Judicial	\$2,716,999	\$1,896,031	\$2,055,863	\$2,187,140
Security of Persons and Property	\$4,984,954	\$5,435,470	\$5,979,331	\$6,339,222
Physical Environment	\$72,264	\$80,035	\$82,380	\$85,195
Transportation	\$3,717	\$3,717	\$3,717	\$3,717
Economic Environment	\$618,456	\$698,017	\$882,229	\$1,216,431
Culture and Recreation	\$948,845	\$976,285	\$1,127,493	\$1,430,387
Debt Service	\$90,837	\$181,340	\$357,964	\$334,506
Capital Outlay	\$330,351	\$1,982,998	\$1,088,785	\$867,558
Total Expenditure	\$13,087,973	\$15,855,270	\$16,756,171	\$18,285,023
Excess (Deficit) Revenues	\$1,215,634	\$628,223	\$2,554,008	\$1,905,983
Other Financing Sources (Uses)	\$52,301	\$345,876	(\$177,632)	(\$148,829)
Net Change in Fund Balance	\$1,267,935	\$974,099	\$2,376,376	\$1,757,154
Ending Fund Balance	\$3,801,465	\$4,773,647	\$7,150,020	\$8,907,174

Source: Kittitas County, 2009a.

Table 2 presents the amended budget for 2008 and the adopted budget for 2009. Property taxes are expected to account for approximately 24 and 30 percent of total revenues, respectively, in 2008 and 2009. While property tax revenues increased from 2008 to 2009, nearly all other sources of revenue are expected to decrease. The decline in other sources of revenue may be a reflection of the current economic recession. The County also decreased its total expenditures budget by over \$2.6 million dollars from 2008 to 2009.

TABLE 2
 General Fund Revenues and Expenditures, 2008-2009

	2008 Amended Budget	2009 Adopted Budget
Beg Fund Balance	\$5,864,631	\$5,945,249
Revenues		
Property Taxes	\$4,985,000	\$5,485,000
Timber Harvest	\$20,000	\$0
Sales and Use Tax	\$3,679,244	\$3,700,000
Excise Tax	\$19,500	\$19,000
Penalties on Taxes	\$375,000	\$300,000
Licenses and Permits	\$1,847,820	\$1,029,400
Intergovernmental	\$3,056,457	\$2,355,102
Charges for Services	\$2,192,853	\$1,844,125
Fines and Forfeitures	\$1,686,600	\$1,634,900
Misc. Revenue	\$1,312,892	\$1,067,678
Interfund Transfers	\$1,223,810	\$631,590
Total Revenue	\$20,399,176	\$18,066,795
Expenditures		
Salaries and Benefits	\$13,521,218	\$12,705,621
Supplies	\$893,054	\$766,627
Charges for Services	\$5,312,752	\$4,907,853
Capital Outlay	\$1,783,859	\$627,912
Non Expense	\$788,043	\$640,285
Total Expenditures	\$22,298,926	\$19,648,298
Ending Fund Balance	\$3,964,881	\$4,363,746

Source: Kittitas County, 2009b.

2.3.2 Assessed Value

According to the County Assessor, Kittitas County had an assessed value of approximately \$6.1 billion in 2008-09 (Kittitas County, 2009c). The 2008-09 average consolidated tax per thousand dollars of assessed value for the County was about \$7.23.

2.3.3 Sales Tax Revenue

The current (third quarter 2009) combined sales and use tax rate in Kittitas County is 8.0 percent (DOR, 2009a). The state sales and use tax accounts for 6.5 percent of the total sales and use tax rate and the remaining 1.5 percent tax rate goes to the County.

Recent trends in taxable retail sales in Kittitas County and Washington State are compared in Table 3. In 2004, retail sales in the County totaled approximately \$538 million. From 2004 to 2008, taxable retail sales in the County increased at an average annual rate of 8.3 percent to \$740 million. Over the same period, sales statewide increased at an annual rate of 5.1 percent. Both the County and the State experienced a decline in taxable retail sales from 2007 to 2008. This decrease in retail sales is likely attributed to the overall slowdown in the regional and national economies.

TABLE 3
 Taxable Retail Sales (000s), 2004-2008

Area	2004	2005	2006	2007	2008	Average Annual Growth Rate
Kittitas County	538,556	601,941	704,543	795,557	740,684	8.3%
Washington State	92,719,153	101,367,459	110,515,076	118,242,922	113,223,051	5.1%

Source: Washington State Department of Revenue (DOR), 2009b.

3.0 Direct Project Impacts

3.1 Construction Impacts

Construction of the project is expected to occur in a 7-month period during each year of a 3-year planned construction period. The construction impacts of interest in this analysis are those relating to direct changes in employment, income, and taxes. As such, the following discussion will evaluate the impacts of the changes in the above-listed variables.

For the following subsections, the number of construction workers that are likely to relocate to Kittitas County (from other parts of Washington or elsewhere in western US) is conservatively assumed to be 50 percent (or 225 workers) of the peak onsite workforce of 450. The remainder (50 percent, or 225 workers) will come from within Kittitas County. In the absence of any data that show how many construction workers typically relocate to a rural construction site, the assumption of 50 percent relocation was derived as a conservative estimate that will likely result in underestimating the positive benefits to employment and income. Therefore, it is anticipated that the actual impacts are likely to be substantially more than those indicated in the following paragraphs.

3.1.1 Construction Workforce

The project is expected to employ an average onsite workforce of 225 and a peak onsite workforce of 450 during each of the three construction seasons. Assuming that the number of the construction workers who relocate to Kittitas County during each construction season is 50 percent of the peak workforce, the average number of relocated workers will be about 225. The number of local workforce will be 225, or about 1.4 percent of the County's total 2009 nonfarm employment of 15,400 and about 24.4 percent of the County's total in the natural resource, mining, and construction workforce sector (see Figure 1).

3.1.2 Sales Tax

The Washington State legislature enacted ESSB 6170 during the 2009 session that provides retail sales tax exemptions or remittance for renewable energy production equipment. The tax exemption amount is 100 percent beginning July 1, 2009, through June 30, 2011.

Beginning July 1, 2011, through June 30, 2013, the exemption is equal to 75 percent of the state and local sales tax. The sales tax exemption expires on June 30, 2013 (DOR, 2009c).

According to the County Assessor's office, it is unclear whether solar equipment is currently included in this exemption (Weyand, 2009). However, assuming that the solar equipment is included and that the project's construction window falls within the tax exemption period, neither the state nor the county is likely to receive any sales or use tax revenues on production equipment during the construction of the project.

The total value of project goods and services that will be purchased locally (within Kittitas County) during the 3-year construction period is estimated to be \$97.5 million. This number excludes the solar modules and related equipment. The effect on fiscal resources during construction, assuming that the project is not completed before June 30, 2011, will be from sales taxes realized on goods and services purchased in Kittitas County. The total sales tax expected to be generated during construction is \$7.8 million (i.e., 8 percent of local sales). Of this amount, \$1.46 million will go to Kittitas County. Since construction will occur over 3 years, the expected annual sales tax revenues will be \$2.6 million, of which \$487,500 will go to Kittitas County. Table 4 summarizes the estimated annual sales tax revenue during construction.

TABLE 4
 Estimated Annual Sales Tax Revenue on Goods and Services During Construction

	Annual Sales Tax Revenues
State	\$2,112,500
County	\$487,500
Total Annual Sales Tax Revenue from Project	\$2,600,000
Percent Increase in County Sales Tax Revenues*	13.3%

Sources: CH2M HILL, 2009; Kittitas County, 2009b.

* Kittitas County fiscal year 2008-09 amended budget sales taxes were \$3,679,244.

Total sales tax revenue in Kittitas County in FY 2008-09 was \$3,679,244. The annual sales tax revenue to Kittitas County during each of the 3 years of construction represents about 13 percent of the total sales tax revenue in FY 2008-09.

3.2 Operational Impacts

The operational impacts of interest are those relating to changes in employment and taxes. As such, the following discussion will evaluate the impacts of the changes in these variables.

3.2.1 Operational Workforce

The project is expected to begin commercial operation in 2010, with additional capacity brought online in 2011 and 2012. The total direct operational workforce is expected to consist of five full-time staff comprising a facility manager, three maintenance technicians, and one IT communications subcontractor. It is expected that all of the operational workers will be drawn from the local workforce. Consequently, only a slight decrease in the County's unemployment is anticipated as a result of the project.

3.2.2 Property and Sales Tax

The operation of the project will generate a significant, long-term beneficial impact to County revenue. The greatest benefit will be derived from the payment of property taxes with a smaller contribution from sales tax revenue. The project will create sales tax revenue through local expenditures on goods and services. This section presents the property and sales tax impacts from operations-related purchases.

The project is located within land zoned Range and Forest (R/F) by Kittitas County. The current levy rate for taxing district 32 is \$5.20134 per \$1,000 of assessed value (Weyand, 2009). The parcels do not currently pay a fire district levy because the land is not improved. If the parcels are improved, the property will have to pay the fire district levy. The improved parcels will pay a levy rate of \$5.746790 per \$1,000 assessed value, which includes a levy for the fire district⁴. Table 5 presents the breakdown of the levy rates for the affected new tax district 32, which now includes the fire district levy.

TABLE 5
 Levy Rates for Tax District 32

Taxing District	Levy Rate (\$/1,000 Assessed Value)
State (Public Schools)	2.018444
County Funds	0.892025
Road District No. 1	1.102931
School District No. 404, Cle Elum-Roslyn Bond	0.878933
Fire District #7	0.545450
Hospital District #1	0.309007
Total	5.746790

Source: Kittitas County, 2009c.

The Kittitas County Assessor suggests using project cost to estimate fiscal impacts because the actual assessed value of the improvements are difficult to quantify at this time. When assessing property with improvements, the Kittitas County Assessor's office typically values the land first and then uses the Marshall Swift Cost Manual to estimate the value of the structures. The value so derived is then adjusted for market conditions through the use of

⁴ Alternatively, Teanaway may enter into a contract with the County to provide funding for fire prevention services.

comparable sales (Weyland, 2009). However, the market adjustment may be difficult to do because there are no other solar farms in the area.

In 2001, voters in Washington State overwhelmingly approved Initiative 747, which imposed a 1 percent cap on increases in state and local property tax collections. The initiative was ruled unconstitutional by the State Supreme Court in 2007 (Seattle Times, 2007).

The valuation of the solar improvements may be considered personal property. Whether the improvements are considered personal or real property depends on whether the solar panels are considered fixed to the property. Generally, real property has concrete footings or some other type of permanent foundation. If the improvements are considered personal property, the solar generation equipment might be considered new construction and may not be subject to Initiative 747. A law is currently in effect that specifically exempts wind turbines from the limits imposed by Initiative 747. According to the County Assessor's office, the solar panels and other equipment are likely to be assumed to be similar to wind turbines in that they will be exempt from the one percent limit imposed by Initiative 747. As such, the project can be assumed to provide additional tax benefits to the taxing district.

Assuming the parcels are assessed on the basis of the current classification as Designated Forest land (current levy rate of 5.20134 per \$1,000 of assessed value) and using the total project capital cost of \$300 million to \$350 million, the assessed property tax revenues generated by the project will be between \$1,560,400 and \$1,820,470 annually. Of this amount, about \$267,600 to \$312,200 goes to Kittitas County while the remaining is distributed between the other taxing districts (with the exception of the fire district) as shown in Table 5 above. According to the 2008 amended budget (see Table 2), the total property tax revenues in Kittitas County in FY 2008-09 were \$4,985,000. The annual property tax revenues going to Kittitas County during operation of the project represents about 5.4 percent to 6.3 percent of the total property tax revenues. Thus, operation of the project will be beneficial to the economy of Kittitas County. Table 6 shows the distribution of the estimated annual property tax revenue between the various taxing districts in Kittitas County.

TABLE 6
Estimated Annual Property Tax Revenue During Operation

Taxing Districts	Operation (assuming \$300M capital cost)	Operation (assuming \$350M capital cost)
State (Public Schools)	\$605,530	\$706,460
County Funds	\$267,610	\$312,210
Road District No. 1	\$330,880	\$386,030
School District No. 404, Cle Elum-Roslyn Bond	\$263,680	\$307,630
Hospital District #1	\$92,700	\$108,150
Total Annual Property Tax Revenue from Project	\$1,560,400	\$1,820,470
Percent Increase in County Property Tax Revenues*	5.4%	6.3%

Sources: CH2M HILL, 2009; Kittitas County, 2009b.

* Kittitas County fiscal year 2008-09 amended budget property taxes were \$4,985,000.

Assuming that the \$525,510 in annual operational expenditures on materials are not exempt from sales tax and that the sales tax rate is 8 percent, the project will generate annual sales tax revenues of \$42,040. The annual sales tax revenues going to the county will be \$7,880 which about 0.2 percent of the total sales tax revenues (\$3,679,244) in Kittitas County in FY 2008-09. Table 7 summarizes the estimated annual sales tax revenue during operation.

TABLE 7
Estimated Annual Sales Tax Revenue on Goods and Services During Operation

	Annual Sales Tax Revenues
State	\$34,160
County	\$7,880
Total Annual Sales Tax Revenue from Project	\$42,040
Percent Increase in County Sales Tax Revenues*	0.2%

Sources: CH2M HILL, 2009; Kittitas County, 2009b.

* Kittitas County fiscal year 2008-09 amended budget sales taxes were \$3,679,244.

4.0 Secondary Project Impacts

Section 3.0 looked at the project's direct impacts resulting from such factors as the payment of property taxes and the influx of temporary workers. This section looks at the indirect and induced impacts that the project will have on the County economy as a whole. The evaluation of indirect and induced impacts is achieved through regional economic analysis.

4.1 Regional Economic Impacts

Regional economics is the study of the economy of a small region. Regional economic impacts result from changes in the economy of the region. The magnitude of the economic impacts is determined by the interactions between linkages within the local and regional economy and the leakages from this economy to the larger economy.

4.1.1 Economic Linkage

Economic linkages are the relationships between industries, businesses, labor, household, and government created by trade and other exchange, such as taxes, within and among regions. Economic linkages create multiplier effects in a regional economy as money is circulated by trade. For example, suppose a construction company is paid \$100 million to construct a power plant. The construction company spends part of the \$100 million to purchase materials (such as concrete) and part to pay construction workers. The purchase of the materials constitutes a direct effect and will lead to increased output from the concrete manufacturing sector, which in turn will lead to increased output from the sectors that provide input into the concrete manufacturing sector such as the cement manufacturers or sand suppliers (as well as those sectors that provide inputs to the cement and sand, and so on). The increased expenditures on construction materials will have the effect of not only increasing output from sectors directly linked to the economic activity but those that supply the inputs to the directly affected sectors. The initial expenditure on materials (e.g., cement) is typically referred to as the direct effect or impact. (These factors were described and analyzed in the Direct Project Impacts section above). The second set of impacts (those resulting from the purchases made by the directly affected sector) are referred as the indirect effect or impact. The construction workers hired for the project spend part of their income to purchase food at the grocery store, which in turn pays for labor at the store and other inputs from the food suppliers. The impacts resulting from construction worker payroll expenditures are referred to as the induced effect or impact.

4.1.2 Economic Leakage

The magnitude of impacts resulting from economic linkages is limited by the amount of leakage that occurs within the region. Economic leakages are a measure of the income shares spent outside of the region. The more economic leakage, the less the multiplier effect. Conversely, the better a region is able to capture expenditures, the higher the multiplier effect. Economic leakages are generally higher the smaller the regional economy because the local region may not supply all of the needs of the project or its employees. For example, if one needs a new car, and there are no local car dealers, one may go to the next county to purchase a car. Therefore, the economic leakages for a county are larger than those for the state which are larger than those for the nation.

4.1.3 Regional Modeling Systems

A number of regional economic analysis modeling systems (consisting of data as well as analytical software) are available for use in regional economic analysis, e.g., REMI (Regional Economic Models Inc.), RIMS II (Regional Industrial Multiplier System II), and IMPLAN (Impact Analysis for PLANning). IMPLAN is a computer database and modeling system used to create input-output (I-O) models for any combination of U.S. counties. For this study, IMPLAN was selected because it has a current database and is readily available.

The IMPLAN package includes: (1) estimates of final demands and final payments developed from government data, (2) a national average matrix of technical coefficients, (3) mathematical tools that help the user structure the I-O model, and (4) tools that allow the user to input more accurate data or add data refinement, conduct impact analysis, and generate reports.

Sections 4.2 and 4.3 describe the regional economic impacts associated with the construction and operation of the project, respectively. Because the duration of the construction and operational phases of the project are different, the impacts are separately evaluated and presented for each phase of the project.

4.2 Construction Phase Impacts

An IMPLAN I-O model of the Kittitas County economy was constructed. For this analysis, the following assumptions were made:

- The region of influence for the economic impact analysis is Kittitas County, Washington.
- The 75-dcMW project will be constructed over three construction seasons in roughly 25-dcMW blocks.
- The construction window for the site is assumed to be from April 1 to October 31, a period of 7 months.
- There will be an annual average onsite workforce of 225, including subcontractors, during each construction season.
- Fifty (50) percent of the onsite peak construction workforce of 450 is assumed to be from the local labor market (within Kittitas County) while the remaining 50 percent, or 225 peak period workers could come from outside the County and are assumed to relocate to Kittitas County for the duration of the construction period or phase.
- Construction is anticipated to start in 2010 with the first 25 MW placed in commercial operation in 2010.
- Disposable labor income is 70 percent of total labor income. This means that 30 percent of gross income is used for taxes and savings.
- The base year of analysis is 2007⁵, but the impacts were adjusted to reflect year 2009 price levels because all project costs are in 2009 dollars.

Table 8 shows the capital cost, materials costs, and labor costs for the project split by estimated costs assumed to be spent with Kittitas County (local) and those assumed to be spent outside the county. Since engineering design on the project is at a preliminary level, the cost estimates used in this analysis are also at a preliminary level.

The total capital costs for the project, over the 3 years, is between \$300 million and \$350 million, in 2009 dollars. Expenditures on materials are estimated to be between \$240 million and 287.5 million while construction payroll is expected to be between \$60 million and \$62.5

⁵ Available IMPLAN data.

million. The local (within Kittitas County) portion of the construction expenditures on materials and labor are \$97.5 million and \$52.5 million, respectively.

TABLE 8
 Development Cost of the Proposed Teanaway Solar Reserve, 2009 Million Dollars

	Total Capital Cost	Total Materials Expenditure	Total Construction Payroll
Out of County	\$150 - \$200	\$142.5 - \$190	\$7.5 - \$10
In-County (local)	\$150,000,000	\$97,500,000	\$52,500,000
Total	\$300 - \$350	\$240 - \$287.5	\$60 - \$62.5

Source: CH2M HILL, 2009.

Given that regional indirect and induced economic impacts arise from the infusion of “exogenous” or outside dollars into the local economy, only the portion of the expenditures on labor for the relocated workers and the local expenditures on goods and services are used to evaluate the economic impacts of expenditures on construction goods and services, and labor. For this analysis, the portion of the expenditures on labor was assumed to be the disposable portion of the income received by the labor assumed to move into the county, while the local portion of the expenditures on materials was assumed to be the entire amount. The total local expenditures on materials and the total local labor local cost for the project are shown in Table 8 above.

Table 9 shows the results of the regional economic impact analysis of the construction phase of the project. As the numbers in the table show, in addition to the average direct employment of 225, the construction phase of the project will result in secondary (indirect and induced) employment within Kittitas County. Along with the average annual direct 225 construction jobs, the estimated annual indirect and induced employment will be 403 and 160, respectively. Assuming an average annual direct construction employment of 225, the employment multiplier associated with the construction phase is 3.5⁶. This project construction phase employment multiplier is based on a Type Social Accounting Matrix (SAM) model.

The annual estimated indirect and induced income within the region will be about \$14,814,500 and \$4,504,400, respectively. Assuming a total annual local construction expenditure (payroll, goods and services) of about \$44,750,000 (\$12,250,000⁷ in disposable payroll and \$32,500,000 in goods and services), the project’s construction phase income multiplier based on a Type SAM model is approximately 1.4⁸.

Because of the short-term nature of construction, the regional economic impacts associated with the construction of the proposed project are temporary.

⁶ The 3.5 employment multiplier is derived as [225 construction jobs + 403 indirect jobs + 160 induced jobs]/225.

⁷ The total construction payroll of \$60 million to \$62.5 million is assumed to be divided evenly over the three construction seasons resulting in an annual construction payroll of \$20 million to \$20.8 million. The local portion of the construction payroll is \$52.5 million. Of this, \$17.5 million is assumed to be spent within Kittitas County annually. The \$12,250,000 is assumed to be 70 percent of the annual local construction payroll of \$17.5 million.

⁸ The 1.4 income multiplier is derived as [\$44,750,000 in annual local construction income from expenditures + \$14,814,500 indirect income + \$4,504,400,100 induced income]/\$44,750,000.

TABLE 9
Estimates of Annual Direct, Indirect, and Induced Impacts Associated with the Construction Phase of the Teanaway Solar Reserve

	Employment
Direct	225
Indirect	403
Induced	160
Total	789
Employment Multiplier	3.5
	Income
Direct	\$44,750,000
Indirect	\$14,814,500
Induced	\$4,504,400
Total	\$64,068,870
Income Multiplier	1.4

Notes:

Numbers may not add as a result of rounding.

Income estimates are in 2009 dollars.

4.3 Operations Phase Impacts

The project is expected to begin operations in 2010. The costs associated with the O&M phase of the project relate to labor and materials. Operations labor is assumed to be local. For the regional economic impact analysis, the expenditures on locally purchase goods and services and the payroll for the relocated labor are used. Table 10 shows the annual O&M costs.

TABLE 10
Annual Operations and Maintenance Cost of Proposed Teanaway Solar Reserve, 2009 Dollars

Costs	In-County	Out of County
Labor	\$2,368,660	\$350,000
Materials	\$525,510	\$1,875,000
TOTAL	\$2,894,170	\$2,225,000

Source: CH2M HILL, 2009.

Table 11 shows the annual regional economic impacts of the O&M expenditures on labor and materials. As the numbers in the table show, in addition to the direct employment of 35 staff resulting from the local O&M payroll expenditures, the operational phase of the project will result in secondary (indirect and induced) employment within Kittitas County. Thus, the estimated annual indirect and induced employment within Kittitas County will be about 1 and 13 jobs, respectively. Assuming an average annual direct operational phase

employment of 35, the employment multiplier associated with the operations phase is about 1.4.⁹ This construction phase employment multiplier is based on a Type Social Accounting Matrix (SAM) model.

The annual estimated indirect income within the region will be \$45,630 while the annual estimated induced income will be \$352,070. Assuming a total annual local operations expenditure (payroll, goods and services) of about \$2,894,170 (\$2,368,660 in payroll and \$525,510 in goods and services), the project's operations phase income multiplier based on a Type SAM model is approximately 1.1.¹⁰

TABLE 11
 Estimates of Annual Direct, Indirect, and Induced Impacts Associated with the Operational Phase of the Teanaway Solar Reserve

	Employment
Direct	35
Indirect	1
Induced	13
Total	49
Employment Multiplier	1.4
	Income
Direct	\$2,368,660
Indirect	\$45,630
Induced	\$352,070
Total	\$2,766,360
Income Multiplier	1.1

Notes:

Numbers may not add as a result of rounding.

Income estimates are in 2009 dollars.

Because of the long-term nature of operations, the regional economic impacts associated with project operation are expected to last at least 20 years. However, these economic impacts are likely to change if the underlying economic linkages and leakages that produced them change over the course of project operations.

⁹ The 1.4 employment multiplier is derived as $[35 \text{ operation jobs} + 1 \text{ indirect job} + 13 \text{ induced jobs}] / 35 \text{ operation jobs}$.

¹⁰ The 1.1 income multiplier is derived as $[\$2,368,660 \text{ in annual local operation income from expenditures} + \$45,630 \text{ in indirect income} + \$352,070 \text{ in induced income}] / \$2,368,660$.

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