



**SUNZIA SOUTHWEST TRANSMISSION PROJECT**  
**ECONOMIC IMPACT ASSESSMENT ON THE STATE OF NEW MEXICO**  
**AN UPDATE**

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## Table of Contents

<b>Section</b>	<b>Title</b>	<b>Page</b>
	Table of Contents	i
	List of Tables	ii
<b>1.0</b>	Introduction	1
<b>1.1</b>	Reasons for the Update	1
<b>1.2</b>	Outline of Study	2
<b>2.0</b>	Impact Analysis	2
<b>3.0</b>	Economic Impacts of the Transmission Line on the State	4
<b>3.1</b>	Transmission Line Construction Impacts	4
<b>3.2</b>	Transmission Line Operations and Maintenance Impacts	7
<b>3.3</b>	Transmission Line Revenue Impacts on the State	8
<b>4.0</b>	Impacts of Potential Generation Facilities	11
<b>4.1</b>	Potential Generation Facilities Construction Impacts on the State	12
<b>4.2</b>	Potential Generation Facilities Operations and Maintenance Impacts on the State	15
<b>4.3</b>	Potential Generation Facilities Revenue Impacts on the State	17
<b>5.0</b>	Summary	18
	Appendix A: Limitations of the Study	20
	Appendix B: Revenue Estimation Methodology: Effective Tax Rates	21
	Appendix C: Economic Impacts of Transmission Line Construction by County	23
	Appendix D: Transmission Line Construction Revenue Impacts by County	29
	Appendix E: Construction Economic Impacts of Potential Generation Facilities by County	30
	Appendix F: Operations and Maintenance Economic Impacts of Potential Generation Facilities by County	34
	Appendix G: Revenue Impacts of Potential Generation Facilities by County	38
	Appendix H: About Arrowhead Center	40

## List of Tables

<b>Number</b>	<b>Title</b>	<b>Page</b>
<b>3.1</b>	Statewide Impacts for Transmission Line Construction by Scenario	6
<b>3.2</b>	Statewide Impacts for Transmission Line Operation and Maintenance by Scenario	8
<b>3.3</b>	Statewide Transmission Line Revenue Impacts (Millions \$) - Construction and Operations and Maintenance	10
<b>4.0</b>	Potential Generation Projects - by County, Type, and Size	12
<b>4.1</b>	Statewide Impacts for Potential Generation Facilities Construction	14
<b>4.2</b>	Statewide Impacts for Potential Generation Facilities Operations and Maintenance	16
<b>4.3</b>	Statewide Potential Generation Facilities Revenue Estimates (Millions \$)	17

# SunZia Southwest Transmission Project

## Economic Impact Assessment on the State of New Mexico

### An Update

#### 1. Introduction

The SunZia Southwest Transmission Project (“SunZia” or “the Project”) comprises of up to two 500 kV electrical transmission lines and associated substations from central Pinal County, AZ, across southern Arizona and southern and central New Mexico to a point located in northern Lincoln County, NM. The purpose of the Project is to provide new transmission capacity primarily to renewable energy generation facilities constructed in southern Arizona and New Mexico. The development of the Project is managed by SunZia Southwest, a wholly-owned subsidiary of SouthWestern Power Group. The owners of the Project comprise MMR Group, Salt River Project, Shell WindEnergy, SouthWestern Power Group, Tri-State Generation and Transmission and Tucson Electric Power<sup>1</sup>. This study considers three scenarios for the Project. The first scenario is a single AC transmission line with a capacity of 1,500 MW. The second scenario is two AC transmission lines with a capacity of 3,000 MW. The third scenario consists of one AC transmission line and one DC transmission line with a capacity of 4,500 MW.

Initial economic impact assessments for the Project and potential renewable generation facilities were completed in 2011 by representatives of The University of Arizona and New Mexico State University. SouthWestern Power Group is in the final stages of obtaining approval to start work on the Project. SouthWestern Power Group has contracted with The Arrowhead Center of New Mexico State University to update the original economic assessment and potential renewable generation facilities for the state of New Mexico.

The purpose of this study is to provide updated estimates of the economic impact of the construction and operational phases of the Project and potential renewable generation facilities on the state of New Mexico and the counties in which the Project will be located. Economic impact estimates include changes in employment, income, value added (state product) and total sales (output). Estimates of tax revenues generated are also provided.

#### 1.1 Reasons for the Update

There are two primary reasons for the update. The first deals with the final determination of the route of the transmission line(s) through the State of New Mexico. In the original study, two alternative routes were analyzed. Figure 1.1 shows the final determination of the Project route. The cost of the transmission lines can now be more accurately determined. In particular, five miles of the lines that pass through the area north of the White Sands Missile Range will now be buried, resulting in an increase in expenditures.

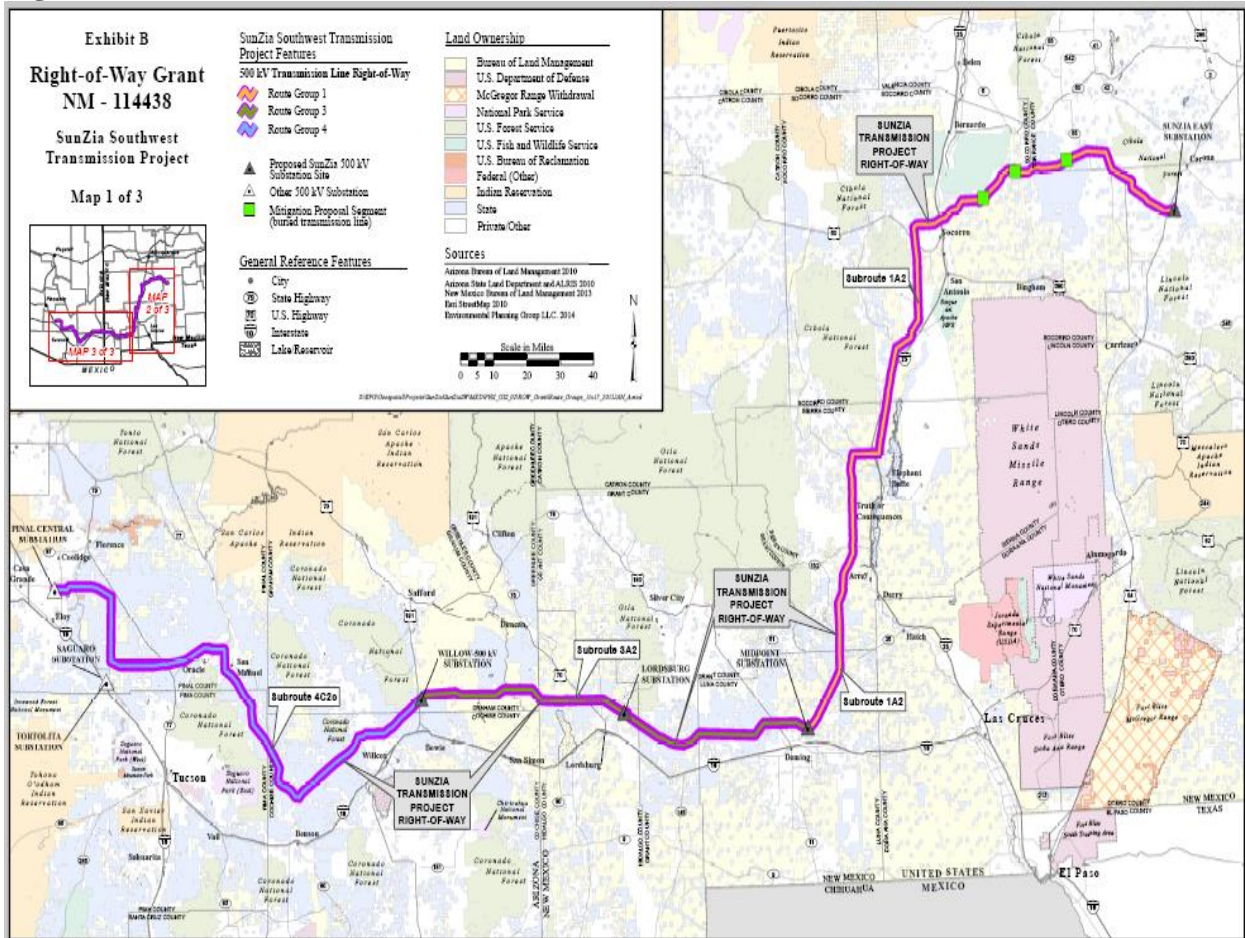
The second reason for the update is that the cost of the potential generation facilities has changed. The original study estimated impacts for four different alternative generation facilities:

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<sup>1</sup> MMR is negotiating the purchase of ownership interests of Shell Wind Energy, Tucson Electric Power and Tri-State Generation and Transmission.

solar photovoltaic, solar thermal, wind, and geothermal. This study will include impacts for two of the alternatives: solar photovoltaic and wind. Today, solar thermal and geothermal projects are not seen as likely. In addition, the costs of these two types of projects have decreased substantially since the time of the initial study.

**Figure 1.1**



## 1.2 Outline of Study

Section 2 explains the method of analysis used in the report. Section 3 presents the economic revenue impacts associated with the construction and operations and maintenance of the transmission line under three scenarios: 1 AC line, 2 AC lines, and 1 AC line and 1 DC line. Section 4 presents the economic and revenue impacts associated with the construction and operations and maintenance of potential renewable generation facilities that could be built once the transmission line(s) are constructed. Section 5 presents a summary of the report.

## 2.0 Impact Analysis

Economic impact analysis is an attempt to measure the overall net change in economic activity in a given geographic area that results from a change in economic activity in that area. Often, the change in economic activity refers to new spending or employment associated with a new

business or a business expansion. The main idea behind economic impact analysis is that a new dollar spent in a local area results in more than one dollar in economic activity in the area.

Commonly used modeling systems to perform economic impact analysis are: RIMS II, REMI, and IMPLAN. All three modeling systems are based on the national input-output model produced by the Bureau of Economic Analysis (BEA). The national model is scaled to state and county areas by the providers of the models. The model used to produce the estimates in this report is IMPLAN PRO Version 3 with the latest (2016) data and structural matrices available.

Economic impacts are generally measured in terms of changes in total sales (or output), state product (or value added), labor income, and employment (jobs).

**Total sales** (output) is measured in dollars and corresponds to gross sales (includes both final and intermediate goods and services). Intermediate goods and services are used to produce other goods and services.

**State Product** (value added) excludes intermediate goods and services. Total sales (output) counts some production more than once while value added does not. Value added can be thought of as the local or regional counterpart to Gross Domestic Product (GDP).

**Labor income**, also measured in dollars, consists of wages and salaries including benefits and proprietors income.

**Employment** is measured in terms of numbers of jobs. Jobs refer to both full and part-time employment, not full-time equivalent positions. IMPLAN provides a table by sector that converts full and part time employment to full time equivalents. Sectors used in this study indicate that FTE can be estimated by multiplying full and part-time employment by .9.

In many impact studies, including this one, estimates of changes in federal, state and local taxes as a result of the new economic activity are also presented.

Generally, in economic impact studies, three types of impacts are estimated: direct, indirect and induced.

**Direct effects** are the initial changes determined to be a result of the activity under study. In the present context, direct effects of construction spending on the transmission line are the jobs, labor income and sales directly associated with that construction spending. In the impact tables, direct effects are divided into those associated with labor expenditures (estimated numbers of construction workers, expected labor costs, etc.) and those associated with other construction expenditures (the result of purchases of equipment and materials).

**Indirect effects** are the impact of local industries buying goods and services from other local industries. These effects are the result of inter-industry linkage. The cycle of local spending works its way backward through the supply chain until all money leaks from the local economy. Money leaks from the local economy at each round. The sum of all the cycles of inter-industry spending represents the indirect effects. Indirect effects are larger for states and large diversified counties than for counties with smaller economies. This is because the leakage from the area can



be quite large at each round of the cycle for small economies, as fewer required intermediary goods are available locally and must be imported.

**Induced effects** measure the response by an economy as income is received and spent locally. Employees in both the direct and indirect sectors spend money locally. The IMPLAN model recognizes that the labor income earned is not a leakage from the regional economy; rather, the money is re-circulated through the local economy causing further local economic activity.

The **total effects** are a sum of the direct, indirect and induced effects. The total effects are a multiple of the direct effects of the new spending in the area of concern. This is called the multiplier effect.

Data for this analysis was provided by the Project Manager, SunZia Southwest LLC and its consultants, Transco Energy, Power Engineers, and Burns & McDonnell, on behalf of the Project. SunZia Southwest provided construction costs for the Lines and Substations by state and county. The costs were broken down by expenditure category (i.e., labor, materials, etc.) and an estimate of the percentage of each category spent within the county and within the state was provided. Only those expenditures made within the counties and state were used to estimate the economic impact.

### **3.0 Economic Impacts of the Transmission Line on the State**

The purpose of this section is to present estimates of the impact of the construction expenditures, the operations and maintenance expenditures, and the tax revenue impacts of the Project on the state of New Mexico. There will be 313<sup>2</sup> miles of transmission line, with substations, located within seven counties: Grant, Hidalgo, Lincoln, Luna, Sierra, Socorro, and Torrance.

Three scenarios are assessed. The first is a single AC line, the second is two parallel AC lines, and the third is two parallel lines, one AC and the other DC. The expenditures on substations for each of the lines are included in the estimates of transmission line construction costs and are not estimated separately.

All of the cost data used in this analysis and all estimated dollar impacts in this study are expressed in (2017) millions of dollars.

### **3.1 Transmission Line Construction Impacts**

The estimated impacts of the construction of the transmission line are presented below. The estimates are for the entire construction period, not for a given year of construction. It is estimated that the construction period for each of the lines would be two and one-half years, with 20% of construction occurring in the first one-half year and 40% occurring in each of the next two full years of construction. In this analysis it is assumed that if a second line is constructed,

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<sup>2</sup> Final mileage in New Mexico will be closer to 320 miles due to route adjustments under consideration.

the two lines would be built concurrently. In reality the second line construction is likely to start within a few years after the start of the first line. The second line impacts would start at that time.

The direct jobs impact includes all construction workers projected to be on the site. It is expected that approximately ten percent of all construction workers, on average, will be hired locally in all counties through subcontracts and an additional thirty percent of workers will be hired within the state but from outside the county in which the work is done.

The direct labor income impact includes all income of all construction workers projected to be on the site. It is assumed that the locally-hired workers spend their income in a pattern similar to other local residents. In-state hires are assumed to spend 40 percent of their income in-county and the rest elsewhere in the state. Imported (non-local) workers are assumed to spend 40 percent of their income in the county in which they are working and living and an additional 40 percent of their income elsewhere in the state and 20 percent is spent out of state. In addition to their payroll, all workers, both local and non-local receive per diem living expenses, which is 15 percent of total labor income. This is assumed to be spent on lodging, food, restaurants, entertainment, and fuel.

Direct state product and direct total sales for the labor expenditures portion of direct expenditures are equal to direct labor income.

Table 3.1 presents the impacts of construction by scenario. The cost to construct the first AC transmission line in New Mexico is approximately \$640 million. The cost of the second AC line is slightly less since payments to private landowners do not increase with the construction of the second line. The approximate cost of the DC transmission line in New Mexico is \$896 million. Only those expenditures made in New Mexico are used to estimate the impacts.

The construction of the first AC line generates almost 2,900 full and part time jobs, over \$214 million in labor income, \$267 million in state product and \$370 million in total sales over the period of construction (2.5 years). On average, 40% of this impact would occur in a one year period, i.e., the job impact for one year would be 1,160 jobs.

The construction of two AC lines generate almost 5,721 full and part time jobs, over \$425 million in labor income, \$527 million in state product and \$726 million in total sales over the period of construction (2.5 years).

The construction of one AC line and one DC line generate almost 6,125 full and part time jobs, over \$461 million in labor income, \$572 million in state product and \$791 million in total sales over the period of construction (2.5 years).



Table 3.1

<b>Statewide Impacts for Transmission Line Construction by Scenario</b>					
<b>New Mexico</b>	<b>Direct Effect Labor Expenditures</b>	<b>Direct Effect Other Expenditures</b>	<b>Indirect Effect</b>	<b>Induced Effect</b>	<b>Total Effect</b>
<b>1 AC Line</b>					
<b>Employment (# of Jobs)</b>	1139	647	155	930	2871
<b>Labor Income (2017 \$ Mils)</b>	\$148.03	\$24.68	\$6.63	\$34.68	\$214.02
<b>State Product (2017 \$ Mils)</b>	\$148.03	\$39.95	\$11.98	\$67.04	\$267.00
<b>Total Sales (2017 \$ Mils)</b>	\$148.03	\$78.40	\$23.56	\$119.86	\$369.85
<b>2 AC Lines</b>					
<b>Employment (# of Jobs)</b>	2277	1293	310	1840	5721
<b>Labor Income (2017 \$ Mils)</b>	\$296.06	\$48.12	\$12.53	\$68.94	\$425.65
<b>State Product (2017 \$ Mils)</b>	\$296.06	\$75.30	\$22.54	\$133.28	\$527.18
<b>Total Sales (2017 \$ Mils)</b>	\$296.06	\$147.77	\$44.12	\$238.29	\$726.24
<b>1 AC Line &amp; 1 DC Line</b>					
<b>Employment (# of Jobs)</b>	2467	1387	338	1933	6125
<b>Labor Income (2017 \$ Mils)</b>	\$320.75	\$53.76	\$14.46	\$72.06	\$461.03
<b>State Product (2017 \$ Mils)</b>	\$320.75	\$86.89	\$26.05	\$139.31	\$572.99
<b>Total Sales (2017 \$ Mils)</b>	\$320.75	\$170.49	\$51.19	\$249.07	\$791.50
Calculation by Authors Using IMPLAN Pro Version 3					

The impacts of construction by county are presented in Appendix C. The sum of the county impacts do not equal the state impacts because only those expenditures taking place in each county are used to calculate the impact in each county.

### **3.2 Transmission Line Operations and Maintenance Impacts**

The operations and maintenance (O&M) impacts on the state, by scenario, are presented in this section. Only the first year of O&M impacts are presented. The impacts of future years of O&M impacts will be very similar to those in the first year.

Table 3.2 presents the operations and maintenance economic impacts by scenario on the State of New Mexico.

The operations and maintenance of the first AC line generates almost 33 full and part time jobs, almost \$1.9 million in labor income, over \$2.6 million in state product and over \$4 million in total sales during the first year of operations.

The operations and maintenance of two transmission lines generate almost twice the impact: 64 full and part time jobs, \$3.7 million in labor income, \$4.9 in state product and \$7.6 million in total sales during the first year of operations. Payments for rental space for operations and maintenance is not doubled. All other expenditures are assumed to be doubled.

No impacts by county are estimated for operations and maintenance. Administrative services, parts, and materials will be located at one site. There will be some impact on the county in which the site is located. Dona Ana County is a prime candidate for these operations since it is located in the center of the transmission line. However, the site is yet to be determined.

**Table 3.2**

<b>Statewide Impacts for Transmission Line Operation and Maintenance by Scenario</b>					
<b>New Mexico</b>	<b>Direct Effect Labor Expenditures</b>	<b>Direct Effect Other Expenditures</b>	<b>Indirect Effect</b>	<b>Induced Effect</b>	<b>Total Effect</b>
<b>One Transmission Line</b>					
<b>Employment (# of Jobs)</b>	10	10	3	10	33
<b>Labor Income (2017 \$ Mils)</b>	\$0.969	\$0.432	\$0.126	\$0.360	\$1.887
<b>State Product (2017 \$ Mils)</b>	\$0.969	\$0.766	\$0.210	\$0.698	\$2.642
<b>Total Sales (2017 \$ Mils)</b>	\$0.969	\$1.407	\$0.401	\$1.249	\$4.024
<b>Two Transmission Lines</b>					
<b>Employment (# of Jobs)</b>	20	19	6	19	64
<b>Labor Income (2017 \$ Mils)</b>	\$1.937	\$0.840	\$0.232	\$0.711	\$3.719
<b>State Product (2017 \$ Mils)</b>	\$1.937	\$1.259	\$0.383	\$1.378	\$4.957
<b>Total Sales (2017 \$ Mils)</b>	\$1.937	\$2.460	\$0.731	\$2.465	\$7.592
Calculation by Authors Using IMPLAN Pro Version 3					

### 3.3 Transmission Line Revenue Impacts on the State

The economic activity that takes place during the construction and operations and maintenance phases of the transmission lines generate tax revenues for the state and counties in which the work occurs.

The tax revenue estimates reported here are based on effective tax rates averaged over the 2006 to 2015 period. The main reason for using effective tax rates instead of statutory rates is to avoid the nearly impossible task of estimating deductions and exemptions. See Appendix B for a listing of New Mexico effective tax rates in four main categories: 1) Gross Receipts Taxes (GRT), 2) Personal Income Taxes (PIT), 3) Corporate Income Taxes (CIT), and 4) Other Taxes. Combined, GRT, PIT, and CIT accounted for 76 percent of all New Mexico tax revenue between 2006 through 2015.

The effective tax rates represent the average from 2006 to 2015 of taxes paid by New Mexicans as a proportion of labor income earned. Labor income is defined as labor compensation measured in dollars consisting of wages and salaries, including benefits, and proprietor's income. For the purpose of estimating tax revenue, an important issue is the stability of the effective tax rates from year to year. Labor income based effective tax rates satisfy this criterion. The variability of the effective tax rates as measured by the standard deviation of each rate is low (see Appendix B).

Table 3.3 presents the state and county revenue impact estimates for the construction and the operations and maintenance phases of the transmission line by scenario. The table shows the type of tax generated and the jurisdiction that receives the revenue. Gross receipts, personal income and corporate income taxes are based on the relation between total revenues received and labor income as described above. The Gross Receipts tax rate is a combination of state and local area tax rates. For this study it is assumed that 60% of the revenues are retained by the state and 40% are retained by the counties. This rule of thumb has been used by the state for many years. Compensating taxes are levied on expenditures for items purchased outside of New Mexico for use in New Mexico. The rate is 5.125%. The revenue is collected by the state and 10% is distributed to the small cities assistance fund and 10% to the small counties assistance fund. The property tax is a combination of 2016 state and county level rates. The state property tax is small relative to the county taxes. Right of way easements and leases for the transmission line will be paid to private land owners, the Bureau of Land Management and New Mexico's State Land Office. Estimates of the payments to these entities were provided by SunZia Southwest LLC. Land payments to private land owners were included in the impact estimates for construction and operations and maintenance.

The construction revenue estimates are for the entire period of construction, 2.5 years for each line. The operations and maintenance estimates are for the first year of operations. The revenues generated in following years of operation will be similar to the revenues generated in that first year.

During the construction of the first AC line, the state will receive \$22.5 million in revenues and the counties will receive \$10.9 million. The Bureau of Land Management will receive \$.192 million and the State Land Office will receive \$1.038 million in right of way leases.

During the construction of two AC lines, the state will receive \$44.9 million in revenues and the counties will receive \$21.8 million. The Bureau of Land Management will receive \$.192 million and the State Land Office will receive \$2.075 million in right of way leases.

During the construction of one AC line and 1 DC line, the state will receive \$52.25 million in revenues and the counties will receive \$25.46 million. The Bureau of Land Management will receive \$.192 million and the State Land Office will receive \$2.075 million in right of way leases.

In the first year of operations for 1 AC line, the state will receive \$.385 million in revenues and the counties will receive \$4.32 million in revenues. The Bureau of Land Management will receive \$.065 million and the State Land office will receive \$.430 million in right of way leases.

Table 3.3

<b>Statewide Transmission Line Revenue Impacts (Millions \$)</b>				
<b>Construction and Operations and Maintenance</b>				
<b>Tax</b>	<b>Jurisdiction</b>	<b>1 AC Line</b>	<b>2 AC Lines</b>	<b>1 AC &amp; 1DC</b>
<b>Construction (2.5 years)</b>				
<b>Gross Receipts Tax</b>	<b>Counties</b>	\$4.730	\$9.400	\$10.180
	<b>State</b>	\$7.090	\$14.100	\$15.270
<b>Compensating Tax</b>	<b>Small Counties and Cities</b>	\$2.190	\$4.380	\$5.640
	<b>State</b>	\$8.760	\$17.530	\$22.540
	<b>State</b>	\$5.180	\$10.300	\$11.160
<b>Corporate Income Tax</b>	<b>State</b>	\$1.240	\$2.470	\$2.670
<b>Property Tax</b>	<b>Counties</b>	\$4.010	\$8.030	\$9.640
	<b>State</b>	\$0.240	\$0.490	\$0.610
<b>Right of Way Lease</b>	<b>Bureau of Land Management</b>	\$0.192	\$0.192	\$0.192
	<b>State Land Office</b>	\$1.038	\$2.075	\$2.075
<b>Operations and Maintenance - Year One</b>				
<b>Gross Receipts Tax</b>	<b>Counties</b>	\$0.040	\$0.080	\$0.080
	<b>State</b>	\$0.060	\$0.120	\$0.120
<b>Compensating Tax</b>	<b>Small Counties and Cities</b>	\$0.001	\$0.002	\$0.002
	<b>State</b>	\$0.005	\$0.009	\$0.009
	<b>State</b>	\$0.050	\$0.090	\$0.090
<b>Corporate Income Tax</b>	<b>State</b>	\$0.010	\$0.020	\$0.020
<b>Property Tax</b>	<b>Counties</b>	\$4.280	\$8.560	\$10.280
	<b>State</b>	\$0.260	\$0.520	\$0.650
<b>Right of Way Lease</b>	<b>Bureau of Land Management</b>	\$0.065	\$0.065	\$0.065
	<b>State Land Office</b>	\$0.430	\$0.860	\$0.860
<b>Calculations by Authors</b>				

In the first year of operations for 2 AC lines, the state will receive \$.759 million in revenues and the counties will receive \$8.64 million in revenues. The Bureau of Land Management will receive \$.065 million and the State Land office will receive \$.860 million in right of way leases.

In the first year of operations for 1 AC line and 1 DC line, the state will receive \$.889 million in revenues and the counties will receive \$10.36 million in revenues. The Bureau of Land Management will receive \$.065 million and the State Land office will receive \$.860 in right of way leases.

During future years of operations the revenues received by the state, counties, Bureau of Land Management and the State Land Office will be similar to the amounts received in year one.

Construction revenue impact estimates by county are provided in Appendix D. No operations and maintenance revenue estimates are provided since the exact location of the maintenance facility is unknown.

#### **4.0 Impacts of Potential Generation Facilities**

This section provides the economic and revenue impacts of the construction and operations and maintenance of potential renewable generation facilities built to supply the transmission line with electricity.

SunZia Southwest LLC has provided cost estimates for renewable generation facilities that potentially could be constructed to provide energy to the transmission lines<sup>3</sup>. Two forms of generation facilities were included: wind facilities and solar photovoltaic facilities. Table 4.0 provides information on the location, type and size of the potential facilities by county. The first line will be an AC line (1,500 MW of capacity). The second line will either be an AC line (1,500 MW of capacity) or a DC line (3,000 MW of capacity). If a second AC line is built, some of the generation capacity will be filled by facilities in Arizona. The second line type will determine the mix of potential generation facilities.

Renewable generation associated with Line 1 is based on SunZia's award of 1,500 MW of anchor tenant capacity to Pattern Energy in August 2016 and SunZia Southwest's estimate of likely locations near the SunZia East substation. Renewable generation associated with Line 2 AC is based on SunZia Southwest's estimate of likely locations for wind and solar generation and assumes that 300 MW of renewable generation will be located in Arizona. Renewable generation associated with Line 2 DC is based on an estimate by SunZia Southwest of likely locations near the SunZia East substation.

Impacts are provided for each line instead of a combination of AC and DC lines.

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<sup>3</sup> The cost data used for renewable generation was based on publicly-available sources.



**Table 4.0**

<b>Potential Generation Projects - by County, Type, and Size</b>					
<b>County</b>	<b>Line 1 AC</b>		<b>Line 2 AC</b>		<b>Line 2 DC</b>
	<b>Wind (MW)</b>	<b>Wind (MW)</b>	<b>Solar PV (MW)</b>	<b>Wind (MW)</b>	
<b>Grant</b>				150	
<b>Guadalupe</b>			200		1,200
<b>Hidalgo</b>			100	150	
<b>Lincoln</b>	1,125		100		600
<b>Luna</b>				150	
<b>Sierra</b>				150	
<b>Torrance</b>	375		200		1,200
<b>Total (MW)</b>	1,500		600	600	3,000

Data provided by SunZia Southwest LLC

#### 4.1 Potential Generation Facilities Construction Impacts on the State

The estimated impacts of the construction of the potential generation facilities are presented below. The estimates are for the entire construction period, not for a given year of construction.

The direct jobs impact includes all construction workers projected to be on the site. For the solar facilities, it is expected that approximately forty percent of all construction workers, on average, will be hired locally in all counties through subcontracts and an additional forty percent of workers will be hired within the state but from outside the county in which the work is done. For the wind facilities, approximately ten percent of the construction workers will be hired locally and additional ten percent of workers will be hired within the state but from outside the county in which the work is done.

The direct labor income impact includes all income of all construction workers projected to be on the site. It is assumed that the locally-hired workers spend their income in a pattern similar to other local residents. In-state hires are assumed to spend 40 percent of their income in-county and the rest elsewhere in the state. Imported (non-local) workers are assumed to spend 40 percent of their income in the county in which they are working and living and an additional 40 percent of their income elsewhere in the state and 20 percent is spent out of state. In addition to their payroll, all workers, both local and non-local receive per diem living expenses, which is 15 percent of total labor income. This is assumed to be spent on lodging, food, restaurants, entertainment, and fuel.

Table 4.1 presents the impacts of the construction of potential generation facilities by line. The first AC line will accommodate facilities producing an estimated 1,500 MW of wind generation.

For the first AC line, the construction of these facilities will generate almost 5,600 jobs, over \$301 million in labor income, almost \$447 million in state product and \$829 million in sales.

If the second line is AC, it will accommodate 1,500 MW of electricity. The facilities proposed would produce an estimated 600 MW of wind generation and 600 MW of solar PV generation. Generation facilities generating 300 MW of electricity would be built in Arizona. The construction of the facilities in New Mexico will generate 7,345 jobs, \$460 million in labor income, \$610 million in state product and \$1,009 million in total sales.

If the second line is a DC line, it will accommodate facilities producing an estimated 3,000 MW wind generation. The construction of these facilities would generate 11,900 jobs, over \$602 million in labor income, \$893 million in state product and almost \$1,660 million in total sales.

Generation facilities construction impacts by county are provided in Appendix E.

**Table 4.1**

<b>Statewide Impacts for Potential Generation Facilities Construction</b>					
<b>New Mexico</b>	<b>Direct Effect</b>	<b>Direct Effect</b>	<b>Indirect Effect</b>	<b>Induced Effect</b>	<b>Total Effect</b>
	<b>Labor Expenditures</b>	<b>Other Expenditures</b>			
<b>Impacts of 1st AC Line</b>					
<b>Estimated 1,500 MW of Wind Generation</b>					
<b>Employment (# of Jobs)</b>	1,500	2,106	752	1,237	5,595
<b>Labor Income (2017 \$ Mils)</b>	\$144.00	\$74.48	\$36.99	\$45.88	\$301.35
<b>State Product (2017 \$ Mils)</b>	\$144.00	\$145.15	\$68.89	\$88.74	\$446.79
<b>Total Sales (2017 \$ Mils)</b>	\$144.00	\$387.30	\$138.99	\$158.65	\$828.94
<b>Impacts of a Another AC Line as Second Line</b>					
<b>Estimated 600 MW of Wind and 600 MW of Solar PV Generation</b>					
<b>Employment (# of Jobs)</b>	2,600	2,181	721	1,843	7,345
<b>Labor Income (2017 \$ Mils)</b>	\$280.00	\$78.71	\$33.28	\$68.55	\$460.54
<b>State Product (2017 \$ Mils)</b>	\$280.00	\$138.56	\$59.24	\$132.56	\$610.35
<b>Total Sales (2017 \$ Mils)</b>	\$280.00	\$373.72	\$118.40	\$236.99	\$1,009.12
<b>Impacts of a DC Line as Second Line</b>					
<b>Estimated 3,000 MW of Wind Generation</b>					
<b>Employment (# of Jobs)</b>	3,000	4,213	1,504	2,474	11,190
<b>Labor Income (2017 \$ Mils)</b>	\$288.00	\$148.96	\$73.97	\$91.76	\$602.69
<b>State Product (2017 \$ Mils)</b>	\$288.00	\$290.30	\$137.78	\$177.48	\$893.57
<b>Total Sales (2017 \$ Mils)</b>	\$288.00	\$774.60	\$277.98	\$317.29	\$1,657.87
Calculations by Authors using IMPLAN Pro Version 3					

#### **4.2 Potential Generation Facilities Operations and Maintenance Impacts on the State**

Generation operations and maintenance (O&M) impacts on the state, by transmission line, are presented in this section. Only the first year of O&M impacts are presented. The impacts of future years of O&M impacts will be very similar to those in the first year.

Table 4.2 presents the generation facilities operations and maintenance economic impacts by transmission line on the State of New Mexico. For the first AC line, the generation facilities O&M impacts are for 1,500 MW of wind generation at the state level. The operations and maintenance of the generation facilities associated with the first AC line will generate 170 jobs, \$9.35 million in labor income, \$14 million in state product, and \$22.66 million in sales.

If the second line is AC, it would be connected to 600 MW of wind generation and 600 MW of solar PV generation. Operations and maintenance would generate 127 jobs, \$7.6 million in labor income, \$11 million in state product, and \$17 million in sales.

If the second line is DC, it would connect to 3,000 MW wind generation. Operations and maintenance would generate 339 jobs, \$18.7 million in labor income, \$28.3 million in state product and \$45.3 million in total sales.

Operation and maintenance estimates by county are provided in Appendix F.

Table 4.2

<b>Statewide Impacts for Potential Generation Facilities Operations and Maintenance</b>					
<b>New Mexico</b>	<b>Direct Effect</b>	<b>Direct Effect</b>	<b>Indirect Effect</b>	<b>Induced Effect</b>	<b>Total Effect</b>
	<b>Labor Expenditures</b>	<b>Other Expenditures</b>			
<b>Impacts of 1st AC Line Estimated 1,500 MW of Wind Generation</b>					
<b>Employment (# of Jobs)</b>	58	25	19	67	170
<b>Labor Income (2017 \$ Mil)</b>	\$4.50	\$1.53	\$0.82	\$2.49	\$9.35
<b>State Product (2017 \$ Mil)</b>	\$4.50	\$3.42	\$1.39	\$4.83	\$14.14
<b>Total Sales (2017 \$ Mil)</b>	\$4.50	\$6.60	\$2.93	\$8.62	\$22.66
<b>Impacts of a Another AC Line as Second Line Estimated 600 MW of Wind and 600 MW of Solar PV Generation</b>					
<b>Employment (# of Jobs)</b>	50	17	14	46	127
<b>Labor Income (2017 \$ Mil)</b>	\$4.20	\$1.08	\$0.60	\$1.72	\$7.59
<b>State Product (2017 \$ Mil)</b>	\$4.20	\$2.43	\$1.01	\$3.33	\$10.96
<b>Total Sales (2017 \$ Mil)</b>	\$4.20	\$4.72	\$2.16	\$5.95	\$17.02
<b>Impacts of a DC Line as Second Line Estimated 3,000 MW of Wind Generation</b>					
<b>Employment (# of Jobs)</b>	116	50	39	134	339
<b>Labor Income (2017 \$ Mil)</b>	\$9.00	\$3.07	\$1.64	\$4.99	\$18.69
<b>State Product (2017 \$ Mil)</b>	\$9.00	\$6.84	\$2.77	\$9.66	\$28.27
<b>Total Sales (2017 \$ Mil)</b>	\$9.00	\$13.20	\$5.87	\$17.25	\$45.32

Calculations by Authors using IMPLAN Pro Version 3

### 4.3 Potential Generation Facilities Revenue Impacts on the State

Table 4.3 presents the revenue estimates at the state level for the generation facilities that would potentially be built to provide electricity to the transmission lines.

The same estimation procedures are used as in the calculations of revenues for the construction of the transmission lines. Only gross receipts, personal income and corporate income taxes are estimated. It is assumed the generation facilities will be constructed using Industrial Revenue Bonds and will be located on private land. Therefore, no compensation taxes will be paid and no lease payments will be paid to federal or state entities. Since the exact location of each of the facilities is unknown, estimates of property taxes are not included.

For the construction of generation facilities associated with the first AC line, the counties in the state will receive \$6.65 million in gross receipts revenues and the state will receive \$9.98 million in gross receipts revenues, \$7.29 million in personal income tax revenues and \$1.75 million in corporate tax revenues.

For the construction of generation facilities associated with a second AC line, the counties would receive \$10.17 million in gross receipts revenues and the state would receive \$15.25 million in gross receipts revenues, \$11.15 million in personal income tax revenues and \$2.67 million in corporate income tax revenues.

For the construction of generation facilities associated with the second line being DC, the counties would receive \$13.3 million in gross receipts revenues and the state would receive almost \$20 million in gross receipts revenues, \$14.6 million in personal income tax revenues and \$3.5 million in corporate income tax revenues.

**Table 4.3**

<b>Generation Revenue Estimates - Statewide (Millions \$)</b>				
<b>Line(s)</b>	<b>Gross Receipt Tax</b>		<b>Personal Income Tax</b>	<b>Corporate Income Tax</b>
	<b>Counties</b>	<b>State</b>	<b>State</b>	<b>State</b>
<b>Construction</b>				
<b>1st AC</b>	\$6.65	\$9.98	\$7.29	\$1.75
<b>2nd AC</b>	\$10.17	\$15.25	\$11.15	\$2.67
<b>1 DC</b>	\$13.31	\$19.96	\$14.59	\$3.50
<b>Operations and Maintenance (Year One)</b>				
<b>1st AC</b>	\$0.206	\$0.310	\$0.226	\$0.054
<b>2nd AC</b>	\$0.168	\$0.251	\$0.184	\$0.044
<b>1 DC</b>	\$0.413	\$0.619	\$0.452	\$0.108



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Calculations by Authors

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During the first year of operations and maintenance of the first AC line, the counties in the state will receive \$.206 million in gross receipts revenues and the state will receive \$.310 million in gross receipts revenues, \$.226 million in personal income tax revenues and \$.054 million in corporate tax revenues.

If the second line is an AC line, during the first year of operations and maintenance the counties would receive \$.168 million in gross receipts revenues and the state would receive \$.251 million in gross receipts revenues, \$.184 million in personal income tax revenues and \$.044 million in corporate income tax revenues.

If the second line is a DC line, during the first year of operations and maintenance the counties would receive \$.413 million in gross receipts revenues and the state would receive \$.619 million in gross receipts revenues, \$.452 million in personal income tax revenues and \$.108 million in corporate income tax revenues.

Future years of revenue would be very similar to the revenues received in the first year.

Revenue estimates by county are provided in Appendix G.

## **5.0 Summary**

The proposed SunZia Southwest Transmission Project will build up to two transmission lines across southern Arizona and southern and central New Mexico. This study estimates the economic impact of the transmission line and potential renewable facilities in the State of New Mexico. It is an update of the initial assessment completed in 2011.

The estimated job impacts of the construction of the transmission line(s) and substations range from 2,871 to 6,125 depending on the type of transmission lines constructed. Labor income impacts range from \$214 million to \$461 million. These impacts are for the entire construction periods.

Once construction is completed, ongoing operations and maintenance generate 33 to 64 full and part time jobs per year. The amount of labor income generated ranges from \$1.9 million to \$3.7 million.

For the construction period and depending on whether one or two lines are built, the state will receive between \$22.5 million and \$52.2 million in revenues. The counties will receive between \$10.9 million and \$25.5 million. The Bureau of Land Management will receive \$.192 regardless of the number of lines built and the NM State Land Office will receive between \$1.04 million and \$2.07 million for right of way leases.

In the first year of operations, the state will receive between \$.385 million and \$.889 million in revenues. The counties will receive between \$4.32 million and \$10.36 million. The Bureau of

Land Management will receive \$.065 regardless of the number of lines built and the NM State Land Office will receive between \$.430 million and \$.860 million for right of way leases.

If all potential renewable generation facilities are constructed, the estimated jobs generated range from 5,600 to 16,800 during the construction period. Labor income generated ranges from \$301 million and \$903 million.

During the operations and maintenance phase, the renewable generation facilities will generate between 170 and 500 jobs and labor income will range between \$9.35 million and \$28 million.

During the generation facilities construction period, the state would receive between \$19 million and \$57 million in revenues and the counties would between \$6.65 million and \$20 million.

During the generation facilities operations and maintenance phase, the state would receive between \$.590 million and \$1.77 million and the counties would receive between \$.206 million and \$.619 million.

## **Appendix A: Limitations of the Study**

An input-output framework uses the existing structure of the economy to estimate the economic response of existing producers to a new demand for regional production. Input-output models are subject to limitations, a few of which merit mention.

Input-output models assume unemployed resources or the possibility of importing resources in the existing economy at the time of the new economic activity. The implication is that prices are fixed and therefore only quantities respond to the stimulus. If these assumptions are violated, the actual impact may be different than predicted by the model.

Input-output models are linear in nature and assume constant returns to scale in production. Actual impacts will differ under actual production characteristics.

It is assumed in this study that all transmission line construction occurs over a 30-month timeline and the potential generation facilities construction occurs over a 12-month timeline. Impacts from longer lead-time items that are typically manufactured before the expected start of construction are spread across the estimated construction timeframe. Variation in the project start date will not change the impact results in a material way.

Direct impacts serve as the economic stimulus in input-output models. All direct impacts were provided by SunZia Sunwest and are believed to represent a good faith description of the project as currently proposed. The total impacts of the construction of the transmission lines will take more than 30 months to be realized and the total impacts of the construction of the generation facilities will take more than 12 months to be realized.

The method of financing the generation facilities has not been determined. If financed through industrial revenue bonds, no compensating tax liability will occur. Since the method of finance is important, compensating taxes were not included in the scope of the study. Since the exact location of any of the facilities is unknown, property taxes were also not included in the scope of the study.

This study does not include an environmental assessment – it is beyond the scope of the economic impact report. Nor does the report estimate the economic impacts from changes in electricity power markets or how the construction of wind farms help meet renewable fuel standards set by the state.

## Appendix B: Revenue Estimation Methodology: Effective Tax Rates

For each year and each tax, two quantities are needed to calculate an effective tax rate: (a) the amount of taxes collected and (b) Labor Income. Taxes collected in each category are reported by the U.S. Bureau of the Census while labor income consistent with the taxable income base must be estimated.

Using components of total personal income (TPI) as reported by the Bureau of Economic Analysis (BEA 2016) an adjusted personal income figure is computed that more closely represents the income which is taxable by the income tax and from which taxable sales are made. Adjusted personal income is defined to be equal to total personal income (TPI) minus most transfer payments and minus two components of dividends, interest and rent. Within transfer payments, retirement and disability insurance benefits and veteran's benefits were not subtracted from TPI because these represent income that can be spent (and taxed) in the region. Most of the rest of transfer payments is comprised of medical payments. The two components of dividends, interest and rent, that were subtracted are the imputed rent (which consists of rent imputed on the value of owner-occupied housing) and imputed interest (which accrues but is typically not paid out to bondholders).

Revenue and income data used to compute New Mexico's effective tax rates are in Table B.1. The calculation of the effective tax rates is shown in Table B.2. The average effective tax rates from 2006 to 2015 (most recently available data) are used throughout the report. For the purpose of estimating tax revenue, the important issue is the stability of the effective tax rates from year to year. Labor income based effective tax rates satisfy this criterion. The variability of the effective tax rates as measured by the standard deviation of each rate is low (Table B.2).

**Table B.1**

New Mexico Tax Revenue - 2006-20015						
Year	GRT	PIT	CIT	other	Total taxes	Adjusted Income
2006	\$2,387,718	\$1,123,954	\$377,185	\$1,221,826	\$5,110,683	\$43,131,506
2007	\$2,646,901	\$1,177,918	\$459,880	\$1,242,518	\$5,527,217	\$44,958,411
2008	\$2,662,257	\$1,198,400	\$403,500	\$947,350	\$5,211,507	\$47,215,893
2009	\$2,484,612	\$958,500	\$162,500	\$1,211,665	\$4,817,277	\$45,811,769
2010	\$2,304,563	\$956,600	\$125,100	\$908,974	\$4,295,237	\$46,865,853
2011	\$2,568,564	\$1,096,922	\$229,800	\$1,033,810	\$4,929,096	\$48,792,635
2012	2,766,698	1,126,460	276,707	\$1,301,117	\$5,470,982	\$49,267,804
2013	2,732,537	1,222,245	266,466	\$1,169,593	\$5,390,841	\$48,919,423
2014	2,799,875	1,297,493	205,702	\$1,454,362	\$5,757,432	\$50,741,789
2015	2,995,689	1,381,254	249,947	\$1,382,553	\$6,009,443	\$51,827,500

GTR includes gross Receipts and Selective Sales Taxes

PIT refers to Personal Income Taxes

CIT refers to Corporate Income Taxes

IMPLAN Labor Income calculated from Bureau of Economic Analysis data and includes: wage and salary disbursements, supplements to wages and salary, and proprietor's income.

**Table B.2**

<b>Effective Tax Rates</b>					
<b>Year</b>	<b>Total Taxes</b>	<b>GRT</b>	<b>PIT</b>	<b>CIT</b>	<b>other</b>
<b>2006</b>	0.1185	0.0554	0.0261	0.0087	0.0283
<b>2007</b>	0.1229	0.0589	0.0262	0.0102	0.0276
<b>2008</b>	0.1104	0.0564	0.0254	0.0085	0.0201
<b>2009</b>	0.1052	0.0542	0.0209	0.0035	0.0264
<b>2010</b>	0.0916	0.0492	0.0204	0.0027	0.0194
<b>2011</b>	0.1010	0.0526	0.0225	0.0047	0.0212
<b>2012</b>	0.1110	0.0562	0.0229	0.0056	0.0264
<b>2013</b>	0.1102	0.0559	0.0250	0.0054	0.0239
<b>2014</b>	0.1135	0.0552	0.0256	0.0041	0.0287
<b>2015</b>	0.1160	0.0578	0.0267	0.0048	0.0267
10 yr. Ave	0.1100	0.0552	0.0242	0.0058	0.0249
Standard Dev.	0.0085	0.0026	0.0022	0.0024	0.0033

## Appendix C: Economic Impacts of Transmission Line Construction by County

Table C1

Economic Impacts for Transmission Line Construction by County For One AC Line						
County		Direct Effect	Direct Effect	Indirect	Induced	Total
		Labor Expenditures	Other Expenditures	Effect	Effect	Effect
Lincoln	Employment (# of Jobs)	59	40	8	26	134
	Labor Income (2017 \$ Mils)	\$7.69	\$0.99	\$0.23	\$0.77	\$9.68
	State Product (2017 \$ Mils)	\$7.69	\$1.39	\$0.43	\$1.69	\$11.21
	Total Sales (2017 \$ Mils)	\$7.69	\$1.47	\$0.44	\$2.81	\$12.42
Torrance	Employment (# of Jobs)	189	106	13	37	345
	Labor Income (2017 \$ Mils)	\$24.55	\$3.56	\$0.42	\$1.02	\$29.55
	State Product (2017 \$ Mils)	\$24.55	\$6.30	\$0.79	\$2.53	\$34.17
	Total Sales (2017 \$ Mils)	\$24.55	\$11.67	\$1.78	\$4.65	\$42.65
Socorro	Employment (# of Jobs)	429	236	23	103	791
	Labor Income (2017 \$ Mils)	\$55.79	\$5.15	\$0.55	\$2.59	\$64.08
	State Product (2017 \$ Mils)	\$55.79	\$9.04	\$0.92	\$5.89	\$71.63
	Total Sales (2017 \$ Mils)	\$55.79	\$20.06	\$2.24	\$10.66	\$88.75



SunZia Southwest Transmission Project: Economic Impact Assessment

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<b>Sierra</b>	<b>Employment (# of Jobs)</b>	227	122	15	62	425
	<b>Labor Income (2017 \$ Mils)</b>	\$29.48	\$3.00	\$0.38	\$1.52	\$34.39
	<b>State Product (2017 \$ Mils)</b>	\$29.48	\$4.82	\$0.61	\$3.21	\$38.13
	<b>Total Sales (2017 \$ Mils)</b>	\$29.48	\$10.41	\$1.53	\$6.44	\$47.85
<b>Luna</b>	<b>Employment (# of Jobs)</b>	133	82	10	41	267
	<b>Labor Income (2017 \$ Mils)</b>	\$17.35	\$2.05	\$0.32	\$1.18	\$20.90
	<b>State Product (2017 \$ Mils)</b>	\$17.35	\$3.25	\$0.56	\$2.40	\$23.56
	<b>Total Sales (2017 \$ Mils)</b>	\$17.35	\$7.05	\$1.23	\$4.54	\$30.18
<b>Grant</b>	<b>Employment (# of Jobs)</b>	40	21	3	9	74
	<b>Labor Income (2017 \$ Mils)</b>	\$5.22	\$0.60	\$0.09	\$0.24	\$6.16
	<b>State Product (2017 \$ Mils)</b>	\$5.22	\$1.04	\$0.18	\$0.56	\$6.99
	<b>Total Sales (2017 \$ Mils)</b>	\$5.22	\$1.89	\$0.39	\$1.05	\$8.54
<b>Hidalgo</b>	<b>Employment (# of Jobs)</b>	61	35	4	11	112
	<b>Labor Income (2017 \$ Mils)</b>	\$7.95	\$0.58	\$0.07	\$0.26	\$8.86
	<b>State Product (2017 \$ Mils)</b>	\$7.95	\$1.04	\$0.15	\$0.63	\$9.76
	<b>Total Sales (2017 \$ Mils)</b>	\$7.95	\$2.43	\$0.38	\$1.22	\$11.99

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Calculations by Authors using IMPLAN Pro Version 3

**Table C2**

<b>Economic Impacts for Transmission Line Construction by County</b>						
<b>For 2 AC Lines</b>						
<b>County</b>		<b>Direct Effect Labor Expenditures</b>	<b>Direct Effect Other Expenditures</b>	<b>Indirect Effect</b>	<b>Induced Effect</b>	<b>Total Effect</b>
<b>Lincoln</b>	<b>Employment (# of Jobs)</b>	118	80	17	49	265
	<b>Labor Income (2017 \$ Mils)</b>	\$15.39	\$1.97	\$0.46	\$1.45	\$19.27
	<b>State Product (2017 \$ Mils)</b>	\$15.39	\$2.78	\$0.87	\$3.18	\$22.22
	<b>Total Sales (2017 \$ Mils)</b>	\$15.39	\$2.95	\$0.88	\$5.26	\$24.47
<b>Torrance</b>	<b>Employment (# of Jobs)</b>	378	213	26	73	689
	<b>Labor Income (2017 \$ Mils)</b>	\$49.10	\$7.12	\$0.84	\$2.00	\$59.06
	<b>State Product (2017 \$ Mils)</b>	\$49.10	\$12.59	\$1.58	\$4.97	\$68.24
	<b>Total Sales (2017 \$ Mils)</b>	\$49.10	\$23.33	\$3.56	\$9.12	\$85.11
<b>Socorro</b>	<b>Employment (# of Jobs)</b>	858	472	46	202	1577
	<b>Labor Income (2017 \$ Mils)</b>	\$111.58	\$10.31	\$1.10	\$5.18	\$128.16
	<b>State Product (2017 \$ Mils)</b>	\$111.58	\$18.08	\$1.83	\$11.78	\$143.27
	<b>Total Sales (2017 \$ Mils)</b>	\$111.58	\$40.12	\$4.48	\$21.33	\$177.50

SunZia Southwest Transmission Project: Economic Impact Assessment

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<b>Sierra</b>	<b>Employment (# of Jobs)</b>	454	243	31	122	849
	<b>Labor Income (2017 \$ Mils)</b>	\$58.96	\$6.01	\$0.76	\$3.04	\$68.77
	<b>State Product (2017 \$ Mils)</b>	\$58.96	\$9.65	\$1.23	\$6.42	\$76.26
	<b>Total Sales (2017 \$ Mils)</b>	\$58.96	\$20.82	\$3.05	\$12.87	\$95.71
<b>Luna</b>	<b>Employment (# of Jobs)</b>	267	164	20	81	532
	<b>Labor Income (2017 \$ Mils)</b>	\$34.71	\$4.06	\$0.58	\$2.35	\$41.70
	<b>State Product (2017 \$ Mils)</b>	\$34.71	\$6.33	\$1.00	\$4.78	\$46.81
	<b>Total Sales (2017 \$ Mils)</b>	\$34.71	\$12.92	\$2.19	\$9.03	\$58.85
<b>Grant</b>	<b>Employment (# of Jobs)</b>	80	42	7	18	147
	<b>Labor Income (2017 \$ Mils)</b>	\$10.43	\$1.18	\$0.18	\$0.49	\$12.28
	<b>State Product (2017 \$ Mils)</b>	\$10.43	\$1.96	\$0.34	\$1.11	\$13.85
	<b>Total Sales (2017 \$ Mils)</b>	\$10.43	\$3.60	\$0.76	\$2.09	\$16.88
<b>Hidalgo</b>	<b>Employment (# of Jobs)</b>	122	70	9	22	223
	<b>Labor Income (2017 \$ Mils)</b>	\$15.90	\$1.17	\$0.14	\$0.51	\$17.72
	<b>State Product (2017 \$ Mils)</b>	\$15.90	\$2.07	\$0.28	\$1.25	\$19.50
	<b>Total Sales (2017 \$ Mils)</b>	\$15.90	\$4.61	\$0.70	\$2.44	\$23.65

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Calculations by Authors Using IMPLAN Pro Version 3

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**Table C3**

<b>Economic Impacts for Transmission Line Construction by County</b>						
<b>For 1 AC Line and 1 DC Line</b>						
<b>County</b>		<b>Direct Effect Labor Expenditures</b>	<b>Direct Effect Other Expenditures</b>	<b>Indirect Effect</b>	<b>Induced Effect</b>	<b>Total Effect</b>
<b>Lincoln</b>	<b>Employment (# of Jobs)</b>	367	285	56	154	862
	<b>Labor Income (2017 \$ Mils)</b>	\$47.72	\$7.77	\$1.53	\$4.56	\$61.57
	<b>State Product (2017 \$ Mils)</b>	\$47.72	\$10.85	\$2.92	\$10.00	\$71.48
	<b>Total Sales (2017 \$ Mils)</b>	\$47.72	\$11.35	\$2.95	\$16.09	\$78.11
<b>Torrance</b>	<b>Employment (# of Jobs)</b>	361	204	25	70	659
	<b>Labor Income (2017 \$ Mils)</b>	\$46.90	\$6.90	\$0.82	\$1.92	\$56.53
	<b>State Product (2017 \$ Mils)</b>	\$46.90	\$12.25	\$1.54	\$4.77	\$65.45
	<b>Total Sales (2017 \$ Mils)</b>	\$46.90	\$22.67	\$3.46	\$8.75	\$81.78
<b>Socorro</b>	<b>Employment (# of Jobs)</b>	806	444	43	190	1483
	<b>Labor Income (2017 \$ Mils)</b>	\$104.84	\$9.69	\$1.04	\$4.77	\$120.34
	<b>State Product (2017 \$ Mils)</b>	\$104.84	\$17.00	\$1.73	\$10.86	\$134.42
	<b>Total Sales (2017 \$ Mils)</b>	\$104.84	\$38.02	\$4.23	\$19.65	\$166.74

SunZia Southwest Transmission Project: Economic Impact Assessment

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<b>Sierra</b>	<b>Employment (# of Jobs)</b>	424	226	28	114	792
	<b>Labor Income (2017 \$ Mils)</b>	\$55.12	\$5.56	\$0.71	\$2.80	\$64.19
	<b>State Product (2017 \$ Mils)</b>	\$55.12	\$8.93	\$1.14	\$5.92	\$71.11
	<b>Total Sales (2017 \$ Mils)</b>	\$55.12	\$19.40	\$2.84	\$11.86	\$89.23
<b>Luna</b>	<b>Employment (# of Jobs)</b>	228	135	16	69	447
	<b>Labor Income (2017 \$ Mils)</b>	\$29.58	\$3.40	\$0.52	\$1.97	\$35.47
	<b>State Product (2017 \$ Mils)</b>	\$29.58	\$5.36	\$0.90	\$4.01	\$39.85
	<b>Total Sales (2017 \$ Mils)</b>	\$29.58	\$11.44	\$1.99	\$7.57	\$50.59
<b>Grant</b>	<b>Employment (# of Jobs)</b>	74	39	6	16	135
	<b>Labor Income (2017 \$ Mils)</b>	\$9.61	\$1.11	\$0.17	\$0.43	\$11.33
	<b>State Product (2017 \$ Mils)</b>	\$9.61	\$1.92	\$0.32	\$0.99	\$12.84
	<b>Total Sales (2017 \$ Mils)</b>	\$9.61	\$3.47	\$0.71	\$1.85	\$15.65
<b>Hidalgo</b>	<b>Employment (# of Jobs)</b>	102.94	64.06	8.01	20.67	\$195.669
	<b>Labor Income (2017 \$ Mils)</b>	\$13.38	\$1.07	\$0.14	\$0.47	\$15.06
	<b>State Product (2017 \$ Mils)</b>	\$13.38	\$1.90	\$0.27	\$1.14	\$16.70
	<b>Total Sales (2017 \$ Mils)</b>	\$13.38	\$4.48	\$0.71	\$2.23	\$20.81

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Calculations by Authors Using IMPLAN Pro Version 3

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## Appendix D: Transmission Line Construction Revenue Impacts by County

Table D1

Transmission Line Construction Revenue Impacts by County (2017 Millions \$)							
County	Line(s)	Gross Receipt Tax		Personal Income Tax	Corporate Income Tax	Property Tax	
		Counties	State	State	State	County	State
<b>Construction (2.5 Years)</b>							
<b>Grant</b>	1 AC	\$0.14	\$0.20	\$0.15	\$0.04	\$0.13	\$0.01
	2 AC	\$0.27	\$0.41	\$0.30	\$0.07	\$0.26	\$0.02
	1AC & 1 DC	\$0.25	\$0.38	\$0.27	\$0.07	\$0.23	\$0.02
<b>Hidalgo</b>	1 AC	\$0.20	\$0.29	\$0.21	\$0.05	\$0.19	\$0.01
	2 AC	\$0.27	\$0.59	\$0.43	\$0.10	\$0.41	\$0.03
	1AC & 1 DC	\$0.33	\$0.50	\$0.36	\$0.09	\$0.37	\$0.02
<b>Lincoln</b>	1 AC	\$0.21	\$0.32	\$0.23	\$0.06	\$0.25	\$0.02
	2 AC	\$0.43	\$0.64	\$0.47	\$0.11	\$0.51	\$0.04
	1AC & 1 DC	\$1.36	\$2.04	\$1.49	\$0.36	\$2.32	\$0.18
<b>Luna</b>	1 AC	\$0.46	\$0.69	\$0.51	\$0.12	\$0.57	\$0.04
	2 AC	\$0.92	\$1.38	\$1.01	\$0.24	\$1.14	\$0.08
	1AC & 1 DC	\$0.78	\$1.17	\$0.86	\$0.21	\$0.85	\$0.06
<b>Sierra</b>	1 AC	\$0.76	\$1.14	\$0.83	\$0.20	\$0.66	\$0.04
	2 AC	\$1.52	\$2.28	\$1.66	\$0.40	\$1.32	\$0.09
	1AC & 1 DC	\$1.42	\$2.13	\$1.55	\$0.37	\$1.19	\$0.08
<b>Socorro</b>	1 AC	\$1.41	\$2.12	\$1.55	\$0.37	\$1.69	\$0.08
	2 AC	\$2.83	\$4.24	\$3.10	\$0.74	\$3.39	\$0.17
	1AC & 1 DC	\$2.66	\$3.99	\$2.91	\$0.70	\$3.54	\$0.18
<b>Torrance</b>	1 AC	\$0.65	\$0.98	\$0.72	\$0.17	\$0.49	\$0.04
	2 AC	\$1.30	\$1.96	\$1.43	\$0.34	\$0.99	\$0.08
	1AC & 1 DC	\$1.25	\$1.87	\$1.37	\$0.33	\$1.13	\$0.08

Calculations by Authors



**Appendix E: Construction Economic Impacts of Potential Generation Facilities by County**

**Table E1**

<b>Construction Economic Impacts of Potential Generation Facilities by County</b>						
<b>For 1st AC Line</b>						
<b>County and Projects</b>		<b>Direct Effect</b>	<b>Direct Effect</b>	<b>Indirect Effect</b>	<b>Induced Effect</b>	<b>Total Effect</b>
		<b>Labor Expenditures</b>	<b>Other Expenditures</b>			
<b>Lincoln</b>	<b>Employment (# of Jobs)</b>	1125	1385	379	233	3121
<b>1,125 MW Wind</b>	<b>Labor Income (2017 \$ Mils)</b>	\$108.00	\$17.90	\$14.34	\$6.76	\$147.00
	<b>State Product (2017 \$ Mils)</b>	\$108.00	\$28.04	\$21.63	\$14.57	\$172.24
	<b>Total Sales (2017 \$ Mils)</b>	\$108.00	\$148.48	\$55.67	\$27.72	\$339.87
<b>Torrance</b>	<b>Employment (# of Jobs)</b>	375	283	46	46	750
<b>375 MW Wind</b>	<b>Labor Income (2017 \$ Mils)</b>	\$36.00	\$11.91	\$1.83	\$1.26	\$51.00
	<b>State Product (2017 \$ Mils)</b>	\$36.00	\$29.07	\$3.39	\$3.14	\$71.60
	<b>Total Sales (2017 \$ Mils)</b>	\$36.00	\$49.49	\$7.58	\$5.77	\$98.84

Calculations by Authors using IMPLAN Pro Version 3

Table E2

<b>Construction Economic Impacts of Potential Generation Facilities by County</b>						
<b>For an AC Line as a 2nd Line</b>						
<b>County and Projects</b>		<b>Direct Effect</b>	<b>Direct Effect</b>	<b>Indirect Effect</b>	<b>Induced Effect</b>	<b>Total Effect</b>
		<b>Labor Expenditures</b>	<b>Other Expenditures</b>			
<b>Grant</b>	<b>Employment (# of Jobs)</b>	500	179	29	103	812
<b>150 MW Solar</b>	<b>Labor Income (2017 \$ Mils)</b>	\$55.60	\$5.15	\$0.92	\$2.76	\$64.43
	<b>State Product (2017 \$ Mils)</b>	\$55.60	\$11.29	\$1.69	\$6.32	\$74.90
	<b>Total Sales (2017 \$ Mils)</b>	\$55.60	\$19.11	\$3.78	\$11.87	\$90.36
<b>Guadalupe</b>	<b>Employment (# of Jobs)</b>	200	243	50	23	516
<b>200 MW Wind</b>	<b>Labor Income (2017 \$ Mils)</b>	\$19.20	\$2.93	\$0.91	\$0.60	\$23.64
	<b>State Product (2017 \$ Mils)</b>	\$19.20	\$4.77	\$2.21	\$1.39	\$27.58
	<b>Total Sales (2017 \$ Mils)</b>	\$19.20	\$26.40	\$6.80	\$2.82	\$55.21
<b>Hidalgo</b>	<b>Employment (# of Jobs)</b>	600	361	61	69	1091
<b>100 MW Wind</b>	<b>Labor Income (2017 \$ Mils)</b>	\$65.20	\$4.56	\$1.10	\$1.57	\$72.42
<b>150 MW Solar</b>	<b>State Product (2017 \$ Mils)</b>	\$65.20	\$7.90	\$2.09	\$3.81	\$79.00
	<b>Total Sales (2017 \$ Mils)</b>	\$65.20	\$30.47	\$6.34	\$7.46	\$109.47
<b>Lincoln</b>	<b>Employment (# of Jobs)</b>	100	123	34	21	277
<b>100 MW Wind</b>	<b>Labor Income (2017 \$ Mils)</b>	\$9.60	\$1.59	\$1.27	\$0.60	\$13.07
	<b>State Product (2017 \$ Mils)</b>	\$9.60	\$2.49	\$1.92	\$1.30	\$15.31
	<b>Total Sales (2017 \$ Mils)</b>	\$9.60	\$13.20	\$4.95	\$2.46	\$30.21

SunZia Southwest Transmission Project: Economic Impact Assessment

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<b>Luna</b>	<b>Employment (# of Jobs)</b>	500	219	27	94	841
<b>150 MW Solar</b>	<b>Labor Income (2017 \$ Mils)</b>	\$55.60	\$4.03	\$0.97	\$2.70	\$63.30
	<b>State Product (2017 \$ Mils)</b>	\$55.60	\$7.19	\$1.71	\$5.50	\$70.00
	<b>Total Sales (2017 \$ Mils)</b>	\$55.60	\$19.11	\$3.91	\$10.40	\$89.02
<b>Sierra</b>	<b>Employment (# of Jobs)</b>	500	162	18	90	771
<b>150 MW Solar</b>	<b>Labor Income (2017 \$ Mils)</b>	\$55.60	\$3.75	\$0.50	\$2.23	\$62.09
	<b>State Product (2017 \$ Mils)</b>	\$55.60	\$6.18	\$0.80	\$4.71	\$67.29
	<b>Total Sales (2017 \$ Mils)</b>	\$55.60	\$12.11	\$1.98	\$9.45	\$79.14
<b>Torrance</b>	<b>Employment (# of Jobs)</b>	200	151	24	25	400
<b>200 MW Wind</b>	<b>Labor Income (2017 \$ Mils)</b>	\$19.20	\$6.35	\$0.97	\$0.67	\$27.20
	<b>State Product (2017 \$ Mils)</b>	\$19.20	\$15.50	\$1.81	\$1.67	\$38.19
	<b>Total Sales (2017 \$ Mils)</b>	\$19.20	\$26.40	\$4.04	\$3.08	\$52.71

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Calculations by Authors using IMPLAN Pro Version 3

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**Table E3**

<b>Construction Economic Impacts of Potential Generation Facilities by County For a DC Line as 2nd Line</b>						
<b>County and Projects</b>		<b>Direct Effect Labor Expenditures</b>	<b>Direct Effect Other Expenditures</b>	<b>Indirect Effect</b>	<b>Induced Effect</b>	<b>Total Effect</b>
<b>Guadalupe</b>	<b>Employment (# of Jobs)</b>	1,200	1,456	301	139	3,096
<b>1,200 MW Wind</b>	<b>Labor Income (2017 \$ Mils)</b>	\$115.20	\$17.59	\$5.46	\$3.57	\$141.83
	<b>State Product (2017 \$ Mils)</b>	\$115.20	\$28.62	\$13.28	\$8.37	\$165.47
	<b>Total Sales (2017 \$ Mils)</b>	\$115.20	\$158.38	\$40.77	\$16.90	\$331.25
<b>Lincoln</b>	<b>Employment (# of Jobs)</b>	600	738	202	124	1665
<b>600 MW Wind</b>	<b>Labor Income (2017 \$ Mils)</b>	\$57.60	\$9.55	\$7.65	\$3.61	\$78.40
	<b>State Product (2017 \$ Mils)</b>	\$57.60	\$14.95	\$11.54	\$7.77	\$91.86
	<b>Total Sales (2017 \$ Mils)</b>	\$57.60	\$79.19	\$29.69	\$14.78	\$181.26
<b>Torrance</b>	<b>Employment (# of Jobs)</b>	1,200	905	147	148	2,399
<b>1,200 MW Wind</b>	<b>Labor Income (2017 \$ Mils)</b>	\$115.20	\$38.12	\$5.84	\$4.04	\$163.21
	<b>State Product (2017 \$ Mils)</b>	\$115.20	\$93.02	\$10.85	\$10.05	\$229.11
	<b>Total Sales (2017 \$ Mils)</b>	\$115.20	\$158.38	\$24.25	\$18.45	\$316.28

Calculations by Authors using IMPLAN Pro Version 3

**Appendix F: Operations and Maintenance Economic Impacts of Potential Generation Facilities by County**

**Table F1**

<b>Operations and Maintenance Economic Impacts of Potential Generation Facilities by County For 1st AC Line</b>						
<b>County and Projects</b>		<b>Direct Effect Labor Expenditures</b>	<b>Direct Effect Other Expenditures</b>	<b>Indirect Effect</b>	<b>Induced Effect</b>	<b>Total Effect</b>
<b>Lincoln</b>	<b>Employment (# of Jobs)</b>	44	10	4	37	95
<b>1,125 MW Wind</b>	<b>Labor Income (2017 \$ Mils)</b>	\$3.38	\$0.27	\$0.50	\$1.08	\$5.22
	<b>State Product (2017 \$ Mils)</b>	\$3.38	\$0.74	\$0.23	\$2.33	\$6.68
	<b>Total Sales (2017 \$ Mils)</b>	\$3.38	\$1.69	\$0.50	\$4.43	\$9.99
<b>Torrance</b>	<b>Employment (# of Jobs)</b>	15	2	1	6	24
<b>375 MW Wind</b>	<b>Labor Income (2017 \$ Mils)</b>	\$1.13	\$0.19	\$0.02	\$0.18	\$1.51
	<b>State Product (2017 \$ Mils)</b>	\$1.13	\$0.35	\$0.03	\$0.44	\$1.94
	<b>Total Sales (2017 \$ Mils)</b>	\$1.13	\$0.56	\$0.07	\$0.80	\$2.56

Calculations by Authors using IMPLAN Pro Version 3

**Table F2**

<b>Operations and Maintenance Economic Impacts of Potential Generation Facilities by County For a AC Line as 2nd Line</b>						
<b>County and Projects</b>		<b>Direct Effect</b>	<b>Direct Effect</b>	<b>Indirect Effect</b>	<b>Induced Effect</b>	<b>Total Effect</b>
		<b>Labor Expend.</b>	<b>Other Expend.</b>			
<b>Grant</b>	<b>Employment (# of Jobs)</b>	7	0	0	3	10
<b>150 MW Solar</b>	<b>Labor Income (2017 \$ Mils)</b>	\$0.60	\$0.02	\$0.01	\$0.08	\$0.70
	<b>State Product (2017 \$ Mils)</b>	\$0.60	\$0.05	\$0.01	\$0.18	\$0.83
	<b>Total Sales (2017 \$ Mils)</b>	\$0.60	\$0.09	\$0.03	\$0.33	\$1.05
<b>Guadalupe</b>	<b>Employment (# of Jobs)</b>	8	2	1	4	15
<b>200 MW Wind</b>	<b>Labor Income (2017 \$ Mils)</b>	\$0.60	\$0.03	\$0.01	\$0.11	\$0.75
	<b>State Product (2017 \$ Mils)</b>	\$0.60	\$0.11	\$0.03	\$0.26	\$1.00
	<b>Total Sales (2017 \$ Mils)</b>	\$0.60	\$0.30	\$0.07	\$0.52	\$1.49
<b>Hidalgo</b>	<b>Employment (# of Jobs)</b>	10	2	1	4	16
<b>100 MW Wind</b>	<b>Labor Income (2017 \$ Mils)</b>	\$0.90	\$0.02	\$0.01	\$0.08	\$1.01
<b>150 MW Solar</b>	<b>State Product (2017 \$ Mils)</b>	\$0.90	\$0.09	\$0.02	\$0.20	\$1.21
	<b>Total Sales (2017 \$ Mils)</b>	\$0.90	\$0.24	\$0.05	\$0.39	\$1.58

SunZia Southwest Transmission Project: Economic Impact Assessment

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<b>Lincoln</b>	<b>Employment (# of Jobs)</b>	4	1	0	3	8
<b>100 MW Wind</b>	<b>Labor Income (2017 \$ Mils)</b>	\$0.30	\$0.02	\$0.04	\$0.10	\$0.46
	<b>State Product (2017 \$ Mils)</b>	\$0.30	\$0.07	\$0.02	\$0.21	\$0.59
	<b>Total Sales (2017 \$ Mils)</b>	\$0.30	\$0.15	\$0.04	\$0.39	\$0.89
<b>Luna</b>	<b>Employment (# of Jobs)</b>	7	0	0	3	10
<b>150 MW Solar</b>	<b>Labor Income (2017 \$ Mils)</b>	\$0.60	\$0.03	\$0.00	\$0.08	\$0.71
	<b>State Product (2017 \$ Mils)</b>	\$0.60	\$0.05	\$0.01	\$0.16	\$0.82
	<b>Total Sales (2017 \$ Mils)</b>	\$0.60	\$0.09	\$0.01	\$0.30	\$1.01
<b>Sierra</b>	<b>Employment (# of Jobs)</b>	7	0	0	3	10
<b>150 MW Solar</b>	<b>Labor Income (2017 \$ Mils)</b>	\$0.60	\$0.02	\$0.00	\$0.07	\$0.70
	<b>State Product (2017 \$ Mils)</b>	\$0.60	\$0.05	\$0.01	\$0.14	\$0.79
	<b>Total Sales (2017 \$ Mils)</b>	\$0.60	\$0.09	\$0.01	\$0.29	\$0.99
<b>Torrance</b>	<b>Employment (# of Jobs)</b>	8	1	0	3	13
<b>200 MW Wind</b>	<b>Labor Income (2017 \$ Mils)</b>	\$0.60	\$0.10	\$0.01	\$0.09	\$0.80
	<b>State Product (2017 \$ Mils)</b>	\$0.60	\$0.19	\$0.02	\$0.23	\$1.04
	<b>Total Sales (2017 \$ Mils)</b>	\$0.60	\$0.30	\$0.04	\$0.43	\$1.36

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Calculations by Authors using IMPLAN Pro Version 3

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**Table F3**

<b>Operations and Maintenance Economic Impacts of Potential Generation Facilities by County For a DC Line as 2nd Line</b>						
<b>County and Projects</b>		<b>Direct Effect Labor Expenditures</b>	<b>Direct Effect Other Expenditures</b>	<b>Indirect Effect</b>	<b>Induced Effect</b>	<b>Total Effect</b>
<b>Guadalupe</b>	<b>Employment (# of Jobs)</b>	47	12	5	25	89
<b>1,200 MW Wind</b>	<b>Labor Income (2017 \$ Mils)</b>	\$3.60	\$0.17	\$0.07	\$0.66	\$4.50
	<b>State Product (2017 \$ Mils)</b>	\$3.60	\$0.68	\$0.15	\$1.54	\$5.98
	<b>Total Sales (2017 \$ Mils)</b>	\$3.60	\$1.80	\$0.42	\$3.11	\$8.93
<b>Lincoln</b>	<b>Employment (# of Jobs)</b>	23	6	2	20	51
<b>600 MW Wind</b>	<b>Labor Income (2017 \$ Mils)</b>	\$1.80	\$0.14	\$0.27	\$0.58	\$2.79
	<b>State Product (2017 \$ Mils)</b>	\$1.80	\$0.39	\$0.12	\$1.24	\$3.56
	<b>Total Sales (2017 \$ Mils)</b>	\$1.80	\$0.90	\$0.26	\$2.36	\$5.33
<b>Torrance</b>	<b>Employment (# of Jobs)</b>	47	7	2	20	76
<b>1,200 MW Wind</b>	<b>Labor Income (2017 \$ Mils)</b>	\$3.60	\$0.60	\$0.06	\$0.56	\$4.83
	<b>State Product (2017 \$ Mils)</b>	\$3.60	\$1.12	\$0.09	\$1.41	\$6.21
	<b>Total Sales (2017 \$ Mils)</b>	\$3.60	\$1.80	\$0.21	\$2.57	\$8.19

Calculations by Authors using IMPLAN Pro Version 3



**Appendix G: Revenue Impacts of Potential Generation Facilities by County**

**Table G1**

<b>Construction Revenue Impacts of Potential Generation Facilities by County (Millions \$)</b>				
<b>County</b>	<b>Gross Receipt Tax</b>		<b>Personal Income Tax</b>	<b>Corporate Income Tax</b>
	<b>Counties</b>	<b>State</b>	<b>State</b>	<b>State</b>
<b>1st AC Line</b>				
<b>Lincoln</b>	\$3.25	\$4.87	\$3.56	\$0.85
<b>Torrance</b>	\$1.13	\$1.69	\$1.23	\$0.30
<b>For an AC Line as 2nd Line</b>				
<b>Grant</b>	\$1.42	\$2.13	\$1.56	\$0.37
<b>Guadalupe</b>	\$0.52	\$0.78	\$0.57	\$0.14
<b>Hidalgo</b>	\$1.60	\$2.40	\$1.75	\$0.42
<b>Lincoln</b>	\$0.29	\$0.43	\$0.32	\$0.08
<b>Luna</b>	\$1.40	\$2.10	\$1.53	\$0.37
<b>Sierra</b>	\$1.37	\$2.06	\$1.50	\$0.36
<b>Torrance</b>	\$0.60	\$0.90	\$0.66	\$0.16
<b>For a DC Line as 2nd Line</b>				
<b>Guadalupe</b>	\$3.13	\$4.70	\$3.43	\$0.82
<b>Lincoln</b>	\$1.73	\$2.60	\$1.90	\$0.45
<b>Torrance</b>	\$3.60	\$5.41	\$3.95	\$0.95
<b>Calculations by Authors</b>				

**Table G2**

<b>Operations and Maintenance Revenue Impacts</b>				
<b>of Potential Generation Facilities by County (Millions \$)</b>				
<b>County</b>	<b>Gross Receipt Tax</b>		<b>Personal Income Tax</b>	<b>Corporate Income Tax</b>
	<b>Counties</b>	<b>State</b>	<b>State</b>	<b>State</b>
<b>1st AC Line</b>				
<b>Lincoln</b>	\$0.115	\$0.173	\$0.126	\$0.030
<b>Torrance</b>	\$0.033	\$0.050	\$0.037	\$0.009
<b>For an AC Line as 2nd Line</b>				
<b>Grant</b>	\$0.016	\$0.023	\$0.017	\$0.004
<b>Guadalupe</b>	\$0.017	\$0.025	\$0.018	\$0.004
<b>Hidalgo</b>	\$0.022	\$0.033	\$0.024	\$0.006
<b>Lincoln</b>	\$0.010	\$0.015	\$0.011	\$0.003
<b>Luna</b>	\$0.016	\$0.024	\$0.017	\$0.004
<b>Sierra</b>	\$0.015	\$0.023	\$0.017	\$0.004
<b>Torrance</b>	\$0.018	\$0.027	\$0.005	\$0.005
<b>For a DC Line as 2nd Line</b>				
<b>Guadalupe</b>	\$0.099	\$0.149	\$0.109	\$0.026
<b>Lincoln</b>	\$0.062	\$0.092	\$0.067	\$0.016
<b>Torrance</b>	\$0.107	\$0.160	\$0.117	\$0.028
<b>Calculations by Authors</b>				



## **Appendix H: About Arrowhead Center**

New Mexico State University's Arrowhead Center fosters sustainable economic development by utilizing a comprehensive approach to generate jobs, wealth, and an enhanced quality of life in New Mexico. The Arrowhead Center focuses on the interrelated activities of technology commercialization, entrepreneurship, economic studies/policy analysis, workforce analyses, research park development, and business incubation that lead to economic development. One of the Arrowhead Center's key strategies to accomplish its economic development mission is providing value-added solutions to unmet needs in the region, and to work collaboratively with other economic and business development organizations.

The Arrowhead Center performs its role through two mechanisms, as an organizational unit of NMSU staffed primarily by NMSU personnel, including faculty, staff, and students, and as a non-profit corporation established in 2004, governed by a Board of Directors. The Corporation's Board is comprised of academic, business, and economic development leaders, providing the direction necessary to focus resources across New Mexico State University elements on the challenges of economic development.

The Arrowhead Center performs wide-ranging services that contribute to the creation and expansion of small businesses in New Mexico. These services and products include:

- Business assistance, including business plan development
- Entrepreneurship education and training
- Analysis of policy issues affecting New Mexico
- Incubating businesses in the Arrowhead Business and Research Park
- Identification of labor and training needs associated with commercial enterprises
- Spin-off of commercially viable business concepts and technologies
- Protection of, licensing, and commercialization of NMSU intellectual property
- Connection of key players in the business and economic development process

The Arrowhead Center has been in existence since 2004, with rapid growth in services provided to faculty, staff, students, entrepreneurs, small business, investors, and venture capitalists. Since its inception, the Center has completed more than 200 business research projects involving more than 300 undergraduate and graduate students, fostered the spin-off of a university genetics testing laboratory resulting in a new for-profit corporation, and completed several state-level economic studies.