The Southwest Intertie Project: Assessment of Potential Benefits

November 2008

THE SOUTHWEST INTERTIE PROJECT

ASSESSMENT OF POTENTIAL BENEFITS

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1 EXECUTIVE SUMMARY

The Southwest Intertie Project (SWIP), a 500-mile, 500 kV bidirectional (north-south and south-north) transmission line will interconnect the transmission systems of Idaho Power and Sierra Pacific Power to utilities in the Desert Southwest, including Nevada Power. The SWIP will run from southern Idaho to southern Nevada. The original SWIP project was conceived in the 1980s and the right of way was granted to Idaho Power by the Bureau of Land Management in 1994. In 2005, an affiliate of LS Power acquired the rights to develop the SWIP.

LS Power is an independent power producer that develops, owns and operates over 20,000 MW of generating assets. LS Power provides safe, reliable, competitive energy throughout the U.S. LS Power develops renewable and fossil-fueled power generation and the transmission projects necessary to deliver its power to markets. Great Basin Transmission, LS Power's affiliate, is completing the development and engineering of the SWIP.

The southern half of the SWIP can connect Sierra Pacific Power (now doing business as NV Energy, north) to utilities in Arizona, California and southern Nevada. These utilities include Nevada Power (now NV Energy, south), Arizona Public Service Company (APS), Salt River Project (SRP), the Western Area Power Administration (WAPA), Southern California Edison (SCE) and the Los Angeles Department of Water and Power (LADWP). The southern portion of the SWIP will have a transfer capability of 1,850 MW and has a target in service date of 2010. This portion will directly connect Sierra Pacific Power and Nevada Power for the first time. It will facilitate the integration of wind and geothermal resources from the north with solar resources based in the Desert Southwest.

The northern half of the SWIP will connect the northern Nevada and Desert Southwest systems to Idaho Power and will have a transfer capability of 2,000 MW. Its target in service date is 2011. This portion will increase the transfer capability between the Desert Southwest and northern Nevada systems and Idaho Power and facilitate the delivery of additional cost-effective wind and natural gas generation from the Northwest to the Desert Southwest.

The SWIP will provide regional resource diversity and seasonal flexibility by delivering baseload and renewable resources to help meet: i) growing Southwest capacity and energy needs, ii) Renewable Portfolio Standard (RPS) requirements in the Desert Southwest and iii) greenhouse gas (GHG) emission reduction goals. When delivering a mix of renewable and natural gas generation, the SWIP can facilitate the reduction of between 2.5 and 4.9 million metric tons of carbon dioxide equivalent ($MMtCO_2e$) annually. The SWIP has the potential to provide significant cost savings for utilities with growing RPS requirements. In a renewable-only generation scenario SWIP can displace higher cost wind resources in the Southwest and potentially save Nevada consumers $125 million per year (exclusive of the cost of transmitting the resources). Under the same scenario the SWIP could provide other utilities in the Desert Southwest with potential incremental cost savings of $195 million per year. If resources delivered on the SWIP displace solar resources at current costs, the SWIP could provide potential cost savings of $320 million per year in southern Nevada and an additional $500 million annually for other utilities in the Desert Southwest, before accounting for the cost of transmitting the resources.

2 INTRODUCTION

The SWIP is a proposed transmission line that will run from the Midpoint substation in Idaho to southern Nevada (see map in Appendix A). The SWIP will provide a host of benefits to both the Northwest and the Southwest energy markets. The SWIP will facilitate renewable energy development in the Western Interconnect by providing transmission access to generators and load serving entities in the Northwest and the Southwest. Furthermore, the SWIP will enhance resource and load diversity and reliability benefits between the regions.

This report was prepared by Energy Strategies, LLC to evaluate a range of possible benefits of the SWIP transmission line. The report assesses the renewable energy potential in the regions accessed by the SWIP. It evaluates various renewable energy generation quantities and portfolios that may be developed as a result of the SWIP construction. It also assesses the busbar costs of these renewable resources and helps drive the determination of the value and benefits of the SWIP transmission line. Potential reductions in carbon dioxide (CO_2) emissions, as a result of additional renewable energy that could be delivered on the SWIP, are also assessed. Finally, the report identifies other possible benefits that might result from the construction of the SWIP transmission line. These benefits include diversification of generation resources and energy transfers, reliability benefits and regional cost savings.

3 POTENTIAL RENEWABLE RESOURCES

This section of the report reviews the scale of the potential renewable resource options available in the West. Recently, there has been a movement towards increased RPS targets and GHG reduction goals in the West. This results in a significant increase in demand for renewable resources. In order to determine the types of renewable resource mixes that may be delivered on the SWIP the report evaluates the potential of a number of renewable resource options located in the Western United States.

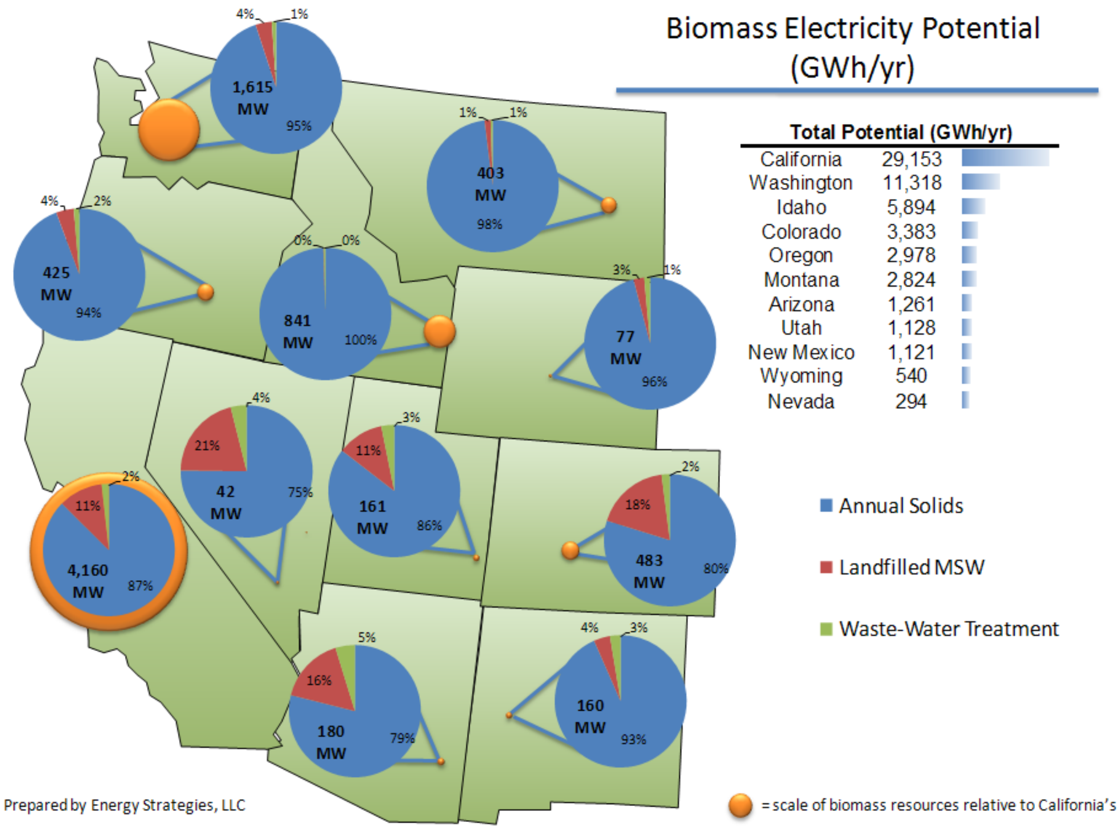
This section relies on information compiled from various studies of renewable resource potential. There are numerous studies that have been completed which evaluate the extensive renewable resource potential of the Western United States. Some of these studies include: the California Renewable Energy Transmission Initiative (RETI) Phase 1A Report, the Western Governors' Association's (WGA's) Clean and Diversified Energy Advisory Committee (CDEAC) task force reports, Idaho National Laboratory's (INL) evaluation of small hydroelectric potential and the National Renewable Energy Laboratory's (NREL) evaluations of wind resources. This section combines the findings of these various studies in order to understand the renewable energy potential that could access the SWIP transmission line.

3.1 WESTERN BIOMASS POTENTIAL

This section reviews the potential biomass resources in the Western United States. It evaluates the potential of solid biomass, land-filled municipal solid waste and waste-water treatment. Of these three different types of biomass, solid biomass (from forestry, agriculture and municipal waste) is by far the most prevalent. Solid biomass makes up 90% of the biomass energy potential in the Western United States. Figure 1 demonstrates that California, by far, possesses the greatest biomass potential. Washington and Idaho also have significant biomass potential. Other states in the West have considerably less potential to generate renewable electricity from biomass.

In 2006, as part of the Clean and Diversified Energy Initiative, the CDEAC commissioned several task forces to help assess the potential of various renewable resources in the West. The CDEAC Biomass Task Force developed estimates of biomass potential for all of the Western states. Furthermore, the 2008 California Phase 1A RETI Report identifies biomass potential in Arizona, California, Nevada, Oregon and Washington. Figure 1 below combines the information contained in these two reports. In Figure 1 the potential from the Phase 1A RETI Report was used, where available, and supplemented with the data from the CDEAC Biomass Supply Addendum. Biomass plants that came on-line in 2007 or to date in 2008 were removed from the biomass potential listed in the CDEAC report. Potential biomass capacity was converted to potential energy using an 80% capacity factor.

Figure 1[i,ii]



3.2 WESTERN SMALL HYDROELECTRIC POTENTIAL

This section reviews the potential for small hydroelectric projects in the West. Data for this section was gathered from INL's hydropower resource assessment by state. In order to be included in the renewable energy potential for this analysis the potential hydroelectric resource had to meet several criteria. First, it must have been assigned a Project Environmental Suitability Factor (PESF) of 0.90 by the INL. A PESF of 0.90 indicates that environmental concerns will have little effect on the likelihood of project development. Second, all resources included in the analysis have a nameplate capacity of at least one megawatt. Due to the fact that the siting of new hydroelectric plants is difficult, new green-field hydropower sites were not included. Only sites where upgrades or efficiency improvements could achieve increased capacity or projects where power generation could be added to an existing dam were included. Hydroelectric projects in this data set were limited to 30 MW (which is consistent with many RPS requirements in the West).[1]

This analysis concludes that the greatest hydroelectric potential in the West is in California (see Figure 2). Washington and Idaho also have significant hydroelectric potential. Other states in the West have very little, if any hydroelectric potential. In fact, Colorado, Arizona and New Mexico do not have any potential hydroelectric sites that meet the criteria outlined above. Potential hydroelectric capacity was converted to energy potential using an average capacity factor of 50%.

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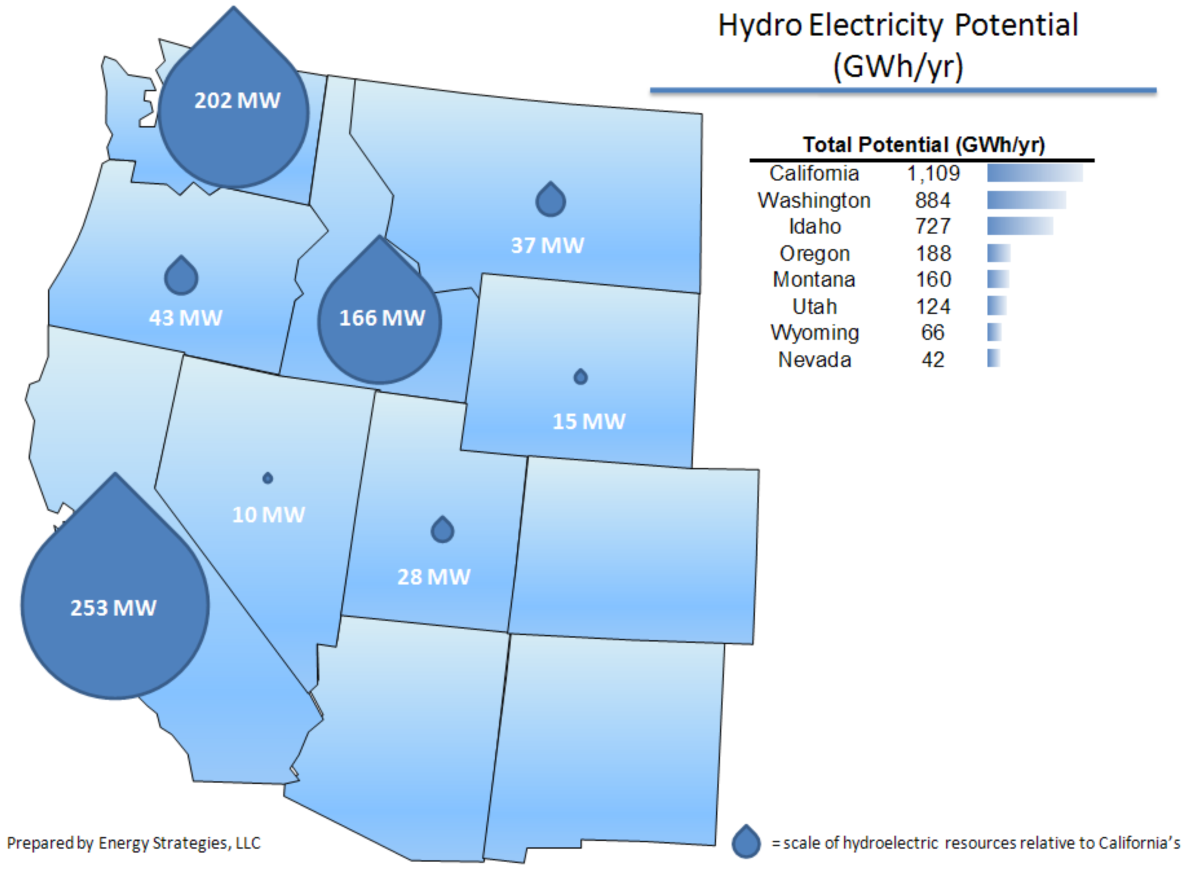
[1] Projects with outstanding permits or approved permits were not considered. This assumption results in only projects without a "project status" being included in this analysis.

Figure 2[iii]



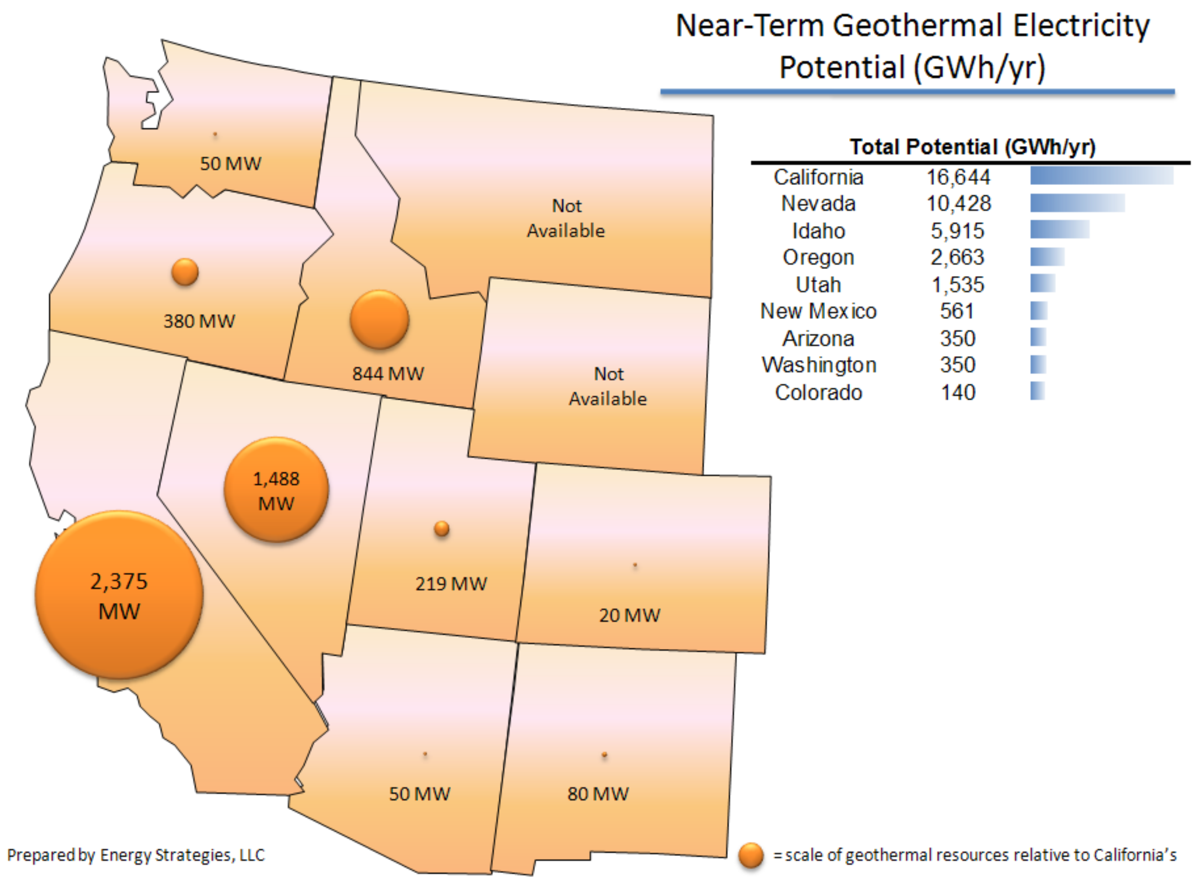
3.3 WESTERN GEOTHERMAL POTENTIAL

This section reviews the near-term geothermal resource potential in the West. Near-term geothermal potential is defined as the known geothermal potential expected to be viable for commercial development by 2015. This analysis utilized existing studies to compile data on near-term geothermal potential in the West. The primary sources of data were the California Phase 1A RETI Report and the CDEAC Geothermal Task Force Report. Where available, the data from the RETI analysis was utilized; when RETI data was not available the CDEAC report was used (geothermal plants that reached commercial operation in 2007 and to date in 2008 reduced the CDEAC estimates). Potential geothermal capacity was converted to energy potential using an average capacity factor of 80%.

Estimates of geothermal electricity production in Montana and Wyoming were not readily available when this report was prepared. We expect that there is minimal geothermal potential in these states that would not have significant environmental or regulatory barriers. Therefore, for purposes of this report we will assume there is no significant, commercially developable geothermal generation in either state.

California has the highest geothermal potential in the region, with 43% of the total. Nevada is also rich in geothermal resources with 27% of the potential near-term geothermal resources in the Western United States. Nevada's geothermal resources are located in the northern part of the state. Nevada's Renewable Energy Transmission Access Advisory Committee evaluated various renewable energy zones in Nevada. This committee identified six geothermal zones; all six are located in the service territory of Sierra Pacific Power. The overall results of the near-term geothermal resource potential assessment are summarized below in Figure 3.

Figure 3[iv,v]



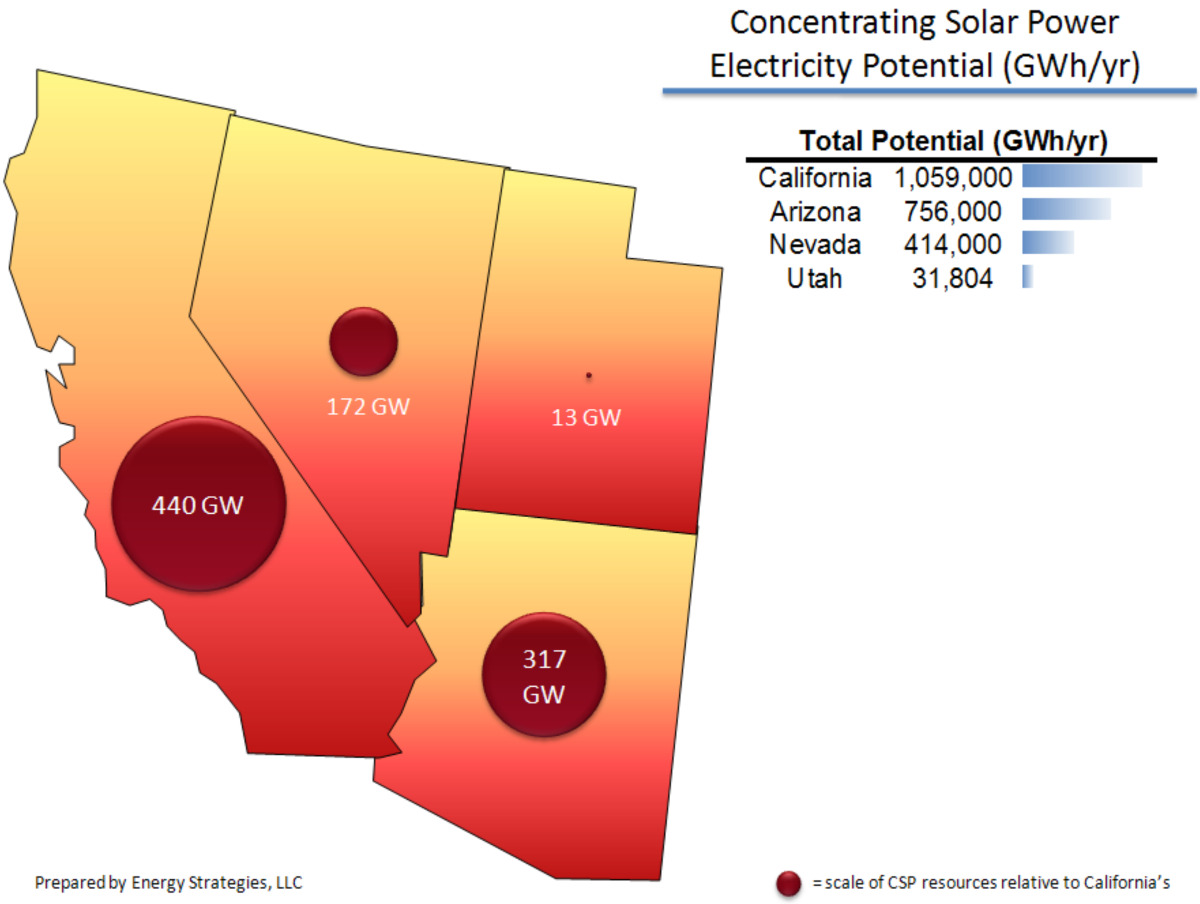
3.4 WESTERN SOLAR POTENTIAL

This section focuses on utility scale concentrating solar power (CSP) in the Desert Southwest. It reviews CSP potential in Arizona, California, Nevada and Utah. The California RETI Phase 1A Report evaluated utility-scale CSP. The report determined that within the RETI study area only Arizona, California and Nevada had economic utility-scale CSP resources.

Utah has used a different method than RETI to assess solar potential. We have been unable to find a current CSP assessment for Colorado and New Mexico. Utah's preliminary estimate of "prime" solar resources is about 13 GW.[2] In order to convert from potential solar capacity in Utah to potential electricity potential the same capacity factor used in the RETI Phase 1A Report was utilized (an average 27% capacity factor). The results of the analysis of potential CSP resources are summarized below in Figure 4.

[2] Since equivalent data for Utah was not readily available this should be considered a preliminary assessment.

Figure 4[vi,vii]



3.5 WESTERN WIND POTENTIAL

This section reviews the wind potential of the West and its concentration. This section relies on the wind resource potential determined in the RETI Phase 1A Report and, for areas outside of the RETI study region, the NREL wind data sets for the Wind Deployment System (WinDS) model. This is the same database utilized in the RETI analysis. The NREL database identifies the capacity by wind class in hundreds of regions throughout the country. In order to understand the total energy potential of the region a capacity factor must be applied to the NREL data. In order to be consistent with the RETI methodology it was assumed that all class 4 and higher wind resources have an average capacity factor of approximately 33%. The resource potential identified in Figure 5 includes only class 4 and higher potential wind resources. The relative quantity of class 6 and 7 wind resources is illustrated in Figure 6. It shows that Montana and Wyoming, by far, possess the largest quantities of high quality (class 6 and 7) wind potential.

As Figures 5 and 6 demonstrate, the region's wind resources and especially its high quality wind resources are almost entirely concentrated in Montana and Wyoming. These are states with very small populations and relatively small electricity needs. States with significant electricity needs, and perhaps more importantly, with an aggressive RPS are located far west of Montana and Wyoming and will need new transmission lines to transmit this high quality wind to the load centers in the West.

Figure 5[viii,ix]

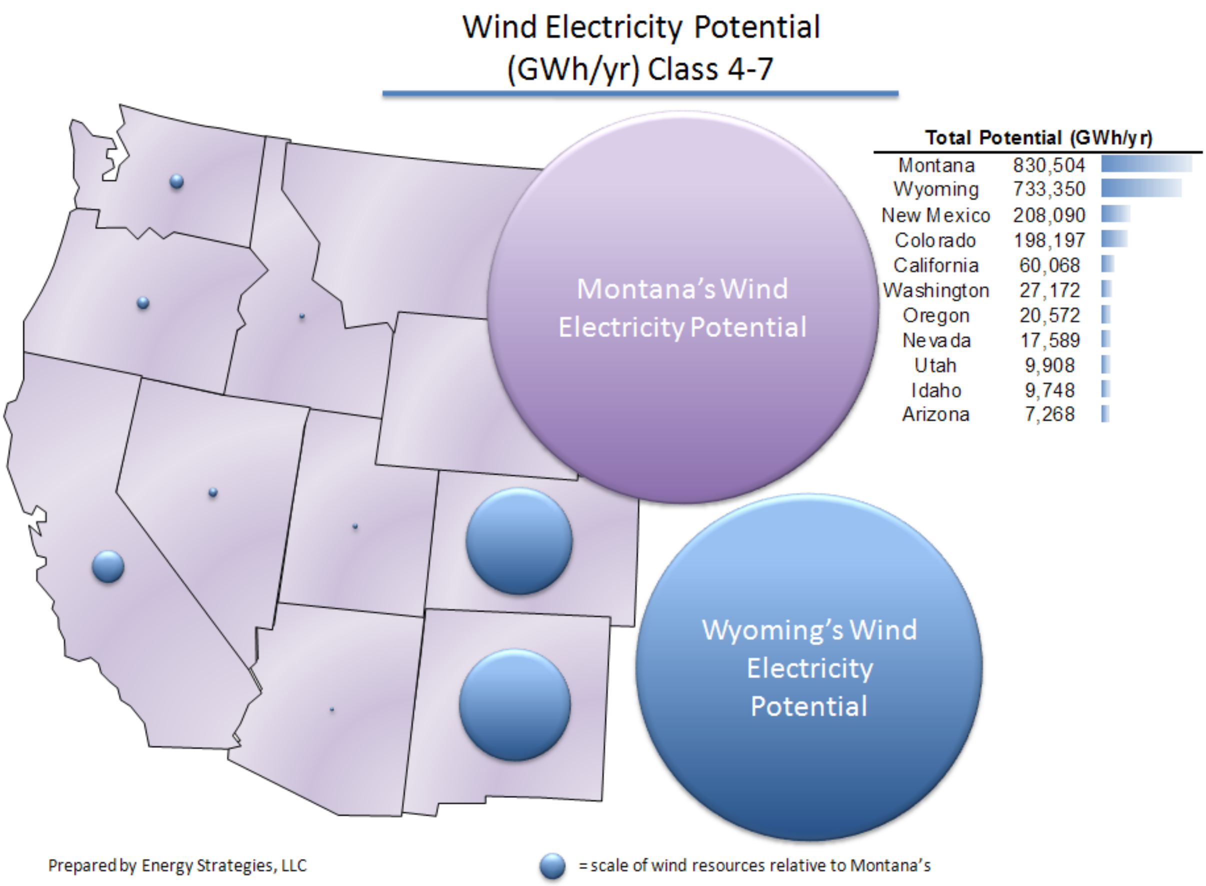
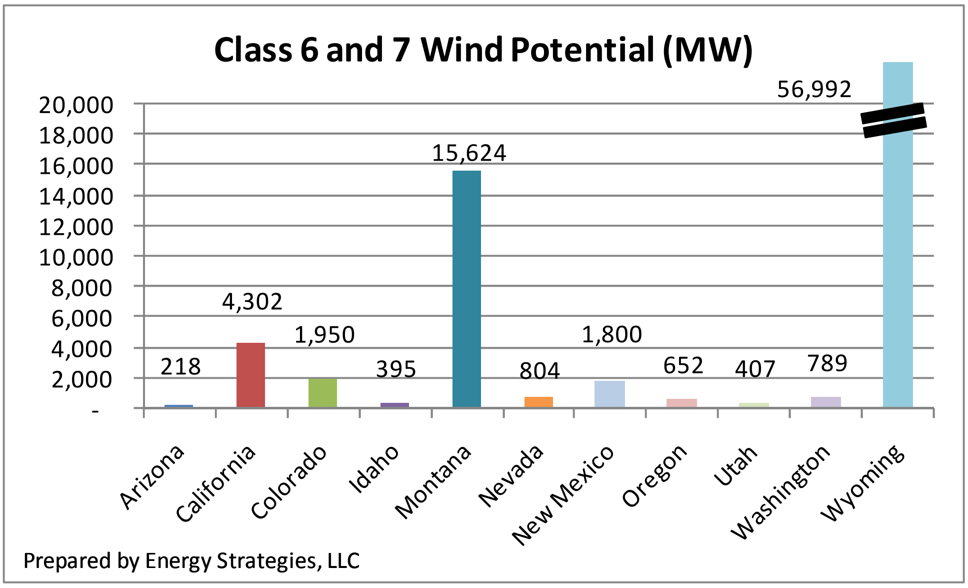


Figure 6

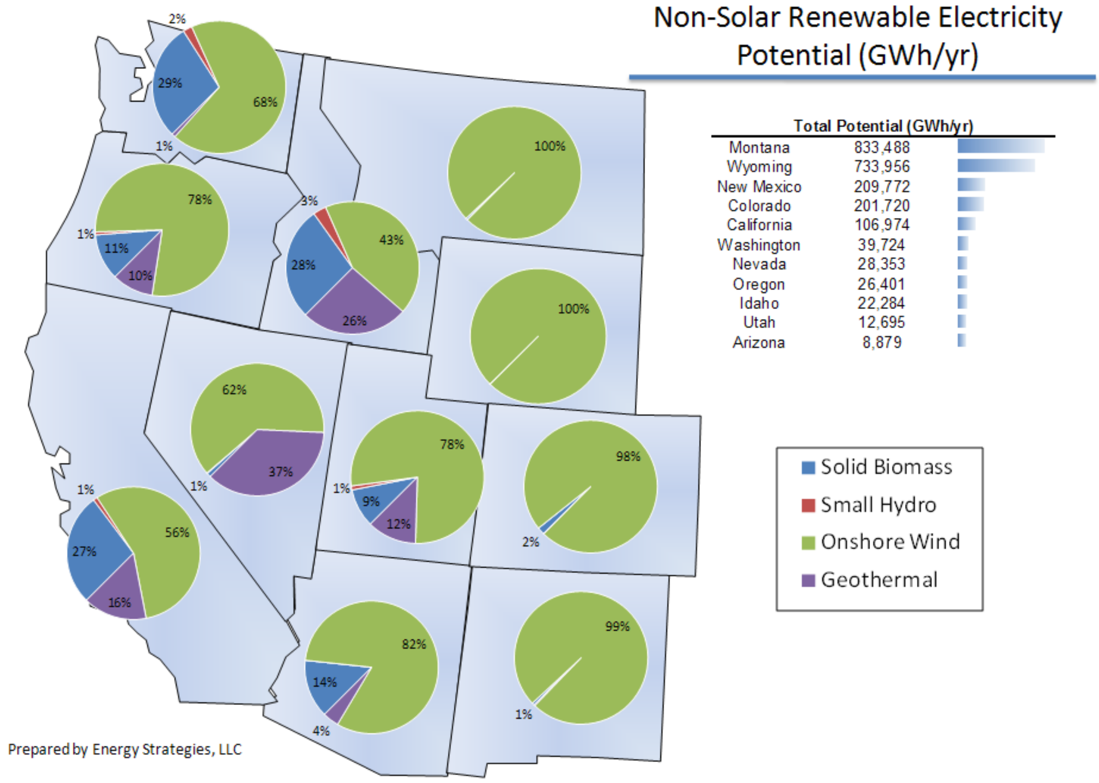


3.6 TOTAL POTENTIAL RENEWABLE RESOURCES IN THE WEST

This section summarizes the total renewable resource potential in the Western United States. Non-solar renewable resources are evaluated first, followed by a review of the region's largest renewable resource potential.

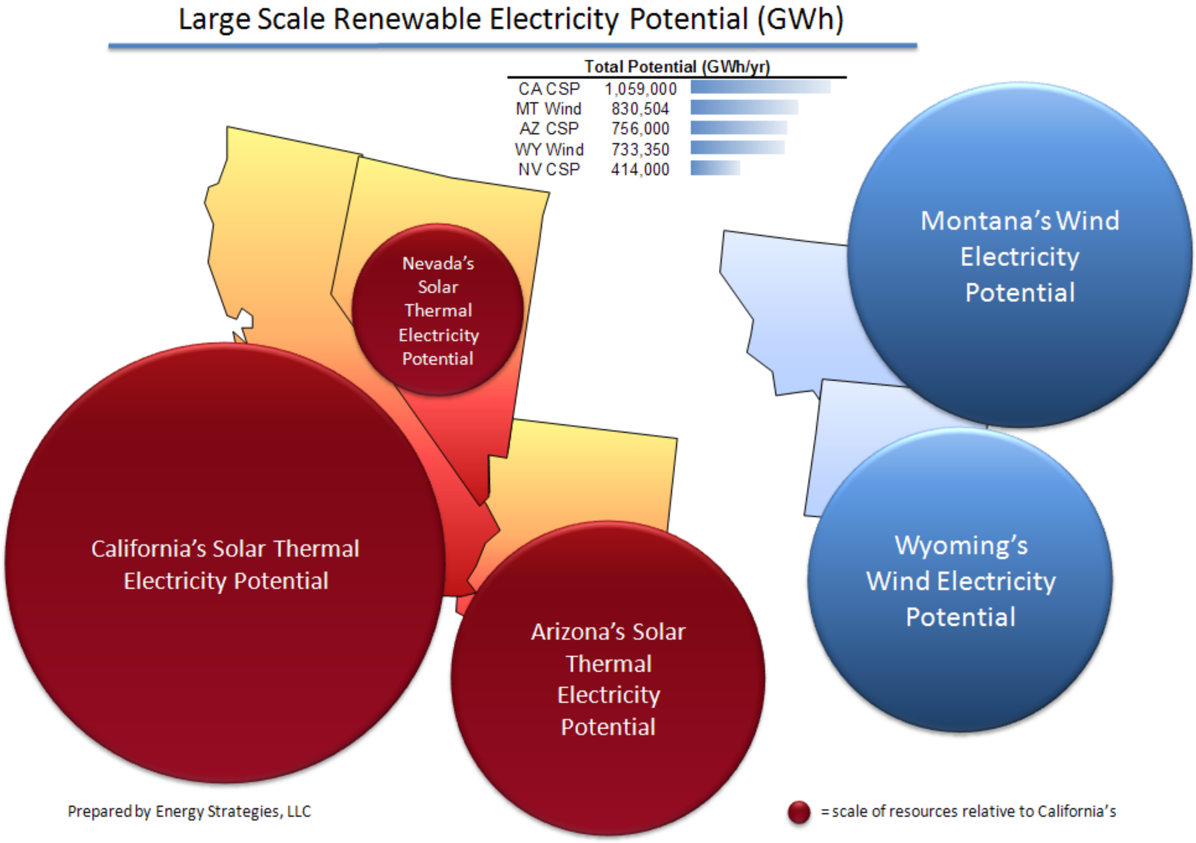
The primary potential non-solar renewable resource in the West is wind, as demonstrated by Figure 7. In fact, 95% of the region's non-solar renewable electricity potential is derived from wind. Montana and Wyoming combined are home to nearly 75% of the region's wind potential (40% and 35% respectively). Geothermal resources are concentrated primarily in California, northern Nevada and Idaho. Potential biomass resources are concentrated primarily in California, Washington and Idaho. Hydroelectric potential in the West is very small and does not have the potential to fulfill RPS requirements in the West in significant quantity. Total biomass potential is greater than geothermal potential, but is expected to be slightly more costly to develop.[x] Wind and geothermal are important resources to evaluate not only because of their potential but also because they are currently among the lowest cost renewable resources available.

Figure 7



Several resources stand out as having the largest renewable electricity potential in the West; these are CSP in the Desert Southwest and wind in Montana and Wyoming. Wind resources in Montana and Wyoming are comparable in scale to CSP resources in the Southwest. The large scale CSP resources combined with the significant wind resources in Montana and Wyoming are depicted below in Figure 8.

Figure 8



3.7 RENEWABLE ENERGY THAT COULD RESULT FROM CONSTRUCTION OF THE SWIP

From the review of potential renewable resources in the West, two resources stand out as having the greatest potential to deliver the largest amount of renewable electricity to the region. The solar and wind resources evaluated make up 50% and 47% of the West's renewable energy potential, respectively. Biomass and geothermal potential constitute significant resources but not on the same scale as wind and solar. When compared to potential wind or solar resources, potential hydroelectric resources are miniscule. While solar constitutes 50% (or more when CSP resources from New Mexico and Colorado are included) of the renewable resources in the West it is not currently as cost-effective as other renewable energy options such as wind, geothermal, hydroelectric and biomass.

The biggest barrier to delivery of renewable resources is a lack of new regional transmission. The SWIP has the potential to connect the regions with the greatest amounts of wind and solar energy. It will facilitate renewable energy development in the West because it can provide low cost renewable resources in the Northwest with the transmission capacity necessary to access load centers in the Desert Southwest. The southern portion of the SWIP will facilitate renewable energy development, in part, by directly connecting the territories of Nevada Power and Sierra Pacific Power. The southern portion of the SWIP, which will run from the new Thirtymile substation in northern Nevada to southern Nevada, will provide the first direct transmission connection between the two utilities. Nevada Power does not currently have enough renewable energy to meet the Nevada RPS.[xi] The development of the SWIP will allow the geothermal and wind potential of northern Nevada to be directly delivered to southern Nevada.

The southern portion of the SWIP will not only connect the two Nevada utilities but may also provide transmission customers of the SWIP with access to other utilities in the Desert Southwest. The SWIP will help other utilities in the Desert Southwest meet their RPS targets more cost-effectively. This line should facilitate the development of significant geothermal resources in northern Nevada because northern Nevada is rich in cost-effective geothermal potential. It should also facilitate the development of the best wind resources in northern Nevada.

The northern portion of the SWIP will connect the Midpoint substation in Idaho to the Thirtymile substation in northern Nevada. This will provide cost effective renewable generation in areas such as Idaho, Oregon, Montana and Wyoming the opportunity to export their energy to the Southwest. As described previously, the SWIP should carry a significant amount of renewable energy from the Northwest to the Southwest. The vast majority of the renewable energy on the line will likely be geothermal resources from northern Nevada and wind from Montana and Wyoming transmitted to Midpoint via other transmission systems.

As a renewables-only transmission line the SWIP could transmit approximately 925 MW of geothermal capacity and over 1,233 MW of wind generation.[3] If this renewable resource mix materialized then the renewable development spurred by the SWIP could deliver nearly 62% of the near-term geothermal potential in Nevada.

A resource portfolio that may be more likely to develop in anticipation of potential federal GHG legislation and future peaking capacity needs, especially in the Southwest, is a mix of approximately 50% of the SWIP transmission line being used for natural gas based generation with the other 50% of the transmission line used for renewable resources. In this scenario the SWIP could spur development of 463 MW of geothermal capacity and approximately 617 MW of wind generation. These renewable resource additions are significant and would help to both reduce GHG emissions in the region (see Section 5.1) and fulfill RPS requirements.

[3] This scenario assumes that 50% of the SWIP's capacity is geothermal from northern Nevada and the remainder is wind from the Northwest. It also assumes that in order to more economically utilize the transmission line the nameplate wind generation capacity exceeds its portion (in this case half, or 925 MW) of the nameplate transmission capacity by 33%.

4 RENEWABLE RESOURCE COSTS

This section reviews the potential costs of renewable resources that may be delivered on the SWIP line and other renewable resources that may be available at the SWIP's interconnect points in Idaho and Nevada. These various resource costs are used to evaluate potential cost benefits of the SWIP. Specifically, this report will compare the cost of resources that can access the SWIP's northern point of receipt with those that might be available near the SWIP's southern point of delivery. For this analysis, resources are evaluated based on a busbar levelized cost of energy (LCOE) basis.

4.1 RENEWABLE RESOURCES EVALUATED

The SWIP line will run from the Midpoint substation in Idaho to southern Nevada. Renewable resources that will be able to connect to the SWIP include geothermal resources in northern Nevada as well as wind resources in northern Nevada and Idaho. Renewable and other generation resources carried on other transmission lines in the region will also be able to access the SWIP and, consequently the markets of the Desert Southwest, further enhancing overall regional generation diversity. Additional Northwest renewable resources include wind generation from Montana, Wyoming, Utah, Washington, and Oregon. These resources will be competing primarily with other renewable resources in the Desert Southwest including CSP in Arizona, Nevada, Utah and California and wind in southern Nevada, Arizona and California. This report will focus on the costs of three of the major renewable types of generation resources that the SWIP is expected to support: geothermal, solar and wind. Wind and solar are evaluated due to their immense potential and geothermal is evaluated due to the concentration of geothermal resources in northern Nevada which can access the SWIP. These resources are briefly described below.

4.1.1 GEOTHERMAL

Geothermal is a baseload renewable resource with capacity factors that typically range from 70% to 90%. While there are several types of geothermal plants, this report focuses on binary geothermal technology, which produces no significant GHG emissions, the least emissions of the three prominent geothermal technologies.[xii] This section evaluates the potential costs of geothermal resources located in northern Nevada. The geothermal resources based in northern Nevada do not currently have direct transmission access to southern Nevada and the Desert Southwest vicinity.

The costs of geothermal plants vary widely, especially with the risk associated with drilling several "dry holes" before an adequate geothermal source is found. A base case installed cost estimate ($/kW) is provided along with sensitivities performed around the base case installed cost estimate. This report also evaluates various potential capacity factors (see Table 2 for the base case cost sensitivity ranges, and Figure 10 for the sensitivity results). The base case assumes that the production tax credit (PTC) for geothermal will be renewed before it is set to expire at the end of 2010. A scenario is also provided that determines the potential costs of geothermal resources if the PTC is not renewed.

4.1.2 SOLAR

CSP has significant potential, especially in the Desert Southwest. However, compared to its potential, CSP development has historically been somewhat limited primarily due to cost. Energy storage technology for CSP plants currently exists and several solar plants with thermal storage capabilities are under construction.[xiii] Due to the increased costs of energy storage and the relative immaturity of the technology, the CSP resources evaluated in this report do not include energy storage.

As illustrated by recent announcements for several plants, CSP has become more widespread in the last few years. Furthermore, Nevada Solar One based near Henderson, Nevada came online in 2007. In the U.S. CSP plants are located in the Desert Southwest. This report evaluates the cost of the most mature CSP technology, parabolic trough, in Arizona, California, Nevada and Utah. As with geothermal resources a base case installed cost estimate is provided and cost sensitivities were conducted around installed costs and capacity factors (see Figure 9 for the base case cost results and Figure 10 for the sensitivity results). The 30% Investment Tax Credit (ITC) was recently extended for eight years thus removing the need to determine the busbar costs of CSP without the ITC.

4.1.3 WIND

Wind is prevalent in the West and has proved to be one of the most cost-effective renewable resources. While Nevada and Idaho have some desirable wind sites, they are relatively scarce when compared to those based in Montana and Wyoming. Montana and Wyoming wind resources may be able to access the SWIP through other proposed transmission projects in the region, such as PacifiCorp's Gateway West Project or NorthWestern Energy's Mountain States Transmission Intertie. Furthermore, Washington and Oregon's wind generation resources may have access to the Southwest (via the SWIP) through the Hemmingway-Boardman line proposed by Idaho Power. While wind generation in Arizona and Nevada are comparable from an installed cost perspective, Arizona's wind generation potential is the least of any of the eleven states evaluated and is largely confined to the eastern part of the state. Approximately 85% of Nevada's wind potential is in the northern part of the state and the wind potential in southern Nevada is of poor quality. In fact, there is less than 30 MW of class 6 and 7 wind potential in southern Nevada.[xiv]

4.2 BASE CASE ASSUMPTIONS

This section summarizes the base case assumptions used in the renewable resource cost analysis, including installed costs, operations and maintenance costs and capacity factors. The base case assumes that the PTC is renewed. Table 1 summarizes these assumptions which are based on research conducted by Energy Strategies.

Table 1

Resource Location	Fuel Type	Fixed O&M & Other Fixed ($2008/kW-yr)	Variable O&M & Other Variable ($2008/MWh)	Installed Cost ($2008/kW)	Capacity Factor (CF)
AZ	Solar	$ 63.42	$ -	$ 4,613	30%
	Wind	$ 66.30	$ -	$ 2,268	30%
CA	Solar	$ 63.42	$ -	$ 4,936	30%
	Wind	$ 66.30	$ -	$ 2,578	30%
ID	Wind	$ 66.30	$ -	$ 2,268	31%
MT	Wind	$ 66.30	$ -	$ 2,268	39%
NV	Geothermal	$ -	$ 27.50	$ 4,225	80%
	Solar	$ 63.42	$ -	$ 4,613	30%
	Wind	$ 66.30	$ -	$ 2,268	30%
OR	Wind	$ 66.30	$ -	$ 2,407	31%
UT	Solar	$ 63.42	$ -	$ 4,613	30%
	Wind	$ 66.30	$ -	$ 2,268	30%
WA	Wind	$ 66.30	$ -	$ 2,407	31%
WY	Wind	$ 66.30	$ -	$ 2,268	43%

Prepared by Energy Strategies, LLC

4.2.1 BASE CASE BUSBAR COSTS

This section summarizes the busbar LCOE resulting from the base case assumptions outlined in Section 4.2. Figure 9 below identifies the base case busbar costs of the various renewable resources.

Figure 9

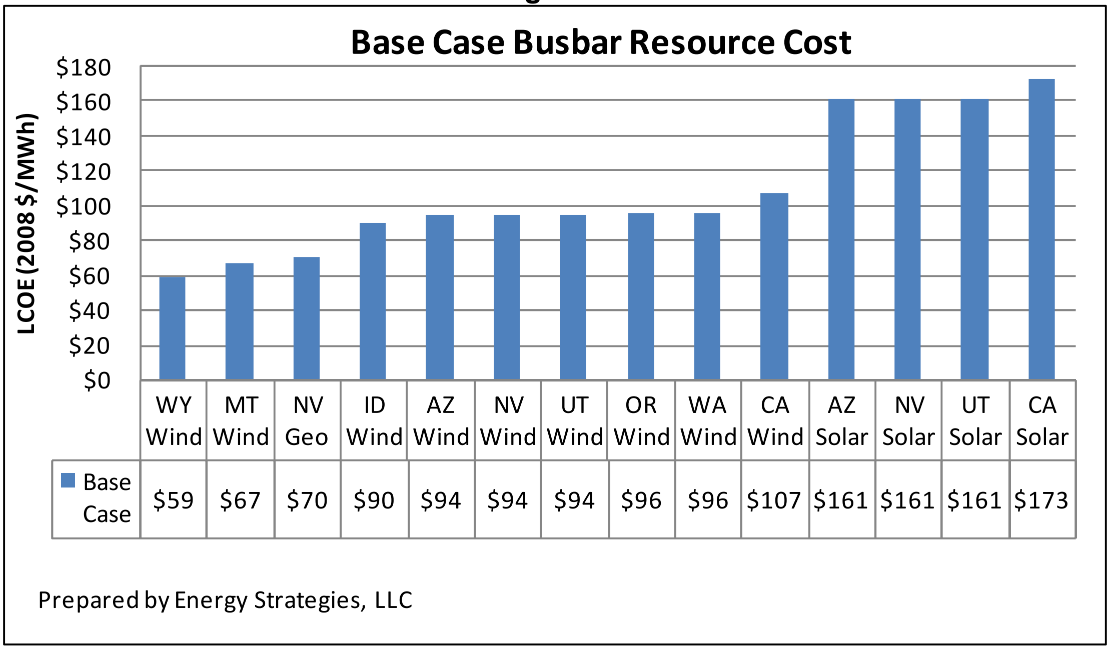


Figure 9 demonstrates that, by far, the three most cost-effective renewable resources evaluated are wind generation in Wyoming and Montana and geothermal generation in northern Nevada. There is a $20-$24 per MWh cost differential between Nevada geothermal resources and wind resources in Arizona, Nevada and Idaho. There is a $31-$35 per MWh cost differential between the base case cost of Wyoming wind and wind in Arizona, Nevada and Idaho. There is a $23-$27 per MWh cost differential between the base case cost of Montana wind generation and wind in Arizona, Nevada and Idaho. In addition, all of the Northwest resources evaluated are less expensive than the primary renewable resource, CSP, available in the Desert Southwest. Renewable resources that might be available at the SWIP's northern point of receipt (i.e. Wyoming, Montana, Idaho, northern Nevada, Washington and Oregon wind and geothermal in northern Nevada), are, on average, $25 per MWh more cost-effective than California wind. These same resources are $60 per MWh more cost-effective than the average cost of the renewable resources evaluated in the Southwest. These base case findings support the construction of the SWIP, which will enable cost-effective renewable resources to be transmitted to the Desert Southwest.

4.3 COST SENSITIVITIES

Resource costs can be extremely volatile. Recently we have seen significant increases in the price of raw materials including steel and cement. In order to account for installed cost volatility in this study, a sensitivity analysis was performed using the base case installed cost assumptions shown in Table 1 plus and minus 15 percent. Furthermore, another significant driver of the LCOE for renewable resources is the resource's capacity factor. The capacity factors associated with renewable energy inherently vary by project location. Therefore, it is important to model a range of capacity factors for renewable resources. Capacity factor ranges were based on research performed on the capacity factors of existing resources, capacity factors for potential projects that have been measured by NREL, and other analyses that have been performed to date. The range of capacity factors used in this analysis is shown below in Table 2.

Table 2

Resource Location	Fuel Type	Min Installed Cost ($2008/kW)	Max Installed Cost ($2008/kW)	Min Capacity Factor (CF)	Max Capacity Factor (CF)
AZ	Solar	$ 3,921	$ 5,304	25%	32%
	Wind	$ 1,928	$ 2,608	25%	33%
CA	Solar	$ 4,196	$ 5,677	25%	32%
	Wind	$ 2,192	$ 2,965	25%	35%
ID	Wind	$ 1,928	$ 2,608	26%	36%
MT	Wind	$ 1,928	$ 2,608	34%	44%
NV	Geothermal	$ 3,591	$ 4,859	70%	90%
	Solar	$ 3,921	$ 5,304	25%	32%
	Wind	$ 1,928	$ 2,608	25%	35%
OR	Wind	$ 2,046	$ 2,768	26%	36%
UT	Solar	$ 3,921	$ 5,304	25%	32%
	Wind	$ 1,928	$ 2,608	25%	35%
WA	Wind	$ 2,046	$ 2,768	26%	36%
WY	Wind	$ 1,928	$ 2,608	35%	48%

Prepared by Energy Strategies, LLC

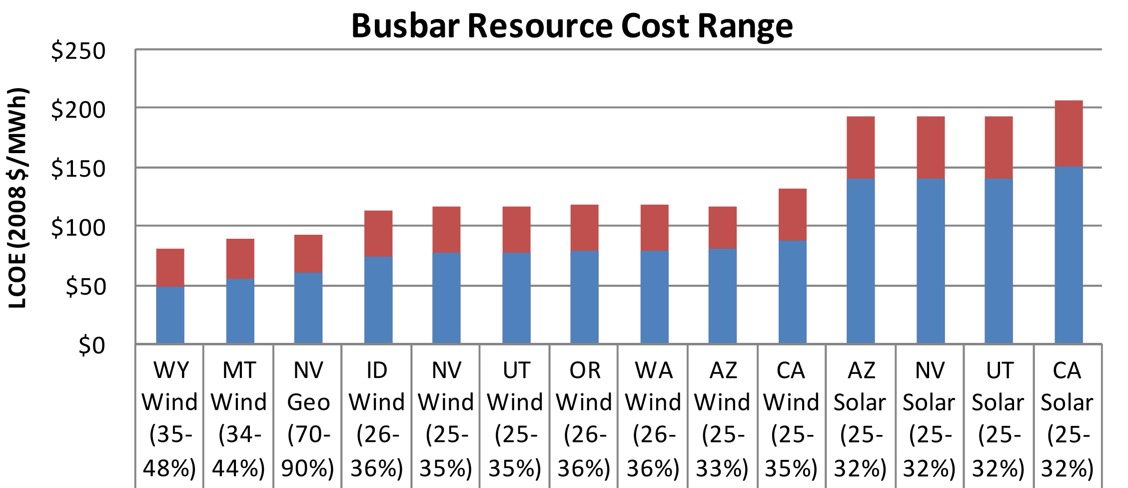
It is important to account for the possibility that the PTC will not be extended throughout the study period. Legislation passed in October 2008 renewed the ITC for solar generation for eight years. It also extended the PTC one year for wind energy and two years for geothermal and other eligible renewable resources. The result of the sensitivity analysis is detailed in Table 3 and shown in Figure 10. These sensitivities show that the resources available in the Northwest and Rocky Mountains are, under nearly every circumstance evaluated, more cost-effective than the primary renewable resources available in the Desert Southwest.

Table 3

Comparison of Resource Alternatives							
		Levelized Cost of Energy (2008$/MWh)					
		Base Case	Capital Cost Sensitivity		Capacity Factor Sensitivity		Without PTC
Resource Type	Location	Busbar Costs	-15%	15%	Low CF	High CF	
Wind	AZ	$ 94	$ 81	$ 107	$ 118	$ 84	$ 117
	CA	$ 107	$ 92	$ 122	$ 133	$ 88	$ 131
	ID	$ 90	$ 78	$ 103	$ 112	$ 75	$ 113
	MT	$ 67	$ 57	$ 77	$ 80	$ 57	$ 90
	NV	$ 94	$ 81	$ 107	$ 118	$ 77	$ 117
	OR	$ 96	$ 82	$ 109	$ 118	$ 79	$ 119
	UT	$ 94	$ 81	$ 107	$ 118	$ 77	$ 117
	WA	$ 96	$ 82	$ 109	$ 118	$ 79	$ 119
	WY	$ 59	$ 50	$ 68	$ 77	$ 50	$ 82
Solar (Parabolic Trough)	AZ	$ 161	$ 141	$ 181	$ 193	$ 151	NA
	CA	$ 173	$ 152	$ 195	$ 208	$ 163	NA
	NV	$ 161	$ 141	$ 181	$ 193	$ 151	NA
	UT	$ 161	$ 141	$ 181	$ 193	$ 151	NA
Geothermal	NV	$ 70	$ 61	$ 80	$ 79	$ 64	$ 93

Prepared by Energy Strategies, LLC

Figure 10



	WY Wind (35-48%)	MT Wind (34-44%)	NV Geo (70-90%)	ID Wind (26-36%)	NV Wind (25-35%)	UT Wind (25-35%)	OR Wind (26-36%)	WA Wind (26-36%)	AZ Wind (25-33%)	CA Wind (25-35%)	AZ Solar (25-32%)	NV Solar (25-32%)	UT Solar (25-32%)	CA Solar (25-32%)
High	$82	$90	$93	$113	$118	$118	$119	$119	$118	$133	$193	$193	$193	$208
Low	$50	$57	$61	$75	$77	$77	$79	$79	$81	$88	$141	$141	$141	$152

Prepared by Energy Strategies, LLC

4.4 REGIONAL COST, QUANTITY AND QUALITY DIFFERENCES

4.4.1 MARKET FUNDAMENTALS

In order to meet baseload and intermediate needs, most electric utilities in the Western United States have increased the amount of gas-fired generation in their Integrated Resource Plans (IRPs) in place of coal generation. This is the result of the uncertainty of GHG legislation and its future implementation in the U.S. and the high cost and long lead times for the permitting and construction of new nuclear generation stations. The decision to move to gas-fired generation for resource planning has been driven by many factors including the assumption that liquefied natural gas (LNG) supplies would increase supply and therefore decrease U.S. gas prices and price volatility and that overall, gas fired generation is more cost-effective. This assumption likely will not materialize. In the long term, U.S. natural gas prices and, as a result, natural gas generated electricity prices will rise as LNG drives global gas price equilibrium.

4.4.2 WESTERN ELECTRICITY MARKETS

The two main drivers influencing electricity markets in the West are: i) the overall balance of generation and transmission assets in the Western Interconnect and ii) future natural gas prices. Overall the Western Electricity Coordinating Council (WECC) projects adequate reserve margins in aggregate through 2011 with the existing resource base and the new generation projects currently under construction or in advanced development.

The WECC does not have a regional planning reserve requirement and planning levels are generally set by the individual state commissions and utilities. Generally the planning limit falls between 12% and 15%. In the Northwest, energy supply can be highly variable year to year where hydro-generation accounts for more than half of installed capacity. The 2007 WECC Power Supply Assessment analyzed resource adequacy for a number of possible future conditions for sub-regions of the Western Interconnection. Under base summer conditions, the assessment indicated that three of the WECC's sub-regions (Southern California, the Desert Southwest and Rockies) show resource deficits by 2010. This demonstrates the potential need for the SWIP to deliver resources to the Desert Southwest.

Based on an expected rise in future natural gas prices at the Henry Hub to a range between $7 and $10/MMBtu, the future annual on-peak wholesale electricity price in the Southwest is expected to average between $60 and $90 per MWh. In the Northwest the annual on-peak price is expected to average between $55 and $75 per MWh. The off-peak price range in the Southwest is expected to average between $45 and $65 per MWh and in the Northwest the off-peak range is expected to be between $40 and $60 per MWh. Prices will likely rise in the event that either a carbon tax or carbon cap and trade system is implemented in the U.S. Transmission customers on the SWIP will be able to take advantage of the price spreads between the markets in the Northwest and in the Southwest.

4.5 COMPARISON OF POTENTIAL SWIP RESOURCE COSTS & CURRENT REGIONAL RESOURCES

In addition to the cost differences described in Section 4.4.2 the analysis performed for this report shows that renewable resources in the Northwest and Rocky Mountains are typically more cost-effective than renewable resources in the Desert Southwest. Clearly the most cost-effective renewable resources reviewed are geothermal in northern Nevada and wind in Montana and Wyoming. Geothermal is typically $20 and $24 per MWh less expensive than the other non-solar resources evaluated. Montana and Wyoming wind is often between $23 and $35 per MWh more cost-effective than the other non-solar resources evaluated. Solar resources in the Southwest are over two times more expensive than the geothermal resources in Nevada and the wind resources from Montana and Wyoming.

This illustrates that the regional cost differences could support, on a renewable resource base only, a transmission (including line loss) cost between northern Nevada and the Desert Southwest of approximately $20 and $35 per MWh. The regional price differential becomes even greater if we assume that the renewable resources in the Northwest will be directly competing with CSP in the Desert Southwest (>$60 per MWh). Furthermore, Section 4.4.2 illustrates that non-renewable resources may also be able to take advantage of cost differentials between the power markets in the Northwest and the Southwest. While, the final cost of transmission on the SWIP will determine whether it is cost-effective to transmit a specific resource, we expect that it will be cost-effective to transmit renewable resources in the Northwest to the Southwest, especially if the Northwest renewables are competing with CSP in the Southwest. Furthermore, non-renewable resources transmitted from north to south on the SWIP will be able to take advantage of summer peaking needs in the Desert Southwest. Conversely, non-renewables transmitted from south to north on the SWIP may be able to help meet the winter-peaking needs of the Northwest.

5 POTENTIAL BENEFITS OF THE SWIP LINE

The SWIP transmission line will provide a market outlet and facilitate the development of additional renewable energy projects especially wind based generation from the Northwest and Rocky Mountains and high capacity geothermal generation based in northern Nevada. Renewable resources delivered by the SWIP will help reduce GHG emissions in the region. The transmission line will enhance economic transfers of energy between the Northwest and Southwest and permit reserve sharing between the regions. Additional benefits include potential delivery of solar based generation from the Southwest to the Northwest enhancing renewable generation diversity between the regions. The SWIP will also provide transmission access for the natural gas based generation necessary to help meet future Southwest capacity requirements. Renewable energy delivered on the SWIP will facilitate RPS compliance for utilities in the Desert Southwest. Finally, the SWIP will also provide regional cost saving benefits by providing utilities in the Desert Southwest with direct access to cost-effective Northwest and northern Nevada renewable resources.

5.1 GHG REDUCTIONS FROM RENEWABLE GENERATION ON THE SWIP

As outlined in Section 3.7 two scenarios of resource mixes on the SWIP were evaluated, one with 100% renewable resources and one with the line's capacity being filled by 50% natural gas based generation and 50% renewable resources. Either of these scenarios will help reduce GHG emissions in the Desert Southwest region compared to fossil fuel alternatives. Although Nevada does not currently have a GHG reduction goal, Arizona and California have established ambitious GHG reduction targets. Arizona's goal is to achieve 2000 level emissions by 2020 and California's is to achieve 1990 level emissions by 2020. GHG emissions have clearly become a focal point of energy policy and the SWIP's potential contribution to GHG reductions in the region is significant.

Assuming that 925 MW of geothermal resources and just over 1,233 MW of wind resources are transmitted on the SWIP, then the SWIP will facilitate GHG reductions between 4.9 and 9.8 $MMtCO_2e$ annually, depending on which resources the wind and geothermal energy displaces. This is a significant contribution to the region's GHG reduction goals. Furthermore, if 925 MW of natural gas resources were transmitted on the SWIP along with approximately 463 MW of geothermal and 617 MW of wind then the SWIP would facilitate a GHG emission reduction of between 2.5 and 4.9 $MMtCO_2e$ annually. These are only the GHG reductions that are attributable to the renewable resources. Although it is possible that natural gas resources could reduce GHG emissions by displacing coal, this evaluation does not attribute any GHG reductions or increases to natural gas resources. Natural gas resources transmitted from the Northwest to the Southwest would primarily provide peaking capacity during the summer months and therefore are more likely to displace other natural gas plants that might otherwise operate.

5.2 SYSTEM DIVERSITY/RESOURCE DIVERSIFICATION

Currently Sierra Pacific Power is connected electrically with Idaho Power, Pacific Gas & Electric, PacifiCorp, and Bonneville Power Administration. Nevada Power is connected electrically with PacifiCorp, LADWP, APS, SCE, and WAPA. The SWIP line will directly interconnect Sierra Pacific Power with Nevada Power and other Desert Southwest utilities. In doing so, the SWIP will facilitate an increase in transfers between the Northwest through Idaho Power. The SWIP will increase resource diversity allowing additional wind generation and geothermal generation from the north an outlet in the Desert Southwest while allowing solar resources based in the Desert Southwest to reach northern Nevada and Idaho, or potentially Oregon and Washington. The SWIP can enhance resource diversity and reserve sharing both within Nevada and between the Northwest region and the Desert Southwest.

The SWIP has the potential to allow transfers of Northwest and Rocky Mountain based natural gas generation to the Desert Southwest for capacity purposes.

5.3 INCREASED ENERGY TRANSFER CAPABILITY

Sierra Pacific Power has forecasted a need for at least 300 MW of new resources to meet load growth over the next 10 years. Likewise, Nevada Power has forecasted a need for at least an additional 1,500 MW of new resources to meet future load growth mostly concentrated in the Las Vegas area.[xv] In addition, APS is expected to need an additional 4,000 MW to meet load growth in the next ten years.[xvi] California utilities, like LADWP, have also forecasted significant energy and capacity needs over the coming years. With a potential rating of 2,000 MW the SWIP project will be a key resource in meeting these expected load requirements. The SWIP will aid utilities in their resource challenges by increasing transfer capability between the Northwest and the Desert Southwest.

5.4 RPS COMPLIANCE

Nevada enacted a RPS and both Nevada Power and Sierra Pacific Power must use eligible renewable energy resources to supply a minimum 20% of the total electricity they sell to retail customers by 2015. Currently both Nevada Power and Sierra Pacific Power are in non-compliance with the Nevada RPS. Until recently the utilities were allowed to exchange renewable energy credits with each other, allowing Sierra Pacific Power to sell Nevada Power its excess non-solar credits and allowing Nevada Power to sell Sierra Pacific Power some of its solar credits. With the addition of Nevada Solar One in 2007, Nevada Power will easily meet the solar requirement of the RPS. In its 2007 annual RPS compliance filing, Sierra Pacific Power was short of its solar requirement but had significantly more non-solar credits than required by the RPS. The utilities had planned on exchanging credits, helping Nevada Power meet the non-solar requirement and helping Sierra Pacific Power meet its solar requirement. However, in 2007 the Nevada Public Utilities Commission (PUC) decided to end this arrangement. The PUC was concerned that the arrangement was a cross subsidy that would eventually hurt ratepayers in northern Nevada because under the arrangement Sierra Pacific Power would run out of credits much more quickly.

The result of the PUC's decision to end the transfer of credits between the two utilities is that Nevada Power is far short of its non-solar RPS requirement. Since Nevada Power and Sierra Pacific Power are not, at present, directly physically connected by transmission they must each meet the requirements separately. The SWIP will provide a physical connection allowing geothermal resources from the north to be sent to Nevada Power and allowing solar resources from the south to be transmitted to the north. The SWIP will aid both Nevada utilities in meeting their individual RPS requirements.

Furthermore, by enhancing delivery of electricity to market points in the Desert Southwest the SWIP will help utilities in Arizona and Southern California meet their RPS targets. Arizona has very few non-solar renewable resources and will likely need renewable electricity from outside the state to facilitate cost-effective achievement of the RPS. The SWIP could help provide Arizona utilities with cost-effective renewable energy. California utilities have very aggressive RPS requirements to meet (currently 20% by 2010) and may be required to meet an even more aggressive RPS if the Governor's 33% goal becomes law. The SWIP may deliver renewable resources to California, helping the utilities in Southern California meet their renewable requirements.

5.5 REGIONAL COST SAVINGS

The SWIP will provide numerous regional benefits, as described in the preceding sections. The SWIP can also provide some regional cost savings for the Southwest. Without a direct physical link to connect northern Nevada and southern Nevada, Nevada Power and Arizona utilities would be forced to rely primarily on CSP resources in the Southwest to meet RPS requirements. Furthermore, utilities in California have significant need for renewable energy to meet the RPS, and much of the most cost effective renewable potential in California has already been utilized. Therefore, the SWIP will be an important addition in helping California utilities meet their renewable requirements without relying primarily on CSP resources, which are far more costly than the renewable resources available in the Northwest.

The addition of the SWIP will allow utilities in the Desert Southwest to develop or purchase the output of high quality wind and geothermal resources to help meet RPS requirements. If Nevada Power continues with its plans to acquire new solar resources and implement energy-efficiency measures, as outlined in the 2007 RPS compliance report submitted to the Nevada PUC, but does not acquire additional non-solar renewable resources, the utility will be short on its RPS requirement by about 3,600 GWh in 2015. With the limited quantity of non-solar renewable resources available in southern Nevada, Nevada Power may be required to meet the RPS by acquiring CSP resources to cover the RPS deficiency. However, if Nevada Power sourced its renewable resource requirements from delivery on the SWIP it would result in RPS compliance cost savings before the cost of transmitting the resources. The range of compliance cost savings is between $125 and $320 million per year. The lower end of the range is a result of energy delivered on the SWIP displacing wind resources from California. The higher end is a result of energy delivered on the SWIP displacing CSP resources in the Desert Southwest. The potential cost savings is a significant benefit to southern Nevada.

Furthermore, under this scenario there would still be significant available transmission capacity on the SWIP to deliver additional cost-effective renewable energy to other utilities in the Desert Southwest. If the SWIP line was utilized by all renewable resources at an average annual utilization factor of 57%, there is the potential to deliver an additional 5,575 GWh per year. This renewable electricity would be available to help meet RPS requirements of other Desert Southwest utilities. If resources on the SWIP displace wind from California the additional regional benefit will be nearly $195 million per year, exclusive of the cost of transmitting the resources. If the resources delivered on the SWIP displace more expensive CSP resources, in addition to the benefit to southern Nevada there would be a potential regional cost savings of up to $500 million per year, exclusive of transmission costs.

6 CONCLUSION

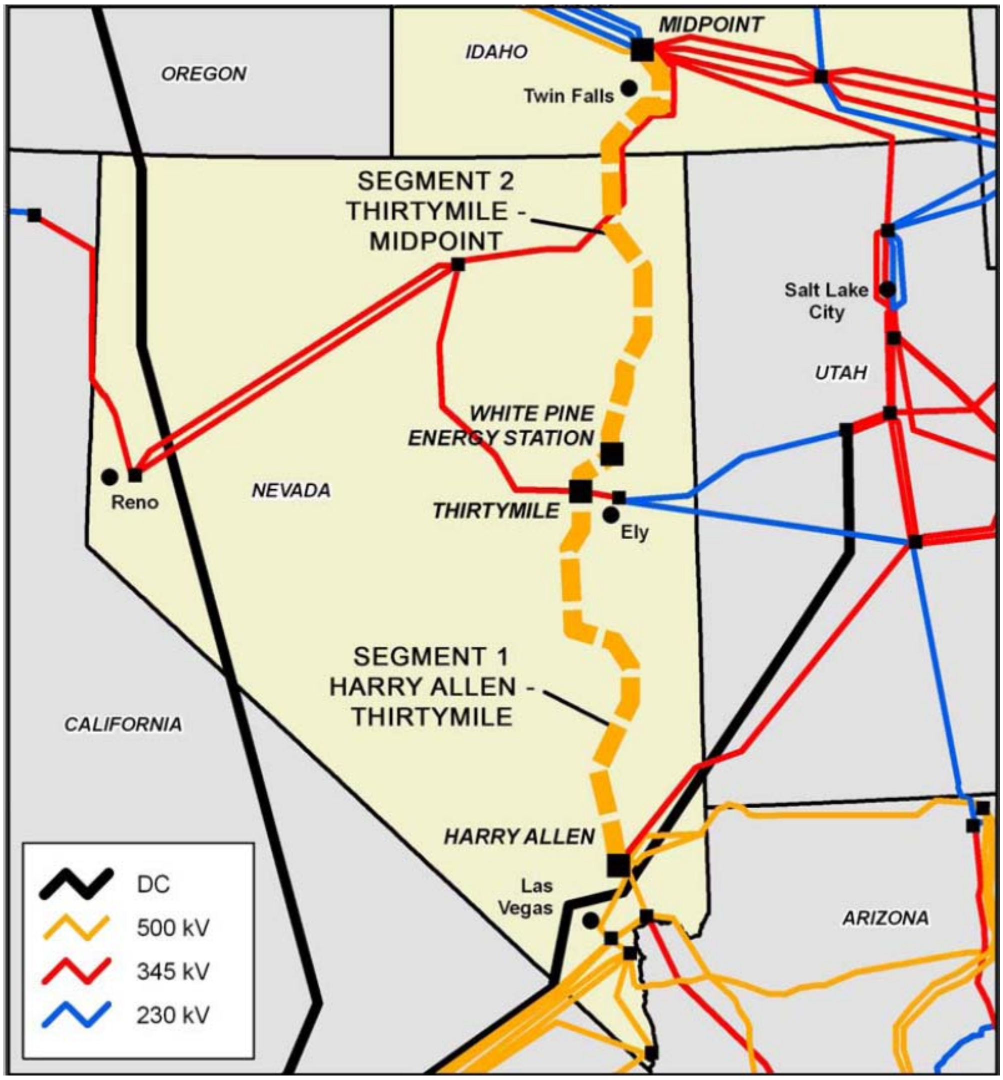
This report concludes that the SWIP will deliver significant benefits to both the Northwest and the Southwest. In the Northwest it will facilitate the additional development of significant renewable resources. In the Southwest, it will provide cost-effective renewable resources to help meet RPS requirements. It will also facilitate the reduction of GHG emissions in the region and support meeting the increasing future capacity needs of the Southwest.

The renewable resources in the Northwest that were evaluated in this report are cost-effective compared to renewable resources in the Southwest and can support a total transportation cost between $20 and $35 per MWh. The SWIP will allow cost-effective delivery of Northwest and northern Nevada renewable resources to the Southwest. Furthermore, the SWIP will provide capacity benefits by connecting the winter-peaking Northwest region with the summer-peaking Southwest region allowing for seasonal economic capacity and energy transfers.

The SWIP has the potential of providing significant regional RPS compliance cost savings for entities that have SWIP access. If resources delivered on the SWIP displace California wind resources the SWIP could provide RPS compliance cost savings of $125 million annually to southern Nevada (exclusive of the cost of transmitting the resources). Under the same scenario the SWIP could provide other utilities in the Desert Southwest with an additional cost savings of $195 million per year. If resources delivered on the SWIP displace more expensive CSP resources the SWIP could provide a RPS compliance cost savings of $320 million per year for southern Nevada and an additional $500 million annually for other utilities in the Desert Southwest, before accounting for the cost of transmitting the resources.

The findings in this report support the development and construction of the SWIP, which can provide significant economic, resource diversity and environmental benefits between the Northwest and the Southwest regions connected by the SWIP.

APPENDIX A – SWIP MAP



LIST OF ACRONYMS

APS	Arizona Public Service Company
CDEAC	Clean and Diversified Energy Advisory Committee
CO_2	Carbon Dioxide
CSP	Concentrating Solar Power
GHG	Greenhouse Gas
GW	Gigawatt
GWh	Gigawatt Hour
INL	Idaho National Laboratory
IRP	Integrated Resource Plan
ITC	Investment Tax Credit
KV	Kilovolt
LADWP	Los Angeles Department of Water and Power
LCOE	Levelized Cost of Energy
LNG	Liquefied Natural Gas
$MMtCO_2e$	Million Metric Tons of Carbon Dioxide Equivalents
MW	Megawatt
MWh	Megawatt Hour
NREL	National Renewable Energy Laboratory
PESF	Project Environmental Suitability Factor
PTC	Production Tax Credit
PUC	Public Utilities Commission
RETI	Renewable Energy Transmission Initiative
RPS	Renewable Portfolio Standard
SCE	Southern California Edison
SRP	Salt River Project
SWIP	Southwest Intertie Project
WAPA	Western Area Power Administration
WECC	Western Electricity Coordinating Council
WGA	Western Governors' Association
WinDS	Wind Deployment System

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[xiv] A query of the NREL, WinDS dataset found just 30 MW of class 6 and 7 wind resources in southern Nevada (regions 39 and 40).
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