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This report shall be reviewed in concert with the transcription and comments dated October 9, 2012 (i.e., viewed as one document).

Economic Analysis of Nevada's Renewable Energy and Transmission Development Scenarios

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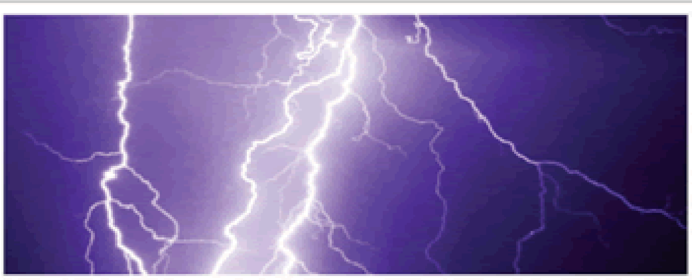

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1. Executive Summary

The State of Nevada is home to diverse, high quality and abundant renewable energy resources with the potential to support large scale development of solar, wind and geothermal generation projects. The Nevada State Office of Energy (NSOE) has estimated that the state holds the potential for the development of over 4000 MW of installed capacity, or for producing over 16 million MWh of energy from renewable sources per year[1]—equivalent to almost 75% of Nevada's 2011 retail sales. This potential far exceeds the amount required to meet the state's current Renewable Portfolio Standard (RPS) requirement. As such, it provides an opportunity to explore the potential economic benefits of further developing these resources for export to California, home of the nation's most aggressive RPS standards and therefore a sizeable market for renewable energy.

Nevada's resources are spread across the geographic expanse of the state, and their large-scale development to serve regional energy needs is dependent on the expansion of the transmission system, both to connect renewable energy zones to the Nevada grid, and to expand the export capability to the neighboring demand areas.

These opportunities were recognized by Nevada Governor Brian Sandoval in late 2011, when the New Energy Industry Task Force (NEITF) was tasked with "facilitating the timely development of transmission facilities and renewable energy resources in [Nevada], which includes without limitation facilitation of permitting, construction, and electrical interconnection of these facilities and resources."[2] The task force was further directed to "develop the business case from the perspective of Nevadans and our neighboring states necessary to develop our state's renewable resources and related industries with lowest possible risk to ratepayers."[3]

In response, the NEITF, with assistance from the Western Grid Group, developed a Request for Proposal outlining a set of six renewable energy generation and transmission development scenarios to act as a bellwether of the opportunities to increase renewable energy development for export. Three near term scenarios envision varying transmission and generation investments for a range of 500-1500 MW in the 5-8 year time horizon; three long term scenarios anticipate development of 500-1000 MW over the 10-20 year time horizon. Table ES-1 presents an overview of these scenarios; analysis of this range of development options is intended to help determine the business case for the clean energy industry and what role the state can play to facilitate continued growth.

Funding for this study was provided by Nevada's Governor's Office of Economic Development, in partnership with NSOE.

[1] Based on "Projects" report on the NSOE website, http://www.energy.state.nv.us/documents/Renewable-Energy-Projects.pdf. As updated 5/10/2012.
[2] Nevada Executive Order 2011-18.
[3] Ibid.

Table ES-1: Summary of proposed scenarios

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6
Description	Harry Allen to Mead	El Dorado and Clayton extension	Harry Allen Transformer	North Project	East Project	South Project
Incremental Capacity (MW)	1150	1500	400-500	500	750	750-1000
Transmission Costs ($2011, mil)[4]	$70	$555	$46	$198	$414	$595
Renewable Capital Costs ($2011, mil)	$4,789	$5,789	$1,808	$2,361	$2,614	$3,491
Timeframe:	***Near term (5-8 years)***			***Long-term (10-20 years)***		

Source: NEITF

Synapse's analysis consists of three major components. First, we explore issues surrounding the development of new generation and transmission within Nevada, and between Nevada and neighboring areas. We consider potential resource needs of California's investor owned utilities (IOUs) and publicly owned utilities (POUs) toward meeting their RPS requirements. We lay out the specific details of each scenario, the anticipated construction times and the potential mechanism for the sponsorship and financing of the various projects to begin to investigate the opportunities for developing Nevada's renewable energy resources for delivery into the California market.

Next, we derive the levelized costs of transmission additions ($2011) included in the six scenarios by using appropriate economic assumptions for the cost of capital, the annual revenue requirement and the expected energy generation and utilization of the lines from the generation projects. Likewise, under appropriate capital cost assumptions, including O&M costs for each technology type, we derive the renewable energy generation costs in the form of levelized cost assumptions in ($2011/MWh) for solar PV in the year 2015 and 2020; and for wind and geothermal generation under utility and merchant financing assumptions with and without subsidies (ITC/PTC). Finally, we provide the estimates for the costs of delivered energy to California[5] by each scenario and funding type by combining our estimates on the levelized costs of generation and transmission.

This key result, shown in Table ES-2, represents one key aspect of the market opportunity or business case for Nevada's renewable energy resources to compete for renewable energy contract solicitations in California. While numerous other factors may affect the business case, such as permitting and construction schedules, and technological diversity, the delivered costs must be competitive with other offerings from within the target market for an economic development strategy based on renewable energy exports to succeed.

[4] Scenarios 4, 5, and 6 include transmission projects that are partially located outside Nevada.
[5] Throughout this report, when we refer to deliveries to California we consider only the mechanics and costs of delivering energy to the CAISO control area. Unless specifically addressed, additional costs and logistical considerations may pertain for delivery to any specific location within California.

Table ES-2: Costs of delivered energy to California by scenario and funding type ($2011/MWh)

Funding Type	*Scenario 1*	*Scenario 2*	*Scenario 3*	*Scenario 4*	*Scenario 5*	*Scenario 6*
Utility, without subsidy	$116	$140	$123	$99	$114	$122
Utility, with subsidy	$93	$109	$97	$89	$99	$102
Merchant, without subsidy	$131	$156	$138	$110	$125	$135
Merchant, with subsidy	$105	$122	$109	$100	$109	$113

Source: NEAC, NEITF, and Synapse

The third part of our analysis is the assessment of economic impacts for the State of Nevada associated with transmission and renewable energy development. For consistency, we have assumed that each scenario attracts a set amount of renewable generation and that each unit runs for 20 years. Synapse developed direct cost estimates for labor and materials and economic multipliers for each renewable resource type and transmission project to estimate the economic impacts of all six scenarios. These impacts are based on both the short term (construction and installation) and long-term (operations and maintenance) spending on the associated transmission and renewable generation activities. Short term spending would impact the state's economy only during the construction period while the long-term impacts would recur annually during the projects' useful lives. Tables ES-3 and ES-4 summarize the total economic impacts (direct, indirect and induced impacts, as explained later in the report) by scenario for renewable generation and transmission. The impacts are reported in terms of jobs, job-years (for short term impacts only), wages, and Gross State Product (GSP) over the life of the project.

Table ES-3: Short term, construction economic impacts by scenario

	Scenario 1	***Scenario 2***	***Scenario 3***	***Scenario 4***	***Scenario 5***	***Scenario 6***
Job-years						
Renewable Generation	26,500	29,400	9,600	15,600	14,800	20,000
Transmission	700	5,400	500	2,000	2,100	800
Total	**27,200**	**34,800**	**10,100**	**17,600**	**16,900**	**20,800**
Wages ($2011, mil.)						
Renewable Generation	$1,430	$1,580	$520	$850	$800	$1,080
Transmission	$40	$300	$30	$110	$120	$50
Total	**$1,470**	**$1,880**	**$550**	**$960**	**$920**	**$1,130**
GSP ($2011, mil.)						
Renewable Generation	$2,060	$2,260	$740	$1,240	$1,160	$1,560
Transmission	$100	$400	$0	$200	$200	$100
Total	**$2,160**	**$2,660**	**$740**	**$1,440**	**$1,360**	**$1,660**

Source: Synapse calculations using IMPLAN model.

Table ES-4: Long term, annual operations and maintenance economic impacts by scenario

	Scenario 1	**Scenario 2**	**Scenario 3**	**Scenario 4**	**Scenario 5**	**Scenario 6**
Annual Jobs						
Renewable Generation	1,130	1,120	390	810	710	930
Transmission	20	170	10	50	60	20
Total	**1,150**	**1,290**	**400**	**860**	**770**	**950**
Annual Wages ($2011, mil.)						
Renewable Generation	$66	$63	$23	$51	$43	$55
Transmission	$1	$10	$1	$3	$3	$1
Total	**$67**	**$73**	**$24**	**$54**	**$46**	**$56**
Annual GSP ($2011, mil.)						
Renewable Generation	$120	$110	$40	$100	$90	$100
Transmission	$3	$25	$2	$7	$8	$3
Total	**$123**	**$135**	**$42**	**$107**	**$98**	**$103**

Source: Synapse calculations using IMPLAN model.

We find that Scenario 2 has the largest economic and job creation benefit compared to other scenarios, in part because it involves the most new renewable generation capacity (1,500 MW) and the second largest capital investment in transmission ($555 million). Scenario 3 involves the lowest amount of renewable generation capacity (450 MW) and the lowest capital investment in transmission ($46 million) which is limited to the replacement of a transformer. Within each scenario, the impact of renewable generation is higher than the impact of transmission; transmission-focused initiatives that leverage higher levels of investment in renewable generation yield the highest economic and employment benefits for the state.

Figure ES-1 shows the amount of economic activity that is leveraged by every million dollar of transmission investments by scenario. Scenarios 1 and 3 involve low cost transmission projects yet leverage 1150 and 450 MW of generation, respectively. Therefore, these scenarios look attractive from a job-creation perspective since they are anticipated to induce extensive economic activity through small initial investments in transmission. The other scenarios involve large-scale transmission infrastructure and higher transmission investments, yet are anticipated to leverage a similar range of renewable generation to Scenarios 1 and 3.

Among the long term scenarios, Scenario 4 appears to be the most effective at job creation—largely due to its reliance on geothermal generation, which generates more job-years per dollar than wind or solar; although this dynamic could shift if Nevada gains traction in manufacturing to support the solar and wind generation industries.

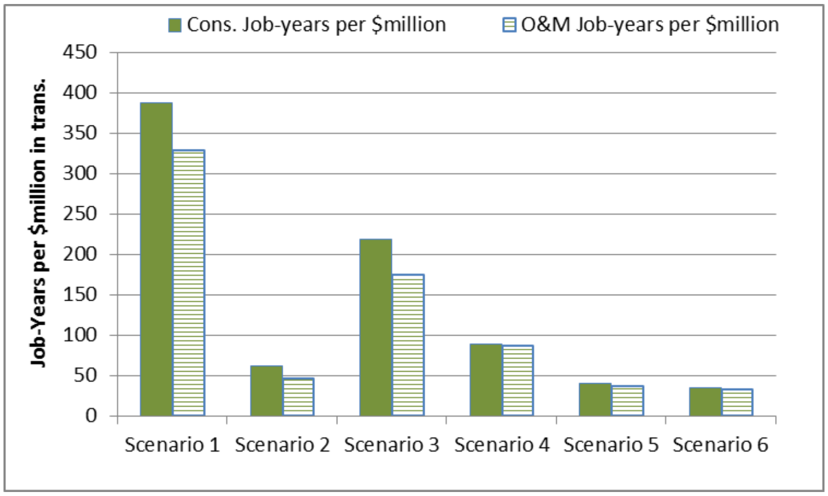


Figure ES-1: Job-year impacts per million dollars of spending on transmission
Source: Synapse estimates using IMPLAN model and data.

In addition to the economic impacts identified above, Nevadans may benefit from various tax revenues generated from both the short term construction and the long term operations that go to the state and applicable county. These include sales and use tax, property tax, and net proceeds or minerals tax. Table ES-5 summarizes the tax impacts for the lives of all projects including transmission and renewable generation.

Table ES-5: State and local tax impacts by scenario ($2011, millions)

	Scenario 1	***Scenario 2***	***Scenario 3***	***Scenario 4***	***Scenario 5***	***Scenario 6***
Mineral Taxes	$11	$6	$3	$12	$8	$10
Property Taxes	$360	$470	$140	$190	$210	$270
Sales and Use Taxes	$182	$215	$65	$122	$110	$143
Total	**$553**	**$691**	**$208**	**$324**	**$328**	**$423**

Sources: Synapse estimates, Tri-sage, NV Department of Taxation

This report serves as part of the work of the NEITF under the Governor's directive and Executive Order, and it is intended as a tool for policy discussions and continued analysis of the benefits of developing Nevada's renewable energy to serve the regional market. The expected economic and fiscal impacts by scenario are only one consideration in evaluating renewable energy development scenarios. The impacts identified in this report are based on the assumption that if any of the projects are built, private investment in the indicated amount of renewable energy and long-term purchase contracts for that energy will follow. However, this investment will occur only if required market conditions exist for the sale of that energy, and if all other necessary technical, political, siting and land use, and electric system factors were in place. To reduce this uncertainty, greater cooperation and coordination within the state and between Nevada and California at the policy-making level may be the best way to ensure that a viable market opportunity exists for Nevada's renewable resources, prior to putting ratepayer or taxpayer funds at risk.

2. Background

The State of Nevada has an abundance of diverse, high-quality renewable energy resources, with attractive opportunities for the development of utility scale geothermal, wind, and solar energy projects. As of 2011, NV Energy (NVE), the state's leading regulated public utility, had approximately 46 renewable energy projects on line or under development. These projects are expected to provide approximately 1250 MW of capacity if and when they are completed, primarily serving the state's retail customers.

Nevada has a Renewable Portfolio Standard (RPS) of 15%of retail sales for the year 2011, which steadily increases to 18% in 2013, 20 percent in 2020, and 25% in 2025. As of 2011, NVE's operating companies have exceeded their RPS requirements—reaching 24.9% for NVE-North and 16.7% for NVE-South--with future projections of energy procurement indicating full compliance with incremental RPS until at 2020, according to NV Energy's compliance reports. As such, there is an opportunity to develop the state's significant renewable energy resources in excess of the current minimum RPS requirements, if a viable market for the capacity and energy can be identified.

One noteworthy aspect of Nevada's renewable energy potential is the geographic proximity and electrical connectivity to the region's major market for renewable energy—the State of California, with its 33% by 2020 RPS program—the most aggressive in the nation.

Governor Brian Sandoval addressed this opportunity in his State of the State Address on January 24, 2011 and further formalized it in Executive Order 2011-18. In this order, he directed the New Energy Industry Task Force (NEITF) to explore opportunities for the state to promote and facilitate the development of renewable resources for export to regional load centers, and to determine if improved coordination between the Nevada and California electricity markets could enable Nevada to realize the economic development benefits of its abundant renewable energy resources. He also asked the NEITF to develop the business case for the development of these resources with the lowest possible risk to Nevada ratepayers.

This memorandum presents Synapse's preliminary analysis of electric system and economic considerations in support of the NEITF's work. As the basis of this effort, six renewable energy development and transmission reinforcement scenarios were identified by NEITF, with the assistance of the Western Grid Group, that would facilitate energy export to or exchanges with California. Synapse has used these six scenarios to quantify the likely costs of developing transmission and renewable resources. We also analyze economic impacts in terms of employment, wages, Gross State Product (GSP), and tax revenues.

Synapse's analysis focuses on the fundamental purposes for the development of the scenarios: export of renewable energy to meet demand in California, and economic benefits for Nevadans. In order for this export to be economically viable and for Nevada to realize the associated benefits, the combined costs of renewable generation and transmission investments in Nevada must be within the willingness to pay for the delivered energy by customers in the target region. Here we provide preliminary estimates of the associated generation and transmission investments, discuss financing models, review the market for renewables in California, and present our revenue and economic impacts analyses for these potential investments in Nevada.

3. Renewable Energy Supply and Demand

A. Nevada Renewable Energy Resources

The State of Nevada has abundant, high-quality renewable energy resources and enormous potential for the development of geothermal, solar, and wind energy projects. The qualitative assessment of these resources and their geographic location has been presented in reports from the National Renewable Energy Laboratory (NREL) and through initiatives such as the Nevada Renewable Energy Transmission Access Advisory Committee (RETAAC). One of the outcomes of the RETAAC initiative has been the development of a resource map identifying many of Nevada's economically viable renewable energy zones and the transmission infrastructure essential to tap the energy from such resources. (Figure 1)

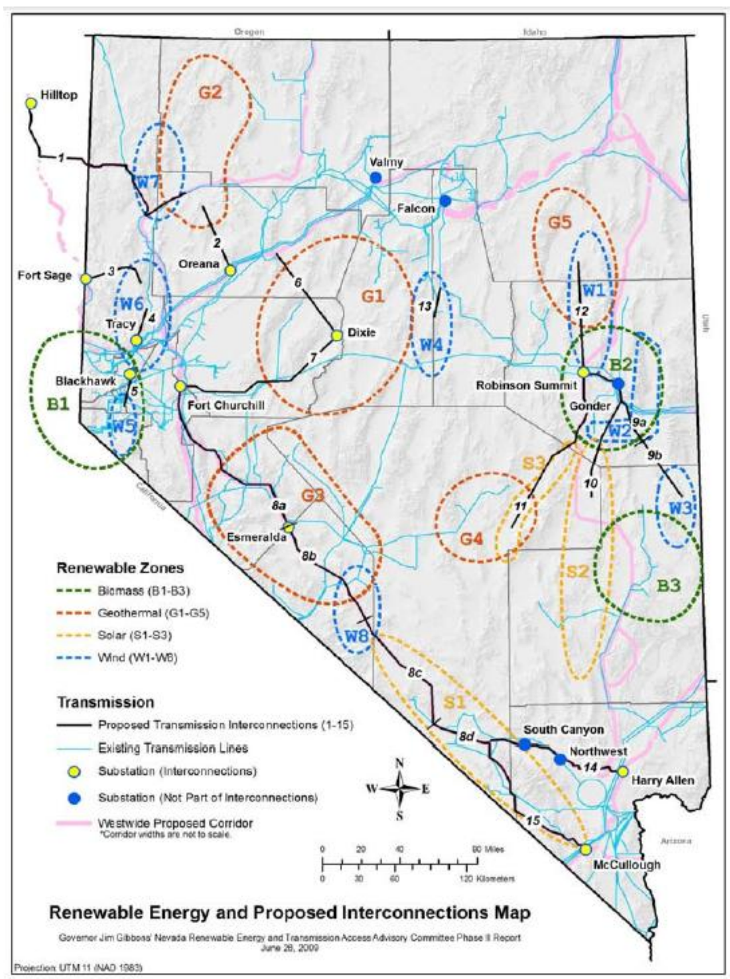


Figure 1: Nevada renewable energy zones and proposed interconnections map
Source: Nevada RETAAC Phase II

As discussed above, the state's RPS states that 25% of NV Energy's energy must come from renewable sources by 2025, with specific carve-outs for solar energy, energy efficiency, and energy conservation programs. By NV Energy's current estimates, Nevada's RPS is fully subscribed through the year 2020, if all approved contracts perform (McGinley, 2012). As such, there may be limited in-state demand for Nevada's utility-scaled renewable energy in the near future unless the state's RPS targets are revised, demands are increased, or other mechanisms are developed to spur demand for these resources.

However, Nevada's geographic and electrical proximity to the California Independent System Operator (CAISO) controlled grid and its wholesale energy market, and to other California Balancing Authority Area (CBA) systems, offers plausible opportunities for renewable energy deliveries into the state of California. As such, developing Nevada's renewable energy resources for use in the regional market may present an attractive economic development opportunity for the state.

B. California's Renewable Portfolio Standard

The State of California has the most ambitious Renewable Portfolio Standard (RPS) program in the United States. Established, accelerated, and expanded through the years 2002 and 2011 by various California legislative bills, the RPS program requires investor owned utilities (IOUs), publicly owned utilities (POUs), electric providers and community choice aggregators to obtain 33% of the total energy required to meet their load from eligible renewable energy sources by 2020.

As of the Fourth Quarter of 2011, the IOUs reported that they collectively served approximately 17% of their electricity with RPS-eligible generation in 2010, and the number increased to 20.6% for their cumulative 2011 retail electricity sales, in line with expected progress toward 20% for the first compliance period. The large and medium sized POUs were cumulatively averaging approximately 23.3% of POU-eligible and 13.4% of California Energy Commission (CEC)-eligible[6] RPS deliveries in the year 2010 (California Energy Commission 2011).

The CEC has established three RPS compliance periods and three categories each, commonly referred to as "buckets" of quantitative procurement limits in meeting the RPS goals (Table 1). Each bucket defines the qualitative aspects of RPS-eligible generation such as interconnection, balancing authority, dynamic scheduling or Renewable Energy Credit (REC)-only procurement.

[6] Only California's IOUs are directly regulated by the CPUC, so only these entities are strictly held to the commission's definition of eligible renewables. The governing body for each POU establishes its own eligibility criteria, which can vary significantly from the CEC criteria.

Table 1: California Renewable Portfolio Standard compliance schedule and resource requirements

	First Compliance Period (2011-2013)	***Second Compliance Period (2014-2016)***	***Third Compliance Period (2017-2020)***
RPS Procurement (% of energy delivered)	*20%*	*21.6 - 25%*	*27-33%*
Bucket I (% of RPS)	50%(min)	65%(min)	75% (min)
Bucket II (% of RPS)	0-50%	0-35%	0-25%
Bucket III (% of RPS)	25%(max)	15%(max)	10%(max)

Source: CPUC

Table 1 shows that the highest percentage of procurement for California is mandated to be in the "Bucket I" category, defined to be meeting one of the following criteria:

1. Energy and Renewable Energy Credits (RECs) from an RPS-eligible facility that is directly interconnected to the distribution or transmission grid within a CBA; or
2. Energy and REC's from an RPS-eligible facility, that is not directly interconnected to a CBA, but is delivered to a CBA without substituting electricity from another source; or
3. Energy and REC's dynamically transferred to a CBA.

This report assumes that all generation within various scenarios modeled in the State of Nevada are deemed eligible for Bucket I due to various system conditions with each scenario, such as the California Load Serving Entity's (CA LSE) control over the transmission substation where energy is delivered; new transmission build-outs directly into CA LSE's territory; or other contractual arrangements enabling direct energy deliveries into the CAISO market.

C. California RPS Compliance Forecast

California's RPS is binding on almost all load serving entities (LSEs) in the state. The regulatory rules surrounding implementation of the standard, development of procurement forecast, definition and calculation of the "Renewable Net Short" (RNS)[7] are all in current proceedings at the California Public Utilities Commission (CPUC) and the CEC. To that extent, LSEs are currently developing methodologies, inputs, and formats of reporting RPS portfolio needs and the RNS, and there is only limited information available in the public domain to substantively verify forecasted renewable procurement and associated shortfall, if any.

The California Public Utilities Commission has provided a set of graphics on RPS-eligible renewable energy procurement of the state's large IOUs for the years 2012-2020, with the total energy mix split into categories of operational and contractual status in the form of online generation and approved, pending, expiring and under negotiation contracts (Figure 2).

[7] Renewable Net Short is defined as the amount of new renewable generation necessary for an LSE to meet or exceed the RPS target, relative to its currently contracted quantity. Because this metric compares a future requirement with currently-held assets, it should not be interpreted to necessarily indicate the degree to which the entity is or is likely to be out of compliance.

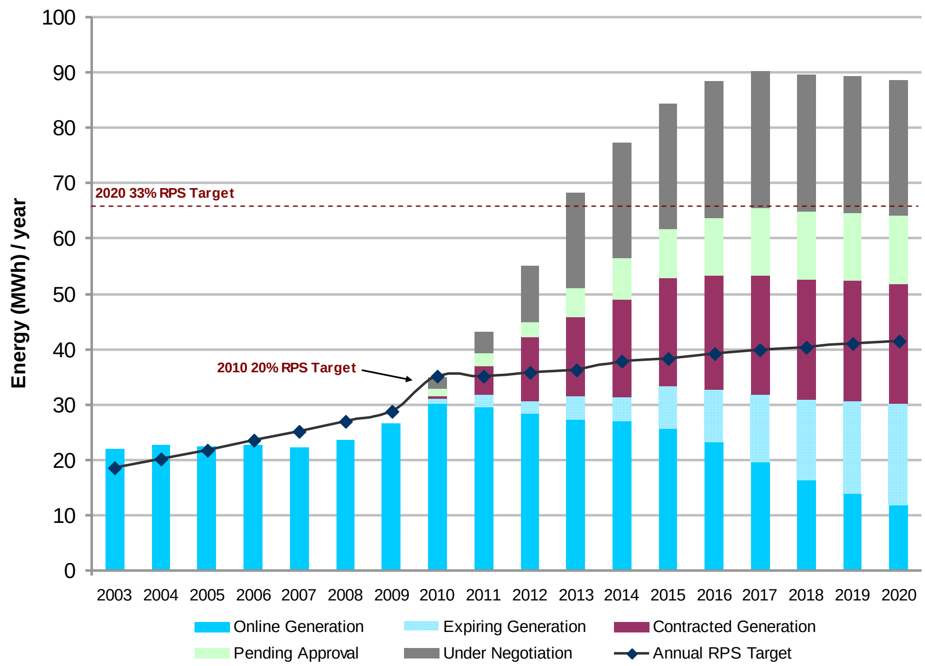


Figure 2: California's projected renewable energy procurement and RPS targets for Investor-Owned Utilities (IOUs). The vertical axis should be interpreted as TWh/yr.

Source: 'California's Renewable Energy Programs for Utility-scale Projects', California Public Utility Commission (CPUC), Sara Kamins, September 16th 2010.

As suggested by Figure 2, the probability of meeting, exceeding or missing the IOUs' 33% RPS obligations will depend on the dynamics and uncertainties with re-contracting of expiring energy contracts, outcomes of contract negotiations, and performance of approved contracts and regulatory approval of pending energy contracts. However, it is unclear if there is any specific consideration to the appropriate treatment to expiring generation and under-negotiation generation, since the former can be eligible for the latter and hence may be double counted.

The CPUC also defines "viability" as a metric for a renewable energy project that bids into the California IOUs' RPS solicitations. As described on the CPUC website,[8] the viability score can be viewed as a means to quantify a project's strengths and weaknesses in key areas of renewable project development. The CPUC has categorized projected renewable energy procurement by viability buckets as shown in Figure 3.

[8] http://www.cpuc.ca.gov/PUC/energy/Renewables/procurement.htm, accessed August 2012

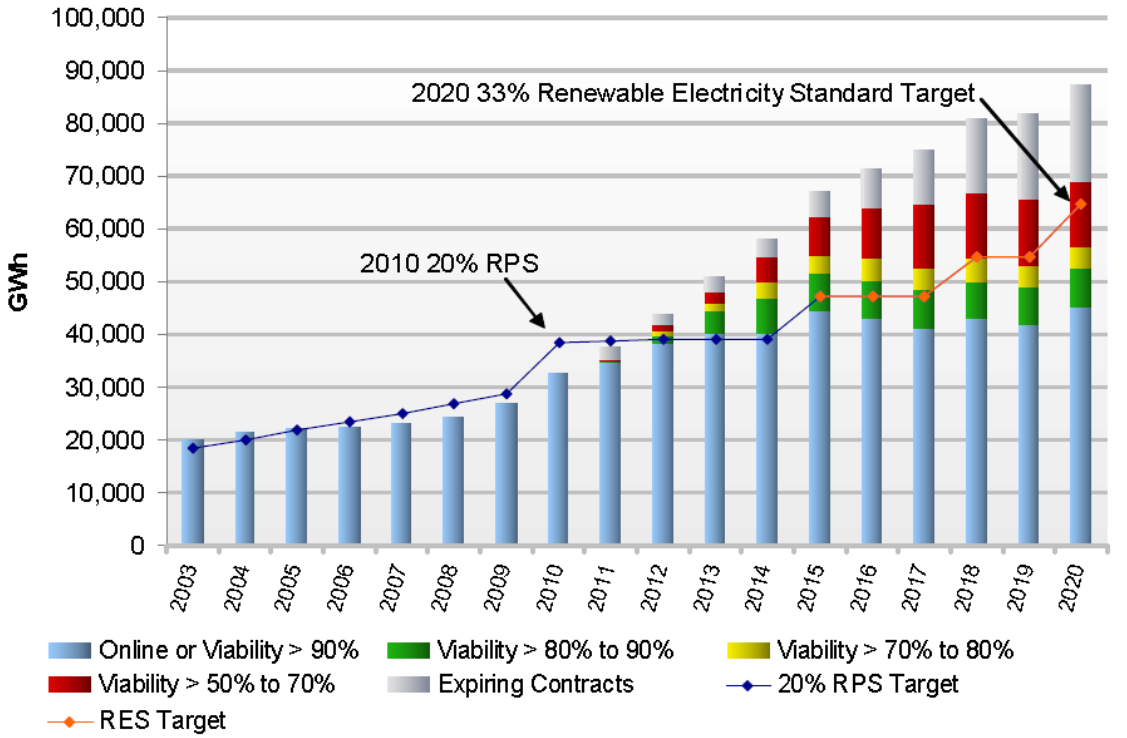


Figure 3: California's projected renewable energy contracts categorized by viability

Source: 'Progress towards California's Renewable Portfolio Standards Goals', California Public Utility Commission (CPUC), Julie Fitch, February 1st 2011

Publicly-owned utility RPS compliance

The California State Energy Commission (CEC) provides some information on the 2020 RPS deliveries expectations for the state's POUs towards meeting the RPS. Unfortunately, this information is generally limited or generic in nature, often with little documentation of assumptions on projected deliveries of renewable energy or success of project contracts. Based on this limited data, it appears that the state's 18 large and mid-sized POUs will cumulatively average between 19% and 29.7% of RPS compliance by 2020, accounting for planned deliveries (California Energy Commission 2011). While this seems to imply a significant need for additional resources to meet the RPS requirement, the extent to which the POUs are already in negotiations to purchase additional resources from within or outside the state is unknown.

The projections of POU RPS deliveries are reported by the CEC in two categories, POU-eligible and CEC-eligible. This difference is a result of current rules, which permit each POU's governing body to establish eligibility criteria. It is possible that in the future, the CEC will impose its eligibility criteria on all California POUs in addition to the IOUs (California Energy Commission 2012). However, absent any additional interim procurement, or regulatory change, we estimate that the POU RPS shortfall in the year 2020 could range between 2000 and 9000 GWh (Figure 4).

One independent study, a report from Emerging Energy Research (2011) on the forecast of California's demand and contracted supply under the RPS targets, projects a significant shortfall for both IOUs and POUs in meeting their targets: up to 6 Terawatt hours (TWh) for the combined

POUs, 3 TWh for San Diego Gas & Electric (SDG&E), 10 TWh for Southern California Edison, and 20 TWh for Pacific Gas & Electric (PG&E) in risk-adjusted deficit.

It is evident that the market for renewable energy in California will be significant in view of the aggressive RPS; however, due to the factors discussed above, the opportunity for meeting that demand through 2020 with new, out-of-state resources is subject to significant uncertainty.

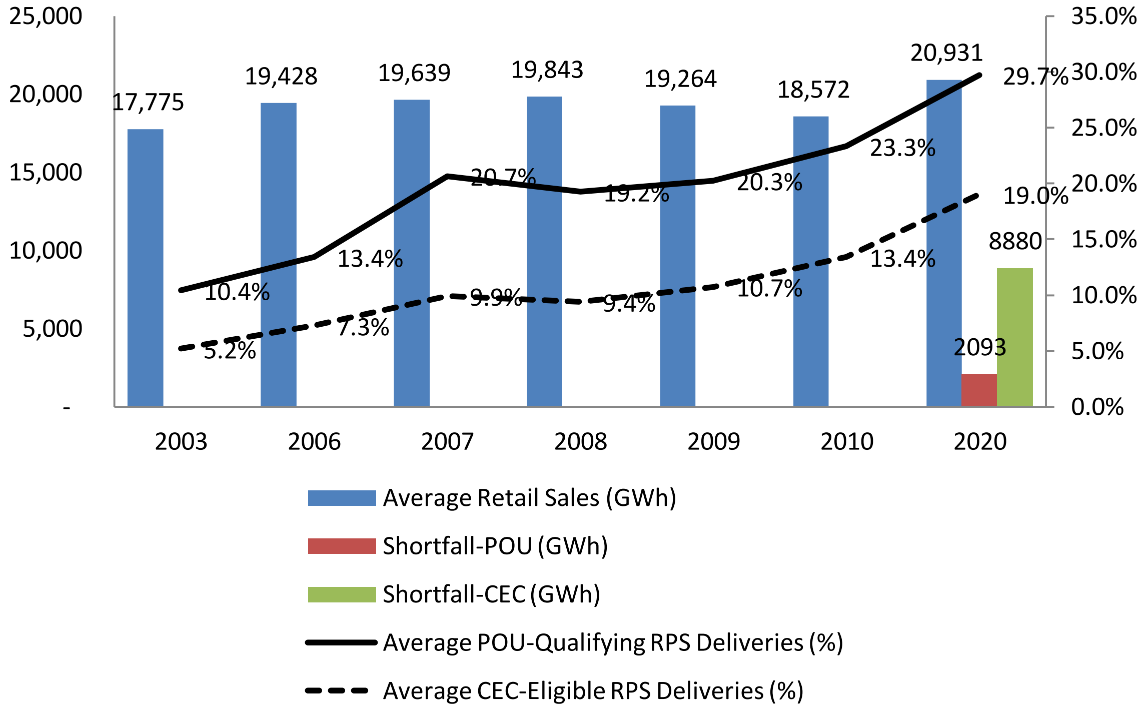


Figure 4: California POUs (selected) renewable energy procurement trends
Source: 'Updated Publicly Owned Utilities Database as of November 2011', California Energy Commission (CEC), November 16th 2011

D. California's Reliability Needs

California's demand for renewable energy resources is driven by the 33% RPS law as described above; however, this is only one of the challenges faced by the state as it moves into an environmentally-sustainable energy future. Another significant challenge is maintaining resource adequacy throughout the state while complying with the State Water Resources Control Board's (SWRCB) Once-Through Cooling (OTC) policy and the Greenhouse Gas (GHG) emissions policy under California's Assembly Bill 32 (AB32).

This policy mandates that any power plant that uses ocean or estuarine water for cooling purposes must either dramatically reduce the use of such water, or cease operations. The California ISO, among others, has estimated that this will lead to the loss of approximately 10 GW of in-state fossil generating capacity later in the current decade.

Much of the OTC generation serves resource adequacy needs in California's local capacity areas constrained by limited transmission import capabilities. This function of some at-risk OTC generation will have to be addressed through replacement resources, but these resources may be procured more for capacity than for energy services, primarily to meet load during periods of peak demand. Some renewable resources, particularly geothermal and solar, may be able to replace a portion of these resources for reliability purposes. However, this will require that the associated energy is deliverable to the local reliability areas when needed. Nevada's renewable resources seem generally unlikely to be best-positioned for this purpose owing to the lack of additional transmission connections into the specific local reliability areas. Therefore, the best opportunity for out-of-state renewable energy resources from states such as Nevada is likely to be California's incremental renewable energy procurement as it moves towards the 33% RPS compliance.

4. Development Scenarios

A. Scenarios

Nevada's New Energy Industry Task Force (NEITF) has proposed six renewable energy export scenarios comprised of generation development and transmission system improvements designed to facilitate the development and export of energy to California. These scenarios have been developed to serve as a foundational framework for the economic analysis of the benefits of developing Nevada's renewable energy resources to serve the regional market.

The three 'near term' scenarios, which could yield renewable energy exports in the 5 to 8 year time horizon, are expected to facilitate between 500 to 1500 MW of energy export. These are characterized primarily by transmission upgrades in Southern Nevada.

The three 'long term' scenarios, which could yield renewable energy exports in the 10 to 20 year time horizon, are expected to facilitate between 500 and 1000 MW of renewable energy exports for each scenario. These scenarios are derived from the Nevada Energy Assistance Corporation (NEAC) Transmission Initiative Routing Study and reflect transmission lines proposed to access the potential renewable energy resource zones (Figure 5) identified as the Nevada Renewable Energy Zones (REZ) by the Renewable Energy Transmission Access Advisory Committee (RETAAC).

Briefly, the scenarios are as follows, and as summarized in Table 2.

Near Term Scenarios

Scenario I: The addition of a 60 mile long, 500 kV AC transmission line from Harry Allen to Mead substation, similar to the Southern Nevada Intertie Project (SNIP). This is expected to add 1150 MW of delivery potential through the congested southern Nevada grid from 800 MW of solar and 350 MW of geothermal resources.

Scenario 2: The addition of multi-segment 500 kV and 230 kV AC transmission lines, approximately 247 miles in total length from Valley Electric Association (VEA) control area to the El Dorado substation and an extension of the VEA line to the Clayton substation. This is expected to add 1500 MW of delivery potential from 200 MW of geothermal and 1300 MW of solar resources.

Scenario 3: The installation of a 1500 MVA transformer at the Harry Allen substation. This is expected to add 400 to 500 MW of delivery potential across the congested southern Nevada grid from 100 MW of geothermal and 400 MW from solar resources.

Long Term Scenarios

Scenario 4: The addition of a 126 mile long, 345 kV AC transmission line connecting NV Energy's Oreana substation to the proposed Viewland substation in the Lassen Municipal Utility District (LMUD) area, referred to as the 'North Project' in the NEAC report. This is expected to provide 500 MW of incremental export capacity to the northern central California market.

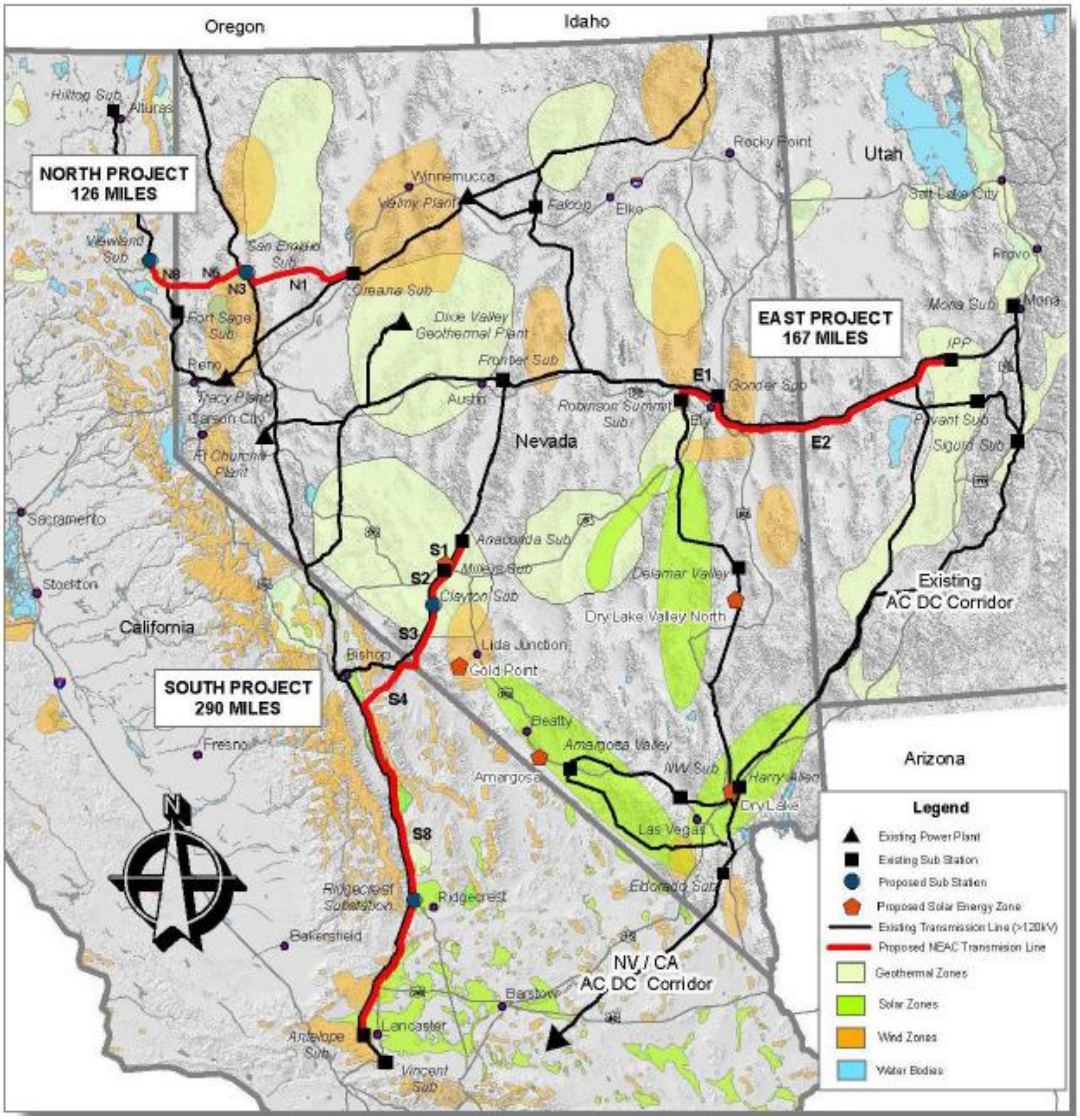


Figure 5: Long term scenarios - transmission
Source: NEAC Transmission Report

Scenario 5: The addition of a 167 mile long, 500 kV AC transmission line connecting Robinson Summit substation in Nevada to the Intermountain Power Project (IPP) substation in central Utah, referred to as the 'East Project' in the NEAC report. At the 500 kV level, the range of export capacity is projected to be between 750 and 1000 MW. The IPP substation is an existing hub of power transfer to California.

Scenario 6: This is a 290 mile multi-segment transmission line project which includes a 230 kV segment from NV Energy's Anaconda substation to the Clayton substation and a 500 kV segment from Clayton to the Antelope substation in southern California with step-up transformation at Clayton, referred to as the 'South Project' in the NEAC report. This project is expected to provide 750 to 1000 MW of incremental export potential into California.

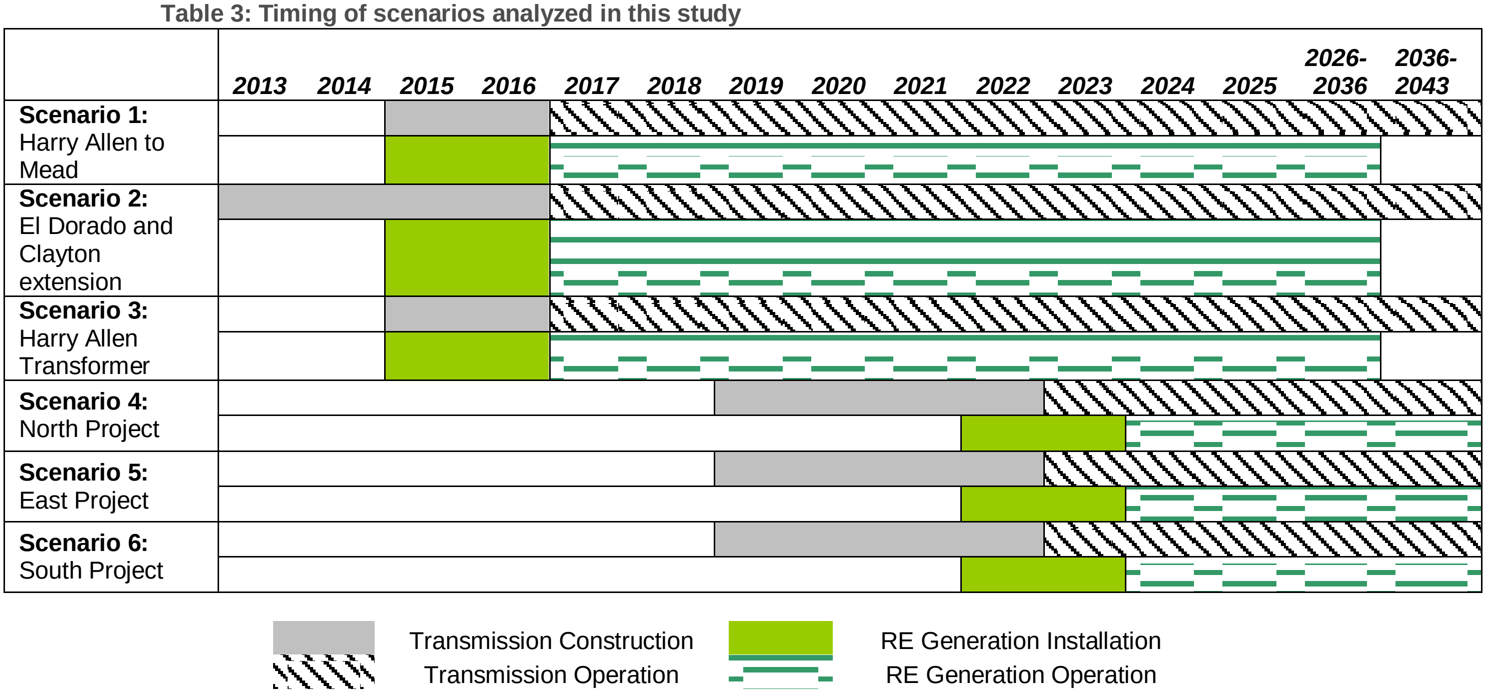
Table 2: Summary of proposed scenarios

	Scenario 1: Harry Allen to Mead	***Scenario 2:*** El Dorado and Clayton extension	***Scenario 3:*** Harry Allen Transformer	***Scenario 4:*** North Project	***Scenario 5:*** East Project	***Scenario 6:*** South Project
New Capacity (MW)	1150	1500	400-500	500	750	750-1000
Timeframe for energy delivery	Near term (5-8 years)			Long term (10-20 years)		

Source: NEITF

Table 3 illustrates the timing of the construction[9] and operations of transmission and renewable generation projects by scenario. The useful lives of the projects were assumed to be 30 years for transmission and 20 years for renewable generation. For transmission projects, we assumed that small projects (Scenarios 1 and 3) would take two years to build and large projects would take four years. For renewable generators, we assumed two years for the installation of solar PV, wind and geothermal technologies. The construction of renewable generation is likely to be staggered over time, however, this does not change the calculation of economic impacts.

Table 3: Timing of scenarios analyzed in this study



Source: NEITF, Tri-Sage et al., 33% Implementation Plan.

Figure 6 shows the proposed mix of new renewable capacity for each scenario. The near term scenarios are predominantly composed of solar capacity while the long term scenarios, with the exception of Scenario 6, include a higher mix of geothermal and wind.

[9] For our current purposes, “construction” refers to all activities required to set up each type of transmission and generation including planning, building, installation, and drilling.

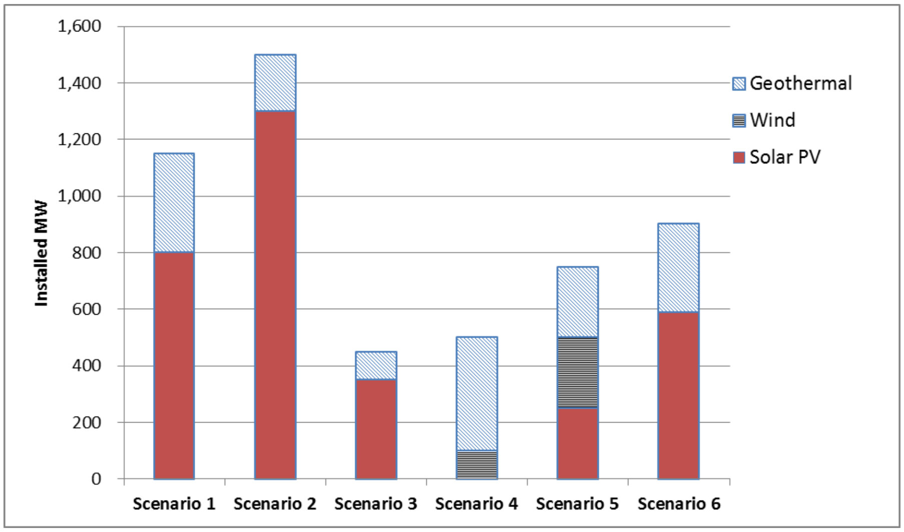


Figure 6: Installed renewable capacity by scenario (Installed MW)

Source: NEITF, calculations by Synapse based with assumed midpoint of any range in RFP.

B. Development and Financing for Generation and Transmission[10]

The mechanism for the development and financing for the renewable energy generation and transmission associated with the six identified scenarios impacts the levelized cost of energy to be delivered to California. It is also germane to the Governor's directive to build a business case with the least possible risk to Nevada ratepayers. The NEITF has a subcommittee focused on the issues of transmission financing and planning, and various options are being reviewed, in conjunction with this report, prior to making recommendations to Governor Sandoval. The discussion here reflects the perspective of the authors, based on our experience with project development and regulatory practices throughout the United States.

While the specifics of each scenario will determine the nature of development and funding assistance that may be applicable, there are primarily two categories - private (i.e., independent investors or unregulated utility affiliate) and public (i.e., regulated utility). Other combinations or hybrid options, encompassing aspects of these two, are also possible.

The development of renewable energy generation projects is mostly expected to be from independent utility-scale generation developers, who invest capital for generation development in anticipation of long term Power Purchase Agreements (PPA's) for firm energy deliveries. In this case, the counter-party would be the potential off-takers outside of Nevada. Generation developers are generally required to fund needed transmission enhancements in the form of generation interconnection upgrades to the interconnecting utility, unless the transmission provider or owner elects to fund the capital for the network upgrades (NV Energy 2011). However, it is also possible that California LSE's may pursue self-build and ownership options to develop renewable energy projects in Nevada, and thus could benefit from lower-cost utility financing.

[10] As noted under policy considerations, the NEITF has a subcommittee devoted to the transmission financing and planning issues, and these types of options are being reviewed at a high-level to gauge interest, in conjunction with this memorandum, in making recommendations to Governor Sandoval.

There are a number of possibilities for transmission development and financing, each with its own set of advantages and disadvantages. These include**:**

1. Private Sector Development: Private sector entities such as independent transmission companies (ITC's) develop transmission with private capital and financing. While there is no direct risk to ratepayers in this case, independent transmission projects often require anchor asset investment and advance transmission capacity subscription to succeed. One model for private sector development would be for NV Energy to form an unregulated subsidiary that would develop transmission on a venture basis without seeking recovery, thus protecting ratepayers from the expense and risk of projects that are not primarily conceived for providing reliable electric service in Nevada. In this case any profits from the use of these assets would be returned to shareholders.

2. Public Sector: Any regional LSE could develop transmission within or between their territory and Nevada, and benefit from utility financing requirements, and have the facilities under applicable CBA control. In this case the ratepayer impacts would have to be justified against other alternatives for procuring renewable energy, and would require approval from the respective public utility commissions or governing bodies.

Conceivably, NV Energy could develop transmission projects as a utility (at ratepayer risk and expense, with any benefits in excess of their allowed return on equity accruing to ratepayers) in anticipation of providing firm energy deliveries to California for firm contracts. However, because the transmission projects for certain scenarios (specifically the near term scenarios) are specifically designed for export and not to support reliable electric service to Nevadans, this would be outside of the conventional charter for regulated utility use of ratepayer funds. For this reason enabling legislation would probably be required before the commission could allow cost recovery for such projects.

3. Hybrid Options: Several other hybrid options of public-private partnership may exist that combine the benefits of both categories. The state of Nevada can form Quasi-governmental agencies that co-fund the development of transmission with the private sector (example – Wyoming Infrastructure Authority) or promote transmission development with limited ownership interests (example – NM RETA). The funding can be arranged by state bonding, guarantees and other incentives such as property taxes, and provision of eminent domains. Alternatively, the state of Nevada could implement safeguards in the form of backstop private development costs or assured recovery of abandonment costs in case of project cancellation. This can be enabled through an Integrated Resource Plan (IRP) or independent transmission contract. Because there are benefits and risks with each option as the level of state involvement and ratepayer liability varies, any choice of a hybrid mechanism will have to be carefully examined against risk, benefits and likely effectiveness.

Another option would be for transmission owners in Nevada to join the regional independent system operator, CAISO, as participating transmission owners (PTO). In this construct, the PTO's file their annual transmission revenue requirement (TRR) with the CAISO. CAISO in turn, collects a Transmission Access Charge (TAC) from the participating load serving entities in proportion to their native load to cover the system-wide TRR. While this may be a potential option for transmission owners in Nevada to allocate their transmission costs more broadly and reduce ratepayer impacts in the state, this is a two-way process: the PTO (and/or LSE) would also be partly responsible for the costs associated with additional transmission investments across the CAISO footprint. Additional studies are being conducted between entities in California and Nevada to study the impacts of such a model, which is beyond the scope of this report.

C. Transmission Costs

Total transmission costs for the development scenarios were taken from the NEAC study and the RFP for the three long term scenarios, and were based on Synapse estimates for the three near term scenarios using standard cost estimates for transmission upgrades in the western interconnection.

The levelized costs of transmission represent the annual, real dollars of recovery required to fund the projects. These were developed using NEAC's assumptions for O&M cost recovery and NV Energy's cost of capital (8%) for a 30-year recovery period. These estimates therefore assume that a utility would secure capital for these projects. These costs would be higher if the transmission projects were developed by an independent transmission owner, due to a private investor's higher financing cost and private investors' requirements for return on investment.[11]

Table 4: Transmission costs by scenario ($2011)

	Scenario 1	*Scenario 2*	*Scenario 3*	*Scenario 4*	*Scenario 5*	*Scenario 6*
Overnight Cost* ($ millions)	$70	$555	$46	$198	$414	$595
Annual Generation (GWh)	4,625	4,932	1,651	3,092	3,154	3,790
Levelized cost ($/MWh)	**$2**	**$13**	**$3**	**$7**	**$15**	**$18**

*Overnight costs refer to the capital investment were a resource to be built overnight; that is, with no requirement for financing during the construction phase.

Sources: NEAC, NEITF, and Synapse

D. Renewable Generation Costs

Table 5 shows Synapse's cost assumptions for new wind, solar and geothermal plants in Nevada in 2015 and 2020. For wind and geothermal costs, we assume an installed cost of $1,950 and $5,406 per kW, respectively, through 2020. For solar PV, our cost estimates reflect the production of AC power, since ultimately energy in that form that will be sold to the grid. These were based on estimates from a number of industry sources, including Black & Veatch, Lazard, E3 Analytics, the California Energy Commission and the U.S. EIA. However, for solar PV we assumed relatively modest cost reductions between now and 2020, given the dramatic reductions seen over the past several years.

[11] Because utilities have captive ratepayers and are guaranteed recovery of prudently-incurred costs for used and useful infrastructure, they are generally considered low-risk borrowers and they can attract investment with a moderate return on equity. Third-party investors put their own capital at risk and therefore face higher financing costs; they also must project a higher return on investment in order to attract capital.

Table 5: Renewable capital and O&M cost assumptions ($2011)

Resource	*Capital Cost ($/kW-AC)*	*Fixed O&M ($/kW-yr)*	*Variable O&M ($/MWh)*
Solar PV (2015)	$3,621	$35	$0
Solar PV (2020)	$3,060	$34	$0
Wind	$1,989	$61	$0
Geothermal	$5,406	$86	$10

Source: Synapse estimates based on review of solar studies, Wiser (wind) and AEO (geothermal) Values assume $100/kW interconnection costs

Synapse developed levelized costs for these resources in order to gauge the cost of each proposed scenario. To do this, we estimated capacity factors of 31% for PV (based on NREL's PV Watts tool), 33% for wind (based on Class 2 wind at 80 meter hub heights), and 80% for geothermal.[12] A key variable for estimating the levelized costs is whether the federal Investment Tax Credit (ITC) and/or Production Tax Credit (PTC) will be available to renewable projects through 2020. Table 6 shows the levelized costs of renewable energy both with and without these federal subsidies, along with costs for both merchant and utility project sponsors as discussed above. Nevada-specific subsidies, such as tax abatements or other incentives, are not considered.

Table 6: Renewable energy levelized cost ($2011/MWh)

Resource	*Utility, w/subsidy*	*Utility, w/o subsidy*	*Merchant, w/subsidy*	*Merchant, w/o subsidy*
Solar PV in 2015	$102	$141	$115	$159
Solar PV in 2020	$88	$121	$99	$136
Wind	$85	$95	$95	$105
Geothermal	$81	$91	$92	$102

Source: Synapse estimates based on review of solar studies, Wiser (wind) and AEO (geothermal). Costs include $100/kW interconnection costs

E. Delivered Energy Costs

Estimates of the levelized cost of delivered energy from the generator in Nevada to the delivery point (i.e. California's "Bucket 1") are provided below, by scenario. These figures are based on the weighted average levelized costs of renewable generation (above) added to the costs of the associated transmission projects on a levelized basis. For the near term scenarios (1 through 3), we used the 2015 generation costs whereas for the long term scenarios (4 through 6), we assumed 2020 generation costs. (The difference between costs in 2015 and 2020 is that solar PV costs decrease over time.) These costs are a key input for evaluating the economic viability of the six scenarios.

[12] We assume that new geothermal units will predominantly use air-cooling, based on discussions with Ormat Technologies. Air-cooled geothermal resources are more sensitive to seasonal and diurnal swings in ambient temperature then water-cooled resources, which affects the level of energy output.

Table 7: Costs of delivered energy to California by scenario and funding type ($2011/MWh)

Funding Type	*Scenario 1*	*Scenario 2*	*Scenario 3*	*Scenario 4*	*Scenario 5*	*Scenario 6*
Utility, w/o subsidy	$116	$140	$123	$99	$114	$122
Utility, w/ subsidy	$93	$109	$97	$89	$99	$102
Merchant, w/o subsidy	$131	$156	$138	$110	$125	$135
Merchant, w/ subsidy	$105	$122	$109	$100	$109	$113

Source: NEAC, NEITF, and Synapse

F. Transaction costs between the Nevada and California markets

The lowest possible costs of delivering renewable energy from Nevada to California would be realized if, in addition to using a lower cost of capital typical of regulated or public utility investments (as opposed to private investors) for both the renewable resources and the transmission infrastructure, all transaction hurdles to delivering power between the two states were eliminated.

Today, transactions across the border from the regulated utility region in Nevada to the California ISO-controlled grid face “hurdle rates” that are imposed according to the applicable transmission tariffs. Table 8 shows the approximate cost of obtaining firm, point-to-point transmission service, based on NV Energy’s Open Access Transmission Tariff, for each of the six development scenarios.[13] In order to express these rates as a $/MWh addition to energy costs, the transmission costs are levelized over the expected energy deliveries from each of the scenarios. If the actual energy deliveries were greater or less than those anticipated here, the effective $/MWh costs would be lower or higher, respectively.

For this calculation, firm transmission service on the lines is assumed to be reserved at the full nameplate generation capacity for each scenario. The total energy delivered is calculated based on the average capacity factor for the energy resources in each scenario. We have estimated the costs for the following service components: Firm transmission service; scheduling, system control and dispatch service; reactive supply and voltage control; and regulation and frequency response service for generators selling outside of control area. Other ancillary services that may be required are not considered here. These include frequency and regulation service (within control area), energy imbalance service, operating reserve service, generation imbalance and loss compensation services. The necessity and specifics of such service requirements will depend on the details of the energy transaction such as generation source and sink, and service timing.

In Tables 8a and 8b, Zones A and B represent the service territories of Sierra Pacific Power Company and Nevada Power Company, respectively. As such, the energy from Scenarios 2 and 4 can be assumed to be subject to Zone A rates, and the other scenarios to Zone B rates. However, as noted above the exact cost of service will depend on the details of transmission scheduling and service paths.

[13] Of necessity, these calculations should be considered approximate. Actual costs would depend on a large number of unknowable characteristics of each specific transaction, along with other considerations such as additional uses of the transmission infrastructure.

Table 8a: Ancillary service rates in Nevada

Service	***Rate (\$/MW per month, unless otherwise indicated)***	
	Sierra Pacific Power (Zone A)	**Nevada Power Company (Zone B)**
Scheduling, System Control and Dispatch	$246.27	$111.90
Reactive Supply and Voltage Control	$100.97	$158.05
Long Term Firm Point-To-Point Transmission ($/kW)	$34.08	$16.80
Regulation and Frequency Response Service for Generators Selling Outside of Control Area	$6,377.45	$6,445.08
Total	**$6,758.77**	**$6,731.83**

Source: NV Energy Open Access Transmission Tariff, Schedules 1 - 11

Table 8b: Estimated hurdle rates for export by scenario based on current NV Energy tariff

Scenario:	***1***	***2***	***3***	***4***	***5***	***6***
Zone*	B	A	B	A	B	B
Maximum Capacity (MW)	1150	1500	450	500	750	875
Average Capacity Factor	45.91%	37.53%	41.89%	70.60%	48.00%	48.02%
Annual Energy (GWH)	4,625	4,931	1,651	3,092	3,154	3,681
Scheduling, System Control and Dispatch ($thousands)	$1,544	$4,433	$604	$1,478	$1,007	$1,175
Reactive Supply and Voltage Control ($thousands)	$2,181	$1,817	$853	$606	$1,422	$1,660
Long Term Firm Point-To-Point Transmission Service** ($thousands)	$19,320	$51,120	$7,560	$17,040	$12,600	$14,700
Regulation and Frequency Response Service for Generators Selling Outside of Control Area ($thousands)	$889	$1,263	$348	$421	$580	$676,733
Total:	**$23,935**	**$58,633**	**$9,366**	**$19,544**	**$15,609**	**$18,211**
Total Estimated Wheeling Costs ($/MWH)	***$5.18***	***$11.89***	***$5.67***	***$6.32***	***$4.95***	***$4.95***

**Synapse assumption based on geographical focus of scenarios*
***Based on billing demand, at 1.1% of Reserved Capacity*

By today's transmission tariffs, the costs of delivering energy produced in Nevada outside the state would exceed production cost, on a per MWH basis, by amounts similar to those shown in Table 8b (in addition to the cost of losses). In examining any market opportunity for Nevada's renewable energy exports, these real costs would have to be included in any comparison against other local or export offerings to the same market.

A more conducive environment for sales of Nevada renewable (or conventional) energy to California could be produced by eliminating such hurdle rates, and allowing all energy to flow on the basis of its economic merit without regard to grid control area of origin. This is the model used in multi-state RTOs such as the PJM Interconnection. For our calculations of the projected cost of delivering energy to California, we have assumed that the hurdle rates for delivering the power across state and balancing area lines have been eliminated. In other words, we assume that there are no additional integration or transmission costs for delivering power from Nevada's resources other than those that would be incurred were the power produced by an in-state or a California balancing area entity. Any additional costs—such as those identified in Table 8b—could lead to a competitive disadvantage for any potential external resources, including those in Nevada, to deliver into California.

One implication of this assumption is that while Nevada may realize substantial macroeconomic and employment benefits, along with sales and use tax benefits, associated with developing resources in-state, there are likely to be little or no ratepayer benefits from this use of NVE's transmission infrastructure. Eliminating these transmission charges means that the export transactions will not contribute to the embedded costs of NV Energy's transmission infrastructure, and thus these full costs would have to be borne by Nevada ratepayers. In other words, there is a trade-off between holding down the cost of delivering Nevada's renewable energy for export, and any ratepayer benefits for the use of NV Energy's transmission assets for this export. The highest levels of cooperation will lead to the greatest market opportunity for Nevada's renewable energy, but the benefits of these cost savings would not accrue to Nevada ratepayers because there will be no surplus rents collected for the use of Nevada's transmission facilities.

5. Market Opportunity

The delivered cost of Nevada renewable energy, discussed in the previous sections, must be economically competitive with alternative forms of RPS-eligible energy procurement options for renewable energy to be acceptable and attractive to California utilities. The potential cost savings from using Nevada resources, along with any operational benefits, represents the market opportunity for export of Nevada renewables to California.[14]

Renewable energy procurement is generally initiated through the public issuance of Requests for Proposals (RFPs); however, executed energy contracts and power purchase agreements are almost exclusively confidential in nature and, as such, the actual contract prices are seldom made available in the public domain. Although the cost of renewable energy at generator or delivered to load is clearly correlated to the quality of the resource, capital cost of generation, transmission and development costs, there is minimal information available to inform any forecasts or future contract prices.

California's major IOUs generally use Time-of-Delivery (TOD) periods and factors in power purchase agreements during solicitations of renewable energy. These are multipliers to the base or unadjusted price of delivered energy during specific timeframes of the day, such as periods of peak demand, which reward the specific renewable generation providing energy when it is required or valued the most (see Table 9). Renewable resources such as solar PV tend to benefit the most from this pricing construct due to the natural correlation between solar resource availability and periods of high demand.

[14] The Market opportunity may also include aspects of transmission development and energy transactions that improve the reliability, balancing, resource diversity, and/or other system benefits. However, these are beyond the scope of this report.

Table 9: California IOU Time-of-Day factors

	Month	Period	Definition	TOD Factor
Pacific Gas and Electric	June-September	Super-Peak	Hours Ending(HE) 13-20 - Weekdays(except NERC holidays)	2.38
		Shoulder	HE 7-12, 21 & 22 - Weekdays(except NERC holidays)	1.12
			HE 07-22 - Saturday & Sunday (and NERC holidays)	0.59
		Night	HE 01-06, 23 &24 - All Days	0.59
	October-February	Super-Peak	Period definitions as above.	1.1
		Shoulder		0.94
		Night		0.66
	March-May	Super-Peak		1.22
		Shoulder		0.9
		Night		0.61
Southern California Edison	June - September	On-Peak	Noon-6pm – WDxH	3.13
		Mid-Peak	8am-Noon, 6-11pm – WDxH	1.35
		Off-Peak	All other times	0.75
	October - May		8am-9pm -WDxH	1
			6-8am, 9pm-Midnight - WDxH; 6am-Midnight WE/H	0.83
			Midnight-6am	0.61
	WDxH is defined as weekdays except holidays; WE/H is defined as weekends and holidays			
San Diego Gas & Electric	July-October	On-Peak	11am-7pm - Weekdays	2.5
		Semi-Peak	6am-11am, 7pm-10pm - Weekdays	1.34
		Off-Peak	All other hours	0.8
	November-June	On-Peak	1pm-9pm - Weekdays	1.09
		Semi-Peak	6am-1pm, 9pm-10pm - Weekdays	0.95
		Off-Peak	All other hours	0.68
	All hours during NERC holidays are considered Off-Peak			

Source: CPUC

Other resources such as wind or geothermal do not tend to benefit from the TOD pricing construct. Wind power output is typically highest during periods of low demand and lower prices (at night) and geothermal generation has a significantly higher capacity factor than the other two resource types and can be operated as a base to intermediate load plant.

The CPUC's 4th Quarter 2011 RPS report to the legislature, in compliance with SB 836, provides weighted average time-of-delivery adjusted cost of all contracts approved from 2003-2011 for the three large IOUs. (Table 10)

Table 10: IOU average contract prices

California IOU Procurement	*Total Weighted Average TOD-Adjusted Contract Cost (2003-2011)*
Southern California Edison (SCE)	$118/MWh
Pacific Gas & Electric (PGE)	$119/MWh
San Diego Gas & Electric (SDG&E)	$113/MWh

Source: CPUC

The report also provides a graphical representation of the historical weighted average TOD-adjusted cost of delivered renewable energy by year for the years 2003-2011 in dollars per kilowatt hours ($/kWh).

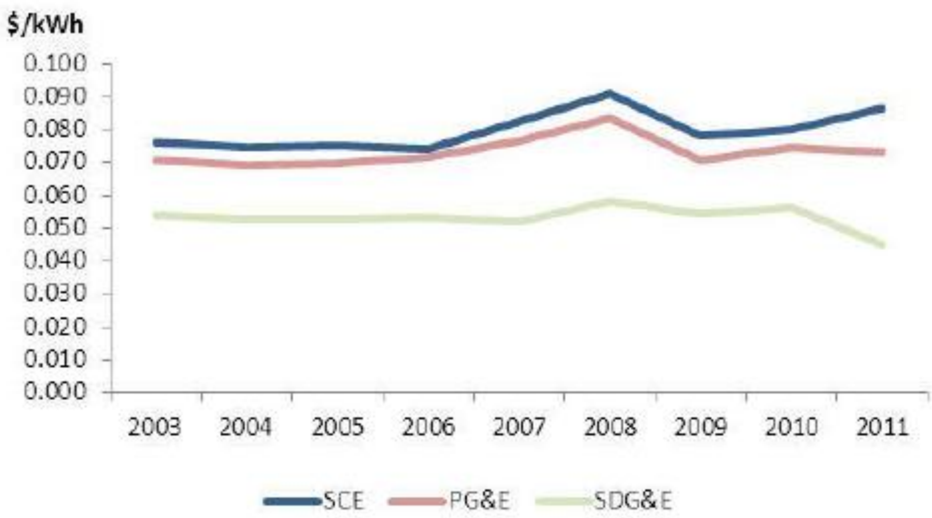


Figure 7: Weighted average TOD-adjusted cost of delivered renewable energy by year (2003-2011)
Source: CPUC

The CPUC report provides two plausible reasons for the increase in costs for 2008. First, during this year most of the procurement was from Qualifying Facilities (QF's) whose energy payments are correlated the cost of natural gas; second, 2008 was a low hydro year in which low-cost hydro generation did not factor into the average procurement costs.

The market opportunity for the development and export of Nevada renewables to California depends largely on how the cost for developing and exporting Nevada's renewable resources, discussed in the previous section, stack up against the willingness to pay by California LSEs. Taken at face value, the resources that California LSE's report towards their future compliance, and the prices they indicate they are willing to pay, leave little room for Nevada to serve as a major supplier to that market. However, there are a number of reasons to suspect that an opportunity remains. These include:

- The likelihood that a large fraction of "expected" in-state renewables will not materialize on time, or at all, consistent with historical experience.

- The likelihood that at least some California entities will not be able to procure all of their renewable requirements at the prices they now say they are willing to pay, and that this price will increase substantially as compliance deadlines near.
- The possibility that if the import of renewable energy from Nevada is clearly supported by Nevada and will be reliably deliverable to California, that this competition will drive certain California in-state projects from the market.
- The general expectation that California's 33% RPS is only the beginning, and that the requirement will grow in the future; this is also more likely if there is a clear option of obtaining low-cost, reliably deliverable renewable energy from Nevada.

On the other hand, the costs derived in this study should be considered the *lowest* expected cost of delivering renewable energy to California. This is consistent with the highest level of cooperation between the two states in delivering the energy—represented by the removal of all cost hurdles for delivering power across control area lines. In other words, we assume that there are no additional integration or transmission costs other than those that would be incurred were the power produced by an in-state entity in California. Any additional costs—such as the current hurdle rates (Table 8b), additional integration and balancing costs, or commitment and scheduling obstacles—would lead to a competitive disadvantage for any resource outside the state of California or a California balancing area, including Nevada resources. This means that in terms of benefits for Nevada's electricity ratepayers, there is a trade-off between benefitting from California LSEs' use of Nevada's transmission resources and the competitiveness of Nevada's renewables in the California market.

There are a number of drivers or policy considerations that are central to the consideration of the business case for export of Nevada renewables. Many of these considerations are discussed in the final section of this report.

6. Economic and Fiscal Impacts

A. Background

Economic impacts are a measure of an investment or policy's stimulus (or footprint) on a local economy. They are composed of:

1. Direct economic effects (e.g. spending on goods and services at a construction site or the purchase of a piece of new equipment), and
2. Multiplier effects, which include:
    a. Spending on supporting goods and services by the firms providing that direct activity ("indirect" impacts), and
    b. Re-spending of wages earned ("induced" impacts).

In addition, any energy resource development in Nevada would be subject to various taxes and fees, discussed later in this section. However, while we explore the revenues that would accrue to the public benefit associated with these taxes, we do not evaluate their macroeconomic impacts in this study.

The six scenarios evaluated in this study would generate economic impacts in Nevada through installation, operation, and maintenance of transmission, solar photovoltaic panels, geothermal plants, and wind turbines. The amount of spending and location of each investment, the supporting labor and materials required, and the extent to which each is provided determine the investment's economic impact on the state. In conjunction with the studies provided by NSOE, Synapse has used our estimates of capital and operations cost by resources (discussed previously).

It is also possible to study the industry impacts to developing a sustainable industry in the state. In the case of clean energy, manufacturing of renewable energy components, project development companies or drilling specialists are examples of industries that could find a critical mass if the renewable energy industry is robust, supported by the state and seen as long term. These impacts are not in the scope of this study but may be important considerations for the development of policy recommendations.

B. Direct spending in Nevada

Economic impacts are in part based on where the initial investment takes place. All of the renewable investment involves in-state generation of solar, wind and geothermal. Therefore, all of the costs associated with these investments count as direct spending in Nevada. However, as shown in Table 11, the transmission projects for Scenarios 4 through 6 cross state lines and thus a portion of the construction and operation of these projects will not accrue to Nevada. Scenarios 1 through 3 are entirely located in Nevada so all of the initial investment can be attributed to the state.

Table 11: Transmission investments – inside and outside Nevada

Scenario	*% of Transmission in NV*
1	100%
2	100%
3	100%
4	83%
5	46%
6	12%

Source: Tri-Sage et al., 2012

Table 12 shows the total construction and operations and maintenance costs for the transmission projects. These costs only account for the spending in Nevada and serve as the basis for the direct spending that in turn feeds their economic impacts.

Table 12: Total transmission costs in Nevada ($2012, millions)

Scenario	*Construction*	*Annual O&M*
1	$70	$2
2	$555	$14
3	$46	$1
4	$163	$4
5	$189	$5
6	$72	$2

Source: Tri-Sage et al. 2012, West Connect 2011, NV Energy 2010 IRP, Brightsource Energy 2011, Lantz and Tegen 2011

The renewable generation investments are all located in Nevada and, therefore, the direct spending can all be attributed to the state. Table 13 shows the construction, operations and maintenance costs for renewable generation facilitated by each scenario's transmission projects.

Table 13: Total renewable generation costs in Nevada ($2012, millions)

Scenario	*Construction*	*Annual O&M*
1	$4,789	$83
2	$5,789	$77
3	$1,808	$28
4	$2,361	$69
5	$2,614	$63
6	$3,491	$69

Source: NEITF, Synapse estimates based on review of solar studies, Wiser (wind) and AEO (geothermal). Include $100/kW interconnection costs

Figures 8 and 9 show the breakdown of initial costs for construction and operations and maintenance by type of generation for each scenario. Geothermal has higher up-front costs per MW than wind and solar, since it requires exploration and drilling, followed by the construction of a steam plant. Geothermal also has higher operations and maintenance costs compared to the other renewable resources (see Table 5).

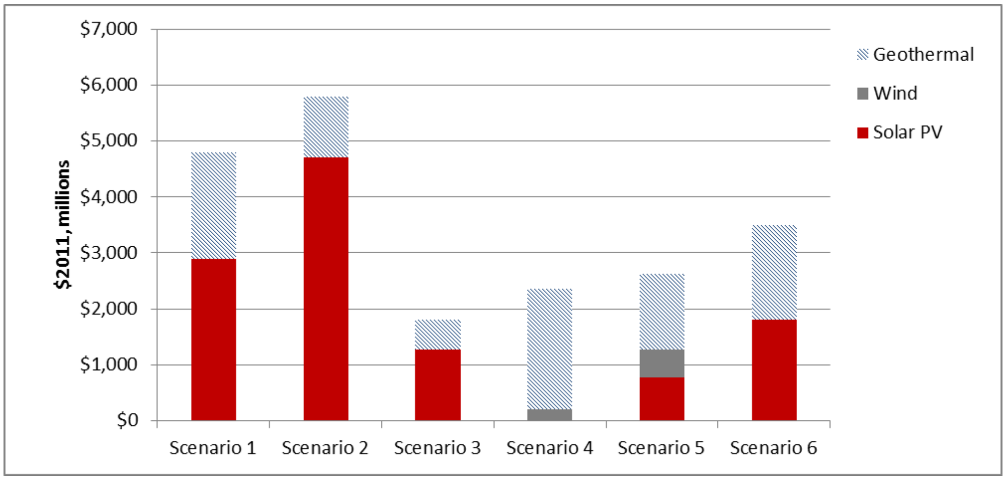


Figure 8: Renewable generation construction costs by scenario and resource ($2012, millions)

Source: NEITF, Synapse estimates based on review of solar studies, Wiser 2012 (wind) and AEO (geothermal). Values shown assume a $100/kW interconnection cost

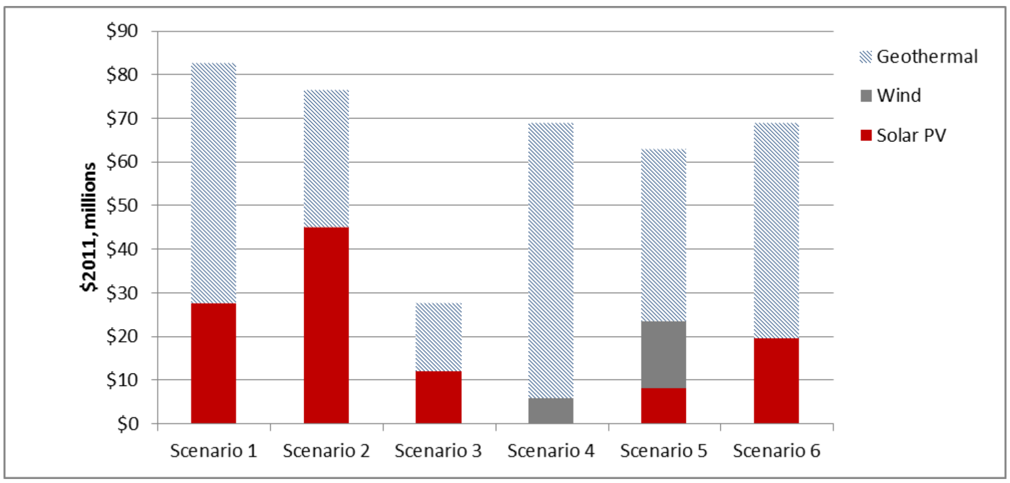


Figure 9: Renewable generation operations and maintenance costs by scenario and resource ($2012, millions)

Source: NEITF, Synapse estimates based on review of solar studies, Wiser (wind) and AEO (geothermal). Values assume a $100/kW interconnection cost

C. Modeling Assumptions

After developing estimates of the direct spending (discussed above), Synapse developed inputs for the IMPLAN model to estimate the total economic impacts which include direct (spending on-site), indirect (spending on local supplies) and induced (re-spending of workers' income related to the two previous categories). These impacts are often referred to as "multiplier" or "spin-off" effects since the spending of a dollar leads to more dollars of activity.

The IMPLAN model can estimate multipliers for more than 400 industries in terms of jobs, income and GSP (i.e. value-added). It has been calibrated specifically for the state of Nevada, capturing industry and household spending patterns. The most important aspects of developing inputs for this type of modeling are determining: 1) the distribution of spending between labor and materials for a given activity and 2) the portion of in-state spending on each supporting industry.

Spending on supplies and services to support construction, operations and maintenance is modeled for the industries that are called upon (e.g. wind farms purchase turbines from those manufacturers). Spending on direct labor accrues to the related contractors and workers that operate and maintain the projects while they are up and running. These workers then re-spend these wages, further stimulating the local economy. Synapse estimated the split of labor versus materials spending for both construction and operations and maintenance for each renewable technology based on our previous research for solar, wind and geothermal, as well as research on transmission (WIRES; Lantz and Tegen) to determine the breakdown of materials and services required for each activity (Table 14).

Table 14: Portion of project spending on labor and materials by activity

Activity	*Source*	*% Labor*	*% Materials and Supporting Services*
Construction			
Solar PV	a	13%	87%
Wind	a	15%	85%
Geothermal	b	27%	73%
Scenario 1 Transmission	c	49%	51%
Scenario 2 Transmission	c	49%	51%
Scenario 3 Transmission	c	57%	43%
Scenario 4 Transmission	d	64%	36%
Scenario 5 Transmission	d	56%	44%
Scenario 6 Transmission	d	59%	41%
O&M			
Solar PV	a	55%	45%
Wind	a	22%	78%
Geothermal	a	44%	56%
All Transmission	c	10%	91%

Sources: (a) Synapse 2011, (b) Wahlstrom and Associates 2011, (c) Lantz and Tegen 2011, (d) Tri-Sage et al.2012

Spending on labor or materials from outside the state is not captured in the economic impact results. Therefore, the extent to which the activities above are provided or located in Nevada determines the magnitude of the economic impacts and must be accounted for at the industry level (e.g. the portion of wind turbines that are manufactured in Nevada). Synapse assumed that 100% of operations and maintenance jobs were in Nevada since full-time workers would most likely live in-state. Per the RFP, Synapse assumed that 80% of the labor for construction and 50% of the soft costs (mainly architechture and engineering) were provided by Nevadans. Where the percentage of local materials by industry was not available, Synapse used IMPLAN's estimates for the portion of each industry's demand that is met by Nevada suppliers.[15] Table 15 summarizes the estimated percentage of labor and materials that would come from Nevada.[16]

Table 15: Portion of labor and materials provided in Nevada by activity

Activity	***% of Labor from NV***	***% of Materials and Supporting Services from NV***
Construction		
Solar PV	80%	19%
Wind	80%	13%
Geothermal	80%	23%
Transmission - Scenario 1	80%	18%
Transmission - Scenario 2	80%	18%
Transmission - Scenario 3	80%	5%
Transmission - Scenario 4	80%	19%
Transmission - Scenario 5	80%	18%
Transmission - Scenario 6	80%	18%
O&M		
Solar PV	100%	63%
Wind	100%	16%
Geothermal	100%	63%
Transmission	100%	80%

Source: NEITF, IMPLAN data

D. Economic Impact Results

Synapse developed economic impact multipliers for each renewable resource type for Nevada, as well as for three different transmission types (500kv, 230kv, and transformer only) to estimate the economic impacts of all six scenarios. These impacts are based on the short term and long term spending on the associated transmission and renewable generation activities. Construction spending would impact the state's economy only during the short term (i.e. construction period) while the operations and maintenance spending would provide long term impacts during the project's useful life.

The economic impacts calculated here do not include the effects of any changes in ratepayers' electric bills. Any such ratepayer impacts would depend on the type of funding mechanism, as discussed in Section 3, and on the ability of Nevada utilities to extract rents for the use of their transmission infrastructure for energy exports. However, as discussed above, any such rents would run counter to the goal of providing low-cost renewable energy to California. If Nevada ratepayers were to bear the cost of new transmission without receiving such rents, the ratepayer impacts could be substantial.

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[15] This is often referred to as the Regional Purchase Coefficient (RPC).

[16] Synapse has not run impacts assuming that more manufacturing of these materials takes place in Nevada pending input from the NEITF.

However, the economic impacts of construction and operation of these projects in Nevada will be similar regardless of whether the funding comes from a private developer or utility, since the same labor and infrastructure would be required. It is these impacts that are the focus of our economic analysis.

Table 16 presents the calculated construction impacts in terms of job-years[17] for the construction period. Our projected construction-related jobs range from 10,000 for Scenario 3 to nearly 35,000 for Scenario 2. These job-year impacts would be spread out over the construction periods of the associated projects.

- Scenario 2 has the largest impact compared to other scenarios in part because it involves the most new MW of renewable generation (1,500 MW) and the second largest capital investment in transmission ($555 million), and the transmission is entirely located within Nevada.
- Scenario 3 involves the lowest amount of renewable generation (450 MW) and the lowest capital investment in transmission ($46 million) which only includes the replacement of a transformer.

Within each scenario, the impact from renewable generation is higher than for transmission because a much higher investment is required for renewable projects (between $1.8 billion and $5.8 billion, see Table 13). This is the "leveraging" benefit of state policies that encourage or fund transmission for renewables, assuming they succeed in enticing the investment in renewable energy that creates many more jobs.

Table 17 presents the annual long-term jobs associated with operating and maintaining the transmission and generation projects once they are in-place.

- Scenario 2 again has the highest impacts with nearly 1,300 jobs.
- Scenario 3 has the lowest impacts with 400 jobs.

Between scenarios, the renewable impacts dominate the transmission impacts because the former require more continual maintenance. These impacts will recur annually as long as each project is operational.

[17] A job-year is the equivalent of full-time work for one person for one year.

Table 16: Construction job-year impacts by scenario

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6
Direct						
Renewable Generation	10,800	10,900	3,800	7,600	6,600	8,400
Transmission	400	3,400	300	1,300	1,300	500
Sub-Total	*11,200*	*14,300*	*4,100*	*8,900*	*7,900*	*8,900*
Indirect and Induced						
Renewable Generation	15,700	18,500	5,800	8,000	8,200	11,600
Transmission	300	2,000	200	700	800	300
Sub-Total	*16,000*	*20,500*	*6,000*	*8,700*	*9,000*	*11,900*
All Impacts						
Renewable Generation	26,500	29,400	9,600	15,600	14,800	20,000
Transmission	700	5,400	500	2,000	2,100	800
Total	**27,200**	**34,800**	**10,100**	**17,600**	**16,900**	**20,800**

Source: Synapse estimates using IMPLAN model and data.

Table 17: Annual O&M job impacts by scenario

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6
Direct						
Renewable Generation	540	570	190	340	320	430
Transmission	2	18	1	5	6	2
Sub-Total	*542*	*588*	*191*	*345*	*326*	*432*
Indirect and Induced						
Renewable Generation	590	550	200	470	390	490
Transmission	18	152	9	45	54	18
Sub-Total	*608*	*702*	*209*	*515*	*444*	*508*
All Impacts						
Renewable Generation	1,130	1,120	390	810	710	920
Transmission	20	170	10	50	60	20
Total:	**1,150**	**1,290**	**400**	**860**	**770**	**940**

Source: Synapse estimates using IMPLAN model and data. Direct jobs calculated based on income per worker from NREL JEDI model (wind and solar), Lantz and Tegen (transmission), and jobs per megawatt for geothermal from Ormat 2011.

Figures 10 and 11 show the breakdown of short term job-years and long-term jobs, respectively, by each type of renewable resource and scenario. The relative job-creation impact is similar to the relative costs presented in Figures 8 and 9. However, the job impacts vary among resource types on a per MW basis due to differences in the activities necessary to build and operate each type of generation. For short term jobs, geothermal creates a total economic impact of 37 job-years per MW, solar PV creates 17 job-years per MW, and wind creates 8 job-years per MW. For long-term jobs, geothermal creates a total economic impact of two jobs per megawatt, solar PV creates 0.6 jobs per megawatt and wind creates 0.4 jobs per megawatt.

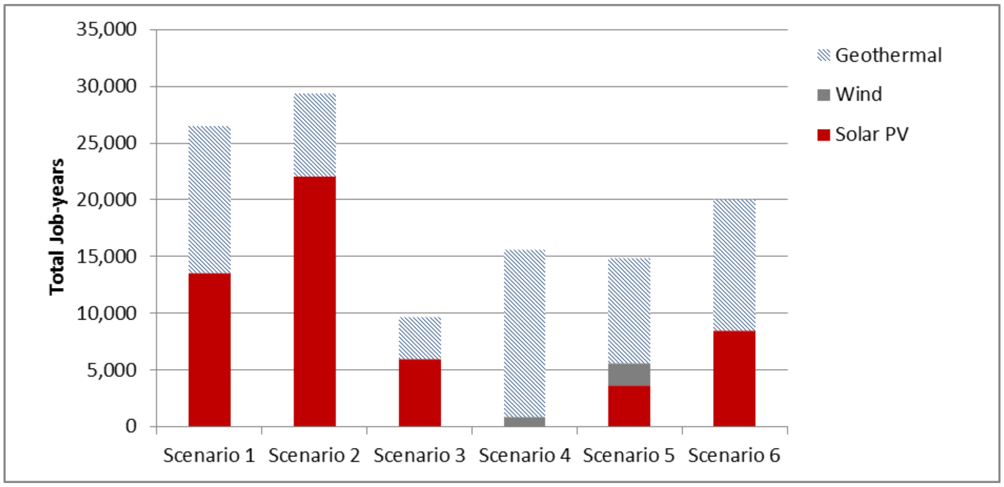

Figure 10: Renewable generation construction job-year impacts by scenario and resource
Source: Synapse estimates using IMPLAN model and data.

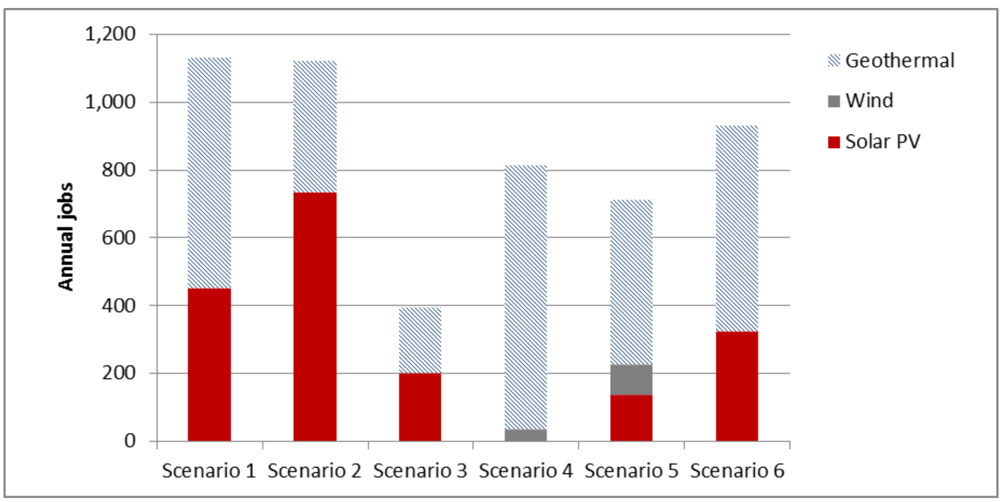

Figure 11: Renewable generation operations and maintenance job impacts by scenario and resource
Source: Synapse estimates using IMPLAN model and data. Direct jobs calculated based on income per worker from NREL JEDI model (wind and solar), Lantz and Tegen (transmission), and jobs per megawatt for geothermal from Ormat 2011.

The induced economic impacts shown previously are caused by workers re-spending wages in the state's economy. This spending is mostly directed towards local retail and household services. Figure 12 shows a distribution of the additional job impacts by industry from household spending.

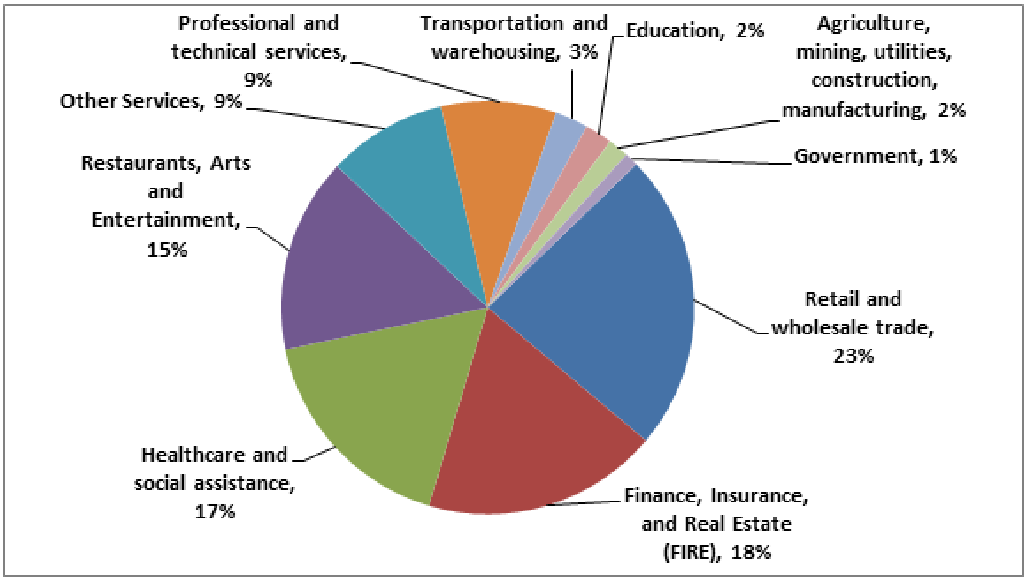

Figure 12: Distribution of job impacts by industry induced by household re-spending
Source: Synapse estimates using IMPLAN model and data.

Tables 18 and 19 show the associated wages paid to the workers discussed above.

Table 18: Construction wage impacts by scenario ($2011, millions)

	Scenario 1	*Scenario 2*	*Scenario 3*	*Scenario 4*	*Scenario 5*	*Scenario 6*
Direct						
Renewable Generation	$700	$710	$240	$490	$430	$550
Transmission	$30	$220	$20	$80	$80	$30
Sub-Total	*$730*	*$930*	*$260*	*$570*	*$510*	*$580*
Indirect and Induced						
Renewable Generation	$730	$870	$280	$360	$370	$530
Transmission	$10	$80	$10	$30	$40	$20
Sub-Total	*$740*	*$950*	*$290*	*$390*	*$410*	*$550*
All Impacts						
Renewable Generation	$1,430	$1,580	$520	$850	$800	$1,080
Transmission	$40	$300	$30	$110	$120	$50
Total	**$1,470**	**$1,880**	**$550**	**$960**	**$920**	**$1,130**

Source: Synapse estimates using IMPLAN model and data.

Table 19: Annual O&M wage impacts by scenario ($2011, millions)

	Scenario 1	*Scenario 2*	*Scenario 3*	*Scenario 4*	*Scenario 5*	*Scenario 6*
Direct						
Renewable Generation	$39	$39	$14	$29	$25	$33
Transmission	$0.2	$1.3	$0.1	$0.4	$0.5	$0.2
Sub-Total	*$39*	*$40*	*$14*	*$29*	*$25*	*$33*
Indirect and Induced						
Renewable Generation	$27	$24	$9	$22	$18	$23
Transmission	$1	$9	$1	$3	$3	$1
Sub-Total	*$28*	*$33*	*$10*	*$25*	*$21*	*$24*
All Impacts						
Renewable Generation	$66	$63	$23	$51	$43	$55
Transmission	$1	$10	$1	$3	$3	$1
Total	**$67**	**$73**	**$24**	**$54**	**$46**	**$56**

Source: Synapse estimates using IMPLAN model and data.

Tables 20 and 21 show the economic impacts in terms of Gross State Product (GSP) in Nevada which measures the value-added of the state's industries.[18]

Table 20: Construction GSP impacts by scenario ($2011, millions)

	Scenario 1	*Scenario 2*	*Scenario 3*	*Scenario 4*	*Scenario 5*	*Scenario 6*
Direct						
Renewable Generation	$860	$870	$300	$600	$530	$670
Transmission	$0	$300	$0	$100	$100	$0
Sub-Total	*$860*	*$1,170*	*$300*	*$700*	*$630*	*$670*
Indirect and Induced						
Renewable Generation	$1,200	$1,390	$440	$640	$630	$890
Transmission	$100	$100	$0	$100	$100	$100
Sub-Total	*$1,300*	*$1,490*	*$440*	*$740*	*$730*	*$990*
All Impacts						
Renewable Generation	$2,060	$2,260	$740	$1,240	$1,160	$1,560
Transmission	$100	$400	$0	$200	$200	$100
Total	**$2,160**	**$2,660**	**$740**	**$1,440**	**$1,360**	**$1,660**

Source: Synapse estimates using IMPLAN model and data.

[18] The value-added is the difference in an industry's revenue from its intermediate inputs or its "mark-up." Therefore, it is mainly made up of wages and profits.

Table 21: Annual O&M GSP impacts by scenario ($2011, millions)

	Scenario 1	*Scenario 2*	*Scenario 3*	*Scenario 4*	*Scenario 5*	*Scenario 6*
Direct						
Renewable Generation	$70	$70	$20	$60	$50	$60
Transmission	$2	$12	$1	$4	$4	$2
Sub-Total	*$72*	*$82*	*$21*	*$64*	*$54*	*$62*
Indirect and Induced						
Renewable Generation	$50	$40	$20	$40	$40	$40
Transmission	$1	$13	$1	$3	$4	$1
Sub-Total	*$51*	*$53*	*$21*	*$43*	*$44*	*$41*
All Impacts						
Renewable Generation	$120	$110	$40	$100	$90	$100
Transmission	$3	$25	$2	$7	$8	$3
Total	**$123**	**$135**	**$42**	**$107**	**$98**	**$103**

Source: Synapse estimates using IMPLAN model and data.

E. Fiscal Impacts

A final benefit that must be considered is the direct revenues to the state and local jurisdictions in the form of taxes and fees. The value of new construction for transmission and renewable energy generation would generate additional property taxes for the state and local governments. The materials purchased for construction, operations, and maintenance would generate tax revenue through sales and use taxes—most of the impact on these taxes would come during the construction period. Sales and use taxes are estimated here based on Tri-Sage's assumption of a combined state and local rate of 7% applied to materials and services (not direct labor).

Table 22: State tax impacts by scenario ($2011, millions)

	Scenario 1	*Scenario 2*	*Scenario 3*	*Scenario 4*	*Scenario 5*	*Scenario 6*
Sales and Use Tax	$182	$215	$65	$122	$110	$143

Source: Synapse estimates, Tri-sage, NV Department of Taxation

Property taxes are assessed by the counties in which the project is located, or can be centrally assessed if the project crosses multiple local jurisdictions in the state. Property tax impacts are presented in Table 23 for the entire life of the project. These estimates are based on recent fiscal impact analyses of renewable projects by Nevada Department of Taxation, accounting for the state's 55% property tax abatement (assuming this policy persists and that no new property tax incentives are instituted in Nevada).[19]

[19] http://www.energy.state.nv.us/energy-efficiency/reap.html

Table 23: Property tax impacts by scenario ($2011, millions)

	Scenario 1	*Scenario 2*	*Scenario 3*	*Scenario 4*	*Scenario 5*	*Scenario 6*
Property Taxes	$360	$470	$140	$190	$210	$270

Source: Synapse estimates, NV Department of Taxation

The "net proceeds of minerals tax" is required for geothermal generation and other mining operations in Nevada based on the difference between gross proceeds and costs of excavation. The estimated minerals tax impacts for geothermal operators is shown in Table 24 for the entire life of the plants. These figures were estimated based on data from the Nevada Department of Taxation's 2010-2011 Net Proceeds of Mineral Bulletin. Synapse calculated the average net proceeds of minerals tax per MW of existing geothermal generation and then applied this to the projected MW of new geothermal generation in each scenario.

Table 24: Mineral tax impacts by scenario ($2011, millions)

	Scenario 1	*Scenario 2*	*Scenario 3*	*Scenario 4*	*Scenario 5*	*Scenario 6*
Mineral Taxes	$11	$6	$3	$12	$8	$10

Source: Synapse estimates, NV Department of Taxation

F. Comparison of Impacts to Initial Investment

The economic and fiscal impact results discussed above apply to a range of upfront investments required--between $1.8 billion to $6.3 billion for transmission and renewable generation by scenario. In order to provide a meaningful comparison between scenarios, the impacts can be presented on a "per dollar of investment" basis. We present this analysis based on both *total* investment (i.e., transmission and renewable energy investments) and for investment in transmission alone, assuming that this latter is the public policy focus.

Figure 13 shows the projected construction and O&M job-years[20] per million dollars of upfront costs for renewable generation and transmission projects for each scenario. Scenario 4 has the largest impact among scenarios with nearly 7 job-years per million dollars for both construction and O&M. Scenario 4 includes mostly geothermal generation which requires more hands-on activity, and therefore more O&M spending, than solar and wind. In general, those scenarios with a higher mix of geothermal also generate more O&M job-years since geothermal requires more hands-on activity than solar or wind (Figure 15).

[20] O&M jobs are translated into job-years by simply multiplying the annual O&M jobs by the years of operation (20 years). With this measure, we have a comparable basis to estimate the total job-year impacts in all stages.

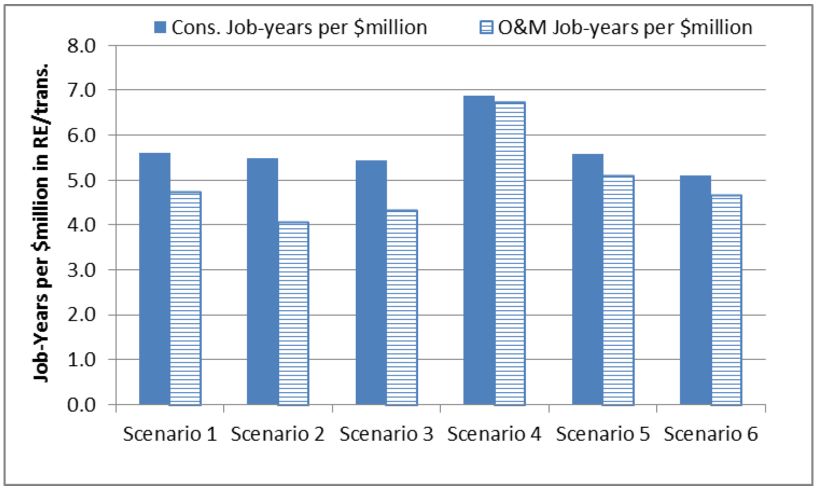

Figure 13: Total job-years per million dollars of spending on renewable and transmission construction
Source: Synapse estimates using IMPLAN model and data.

Figure 14 shows the projected total job-year impacts per dollar of transmission investment. Scenarios 1 and 3 involve low cost transmission projects yet are expected to leverage 1150 and 450 MW of generation, respectively. Therefore, these scenarios look attractive since they induce heavy economic activity through small initial investments in transmission. The other scenarios involve large-scale transmission infrastructure yet leverage a similar range of renewable generation compared to Scenarios 1 and 3. Among the long term scenarios, Scenario 4 is attractive using the measure of job-years per dollar spent on transmission, largely due to its reliance on labor-intensive geothermal technology.

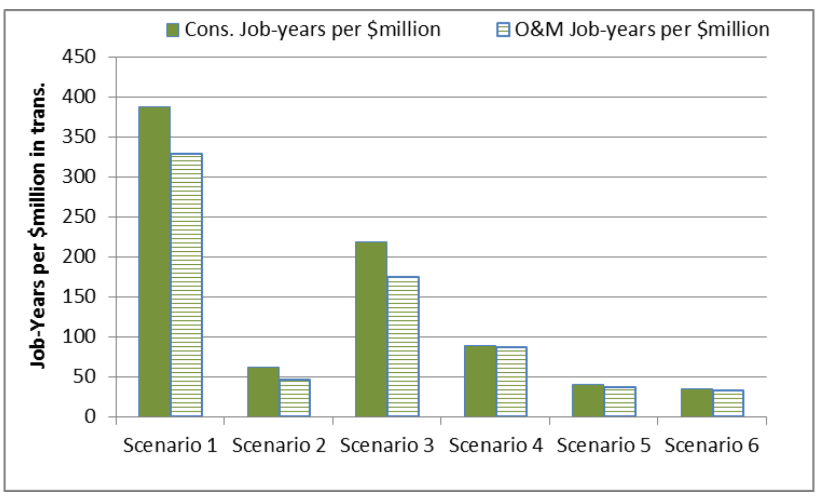

Figure 14: Total job-years per million dollars of spending on transmission construction only
Source: Synapse estimates using IMPLAN model and data.

Figure 15 shows the job-year impacts per dollar of spending on renewable energy for each renewable technology. As mentioned previously, geothermal provides more employment activity for operations as well as construction—approximately seven job-years in both categories per million dollars spent on construction. Wind and solar generate between four and five job-years per million dollars of installation spending, respectively. The differences in activity level required for each explain the differences in impacts by scenario seen in Figures 13 and 14.

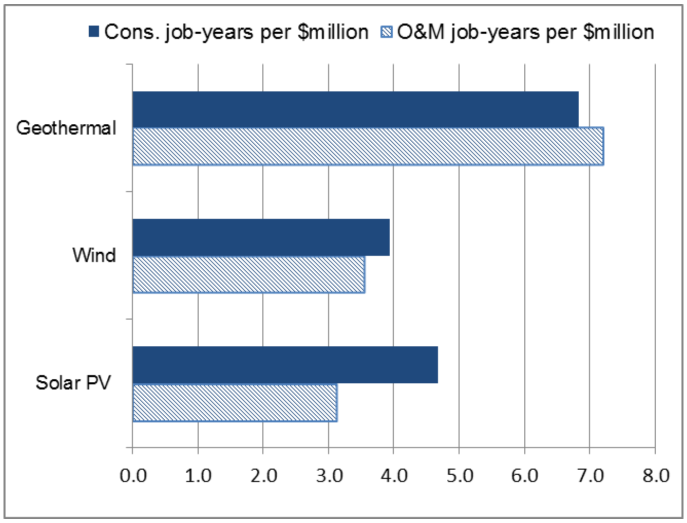

Figure 15: Total job-years per million dollars of spending on renewable generation
Source: Synapse estimates using IMPLAN model and data.

7. Conclusions and Policy Considerations

The State of Nevada has abundant and diverse renewable energy resources that hold the potential for the development of large scale renewable energy generation projects. As of May 2012, Nevada hosts approximately 800 MW of installed renewable energy capacity from geothermal, solar, wind, hydroelectric, landfill and biomass projects, providing about 4 million MWh of energy per year.

Nevada has a RPS goal of 25% energy from renewable sources by 2025. The state's regulated utility, NV Energy, is currently compliant with the interim RPS goals and is expected to remain compliant through 2020, provided all approved energy contracts materialize.

The Nevada State Office of Energy has estimated that the state holds the potential for the development of over 4000 MW of additional renewable energy installed capacity, or for producing over 16 million MWh of energy from renewable sources per year—equivalent to almost 75% of Nevada's 2011 retail sales.

Nevada's renewable energy resources are spread across the state, and are often located in remote regions that would require significant investment for transmission access. In addition to public policy, economic development or environmental goals that drive the overall requirement for renewable energy, there are also considerations such as rate impacts, location of demand, resource quality and availability, ease and timing of permitting, available subsidies, and financing models that determine the viability of any resource for meeting the needs of any given LSE. Many of these considerations can be characterized as follows:

- **Demand Drivers**
  - Potential national energy policy and goals
  - Nevada's RPS and its future beyond current goals
  - California's RPS and its future beyond current goals
  - Dynamics, reliability, and integration of renewable energy in the region
  - Replacement generation for coal plants and OTC retirements in California and elsewhere
- **Regional Electric System Coordination**
  - Electric system configuration and operation of each Balancing Authority (BA)
  - Motivation, benefits and requirements of forming a regional BA or tighter regional coordination of BAs
  - Mechanics of enhanced and coordinated regional dispatch, including an Energy Imbalance Market
- **Project Sponsorship and Financing**

  (Note that the NEITF has a subcommittee devoted to the transmission financing and planning issues and these types of options are being further reviewed at a high-level to gauge interest, in conjunction with this memorandum, in making recommendations to Governor Sandoval.)

- Feasible economic structures to support development of transmission and renewable energy projects
- Policies affecting cost allocation, including subsidies, for regional and/or export-oriented transmission projects
- Formation of public-private partnerships and regional infrastructure authorities
- Trade-off between transmission charges (benefiting ratepayers) and the desire to keep the cost of exporting energy low

- **Permitting and Environmental Impact**
  - Development of policies conducive to the development of large scale generation and transmission projects.
  - Appropriate timing of permitting to capture market opportunity.

- **Benefits and Risks**
  - Economic benefits to Nevada from investments in infrastructure
  - Economic benefits to contracting entities from procurement of Nevada renewable energy
  - Direct tax and fee revenues to the state and communities
  - Risk of failure to attract investment in renewables, despite investments in transmission infrastructure
  - Risk that incremental costs will not be offset by incremental transmission fees

Our analysis quantified the substantial economic, employment, and fiscal benefits that both transmission and renewable energy investments can provide for Nevada. We find that, among all of the scenarios, Scenarios 1 leverages the most economic activity per dollar of transmission investment in the construction (short term) and O&M (long term) stages, followed by Scenario 3.

Among the long term scenarios, Scenario 4 leverages the most economic activity per dollar of transmission investment, due mostly to the reliance on geothermal generation which creates more jobs per dollar in Nevada than solar or wind; this dynamic could shift if Nevada gains traction in manufacturing to support the solar and wind generation industries.

State policies that support transmission investments could be an effective way to stimulate job creation because every dollar spent on transmission can enable many more dollars of private investment in generation, but such a strategy does entail substantial risk—and an important feature of state policy will be the management of that risk; and, ultimately, how it is allocated among taxpayers, ratepayers, and private investors.

The economic impact and fiscal impacts by scenario investigated here are only one consideration in evaluating renewable energy development scenarios. To the extent that the success of such a policy hinges on exports to the regional market, the demand for, deliverability of, and price competitiveness of Nevada's renewable resources will be key factors.

The impacts identified in this report are based on the assumption that if any of the projects are built, private investment in the indicated amount of renewable energy and long-term purchase contracts for that energy will follow. However, this investment will occur only if required market conditions exist for the sale of that energy, and if all other necessary technical, political, siting and land use, and electric system factors were in place. To reduce this uncertainty, greater cooperation and coordination within the state and between Nevada and California at the policy-making level may be the best way to ensure that a viable market opportunity exists for Nevada's renewable resources, prior to putting ratepayer or taxpayer funds at risk.

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