Assessing Renewable Energy Export Opportunities and the Potential Benefits of Nevada/California Electricity Exchanges

Prepared by:

Aspen Environmental Group
5020 Chesebro Road, Suite 200
Agoura Hills, CA 91301

December 19, 2012

Authors:
John Candelaria and Carl Linvill

Executive Summary

Nevada and California have a common interest in taking advantage of energy exchanges that benefit the respective states. Each state has resources to offer for energy exchanges. Nevada has outstanding high quality renewable energy resources, a number of available and potential options for transmission capacity for export and excess gas generation capacity. California also has outstanding high quality renewable resources, available transmission capacity for export and faces the challenge of retiring several thousand megawatts of base load generation. While California and Nevada have a history of exchanging electricity for mutual benefit, joint system operation and planning opportunities appear to exist that could increase reliability, decrease ratepayer costs and provide economic benefits to each state.

The Nevada Office of Energy recently commissioned a Synapse Energy Economics study to begin the evaluation of mutual benefits. The Synapse Report evaluates six export options, provides some information on the relative cost of Nevada renewables and indicates that substantial employment, wage and revenue benefits could accrue to Nevada from increasing exports to California. This report complements the Synapse Report by providing evidence that:

- Nevada Renewables are competitive in California markets when existing transmission capacity can be utilized and can be competitive for some transmission expansion options;
- Existing transmission export capacity exists and additional transmission export capacity is likely to become available within the next five years;
- Nevada electricity consumers benefit when existing generation capacity and existing available transmission capacity is more fully utilized;
- California consumers can benefit from energy exchanges with Nevada that draw upon Nevada's flexible conventional and renewable resource fleet;
- Nevada consumers can benefit from energy exchanges with California that draw upon California's low cost wind energy fleet;
- The job, wage, revenue and ratepayer benefits cited in the Synapse Report underestimate the benefits of exchanges that utilize existing generation and transmission capacity because they do not account for the economic benefits of lower energy costs;
- The job, wage, revenue and ratepayer benefits cited in the Synapse Report overestimate the benefits of exchanges that rely upon transmission that increases transmission rates for Nevada ratepayers because the study does not account for the impact of rate increases;
- The job, wage, revenue and ratepayer benefits cited in the Synapse Report appropriately estimate the benefits of exchanges that rely on transmission that does not affect NVE's transmission rates, such as transmission built in Nevada that does not pass through NVE's congested grid.
- The Synapse report, which focused primarily on Nevada, provides a good starting point for understanding mutual benefits but further study is needed to evaluate the magnitude of benefits to each state.

Recommendations

- Immediately remove barriers which prevent increased utilization of NVE's excess generation and transmission capacity;

- Enact legislation that provides a business model for NVE where NVE ratepayers and shareholders can share in the benefits of increased utilization of NVE's existing transmission and generation capacity;
- Continue to encourage NVE to participate more fully in regional curtailment, imbalance and ancillary service markets;
- Enact legislation that provides a business model for NVE where NVE ratepayers and shareholders can share in the benefits created by mutually beneficial operational and planning improvements between CA and NV;
- Continue to encourage NSOE, NVE, the CAISO, California Utilities and California State representatives to collaborate on studies that demonstrate the magnitude of the benefits of increased coordination, cooperation and planning between California and Nevada as they pursue their respective State goals;
- Support new transmission projects that provide joint benefits to Nevada and California and either benefit, or at least holds harmless, the ratepayers in the respective states;
- Enact legislation that provides a business model for NVE where NVE ratepayers and shareholders can share in the benefits created by new transmission projects;
- Investigate the jobs, wage, revenue, ratepayer and shareholder benefits of increasing the Renewable Portfolio Standards (RPS) in Nevada; and
- Adopt recommendations listed under the "Least Cost Short-term Transmission Options …" section of this report.

Are there Mutual Benefits of Increasing NV/CA Energy Exchange?

Are there mutual benefits to NV and CA of increasing energy exchange between the states? The Synapse report indicates economic development benefits to Nevada of exporting renewable energy to California for six development scenarios. This report complements the Synapse report in a number of ways. First, it assesses potential cost savings to Nevada and California ratepayers of trading renewable resources by providing an apples-to-apples cost comparison of California and Nevada renewable energy cost drivers. Next, it describes the transmission access conditions which make Nevada resources most cost competitive in California. It also describes the electricity system and energy policy drivers in California that affect whether California will express demand for renewable and gas generation from Nevada. It further describes the opportunity to use excess generation and transmission capacity in the respective states for mutual ratepayer benefit in both states. And, it broadens the economic development analysis provided by Synapse to include an assessment of how changes in electricity prices affect development benefits.

Can Nevada Renewable Resources Compete in California and can California Renewable Resources Compete in Nevada? – A Direct Cost Comparison

Nevada renewable resources can compete and are competing in California as evidenced by the fact that renewable developers have signed and are signing contracts with California Investor Owned Utilities (IOUs) and Publicly Owned Utilities (POUs). Most of the Purchased Power Agreements (PPAs) that have been signed are for situations where existing transmission capacity is used to deliver the energy from the developer's site to a California load center and the only new transmission required is the generator interconnection (gen-tie) to the electric grid. As explained below, California IOUs and POUs have transmission assets (substations, transmission lines) located in southern, eastern and northern Nevada that have in some cases strong ties to California load centers. And, there currently is available existing

transmission capacity between these assets and the California load centers. Lack of access to these assets appears to be the primary factor limiting renewable developers from more fully participating in the California renewable energy market. Nevada renewable energy developers can compete in California in the near term as long as existing transmission capacity is available and there is a demand for renewable energy in California. Near term renewable energy development opportunities (present to 2020) in Nevada appear to be limited to these types of arrangements as California IOUs and POUs have secured much of the renewable energy needed to meet their RPS requirements through 2020 and, high capacity transmission projects that allow renewable energy imports are not likely to be pursued.

In the longer term (beyond 2020), can renewable energy resources from Nevada compete with renewable energy resources from California? An apples–to-apples comparison of the cost to develop and deliver energy to load centers from various locations within each state is required to answer this question. Potential projects and transmission for these projects would have to be evaluated on a case by case basis. The Synapse analysis indicates that each state has high quality resources that could effectively compete in each other's market. It also identifies renewable resource technology costs, renewable resource quality, and transmission access costs as factors that affect the relative delivered cost of renewable resources. There is also evidence to suggest that renewable resource and transmission development costs in Nevada are in general less expensive than in California. This relative cost difference needs to be considered to ensure a valid apples-to-apples delivered cost comparison.[1] Table 1 below which was developed by E3 for the Western Electricity Coordinating Council (WECC) Transmission Expansion Planning Policy Committee (TEPPC) process shows that renewable energy resources cost less to develop in Nevada than California.

Table 1. Technology-Specific Regional Cost Multipliers (Technology-Specific Multipliers Apply to Capital Costs; Fixed O&M Multiplier Applies to Fixed O&M for All Technologies).

State/Prov	Alberta	Arizona	British Columbia	California	CFE	Colorado	Idaho	Montana	Nevada	New Mexico	Oregon	Texas	Utah	Washington	Wyoming
Biogas	1.000	0.977	1.000	1.105	0.941	0.994	0.971	0.982	1.047	0.971	1.041	0.924	0.971	1.041	0.941
Biomass	1.000	0.962	1.000	1.170	0.905	0.991	0.953	0.972	1.076	0.953	1.066	0.877	0.953	1.066	0.905
CHP	1.000	0.983	1.000	1.077	0.957	0.996	0.979	0.987	1.034	0.979	1.030	0.944	0.979	1.030	0.957
Coal – PC	1.000	0.975	1.000	1.114	0.937	0.994	0.968	0.981	1.050	0.968	1.044	0.918	0.968	1.044	0.937
Coal – IGCC	1.000	0.978	1.000	1.097	0.946	0.995	0.973	0.984	1.043	0.973	1.038	0.930	0.973	1.038	0.946
Gas CCGT	1.000	0.983	1.000	1.077	0.957	0.996	0.979	0.987	1.034	0.979	1.030	0.944	0.979	1.030	0.957
Gas CT	1.000	0.959	1.000	1.186	0.896	0.990	0.948	0.969	1.083	0.948	1.073	0.865	0.948	1.073	0.896
Geothermal	1.000	0.977	1.000	1.105	0.941	0.994	0.971	0.982	1.047	0.971	1.041	0.924	0.971	1.041	0.941
Hydro – Large	1.000	0.960	1.000	1.178	0.901	0.990	0.950	0.970	1.079	0.950	1.069	0.871	0.850	1.069	0.901
Hydro – Small	1.000	0.953	1.000	1.211	0.883	0.988	0.941	0.965	1.094	0.941	1.082	0.848	0.941	1.082	0.883
Nuclear	1.000	0.957	1.000	1.195	0.892	0.989	0.946	0.968	1.086	0.946	1.076	0.859	0.946	1.076	0.892
Solar PV	1.000	0.984	1.000	1.073	0.959	0.996	0.980	0.988	1.032	0.980	1.028	0.947	0.980	1.028	0.959
Solar Thermal	1.000	0.971	1.000	1.130	0.928	0.993	0.964	0.978	1.058	0.964	1.050	0.906	0.964	1.050	0.928
Wind	1.000	0.986	1.000	1.065	0.964	0.996	0.982	0.989	1.029	0.982	1.025	0.953	0.982	1.025	0.964
Fixed O&M	1.000	0.971	1.000	1.130	0.928	0.993	0.964	0.978	1.058	0.964	1.050	0.906	0.964	1.050	0.928

[1] E3, "Cost and Performance Review of Generation Technologies" October 23, 2012.

The multiples in Table 1 suggest that, for example, it would cost on average 3.6% more to develop a wind project in California than in Nevada. It is important to note, however, that site-specific and resource quality factors may have a larger effect on development costs than these generic multiples.

Furthermore, cost data for large high capacity transmission projects developed to access renewable energy zones in Nevada and California suggest that, at least for known projects, it is much less expensive for Nevada developers to develop transmission than for California developers to develop transmission.

Table 2. High Capacity Transmission Project Costs

Name	Voltage	Capacity (Mw).	Miles	Cost	$/Mile
Tehachapi	500 & 230 kV	4500	173	$2 Billion	11.6 million
Devers/Colorado	500 kV	877	153	$670 Million	4.4 million
Eldorado/Ivanpah	230 kV	1400	36	$450 Million	12.5 million
Sunrise PowerLink	500 kV	1000	117	$1.7 Billion	14.5 million
NVE ON Line	500 kV	600	235	$509 Million	2.2 million

While it is accurate to say that each state possesses resources that could compete effectively in both states, renewable energy resource and transmission development costs alone do not support a case that renewable energy from Nevada can compete in California in the long-term. Transmission access costs need to be included to complete the apples-to-apples cost comparison. These costs could include the use of NVE, CAISO and other utility electric systems that are required to deliver the energy from the renewable resource to a load center. As shown in Table 1, the differences in cost to develop renewable energy resources in each state is not significant. However, there is a significant difference in transmission development and access costs. These costs are likely to be the primary factors in determining which resources are the most competitive.

Transmission Access Options for Renewable Energy Projects in Nevada

Are there transmission access options that allow Nevada renewable developers to compete in California?

WECC TEPPC annually solicits requests for future west wide generator resource expansion plans and proposed transmission expansion projects that support these plans. The developers of many of the proposed transmission expansion projects intend to deliver energy from renewable energy zones located in places throughout the west to the Eldorado Valley in southern Nevada. The developers of these projects intend to rely on available transmission capacity from southern Nevada to California to deliver the energy from their projects to the California load centers. In addition, transmission path utilization reports for the path between southern Nevada and southern California, Path 46, prepared by WECC and others, reveal that there is a significant amount of available transmission capacity on this path. The key point to be made here is that there is a significant amount of available transmission capacity from southern Nevada to California and, its availability is widely known. Furthermore, as discussed elsewhere in this report, no new transmission projects that would increase the amount of energy that can be delivered from southern Nevada to California are in CAISO's most recent transmission plan and Nevada still has, and has had for a long time, an opportunity to deliver energy to California using this transmission capacity. Needless to say, there is a lot of competition for this capacity and it will remain until there is no longer capacity available.

Nevada's proximity to California is a real advantage for developers in Nevada over developers in other western states for a number of reasons. First, as an adjacent state, transmission access costs to reach a California balancing area are likely lower in Nevada than non-adjacent states, and there are opportunities to connect directly to a California balancing area and avoid multiple transmission access charges. Second, the transmission system in southern Nevada has strong interconnections with load centers in southern California and there are also weaker interconnections with these load centers in eastern and northern Nevada. Third, California IOUs and POUs own transmission assets including substations and transmission capacity that are located throughout Nevada. These assets offer near-term and long-term opportunities for renewable energy developers to access California markets. In the near term there is existing capacity available to deliver energy to California load centers if developers can access these assets. For example, the up to 250 MW K-Road Moapa Solar Project, whose PPA was recently approved, will interconnect at Crystal Substation and deliver energy to the Los Angeles Department of Water and Power (LADWP) using existing transmission capacity. In addition, the proposed Moapa Solar Energy Center is pursuing this same opportunity. This project would connect to a LADWP controlled section of the Crystal Substation and use existing LADWP transmission capacity to deliver energy to LADWP's customers. In addition, renewable developers near Boulder City, NV and Ivanpah, NV are using available transmission capacity to deliver energy to California.

In the longer term, transmission capacity owned by these IOU's and POU's may become available as these utilities' ownership interest in coal-fired generation ends. This has already happened with the closure of the Mohave Generating Station which is located near Laughlin, Nevada. The closure of this generating station made available transmission capacity that allows access to southern California load centers. It should be noted that the California POU ownership interests in the Navajo Generating Station may be terminated early making available transmission capacity that could offer similar future opportunities. In fact, LADWP has included a plan for early divestiture of coal fired generation at Navajo Generating Station as an alternative in its Draft 2012 Integrated Resource Plan from which the following excerpts were taken.

> "Initiated Coal Replacement
>
> Processes to replace coal generation from the IPP [Intermountain Power Project in Delta, UT] and Navajo stations have been initiated and are in progress. At Navajo, LADWP is planning to divest from the project by the end of 2015, which is four years ahead of the date required by SB 1368. At IPP, LADWP is working with the other participants to establish the contractual structure to enable a conversion from coal to natural gas. The date of conversion will likely be established before next year's 2013 IRP.[2]" Page 17 2012 Draft IRP
>
> "SB 1368 requires that imported base load energy from outside California meet a GHG emissions standard of 1,100 lbs. per MWh. To comply with this requirement, all future base load generation outside the LA Basin will need to come from either highly efficient combined cycle gas turbines (if fossil fueled), or from renewable energy resources. This eliminates the use of coal-fired generation, at least until future coal combustion and sequestration technology improves sufficiently to make this a viable option. As a result, four coal replacement cases have been

[2] LADWP, October 5, 2012 Draft Integrated Resource Plan, page 91.

> considered in this 2012 IRP and will further define the costs and operational impacts that replacement of these facilities will have in meeting future energy and capacity load requirements."

Another transmission capacity option made possible by Nevada's close proximity to California is utilization of transmission capacity freed up by expiration of contracts from California agencies. The table below, which was taken from Nevada Power Company's (NPC) 2012 IRP[3], shows that the transmission service agreement between NPC and the California Department of Water Resources (CDWR) terminates on July 1, 2013. The transmission capacity under this agreement is currently used to deliver CDWR's share of the Reid Gardner 4 coal-fired generating station to CDWR's loads in California. When the agreement terminates, this capacity may be available to provide access to renewable developers north of the Las Vegas valley to load centers in southern California.[4] If this capacity is available, this may be an additional transmission option for developers, if the NVE point to point transmission rate is not high enough to make their resources non-competitive. NPC's current rate in the south is $1.40 / KW-mo and its proposed rate from the filing it made at FERC (ER13-255) on October 31, 2012 is $2.51/kw-month. The electric systems of Sierra Pacific Power Company (SPPC) and NPC will be connected with the completion of the ON Line transmission project. NV Energy (NVE) intends to issue a combined system rate once the two systems are connected. Renewable developers in Nevada that connect to NVE's electric system and want to export to California will have to pay this rate to access a California balancing area. It remains to be seen whether Nevada renewable energy developers can be competitive in the short and long-term with developers in California after paying NVE's combined system rate.

Figure Tp-7. Nevada Power's Long Term Balancing Area Transmission Export Obligations

Agreement	MW	POR – POD	Termination
CDWR RG4	235	Reid Gardner – ELD 500	7/1/2013
Apex-Las Vegas Power Co	225	LS Apex – MD 230	7/30/2023
Apex-Las Vegas Power Co	275	LS Apex – MD 230	7/30/2023
Silverhawk – SNWA	125	Silverhawk – MD 230	4/30/2014
Total	**860**		

Another option made available to Nevada as a result of its close proximity to California is the possibility of placing transmission assets under the control of CAISO. Valley Electric Association (VEA) will be joining CAISO beginning in 2013. This will allow developers connecting to the VEA system to have direct access to a California balancing area. Additional Nevada transmission assets may be able to be placed under the CAISO control. Finally, only NVE's control area/balancing authority[5] lies between Nevada developers and a California balancing area. Consequently, agreements and development activities required to facilitate delivery of renewable/conventional energy between the two States are much less complicated than if there are multiple balancing authorities or multiple parties involved. As a result, transaction like dynamic scheduling, renewable and conventional energy exchanges and ancillary service exchanges are easier for Nevada developers than with developers in other western states.

[3] NPC 2012 Resource Plan, Volume 16, page 76.
[4] Meeting November 8, 2012, NVE representatives Jack McGinley & Charlie Pottey
[5] From WECC: a control area is an area comprised of an electric system or systems, bounded by interconnection metering and telemetry, capable of controlling generation to maintain its interchange schedule with other control areas, and contributing to frequency regulation of the interconnection.

In summary, because Nevada is in close proximity to California, Nevada renewable energy developers have an advantage over developers in other western States. Policy makers, renewable energy and transmission developers' near-term focus should be on taking advantage of this opportunity by identifying low cost transmission access opportunities and by exploring transmission ownership and control options that allow renewable energy developers in Nevada to be competitive with developers in California.

California Policy Drivers Affecting Demand for Nevada Renewables

Demand for Nevada Renewables in California

Potential demand for Nevada renewable energy generation in California is driven by several factors. The most important policy driver is renewable portfolio standard (RPS) compliance, but additional policy drivers make out of state renewable energy attractive in California.

RPS Compliance

The California Energy Commission graphic below shows status of RPS compliance for each of three compliance snapshots, 2013, 2016 and 2020.[6] For each compliance year a range of GWh compliance values is shown to reflect the range of RPS requirement expected given the range of demand forecasted.

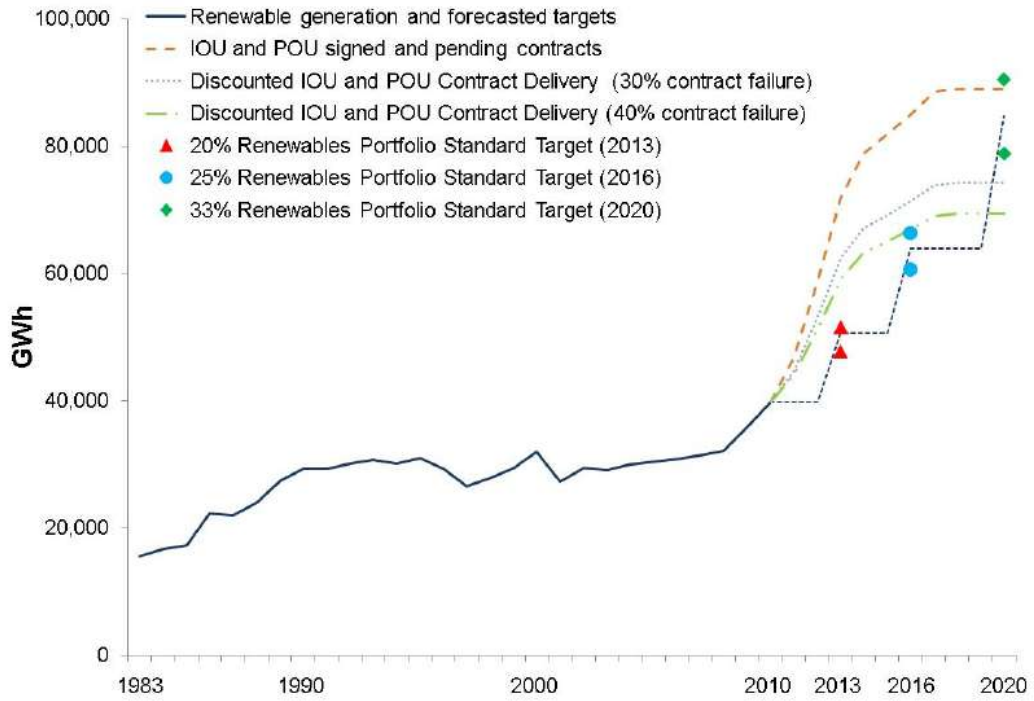
The graphic appears to indicate that if all signed contracts perform then there is essentially no demand for renewable energy in California to meet the RPS in 2020. However, it is likely there is still an open position for renewable energy generation in California for three reasons. First, some contract failure has been experienced to date and history suggests that a 30 to 40% failure rate is entirely possible. The graphic above shows that a 40% failure rate will yield a substantial open position for the 2020 compliance target ranging from about 10,000 GWh to about 20,000 GWh, depending on the realized statewide energy demand in 2020. To make this demand concrete, consider that each 10,000 GWh of generation would require about 1,200 MW of additional geothermal generation, 2,000 MW of additional solar thermal generation with storage, or 3,000 MW of wind generation.

Second, the apparent overall compliance with no contract failure masks the requirement that each IOU and POU must separately reach their respective targets. Examination of the status of compliance by each IOU and POU reveals a substantial open position in the POU sector. While Sacramento Municipal Utility District (SMUD) is well on its way to compliance with 27% of its 2020 target contracted, Los Angeles Department of Water and Power (LADWP) is well short at about 19% of its target.[7] The same source shows that the medium and large POUs are about 9,000 GWh short of complying with the 2020 target.

[6] California Energy Commission. Renewable Power in California: Status and Issues. Figure ES-1, page 6. December 2011.

[7] See the November 16, 2011 updated database of POU renewable energy compliance posted at http://www.energy.ca.gov/2008publications/CEC-300-2008-005/index.html

Figure ES-1: Renewable Generation for California and Renewables Portfolio Standard Goals



Source: California Energy Commission

Third, while it is possible that there will be limited demand for additional out of state renewable generation in meeting 33% compliance in 2020, Governor Brown has clearly indicated a preference for extending the RPS to 40% or more. Moving the RPS requirement in California from 33% to 40% would increase demand for renewable energy generation in California by about 20,000 GWh.

Additional California Policy Drivers

While expansion of the RPS in California offers the greatest promise for creating demand for Nevada renewable generation, additional policy drivers indicate potential benefits to California from importing Nevada renewables. One policy driver that may directly increase demand for Nevada renewable energy is the California requirement that utility generation meet an air emission performance standard. The air emission performance standard is well below the emissions produced by coal generation units so all California utilities are faced with the prospect of phasing out their out of state coal contracts. As these coal contracts are terminated, out of state transmission capacity may become available to deliver renewable energy from places like Nevada to replace the energy lost from retiring coal.

A number of uncertainties regarding the effect California policies could also drive additional California demand for Nevada renewable resources. The California Energy Commission's 2012 Integrated Energy Policy Report (IEPR) Update report summarizes several important uncertainties that could affect demand for additional renewables, perhaps Nevada renewables. Table 4 from the IEPR Update report is

reprinted below.[8] Some of the uncertainties indicate the possibility of additional demand for Nevada renewables. For example the retirement of the "Once through Cooling" (OTC) generation[9] on the southern California coast will create an incremental demand for new resources as approximately 20,000 MW of generation resources with compliance retirement dates from 2010 to 2029 are affected by Once-Through Cooling policy. Generation deficiencies in 2021 of approximately 2500 MW in the Western LA Basin due to these retirements have already been identified in the CAISO 2011-2012 Transmission Planning Process[10]. Some portion of the new demand might be able to be filled with high capacity renewable resources from Nevada like geothermal energy resources and concentrating solar power resources with storage. Other uncertainties mentioned that could affect demand for Nevada renewable energy in California include unexpected retirements, like the retirement of one or more unit from the San Onofre Generating Station (SONGS), less than expected demand reduction from energy efficiency, distributed generation and demand response programs in California, or an increased concern in California for obtaining least cost renewable energy resources.

[8] California Energy Commission, Integrated Energy Policy Report Update, October 2012, Table 4, page 35.
[9] California State Water Resource Control Board, Fact Sheet "Once-Through Cooling Policy Protects Marine Life and Ensures Electric Grid Reliability"
[10] California ISO 2011-2012 Transmission Plan, March 23, 2012, Table 3, page 11.

Table 4: Key Electricity Planning Uncertainties

Variable	Uncertainty Influencing Planning Assumptions
Demand	
Base demand forecast	• +/- 5 percent to reflect range of economic and demographic growth • Increased intensity of electricity use from process electrification • Increased electricity use and different load shapes from transportation electrification and climate change
Incremental energy efficiency	Impacts of programs not included in the base forecast but compatible with adopted energy efficiency goals
Customer-side generation (rooftop PV, CHP)	"Guesstimates" of energy and peak demand reduction from programs to encourage customer adoption
Price response from market-based tariffs	Assumptions whether/when CPUC can create such tariffs given SB 695 (Kehoe, Chapter 337, Statutes of 2009) and estimates of impacts
Supply	
Demand response programs	Range from existing program capabilities up to 10 percent of base peak demand. Estimates of automated demand response are 0.9 GW on a hot summer day and 0.18 GW on a cold winter night; with increased use in commercial and industrial facilities that could double to 2.07 GW and 0.421 GW, respectively.[48]
OTC power plant retirement	Distribution of retirement dates centered on official OTC compliance date for each steam plant
Other power plant retirement	Range of assumptions for retirement of other aging power plants
Conventional resource additions in the pipeline	Alternative scenarios using different assumptions about development milestones like signed/approved contracts, permits, and others
Utility-scale renewables needed to satisfy 2020 RPS target	Alternative scenarios of the mix of technology and locations emerging over time
Distributed generation	Increased uncertainty of load/supply at the bulk system level as less information is available to the system operator implies that the system operator will need to operate more conservatively or that improved communications will be needed.
Supply-side CHP	Alternative consequences for the QF settlement at the CPUC
Performance change for existing resources	Climate change effects including reduced efficiency of air-cooled facilities due to higher temperatures, changes in timing and amount of hydroelectric output, and increased danger of wildfires near critical transmission infrastructure; catastrophic outages like SONGS
Imports/Exports	Potential for fewer imports as California becomes more self-sufficient; availability of lower-cost renewables in other parts of the Western interconnection
Other	Effects of cap-and-trade program

Source: California Energy Commission

California Policy Drivers, Regulatory Changes and the Likelihood of New Transmission Projects for Energy Exchanges

The expected high demand for renewable resources resulting from California's 33% RPS legislation has been the motivating factor for transmission developers in Nevada[11] and other western states to develop transmission projects that can deliver renewable energy to load centers in California. Transmission development activities in the last four to six years have been especially furious. California's interest in supporting high capacity transmission projects that allow renewable energy to be imported into its State should be of great interest to Nevada policy makers as it affects strategies for economic development related renewable energy. There is plenty of information suggesting that California policy makers currently have little interest in pursuing transmission projects in California that allow access to large amounts of renewable energy from out-of-state resources. Policy makers and developers in Nevada need to be aware of this information so that they can respond accordingly and develop strategies for pursuing existing opportunities and/or increasing the interest level of California policy makers in Nevada's renewable energy resources.

As indicated above, there is plenty of evidence suggesting that California policy makers currently have little interest in developing transmission projects in California for importing large amounts of renewable energy from out-of-state resources to achieve compliance with the existing 33% RPS requirement. Probably the most direct indication of California's intent to meet its current RPS with California resources is included in a letter[12] sent in August 2011 by Michael Picker, Senior Advisor to the Governor for Renewable Energy Facilities, to the Western Electricity Coordinating Council (WECC). The letter addresses California's expectation that it will meet most of its renewable energy resource needs from resources located within California and expresses its concerns regarding the risk and cost of development of long distance transmission lines to be used to import power into California – specifically those being considered by WECC in the TEPPC process.

In addition, the most recently approved CAISO Transmission Plan (2011-2012) provides further evidence that high voltage, high capacity transmission projects designed to import renewable energy into California may not be necessary through at least 2020. The CAISO Transmission Planning Process is a collaborative planning effort that has broad stakeholder participation, including IOUs, POUs, agencies (California Public Utilities Commission and the California Energy Commission), voluntary organizations (California Transmission Planning Group, etc.), and transmission & renewable energy developers. The transmission plan used a range of plausible renewable energy generation development portfolios to develop a range of potential in-state and out-of-state transmission projects that could deliver the portfolios to California markets. The CAISO then selected an Approved Plan that includes a list of projects that provide sufficient transmission capacity to deliver enough renewable energy to meet California's 33% RPS under a number of plausible scenarios. These transmission projects are listed in the table below.

It should be noted that not one of the projects listed in the Approved Plan is designed to increase the amount of transmission capacity to deliver energy from out-of-state resources into California. And, one project, the Eldorado – Ivanpah project, will ultimately reduce the amount of available transmission capacity from the Eldorado Valley to California load centers. Furthermore, the CAISO 2011-2012

[11] NVE's Renewable Transmission Initiative , LS Power's North SWIP, Great Basin Energy, Solar Express, etc.,
[12] August 3, 2011 letter from Michael Pickers, Office of the Governor California to Brad Nickell, Director Transmission Expansion Planning Policy Committee, Western Electricity Coordinating Council

transmission plan[13] clearly states that CAISO believes California can meet its 33% RPS requirements in 2020 using resources located within California or imported resources with just the new transmission that has already been approved and permitted for construction, been identified as needed in ISO interconnection agreements and has approval as a policy driven transmission line but has not been permitted.

Table 3. California Renewable Energy Projects	
Transmission Facility	**Online**
Transmission Facilities Approved and Permitted For Construction	
Sunrise Powerlink	2012
Tehachapi Transmission Project	2015
Colorado River - Valley 500 kV line	2013
Eldorado – Ivanpah 230 kV line	2013
Carrizo Midway Reconductoring	2012
Additional Network Transmission Identified as Needed in ISO Interconnection Agreements but not Permitted	
Borden Gregg Reconductoring	2015
South of Contra Costa Reconductoring	2014
Pisgah – Lugo	2017
West of Devers Reconductoring	2018
Coolwater - Lugo 230 kV line	2018
Policy-Driven Transmission Elements Approved but not Permitted	
Mirage-Devers 230 kV Reconductoring (Path 42)	2014

The Plan also addresses transmission requirements to support out-of-state resource procurement. As indicated in the excerpt below, transmission to support additional out-of-state procurement will be addressed in future transmission plans.

> "Justification for additional transmission to support out-of-state procurement will need to be addressed in subsequent transmission plans through the CPUC renewable energy procurement approval process to determine the specific location, quantity, and type of renewable energy projects.
>
> Immediate focus now should be on:
>
> – obtaining approvals for identified transmission;
>
> – renewable energy procurement; and;
>
> – revisiting procurement forecasting assumptions for use in the 2012/2013 transmission plan cycle."[14]

Another factor affecting the development of large capacity transmission projects are changes in California RPS procurement process and the CAISO transmission planning and generator interconnection processes. These changes, discussed below, will likely reduce the number of renewable developer driven transmission projects especially if there are renewable resource alternatives that require lower network upgrade costs.

[13] CAISO 2011- 2012 Transmission Plan, March 23, 2012
[14] CAISO 2011-2012 Transmission Plan, Page 2

California's RPS Procurement Processes are Changing – Implications

Policy makers in California have recently become concerned with the cost of adding renewable energy resources to comply with RPS targets. Consequently, the cost of renewable energy resources, corresponding transmission upgrades, flexible and other resources required to support high penetration levels of renewable energy resources are all targets for cost reduction efforts. In fact, California policy makers are changing renewable energy resource procurement practices as well as generator interconnection and transmission planning processes to address these cost concerns. Current efforts place a greater emphasis on costs, valuation of resource attributes and in making sure that transmission upgrades are consistent with the CAISO transmission planning process. These changes and concerns have ramifications in Nevada.

The California Public Utilities Commission requires investor owned utilities to use a Commission approved renewable energy procurement process. California's IOUs use a Least Cost Best Fit (LCBF) formula to determine the net market value of bids that are received in their respective RPS procurement processes. The LCBF formula under consideration by the CPUC now and approved for use by the IOUs in their latest (2013) renewable energy procurement plans is listed below:

Net Market Value: $R = (E + C) – (P + T + G + I)$
Adjusted Net Market Value: $A = R + S$

R = Net Market Value
A = Adjusted Net Market Value
E = Energy Value
C = Capacity Value
P = Post-Time-of-Delivery Adjusted Power Purchase Agreement Price
T = Transmission Network Upgrade Costs
G = Congestion Costs
I = Integration Costs
S = Ancillary Services Value

The IOU renewable resource procurement process is proscriptive, however qualitative factors are also considered in the final selection. Since the process is proscriptive, Nevada renewable energy developers can compete if the Net Market Value of their bids is competitive with those in California. Assuming conservatively that all variables in the LCBF formula except transmission are similar between California and Nevada, Nevada developers should be able to compete in California if their transmission development and access costs are less than those of developers in California. This will occur if the generator interconnection cost and access charge (e.g., NVE OATT firm point to point transmission rate) to get to a California balancing area are less expensive than that of a California developer. If a developer can avoid a Nevada access charge by interconnecting directly to a California balancing area (CAISO or IOU, POU transmission asset in Nevada) or if this access charge is competitive with generator interconnection and network upgrade cost in California, then a renewable energy developer in Nevada can be competitive.

It should be noted that the process used by IOUs in California to estimate the network upgrade costs has changed. Transmission upgrade estimates are now more closely aligned with CAISO's generator interconnection process and new terms in the pro forma agreements now allow for contract termination if final transmission upgrade cost estimates are in excess of initial estimates.

In addition to refining the process for estimating transmission costs, CAISO sought and received approval to modify its Generator Interconnection Process such that it was in line with its Transmission Planning Process. A fuller discussion about these changes is discussed in the next section.

CAISO Transmission Planning Process and Generation Interconnection Process Procedures are Changing - Implications

Large scale development of renewable energy in Nevada for export to California will require coordination with California agencies, organizations, IOU's and POUs, etc. It is important to understand how the processes used by these entities affect renewable energy development in Nevada. This section includes a discussion of some of the recent changes made to the California Independent System Operator's (CAISO) generator interconnection process and the CPUC's RPS procurement process and explains how these changes may affect renewable energy development in Nevada.

The CAISO Generator Interconnection Process (GIP) has recently been changed so that projects eligible for rate payer reimbursement are now required to be consistent with the transmission needs identified in the CAISO Transmission Planning Process (TPP). CAISO submitted a revised Open Access Transmission Tariff to FERC for approval in FERC Docket ER12-1855-000 that was intended to align the GIP and TPP processes as far as determining transmission needs. The modified interconnection process is now called the Generation Interconnection and Deliverability Allocation Procedures (GIDAP). FERC conditionally accepted the tariff revisions related to GIDAP on July 24, 2012. The following sections of FERC's order accepting the tariff revisions describe CAISO's GIDAP process.

> "6. CAISO does not propose revisions to the TPP tariff provisions. Rather, CAISO limits its proposed revisions to the GIP to make the TPP, particularly the TPP provisions regarding public policy-driven transmission expansion, the primary vehicle for identifying the large-scale network upgrades associated with the interconnection of renewable generation necessary to achieve the renewable portfolio standards.
>
> 7. CAISO states that under the proposed GIDAP, the capability of the CAISO grid, as modified by the network upgrades identified through the TPP, will be referred to as transmission plan deliverability. As discussed in greater detail below, CAISO proposes to integrate the TPP into its interconnection procedures through a process where, for each identified study area, it will determine the megawatt (MW) volume of new generation that can be added based on the transmission plan deliverability. CAISO will then allocate that volume of transmission plan deliverability to those proposed generating facilities in each study area that it determines to be most viable based on a set of specified project development milestones. The assignment of cost responsibilities and eligibility for reimbursement under the GIDAP are tied to the allocation of transmission plan deliverability and CAISO's assessment of the

> likelihood that specific projects are likely to achieve commercial operation. Thus, under the GIDAP, developers that request interconnection for projects that are not consistent with the outcome of the TPP are less likely to be eligible for reimbursement for their project than those developers who are allocated transmission plan deliverability.
>
> 8. CAISO asserts that the TPP-GIP revisions will achieve several important objectives, including (1) providing incentives for generation developers to choose interconnection points that are consistent with public policy-driven transmission development, and limit ratepayer responsibility for inefficient or underutilized upgrades; (2) producing more realistic study result and cost estimates, thereby improving chances that viable projects will achieve commercial operation; (3) providing greater certainty for generation developers that the needed delivery upgrades will be granted permits by relevant state siting authorities; (4) providing greater transparency into the transmission development process; and (5) providing increased opportunities for independent transmission developers to build and own transmission."[15]

The new process affects Nevada in a couple of ways. First, GIDAP minimizes the role that the generator interconnection process has on determining transmission upgrades that get included in IOU customer rate base. Consequently, generation interconnection requests will not in and of themselves drive transmission development in California. Second, network upgrades driven by a Nevada project have to be consistent with the Transmission Planning Process and the energy policy implications included in CAISO's approved transmission plan. Under the GIDAP process, developers that request interconnection for projects that are not consistent with the outcome of the TPP are less likely to be eligible for reimbursement for their project than those developers that are. As mentioned elsewhere in this report, the CAISO 2011/2012 transmission plan does not contain transmission projects that accommodate large transfers of renewable energy from out-of-state resources.[16] Therefore, focusing on large transmission projects that interconnect to a California balancing areas would not seem to make much sense unless policy in the transmission plan supports higher levels of out-of-state renewable energy resources.

In summary, future efforts to develop Nevada renewable energy for export efforts must accommodate California practices and cost containment efforts and strategies should be developed that are consistent with these efforts. As indicated above, Nevada developers can already compete in California if they have access to existing transmission that allows delivery to a California balancing area. Nevada policy makers and developers develop strategies and marketing products to influence policy makers in California to consider securing more renewables resources from Nevada.

Least Cost Short-term Transmission Options to Deliver Power to California

Renewable energy development in Nevada for export to California or any sharing of renewable or conventional resources for mutual benefit is not going to happen unless there is transmission capacity

[15] Docket No. ER12-1855-000, Order Conditionally Accepting Tariff Revisions, pages 2, 3.

[16] Projects like Zephyr and TransWest Express are counting on using existing capacity from the Eldorado Valley to deliver energy to load centers in California.

available to move energy from Nevada to California. Because of its proximity to California, as explained previously, Nevada has long been, and still is in, an advantageous position to sell renewable energy to California. There are a number of reasons for this:

First, it is widely known that there is available transmission capacity between the southern Nevada substations in the Eldorado Valley and the California load centers. Many transmission developers in the West have proposed projects that terminate in the Eldorado Valley and intend to rely on existing transmission capacity on path 46 to get to California load centers. In fact, the proposed TransWest Express and the Zephyr transmission projects both intend to terminate their very high capacity (3000 MW) projects in the Eldorado Valley and use existing capacity on Path 46 to deliver energy from their project to California load centers. If these or other projects with the same strategy are built, Nevada developers' opportunity to use this existing and available capacity will be eliminated. In fact, a substantial amount of new renewable energy generation projects located in Nevada have Purchased Power Agreements with California interests and will be using this existing capacity to deliver energy from their projects. Furthermore, one transmission project, the Eldorado-Ivanpah project, when completed, will deliver energy from California to the Eldorado Valley just so that it can be delivered back to load centers in California using available capacity on Path 46. Nevada renewable and transmission developers have a window of opportunity to use this capacity. Nevada developers have not been able to take advantage of this opportunity due to the impact on Nevada ratepayers and transmission ownership and control issues.

Second, many IOUs and POUs have transmission ownership interests at substations located in southern Nevada. IOUs and POUs with ownership interests include the Los Angeles Department of Water & Power, Southern California Edison, City of Vernon, Metropolitan Water district/ Southern California and the Western Area Power Administration. Other California IOUs such as Pacific Gas & Electric can take delivery of power at CAISO controlled substation in southern Nevada.

Third, when Valley Electric Association formally joins the CAISO in January 2013 renewable energy projects connecting to VEA will be directly connected to a California balancing area. Nevada renewable energy developers that connect to VEA's system will avoid an NVE access charges and hopefully find themselves in a more competitive situation.

Given California policy makers' current preferences for in-state development of renewable energy and their lack of support for high capacity transmission projects to support large imports of renewable energy, Nevada developers immediate transmission development options appear to be limited to short term low to medium capacity transmission projects (< 1000 MW). Nevada policy makers should focus on finding low cost transmission ownership/control/construction opportunities so that this opportunity can be taken advantage of while it still exists. The following are possible measures that could support this effort:

- Identify known transmission projects that provide low cost access to California delivery points;
- Commission a study to identify best value transmission options that allow delivery of renewable energy from Nevada to California delivery points. This could be modeled on Arizona's Biennial Transmission Assessment process;[17];

[17] "As part of the 5th Biennial Transmission Assessment, the Arizona Corporation Commission ("ACC" or "Commission") adopted Decision No. 70635 which required "utilities and other stakeholders to hold a workshop to develop ways in which new transmission projects can be identified, approved for construction, and financed in a manner that will support the growth of renewables in Arizona." The

- Identify transmission development options that avoid financial impact on Nevada ratepayers. Ratepayer impact issues have often stifled transmission development to support a renewable energy export market;
- Evaluate various ownership/control issues that will keep renewable developers in Nevada competitive with developers in California and other western States;
- Facilitate cooperation between renewable energy developers and transmission developers to foster development of viable transmission options;

Mutually Beneficial Renewable and Conventional Electricity Exchanges between California and Nevada

Benefits to California

California is currently confronted with a number of challenges that could benefit from expanded exchanges of conventional and renewable energy between Nevada and California. The table reprinted below from the California Energy Commission Integrated Energy Policy Report (IEPR) Update identifies several of the challenges in southern California that could more effectively be addressed if expanded cooperation between Nevada and California could be achieved.[18] Retirements of Once through Cooling generation, potential retirement of one of the San Onofre Nuclear Generating Station (SONGS) units, as well as the on-going challenges of addressing climate change and meeting the State Renewable Portfolio Standard are identified. While the table emphasizes southern California infrastructure challenges, several of these challenges are statewide and all of challenges would benefit from some conventional energy exchange with Nevada.

decision further specified that each utility "identify the top three potential renewable transmission projects in its service territory". Salt River Project 2010 10 Year Transmission Plan, January 2010.

[18] California Energy Commission, 2012 Integrated Energy Policy Report Update, October 2012. Page 24, Table 2.

Table 2: Forces Influencing Southern California Infrastructure Development

Force	Effect
State Water Resources Control Board policy on once-through cooling in power plants	New generation sources needed to replace plants that retire as a result of policy.
Ability of South Coast Air Quality Management District to implement its power plant permitting rules	Scarcity of commercial offsets makes generators dependent on South Coast Air Quality Management District's offset exemption and internal bank credits.
San Onofre Nuclear Generating Station outage	New generation sources needed to assure local reliability and replace lost energy production; transmission upgrades and synchronous condensers needed to replace lost energy production and maintain system voltage levels;.
South Coast Air Quality Management District policy for electrification of combustion sources in the Los Angeles Basin	New generation sources needed to satisfy increased electrical load.
Climate change	Increased electrical loads, reduced generation and transmission efficiency, increased need for new generation sources.
Renewables Portfolio Standard	Additional and flexible generation and transmission upgrades needed to support intermittent resources like wind and solar.
State demand-side policies such as energy efficiency and demand response	Reduced electricity usage and reduced need for new power plants but increased uncertainty regarding timing/amounts.
Numerous single-purpose agencies	Need agreement from multiple agencies for necessary infrastructure to be built.

Source: California Energy Commission

The generation retirements pose a particular near term challenge where access to conventional and renewable resources in Nevada could be beneficial. Once Through Cooling retirements in the LA Basin, Big Creek/Ventura and San Diego will amount to nearly 8,000 MW of base load generation retirement. Retiring base load generation will require some additional supply side and demand side facilities within the identified locally constrained areas in California, but flexible Nevada resources can also be part of the solution.

Nevada currently has excess fossil generation capacity in northern and southern Nevada with significant amounts of efficient gas fired generation that has been built within the last ten years. Excess capacity in Nevada means that Nevada ratepayers are paying for underutilized facilities that could be used for generation export to California. California would benefit from importing power from these flexible gas generation units because doing so in much less expensive than building its own new gas generating plants. California would also benefit from importing geothermal and Concentrating Solar Power (CSP) with Thermal Electric Storage (TES) to help compensate for the loss of retiring base load generation.

An additional basis for mutual benefit with the loss of retiring base load is the possibility of complementary variable generation exchanges. The diurnal generation profile of wind energy in California and the diurnal generation profile of solar energy have complementary features which indicate a basis for mutually beneficial exchange.

Affecting mutually beneficial exchanges that benefit ratepayers in both states and encourage continued renewable energy development in both states will require better real time communication between system operators in the states. Valley Electric Association (VEA) has taken a first step in enhancing communication by joining the California Independent System Operation (CAISO) balancing authority. The CAISO has invested in a real time communication and data processing platform that should enable NVE to enhance real time, intra-hour exchanges between the two balancing authorities at a modest cost. The implementation of an intra-hour communications and exchange platform between the authorities will allow Nevada resources to bid into CAISO ancillary service and flexible generation markets.

Exchanging conventional resources as well as renewable resources, trading complementary variable renewable resources and pooling energy resources to meet ancillary and flexible generation resource in the two states will benefit California ratepayers. California ratepayers will have access to a broader pool of resources and that broader pool enables cost saving trades on intra hour markets. In addition, Nevada resources can help California to meet the base load retirement challenge facing the State and southern California in particular.

Nevada ratepayers will also benefit. Increased use of NVE resources will spread the cost recovery of those resources over more kWh of energy sales resulting in a decline in the revenue requirement that Nevada ratepayers need to fund to make NVE investors whole. Nevada ratepayers will also benefit from complementary renewable resource exchanges that can reduce the cost of complying with the Nevada RPS as the RPS grows beyond its current limits.

Benefits of Conventional and Renewable Energy Resource Sharing

Establishing an intra-hour communications, data processing and energy exchange platform between the states will allow NVE to serve customers better by expanding the resources available to optimize system operations on behalf of customers. Reliable real time communications and exchanges between Nevada and California bring many of the same benefits NVE identified as being provided by joining the Sierra Pacific and Nevada Power systems with the ON Line transmission project.

Benefits of real time joint exchange include increased dispatch optionality. Expanding the resources available to meet system needs on a real time basis allows for economic exchanges that were not previously available. Economic exchanges mean lower costs for ratepayers on both sides of the exchange. In addition, dispatch optionality has reliability benefits because potential resource shortages caused by the loss of a transmission line, a generation outage or an unexpected spike in electricity demand can be addressed with an expanded set of options. More resources and more real time access to those resources implies lower cost and increased reliability.

Other benefits of exchange include the ability to use uncorrelated variability in variable generation resources and uncorrelated variability in demand between California and Nevada to improve the overall generation profile of variable generation and reduce investment in peak capacity fossil generation resources in each state. In addition, uncorrelated variability, load diversity and differences in peak consumption occurrences between the states will allow each to reduce its required reserve margin in planning for future system needs. Reducing the planning reserve margin means reduced investment in new fossil generation resources which translates into lower costs for ratepayers in the future as new generation investments are averted.

Enhanced exchange between the states also allows for enhanced optimization of gas transportation assets and lower cost dispatch of gas generation units based on gas price basis differentials across the

combined Nevada and California footprint. Since additional gas generation resources become available for mutual benefit, gas transportation and fuel scheduling can be adjusted to take advantage of least cost gas and gas generation can be taken advantage of based on access to least cost gas. The joint optimization creates the further benefit that new investment in gas transportation and gas storage can be deferred by taking advantage of system wide flexibilities.

Taken together, the benefits of closer coordination of Nevada and California systems produces reliability benefits for both states, decreases ratepayer costs by increasing capacity utilization of efficient resources and deferring investment in additional peaking resources, decreases the cost of accommodating increased penetrations of variable energy resources in both states, and provides gas price hedging benefits to both states that protects ratepayers from future natural gas price volatility.

Achieving Mutual Benefits

Investments by the CAISO in an intra-hour communications, data processing and energy exchange platform along with investments already made by NVE in advanced communications and data processing capabilities indicate that establishing a real time exchange platform will not be a financial burden to ratepayers. Precise cost estimates need to be developed by the CAISO price quote for expanding its platform to other balancing authorities indicates the burden to NV ratepayers would be minimal[19]. Once closer communications and data exchanges are in place, there are several implementation actions that could be taken to achieve mutual benefits. Implementation actions range from implementing the curtailment calculator, implementing an Energy Imbalance Market (EIM) exchange, expanding reserve sharing through pooling agreements, and establishing the ability to trade in the respective ancillary service and flexible generation markets in each state. Each of these implementation steps holds the promise of improving reliability and reducing costs for ratepayers in each state. The magnitude of the benefits to each state requires further study but results produced to date by NREL indicate that NV Energy excess capacity of flexible generation resources indicate that savings for ratepayers could be substantial and should be further investigated.

Renewable and Conventional Energy Exchanges - Next Steps

As indicated above, renewable energy exchanges between Nevada and California could be valuable to both states. Nevada has excess high quality renewable energy resources and California must implement the most aggressive renewable energy standard in the country and the list of reasons supporting consideration of renewable energy exchanges between the two States is long. While it is easy to visualize these types of exchanges, it is not so easy to determine what types of exchanges would provide the most value or how to implement processes that would allow such exchanges to take place. In order to do this, Nevada and California would need to complete studies to determine to what extent it is practical and advantageous for exchanges to occur. These studies could include:

- An examination of expected load profiles and their implications for future exchanges;
- An examination of renewable resource output profiles in Nevada and California to determine complementary attributes and the types of exchanges that would be advantageous;
- Projections of operating characteristics and ancillary service needs of the electric system in Nevada and California;

[19] March 26, 2012, CAISO Letter to Victoria Ravenscroft, Western Interstate Energy Board, and accompanying "CAISO Response to Request from PUC-EIM Task Force March 29, 2012, http://www.westgov.org/PUCeim/documents/CAISOcewa.pdf

- Identifying existing renewable energy projects that could be part of the exchange (e.g., existing renewable energy in Nevada or California under PPA with a CA IOU or POU and vice-versa exchanged for mutual benefit-California wind for Nevada solar or geothermal);
- Determine the operational and infrastructure cost savings associated with the exchanges;

Once it is determined whether it would be beneficial to make the exchanges, then the process requirements necessary for these exchanges would have to be addressed. These requirements could include:

- Identifying existing transmission that could be made available for the exchanges;
- Determine how to include existing and future renewable energy purchase power agreements in a sharing arrangements;
- Coordination with IOUs, POUs, and CAISO to develop process to facilitate such an exchange;
- Coordination with state and other regulatory agencies to develop process to facilitate for such and exchange;
- Addressing political issues associated with the exchanges;

The benefits of exchanges will be difficult to study unilaterally and will require the cooperation of IOUs, POUs and other agencies within each state. An investigation of a renewable energy and conventional energy exchanges would require the same type of assessment and process development requirements. Load and resource projections and profiles (and implications) need to be examined in conjunction with renewable energy profiles, operating characteristics and ancillary service needs.

Economic Development

Economic Development Impacts of the Export Scenarios

The Synapse economic analysis of six build-out scenarios estimates that construction jobs ranging from 10,000 to 35,000 job-years could be added during project construction. This would yield between $550 million and $1,880 million in wages. The renewable energy build-outs would create 400 to 1,290 permanent jobs during the life of the constructed facilities, with these jobs producing $24 million to $73 million in annual wages. The total sales, use and property taxes reported range from $107 million to $350 million for construction and operation activities.

The Synapse report results were estimated using a reputable economic impact tool, IMPLAN, based on recent information for input into its analysis. The analysis appropriately considers direct, indirect and induced impacts and demonstrates that renewable energy development can add substantially to the State's economy. However, the analysis does not consider all of the potential benefits nor does it consider all of the potential costs because the analysis does not evaluate the range of electricity rate impacts that might be experienced. The ultimate impact on jobs, wages, and revenues is affected by how NVE ratepayers are affected by the development. If Nevada electricity rates are decreased by the project then additional economic development benefits can be expected and if Nevada electricity rates are increased by the project then a reduction in development benefits can be expected. The remainder of this section presents some plausible cases that demonstrate when ratepayers are helped and when they are harmed.

The Impact of Expanded Exchange with California on Nevada Electricity Rates

Expanded exchange of existing or new resources offers benefits to Nevada ratepayers in some circumstances. This section evaluates the potential economic impacts caused by impacts on Nevada electricity rates.

Case I: The Economic Benefits of Increasing Use of Existing Capacity

The Nevada Power balancing authority currently has excess generation capacity and available transmission capacity. If available generation and transmission capacity is used to increase exports, Nevada ratepayers will enjoy a financial benefit that should result in a rate decrease. Selling generation capacity at or above its marginal cost into the regional market will decrease deferred energy balances. A decreased deferred energy balance will decrease any deferred energy rate relative to what that rate would have been without the sale.

Use of available transmission capacity for sale also benefits Nevada ratepayers. Selling transmission capacity to a willing buyer will increase Nevada Power's transmission revenues and thus lead to a decrease in Nevada Power's transmission rate. Since NVE ratepayers pay for transmission according to Nevada Power's transmission rates, any decrease in the rate will reduce Nevada Power ratepayer rates.

With the addition of the Harry Allen Generation Facility to the Nevada Power fleet, NVE has abundant surplus gas generation that can be marketed into the regional market. In addition, NVE has unused, existing transmission capacity that could be used to deliver energy from the facility into the regional market. Nevada ratepayers would benefit from these sales into the regional market with decreases in the deferred energy rate and the transmission rate. ***A decrease in Nevada electricity rates caused by increased use of existing generation and transmission capacity creates an additional economic benefit for the Nevada ratepayers and the Nevada economy that is not captured in the Synapse analysis.***

Case 2: The Potential Economic Benefits of Additional Renewable Generation for Export for some Scenarios

Additional electricity sales from new renewable generation facilities into the regional market can also benefit the Nevada ratepayer under some conditions. If a new generation facility is delivered to the regional market using available transmission capacity then the transmission rate experienced by the Nevada ratepayer should decline. If the new generation facility requires additional transmission facilities but the cost per MW of the new transmission facility is less than the embedded cost of transmission per MW then rolling the new facilities into the transmission rate will decrease the Nevada ratepayer's transmission rate and produce an economic benefit for the ratepayer. Some proposed transmission in the Synapse report will cause a decrease in Nevada Power transmission rates. For example, the investment in capacitor banks required in Scenario 3 will reduce Nevada transmission rates if the capacity created by the investment is utilized. ***The potential decrease in Nevada electricity rates caused by using existing and certain new transmission by a new renewable generation project creates an additional economic benefit for Nevada ratepayers and the Nevada economy that is not captured in the Synapse analysis.***

Case 3: The Possibility of No Impact on Nevada Rates with Additional Renewable Generation for Export

Additional electricity sales from new renewable generation facilities into the regional market can hold the Nevada ratepayer harmless under some conditions. If a new generation facility is delivered into the

regional market using a combination of existing transmission capacity and new transmission capacity then the transmission rate experienced by Nevada ratepayers could remain unchanged. While the transmission rate may decline due to use of existing capacity, it is possible that a countervailing increase of transmission rates could occur that would leave Nevada ratepayers indifferent to the ultimate transmission rate. For some scenarios, the cost of transmission per MW of new transmission could exceed the embedded Nevada Power transmission rate by an amount that just offsets the decrease in rates caused by use of existing capacity. In this case, the Nevada ratepayer is held harmless from the transmission cost impact of the new transmission facilities.

If transmission is built from Nevada outside of Nevada Power's balancing authority and if that transmission is directly interconnected to an adjacent balancing authority without interconnecting with Nevada Power's system, then the Nevada ratepayer is held harmless.

Case 4: The Potential Economic Costs imposed by Additional Renewable Generation for Some Export Scenarios

It is also possible that NVE ratepayers will experience an increased cost if new transmission facilities are built for export within NVE's control areas. If new transmission is directly interconnected to NVE and if the cost of transmission per MW exceeds the embedded cost of transmission per MW then the transmission rate will increase for Nevada ratepayers. **The potential increase in Nevada electricity rates in some scenarios caused by the need for new transmission within NVE's control area that exceeds NVE's transmission embedded transmission rate will create an economic development cost for the Nevada economy that is not captured in the Synapse Analysis.**

Other Sources of Potential Mutual Benefit for Nevada and California

In cases 1 through 3, the Nevada ratepayer benefits or at least is held harmless from the costs of additional regional exchange. In case 4, the Nevada ratepayer experiences a net cost through increased electric rates. However, increased export of Nevada renewable energy could provide additional benefits that have not yet been considered. Potential sources of benefit that could offset any increased transmission cost include:

- Decreased costs caused by the availability of low cost wind power from California;
- Decreased costs of acquiring additional Nevada resources through sharing development costs;
- And decreased costs associated with an increase of mutually beneficial conventional electricity exchange enabled by the implementation of curtailment exchanges, imbalance exchanges or any other enhanced mutual exchange products.

It is also possible that increased exchange could increase Nevada costs if increased regional purchases of renewable energy cause increases in the cost of procuring renewable energy in Nevada to meet increased Nevada RPS requirements.

Recommendation: Nevada should explore exchanges with California and others in the regional market that benefit the Nevada and California ratepayers or at least hold Nevada and California ratepayers harmless. These exchanges include exchanges that use existing under-utilized generation and transmission capacity, exchanges that use new transmission capacity in Nevada that benefits or hold Nevada ratepayers harmless, and exchanges that increase Nevada transmission rates but have compensating benefits that offset or exceed any Nevada ratepayer impact.

Conclusion

Nevada and California have a common interest in taking advantage of energy exchanges that benefit ratepayers, labor, shareholders and the public in the respective states. Each state has resources to offer for energy exchanges. Nevada has outstanding high quality renewable energy resources, a number of available and potential options for transmission capacity for export and excess gas generation capacity. California also has outstanding high quality renewable resources, available transmission capacity for export and faces the challenge of retiring several thousand megawatts of base load generation. While California and Nevada have a history of exchanging electricity for mutual benefit, joint system operation and planning opportunities appear to exist that could increase reliability, decrease ratepayer costs and provide economic benefits to each state.

The Nevada Office of Energy recently commissioned a Synapse Energy Economics study to begin the evaluation of mutual benefits. The Synapse Report evaluates six export options, provides information on the relative cost of Nevada renewables and indicates that substantial employment, wage and revenue benefits could accrue to Nevada from increasing exports to California. This report complements the Synapse Report by providing additional information on a number of topics including: the near term and long-term competitiveness of Nevada renewable resources; transmission access options; mutual benefits to California and Nevada of renewable and conventional energy exchanges; and job, wage and ratepayer benefits. Recommendations are also provided to assist policy makers with developing strategies to realize the mutual benefits to Nevada and California of resource sharing between the two states. These recommendations follow.

Recommendations

- Immediately remove any barriers that exist which prevent increased utilization of NVE's excess generation and transmission capacity;
- Enact legislation that provides a business model for NVE where NVE ratepayers and shareholders can share in the benefits of increased utilization of NVE's existing transmission and generation capacity;
- Continue to encourage NVE to participate more fully in regional curtailment, imbalance and ancillary service markets;
- Enact legislation that provides a business model for NVE where NVE ratepayers and shareholders can share in the benefits created by mutually beneficial operational and planning improvements between CA and NV;
- Continue to encourage NSOE, NVE, the CAISO, California Utilities and California State representatives to collaborate on studies that demonstrate the magnitude of the benefits of increased coordination, cooperation and planning between California and Nevada as they pursue their respective State goals;
- Support new transmission projects that provides joint benefits to Nevada and California and either benefits, or at least holds harmless, the ratepayers in the respective states;
- Enact legislation that provides a business model for NVE where NVE ratepayers and shareholders can share in the benefits created by new transmission projects;
- Investigate the jobs, wage, revenue, ratepayer and shareholder benefits of increasing the Renewable Portfolio Standards (RPS) in Nevada; and

- Adopt recommendations listed under the "Least Cost Short-term Transmission Options …" section of this report.