Nevada
Energy Markets and Planning (E-MAP)
Baseline Assessment

Overview:
The goal of the E-MAP Program is to help states develop comprehensive approaches to advancing electric system and related energy infrastructure modernization, resilience, and affordability. The E-MAP Program will provide assistance to GOE to develop a state-led energy system modernization roadmap that takes a comprehensive view across the electric system to include advances in renewable energy, distributed generation, energy storage, ancillary services, and energy efficiency with the aim of fostering market innovation and ensuring a reliable, affordable, and environmentally sustainable electric system. (NASEO Statement of Work)

Baseline assessment of state energy system: Analyze and identify key energy sectors, trends, emerging technologies, and system interdependencies to conduct a baseline assessment of the state energy landscape (e.g., renewable energy, distributed generation, utility business models, storage, services, resiliency efforts, policies, regulations, laws, state energy planning efforts).

State Energy Landscape (Electric Sector)[1]

Nevada has substantial geothermal and solar development. However, the state has no significant fossil fuel reserves, and most of Nevada's energy comes from out of state. The transportation sector is the state's leading energy-consuming sector, using almost one-third of all energy consumed in Nevada.

Nearly nine-tenths of petroleum products consumed in Nevada are transportation fuels. Nevada is one of the lowest petroleum-consuming states in the nation. Less than 1% of Nevada's residents use fuel oil for heating. Until 2012, fuel was supplied to Las Vegas and Reno almost exclusively by petroleum product pipelines from California refineries. In 2012, the 425-mile UNEV pipeline began bringing fuel to Las Vegas from refineries in Salt Lake City, Utah.

Nevada's small amount of natural gas production is entirely associated gas from oil wells, and the state produces only small amounts of crude oil. Interstate pipelines supply Nevada with natural gas from producing regions outside the state. The Las Vegas area receives natural gas primarily by pipeline through Utah from the Opal trading hub in Wyoming. Secondary supply comes from a pipeline crossing Arizona bringing natural gas from the Permian Basin in Texas and the San Juan Basin in New Mexico. Other pipeline systems transport natural gas from the Malin trading hub in Oregon and from interstate pipelines in Idaho across the border to northern Nevada. Of the natural gas consumed in Nevada, about two-thirds is used for electricity generation and almost half of the rest is consumed by the residential sector. Three in five Nevada households use natural gas as their primary heating fuel. Natural gas is the primary fuel for power generation in Nevada, supplying about two-thirds of Nevada's net electricity generation.

There are no coal mines in Nevada. The state's three coal-fired power plants are supplied by railroad from mines in Wyoming and Utah. One power plant generates electricity for the Las Vegas region, a second plant supplies northern Nevada towns, and the third provides power to gold and copper mining operations in northern Nevada. That power plant also sends electricity to the regional transmission grid. The coal-fired plant near Las Vegas was the state's largest prior to de commissioning.

Coal-fired power plants supply less than one-fifth of the state's net generation. In compliance with a 2013 state law, Nevada's largest utility is planning to eliminate most of its coal-fired electricity generation by the end of 2019. Renewable energy resources, mainly geothermal, hydroelectric, and solar power plants, are supplying an increasing share of the state's net generation and now exceed the contribution from coal.

[1] U.S. Energy Information Administration, Nevada Profile Analysis Updated 2015; http://www.eia.gov/state/analysis.cfm?sid=NV, (Accessed 11/1/16)

The industrial sector is the leading electricity-consuming sector, followed closely by the residential sector, where about one in three households use electricity for home heating.

Two separate transmission grids provide power to Nevada. One grid supplies the Las Vegas area and is connected to the Arizona, southern Utah, and California grids. The other power grid supplies communities in the northern part of Nevada, including the cities of Elko and Reno. The northern grid is tied into Idaho, northern Utah, and northern California. Transmission projects running the length of the state, through the eastern desert from Idaho to Las Vegas, connected the two grids for the first time in 2014. New transmission is also planned elsewhere in the state to facilitate development of electricity generation projects fueled by either natural gas or renewable sources. Transmission projects linking the northern and southern Nevada electric grids are aimed in part at enabling the connection of electricity generated from renewable energy projects in remote areas of Nevada to the state's population centers.

Nevada is one of the few states that generates electricity from geothermal resources, and those resources account for more than two-thirds of the state's renewable power generation. Nevada is second in the nation, after California, in the amount of geothermal power produced and has the country's largest untapped geothermal resources. Most of the rest of Nevada's renewable generation comes from hydroelectric power plants, primarily the Hoover Dam. The Hoover Dam also supplies electricity to Arizona and California and is a National Historic Landmark.

A small but increasing share of Nevada's electricity generation comes from solar resources, particularly several large-scale solar thermal and solar photovoltaic (PV) projects. The state leads the nation in solar power potential. By 2014, Nevada ranked among the top five states nationally in installed solar electric capacity. The world's first hybrid geothermal-solar PV plant, combining base-load geothermal and peaking solar generation, is in Nevada. The state also has wind power potential along ridgelines across Nevada. Because the federal government controls more than four-fifths of all land in the state, most large-scale projects need some federal rights-of-way. The state's first commercial wind farm on public lands opened in 2012. [1]

Nevada's renewable portfolio standard (RPS) requires a growing share of solar power in the renewable mix. Overall, the RPS requires that increasing percentages of electricity sold to retail customers in Nevada must come from renewable resources, reaching the goal of 25% of retail electricity sales by 2025.

A. Electric Utility Providers

Nevada Electric Energy Consumption by Provider- 2016 [2]

Electric energy consumption in Nevada consists of customers of the major providers listed below. NV Energy (Sierra Pacific Power Co. and Nevada Power Co.) provides 82.7 percent of the state's electrical power; 7.6 percent is provided by retail power marketers; 5.4 percent by electric cooperatives; 1.9 percent by the Colorado River Commission of Nevada, and the remaining by businesses, general improvement districts, municipal utilities, and others. While some of the service areas of several service providers extend into neighboring states, the electric energy consumption estimates presented in the table below are for Nevada only.

[2] 2017 State of Nevada Status of Energy Report
http://energy.nv.gov/uploadedFiles/energynvgov/content/About/GOE_2016_StatusOfEnergyReport.pdf

2016 Electric Energy Consumption[2]

Investor Owned	**29,920,031**	**MWh**
Nevada Power Co.[1]	21,581,533	
Sierra Pacific Power Co.[1]	8,338,498	
Retail Power Marketer	**2,729,156**	
Exelon Generation Company[1]	43,016	
Shell Energy North America[1]	1,428,623	
Silver State Energy Association[1]	1,037,031	
Tenaska Power Services[1]	220,486	
Cooperatives	**1,957,823**	
Harney Electric Coop, Inc.[1]	111,607	
Mt Wheeler Power, Inc.[1]	521,016	
Plumas-Sierra Rural Elec. Coop[1]	4,167	
Raft Rural Elec Coop Inc.[1]	51,295	
Surprise Valley Electrification[1]	141	
Valley Electric Assn, Inc.[1]	519,614	
Wells Rural Electric Co.[1]	749,983	
Political Subdivision	**443,254**	
Aha Macav Power Service[1]	22,851	
Overton Power District No 5[1]	362,966	
Lincoln County Power District No. 1[2]	43,700	
Alamo Power District No 3[2]	13,737	
Municipal	**257,762**	
Boulder City[1]	156,042	
City of Fallon[2]	83,354	
City of Caliente[2]	10,984	
City of Pioche[2]	7,382	
Colorado River Comm. of Nevada[1]	**675,530**	
Western Area Power Administration[1]	**26,123**	
Behind the Meter	**153,341**	
SolarCity Corporation[1]	99,904	
Spruce Finance[1]	1,059	
SunEdison LLC[1]	2,336	
Sunnova[1]	20,673	
SunPower Capital, LLC[1]	1,555	
Sunrun Inc.[1]	27,814	
Grand Total	**36,163,020**	**MWh**

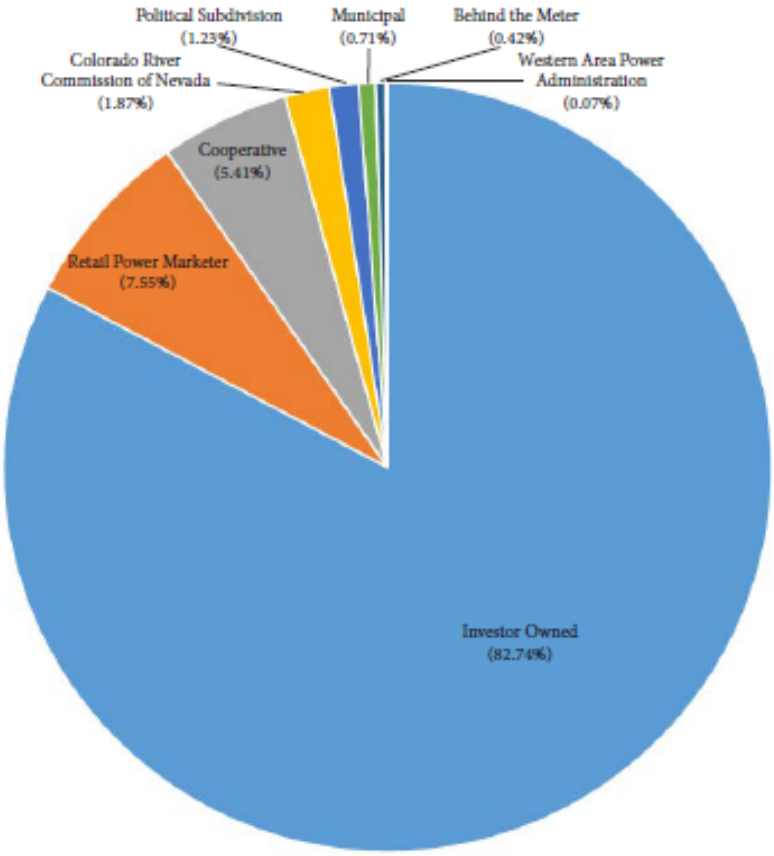

Figure 1 - Electric Energy Consumption by Provider

[1]Source: U.S. Energy Information Administration (EIA) 2016 Form 861 (Utility Sales)

[2]Source: EIA 2016 Form 861 (Short Form)

i. Investor owned utilities

NV Energy, Inc., headquartered in Las Vegas, provides energy services to 1.3 million customers throughout Nevada. NV Energy is a holding company whose principal subsidiaries, Nevada Power Company and Sierra Pacific Power Company, are doing business as NV Energy.

NV Energy has served citizens in northern Nevada for over 150 years, and southern Nevada since 1906. Las Vegas based Nevada Power Company, merged with Reno based Sierra

Pacific Power Company, and its holding company, Sierra Pacific Resources, in 1999. In 2008, subsidiaries Sierra Pacific and Nevada Power began doing business as NV Energy. NV Energy was acquired by Berkshire Hathaway Energy in 2013. NV Energy also provides natural gas to more than 155,000 citizens in the Reno-Sparks area.[3]

Shell Energy provides power to Barrick Goldstrike, Turquoise Ridge, and Cortez Mines[4]. The Southern Nevada Water Authority (SNWA) contracts with the Colorado River Commission for power generated at Hoover Dam and is allocated a percentage of the power.

ii. Publicly Owned Utilities

Valley Electric Association, Inc. (VEA) is a member-owned electric cooperative that provides service to more than 45,000 people within a 6,800 square mile service area located along the California-Nevada border, with the majority in Nevada. VEA, in addition to electric service, plans to offer high speed communication and internet service. On September 15, 2016, VEA announced that the VEA Board of Directors has approved the sale of VEA's 230 kV High Voltage Transmission System (HVTS) to GridLiance Holdco, L.P.[5]

Nevada Rural Electric Association (NREA) is comprised of ten publicly owned electric utilities serving customers in Nevada, including cooperatives, power districts and municipalities. Nevada's rural Utilities serve more than 60,000 customers, with service territories covering nearly 50,000 square miles, nearly 50% of the state.[6] The Nevada Rural Electric Association members get approximately two thirds of their electricity from hydroelectric and other renewable sources (2013 data). About 1/3 of NREA's utilities receive and distribute the majority of their power from the Bonneville Power Administration, a nonprofit federal power marketing administration based in the Pacific Northwest. Due to the remoteness, and size of the service territories, member utilities have significant distribution infrastructure, per consumer. NREA members as a whole have very low projected load growth. (**See Appendix A - Nevada Electric Utilities, for a list of utilities serving customers in rural Nevada**.)

The Colorado River Commission of Nevada (CRC) is an executive agency of the State of Nevada responsible for acquiring and managing Nevada's share of water and hydropower resources from the Colorado River.

The Southern Nevada Water Authority (SNWA) contracts with the Colorado River Commission for power generated at Hoover Dam and is allocated a percentage of the power. SNWA is a member of the Silver State Energy Association (SSEA), a cooperative association between public agencies with the common goal to jointly plan, develop, own and operate power resources to meet their own needs and those of their customers. Other members of the SSEA include the City of Boulder City, the Colorado River Commission of Nevada, Lincoln County Power District No. 1 and Overton Power District No. 5. [7]

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[3] NV Energy; https://www.nvenergy.com/company/; (Accessed 11/1/16)
[4] U.S. DOE; http://energy.gov/savings/energy-portfolio-standard, (Accessed 11/3/16)
[5] Valley Electric Association, http://www.vea.coop/content/valley-electric-association-sell-its-transmission-system-gridliance, (accessed 11/1/16)
[6] David Luttrell; GM Lincoln County Power District No. 1; "Grid Modernization and Resiliency Presentation May 12, 2016. http://energy.nv.gov/uploadedFiles/energynvgov/content/Programs/5%20-%20LuttrellEnergy%20Task%20Force%20042716.pdf (Accessed 11/21/16)
[7] Southern Nevada Water Authority (SNWA); https://www.snwa.com/env/sustain.html, (Accessed 11/3/16)

iii. Public Utilities Commission of Nevada

The PUCN has broad regulatory authority to implement the State's energy policies, including developing renewable energy resources within Nevada and promoting energy conservation, while promoting safe and reliable service at just and reasonable rates.

The PUCN regulates the operations of Sierra Pacific Power Company and Nevada Power Company, both of which conduct business as NV Energy. The PUCN regulates the service territories, but not the rates or service quality of municipally-owned or cooperative electric utilities.

B. Delivery Systems

i. Transmission systems

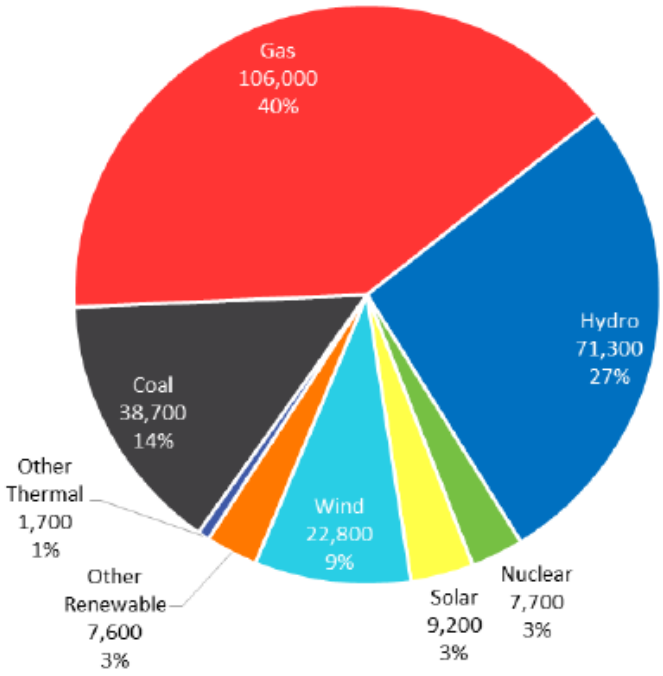
The Western Electricity Coordinating Council (WECC)
WECC is geographically the largest and most diverse of the eight Regional Entities that have Delegation Agreements with the North American Electric Reliability Corporation. WECC's service territory extends from Canada to Mexico. It includes the provinces of Alberta and British Columbia, the northern portion of Baja California, Mexico, and all or portions of the 14 Western states between.[8]

The Western Interconnection has a diverse mix of resources, including large amounts of hydro and renewable resources. The Western Interconnection relies less on coal and nuclear resources than the Eastern Interconnection. The roughly 265,000 MW of generation capacity in the Western Interconnection make up approximately 20 percent of all capacity in the United

[8] WECC, https://www.wecc.biz/Reliability/2011Plan_Backgrounder.pdf, (Accessed 11/1/16)

States and Canada. However, the Interconnection has 35 percent of all wind and solar capacity, and 40 percent of all hydro capacity.[9]

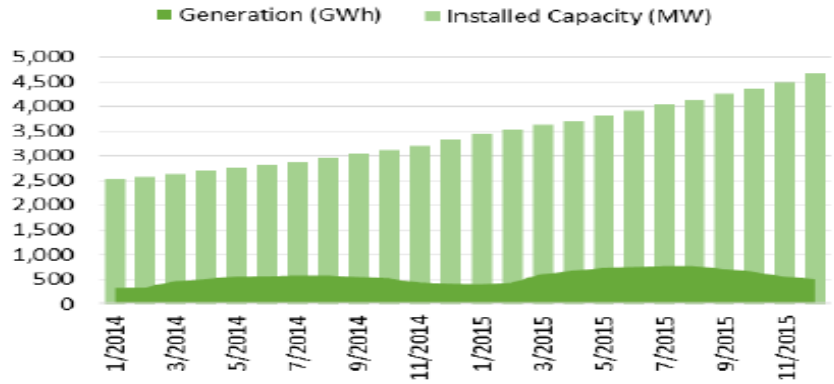
WECC 2015 Nameplate Generation Capacity[9]



Installed capacity of rooftop solar in the Western Interconnection has increased by 85 percent over the last two years. Capacity has grown linearly, averaging a net increase of 115 MW per month during 2015.

The majority of this growth is in California, where lots of sun, electricity prices and incentives have made rooftop solar a viable option. Increases in rooftop solar create operational challenges because it is behind-the-meter generation. It cannot be measured or dispatched by system operators, but its variability must be balanced by other resources.

WECC Rooftop Solar[9]



Nevada Transmission Systems

Two separate transmission grids provide power to Nevada. One grid supplies the Las Vegas area and is connected to the Arizona, southern Utah, and California grids. The other power grid supplies communities in the northern part of Nevada, including the cities of Elko and Reno. The northern grid is tied into Idaho, northern Utah, and northern California. Transmission projects running the length of the state, through the eastern desert from Idaho to Las Vegas, connected the two grids for the first time in 2014. New transmission is also planned elsewhere in the state to facilitate development of electric generation projects fueled by either natural gas or renewable sources. Other large-scale transmission projects are routed through Nevada for the delivery of renewable power to the California, Arizona, and Nevada. The transmission projects linking the northern and southern Nevada electric grids, the Southwest Intertie Project (SWIP)[10], are aimed in part at enabling the connection of electricity generated from renewable energy projects in remote areas of Nevada to the state's population centers.[11]

The consolidated Nevada Power and Sierra transmission Balancing Authority Area ("BAA") encompasses approximately 45,000 square miles. Nevada Power owns approximately 1965 miles of FERC jurisdictional transmission lines with voltages ranging from 69kV to 500kV.[12] Transmission services are offered under the consolidated Sierra and Nevada Power Open Access Transmission Tariff (OATT).

Nevada Power's transmission system (as of IRP Dkt 15-0004) is described by three sections. Section 1 is referred to as the internal system located within the Las Vegas Valley. Section #2, formerly known as the Southern Cut Plane, are the transmission lines Nevada Power uses to transfer power with major substations on the southern interface of its transmission system. Section # 3 is referred to as the Northern Cut Plane and comprises the 345 kV interconnection with PacifiCorp, and interconnection with the Navaho-Crystal- McCullough 500kV line.[12]

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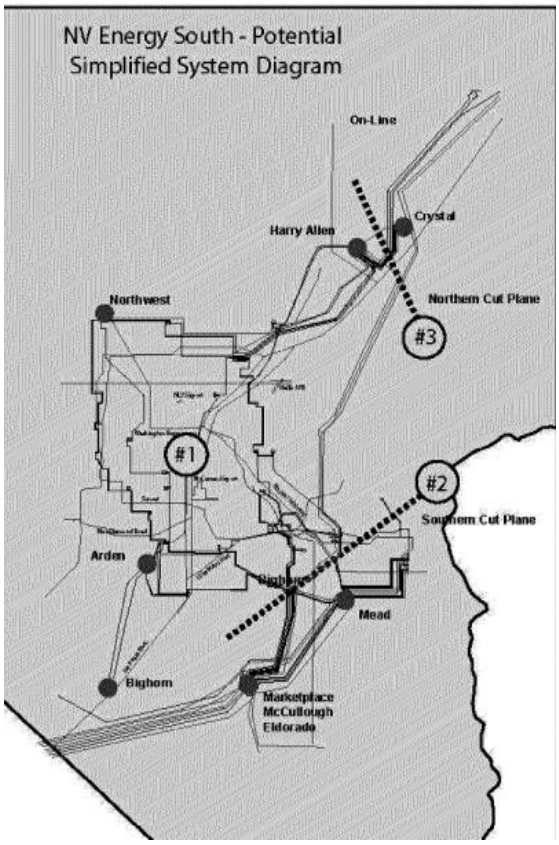
[9] WECC, 2016 State of the Interconnection; https://www.wecc.biz/Reliability/2016%20SOTI%20Final.pdf ; (Accessed 11/1/16)

[10] LS Power – Southwest Interties Project, Sandeep Arora RET2.0 – Transmission Technical Input Group http://docketpublic.energy.ca.gov/PublicDocuments/15-RETI-02/TN208289_20160121T121359_LS_Power__Southwest_Intertie_Project.pdf ; (Accessed 11/1/16)

[11] U.S. Energy Information Administration; Nevada State Profile; http://www.eia.gov/state/analysis.cfm?sid=NV; (Accessed 11/2/2016)

[12] PUCN Docket 15-07004; Nevada Power IRP; Vol-12 Supply Plan and Technical Appendix; http://pucweb1.state.nv.us/PDF/AxImages/DOCKETS_2015_THRU_PRESENT/2015-7/3649.pdf ; Over view of Nevada Power's Transmission System; (Accessed 11/1/16)

Nevada Power Transmission System Diagram[12]



The Southwest Intertie Project (SWIP)[13]

[13]LS Power – Southwest Interties Project, Sandeep Arora RET2.0 – Transmission Technical Input Group http://docketpublic.energy.ca.gov/PublicDocuments/15-RETI-02/TN208289_20160121T121359_LS_Power__Southwest_Intertie_Project.pdf ; (Accessed 11/1/16)

- SWIP North (Midpoint to Robinson Summit 500kV line) - Target in-service date 2020. The key benefits include delivery of Wyoming wind energy to the California market, access to low cost solar for Rocky mountain power and others, complements other proposed projects, and improves transfer capability between CAISO, PacifiCorp, NV Energy, Idaho Power and BPA.

- ON Line (Robinson Summit to Harry Allen 500 kV line) - Currently in service. The "One Nevada Line" connected NV Energy's northern and southern service areas first time and enabled development of renewable energy in remote areas of Nevada.[14] The 235-mile, 500-kV line which extends from the Thirtymile substation in White Pine County, Nev., to the Harry Allen substation in Clark County, Nev., began service in 2014 and is the central leg of a three-phase transmission plan to increase capacity from southern Idaho to the Eldorado substation.[15]

- DesertLink Line for CAISO (Harry Allen to Eldorado kV Line) - In service by 2020. The Harry Allen – Eldorado 500kV Transmission Project is a 60 mile extension of "One Nevada Line" that will connect the Nevada transmission system to California's power grid. The increased connectivity is expected to strengthen grid reliability and improve the integration of Nevada's renewable energy resources[16]

ii. **Distribution systems**

NV Energy, Inc. provides energy services to 1.3 million customers throughout Nevada and nearly 40 million tourists annually. Among the communities that receive power from NV Energy are Henderson, Las Vegas, and North Las Vegas in the south, and Carson City, Elko, Fernley, Reno, and Sparks in the north. NV Energy also provides natural gas to more than 155,000 citizens in the Reno-Sparks area. NV Energy is a holding company whose principal subsidiaries, Nevada Power Company and Sierra Pacific Power Company, are doing business as NV Energy. The company is headquarter ed in Las Vegas, and was acquired by Berkshire Hathaway Energy in 2013.

Sierra Pacific generates, transmits, and distributes electric energy to over 330,000 customers and its electric service territory covers nearly 50,000 square miles of western, central and northeastern Nevada, including the cities of Reno, Sparks, Carson City, and Elko. Sierra also provides natural gas service to over 150,000 customers in a service territory of about 800 square miles in the Reno/Sparks area.[17]

Nevada Power generates, transmits and distributes electric energy to approximately 900,000 customers in Las Vegas, North Las Vegas, Henderson, Searchlight, Laughlin, and Adjoining

[14]NV Energy; "One Nevada Line Begins Serving Customers" ; 11/23/14; http://www.lspower.com/News/linked%20articles/2014%20ms%20js%20on%20line%20dedication%20final.pdf (Accessed 11/1/16)

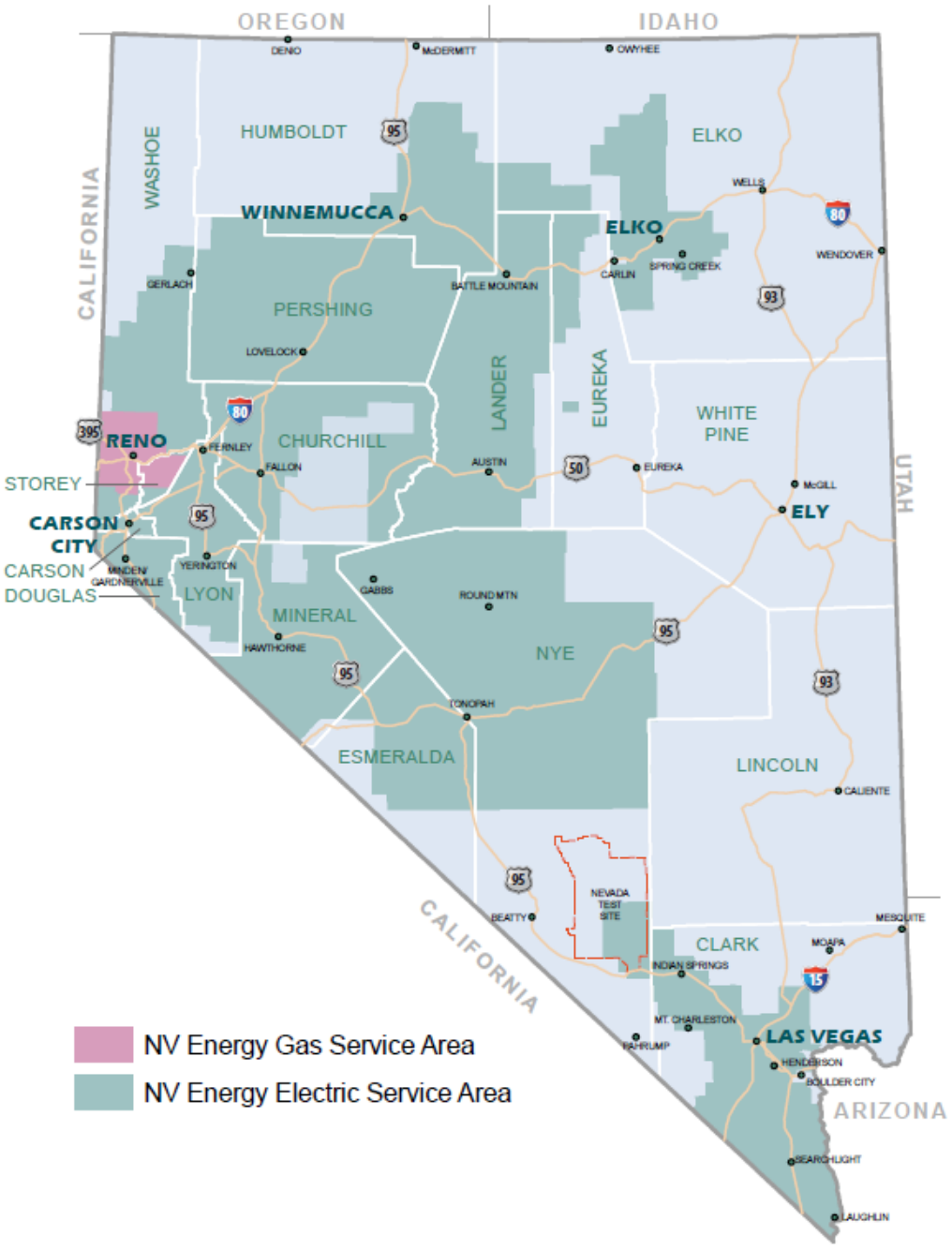
[15] Transmission Hub "NV Energy seeks approval of new capacity plan for ON transmission line" 4/14/16 http://www.transmissionhub.com/articles/2016/04/nv-energy-seeks-approval-of-new-capacity-plan-for-on-transmission-line.html (Accessed 11/1/16)

[16] Nevada Governor's Office of Energy; "Approved Transmission Line Will Unblock More Nevada Energy Resources";http://energy.nv.gov/Media/Press_Releases/2014/Approved_Transmission_Line_Will_Unlock_More_Nevada_Energy_Resources/. (Accessed 11/1/16)

[17]Sierra Pacific Power Company IRP; PUCN Docket No. 16-07001, Volume 4 of 16 - Summary http://pucweb1.state.nv.us/PDF/AxImages/DOCKETS_2015_THRU_PRESENT/2016-7/13030.pdf (Accessed 11/1/16)

areas, including the Nellis Air Force Base, Nevada Power (and Sierra Pacific) are regulated by the PUCN and FERC. [18]

NV Energy Electric Service Territory [19]



[18] Nevada Power Company IRP: PUCN Docket 15-07004; Nevada Power IRP; Volume 4 of 18 Summary http://pucweb1.state.nv.us/PDF/AxImages/DOCKETS_2015_THRU_PRESENT/2015-7/3640.pdf (Accessed 11/1/16)
[19] NV Energy Service Territory; https://www.nvenergy.com/company/territory.cfm (Accessed 02/07/17)

Nevada's rural cooperative utilities are democratically organized and controlled by their members, who actively participate in setting policies and making decisions. Members of the Board of Directors are elected by and from local citizens who take service from the utility. Each member is cooperatively organized and owned by their members or a consumer-owned not for profit utility.

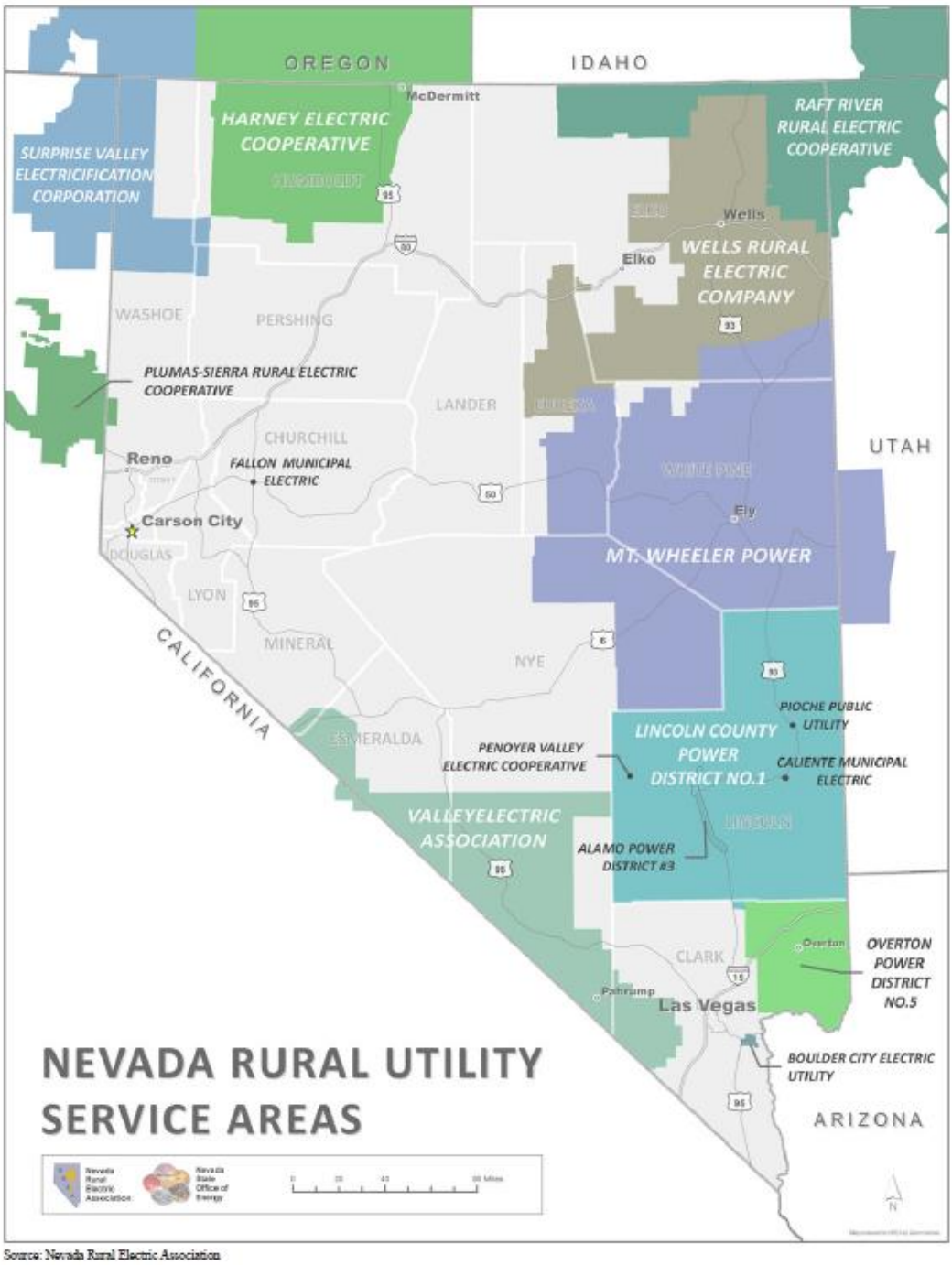
The Nevada Rural Electric Association, which is comprised of most rural cooperatives, receives approximately two thirds of their electricity from hydroelectric and other renewable sources (2013 data). About 1/3 of NREA's utilities receive and distribute the majority of their power from the Bonneville Power Administration, a nonprofit federal power marketing administration based in the Pacific Northwest.[20] Due to the remoteness, and size of the service territories, member utilities have significant distribution infrastructure, per consumer. NREA members as a whole have very low projected load growth. Nevada's rural cooperatives serve more than 60,000 customers, with service territories covering nearly 50,000 square miles, nearly 50% of the state.[21] These member utilities range in size from less than 1,000 services (Lincoln County Power District in southeast Nevada) to less than 14,000 (Overton Power District # 5 in Clark County). [22]

[20] Hank James; Nevada Rural Electric Association

[21] David Luttrell; GM Lincoln County Power District No. 1; "Grid Modernization and Resiliency Presentation May 12, 2016. http://energy.nv.gov/uploadedFiles/energynvgov/content/Programs/5%20-%20LuttrellEnergy%20Task%20Force%20042716.pdf (Accessed 11/21/16)

[22] Presentation to the Assembly Commerce and Labor Committee; Nevada Rural Electric Association; http://www.leg.state.nv.us/Session/77th2013/Exhibits/Assembly/CL/ACL326N.pdf (Accessed 11/1/16)

Nevada Rural Electric Utility Service Territories [23]



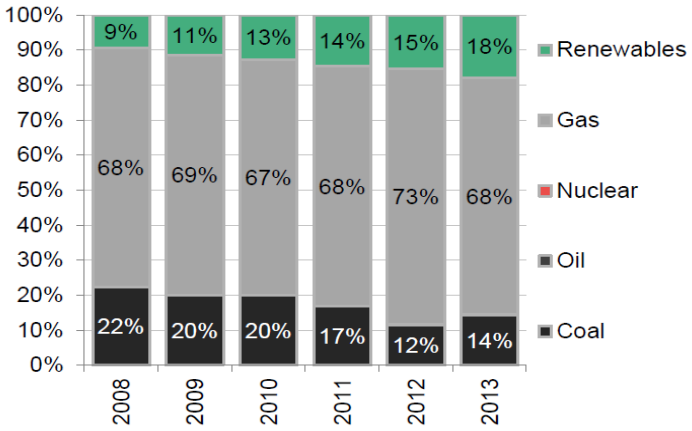
Source: Nevada Rural Electric Association

[23] http://puc.nv.gov/uploadedFiles/pucnvgov/Content/Utilities/Nevada_Rural_Utility_Service_Areas.pdf (Accessed 02/07/17)

C. Generation (in-state, out of state, and imports)

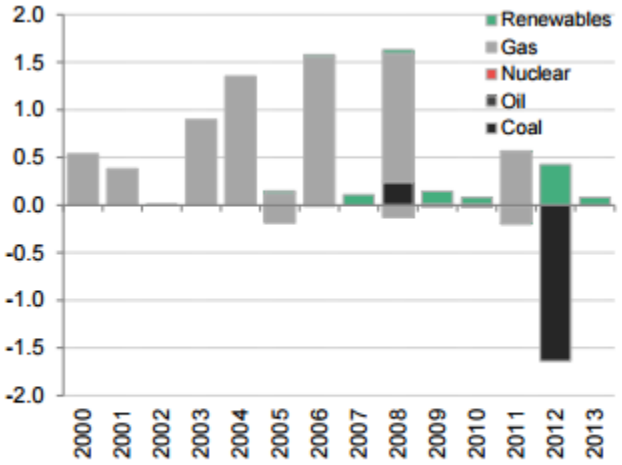
Nevada (NV) consumes nearly as much electricity as it produces (35TWh of consumption versus 36TWh of generation in 2013), with industrial, residential and commercial customers accounting for 39%, 35% and 26% of retail sales, respectively[24].

Nevada Electricity Sales and Generation, 2008-13 (TWh) [24]



Source: Bloomberg New Energy Finance, EIA Note: Oil too small to see on figure. Nevada has no nuclear capacity.

Nevada Utility-scale capacity Additions (build above, retirements below) [24]



Source: Bloomberg New Energy Finance, EIA Note: Nevada neither added nor retired any nuclear or oil capacity between 2000 and 2013.

[24] Bloomberg State energy Factsheet; Nevada September 2015
http://www.bcse.org/images/2015EFGrant/BNEF_BCSE_Nevada%20Energy%20Factsheet.pdf (Accessed 11/1/16)

Ten Largest Plants by Capacity, 2015
Nevada

	Plant	Primary energy source	Operating company	Net summer capacity (MW)
1	Chuck Lenzie Generating Station	Natural gas	Nevada Power Co	1,170
2	Clark (NVE)	Natural gas	Nevada Power Co	1,141
3	Hoover Dam (NV)	Hydroelectric	U S Bureau of Reclamation	1,039
4	Tracy	Natural gas	Sierra Pacific Power Co	898
5	Harry Allen	Natural gas	Nevada Power Co	654
6	Silverhawk	Natural gas	Nevada Power Co	560
7	Higgins Generating Station	Natural gas	Nevada Power Co	550
8	North Valmy	Coal	Sierra Pacific Power Co	522
9	Apex Generating Station	Natural gas	Los Angeles Department of Water & Power	494
10	Desert Star Energy Center	Natural gas	Desert Star Energy Center SDG&E	450

Source: U.S. Energy Information Administration, Form EIA-860, "Annual Electric Generator Report."

Ten Largest Plants by Generation, 2015
Nevada

	Plant	Primary energy source	Operating company	Generation (MWh)
1	Chuck Lenzie Generating Station	Natural gas	Nevada Power Co	7,245,523
2	Harry Allen	Natural gas	Nevada Power Co	3,826,989
3	Tracy	Natural gas	Sierra Pacific Power Co	3,686,069
4	Apex Generating Station	Natural gas	Los Angeles Department of Water & Power	2,647,857
5	Higgins Generating Station	Natural gas	Nevada Power Co	2,604,711
6	Silverhawk	Natural gas	Nevada Power Co	2,566,599
7	Hoover Dam (NV)	Hydroelectric	U S Bureau of Reclamation	2,248,649
8	Desert Star Energy Center	Natural gas	Desert Star Energy Center SDG&E	2,184,488
9	North Valmy	Coal	Sierra Pacific Power Co	1,425,257
10	Clark (NVE)	Natural gas	Nevada Power Co	899,121

Source: U.S. Energy Information Administration, Form EIA-923, "Power Plant Operations Report" and predecessor forms.

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i. Fossil generation

Nevada's gas-fired plants provided 73% of in-state generation in 2012 and have generated no less than 67% of the mix in any year since 2008. Gas-fired capacity accounted for 70% in 2013, up from 50% in 2000, owing to the addition of 6.8GW of gas capacity (and the retirement of 1.6GW of coal capacity). Coal's share of the power mix fell from 22% in 2008 to 14% in 2013, and over 500MW of coal plants are slated to retire between 2014 and 2017. Meanwhile, renewables have become more important: renewable energy generation grew from 9% in 2008 to 18% in 2013, as the state added 760MW of utility-scale renewable capacity over that period.

Nevada legislature's 2013 Senate Bill 123 required Nevada's investor-owned electric utility, NV Energy, to eliminate 800 megawatts of coal-fired power plants from its portfolio and replace these plants with a mix of cleaner-than-coal natural gas and renewable generation.

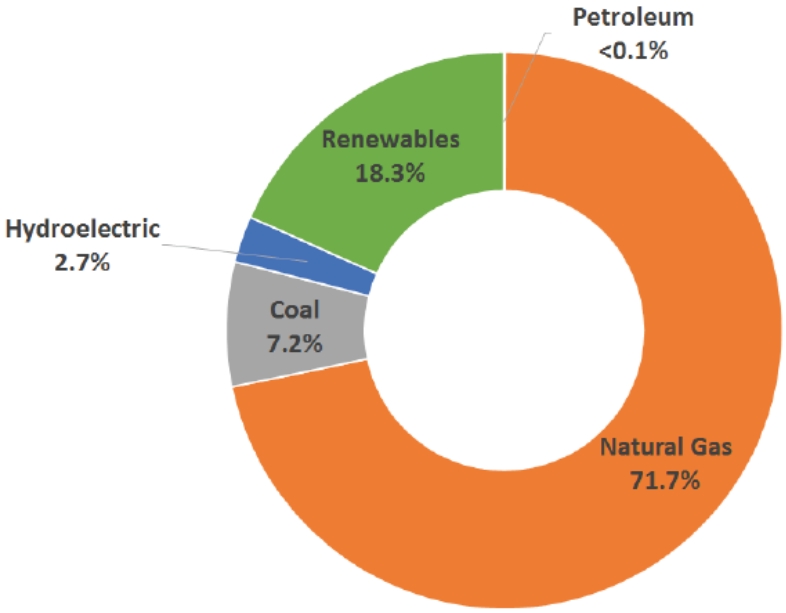
[25] U.S. Energy Information Administration; Nevada State Profile; http://www.eia.gov/state/analysis.cfm?sid=NV; (accessed 11/2/2016)

These 800 megawatts comprised the Reid Gardner Generating Station and NV Energy's portion of the Navajo Generating Station. 26

Senate Bill 123 did not address two northern Nevada coal facilities: the 522-megawatt North Valmy Generating Station, jointly owned by NV Energy and Idaho Power, and the 200-megawatt TS Power Plant, which is owned by Newmont Mining Corp and supplies electricity to its mines and NV Energy customers. 26

In 2013, Nevada Public Utilities Commission approved a 2025 retirement date for both Valmy units. [27]

Nevada's Net Electricity Generation by Source [28]



Source: EIA; data through August 2017

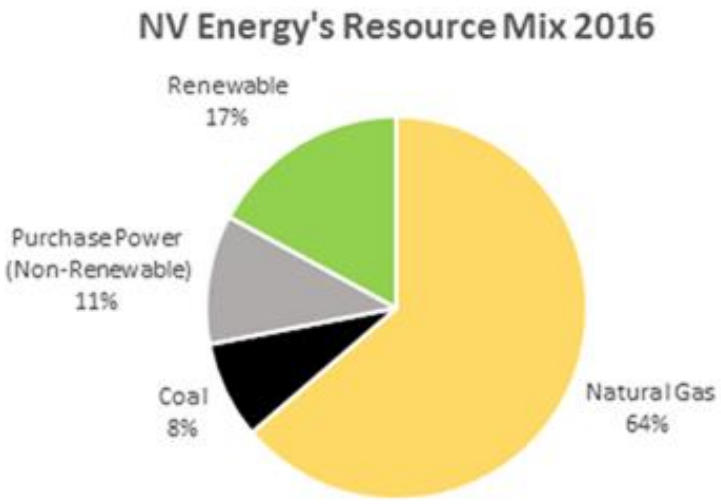
[26] Dylan Sullivan for the Natural Resources Defense Council; October 20, 2016 http://ieefa.org/blogs-nevada-can-close-last-2-coal-fired-plants-without-affecting-grid/ (accessed 11/23/16)

[27] Comings, Jackson, Fisher; Synapse Energy Economics, Inc; "The Economic Case for Retiring North Valmy Generating Station; June 2016; http://energy.nv.gov/uploadedFiles/energynvgov/content/Programs/Sierra_Club%20Synapse%20Valmy%20Final%206-1%20clean.pdf (Accessed 11/23/16)

[28] Source: EIA data through August 2107

NV Energy-Owned Generating Resources

NV Energy owns and operates power facilities that keep the lights on for over 1.3 million customers throughout Nevada, as well as a state tourist population exceeding 40 million annually. [29] [30]

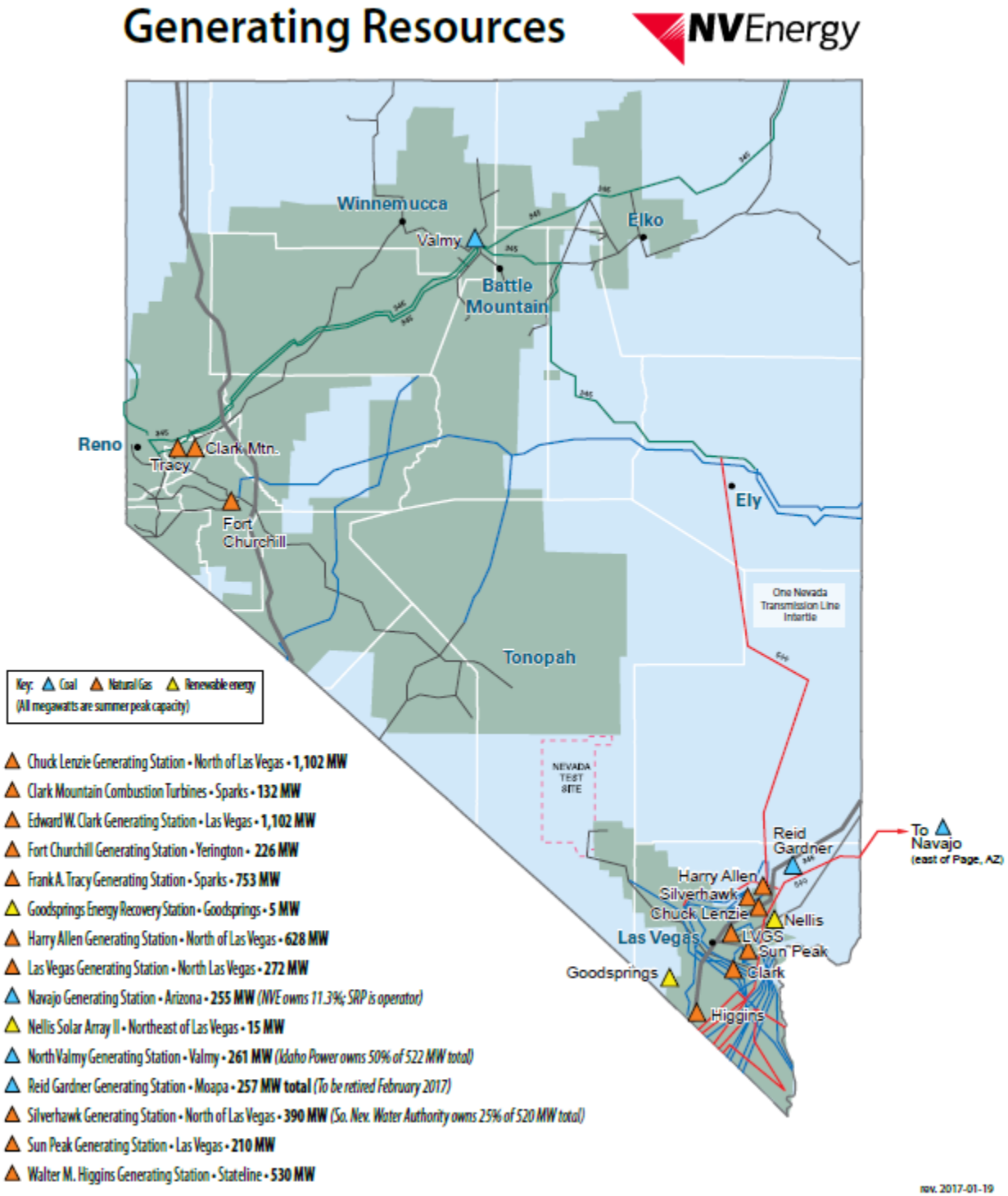


NV Energy serves its customers through a generation portfolio primarily fueled by natural gas but renewable energy also is an important part of the company's generation mix. Currently, the company has contracts with 35 renewable energy facilities to provide energy to customers, including geothermal, solar thermal, solar photovoltaic, hydro, biomass, wind and waste-heat recovery. Five additional projects are in development or under construction[31]

See Appendix B - Nevada Generating Stations, for a list and description of NV Energy's generating stations in Nevada.

[29] NV Energy; https://www.nvenergy.com/company/energytopics/where.cfm (accessed 11/2/2016)
[30] October 13, 2016 email from Mark Severts, NV Energy, to Scott Kelley GOE PIO.
[31] NV Energy; "Lighting Up the Nevada Economy; http://www.berkshirehathawayenergyco.com/our-businesses/nv-energy; (accessed 11/2/2016)

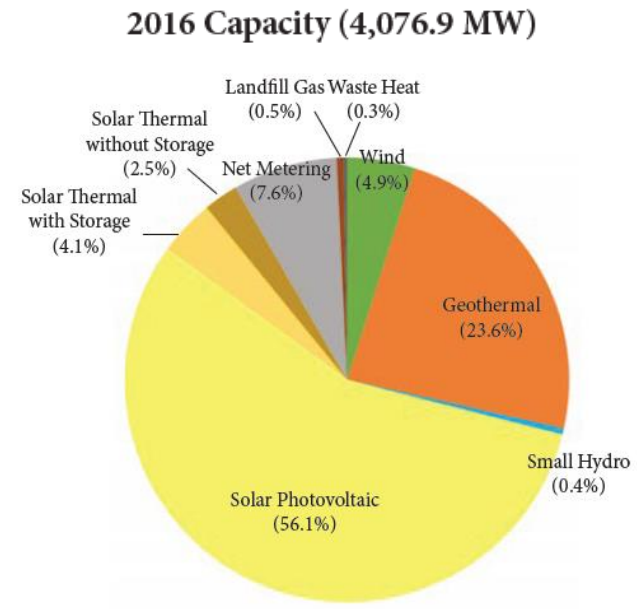
NV Energy Generating Resources (rev. 2017-01-19)[32]



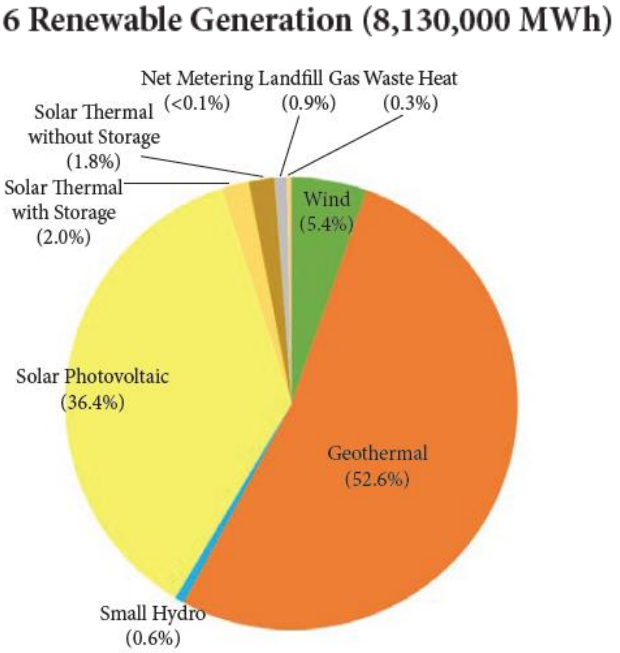
[32] NV Energy; https://www.nvenergy.com/company/energytopics/images/GeneratingStations.pdf (Accessed 2/8/16)

ii. Renewable Generation

Nevada Renewable Electric Generation by Source Type [2]



Source: EIA 2016 From 860; Note: graph does not show Hoover Dam.

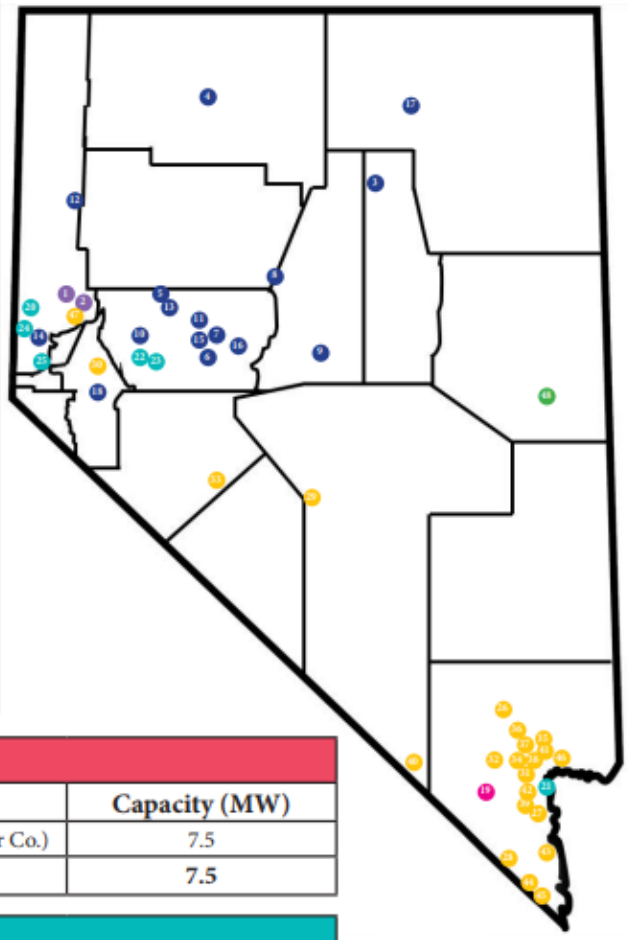


Source: EIA 2016 From 923; Note: net metering value represents the amount of energy sold back to the grid; graph does not show Hoover Dam

Nevada Renewable Energy Portfolio [2]

Biomass / Biogas / Landfill		
	Power Plant Name	**Capacity (MW)**
1	Clark County Landfill Energy (DCO Energy LLC)	12.0
2	Waste Management Lockwood LFGTE (WM Renewable Energy LLC)	3.2
	Subtotal (Biomass)	**15.2**

Geothermal		
	Power Plant Name	**Capacity (MW)**
3	Beowawe Power (Terra-Gen)	20.6
4	Blue Mountain (NGP/AltaRock)	63.9
5	Brady Complex (Ormat)	58.9
6	Dixie Valley (Terra-Gen)	60.5
7	Don A. Campbell (I & II) (Ormat)	47.5
8	Jersey Valley (Ormat)	23.5
9	McGinness Hills (I & II) (Ormat)	100.0
10	Patua Phase 1A (Cyrq)	48.0
11	Salt Wells (Enel)	23.6
12	San Emidio (U.S. Geothermal)	11.8
13	Soda Lake No I II (Cyrq)	26.1
14	Steamboat Complex (Ormat)	131.7
15	Stillwater (Enel)	47.2
16	*Tungsten Mountain (Ormat)	24.0
17	Tusarora (Ormat)	24.0
18	Wabuska (Homestretch)	5.4
	Subtotal (Geothermal)	**716.7**



Waste Heat		
	Power Plant Name	**Capacity (MW)**
19	Goodsprings Waste Heat Recovery (Nevada Power Co.)	7.5
	Subtotal (Waste Heat)	**7.5**

Hydroelectric		
	Power Plant Name	**Capacity (MW)**
20	Fleish (Truckee Meadows Water Authority)	2.0
21	Hoover Dam (NV Allocation)	1,039.4
22	Lahontan (Truckee-Carson Irrigation District)	1.8
23	New Lahonton (Truckee-Carson Irrigation District)	4.0
24	Verdi (Truckee Meadows Water Authority)	2.4
25	Washoe (Truckee Meadows Water Authority)	2.6
	Subtotal (Hydroelectric)	**1,052.2**

Source: EIA 2016 Form 860. Schedule 3.
* Indicates new generation online in 2017.

Nevada Renewable Energy Portfolio [2]

Solar		
	Power Plant Name	**Capacity (MW)**
26	Apex Solar (Southern Power Co.)	20.0
27	Boulder Solar (Southern Power Co.)	100.0
27	*Boulder Solar II (AEP Renewables)	50.0
28	Copper Mountain 1-3 (Sempra)	467.0
28	*Copper Mountain 4 (Sempra) - 12/2016	94
29	Crescent Dunes (SolarReserve) [1]	125.0
30	Ft. Churchill (Apple)	19.9
31	*IKEA Las Vegas (IKEA)	1.0
32	Las Vegas WPCF (City of Las Vegas)	3.3
33	*Luning Energy (Algonquin Power Co.)	50.0
34	Mandalay Bay-1 (MGM)	5.0
34	Mandalay Bay-2 (MGM)	1.9
35	Moapa Southern Paiute (First Solar)	250.0
36	Mountain View (NextEra)	20.0
37	Nellis Air Force Base (Solar Star NAFB)	14.0
38	Nellis PV II (Nevada Power Co.)	15.0
39	Nevada Solar One (Acciona Solar Power) [1]	75.7
40	Nevada Valley Solar Solutions II (VEA)	15.0
10	*Patua Geothermal (Cyrq)	10.6
41	*Playa Solar 2 (EDF), (Switch 1)	100.0
41	*Playa Solar 1 (EDF), (Switch 2)	79.0
42	*River Mountains Solar (SNWA)	14.4
43	Searchlight Solar (Searchlight Solar)	17.5
44	Silver State Solar North (Enbridge)	52.0
45	Silver State Solar South (NextEra)	250.0
46	Spectrum Solar (Southern Power Co.)	30.0
15	Stillwater (Enel)	22.0
47	Western 102 (Barrick Goldstrike Mines)	1.0
	Subtotal (Solar)	**1,903.3**
Net Metered		
Subtotal (Net Metered, All Technologies, MW)		**232**
Wind		
	Power Plant Name	**Capacity (MW)**
48	Spring Valley Wind Project (Pattern)	150.0
	Subtotal (Wind)	**150.0**
		Total 4,076.9

Source: EIA 2016 Form 860. Schedule 3.
Net Metered: EIA 2016 Form 826, data through 10/2017.
[1] Concentrated Solar Plant
* Indicates new generation online in 2017.

1. **Domestic**

Between 2008 and 2013, Nevada built 760MW of utility-scale renewables, bringing cumulative installed utility-scale renewable capacity to 2.2GW. Geothermal development has lagged behind other renewables nationally, however the technology has had success in Nevada, home to the only two geothermal projects commissioned in 2014. In addition, the state saw over 30MW of residential PV build through 2013 and estimate that it is currently the third-largest residential solar PV market in the country (as of the first quarter of 2015).

As renewable energy generation grew (from 9% in 2008 to 18% of annual generation between 2008 and 2013, driven by geothermal, solar and wind) coal generation trended downwards (it fell from 22% to 14% over that period). Nevada Power planned to retire 557 MW of coal capacity between 2014 and 2017 (and eliminate its ownership interest in another 255 MW by 2020) in order to comply with state legislation passed in 2013. [33]

Most NV Energy customers are benefitting from more than 40 solar, geothermal, wind, hydro and other renewable energy technologies being produced in Nevada. More than 300 megawatts of new solar energy is in the construction stage. In its August 15, 2016 Emissions Reduction and Capacity Replacement second amendment filing, NV Energy requested that the Public Utilities Commission of Nevada approve a new 100-megawatt solar project in Boulder City, Nevada. This new 100-megawatt Techren Solar project would bring NV Energy's total renewable energy portfolio to more than 1,900 megawatts. 34 (See Appendix F: PUCN Exhibit - New and Proposed Generation Plants in Nevada, updated March 2016)

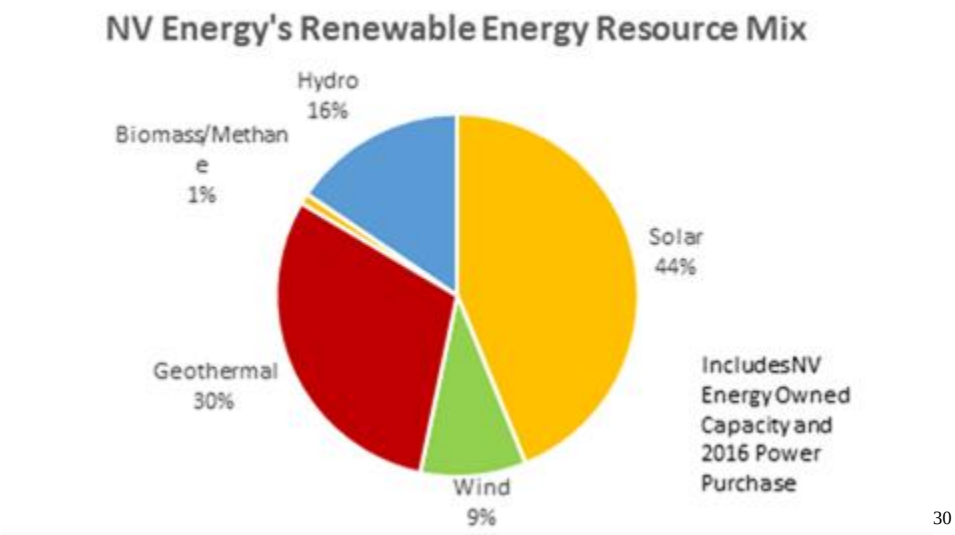
Crescent Dunes Solar Energy, a 110 megawatt (MW) concentrating solar power (CSP) electricity plant, began full operation in February, 2016. Crescent Dunes developers expect it to generate more than 500,000 megawatt hours annually, equivalent to 1.3% of Nevada's 2015 utility scale net generation from all sources. 35 NV Energy purchases 100% of the electricity produced under a 25-year contract, and uses this electricity for distribution to its customers in the state of Nevada during peak demand periods. [36]

[33] Bloomberg State energy Factsheet; Nevada September 2015 http://www.bcse.org/images/2015EFGrant/BNEF_BCSE_Nevada%20Energy%20Factsheet.pdf (Accessed 11/1/16)

[35] U.S. Energy Information, Crescent Dunes concentrating solar plant begins producing electricity, March 2016; http://www.eia.gov/todayinenergy/detail.php?id=25212 (Accessed 11/21/16)

[36] Solar Reserve; Crescent Dunes; http://www.solarreserve.com/en/global-projects/csp/crescent-dunes (Accessed 11/21/16)

2. Export



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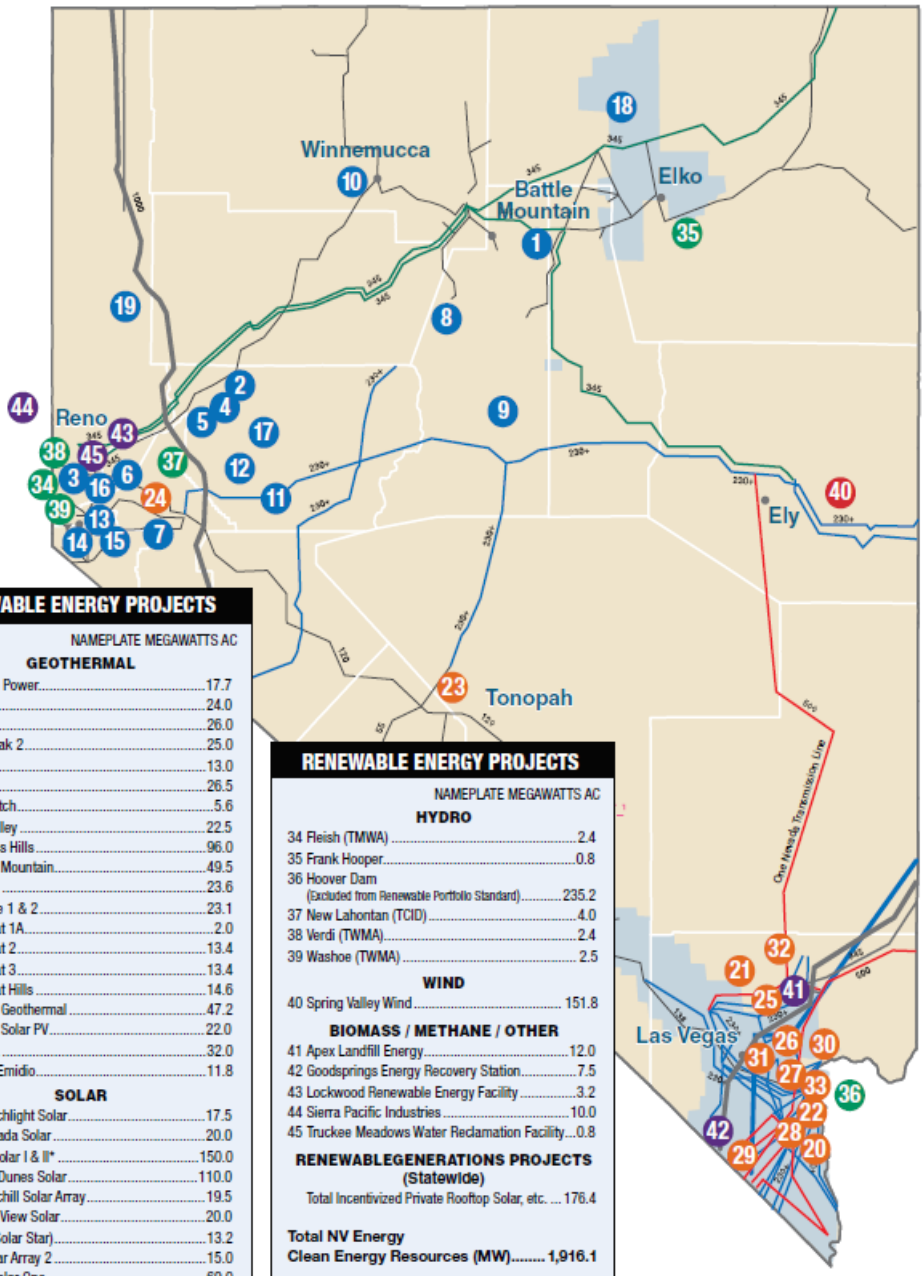
In August 2016, NV Energy requested that the Public Utilities Commission of Nevada approve a new 100-megawatt solar project in Boulder City, Nevada and an earlier retirement date for the remaining 257-megawatt unit at the Reid Gardner Generating Station. The proposal asks to move the original December 31, 2017, retirement date to February 28, 2017. [34]

NV Energy noted that the filing is its next step in the transformation of NV Energy's fuel mix, moving to a cleaner, more balanced generation portfolio. This request aligns with the Nevada legislature's 2013 directive in Senate Bill 123 for a structured and orderly retirement of coal-fired generation in southern Nevada and replacing that generation with renewable energy and natural gas-fueled resources. The company retired the first three generating units at Reid Gardner at the end of 2014 and is also exiting its participation in Arizona's Navajo Generating Station by the end of 2019. [34]

NV Energy signed a 25-year power purchase agreement with Techren Solar LLC to build a 100-megawatt high-efficiency single-axis solar photovoltaic project in Eldorado Valley. The project is in the development phase and, subject to regulatory approval, is expected to be operational in the fourth quarter of 2018.

At an average cost of energy for the life of the project at approximately four cents per kilowatt-hour, this is one of the lowest-cost solar projects in the nation.

NV Energy's Clean Energy Commitment



RENEWABLE ENERGY PROJECTS

NAMEPLATE MEGAWATTS AC

GEOTHERMAL

1	Beowawe Power	17.7
2	Brady	24.0
3	Burdette	26.0
4	Desert Peak 2	25.0
5	Galena 2	13.0
6	Galena 3	26.5
7	Homestretch	5.6
8	Jersey Valley	22.5
9	McGinness Hills	96.0
10	NGP Blue Mountain	49.5
11	Salt Wells	23.6
12	Soda Lake 1 & 2	23.1
13	Steamboat 1A	2.0
14	Steamboat 2	13.4
15	Steamboat 3	13.4
16	Steamboat Hills	14.6
17	Stillwater Geothermal	47.2
	Stillwater Solar PV	22.0
18	Tuscarora	32.0
19	USG San Emidio	11.8

SOLAR

20	ACE Searchlight Solar	17.5
21	Apex Nevada Solar	20.0
22	Boulder Solar I & II*	150.0
23	Crescent Dunes Solar	110.0
24	Fort Churchill Solar Array	19.5
25	Mountain View Solar	20.0
26	Nellis 1 (Solar Star)	13.2
27	Nellis Solar Array 2	15.0
28	Nevada Solar One	69.0
29	Silver State Solar North	52.0
30	Spectrum Nevada Solar	30.0
31	SunPower (Las Vegas Valley Water District)	3.0
32	Switch Station 1 & 2*	179.0
33	Techren Solar Energy Project**	100.0

* In construction or development
** Subject to regulatory approval

RENEWABLE ENERGY PROJECTS

NAMEPLATE MEGAWATTS AC

HYDRO

34	Fleish (TMWA)	2.4
35	Frank Hooper	0.8
36	Hoover Dam (Excluded from Renewable Portfolio Standard)	235.2
37	New Lahontan (TCID)	4.0
38	Verdi (TWMA)	2.4
39	Washoe (TWMA)	2.5

WIND

40	Spring Valley Wind	151.8

BIOMASS / METHANE / OTHER

41	Apex Landfill Energy	12.0
42	Goodsprings Energy Recovery Station	7.5
43	Lockwood Renewable Energy Facility	3.2
44	Sierra Pacific Industries	10.0
45	Truckee Meadows Water Reclamation Facility	0.8

RENEWABLEGENERATIONS PROJECTS (Statewide)

Total Incentivized Private Rooftop Solar, etc. ... 176.4

Total NV Energy Clean Energy Resources (MW)..... 1,916.1

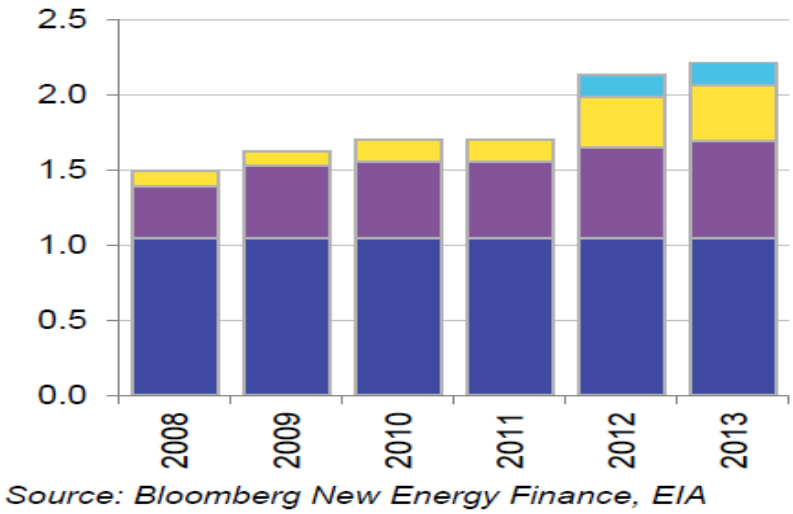
ENERGY EFFICIENCY

Peak Demand Reduction
Statewide ..... 463 Megawatts
Calculated for Years 2005 through 2015

NVEnergy

Updated 08-15-2016

NV cumulative utility-scale renewable capacity, 2008-13 (GW)[24]



Sierra Pacific's portfolio includes 25 commercial renewable purchase agreements. Together these agreements represent a total nameplate capacity of approximates 2330 MW. The newest addition to the portfolio is the FT. Churchill Solar array (19.5 MW), achieved commercial operation in August 2015. The Boulder Solar II and Switch Station 2 projects (approx. 101 MW total) are expected to achieve commercial operation in 2017. Sierra's renewable purchase agreements secure a mix of solar, geothermal, and hydro resources. [37]

iii. Electric generation gas supply

Sierra Pacific diversifies its natural gas supply portfolio by accessing gas from the Rock mountain Basin, the San Juan Basin, British Columbia, and the Western sedimentary Basin and takes delivery of natural gas from both the Paiute Pipeline Company (Paiute) and Tuscarora Gas Transmission Company (Tuscarora). Paiute delivers gas supplies from upstream Williams – Northwest Pipeline. Northwest sources its gas from British Columbia, the San Juan Basin, and the Rocky Mountain region of Wyoming, Utah and Colorado. Tuscarora delivers gas from upstream pipeline Gas Transmission Northwest (GTN), which is connected to the gas producing regions of the eastern Canada Sedimentary Basin in Alberta, Canada though TransCanada Pipelines, including the NOVA pipeline system. The GTN system is currently undersubscribed, has excess capacity and Sierra procures any needed gas supplies at the Malin Oregon hub for load requirements exceeding upstream transport contract volumes.

[37] Sierra Pacific Dkt 16-07001, Volume 10 of 16; Supply Side Plan Technical Appendix, p 20/396
http://pucweb1.state.nv.us/PDF/AxImages/DOCKETS_2015_THRU_PRESENT/2016-7/13050.pdf

Nevada Power's gas procurement plan has three components: a Physical Gas Procurement Plan, a Gas Transportation Plan, and a Gas Hedging Plan. Nevada Power employs a four-season laddering strategy in which 25% of projected monthly gas requirements per season are procured. In the most recent IRP (PUCN Dkt 15- 07004) recommended no new contracts and no discontinuing any existing contracts. Nevada Power recommended the continuation of the currently approved hedging strategy that includes the procurement of no fixed price or financial hedges.

Interstate Natural Gas Pipelines in Nevada

Tuscarora is a 305-mile interstate natural gas pipeline that receives natural gas from its interconnection with the Gas Transmission Northwest, LLC (GTN) pipeline system. GTN is interconnected with Western Canadian Sedimentary Supply, as well as natural gas from the Rockies and other U.S. basins. Tuscarora is operated by a subsidiary of TransCanada Corporation. TC PipeLines, LP owns 100 percent of Tuscarora.

Paiute Pipeline Co. owns and operates an interstate pipeline system which extends from a point of interconnection with the facilities of Northwest Pipeline Corp. at the Idaho-Nevada border to the California-Nevada state line near the north and south ends of Lake Tahoe, where Paiute delivers gas into the facilities of three local distribution companies. Paiute operates a storage facility near Lovelock.

Ruby Pipeline, owned and operated by Kinder Morgan, is a 680-mile, 42-inch diameter pipeline system that extends from Wyoming to Oregon providing natural gas supplies from the major Rocky Mountain basins to consumers in California, Nevada and the Pacific Northwest

Kern River Gas Transmission Company, based in Salt Lake City, Utah, operates an interstate natural gas pipeline extending from the oil and gas producing fields of southwestern Wyoming, through Utah and Nevada, to the San Joaquin Valley near Bakersfield, California.

D. Markets

i. Energy Imbalance Market

NV Energy successfully began operating in the Energy Imbalance Market (EIM) on December 1, 2015. NV Energy's participation was estimated to save Nevada ratepayers an estimated $6 to $10 million per year by enhancing the ability to analyze supply and demand by dispatching the lowest cost resource to meet energy needs every five minutes, and integrating more renewable resources. Results to date have been greater, with $12.5 million economic savings in the first 3 quarters 2016. [38]According to the California ISO, NV Energy's participation improved transmission access throughout Nevada and to other states. Although CAISO's EIM Quarterly Benefit Report has not yet been released for Q3 2016, results from the second quarter show estimated gross benefits of $5.2 million for NV Energy, $10.51 million for PacifiCorp, and $7.89 million for CAISO yielding total quarterly benefits of $23.6 million, while optimizing renewable energy use to displace nearly 68,000 metric tons of carbon

[38] CAISO; Don Fuller, Director Strategic Alliances; "Energy Imbalance Market update" presentation; November 10, 2016.

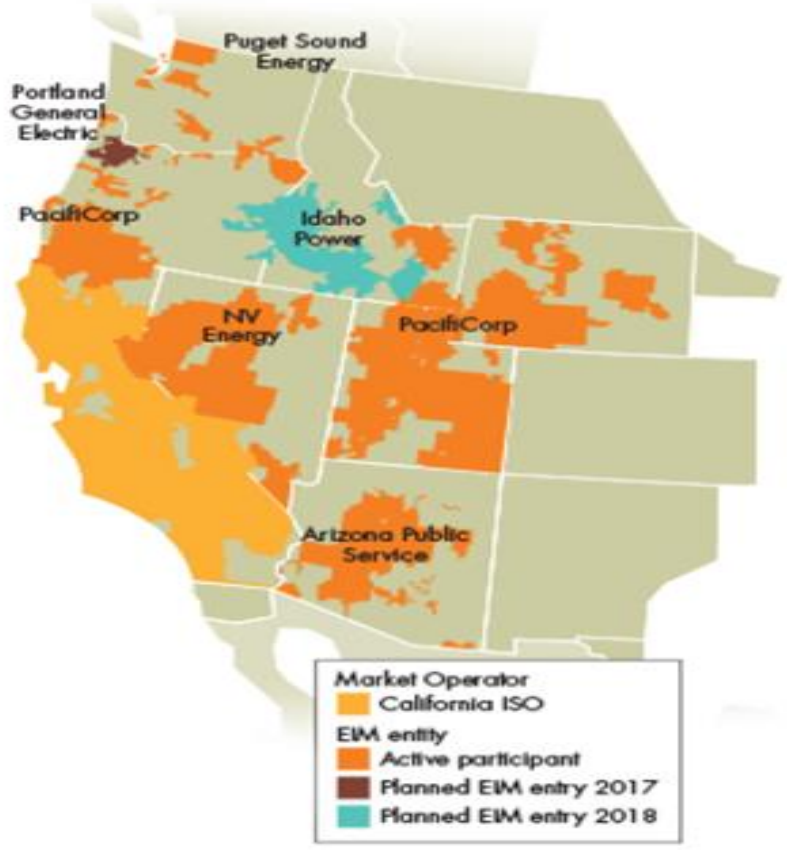
emissions. CAISO exported a significant amount of energy to NV Energy and PacifiCorp in this quarter, much of which was renewable generation[39].

The EIM allows CAISO operators using advanced software to draw on least-cost power to serve consumer demand in California, Oregon, Washington, Nevada, Utah, Idaho, Wyoming and Nevada. Additional benefits are produced by more efficiently using renewable energy, including excess energy, across a wide geographic region. EIM also reduces costly energy reserves utilities are required to secure to ensure reliability. Oregon-based PacifiCorp, which serves customers in six western states, was the first EIM participant, followed by NV Energy, which serves customers in Nevada. Other utilities that have announced plans to join the EIM include Puget Sound Energy of Washington state and Arizona Public Service, both in October 2016, Portland General Electric in October 2017 and Idaho Power in April 2018.

Energy Imbalance Market (EIM) Overview[40] :
EIM's advanced market systems automatically find the lowest-cost energy to serve real-time consumer demand across a wide geographic area. Offered in 2014 to western utilities in 14 states, it helps reduce carbon emissions by facilitating the efficient connection of renewable resources and enhancing grid resiliency. The EIM also enables grid operators to use low cost excess renewable energy that avoids having to turn off those resources to protect grid reliability, and supports clean energy policies. Benefits of EIM:

- Efficiency: Automated dispatch to balance load and generation is more efficient than manual dispatch.
- Reduced costs: A wider portfolio of resources to maintain system balance could reduce the costs of energy and capacity.
- Operating flexibility: Improved situational awareness and real-time visibility of transmission constraints, and dispatches resources to reduce and avoid congestion issues. Captures the benefits of geographical diversity of load and resources.

[39] Source: https://www.hubs.biz/power/explore/2016/07/california-iso-touts-savings-from-energy-imbalance-market; and, https://www.caiso.com/Documents/ISO-EIMBenefitsReportQ2_2016.pdf. Accessed 11/1/16)
[40] CAISO Energy Imbalance Market Overview; http://www.caiso.com/informed/pages/eimoverview/default.aspx (Accessed 11/1/16)



[41]

E. Existing Policies (Laws/Regulations)

i. Renewable Portfolio Standard

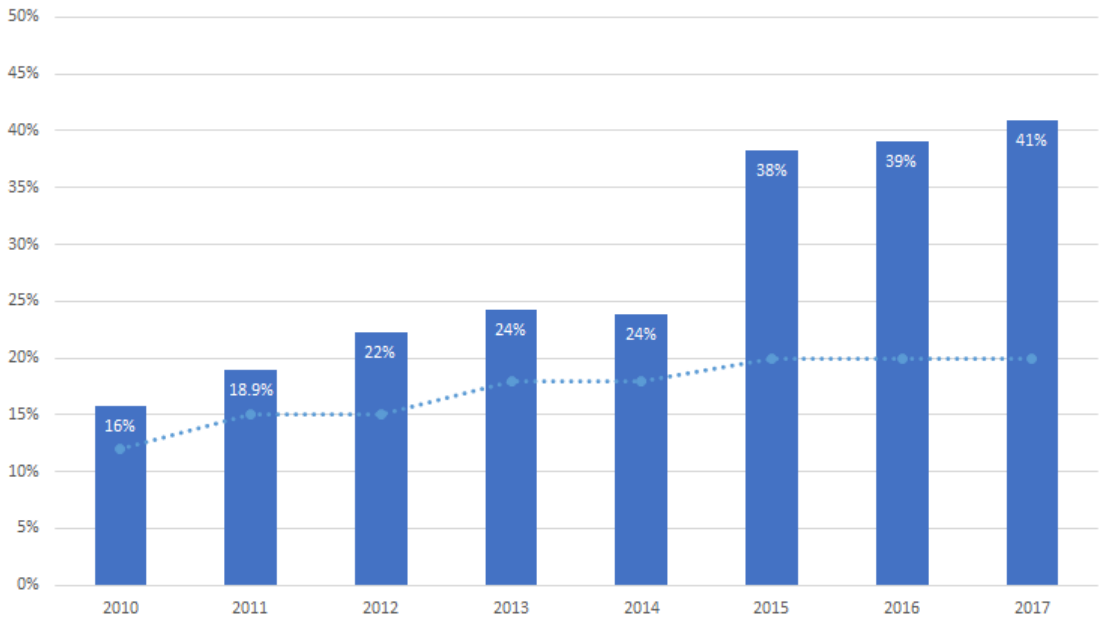
Nevada's Renewable Portfolio Standard ("RPS"), NRS 704.7801, was first adopted by the Nevada Legislature in 1997 and has been modified nearly every legislative session since then. The RPS establishes the percentage of electricity sold by an electric utility to retail customers that must come from renewable sources. More specifically, electric utilities are required to generate, acquire or save with portfolio energy systems or energy efficiency measures, a certain percentage of electricity annually. The percentage of renewable energy required by the RPS will increase every two years until it reaches 25 percent in 2025. Included within the RPS is a requirement that at least 5 percent of the total renewable energy in the portfolio must be generated by solar facilities through 2015 and at least 6 percent must be generated by solar facilities beginning in 2016.

Nevada's 2015-2019 Renewable Portfolio Standard sits at 20 percent. In its most recent Renewable Portfolio Standard Annual Report, NV Energy reported that its northern operating company achieved a 31.3 percent level and southern Nevada achieved a 21.2 percent

[41] CAISO Energy Imbalance Market Overview; http://www.caiso.com/informed/pages/eimoverview/default.aspx (accessed 11/1/16)

Renewable Portfolio Standard. NV Energy is well on its way to achieve the required 25 percent by 2025. [42]

NV Energy RPS Compliance [2]



Note: Includes carry-forward credits; 2017 is forecasted based on NV Energy's 2016 RPS compliance report.

In total, more than 1,900 megawatts of renewable energy have been built or secured exclusively for NV Energy customers.

- 19 geothermal energy plants
- 12 solar energy resources
- 6 hydroelectric facilities
- 4 biomass or methane projects
- 1 large windfarm

Additionally, NV Energy has financially supported more than 19,000 private rooftop solar installations at homes, schools, civic buildings, nonprofits and businesses.

Three large-scale solar energy projects are on the horizon:

- **Boulder Solar I and II** – The 150-megawatt project is located in Boulder City's Eldorado Valley. Construction began in December 2015 and project completion is scheduled for early 2017.
- **Switch Station 1 & 2** - The 179-megawatt project is also under construction and is located north of Las Vegas.
- **Techren Solar Energy** - The 100-megawatt Project is located in Eldorado Valley. Construction on the Techren Solar Energy Project is scheduled to

[42] PowerTalk, NV Energy, https://members.questline.com/article.aspx?accountId=2829&articleId=36841&nl=20461&userID=18101372 (Accessed 11/1/16)

commence sometime in 2017, and the project is expected to be operational in the fourth quarter of 2018. [42]

ii. **Net Energy Metering**

Net energy metering (NEM) is a billing mechanism that has historically compensated owners of distributed generation systems at retail rates for any electricity that they export back to the grid rather than consume on-site.

Nevada's original net energy metering (NEM) law for renewable energy systems was enacted in 1997 (DSIRE 2016A). Prior to the recent legislative action, Nevada's electric utilities offered net metering to their customers up to an aggregate capacity equal to 3% of the total peak capacity of all utilities in the state. In June 2013, the Nevada Legislature required the Public Utilities Commission of Nevada (PUCN) to open an investigation to evaluate the costs and benefits of NEM and to subsequently recommend a methodology for allocating such costs and benefits appropriately (Assembly Bill 428). The PUCN commissioned E3, a consulting firm, to perform that investigation (Price et al. 2014).[43]

On September 26, 2014, the PUCN submitted its NEM report to the Nevada Legislature. This document recommended that the legislature modify existing net metering statutes to provide the PUCN greater latitude in addressing net metering issues in general rate cases. An investigation under Docket 14-06009 was also initiated to examine the implications of creating a separate customer class for net-metered customers.[43]

On March 17, 2015, Senate Bill 374 was introduced in the Nevada Senate which temporarily set the cumulative capacity of NEM systems at 235 MW, and it instructed Nevada's utilities to develop new net metering tariffs to be approved by the PUCN. Specifically, it stated that the PUCN "may authorize a utility to establish just and reasonable charges to avoid, reduce, or eliminate an unreasonable shifting of costs from customer-generators to other customers of the utility" (SB 374 Sec. 2.3.2.d). [43]

NV Energy filed applications with the PUCN for approval of a marginal cost-of-service study in July 2015. The results of the study were ultimately used to inform the structure of a new class of net metering tariffs, established on December 23, 2015, and took effect on January 1, 2016. There is no statutory or regulatory limit on the cumulative capacity of Distributed Photovoltaic (DPV) systems under the new tariffs.[43]

The introduction of the new NEM tariffs originally included a scheduled transition of five annual step changes in the levels of each of the tariff's components. On February 17, 2016, the PUCN issued a modified order that lengthened the transition period to twelve years by making each step change last three years, with the final levels reached at the beginning of 2028. Additionally, the original implementation of the new NEM tariffs applied them to all distributed generation customers. This was retroactively changed on September 16, 2016,

[43] NREL "The Impacts of Changes to Nevada's Net Metering Policy on the Financial Performance and Adoption of Distributed Photovoltaics" by Pieter Gagnon, Ben Sigrin and Mike Gleason of the National Renewable Energy Laboratory. http://www.nrel.gov/docs/fy17osti/66765.pdf

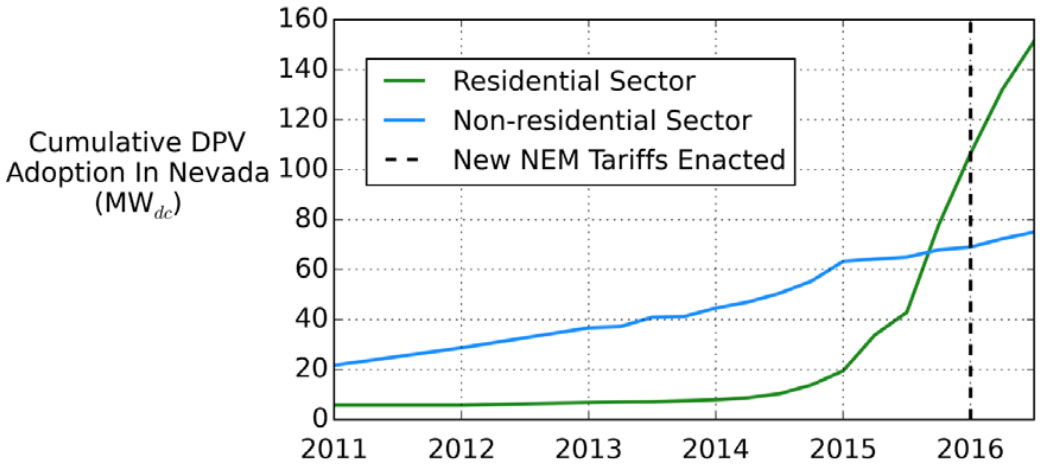
when the PUCN approved the grandfathering of approximately 32,000 customers who had either already installed or had pending applications for distributed generation systems prior to the change in the tariffs. Further, a PUCN order reopened the original tariffs to six megawatts of rooftop PV capacity on January 1 2017.43 The increased cap of 6MW will allow nearly double the NEM growth that Sierra Pacific has experienced over the past three years.

Separate from net metering regulations, Nevada has the Renewable Generations incentive program, which was established in 2003 as a result of Assembly Bill 431.14 The incentive amounts changed in steps based on the amount of cumulative capacity in the state. As of July 2016, the program was on its ninth step, and had paid $203 million out of its $255 million cap (NV Energy Renewable Generations 2016). The ninth step offered $0.1475/WAC for systems under 25 kW and $0.0159/kWh for five years for systems over 25 kW.[43]

Nevada established a renewable portfolio standard (RPS) in 1997. It requires NV Energy to use eligible renewable energy sources to supply a minimum of 25% of the total electricity that it sells by 2025, including a 6% annual requirement from solar. The actual installed capacity could be compliant at slightly lower levels, as energy from DPV capacity that was installed prior to 2015 is counted with a 2.4 multiplier. Additionally, Senate Bill 123 requires NV Energy to retire 800 MW of coal-fired plants by December 31, 2019. As part of the replacement of that capacity, a minimum of 350 MW must come from renewable energy facilities (DSIRE 2016B).43

Historical trends in the cumulative installed capacity of DPV in Nevada are shown just below (GTM and SEIA, 2016). Significantly reduced system prices and a maturing solar industry resulted in rapid adoption in the residential sector in both 2014 and 2015. The continued installation of systems during 2016 is largely due to contracts that were signed prior to the tariff changes. A slowdown in installations in 2017 is indicated in a decrease in applications to the Renewable Generations incentive program—there were only 14 new applications in July of 2016, in contrast to a peak of 2,958 in August of 2015 (NV Energy Renewable Generations 2015, NV Energy Renewable Generations 2016). As of March 2016, Nevada was ranked fifth amongst all states in total PV, with 1,240 MW of installed capacity (GTM and SEIA, 2016). Over 80% of that capacity came from utility-scale installations.[43]

Historical DPV adoption in Nevada



There are approximately 23,000 existing NEM customers on the Companies' (Nevada Power and Sierra Pacific) respective distribution systems, representing about 3 percent of total customers. Although a small percentage, the companies have been engaged in a multi-platform collaborative effort with other Berkshire-Hathaway Energy electric utilities examining DERS as a whole with respect to interconnection rules and standards, forecasting issues, tools for analyzing DER installations, technical requirements and solutions to determine system effects of DER, and operating and safety concerns. The Companies are in the process of determining next steps in furthering this effort to integrate the analysis of DER options along with traditional infrastructure options into the Companies' Distribution Planning processes.[44]

iii. Integrated Resource Planning

An IRP is a utility's long-term (20-year) plan to meet demand for gas and electric services in an efficient, reliable and sustainable manner at the lowest reasonable cost to consumers. The 20-year IRP includes an immediate 3-year plan. This schedule allows utilities to address continuing changes in consumer needs. Future construction predicted in a utility's IRP may or may not come to fruition as the utility's IRP changes with each 3-year filing as customer demand grows or slows.

The most recent NV Energy triennial Integrated Resources Plan filed with the PUCN, was filed by Sierra Pacific Power company d/b/a NV Energy (Docket No. 16-07001) seeking approval of the 2017-2036 IRP, is three year Action Plan for 2017-2019, and Energy Supply Plan for 2017-2019[45].

According to the IRP, Sierra Pacific Power proposed a plan to acquire a Calpine combined cycle plant based in Arizona for $76 million, with plans to invest $21 million in the the facility and a proposal to spend $39.9 million on an energy efficiency program. The plan also included a request for more time to provide the Public Utilities Commission of Nevada the required analysis of the environmental and economic impacts of renewable resources.

The utility said natural gas prices have decreased significantly, as well as the cost of large-scale solar, but critics said the amount allotted for efficiency should be expanded in addition to more investment in renewables.

From the utility's perspective, the 550-megawatt South Point Energy Center is needed to serve its operations in Nevada. With gas prices expected to remain low and significant change on the horizon, Sierra Pacific Power says its plan makes sense. Efficiency spending will be $12.8 million in 2017 and higher in 2018 and 2019. The utility's request of roughly $40 million is in line with what regulators approved last year, which was $16 million higher. While critics have pushed for more investment in efficiency, regulators last year cut the utility's efficiency budget from a proposed $56 million to $41 million. PUCN Chairman Paul Thomsen told Utility Dive earlier that Sierra Pacific's IRP would set the stage for a deeper discussion in the future of distributed energy resources in the state.[46]

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[44] Sierra Pacific Dkt 16-07001, Volume 10 of 16; Supply Side Plan Technical Appendix, p 167/396 http://pucweb1.state.nv.us/PDF/AxImages/DOCKETS_2015_THRU_PRESENT/2016-7/13050.pdf (accessed 11/1/16)

[45] Sierra Pacific Power Company IRP; PUCN Docket No. 16-07001, Volume 4 of 16 - Summary http://pucweb1.state.nv.us/PDF/AxImages/DOCKETS_2015_THRU_PRESENT/2016-7/13030.pdf (Accessed 11/1/16)

[46] "NV Energy subsidiary pushes to invest more in natural gas in IRP" http://www.utilitydive.com/news/nv-energy-subsidiary-pushes-to-invest-more-in-natural-gas-in-irp/422320/ (accessed 11/1/16)

Current proposed legislation, Integrated Resource Planning Process Revision, 2017 S.B. 65, effectively requires that the utility shall meet with not only Commission's operations staff and personnel of the BCP but also interested persons to provide an overview of the anticipated filing and to receive input on the IRP hence broadening the opportunity for early input and participation. In addition, this bill would *require* instead of *allow* the Commission to give preference for measures that provide the greatest economic and environmental benefits, the greatest opportunity for the creation of new jobs in the state, diversify energy portfolios and reduce fuel and carbon-price risk, and help to position Nevada to lead the nation as a producer and consumer of clean and renewable energy consistent with established State policy. [47]

iv. Emission reduction/capacity replacement

In 2013, Governor Sandoval signed SB 123 requiring Nevada Power to file an Emissions Reduction and Capacity Replacement Plan with the PUCN. Section 704.7316 of the Nevada Revised Statutes prescribes minimum elements of the ERCR plan. The legislation provides for the retirement or elimination in three phases of not less than 900 MW of coal-fired electric generating capacity. The first 300 MW of coal-fired generating capacity must be retired or eliminated prior to the end of 2014, then 250 MW of coal-fired generation prior to the end of 2017, followed by 250MW prior to the end of 2019. [48]

In its August 15, 2016 Emissions Reduction and Capacity Replacement second amendment filing, NV Energy requested an earlier retirement date for the remaining 257-megawatt unit at the Reid Gardner Generating Station. The proposal asks to move the original December 31, 2017, retirement date to February 28, 2017. [34]

This request aligns with the Nevada legislature's 2013 directive in Senate Bill 123 for a structured and orderly retirement of coal-fired generation in southern Nevada and replacing that generation with renewable energy and natural gas-fueled resources. The company retired the first three generating units at Reid Gardner at the end of 2014 and is also exiting its participation in Arizona's Navajo Generating Station by the end of 2019.[34]

v. NRS 704B (Direct access)

NRS 704b, passed in 2001, allows companies to cut ties with the utility if they consume more than 1 megawatt of power per year, pay an exit fee and receive PUC approval.
The law was an effort to provide large-scale power consumers with more options for buying and creating power.

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[47] Fact sheet Jan, 2017: Integrated Resource Planning Process Revision, 2017 S.B. 65; http://energy.nv.gov/uploadedFiles/energynvgov/content/Home/Features/SB%2065%20-%20IRP%20Summary%202.pdf

[48] Nevada Power IRP Dkt 14-05003; Volume 3 of 15, Emissions Reduction and Capacity Replacement Plan, p 1. https://www.nvenergy.com/company/rates/filings/IRP/NPC_IRP/ERCR_NPC/Vol3-ERCRSummary.pdf (accessed 11/1/16)

MGM Resorts and Wynn Resorts NV Energy, stopped purchasing power from NV Energy on October 1, after paying nearly $87 million (MGM), and $13 million (Wynn), in exit fees for the right to purchase its electricity elsewhere. MGM Resorts represents nearly 5 percent of the power NV Energy sells, Wynn accounts for just less than 1 percent of electricity sold. While MGM and Wynn will buy their electricity from a brokerage, they still need to use NV Energy's transmission lines and other equipment, and will remain customers of the utility in that regard.

Wynn and MGM originally petitioned the PUC in May 2015, along with the Sands Corporation, which operates two resorts on the Strip. The Sands eventually decided to stay with NV Energy.

While corporations are motivated to "go green," their push to be more energy efficient leaves the utility with less revenue to maintain the grid and can lead to rate increases. This can cause what energy market observers call the "death spiral."

Switch, a large data storage company, previously applied to leave NV Energy with plans to contract for a large solar array. The PUC denied the application, and Switch was eventually convinced to partner with NV Energy on the solar array. Switch says NV Energy engaged in deceptive practices and wants a Nevada court to rescind the settlement and allow Switch to exit. [49]

Peppermill Casinos, Inc., notified the Public Utilities Commission of Nevada that it wants to leave NV Energy. The owner of the Peppermill Resort Spa Casino in Reno is seeking to "purchase energy, capacity, and/or ancillary services from a provider of new electric resources" according to a filing with the PUC dated July 14[50].

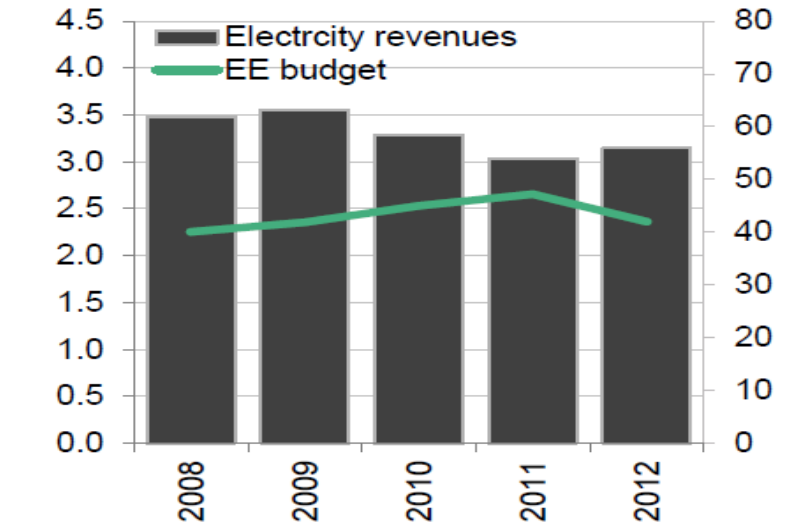
Nevada voters will have the opportunity to voice their support or disapproval of efforts to deregulate Nevada's energy market through the Question 3, ballot measure, in November. The measure seeks to amend the Nevada constitution by adding language that would open the state's energy markets to competition. Question 3 must receive voter approval in 2016 and 2018 in order for it to pass. If it passes, consumers will not only be allowed to buy energy from other sources but also generate energy that they can resell. The measure requires Nevada state lawmakers to pass legislation by 2023 that opens the market to competition.[51]

vi. Energy Efficiency

Nevada's annual electricity revenues (black bars, left axis, $bn) and energy efficiency budget (green line, right axis, $m) from 2008 to 2012 and Figure 6 shows how Nevada compares to nearby states on energy efficiency spending. Between 2005 and 2009, the state's IOUs grew their energy efficiency programs to a level of 1.5% annual savings in 2009. However, annual energy efficiency savings have since dropped to half of this amount, according to ACEEE; and in 2013, the legislature voted to gradually phase out energy efficiency from the state's RPS.

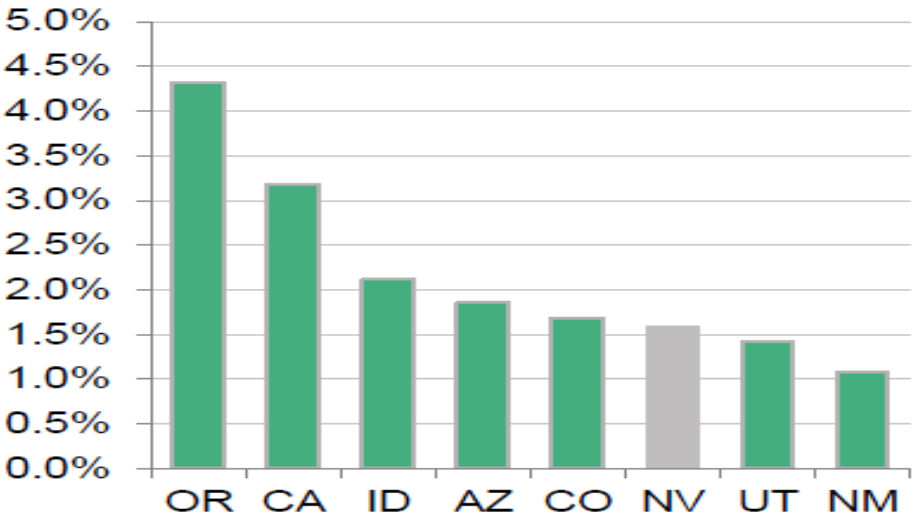
[49] http://lasvegassun.com/news/2016/sep/30/mgm-resorts-wynn-stop-purchasing-nv-energy-power/
[50] http://www.rgj.com/story/money/business/2016/07/18/peppermill-files-notice-puc-leave-nv-energy/87269372/
[51] http://www.rgj.com/story/news/politics/2016/10/12/what-does-question-3-energy-deregulation-mean-nevada/91916974/

NV utility electricity revenues (left axis, $bn) and electricity efficiency budget (right axis, $m), 2008-12 [24]



Source: ACEEE, Nevada Public Utilities Commission

States' utility electricity efficiency budgets as a fraction of statewide Electricity revenue, 2013 (%) [24]



Note: EE budget includes share of budget from BPA incentive dollars

The American Council for an Energy-Efficient Economy (ACEEE) State Energy Efficiency Scorecard [52]

[52] The American Council for an Energy-Efficient Economy (ACEEE) State Energy Efficiency Scorecard, http://aceee.org/sites/default/files/pdf/state-sheet/2016/nevada.pdf (Accessed 11/15/16)

ACCEEE has ranked states based upon scores in six categories including: 1) utility policies and programs; 2) combined heat and power; 3) building energy codes; 4) transportation policies; 5) appliance standards; and 6) state government initiatives. In the 2015 state scorecard, Nevada was tied for 37th in the 2016 State Energy Efficiency Scorecard. 52

Utilities Policies and Programs

Nevada allows energy efficiency investments to count toward its renewable portfolio standard, but energy efficiency allowances will phase out over time. Utilities offer electricity and natural gas efficiency programs, and electricity savings were consistent with the national average in 2015. Nevada allows utilities to recover lost revenues resulting from efficiency programs. [52]

NV Energy offers a broad set of energy efficiency programs for their residential and business customers. The utilities helped their customers save about 223 million kWh per year through programs implemented in 2015 alone. Total spending on electric utility energy efficiency and load management programs in 2015 was about $45 million, or 1.5% of utility revenues.[53]

Building Energy Codes

The state has adopted the 2012 IECC as the state energy code, but does not require local jurisdictions in Nevada to adopt this version of the code. The communities of Henderson, Reno, and Clark County—have adopted the 2012 International Energy Conservation Code (IECC) for new residential and commercial buildings. In addition, the state has adopted the 2012 IECC for all new buildings in localities that do not have a local building code. The U.S. Department of Energy estimates that new homes built in Nevada complying with the 2012 IECC rather than the 2009 version will save $360 per year on energy costs. (http://www.energycodes.gov/adoption/states)53

State Government-Led Initiatives

The state offers a wide-reaching property tax abatement for green buildings, as well as several other financial incentives. The state government leads by example by requiring efficient buildings, benchmarking energy use in public facilities, and encouraging the use of energy savings performance contracts. [52]

Since 2009, Nevada has provided partial property tax abatements for energy-efficient commercial buildings that achieve LEED certification. The incentives range from 25% to 35% of property taxes paid for 5 to 10 years, depending on the building's LEED certification level. Forty-four buildings representing more than 47 million square feet of floor area have obtained over $100 million in tax incentives since the program began. (http://energy.nv.gov/Programs/Green_Building_Tax_Abatements/)53

[53] Southwest Energy Efficiency Project (SWEEP); "Energy Efficiency & Energy Consumption (April 2016) Nevada Energy Fact Sheet; http://www.swenergy.org/Data/Sites/1/media/documents/publications/factsheets/NV-Factsheet.pdf; (Accessed 11/16/16)

F. Challenges

i. Transmission and New transmission siting

The Western Electricity Coordinating Council (WECC) reliance on natural gas generation is heavy and growing.[54] Environmental regulations and an aging fleet contribute to changes in coal capacity. Renewable portfolio standards help drive development of wind and solar resources. Changes to the resource portfolio are altering the operational characteristics of the Interconnection. They lead to several challenges, including ensuring the resource portfolio provides sufficient voltage and frequency support and ramping capability to balance generation and load. Without these Essential Reliability Services (ERS), the grid cannot be operated reliably.

As variable generation is added to the system, more ERS are needed. Sufficient resources with the flexibility to respond to sudden changes in generation and demand strengthen the grid. These services are needed both Interconnection-wide and locally[55].

1. Sage grouse

The greater sage-grouse is a large, ground-dwelling bird with round wings and distinct pointed tail feathers, up to two feet tall and can weigh between two and seven pounds. The greater sage-grouse is found in the Western region of the United States, typically in areas with an elevation between 4,000 and 9,000 feet that are well-populated with sagebrush.[56]

The U.S. Fish and Wildlife Service in 2010 determined federal protection for the bird found in 11 Western states was warranted but precluded because of other priorities. Environmentalists sued and a federal judge ordered the service to make a definitive finding. That spurred an unprecedented effort by states to devise their own strategies to protect the bird. States feared a listing by the federal government would lead to severe land restrictions and decimate rural economies and lifestyles.[57]

The Fish and Wildlife Service announced in September 2015 the grouse does not warrant protection under the Endangered Species Act. The Service simultaneously announced final plans governing land use activities on millions of acres of federally managed sagebrush habitat in 10 Western states.[58]

On August 30, 2016, The State of Nevada, the U.S. Department of the Interior and the Bureau of Land Management (BLM) announced an agreement with Newmont Mining Corporation on a sagebrush ecosystem conservation program that will guide management of more than 1.5 million acres of habitat in Nevada. The agreement will, put into practice for the first time, its Conservation Credit System (CCS). Under the terms of the agreement, Newmont will seek approval for individual habitat conservation projects for which the company may receive conservation credits that can later be used to offset

[54] WECC 2016 State of the Interconnection; https://www.wecc.biz/Reliability/2016%20SOTI%20Final.pdf

[55] WECC 2016 State of the Interconection; https://www.wecc.biz/Reliability/2016%20SOTI%20Final.pdf

[56] http://esawatch.org/issues/greater-sage-grouse/

[57] http://www.reviewjournal.com/news/nevada/officials-sign-landmark-pact-protect-northern-nevada-sage-grouse

[58] http://esawatch.org/issues/greater-sage-grouse/

impacts related to future proposals for Newmont's mining operations in Nevada.[59] Janice Schneider, assistant secretary for land and minerals at the U.S. Interior Department, said the mitigation credit system is "the first of its kind" in the nation and may be used as a model for other Western states as they strive to achieve protections for the sage grouse while allowing mining, ranching and other activities crucial to rural economies.[60]

2. Desert Tortoise

The Mojave population of desert tortoise (Gopherus agassizii) is a federally listed threatened species whose designated critical habitat is often within the boundaries of solar energy projects.[61]

Solar Projects within Desert Tortoise Habitat Area

The tension between the renewable energy industry and conservation groups was highlighted in the development of the Ivanpah solar plant, which opened in 2014 on roughly 5 square miles (13 sq. kilometers) of federal land near the California-Nevada border. An environmental group unsuccessfully sued the federal government in an attempt to stop construction that displaced desert tortoises. In the end, the developers spent more than $20 million to relocate the animals. [62]

The Desert Tortoise Recovery Office (DTRO) based at the Service's Nevada Fish and Wildlife Office in Reno, Nevada, was established to address population declines and focus

[59] http://gov.nv.gov/News-and-Media/Press/2016/Historic,-Landscape-Level-Sagebrush-Ecosystem-Conservation-Program-Announced-for-Nevada/

[60] http://www.reviewjournal.com/news/nevada/officials-sign-landmark-pact-protect-northern-nevada-sage-grouse

[61] http://graphics.latimes.com/towergraphic-solar-desert-tortoise-habitat/

[62] http://www.usnews.com/news/business/articles/2016-09-14/plan-divvies-up-desert-for-conservation-energy-projects

on recovery of the Mojave desert tortoise which occurs north and west of the Colorado River in California, Nevada, Arizona, and Utah. The DTRO focuses on research, monitoring, recovery plan implementation, and associated recovery permitting, and provides a centralized point of contact through which these activities are coordinated.63

The Ivanpah Desert Tortoise Research Facility was acquired and built by Chevron in 2011 as a creative partnership between the company, the National Park Service and National Park Trust. It was part of a settlement to satisfy park land mitigation obligations for impacts by the Mountain Pass rare earth mine on the desert tortoise (Gopherus agassizii), a species listed as threatened under the Endangered Species Act.

3. BLM

In November, 2016, the Secretary of the Interior announced that the Bureau of Land Management (BLM) finalized its rule governing solar and wind energy development on public lands. The rule strengthens existing policies and creates a new leasing program that will support renewable energy development through competitive leasing processes and incentives to encourage development in suitable areas. The rule complements the Department's landscape-scale planning efforts, including the Western Solar Plan, California's Desert Renewable Energy Conservation Plan, and Arizona's Restoration Design Energy Project, which were designed to streamline development in areas with high generation potential, while protecting important environmental, cultural and recreational resources.[64]

The BLM final rule, effective January 18 2017, overhauls the agency's regulations governing the permitting of solar and wind facilities on 245 million acres of federal public lands, most of which are located in the 12 Western states. The BLM has authorized almost 10 GW of utility-scale solar projects since 2009 and intends to approve more. The rule replaces the BLM's long-held practice of permitting solar and wind projects on a first-come, first-served basis with a framework for the creation of preferred "Designated Leasing Areas" (DLAs) and competitive leasing procedures, both inside and outside DLAs. The rule also codifies bonding, rental, megawatt capacity fee and pre-application policies.[65]

[63] https://www.fws.gov/Nevada/desert_tortoise/dtro/index.html

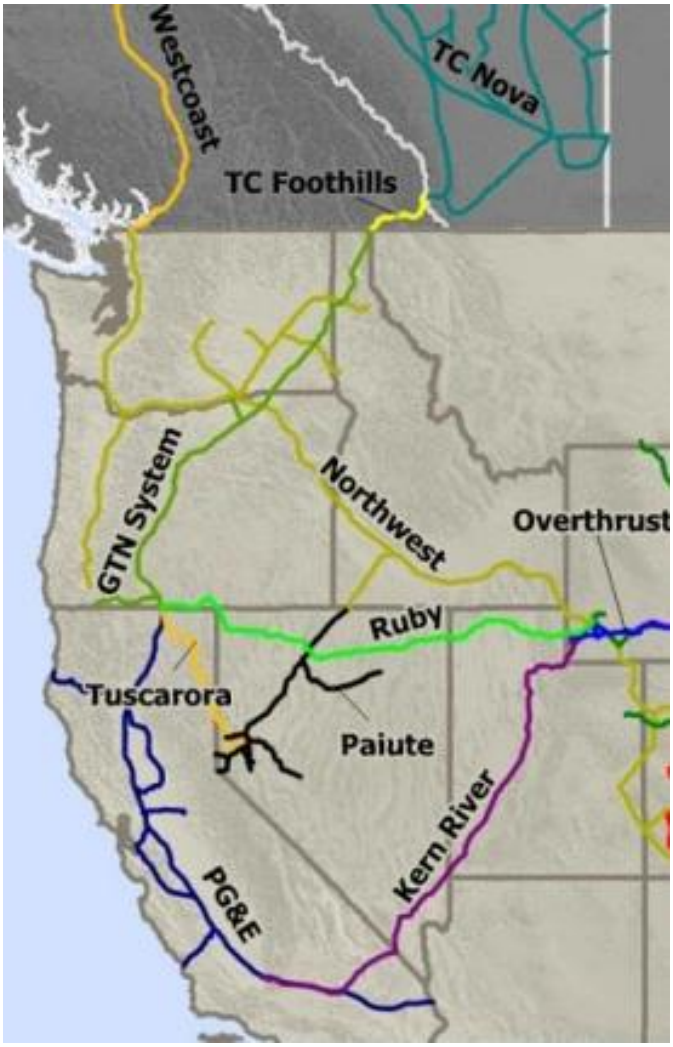
[64] https://www.doi.gov/pressreleases/interior-department-finalizes-rule-providing-foundation-future-blms-renewable-energy

[65] http://issues.solarindustrymag.com/article/blm-overhauls-solar-and-wind-permitting-rules

ii. Existing generation

1. Gas supply

Interstate Pipelines in Nevada and surrounding states[66]:



2. Gas price risk

As outlined in their recent IRP Dkt 16-07001, Sierra employs a four-season laddering strategy for physical gas purchases in which 25% of projected requirements per season are procured. Physical gas is procured at indexed prices. Sierra is able to access the dominant natural gas supply basins serving the Pacific Northwest through its existing firm transportation agreements, which Sierra will continue to renew annually, in order to ensure

[66] https://fromthestyx.wordpress.com/2016/05/16/jordan-cove-is-a-canadian-project-to-sell-canadian-ng/

deliveries of gas supply. In this IRP Sierra is seeking Commission approval of a hedging strategy that uses no financial or fixed products to hedge its price exposure.[67]

iii. New generation siting

1. BLM

Section 368 of the Energy Policy Act of 2005 directed the Secretaries of Agriculture, Commerce, Defense, Energy, and the Interior to designate corridors on federal land in 11 western states (Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming) for oil, gas, and hydrogen pipelines and electricity transmission and distribution facilities (energy corridors).[68]

In 2009 multiple organizations (Plaintiffs) filed a Complaint in the *Wilderness Society, et al. v. United States Department of the Interior, et al., No. 3:09-cv-03048-JW (N.D. Cal.).* The 2012 Settlement Agreement that resolved litigation about the corridors identified, the BLM, USFS and DOE established an interagency Memorandum of Understanding (MOU) to explain how the agencies will review the Section 368 (a) corridors on a regional basis. The MOU describes the interagency process for conducting the reviews, the types of information and data to be considered, and the process for incorporating resulting recommendations in BLM and USFS land use plans.[69]

On May 20, 2016, BLM, the DOE, and FS released the *Section 368 Corridor Study*, that provides a foundation for upcoming regional reviews of energy corridors on western public lands to assess the need for revisions and provide greater public input regarding areas that may be well suited for transmission siting. The regional reviews will begin with priority corridors in southern California, southern Nevada and western Arizona, and provide more opportunities for collaboration with the public and Federal, Tribal, state and local governmental stakeholders.

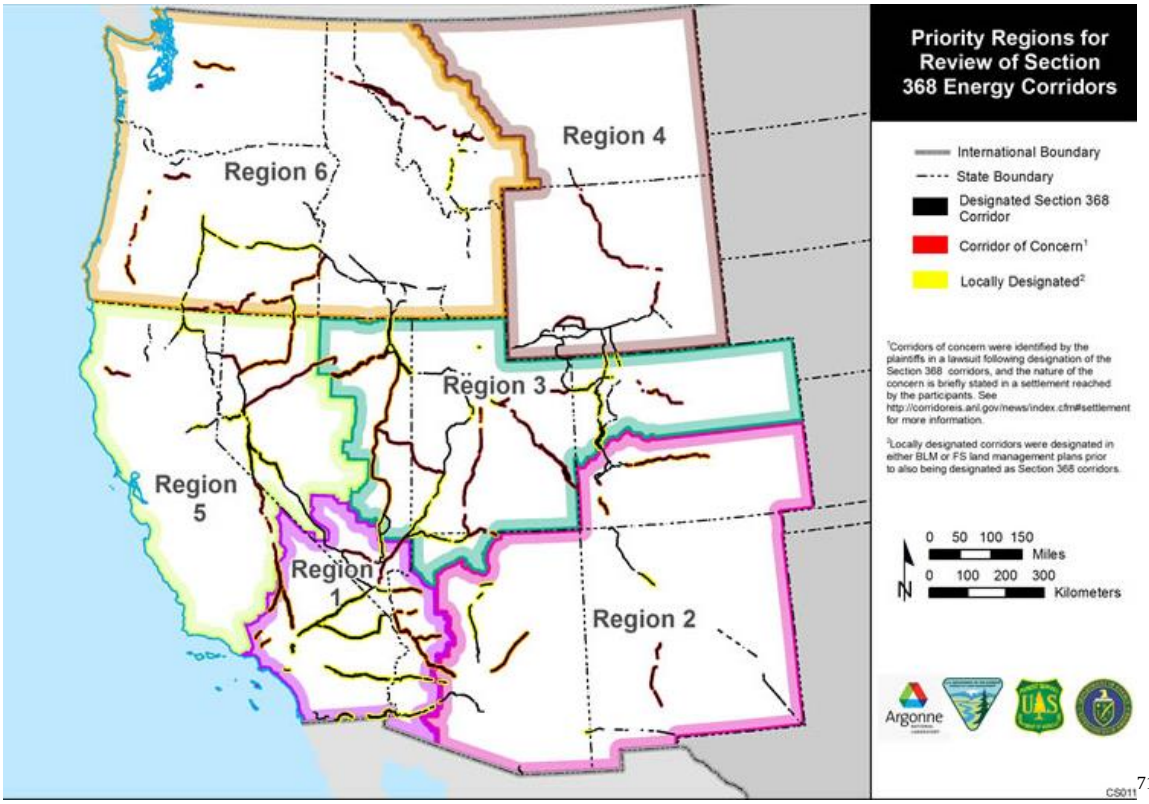
The study examines whether the energy corridors established under Section 368(a) of the Energy Policy Act of 2005 are achieving their purpose to promote environmentally responsible corridor-siting decisions and to reduce the proliferation of dispersed rights-of-way crossing Federal lands. With the aim of encouraging more efficient and effective use of the corridors, the study establishes baseline data and presents opportunities and challenges for further consideration during the periodic regional reviews that BLM and USFS will conduct.

Nevada is included in three of the six Energy Corridor Regions (region 1, 3 and 5); with public input starting in September 2016 (Region 1), October 2017 (Region 3), and November 2018 (Region 5).

The federal government owns 84.9 percent of the land in Nevada, the highest in the nation. Nevada's federal land ownership is divided between the Bureau of Indian Affairs, the Bureau of Land Management (BLM), Bureau of Reclamation, Department of Defense,

[67] Sierra Pacific Power Company IRP; PUCN Docket No. 16-07001, Volume 4 of 16 – Summary, p 24, http://pucweb1.state.nv.us/PDF/AxImages/DOCKETS_2015_THRU_PRESENT/2016-7/13030.pdf (Accessed 11/1/16)
[68] http://www.blm.gov/az/st/en/prog/energy/west_wide_energy_corridor.html
[69] http://www.blm.gov/wo/st/en/info/newsroom/2016/may/nr_05_20_2016.html

Department of Energy, Fish and Wildlife Service, Forest Service and National Park Service. [70]



[71]

G. Trends

i. Electrification of transportation system

The California renewable target of 50% by 2030 will lead to substantial increase in generation coming from renewable energy sources, and the need for extensive improvements to that state's transmission infrastructure to get renewable generated electricity to load centers.[72]

To facilitate electric transmission coordination and planning, the California Energy Commission, California Public Utilities Commission, and the California Independent System Operator have initiated the Renewable Energy Transmission Initiative 2.0, also known as RETI 2.0. RETI 2.0 is an open, transparent, and science-based process that will explore the abundant renewable generation resources in California and throughout the West, consider critical land use and environmental constraints, and identify potential transmission opportunities that could access and integrate renewable energy with the most environmental, economic, and community benefits. While RETI 2.0 is not a regulatory proceeding, the insights, scenarios, and recommendations it develops will frame and inform future

[70] http://www.reviewjournal.com/trending/silver-state/heres-how-land-used-the-federal-government-nevada

[71] http://corridoreis.anl.gov/

[72] http://pucweb1.state.nv.us/PDF/AxImages/DOCKETS_2015_THRU_PRESENT/2016-7/13032.pdf ; p 60 of 340

transmission planning proceedings with stakeholder-supported strategies to help reach the state's ambitious 2030 energy and environmental goals[73].

In January 2015, the SunZia Southwest Transmission Project was approved by the U.S. Department of the Interior to help move wind and solar energy produced in New Mexico and Arizona to larger markets in the West. The $2 billion project consists of two parallel 500kV transmission lines spanning 515 miles across New Mexico and Arizona.

The TransWest Express Transmission Project will provide the transmission infrastructure and 3,000 MW of capacity necessary to reliably and cost-effectively deliver approximately 20,000 GWh/yr of clean and sustainable electric energy generated in Wyoming to the Desert Southwest region. The $3 billion[74], 725-mile, 600kV DC line will extend from Wyoming through Colorado and Utah, then Interconnect into the California ISO system at the Marketplace hub near Las Vegas[75] .

TransWest Express Transmission Project

ii. Regionalization (RTO/ISO)

Casio states that a regional energy market would better use resources, especially renewables, to reduce greenhouse gas emissions and costs. Enabling the ISO's sophisticated market and grid optimization systems to pick the lowest cost energy to serve demand and give preference to renewable resources across a wide geographic region also means grid planners can build a cleaner, more resilient energy generation and delivery network that will create tangible economic benefits.[76]

[73] http://www.energy.ca.gov/reti/
[74] http://www.transmissionhub.com/articles/2016/09/electric-transmission-investment-remains-strong-overall-but-signs-point-to-it-slowing-down.html
[75] http://pucweb1.state.nv.us/PDF/AxImages/DOCKETS_2015_THRU_PRESENT/2016-7/13032.pdf; p 62 of 340
[76] http://www.caiso.com/Documents/ExecutiveSummary-SB350Study.pdf

•Overall benefits to California ratepayers;
• Emissions of greenhouse gases and other air pollutants;
• The creation or retention of jobs and other benefits to the California economy;
• Environmental impacts in California and elsewhere;
• Impacts in disadvantaged communities in California; and
• Reliability and integration of renewable energy resources.

The key findings of the SB 350 analysis with respect to California ratepayer impact, greenhouse gas and other emissions, economic and environmental impacts, and impacts on disadvantaged communities are as follows:[77]

• Overall benefits to California ratepayers: An annual net benefit to California ratepayers of $55 million a year in 2020 (assuming the regional market would only include CAISO and PacifiCorp). That benefit grows to a baseline net benefit range of $1 billion to $1.5 billion a year by 2030 (assuming a large regional footprint that includes all of U.S. WECC without PMAs.

• Emissions of Greenhouse Gases and Other Air Pollutants: The market simulations undertaken for this effort show that California's energy policy initiatives will substantially reduce the emissions of GHGs associated with serving California electricity loads.

• The Creation or Retention of Jobs and Other Benefits to the California Economy: The impacts of a Regional ISO-operated market are expected to create numerous and diverse jobs and economic benefits to California households and enterprises.

•Environmental Impacts in California and Elsewhere: The analysis for 2030 shows that implementing a regional market increases the efficiency of investments in low-cost renewable energy generation, including investments in new wind and solar resources to meet California's RPS.

• Reliability and Integration of Renewable Energy Resources: A regional market reduces the cost of maintaining reliability by reducing the need for load-following resources, operating reserves, and planning reserves. A regional market improves integration of renewables to achieve California's 50% RPS by reducing curtailments of renewable resources in a regional market and therefore would allow California to build less renewable generating capacity to meet the same goals. Regional pooling of resources to meet flexibility reserves allows the region to balance the intermittent output of wind and solar generation much more efficiently than operating individual balancing areas independently.

Creating a full-time, day-ahead regional energy market will require the California state Legislature to pass legislation to update the ISO's governance structure so out of state utilities can join the ISO.

[77] http://www.caiso.com/Documents/ExecutiveSummary-SB350Study.pdf

iii. Decarbonization of electric sector (Clean Power Plan)

Under the Environmental Protection Agency's (EPA) final Clean Power Plan, Nevada's final and interim emission rate goals have become less stringent relative to the goals released in the draft proposal. The final rule requires a 22% reduction in the state's carbon emissions rate to 0.39tCO2/MWh by 2030, whereas the draft rule requires a 2030 emissions rate of 0.29tCO2/MWh. The changes are measured against a 2012 baseline. Nevada's new interim goal to be met on average between 2022 and 2029 is now 0.43tCO2/MWh, increased from 0.32tCO2/MWh in the proposal. The state's interim goal reflects EPA's efforts to provide a "smoother glide path" and eliminate "the cliff" at the start of the program.5 The final plan also provides mass targets, which states can choose as their compliance standard instead of emission rate goals. Nevada's interim mass goal is 13MtCO2, and its final goal 12.3MtCO2, representing a 13% cut from its 2012 starting line. Nevada's current pipeline of coal-fired power plant retirements and investments in renewable energy mean that the state is already on pace to meet its 2030 mass reduction requirements. The state's renewables pipeline is helped by policies such as a goal of sourcing 25% of electricity from renewables by 2025[78].

Governor Sandoval's Energy Policy Goals

A. Executive Order

Governor Brian Sandoval issued an executive order in January 2016 reconvening the New Energy Industry Task Force and charging it with providing recommendations on the best energy policies for Nevada's future. The Task Force will specifically address policies that encourage development of clean energy sources and integrate renewable energy technologies into Nevada's energy sector, foster the creation of a modern, resilient, and cost-effective energy grid, and support distributed generation and storage with a specific focus on rooftop solar and net metering. The order states that clean and renewable energy is important to the economy and environment of the State of Nevada. The Governor's Office of Energy Director serves as the chair of the Task Force, which also includes members of industry, utility, environmental interests, Nevada Legislature, as well as representation from other valuable stakeholders. (See Appendix E for the Executive Order)

i. Direction to New Energy Industry Task Force

1. **Encourage development of clean energy sources and integrate renewable energy technologies into energy sector**
2. **Foster the creation of a modern, resilient, and cost-effective energy grid**
3. **Support distributed generation and storage with specific focus on rooftop solar and net metering**

B. Governors' Accord for a New Energy Future

Nevada Governor Brian Sandoval joined a bipartisan group of 17 governors on February 16, 2016 in signing the Governors' Accord for a New Energy Future - a joint commitment to take action to promote clean energy, clean transportation choices and a modern electrical grid. The Accord provides participating governors – a bipartisan coalition together representing 124 million Americans – with a platform through which their states will collaborate, learn from one another, and leverage partnerships in energy planning and policymaking. The Accord commits that their states will continue to diversify energy generation and expand clean energy sources, modernize

[78] Bloomberg State energy Factsheet; Nevada September 2015
http://www.bcse.org/images/2015EFGrant/BNEF_BCSE_Nevada%20Energy%20Factsheet.pdf

energy infrastructure, and encourage clean transportation options. The 17 participating governors represent states that vary considerably in their energy mix and policy portfolios. However, these governors have committed to working together to make transformational policy changes to secure a stronger energy future for their states and the nation[79]. The 17 participating states are California, Delaware, Iowa, Michigan, Nevada, New York, Pennsylvania, Vermont, Washington, Connecticut, Hawaii,
Massachusetts, Minnesota, New Hampshire, Oregon, Rhode Island, and Virginia. (A copy of The Governors' Accord is in located in Appendix C.)

i. **States will: diversify energy generation and expand clean energy sources**
ii. **Modernize energy infrastructure**
iii. **Encourage clean transportation**
iv. **Plan for energy transition**
v. **Work together to make transformational policy changes**
vi. **Help secure a stronger national energy future**

C. Nevada's Strategic Planning Framework 2016 -2020 (see Appendix D)

"The Framework sets out the Goals and Objectives that will guide State Government for the next five years. Crafted by Governor Sandoval and his Cabinet, the Framework acknowledges how far we have come and sets a point on the horizon toward which state agencies will steer. The budgets, legislation, and agency strategic plans that follow will implement this Framework…". Of particular relevance to the EMAP program is section 7.2 (p. 10):

Become the nation's leading producer and consumer of clean and renewable energy

1. **By 2020, complete "electric highway" system serving energy state.**
2. **Significantly reduce percentage of imported fossil fuels over the next 10 years.**
3. **Reduce carbon emissions to a level at or below accepted federal standards.**

[79] http://gov.nv.gov/News-and-Media/Press/2016/Governor-Sandoval-Joins-Bipartisan-Governors-Accord-for-a-New-Energy-Future/

Appendix A

Nevada Electric Utilities

Investor Owned Utilities

NV Energy

Nevada Power Company
PO BOX 98910
Las Vegas, NV 89151
https://www.nvenergy.com/

NV Energy

Sierra Pacific Power Company
PO BOX 10100
Reno, NV 89520
https://www.nvenergy.com/

Member owned electric cooperatives

Valley Electric Association, Inc.

800 E. Hwy 372
Pahrump, NV 89048
Phone: (775) 727-5312
Website: http://www.bcnv.org/

Nevada Rural Electric Association (NREA) – (Cooperatives, power districts and municipalities)

Boulder City Electric Utilities

401 California Avenue | Boulder City, NV
Phone: (702) 293-9231
Website: http://www.bcnv.org/

Deseret Power, Associate Member

10714 South Jordan Gateway | South Jordan, UT 84095
Phone: (801) 619-6500
Website: http://deseretgt.com

Harney Electric Cooperative, Inc.

C277 Lottery Lane | Hines, OR 97738
Phone: (541) 573-2061
Website: http://www.harneyelectric.org

Lincoln County Power District #1

HC 74 Box 101 | Pioche, NV 89043
Phone: (775) 962-5121

Website: http://lcpd1.com

Mt. Wheeler Power, Inc.
PO Box 151000 | Ely, NV 89315
Phone: (775) 289-8981
Website: http://www.mwpower.net

Overton Power District 5
PO Box 395 | Overton, NV 89040
Phone: (702) 397-2512
Website: http://www.opd5.com

Plumas-Sierra Rural Electric Cooperative
73233 State Rt. 70 | Portola, CA 96122
Phone: (530) 832-4261
Website: http://www.psrec.org

Raft River Rural Electric Cooperative, Inc.
PO Box 617 | Malta, ID 83342
Phone: (208) 645-2211
Website: http://www.rrelectric.com

Surprise Valley Electrification Corporation, Associate Member
22595 Hwy 395 N | Alturas, CA 96101
Phone: (530) 233-3511
Website: http://www.surprisevalleyelectric.org

Wells Rural Electric Company
PO Box 365 | Wells, NV 89835
Phone: (775) 752-3328
Website: http://www.wrec.coop

Appendix B

Nevada Generating Stations – NV Energy

Southern Nevada Generating Stations:

Nellis Solar Array II (Nellis Air Force Base, North Las Vegas)

Peak Generating Capacity: 15 Megawatts

Description: The Nellis Solar Array II Project is owned by NV Energy and primarily serves Nellis Air Force Base. It became operational November 2015. Added to the 13.2-megawatt solar project built on the base in 2007, this project will enable Nellis Air Force Base to be energy independent during daylight hours. The project uses a single-axis tracking system that uses GPS to enable the panels to follow the movement of the sun throughout the day.

Chuck Lenzie Generating Station (30 miles North of Las Vegas)

Peak Generating Capacity: 1,102 Megawatts

Plant Description: The Chuck Lenzie Generating Station is a clean-burning natural gas-fueled power plant that is located north of Las Vegas. It is the largest combined-cycle generating plant in the NV Energy fleet. The plant's air-cooled condenser system saves millions of gallons of water annually and may be the largest such installation in North America.

Edward W. Clark Generating Station (Las Vegas)

Peak Generating Capacity: 1,103 Megawatts

Plant Description: The Edward W. Clark Generating Station dates back to 1954 and included the oldest steam generated power plant in Nevada. Today, it is a multi-technology natural gas-fueled power generating complex that comprises a total of 19 generating units with in-service dates ranging from 1973 to 2008. One of the plant's unique aspects is that it can help avoid purchasing high-cost energy, and it can support intermittent renewable energy by the use of 12 quick-start peaking units that can provide up to 600 megawatts of electricity in as short as 10 minutes start-up time.

Goodsprings Waste Heat Recovery Station (Near Primm, Nevada)

Peak Generating Capacity: 5 Megawatts

Plant Description: Located near Goodsprings, Nev., this heat recovery project is owned by NV Energy, and currently operated by Ormat Technologies. It is located adjacent to a Kern River Gas Transmission Company compressor station and captures heat from the compressors and then uses that heat to turn a separate generator to produce electricity.

Harry Allen Generating Station (30 miles North of Las Vegas)

Peak Generating Capacity: 628 Megawatts

Plant Description: The Harry Allen Generating Station is a clean-burning natural gas-fueled power plant that is located in southern Nevada, north of Las Vegas. It was originally built as a "simple cycle" plant to operate mostly during the hottest time of the year when customer demand was the highest. However, the plant expanded in 2011 to include two highly efficient General Electric 7FA+e combustion turbines and a recycled exhaust system to produce steam for a General Electric D11 steam turbine to make additional electricity. The plant is one of the most efficient and most environmentally clean plants in the nation.

Las Vegas Generating Station (North Las Vegas)

Peak Generating Capacity: 272 Megawatts (summer)

Plant Description: The Las Vegas Generating Station is a clean-burning natural gas fueled power plant that joined the NV Energy fleet in 2014. It previously was known as the Las Vegas Co-generation plant, as it initially was designed to also provide waste heat to a neighboring greenhouse. It no longer is associated with the greenhouse operations.

Navajo Generating Station (East of Page, Arizona)

NV Energy's share of Generating Capacity: 255 Megawatts

Description: NV Energy owns 11.3 percent of the Navajo Generating Station, which is operated by Phoenix-based SRP. It is a coal-fueled facility that is jointly owned with the U.S. Bureau of Reclamation, SRP, Los Angeles Dept. of Water and Power, Arizona Public Service Co. and Tucson Electric Power. Its total capacity is 2,250 megawatts

Reid Gardner Generating Station (Near Moapa, Nevada)

Peak Generating Capacity: 257 Megawatts

Plant Description: The Reid Gardner Generating Station is a coal-fueled, steam-electric power plant that has been serving electricity customers in Southern Nevada since 1965. The first three 100-megawatt generating units are currently being decommissioned and dismantled. The fourth 257-megawatt generating unit is still in operation and scheduled to be shut down at the end of 2017.

Silverhawk Generating Station (30 miles North of Las Vegas)

Peak Generating Capacity: 520 Megawatts

Plant Description: The Silverhawk Generating Station is a clean-burning natural gas-fueled power plant that is located in Southern Nevada north of Las Vegas. The plant utilizes two highly efficient Siemens / Westinghouse 501FD2 ng system. Similar to a car radiator, 40 massive fans (34 feet in diameter) are used to condense the steam and cool plant equipment.

Sun Peak Generating Station (East side of Las Vegas)

Peak Generating Capacity: 210 Megawatts (Summer Peak)

Plant Description: The Sun Peak Generating Station is a clean-burning natural gas-fueled power plant that was purchased in 2014 to help NV Energy meet the needs of its customers, especially during the hot summer months when customer needs are at their highest.

Walter M. Higgins Generating Station (Primm, Nevada)

Peak Generating Capacity: 530 Megawatts

Plant Description: The Walter M. Higgins Generating Station is a clean-burning natural gas-fueled power plant located in Southern Nevada near the California border. The plant utilizes two highly efficient Westinghouse 501FD combustion turbines to produce electricity. Additionally, the exhaust from the two turbines is recycled to produce steam for an Alstom STF30C steam turbine to make additional electricity for NV Energy customers. The plant went into service in 2004. Unlike conventional power plants that use substantial amounts of water for cooling, the Higgins Station uses a six story-high dry cooling system. Similar to a car radiator, 40 massive fans (34 feet in diameter) are used to condense the steam and cool plant equipment.

Northern Nevada Generating Stations:

Clark Mountain Combustion Turbines (Located 17 miles east of Reno)

Peak Generating Capacity: 132 Megawatts

Description: The two Clark Mountain Peaking Units are part of the Frank A. Tracy Generating Station complex. They are each 66 megawatt General Electric 7EA units that can burn either natural gas or diesel oil.

Fort Churchill Generating Station (Yerington)

Peak Generating Capacity: 226 Megawatts

Plant Description: The Fort Churchill Generating Station is a clean-burning natural gas fueled power plant located in northern Nevada. The plant utilizes two Babcock and Wilcox boilers to produce high pressure steam to drive two General Electric turbine generators. The first 113 megawatt unit went into service in 1968, followed by the second unit in 1971. In the event of an interruption in natural gas service, this plant can switch to an on site fuel oil to provide temporary service to NV Energy customers.

Frank A.Tracy Generating Station (17 miles east of Reno)

Peak Generating Capacity: 885 Megawatts (including the Clark Mountain Combustion Turbines)

Plant Description: The Frank A. Tracy Generating Station is a multi-technology natural gas-fueled power plant complex that includes a total of eight generating units with in-service dates ranging from 1974 to 2008. The newest and largest addition consists of two highly efficient 7FA General Electric combustion turbine generators, similar to the turbines that power jet airplanes. Two older units built in 1963 and 1965 are being dismantled.

North Valmy Generating Station (Near Valmy, Nevada)

Peak Generating Capacity: 522 MW

Plant Description: The North Valmy Generating Station is a coal-fueled, steam-electric generating plant with two operating units. The plant and complex are jointly owned (50/50) by NV Energy and Idaho Power. NV Energy is the operating company. Unit No. 1 went into service in 1981 and produces 254 megawatts with a Babcock & Wilcox Boiler and Westinghouse turbine/generator. Unit No. 2 went into service in 1985 and produces 268 megawatts with a Foster Wheeler Boiler and General Electric turbine/generator.

Planned generation plant retirement dates: In 2016, five units will fall within the criteria of the last decade of the unit life span. These Units are: Clark Mountain 3 & 4 – 2024, Fort Churchill 1 – 2025, Valmy Units 1 & 2 – 2025.

Appendix C

Governors' Accord for a New Energy Future

..\Appendices\Appendix C - Governors Energy Accord.pdf

Appendix D

Nevada's Strategic Planning Framework

2016 - 2020

..\Appendices\Appendix D - GovernorsPlanningFrameworkFinal.pdf

Appendix E

New Energy Industry Energy Task Force

Executive Order 2016 - 04

..\Appendices\Appendix E - New Energy Industry Task Force 2016 Reconvene Order.pdf

Appendix F

PUCN Exhibit - New and Proposed Generation Plants in Nevada

(Updated March 2016)

..\Appendices\Appendix F - ProposedGeneration.pdf