2009 Status of Energy in Nevada

Report to Governor Gibbons and Legislature

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This document was prepared in compliance with the Nevada revised statues (NRS) 701.160

Our Mission

The mission of the Nevada State Office of Energy is to ensure the wise development of the State's energy resources in harmony with local community economic needs and Nevada's natural resources to lead the nation in renewable energy production, energy efficiency and conservation, and exportation. We strive for this by facilitating cooperation between key stakeholders, leading initiatives to stimulate economic development and attracting every energy related business venue; including, energy education, retro-fitting, manufacturing, site development, generation and production, interstate and intrastate transmission, materials transportation, and energy-related recycling.

May 26, 2010

I am pleased to provide the attached 2009 Status of Energy in Nevada Report. Much has changed in the Nevada State Office of Energy (NSOE) in just the last six months. The NSOE has doubled in size and is leading several new key energy related initiatives in the State. One of our current priorities is ensuring the 2009 American Rec5(d2sg)-280a(n)-4(d)2792(R)5(ic)9(n)-4v0ent At (72(

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Acknowledgements

Nevada statutes require the Director of the Nevada State Office of Energy to file a report each year to the Governor and the Commissioner describing the Status of Energy in Nevada. In even-numbered years, this report must also be filed with the Director of the Legislative Counsel Bureau for transmittal to the next regular session of the Legislature. This document has been prepared in compliance with this statute (see NRS 701.160).

The creation of this report was a collaborative effort between the Nevada State Office of Energy and Nevada's energy community. We would particularly like to acknowledge and express our gratitude to the following individuals for their valuable contributions to the development of this report:

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Executive Summary

During the past year the State has made tremendous strides toward a host of energy goals. Nevada State Office of Energy's (NSOE) 2009 achievements include:

Policy & Programs

- In 2009, the legislature enacted several important bills to promote renewable energy and energy efficiencies for the State, including AB 522 and SB 358.
- NV Energy's Northern utility has met its Renewable Portfolio Standard (RPS) goals. Given Nevada has one of the highest RPS in the country, this is a tremendous achievement.
- NV Energy's WindGenerations program is currently the largest distributed wind generation program in the country. NV Energy's SolarGenerations program is also very successful. The program has received multiple awards from a variety of industry organizations and is currently being replicated in numerous other states.
- The Public Utilities Commission of Nevada (PUCN) is in the process of creating the regulations for a Solar Thermal Pilot Demonstration Program.
- The PUCN has established the regulations for 3rd Party Ownership (such as the PACE program).

Competitive Analysis

- Nevada's ability to attract renewable energy development is greatly enhanced by the creation of renewable energy tax abatements and other incentives managed through the NSOE. Nevada's renewable energy policies including 3rd party development, net metering, RPS, distributed generation, rebate programs and other incentives which make the State a strong competitor.

Goals

- Renewable energy manufacturing has also moved forward. Plans for a major wind turbine manufacturing facility have recently been announced. Discussions are also being held to bring solar manufacturing facilities to the State.

- To help realize the State's energy opportunities, the NSOE will create the "Nevada Energy Economy Strike Force" in 2010. The Strike Force will be organized into five (5) teams dedicated to breaking down barriers to rapid deployment of renewable energy development, energy efficiency measures, exporting power and renewable energy manufacturing.

Transmission

- The State also made great strides in transmission development. NV Energy's ON-Line transmission line will finally connect the State's northern and southern grids. This line will deliver northern wind and geothermal resources to the south, and southern solar resources to the north. Other shorter transmission lines will help

alleviate the congestion around Las Vegas facilitating access to energy markets in California.

- The PUCN has codified the Renewable Energy Zones identified by the Governor's Renewable Energy Transmission Access Advisory Committee (RETAAC). RETAAC also identified the transmission projects necessary to access the renewable energy believed to be contained in the zones.
- The Nevada Energy Assurance Corporation, a non-profit organization, was created to leverage the State's bonding capacity to help fund the transmission lines identified by the RETAAC.

Renewable Energy Projects

- Bureau of Land Management (BLM) has initiated a "Fast Track" process. Four (4) solar and two (2) wind projects representing hundreds of MWs of renewable energy have been fast-tracked.
- NV Energy continues to sign Power Purchase Agreements (PPA) for geothermal and solar projects. They have recently signed their first PPA's for wind and landfill gas.

Natural Gas

- The construction of the Ruby Pipeline will help bring natural gas to new areas of the State facilitating everything from economic development to a more stable supply.

Transportation Fuels

- The construction of the UNEV petroleum pipeline, a 400 mile, 12 inches buried pipeline that will originate in North Salt Lake, Utah and ship products to a terminal location in North Las Vegas, is expected to begin soon. The final Environmental Impact Study (EIS) has been posted on the Federal Register and once the BLM issues the Record of Decision, construction of the pipeline will begin (estimated in 2010). The UNEV pipeline will help secure an energy future for Southern Nevada that will help the economy and everyone's quality of life.

Nevada State Office of Energy

- The NSOE has utilized federal ARRA funds to expand its operations, adding seven staff members.
- NSOE has worked closely with the newly created Nevada Renewable Energy and Energy Efficiency Authority to establish the regulations and application process for the State's new renewable energy tax incentives.
- NSOE continues to work with the State's builders to award incentives under Nevada's green building tax abatement program.

The following report expands upon these and other achievements. In the coming year the Nevada State Office of Energy will continue to work with all the State's energy stakeholders to improve the Status of Energy in Nevada.

Chapter I Energy Policy and Programs

Overview

This chapter identifies the federal and regional energy policies that affect energy in Nevada. For instance, Nevada's ability to develop and market its vast renewable energy resources is tremendously affected by federal land policies, access to regional transmission and the economic incentives offered by neighboring states. Nevada's access to transportation fuels is almost entirely dependent upon California refineries, which are in turn affected by California regulations. Nevada's geographic location is the determining factor in the shipment of almost 70% of the natural gas Nevada receives is transferred to California.

Policies create programs which result in projects. These programs also affect Nevada's energy supply. An example is the Bureau of Land Management's Fast-Track program. This program is the result of a federal policy designed to speed the development of renewable energy generation projects in Nevada (See page 15 for more details on the Fast-Track program).

The identification, and comparison, of the intersections between national, regional and state policies and programs reveal the Nevada energy challenges and opportunities discussed in Chapter II.

National Energy Status

Nevadans need ample supplies of energy, at reasonable and affordable prices. This will sustain and improve the quality of life for individuals and provide a robust commercial environment that fuels economic growth and provides jobs. This needs to be accomplished in a way that balances our strong sense of individual and cultural freedom with the use of indigenous energy resources, with proper sense of responsibility to the principles of good government, and sound management of these resources.

Electricity

The United States, Canada and northern Mexico are divided into three (3) separate and electrically isolated grids; the Western Interconnection, The Eastern Interconnection and most of Texas. Nevada, together with eleven (11) states, four (4) Canadian provinces and northern Baja California, and Mexico, are known as the Western Interconnection. All of the electric utilities in the Western Interconnection are electrically tied together during normal system conditions and operate at a synchronized frequency at an average of 60Hz.

Interconnections can be tied to each other via high-voltage direct current (DC) power transmission lines, or with variable frequency transformers (VFTs), which permit a controlled flow of energy while also functionally isolating the independent alternating

current (AC) frequencies of each side. The Western Interconnection is tied to the Eastern Interconnection with six (6) DC ties. It is not tied to the Alaska Interconnection.

On October 13, 2009, the Tres Amigas Project was announced to connect the Eastern, Western and Texas Interconnections via three 5 gW superconductor links.

The Tres Amigas Project focuses on uniting North America's two major power grids (West and East) and one minor grid (Texas) to enable faster adoption of renewable energy and increase the reliability of the U.S. grid.

Natural Gas

Natural gas in Nevada is used overwhelmingly for electricity generation, and over 50% of Nevada households use natural gas as their primary energy source for home heating. Interstate pipelines supply Nevada with natural gas from Utah and other neighboring Rocky Mountain states. The largest of these lines, the Kern River Gas Transmission pipeline (See Chapter IV, page 141) from Wyoming, which supplies the Las Vegas area, as it passes through southern Nevada on the way to markets in southern California.

Transportation Fuels

In terms of transportation fuels, Nevada has one small crude oil refinery that produces primarily asphalt and diesel fuel. The State relies on California refineries for nearly all of its transportation fuels. Three (3) petroleum product pipelines transport supply from California refining centers to the Las Vegas and Reno fuel markets. A new 400-mile pipeline has been proposed to connect Salt Lake City refineries to southern Nevada consumers. The UNEV Pipeline (See Chapter V, page 158) is expected to be completed by the end of 2010 and would help accommodate the growing population of the Las Vegas region, (one of the fastest growing metropolitan areas in the Nation). Although total petroleum consumption is low, Nevada's jet fuel consumption is disproportionately high due to demand from airports in Las Vegas and Reno and from two military air installations. The Las Vegas metropolitan area requires the year-round use of a cleaner burning gasoline (CBG) blend, which has low volatility and contains oxygenates. Both the Las Vegas and Reno metropolitan areas require the use of oxygenated motor gasoline during the winter months.

National Policies

Federal policies affect the development of Nevada's resources in many ways. For instance, the federal government owns or manages more than 87% of Nevada's land. About 50% of these public lands are federally managed for conservation of resources and cannot be developed. This makes land use policies developed by federal agencies like the Bureau of Land Management (BLM), U.S. Fish & Wildlife, the U.S. Forest Service and other federal agencies extremely important. Policies developed by these agencies have the ability to grant

or deny access to Nevada's renewable resources. Since renewable energy projects represent millions and potentially billions in new taxes, access to these resources is extremely important to the future economic health of rural Nevada.

Another federal entity that has a huge affect on the State's ability to develop its renewable resources is the Department of Defense (DOD). The DOD manages more than 3.1 million acres in Nevada, approximately 4.7% of the land. As a result, the DOD has a significant impact on the development of Nevada's renewable resources.

Decisions made by the Federal Energy Regulatory Commission (FERC) are also important to Nevada. For instance, FERC rulings affect the development of the transmission system necessary to get the State's renewable energy to markets throughout Nevada and across the West.

Policy decisions made by the President and Congress affect Nevada too. The policies adopted by these Federal entities have the ability to pour millions of dollars in grants, loans and other incentives into the State. The U.S. Department of Agriculture's clean energy grant and loan program provides money for small renewable energy projects for Nevada's rural areas. The Department of Energy's State Energy Program Formula Grant provides the majority of funding for the Nevada State Office of Energy (NSOE). Department of Energy (DOE) also funds Nevada's Wind Powering America Program.

Recent Energy Bills

The Energy Policy Act of 2005 provides tax incentives and loan guarantees for energy production. The Act provides tax reductions for nuclear power, fossil fuel production, renewable electricity production, clean coal facilities, conservation and energy efficiency and alternative motor vehicles and fuels.

Just a few of the highlights of this Act include:

- Loan guarantees for innovative technologies that avoid greenhouse gases
- Subsidies for wind and other alternative energy producers
- Tax breaks for residents making energy conservation improvements in their homes
- Biomass grants
- Geothermal energy that is more competitive with fossil fuels
- Studies and reports by DOE related to electricity demand response recommendations on time-based pricing
- Public utility offers of net metering on request to their customers
- Designate National Interest Electric Transmission Corridors (the Federal Energy Regulatory Commission may authorize federal permits for transmission projects in these regions)

- Federal reliability standards regulating the electrical grid
- Federal fleet vehicle requirements capable of operating on alternative fuels be operated exclusively on these fuels

The Energy Independence and Security Act of 2007 was designed to "move the United States toward greater energy independence and security; to increase the production of clean renewable fuels; to protect consumers; to increase the efficiency of products, buildings, and vehicles; to promote research on and deploy greenhouse gas capture and storage options; and improve the energy performance of the Federal Government…"

Key provisions of the act address the following:

- Taxpayer funding of research and development of solar and geothermal energy
- Expanded federal research on carbon sequestration technologies
- A green jobs training program for "energy efficiency and renewable energy workers"
- Modernization of the electricity grid (aka Smart Grid)
- New initiatives for promoting "green" buildings and industry
- Revised standards for appliances and lighting
- New standards and grants for promoting efficiency in government and public institutions (federal buildings must reduce fossil fuel use by 55% (from 2003 levels) by 2010 and 80% by 2020)
- New initiatives for highway infrastructure
- Increased CAFE standards requiring automakers to boost fleet-wide gas mileage to at least 35 miles per gallon
- Incentives for the development of plug-in hybrids
- Taxpayer funding for bio-fuels

The American Recovery and Reinvestment Act (ARRA) included more than $80 billion in clean energy investments:

- $11 billion for smart grid technologies
- $5 billion for low-income weatherization projects
- $4.5 billion to "green" federal buildings
- $67.3 billion for state and local renewable energy and energy efficiency projects
- $600 million in green job training
- $2 billion in competitive grants for the development of the next generation of energy storage batteries

National Programs

The combination of ongoing energy policies, 2005 and 2007 Acts, and the ARRA resulted in the following national energy programs that affect Nevada:

Financial Incentives

- Energy-Efficient Commercial Buildings Tax Deduction
- Modified Accelerated Cost-Recovery System (MACRS) + Bonus Depreciation
- Residential Energy Conservation Subsidy Exclusion (Corporate)
- Business Energy Investment Tax (ITC)
- Energy-Efficiency New Homes Tax Credit for Home Builders
- Renewable Electricity Production Tax Credit (PTC)
- Tribal Energy Program Grant
- U.S. Department of Treasury – Renewable Energy Grants
- USDA Rural Energy for America Program (REAP) Grants
- USDA Rural Energy for America Program (REAP) Loan Guarantees
- Clean Renewable Energy Bonds (CREBs)
- Energy-Efficiency Mortgages
- Qualified Energy Conservation Bonds (QECBs)
- U.S. Department of Energy Loan Guarantee Program
- Energy-Efficient Appliance Manufacturing Tax Credit
- Qualifying Advanced Energy Manufacturing Investment Tax Credit
- Residential Energy Conservation Subsidy Exclusion (Personal)
- Residential Energy Efficiency Tax Credit
- Residential Renewable Energy Tax Credit
- Renewable Energy Production Incentive (REPI)

Bureau of Land Management Fast-Track

One federal program that has a tremendous effect on Nevada's renewable energy development is the Bureau of Land Management's Fast-Track program. Fast-Track projects are those where the companies involved have demonstrated to the BLM that they have made sufficient progress to formally start the environmental review and public participation process. These projects are advanced enough in the permitting process that they could potentially be cleared for approval by December 2010, thus making them eligible for economic stimulus funding under the American Recovery and Reinvestment Act of 2009.

Nevada has four (4) solar projects and two (2) wind projects in the Fast-Track program:

- NextLight, Silver State South; a 267 MW solar photovoltaic project, and NextLight, Silver State North; a 140 MW solar photovoltaic project on a combined 7,840 acres in Clark County
- Tonopah Solar; a 180 MW concentrating solar power tower project on 1,600 acres in Nye County
- Solar Millennium; a 484 concentrating parabolic trough solar project on 4,350 acres in Nye County
- Duke Energy, Searchlight; a 200 MW wind project on 24,382 acres in Clark County
- Spring Valley Wind; a 150 MW wind project on 8.320 acres in White Pine County

Understanding the Federal Energy Regulatory Commission

As Nevada's energy focus shifts to transmission development to facilitate the internal consumption (and export) of the State's renewable energy resources, and with the implementation of Smart Grid technologies that will allow residents and businesses to take control of their electricity costs, it becomes increasingly important to understand the role the Federal Energy Regulatory Commission (FERC) plays. The current FERC Chairman is Jon Wellinghoff, a Nevadan.

FERC:

- Regulates the transmission and wholesale sales of electricity in interstate commerce
- Reviews certain mergers and acquisitions and corporate transactions by electricity companies
- Regulates the transportation and sale of natural gas for resale in interstate commerce
- Regulates the transportation of oil by pipeline in interstate commerce
- Approves the siting and abandonment of interstate natural gas pipelines and storage facilities
- Reviews siting applications for electric transmission projects under limited circumstances
- Ensures the safe operation and reliability of proposed and operating Liquid Natural Gas (LNG) terminals
- Licenses and inspects private, municipal and state hydroelectric projects
- Protects the reliability of the high voltage interstate transmission system through mandatory reliability standards
- Monitors and investigates energy markets
- Enforces FERC regulatory requirements through imposition of civil penalties and other means
- Oversees environmental matters related to natural gas and hydroelectricity projects and other matters

- Administers accounting and financial reporting regulations and conduct of regulated companies

Regional Energy Status

The western governors have set the short-term regional agenda by calling for 30,000 MW of "clean and diversified" energy, 20% improvement in energy efficiency, comprehensive evaluations of electricity and natural gas adequacy, and enhanced regional coordination in transmission planning. The governors have made a clear statement of expectations for western states. Actions are already underway to implement these initiatives and meaningful results are expected within the next few years. Similarly, the governors have strongly opposed ceding such important local tools as eminent domain to federal regulators as FERC attempts to rewrite its own statutory authority.

The governors and other state and local regulators have also moved quickly to deal with two (2) other potential problems with regional implications; 1) continuing drought in the Colorado River basin, and various threats to the west's fragile ecological systems, and 2) the economic vitality of the West demands not only ample energy, but also ample water and access to valuable renewable resources. Good management of western energy, air, water and wildlife are essential to the economic vitality, most of all in tourism driven economies in Las Vegas, Lake Tahoe and Reno.

Regional Policies

Regional policies—even non-binding ones—affect Nevada in a number of ways. For instance, the Western Governors' Associations' (WGA) Energy and Transmission Initiative identified the Western Renewable Energy Zones which includes zones in Nevada. Identification of these zones will be important to a state's ability to participate in pending federal legislation.

Other WGA initiatives affect Nevada's adaptation of climate change, forest health and welfare, radioactive waste transportation, biomass energy production, water strategies, transportation fuels, transmission, and wildlife corridors and habitats.

Another regional entity that affects Nevada is the Western Electricity Coordinating Council (WECC). WECC works with the North American Electric Reliability Corporation[1] (NERC) to develop and enforce reliability standard for the bulk power system within the Western Interconnection. As Nevada expands its transmission system in order to export renewable energy to our surrounding states, WECC, NERC and FERC will all have influence.

[1] NERC is certified by FERC pursuant to Section 215© of the Federal Power Act

Competitive Analysis

A comparison of state incentives and potentials highlights where Nevada is competitive and where it has room for improvement. Figures 1-1 to 1-4, show electricity potential. The following maps, Figures 1-5 to 1-11 compare Nevada's incentives to incentives offered by other states and Figure 1-12 is the State Energy Efficiency Scorecard.

Figure 1-1 Geothermal Potential

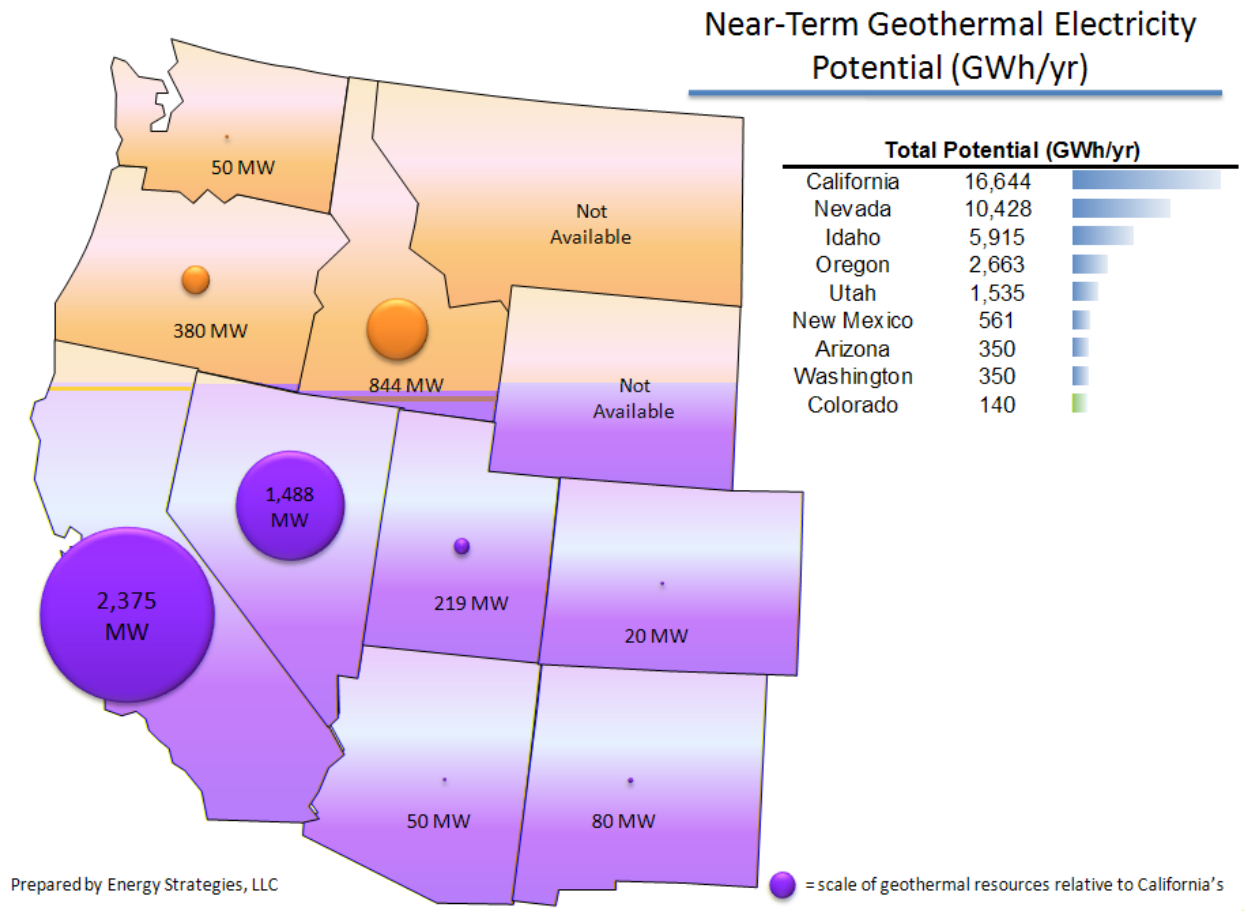


Figure 1-2 Solar Potential

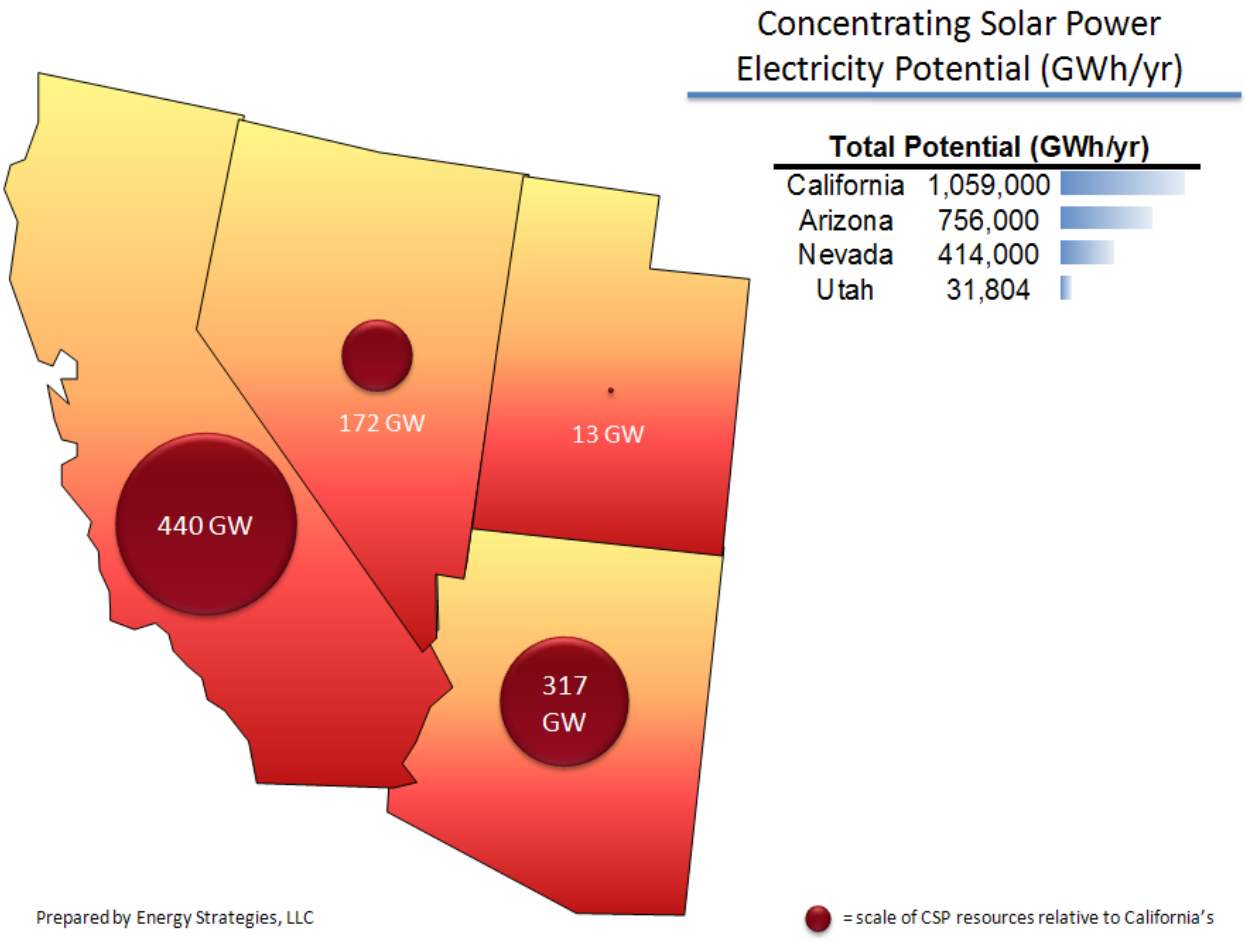


Figure 1-3 Wind Potential

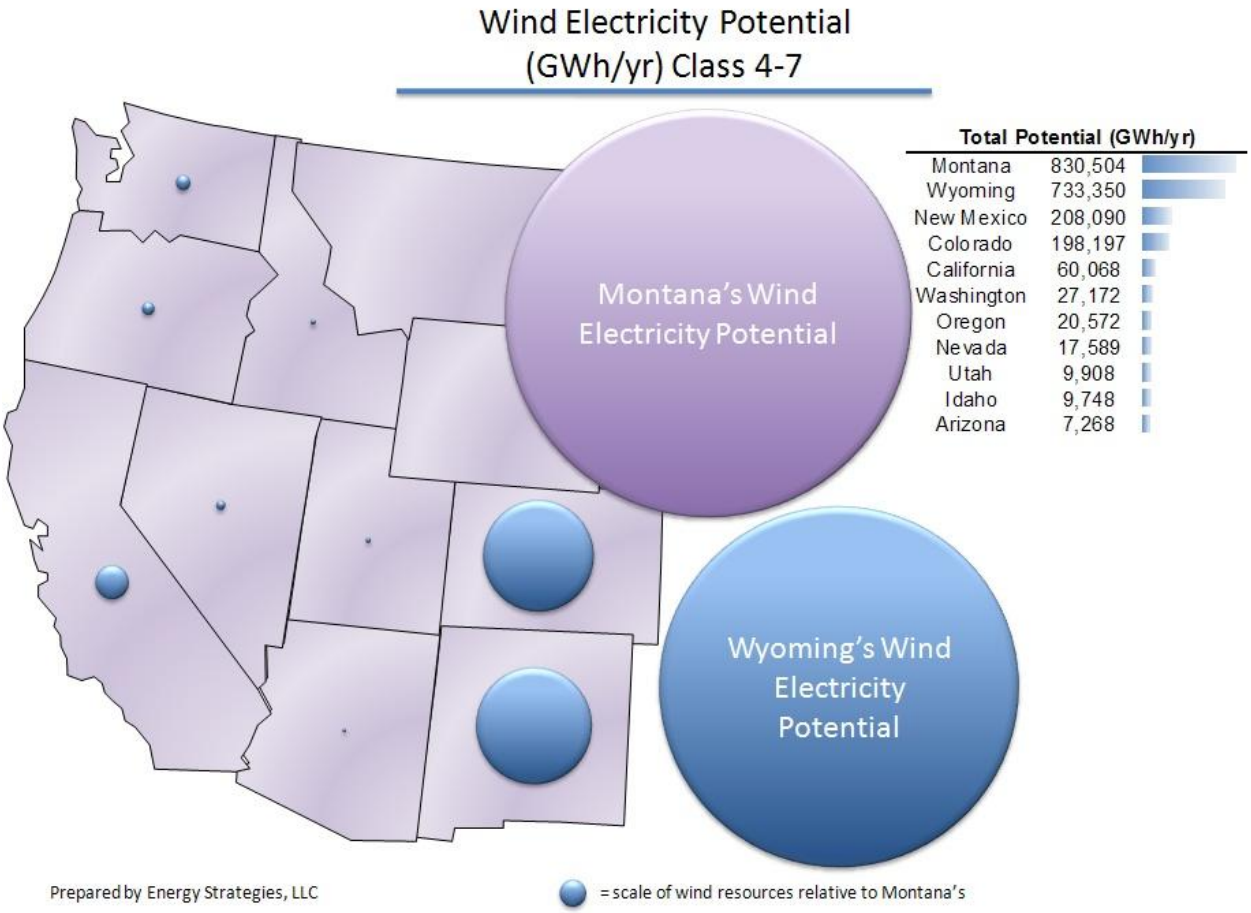
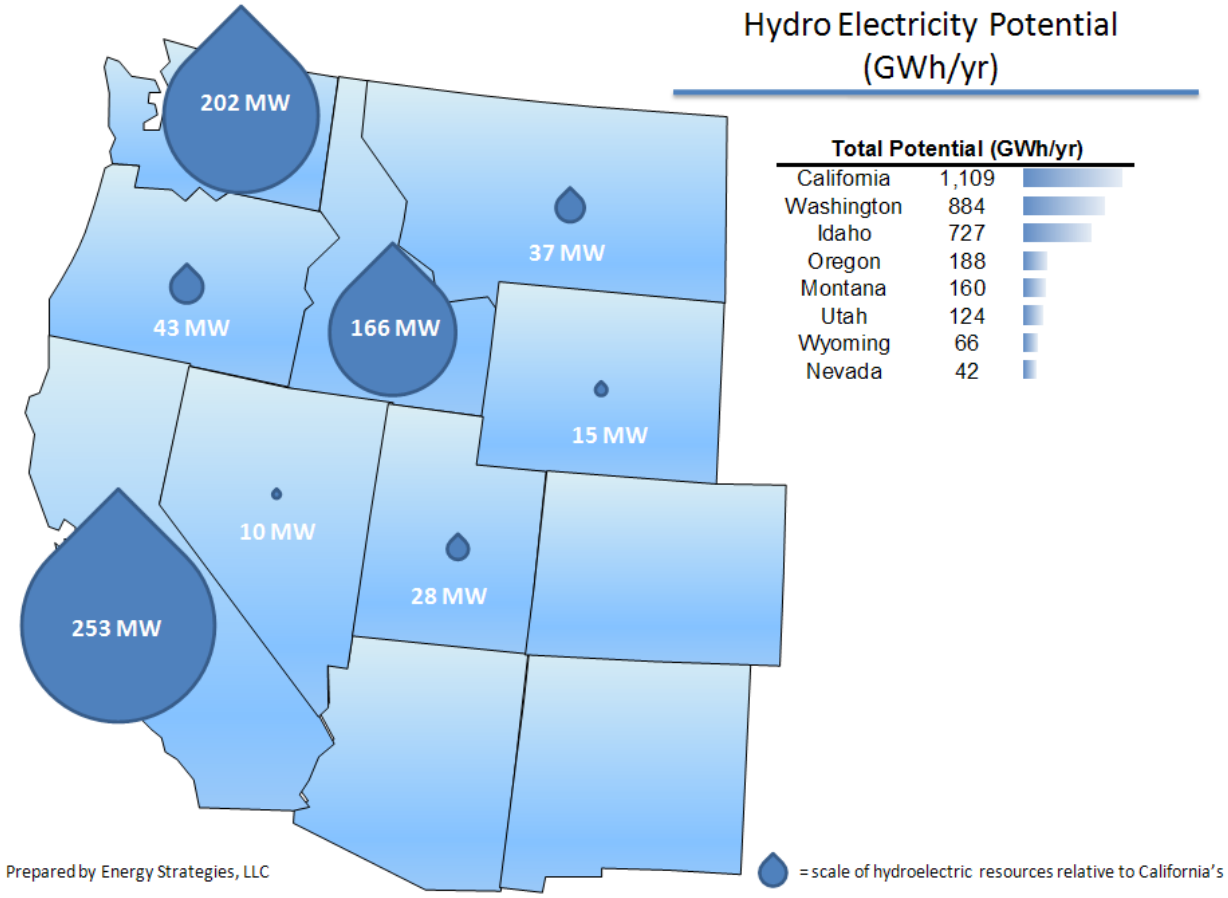


Figure 1-4 Hydro Potential



A Renewable Portfolio Standard goal for each state represented in percentages and year achieved.

Figure 1-5
Database of State Incentives for Renewables & Efficiency
Renewable Portfolio Standards

The below map, Figure 1-6 shows 16 States which have Renewable Portfolio Standards to be achieved under the distribute generation provisions including solar water heating counts.

Figure 1-6
Database of State Incentives for Renewables & Efficiency
RPS Policies with Solar/DC Provisions

In Figure 1-7 below, shows at least 15 states allow 3rd party solar PPA's. States in white represent status as unclear or unknown.

Figure 1-7
Database of State Incentives for Renewables & Efficiency
3rd-Party Solar Power Purchase Agreements

The map below shows 43 states that have adopted a net metering policy.

Figure 1-8
Database of State Incentives for Renewables & Efficiency
Net Metering

Figure 1-9 below shows 32 states that have adopted property tax incentives for renewables.

Figure 1-9
Database of State Incentives for Renewables & Efficiency
Property Tax Incentives for Renewables

Below, Figure 1-10 shows, 26 States that offer tax exemptions or deductions for renewable energy.

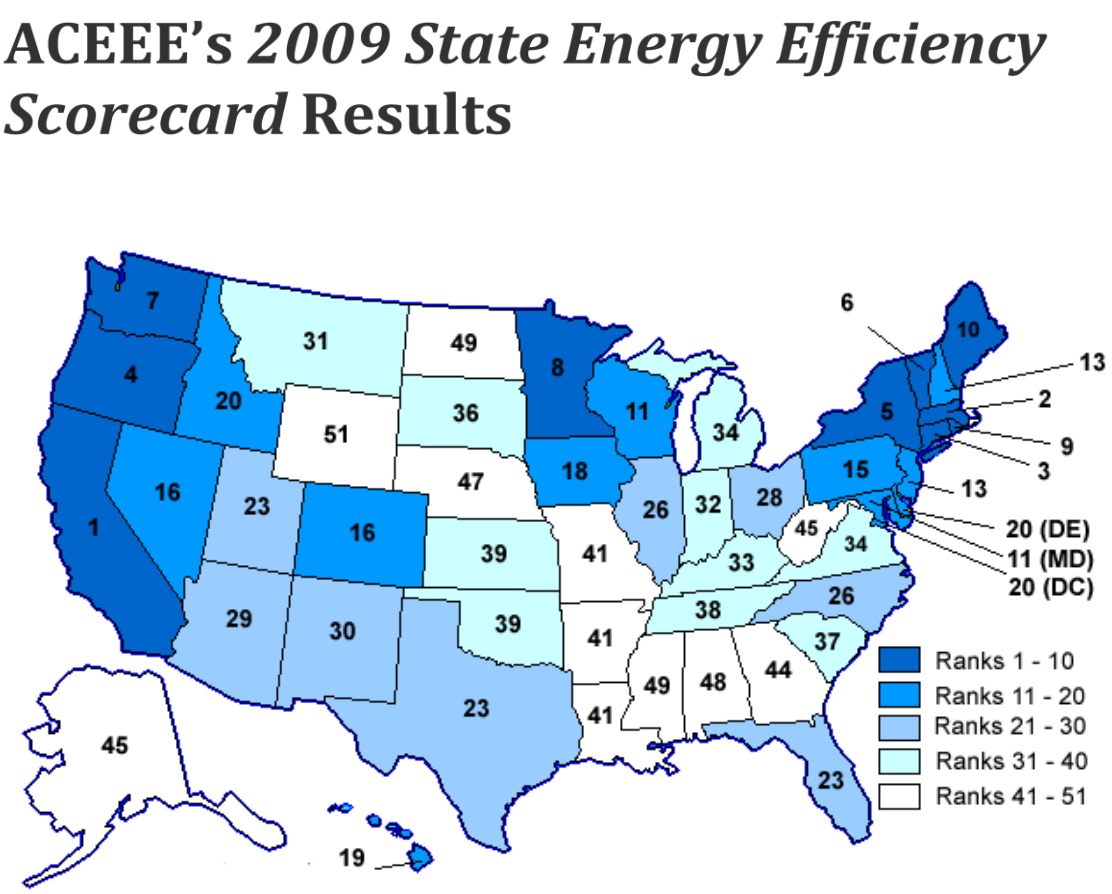
Figure 1-10
Database of State Incentives for Renewables & Efficiency
Sales Tax Incentives for Renewables

Rebate programs depicted as state programs, utility and/or local programs; and state programs(s) and utility and/or local programs only are shown below.

Figure 1-11
Database of State Incentives for Renewables & Efficiency
Rebate Programs for Renewables

The State Energy Efficiency Scorecard below shows state ranking and classifies states and the District of Columbia into five bins. The scores are based on overall Utility and Public Benefits Efficiency Programs and Policies, Transportation, Building Energy Code, Combined Heat and Power, State Government Initiatives, and Appliance Efficiency Standards. The total possible points are 51.

Figure 1-12 2009 State Energy Efficiency Scorecard Results[2]



[2] Eldridge et. al. 2009 http://aceee.org/pubs/e097.htm

Nevada's Policies

Over the last several legislative sessions Nevada's energy-related policies have focused on renewable energy, energy conservation and energy efficiency. In terms of policy implementation, the State's most recent effort was the creation of the Nevada Renewable Energy and Energy Efficiency Authority (

generating facilities in other states. This sends billions of Nevada dollars out of the state---dollars that could remain here in the form of jobs, taxes to support rural economies, and other economic benefits. Secondly, self-generation that is based on renewable energy levels stabilizes customers' electricity costs, which over time reduces them.

Under Nevada's net metering laws, NVE customers can net meter renewable energy systems as large as 1 MW, although systems greater than 100 kilowatts (kW) in capacity may be subject to additional costs. For systems that exceed this capacity there is: 1) a limit on demand that the class of customer of the customer-generator may place on the utility's system; or 2) 150% of the customer's peak demand are not eligible for net metering. Net metering is capped at 1% of the utility's peak capacity.

Nevada's net metering regulations apply only to NVE, the State's regulated utility. Nevada's other utilities are not subject to the State's net metering laws.

3rd Party Ownership

Third-party ownership is a policy that encourages the development of renewable energy distributed generation. A typical third-party scenario is the installation of solar panels on a roof top where the panels are owned by a third-party who operates and maintains them and then sells the electricity to the building owner.

Assembly Bill 186 of the 2009 Session codified third-party ownership by establishing that parties who—for compensation—own or operate individual systems which use renewable energy to generate electricity, and then sell the electricity to not more than one customer per system, shall not be classified as a utility. The system must be located on the premises of another person, cannot produce more than 150% of that person's requirements and may not be part of a larger system that aggregates electricity for resale or use on other premises.

Green Buildings

Green building policies also accomplish multiple objectives. They are energy efficient which reduces the amount of electricity a utility must generate or purchase. Green buildings emit less carbon and other pollutants. And because they focus on local recycling and the use of local materials, they also contribute more to local economies.

Nevada's Green Building policy encourages building owners and building designers to design and construct buildings to the United Sates Green Building Council Leadership in Energy and Efficiency Design (USGBC LEED) standard. The incentive for doing so is a personal property tax exemption. Nevada's Green Building Partial Property Tax Abatement Program is managed by the NSOE.

Building Codes

Building codes support green building. Senate Bill 73 of the 2009 Session of the Nevada Legislature requires local governments to adopt state building codes as minimum standards including retro-fitting buildings for energy efficiency and heat generating renewable energy systems. Under Senate Bill 358 they must also develop plans for retro-fitting public buildings and other facilities to use renewable energy and energy efficiency measures.

Senate Bill 358 also provides that the Nevada Energy Commission must adopt regulations for the conservation of energy in buildings, including manufactured homes. The regulations must include the adoption of the most recent version of the International Energy Conservation Code, issued by the International Code Council (IECC).

Energy Reduction in State-Owned Buildings

NRS 701.215 requires the NSOE to prepare the state energy reduction plan which reduces grid-based energy purchases for state-owned building by 20% by 2015.

Home Energy Audits

Home energy audits will help Nevada's homeowners take control of their energy costs. Senate Bill 358 of the 2009 Session of the Nevada Legislature requires the Nevada Energy Commissioner to develop a program for evaluating the energy consumption of residential property in the State of Nevada. To assist in the development of the regulations the Commissioner has created a collaborative that consists of the REEEA, the Nevada Real Estate Division and the Housing Division (both within the Department of Business and Industry) and the Southwest Energy Efficiency Project of Nevada (SWEEP) among others. This collaborative is holding public hearings to establish:

- The requirements of SB 358 Section 1.69 from the 2009 Legislative Session
- Which profession will evaluate energy consumption of residential properties and the availability for training/certification of this profession in Nevada
- The impact of SB 359 Section 1.69 on the sale of real estate and real estate agents
- SB 358 Section 1.68 compliance and enforcement

Solar and Wind Access Law

Nevada statutes provide owners of solar and wind energy systems protection against restrictions that would otherwise prevent them from installing these systems on their property. NRS 111.239 and 278.0208 disallow the adoption of any covenant, deed, contract, ordinance or other legal instrument which affects the transfer or sale of real property that unreasonably restricts a landowner from installing solar or wind energy systems on their land. The law further states that any existing covenant, deed, contract or other legal instrument that unreasonably restrict a landowner from installing solar or wind energy systems on their land is void and unenforceable.

Solar and wind systems are also protected from siting restrictions that would "significantly decrease the efficiency or performance of the system and not allow for the use of an alternative system at a comparable cost and with comparable efficiency and performance." Senate Bill 114 of May 2009 clarified that a 10% decrease in performance is considered a "significant decrease" for a solar system. The bill did not provide a similar value for an unacceptable decrease in the performance of a wind system.

NRS 116.211 ensures that common interest communities may not unreasonably restrict, prohibit or withhold approval of a wind energy system if it is installed on two acres or more of the owner's property within the established community if the owner obtains written consent from the owners of all properties within 300 feet of the system.

Nevada also allows parties to enter voluntarily into solar easements that are legally binding.

Assembly Bill 522

Assembly Bill No. 522 is "AN ACT relating to energy; creating the Fund for Renewable Energy, Energy Efficiency and Energy Conservation Loans and the Account for Set-Aside Programs; authorizing the Director of the Office of Energy to administer the Fund; authorizing the granting of partial abatements of certain property taxes and local sales and use tax to certain facilities for the generation of process heat from solar renewable energy, wholesale facilities for the generation of electricity from renewable energy, facilities for the generation of electricity from geothermal resources and facilities for the transmission of electricity produced from renewable energy; and providing other matters properly relating thereto."

Senate Bill 358

Senate Bill No. 358 is "AN ACT relating to energy; creating the Renewable Energy and Energy Efficiency Authority; establishing the position of the Nevada Energy Commissioner; revising provisions related to energy and state and residential property; revising provisions related to public utility rates; revising provisions related to capacity and incentives in certain renewable energy programs; requiring the Public Utilities Commission of Nevada to adopt regulations authorizing electric utilities to recover certain costs; authorizing local governing bodies to establish improvement districts for the construction and installation of certain renewable energy projects, energy efficiency projects and public safety projects; abolishing the Task Force for Renewable Energy and Energy Conservation; transferring authority for the administration of the Trust Fund for Renewable Energy and Energy Conservation from the Task Force to the Authority; and providing other matters properly relating thereto."

Green Jobs Initiative

The Green Job Initiative promotes job training and outreach for weatherization and retro-fitting buildings. The Office of Energy within the Office of the Governor; the Department of

Employment, Training and Rehabilitation; and the Housing Division of the Department of Business and Industry shall report to the Interim Finance Committee (IFC) as required by the Committee concerning the application for and acceptance and expenditure of any money available to the State to carry out the purposes of this act pursuant to the American Recovery and Reinvestment Act of 2009.

Nevada Programs

Nevada's renewable energy programs have focused largely on distributed renewable energy generation. As a result of these programs, the State now has a robust renewable energy industry that consists of a wide variety of job training programs supplying a large network of contractors with hundreds of highly-qualified, certified renewable energy employees.

RenewableGenerations

One of Nevada's most successful policy experiments is the RenewableGenerations program which actually consists of three (3) separate rebate programs: SolarGenerations, WindGenerations and HydroGenerations. The WindGenerations program is the largest of its kind in the country. For more information on these programs, see Chapter III, page 112.

RenewableGenerations programs are only available to NVE customers. Customers of the State's other utilities are not eligible to participate in the programs.

The RenewableGenerations program was created in 2003 by Assembly Bill 431 - the Solar Energy Systems Demonstration Program. It authorizes the funding so that rebates could be provided to residents who install photovoltaic systems. The program was launched in August of 2004 and its success led to the Nevada State Legislature making the SolarGenerations Program permanent in 2007. The new HydroGenerations and WindGenerations Programs were also created in 2007. All three Programs together form RenewableGenerations.

In 2009, SB 358 made adjustments to the administration of the RenewableGenerations program. After the utility approves the applicant, the utility will have 30 days to notify them in writing. Further, applicants will have 12 months to complete a project following their initial approval. If projects that have been approved miss the 12-month target date, they can become eligible again after the project is complete, but will receive an incentive at the current rate, rather than the rate when they received initial authorization.

Solar Thermal Demonstrations Program

Nevada's tremendous success with the RenewableGenerations program led the 2009 Legislature to establish the Solar Thermal Demonstration Program. The PUCN is currently adopting the regulations for the program which is expected to begin sometime in 2011.

Nevada Sure Bet

The Sure Bet Project is an incentive project that focuses on helping businesses to wisely use energy. NVE offers both prescriptive and custom incentives to NVE non-residential electricity customers. In addition, technical services are available to help assess energy saving opportunities for customers committed to installing electric energy efficiency equipment.

Custom incentives are offered for most measures not covered under a prescriptive incentive that results in verifiable energy savings. NVE also offers small commercial direct install incentives and services.

Chapter II Energy in Nevada

Overview

This chapter describes Nevada's energy goals, challenges and opportunities.

Nevada's Goals

Achieving our State's energy goals requires the active participation of all of our State's stakeholders. The Nevada State Office of Energy (NSOE) is actively engaging all of our stakeholders in a continuous cycle of goal setting, goal achievement, and new goal identification.

Energy as Revenue

The only revenue-generating energy source Nevada has is renewable energy. Fortunately Nevada has a lot of renewable energy. We have more solar and geothermal resources than just about any other state – or any other country for that matter. We also have good wind resources and extraordinary biomass and methane generating potential.

Our first goal is turning these resources into sources of revenue. The benefits to the State in terms of tax revenue, job creation, economic diversity, emissions offsets, reduction in water use, reduction of wildfire threats and the diversification and stabilization of our electricity and fuel supplies make this our number one priority.

Energy Manufacturing

Achieving our first goal facilitates our second—attracting energy manufacturing plants. Nevada already has a highly favorable corporate climate. In addition to supplying renewable energy projects in our own state, Nevada is also ideally situated so that energy manufacturing plants can supply renewable energy production zones throughout the west. This makes Nevada an attractive location for siting renewable energy manufacturing facilities.

Nevada has already achieved some successes in this area. Recently a consortium of companies announced plans to open a 320,000 square-foot wind turbine manufacturing plant in Southern Nevada. It is expected that the plant will employ approximately 1,000 Nevadans.

Energy Technology

Technology drives manufacturing; as a result, our third goal goes hand-in-hand with our second. Energy Technology (ET) is the next Information Technology (IT). Like the IT revolution, the ET revolution will change the world. Whoever develops ET will be in a position to sell that technology to countries currently relying on fossil fuels. For example, advanced storage technologies will influence renewable energy applications significantly.

Nevada is uniquely poised to create, and comme4ni newsEni cage

NSOE will meet weekly with CED and Employment Training to discuss companies that are prime candidates looking to move to Nevada.

Nevada's Challenges

Nevada has a long history of facing and overcoming challenges. We also have a history of innovation. To demonstrate, Nevada's RPS was one of the first and remains one of the highest in the country. Our SolarGenerations program has been copied by states across the nation. Our WindGenerations program is the largest in the country. Our next set of energy challenges are articulated below.

Land Access

Nevada has been dubbed by the media as the "Saudi Arabia of Solar." Nevada is indeed rich with both abundant solar as well as land resources. However, the ability to harness and utilize those resources to expeditiously export power is hampered by the fact that Nevada is 87% federally owned. The large amount of federal ownership makes it difficult for even privately owned lands to be developed for renewable energy production since many sites must be accessed through federal lands. The impediments to developing federal lands and accessing private lands must be removed to enable Nevada to live up to the expectation of becoming the "Saudi Arabia of Solar."

Transmission

A review of the competitive analysis in Chapter I reveals that Nevada has successfully adopted the policies necessary to encourage the development of our renewable energy resources. The next critical step in this process is transmission. Without access to transmission, developers cannot get their energy to markets within the State of Nevada, or to markets in our neighboring states.

Standardized Codes and Ordinances

No renewable energy projects can move forward without financing and power purchase agreements. Both are based on the project's ability to secure permits. The Nevada Legislature has acknowledged and addressed this challenge by passing several statutes. The issue now moves down to the counties and cities that need to adopt the codes and ordinances that grant the special—and other—use permits required by project financiers and the utilities.

Water

As Mark Twain so famously said "whiskey is for drinking, water is for fighting." Nevada is one of the most arid states in the country. According to Bennett Raley, Department of Interior's former Assistance Secretary for Water and Science, "The demands for water in many basins of the West exceeds the available supply even in normal years." Water managers in 36 states surveyed by the General Accounting Office said they anticipate water

shortages in the next 10 years even under "normal conditions." Forty-six water managers predicted water shortages in the next 10 years under drought conditions. These shortages "may be accompanied by severe economic, environmental and social impacts."

In 2000 the largest consumer of water was the production of thermo-electric power. Furthermore, water quality is affected by water use at power plants because of the effects of the temperature of discharged cooling water and the conditioning agents used to treat cooling water.

Fortunately for Nevada, the number one renewable energy resource—solar—has one technology—solar photovoltaic—that requires no water to produce electricity. Just as importantly, neither does another of the State's renewable resources—wind. The only water either wind or solar photovoltaic technologies use, is to occasionally wash the solar panels or the turbine blades. As we identify and implement future energy policies we need to take into consideration the preservation of our precious water resources and consider renewable energy (RE) that utilizes the least amount of water.

Declining Load

The recent economic down-turn has resulted in a decline in our State's electrical load. This is a challenge because many of our policies are expressed as percentages as opposed to actual numbers. For instance, our RPS is expressed in terms of percentage. As the State's load declines, the need for the total number of megawatts from renewable energy projects also declines. Other programs potentially affected by a declining load include energy efficiency and energy conservation programs.

Nevada's Opportunities

Nevada's greatest energy opportunity rests in its people and its institutions. This is where the solutions to our challenges will be developed.

The following processes all need to be in dialogue in the development and articulation of the following energy opportunities.

1. To use Nevada's vast renewable resources to produce electricity, and other products, that provides economic development opportunities, create high-paying jobs and diversify the State's economy.
2. To use Nevada's wind and solar photovoltaic resources to produce electricity that does not require the use of the State's precious water resources.
3. To use renewable resources to produce electricity that does not result in greenhouse gases, or pollute the State's delicate air shed.
4. To help the utility meet its RPS requirements by working with it to enhance the State's transmission infrastructure in order to move electricity from northern

Nevada's wind resources and rich geothermal fields to southern Nevada's markets, and electricity from solar resources in southern Nevada to northern Nevada electricity markets.

5. To work with the federal government and with surrounding states to develop the transmission capacity to export electricity generated from Nevada energy plants.
6. To work with the utilities to expand the number of distributed generation projects in the State to increase energy security.
7. To work with the utilities to expand and increase the number of net-metered projects in Nevada to increase energy security and stabilize electricity bills.
8. To work with the DOD to balance the DOD's need for air space with the need to develop the State's renewable resources.
9. To work with Fish and Wildlife, the Department of Transportation and Nevada's sportsmen to secure the safety of renewable energy projects in remote locations.
10. To work with federal agencies to secure the use of Nevada's biomass resources on federal land, reducing the risk of wildfires.
11. To use biomass resources on federal land to generate electricity, develop new bio-fuels and create other products.
12. To recycle municipal waste to generate electricity, develop new bio-fuels, and create other products.
13. To leverage the creation of Nevada's federally-funded Renewable Energy Centers to attract federal grants and private investments to develop and commercialize new renewable energy technologies, desert southwest architectural innovations and new transportation fuel products.
14. To leverage federal funds for low income weatherization and assistance programs to increase energy efficiency and energy conservation.
15. To leverage federal funds and other federal programs to create renewable energy job training programs.

Production & Use of Energy

The 2009 Legislature directed the Legislative Commission to conduct an interim study on the Production and Use of Energy. Members of the committee conducting the study include Senator Michael A. Schneider (Chair), Assemblywoman Marilyn Kirkpatrick (Vice-Chair), Senator John Lee, Senator Randolph Townsend (resigned), Assemblyman Marcus Conklin, and Assemblywoman Heidi S. Gansert. The committee has been meeting on a regular basis receiving presentations from a wide variety of energy stakeholders.

Nevada State Office of Energy

The NSOE is responsible for implementing federal energy polices within the State of Nevada. These policies are established by the U.S. Department of Energy (DOE).

Nevada's state energy policies are established by the Governor and the Legislature. Renewable energy, energy conservation and energy efficiency policies are developed in coordination with the Nevada Renewable Energy and Energy Conservation Task Force (NRS 701.350-701.380). The NSOE implements state energy policies on behalf of the executive branch of government. For more information regarding the NSOE, please see Chapter VI.

Nevada Renewable Energy and Energy Efficiency Authority

The Nevada Renewable Energy and Energy Efficiency Authority[3] (REEEA) were created by the 2009 Session of the Nevada Legislature[4'5]. The REEEA is funded via a combination of PUCN Reserve account and ARRA funds during FY 2010 and 2011 and will be funded via Renewable Energy Fund after FY11. The head of the REEEA is the Nevada Energy Commissioner. The Commissioner is appointed by the Governor. Nevada's first Energy Commissioner, Dr. Hatice Gecol was appointed in Mid October 2009.

The Mission of the REEEA is to:

- Development and Use of Renewable Energy Resources and its Infrastructure
- Reduction of Energy Demand through Conservation and More Efficient Use of Energy

The Goal of REEEA is to place and keep Nevada as the Renewable Energy and Energy Efficiency Leader in the West through:

- New Energy Economy (renewable energy and energy efficiency measures)
- Attracting and retaining large-scale renewable energy industries for long-term renewable energy economy
- Affordable renewable energy for small businesses and homeowners
- Energy Security and Independence

The Commissioner is also the Chairman of two (2) other entities created by the 2009 Legislature; the State and Local Government Panel on Renewable and Efficient Energy (SLGPREE) and the New Energy Industry Task Force (Task Force). The SLGPREE consists of seven (7) members who are appointed by the Commissioner. Members represent the State Public Works Board, the Housing Division of the Department of Business and Industry, Buildings and Ground Division of the Department of Administration, the

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[3] http://renewableenergy.state.nv.us/
[4] SB 358 and AB 522.
[5] At the time of this report the REEEA staff consisted of an Executive Assistant and a contract Attorney

Department of Wildlife, the Nevada Association of Counties, the Nevada League of Cities, and the Nevada Association of School Boards. The SLGPREE's mission is to:

- Monitor viability and progress of energy efficiency and renewable energy retrofit projects at public buildings and schools
- Apply for any available grants and accept any gifts, grants or donations to assist the Panel in carrying out its duties
- Serve as an expert group to the State and Local Government Entities and Elected Officials.

The Task Force consists of eight (8) members and five (5) advisory members. Members represent the solar energy industry, the geothermal energy industry, the wind energy industry, the distributed generation industry, an electric utility, an environmental or public lands organization, a labor organization and a contractor's organization. Advisory members represent the geothermal industry, the wind energy industry, the energy efficiency equipment and installation industry, an environmental or public lands organization and a contractor's organization. The Task Force's mission is to:

- Promote the development of renewable energy and energy efficiency projects in Nevada
- Apply for any available grants and accept any gifts, grants or donations to assist the Task Force in carrying out its duties pursuant to this section
- Serve as an expert group on the renewable energy and energy efficiency project development issues to the state and local government entities and elected officials

SLGPREE and Task Force meeting notices and agendas are available on the REEEA web site http://renewableenergy.state.nv.us/ .

Other duties given to the Commissioner include:

- Rule making and the implementation of the State's renewable energy tax abatement program for utility scale renewable energy facilities and transmission projects[6] (at the time of this report, Commissioner received 10 pre-application and two full applications)
- Developing the regulations behind the State's standard for determination of the energy consumption of residential property for the purpose of residential sale transaction
- Establishing minimum standards for general purpose lighting sold in the State
- Adopting certain building code standards (International Energy Conservation Code)

[6] http://renewableenergy.state.nv.us/TaxAbatement.htm

- Encouraging the development of the State's renewable energy resources including coordinating planning activities in appropriate areas of the state
- Working with renewable energy developers to locate projects within appropriate areas of the State
- Assisting developers to interact with the BLM, the DOD and other federal agencies
- Developing proposals for the financing of future electric transmission projects for renewable energy (see the Nevada Energy Assurance Corporation)
- In cooperation with the Nevada System of Higher Education, making recommendations to the appropriate state and federal agencies relating to the research and development of the State's renewable energy resources
- In cooperation with the Director of the State Office of Energy promoting the use of renewable energy in the State, energy projects that enhance the economic development of the State, promote energy efficiency and develop a program for retrofitting public buildings in the State
- Coordinating activities with the NSOE, the Consumer Advocate's Office and the PUCN
- Writing an annual report to the Governor and the Legislature
- Prepare a comprehensive State Energy Plan

To fulfill these REEEA's mandates the Commissioner may request assistance from the Public Utilities Commission of Nevada.

Public Utilities Commission of Nevada

The Public Utilities Commission of Nevada's (PUCN) mission is to supervise and regulate the operation and maintenance of utility services in Nevada. The PUCN regulates the State's electric, natural gas, rail safety, renewable energy, telecommunications and water/wastewater systems.

The PUCN issues a biennial report to the Governor[7], Nevada Utility Law and Nevada Utility Regulations[8], and a Strategic Plan[9].

Education and Research

Nevada's energy education and research efforts are coordinated by the Nevada System of Higher Education's (NSHE) Renewable Energy Consortium (REC). State Senator Randolph Townsend created the REC concept which has been continuously funded since its inception

[7] http://pucweb1.state.nv.us/PDF/Admin/Biennialreport.pdf
[8] http://pucweb1.state.nv.us/PUCN/General/Genlaw.aspx
[9] http://pucweb1.state.nv.us/PDF/Admin/StrategicPlan.pdf

by U.S. Senator and Majority Leader Harry Reid. The current fiscal year appropriation is $3 million.

The purpose of the REC is to help Nevada become a national leader in renewable energy research and development and energy workforce development. The REC scope is to expand, accelerate, and coordinate basic and applied renewable energy research and development across NSHE's institutions.

The REC has four (4) goals:

1. Increase the national renewable energy research competitiveness of NSHE's research institutions
2. Develop an NSHE inventory of research capabilities, facilities and educational and outreach programs
3. Enhance outreach, training and workforce development programs with participating community colleges
4. Build partnerships with industry and enhance opportunities for expanding the economic impact of renewable energy programs in Nevada

Long term goals include:

1. Increase the number of renewable energy research projects being conducted at member institutions, and integrate this research across campuses
2. Build a strategic plan for longer term development and sustainability of the Consortium
3. Serve as a point of entry for associated businesses, technical organizations and academic entities seeking partnerships with NSHE in renewable energy and clean technologies
4. Increase commercialization, economic analysis, public policy and outreach capabilities in renewable energy

The Table 2.1 below represents the current REC projects and their lead institutions.

Table 2.1 Current REC Projects (X= involved)

FY09 R&D Project No. and Title	DRI	UNR	UNLV
1.1 Pre-Treatment of lignocelluloses biomass	Lead	X	
1.2 Thermal treatment of biomass	Lead	X	
1.3 Algal-based fuels	Lead	X	X
1.4 De-watering of	X	Lead	

wastewater sludge			
2.1 Flexible solar cells		Lead	
2.2 Hydrogen generation from solar heat	X	Lead	
2.3 Concentrated solar energy test facility			Lead
2.4 Building façade evaluation facility			Lead
3.1 Hyper spectral remote sensing	Lead	X	
3.2 Shallow temperature and soil gas survey		Lead	
3.3 Isostatic rebound patterns in the Great Basin	Lead		
3.4 Geothermal life-cycle evaluations		Lead	

Great Basin Center for Geothermal Energy

Nevada's oldest renewable energy research institution is the Great Basin Center for Geothermal Energy. Established in 2000 at the University of Nevada Reno within the Mackay School of Mines, the Center conducts research toward the establishment of geothermal energy as an economically viable energy source within the Great Basin.

The Center is internationally recognized as a center of excellence in promoting the development of geothermal energy. The Center's activities include:

- Providing needed and timely information on geothermal resources
- Identifying key policy, regulatory, economic, social/cultural and environmental issues
- Identifying and evaluating new and emerging technologies for geothermal energy production, storage, transmission and use
- Fostering new scientific and technological developments
- Facilitating outreach, training and communication between geothermal energy stakeholders
- Nevada Geothermal Institute

Energy Technology Commercialization

The Nevada Institute for Renewable Energy Commercialization (NIREC) is a powerful economic growth catalyst for Nevada that will enable the creation of knowledge-based

industries and the workforce required to satisfy the worldwide demand for affordable clean energy solutions.

NIREC, a 501(c) 3 non-profit organization; was founded in 2007 by veteran business executives, entrepreneurs and technology investors to increase the education, innovation and entrepreneurial capacity of Nevada and the nation. Focused on the rapidly growing clean energy sector (energy efficiency and renewable energy), NIREC provides seed funding and advisory services through its Entrepreneur-in-Residence Program to early-stage companies and researchers from universities and research institutes in Nevada and the surrounding region.

NIREC has leveraged its initial seed investment by the State of Nevada and the federal

Renewable Energy Codes and Ordinance Committee that is working with various entities throughout the state to develop best-practice renewable energy codes and ordinances.

Nevada Woody Biomass Collaborative

The Nevada Woody Biomass Collaborative[12] (NWBC) is now managed by the Business Environmental Program at the University of Nevada Reno. The NWBC includes Nevadans interested in improving the utilization of woody biomass from forests and rangelands as well as urban green and wood wastes. As a collaborative, the NWBC is open to all those who want to contribute to making better uses of wood and to foster the idea that wasting valuable resources is "our" problem and we need to take back the responsibility of managing those resources.

The NWBC has recently joined with the USDA Rural Development to create the Pinyon Juniper Woodlands Impacts and Opportunities Partnership. Nevada's Pinyon Juniper (PJ) woodlands are critically important to Nevada both because of the threats they pose and the potential they represent. A significant number of agencies and organizations, including the Nevada Woody Biomass Collaborative, are already investing time and resources on their individual responsibilities related to the PJ woodlands. The Partnership's goal is to move beyond the status quo programs for treating PJ woodlands into a pilot project in eastern Nevada that combines environmentally acceptable treatment with economically sustainable production.

[12] http://finance.groups.yahoo.com/group/NevadaWoodyBiomassCollaborative/

Chapter III Electricity

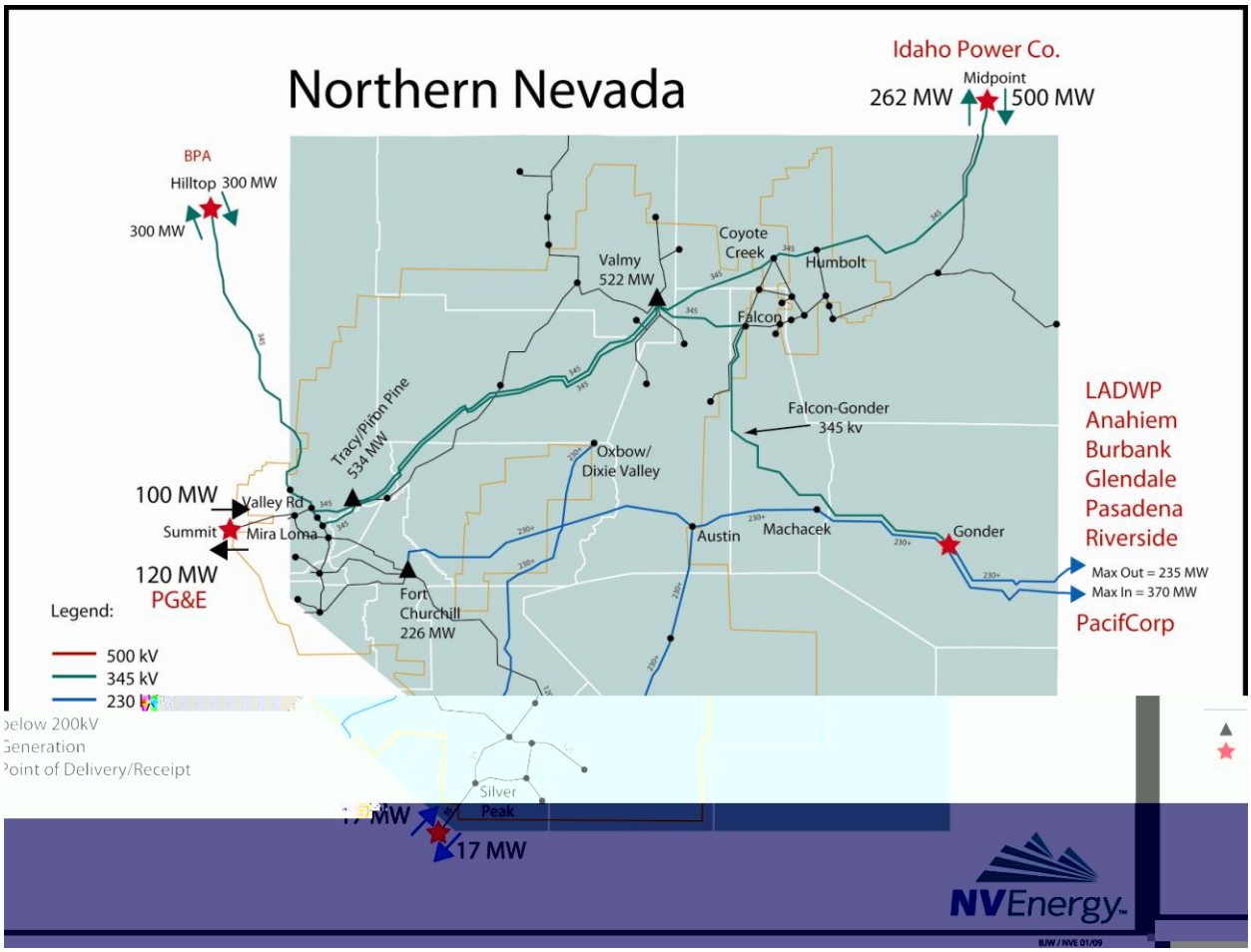
Transmission

Transmission is the key to unlocking the economic value of the State's renewable resources. Without a transmission line connecting the State's northern and southern grids the State will not be able to develop renewable resources for internal consumption. And without a way to by-pass the congestion in the Las Vegas area we will not be able to export our resources to California and other states in the Western Interconnection. Finding a way around the congestion is particularly important because California has designated the Mountain Pass Gateway Substation located south of Las Vegas as one of the collector points for renewable energy transfers to California.

NV Energy Northern Nevada

The NV Energy North (NVEN) bulk transmission system is depicted in the map in Figure 3-1. The system primarily consists of a 345 kV line from North Valley Road and Mira Loma to Tracy; a pair of 345 kV lines from Tracy to Valmy; and a 345 kV line from Valmy to Gonder. Additionally, a 230 kV line runs from Ft. Churchill (Yerington) to Gonder (Ely). Numerous smaller capacity 120 kV and 60 kV circuits complete the transmission system.

Figure 3-1 NVEN Transmission System



As the transmission system Balancing Authority, NVEN is responsible for balancing electric supply and demand in real-time. Table 3.1 lists the major transmission interties between the NVEN system and neighboring systems, including transmission line voltages and non-simultaneous transmission line capacities. The transmission "capacity" refers to the non-simultaneous amount of electricity that each of the interties can import or export on an individual basis.

Table 3.1 NVEN Transmission Interties & Non-Simultaneous Design Capacities

Intertie	Balancing Area	Voltage (kV)	Capacity In/Out (MW)	Notes
Humbolt Line	Idaho Power	345	500/262	
Summit Line	CAISO PG & E	120 (92) & 60	100/120	
Alturas Line	COB / BPA System	345	300/300	BPA has 100 MW cap into NVEN System
Utah Intertie	Gonder to	230	370/235	

	PacifiCorp / Pavant to LADWP et. al. / Intermountain PP			

A more detailed description of these four (4) major interties with neighboring utility systems is provided below.

1. NVEN to Idaho (the Humboldt to Midpoint 345 kV line) – The Humboldt to Midpoint 345 kV line connects the NVEN system to Idaho Power Company. This is NVEN's largest intertie, with a capability of transferring 500 MW from Idaho to NVE and 262 MW from NVEN to Idaho. NVE and Idaho Power jointly own the line with ownership rights ending at the Idaho/Nevada border. NVE has rights to the transmission capacity from Midpoint into Nevada. Idaho Power has rights to the transmission capacity from Humboldt to Idaho to move its 50% ownership of the Valmy power plant to Idaho.
2. NVEN to California/Oregon (the Alturas line) – The Bordertown to Hilltop 345 kV line connects NVEN to the energy-trading hub at the California – Oregon Border (COB) via a Bonneville Power Administration (BPA) 230 kV line from Alturas to COB. The Alturas intertie is capable of transferring 300 MW between COB and NVEN in both directions. The intertie is wholly owned by NVE. BPA has rights to 110 MW of the capacity from COB to NVEN to serve its contracts with the Harney and Wells Rural Electric Cooperatives.
3. NVEN to Utah (the Utah Intertie) – The Utah Intertie is composed of two 230 kV lines. One extends from the Gonder Substation (located near Ely, Nevada) to PacifiCorp's Pavant Substation. The other extends from Gonder to the Intermountain Power Project Substation (owned by the Los Angeles Department of Water and Power (LADWP) and others). These lines, in combination, are capable of transferring 370 MW east to west and 235 MW west to east. NVE owns the Gonder to Pavant Line from Gonder to the Stateline. NVE has no ownership in the Gonder Intermountain line.
4. NVEN to California (the Summit line) – The Summit intertie is composed of two 120 kV lines and one 60 kV line extending from NVEN over Donner Summit to the Pacific Gas and Electric (PG&E) system operated by the California Independent System Operator (CAISO). These lines are capable of transferring ~100 MW to and from California. Specific operating conditions in the PG&E and NVE systems can dramatically reduce this tie's capability. NVEN owns these lines up to the Summit metering station on top of Donner Summit.

The total import capacity via these four interties that NVEN's control area can rely on at any given time (i.e., that can deliver firm imported power) is referred to as the simultaneous capacity. The simultaneous import capacity of the NVEN system is 1,000 MW, i.e., much lower than the summation of the four non-simultaneous line capacities. Simultaneous import ratings are developed under operating scenarios in which one of these transmission interties is taken out of service due to an unforeseen fault condition. Import limits are thereby established so that a loss of the most critical intertie will not overload the remaining interties and cause cascading outages.

The import limit can also vary depending upon how much power is actually flowing on each of the four interties. The 1,000 MW simultaneous limits describe the system condition when actual import flows are optimized. However it is important to note that it is not always possible to achieve the optimal flows for maximum import; for example, if a relatively large amount of power is imported on the Summit Line, the total system capacity can be less than half of the 1,000 MW simultaneous limits. Additionally, ambient temperatures can also affect total system capacity; for example, higher temperatures reduce the amount of power that can be transported because of thermal loading limitations inherent in the type and size of conductor used in the transmission line. As a practical matter, NVEN maintains a series of monographs that visually display the load limits for control area operators.

Import Capability

NVEN has approximately 283 MW of import capacity commitments under long-term contract to wholesale and retail access transmission customers. The remaining import capacity (of the 1,000 MW limit) which would be available for use by NVEN's native load customers is therefore 717 MW. This import capacity value represents the maximum amount of off-system purchases that NVEN can import into its system to serve its native load requirements.

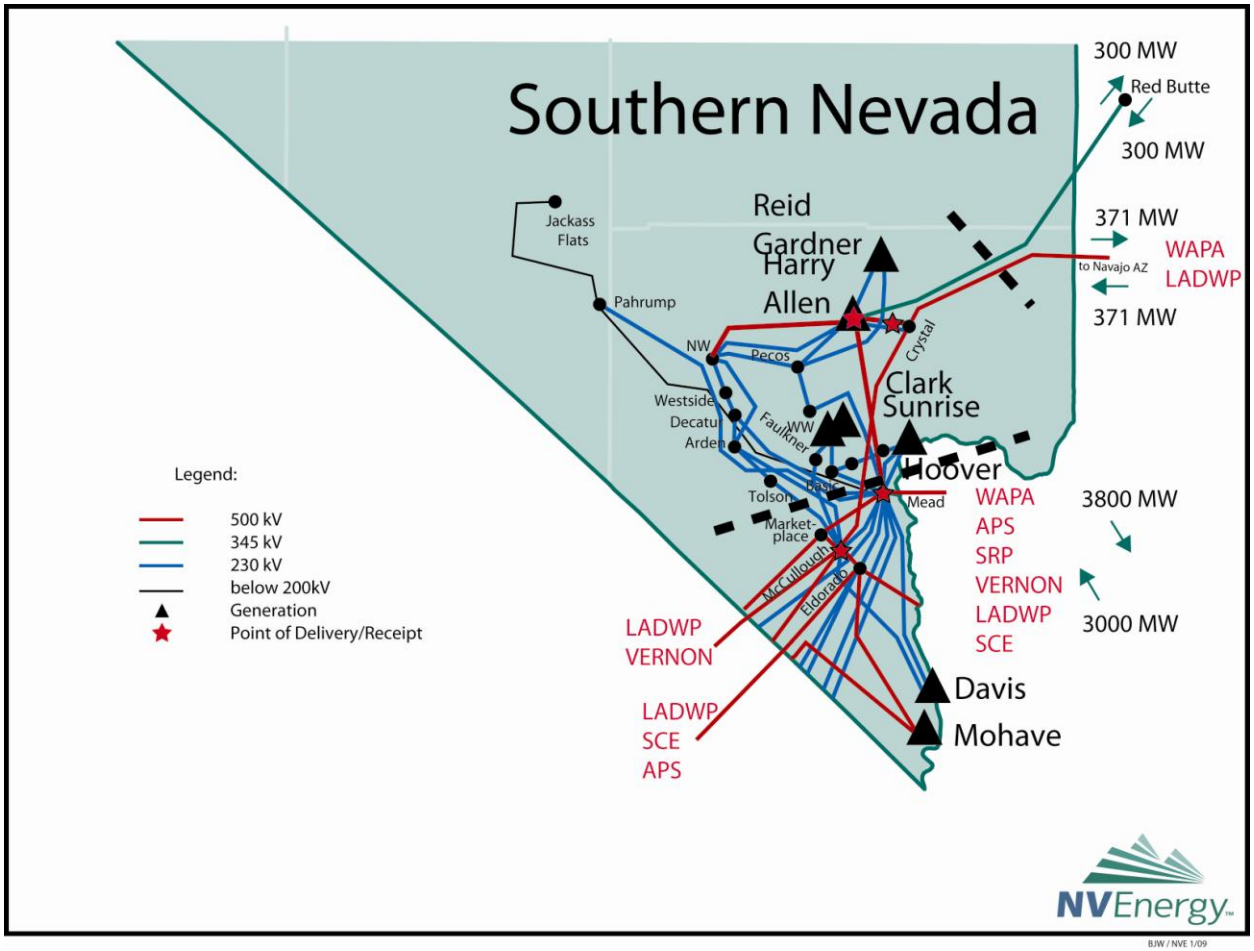
Export Capability

In addition to the limitations outlined in Table 3.1, there is a total system export limit of approximately 700 MW out of NVEN's control area. Currently, NVEN does not export a great deal of power to wholesale customers; however this could change in the future as more internal generation is added to NVEN's system and also with the planned interconnection of the NVEN and NVES balancing areas via the 500 kV ON-Line Project in 2012 (see page 54 for more detail). Such an interconnection would allow for the interchange of power between the two control areas. Moreover this proposed interconnection will also serve to increase the existing import and export limits on the NVEN system.

NV Energy Southern Nevada

The NV Energy South (NVES) bulk transmission system is depicted in the map in Figure 3-2. The system primarily consists of 500 kV lines from Crystal to Harry Allen, Harry Allen to Northwest, and Harry Allen to Mead. Additionally, NVES has a 345 kV line from Harry Allen to Red Butte and several 230 kV lines from Mead, McCullough and Crystal. Extensive 230 kV, 138 kV and 69 kV lines interconnect throughout the Las Vegas Valley for complete the system.

Figure 3-2 NVES Transmission System



The NVES system also has three (3) major interties that connect it to neighboring utilities. These interconnections allow for transfer of energy among the west coast utilities. A description of each intertie is provided below:

1. NVES to the Eldorado Valley - The NVES to Eldorado Valley interconnection is composed of twelve 230 kV lines and one 500 kV line extending from the Las Vegas Valley to the Mead, McCullough, and Eldorado Substations. NVE owns nine (9) 230

kV and one (1) 500 kV of the thirteen lines from the Las Vegas valley into the Eldorado Valley. These lines are capable of approximately 3,000 MW of import and 3,800 MW of export with the new Harry Allen – Mead 500kV line in service. This is NVES's largest interconnection in terms of transmission capacity and is used to deliver off-system energy to NVES - including the allocated share of the Hoover Dam.

2. NVES to Navajo – McCullough (Crystal Tap) - The Crystal Tap allows for 950 MW of transfers from the Navajo 500 kV system into or out of the NVES. The Crystal Tap is composed of a pair of 500/230 kV step down transformers and a pair of 230 kV phase regulating transformers. NVE owns the entirety of the Crystal facilities.
3. NVES to Utah - The Red Butte to Harry Allen line is a 345 kV line running from the Las Vegas Valley to PacifiCorp's southern Utah system. This line is rated for 300 MW of transfer in both directions. NVE owns this line from Harry Allen to the Utah – Nevada Stateline.

Import Capability

The NVES transmission system is capable of importing up to 4,250 MW as the total simultaneous limit of flow on the three (3) interties. As described above in the Transmission System section for NVEN, this limit is governed by the system ability to survive the loss of its single largest element; and the limit itself may also be less than 4,250 MW depending on generation dispatch patterns.

Export Capability

The NVES system is currently capable of exporting approximately 3,800 MW. However this number is limited when generation resources are committed to serve control area load.

NV Energy North and South: Planned Additions

Current and planned transmission resources for the NVE systems are expected to be adequate to reliably serve customers in northern Nevada. NVE is in the process of upgrading its transmission facilities to serve load growth in Reno, Sparks, Carson City, and other nearby communities. The demand for new and upgraded distribution facilities is among the highest in the West, however due to the recent economic downturn, many facilities are being delayed.

Among the intra projects that are currently being discussed is a north-south Intertie from Robinson Summit near the Gonder Substation to the Crystal or Harry Allen Substation near Las Vegas (ON-Line Project). The completion of this or a similar link between the two systems is quite important. The ON-Line project provides a needed path for renewable generation which is largely located in the northern part of the State to access the larger market in the southern part of the State. It also provides needed operational flexibility for the NVE utilities to combined dispatch.

One recent addition called the Centennial Project is a 500 kV system interconnected at Crystal, Mead, and Northwest Substations. It provides a total of 3,000 MW of transmission service from Harry Allen / Crystal to the Eldorado and Las Vegas Valleys. The system was completed in March of 2007. This 500 kV system provides the base system for all future bulk system expansions including the ON-Line project and the Sunrise Tap.

In planning for future system needs NVE has also received approval for portions of our East Valley Master Plan (EVAMP), Valley Area Routing and Siting (VARS), and West Henderson Master Plan. These are major bulk transmission expansions planned to meet load growth. Additionally, NVE had been planning to install seven (7) major bulk/network 230/138 kV transformers and 14 new transmission/distribution substations. The timing of many of these transmission expansions and substations has been delayed to match the forecasted downturn in Las Vegas growth.

USDA Rural Development, Rural Utilities Service

Transmission lines in rural areas may also obtain financing through the USDA's Rural Utilities Service (RUS). The RUS has an electric loan portfolio of approximately $40 billion. The current interest rate is 4.75% (Treasury + 1/8). Their typical time for loan approval (post the NEPA process) is four (4) months.

Transmission for Internal Use

In terms of the internal consumption, the most important transmission project in Nevada is the combined Southwest Intertie Project[13] (SWIP) and the One Nevada Line, also referred to as ON-Line.

SWIP and On Line

SWIP

Nevada's first renewable energy transmission line is the SWIP line below (Figure 3-3). SWIP is a 501 mile 500kV AC transmission line with 200- MW of transfer capability. The SWIP line extends from Idaho south through eastern Nevada to just north of Las Vegas.

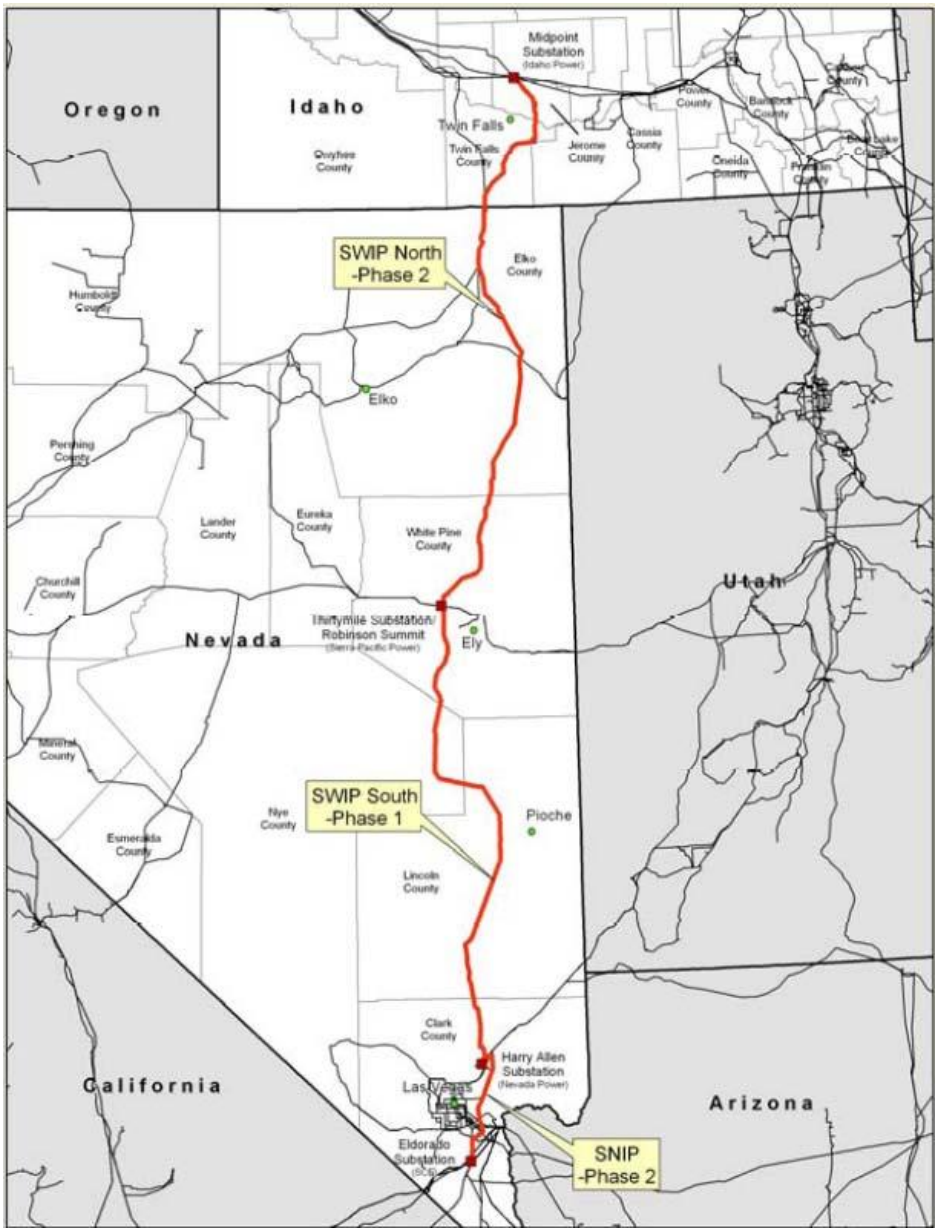
ON-Line

On February 4, 2010 NVE's Integrated Resource Plan Filing requested PUCN approval of the One Nevada Transmission Line (On-Line) which will provide 500 kV link between NVEN and NVES. Since NVEN is in compliance with the State's RPS, any additional renewable energy development in northern Nevada is dependent upon the construction of the line.

[13] http://www.swipos.com/

NVE's ON-Line project (see Figure 3-7) will help connect the northern and southern grids. A number of smaller transmission projects are being proposed to alleviate the congestion around Las Vegas. The following section describes these efforts and the regional activities driving them.

Figure 3-3 SWIP line



The two (2) lines are being built by LS Power's[14] affiliate Great Basin Transmission LLC. SWIP consists of two (2) segments, the Northern Portion and the Southern Portion. SWIP North is expected to begin construction in 2011 and be in service by 2013. NVE[15] is the anchor shipper and co-owner of SWIP-South which NVE calls ON-Line. Construction is expected to begin 2010 with an in service date of 2012.

ON-Line transmission project will connect the northern and southern electric systems for the first time, creating infrastructure that is necessary for the full realization of the development potential of our State's significant geothermal, wind and solar renewable energy resources. This transmission connectivity will also improve operational efficiency by maximizing the significant investment NVE has made in electric generation assets throughout the state, both fossil fuel and renewable— generation capacity that NVE has built and acquired in Nevada for Nevadans to ensure our State's energy independence.

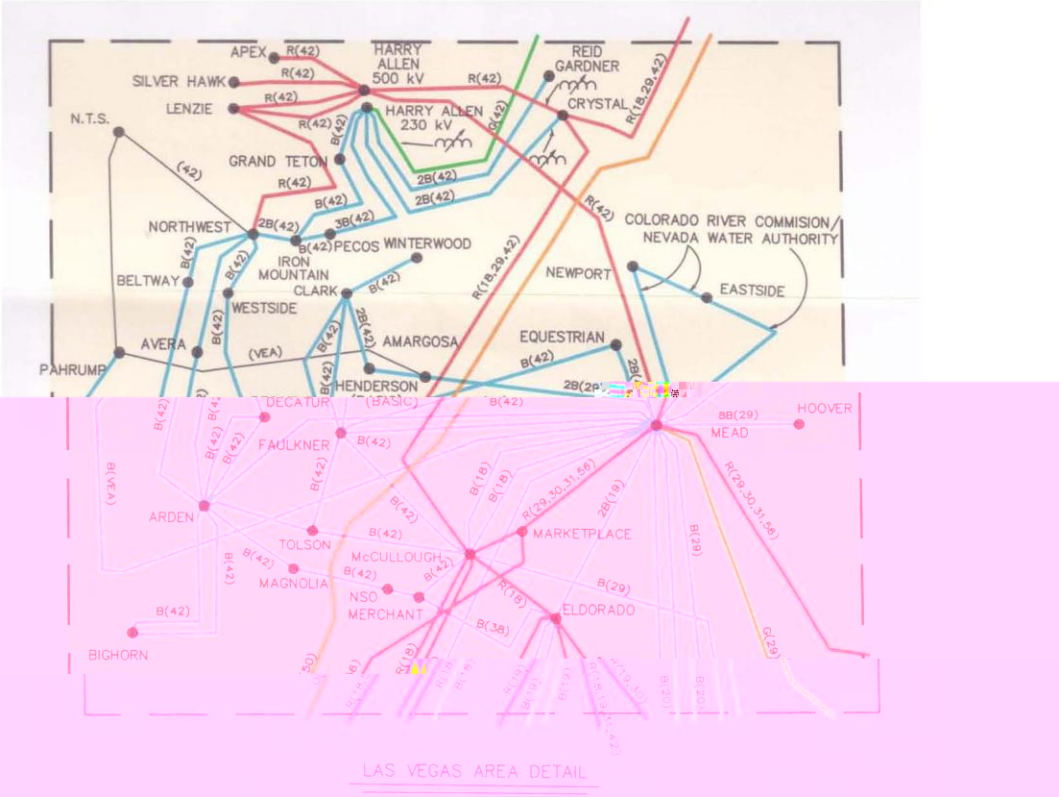
Alleviating Las Vegas Congestion

Alleviating the congestion surrounding Las Vegas is critical to both internal electricity markets and the electricity export markets. Two maps, Figures 3-4 and 3-5, from the Western Electricity Coordinating Council[16] (WECC) illustrate this problem.

[14] http://www.lspower.com/
[15] http://investors.nvenergy.com/phoenix.zhtml?c=117698&p=irol-irhome
[16] http://www.wecc.biz/Pages/Default.aspx

Figure 3-4 WECC
Nevada Transmission

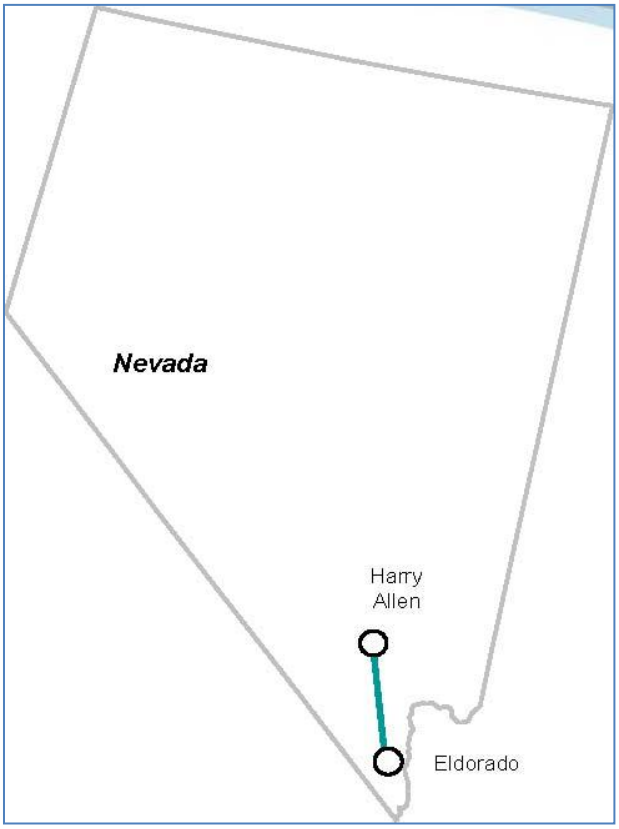
Figure 3-5 WECC
Las Vegas Area Detail



SNIP

Southern Nevada Intertie Project[17] (SNIP) pictured below (Figure 3-6) is also a Great Basin Transmission project. This project is a sixty (60) mile 500kV AC line between southern Nevada and CAISO[18]. It has 2000 MW of capacity and will strengthen the connection between Southern Nevada and Southern California. Target construction date is 2011 with an in service date of 2013.

Figure 3-6 Great Basin Transmission SNIP Line



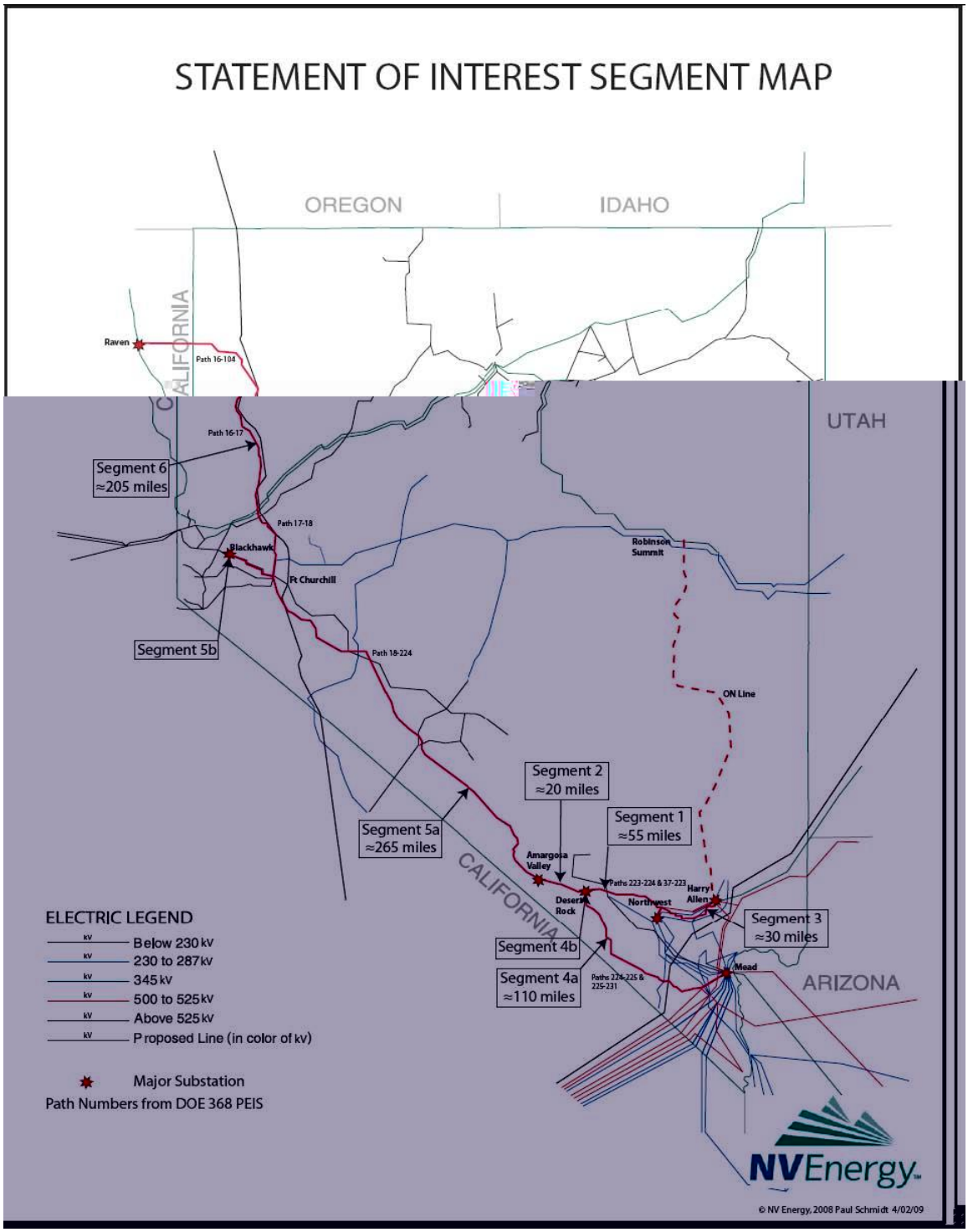
NV Energy and Western Area Power

Another project designed to alleviate the transmission congestion around Las Vegas is a series of short lines proposed by NVE in their 2009 response to Western Area Power

17 http://www.wecc.biz/committees/StandingCommittees/PCC/03102010/Lists/Presentations/1/SWIP%20Presentation%20to%20PCC%203-12-10.pdf

18 http://www.caiso.com/

Figure 3-7 NV Energy
Statement of Interest Segment Map



Transmission for Renewable Energy

Governor Jim Gibbons Renewable Energy Transmission Access Advisory Committee

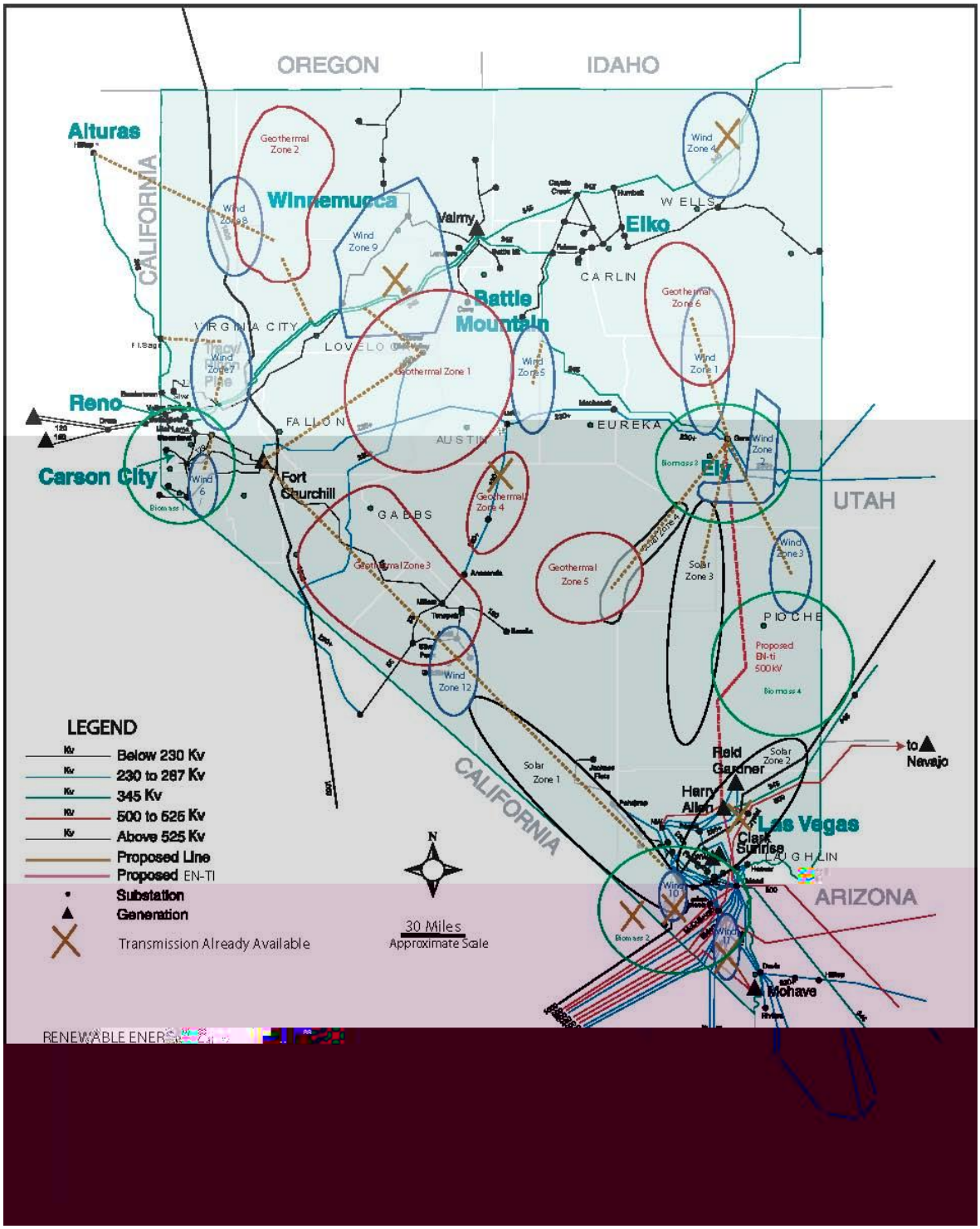
The Renewable Energy Transmission Access Advisory Committee[21] (RETAAC) worked in two phases. Phase I of the committee was established in May 2007 and Phase II in June 2008.

RETAAC Phase I

RETAAC Phase I identified six (6) economically viable geothermal zones, four (4) solar zones, twelve (12) wind zones and four (4) biomass zones within the state. They also identified the transmission lines necessary to access those zones and their land use constraints.

[21] http://www.retaac.org/

Figure 3-8 RETAAC Phase I
Renewable Energy Zones and Transmission Interconnects



RETAAC Phase II

RETAAC Phase II: (i) determined the power potential for the renewable energy zones designated by the first phase; (ii) reviewed the environmental, land use and permitting constraints; (iii) identified potential construction corridors that could avoid these constraints, and (iv) reviewed the potential revenue needs for construction, among other duties.

To implement the objectives of RETAAC Phase II, the committee created the following Study Groups:

Environmental and Land Use Constraints: The Environmental and Land Use Constraints Study Group consisted of members of state and federal agencies with interest and oversight of these issues, along with volunteers from industry and advocacy groups. The study group was tasked with providing information on these issues which could be used in prioritizing and analyzing the feasibility of constructing the proposed transmission lines to the renewable energy zones. *After evaluating available secondary data collected for this project and consulting with representatives from land management agencies, no fatal flaws were indentified for the proposed interconnections*.

Renewable Energy Zone Prioritizations: The Renewable Energy Zone Prioritization Study Group was tasked with: a) developing a method for prioritizing the zones defined in RETAAC Phase I, and the transmission links that serve these zones; and b) presenting these recommendations to RETAAC Phase II. The methodology developed resulted in a matrix which employed four (4) evaluation criteria: (i) renewable energy potential; (ii) cost of transmission construction; (iii) transmission environmental impact; and (iv) other system benefits from transmission. *This matrix served as the basis for the analysis by the Economic Feasibility Study Group.*

Economic Feasibility: The Economic Feasibility Study Group was tasked with answering the critical questions including: a) how much does a transmission line developer need to charge for the use of the transmission line to recover the construction costs and operating and maintenance expenses including a sufficient return on the investment; b) how much are the resource developers willing to pay for the use of the transmission line; and c) are the renewable resource providers still competitive after recovering the cost of delivering their energy to load centers. *The results of this analysis indicates that certain transmission lines could charge economically acceptable fees for the use of the transmission lines and that these fees could recover the costs, if the transmission line usage were fully subscribed.*

Transmission for Export: The Export Study Group was tasked with identifying existing transmission facilities and proposed transmission projects that could be used to export energy from Nevada's renewable resources to adjacent states. This task assumed that such

export would in essence be in addition to the needs of Nevada load serving utilities and would also result in economic benefit to the citizens of the state. *The results indicate that a significant market exists in California, Arizona and elsewhere for Nevada's renewable energy and that the transmission paths are feasible.*

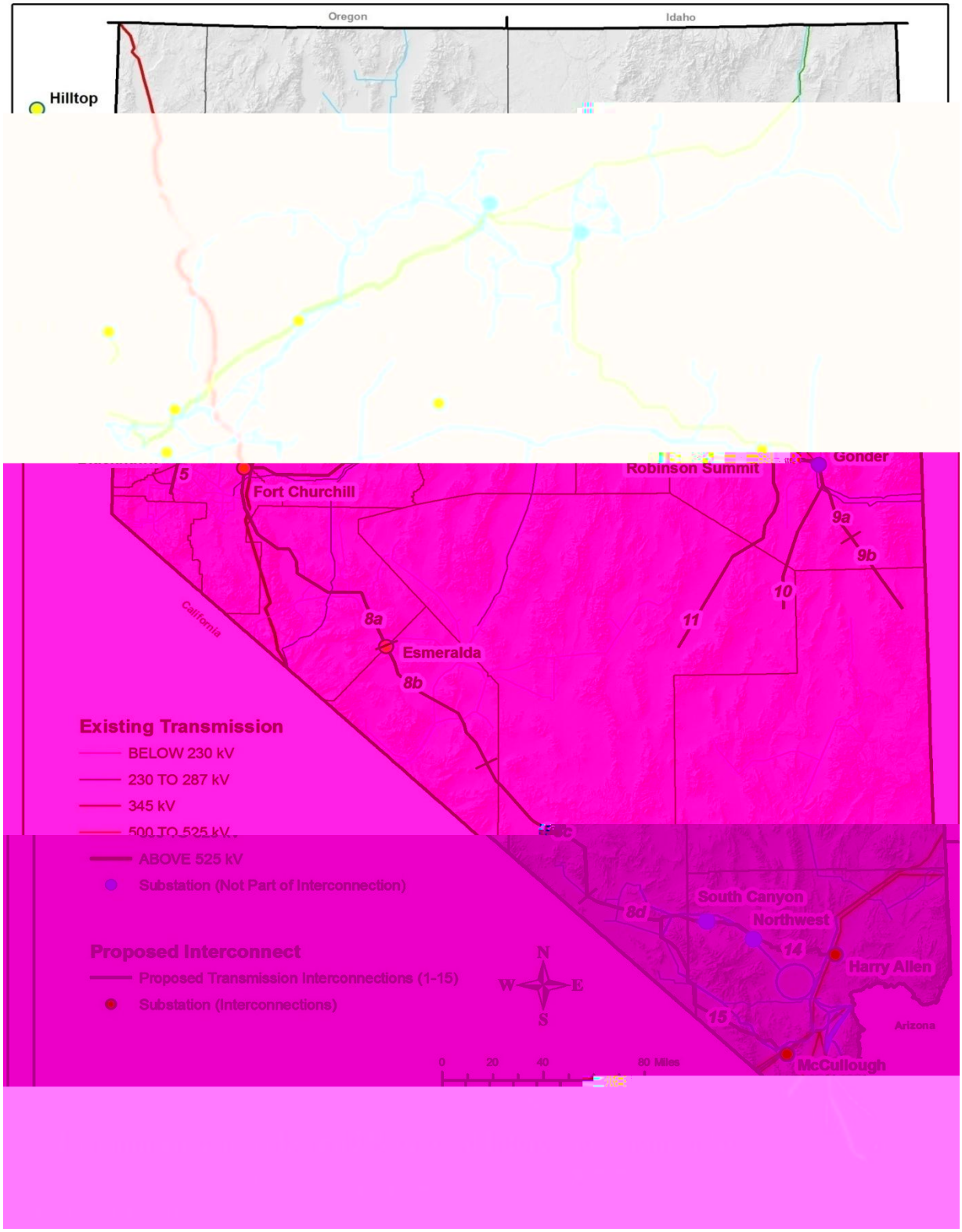
Feasibility Criteria: The Feasibility Criteria Study Group, which consisted of representatives of: a) publically owned and investor owned utilities; b) representatives of the Public Utility Commission of Nevada; c) the committee chairman; and d) the Governor's Energy Advisor, was tasked with drafting the recommendations for the RETAAC approval.

Existing transmission lines and proposed interconnects were identified first.

N ct ct ct ct ctN ct ct w

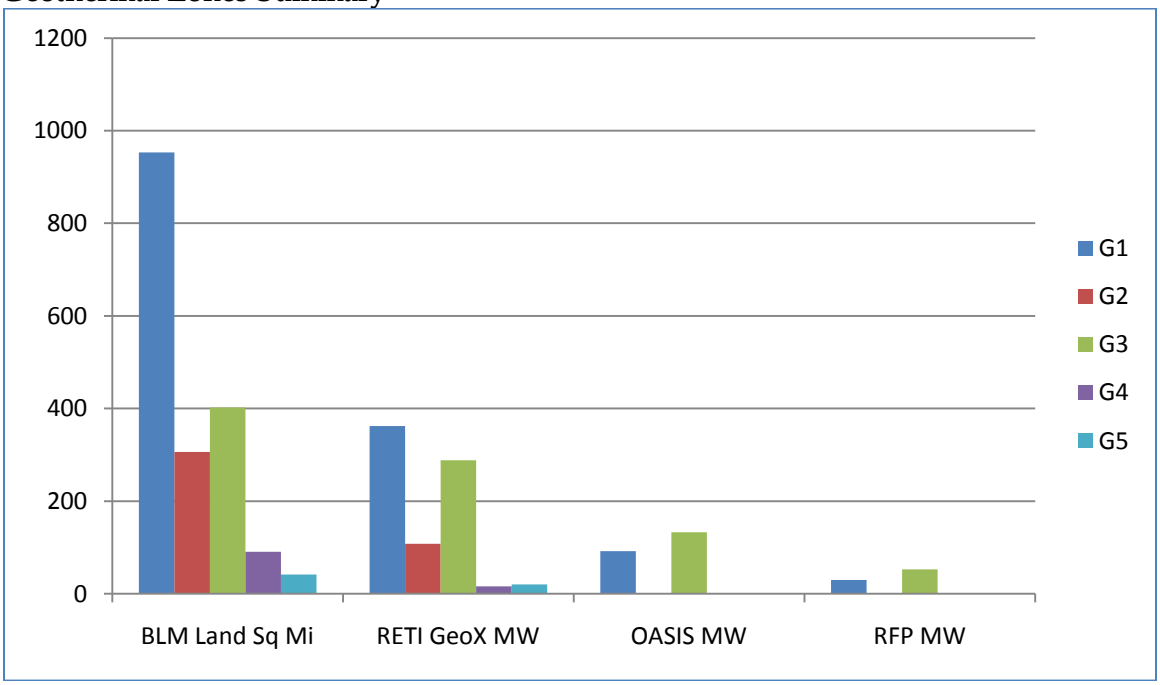
ct S ct

Existing Transmission and Proposed Interconnections Map



Next the RETAAC Phase I zones were examined with regard to the amount of electricity thought to be contained within each zone. The zones were then prioritized.

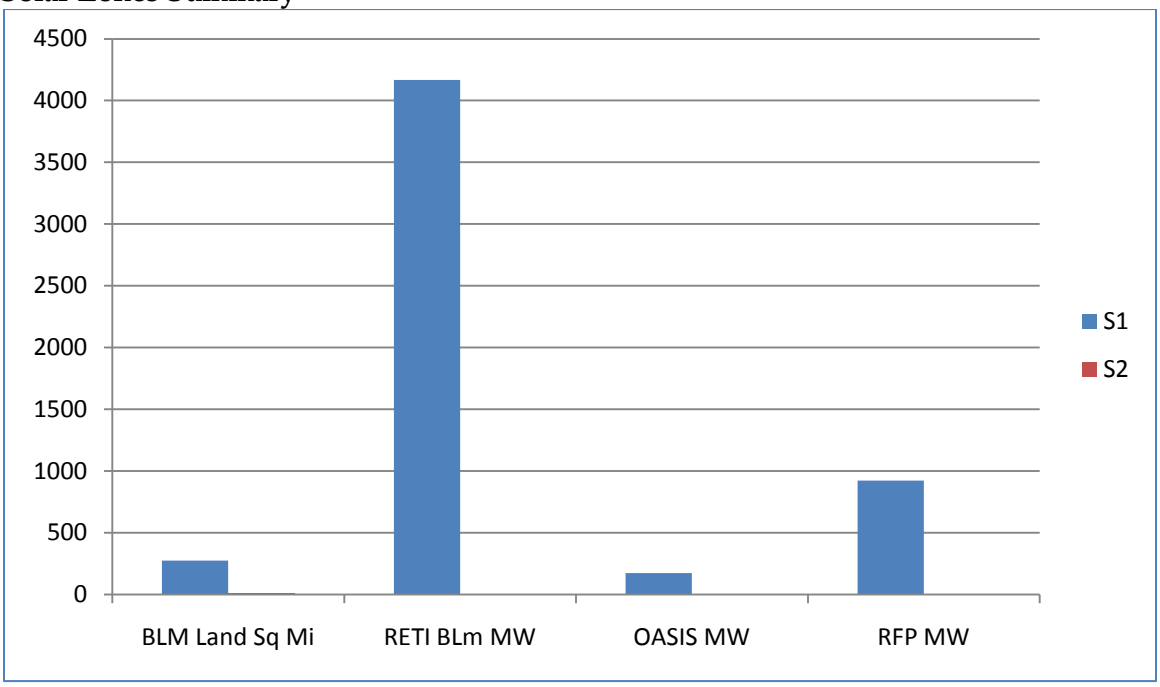
Figure 3-10 and Table 3.2
RETAAC Phase II
Geothermal Zones Summary



ct ctl j ct					
BLM Land (Est'd Sq Mi)	953	306	402	91	42
RETI GeoX MW	362	108	288	16	20
OASIS MW	92	0	133	0	0
RFP MW	30	0	53	0	0
EST MW RANGE	350-400	100-150	250-300	50-100	50-100

Resource potential within zones G1 –G5 is estimated at 800 – 1,100 MW. Resource potential is only one of multiple factors that determine project viability. Therefore, it is likely that a substantial portion of these potential resources is undevelopable.

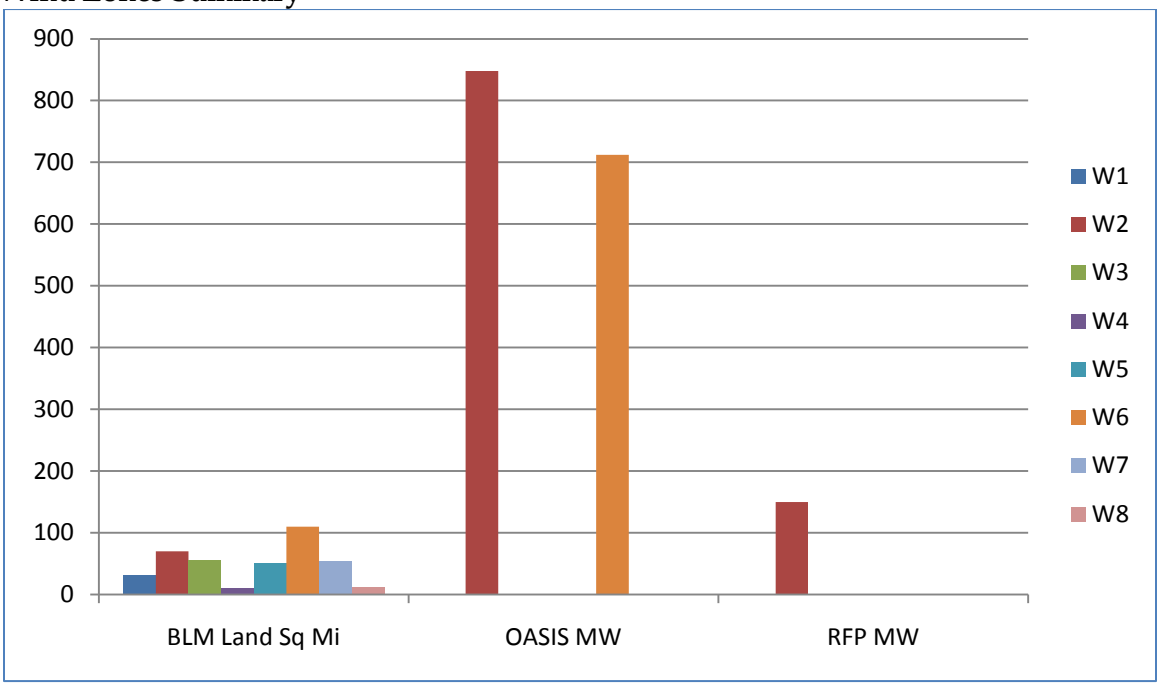
Figure 3-11 and Table 3.3
RETAAC Phase II
Solar Zones Summary



Solar Zones	S1	S2
BLM Land Sq Miles	275	16
RETI BLM MW	4168	0
OASIS MW	175	0
RFP MW	923	0
EST MW Range	4-5,000	Unknown

Unknown = Further examination needed for basis of MW.

Figure 3-12 and Table 3.4
RETAAC Phase II
Wind Zones Summary



Wind Zones	W1	W2	W3	W4	W5	W6	W7	W8
BLM Land Sq Mi	32	70	56	10	51	110	55	13
OASIS MW	0	848	0	0	0	712	0	0
RFP MW	0	150	0	0	0	0	0	0
EST MW Range	50-100	800-900	300-400	50-100	50-100	500-700	50-100	0

Resource range for zones W1-W8 is estimated at 1,800 to 2,400 MW.

Figure 3-13 RETAAC Phase II[22]
Renewable Energy Zone Prioritization

	RENEWABLE ENERGY ZONE PRIORITIZATION CRITERIA																						
				(3) Renewable Energy Potential			(3) Cost of Transmission Construction[3]							(3) Transmission Environmental Impact		(3) Other System Benefits[3]							
																System Reliability		Transmission Utilization					
Transmission Segments	Zones Contained in Segment	Terminal	kV	Score	Wtd Score	MW limit of line and system configuration[3]	Line Miles	Associated Facilities Line ($000)	Associated Facilities Terminal ($000)	Total ($000)	$/MW	Score	Wtd Score	Segment Score	Wtd Score	Score	Wtd Score	Score	Wtd Score	Wtd Total	Rank
1	G-2	Hilltop	120	2	6	100	131	$ 52,400	$ 30,000	$ 82,400	$ 824	1	3	1	3	1	1.5	3	4.5	18	16
2	G-2	Oreana	120	2	6	100	37	$ 14,800	$ 12,000	$ 26,800	$ 268	2	6	3	9	1	1.5	2	3	25.5	4
3	W-6	Ft Sage	345	2	6	200	34	$ 28,900	$ 30,000	$ 58,900	$ 295	2	6	1	3	1	1.5	3	4.5	21	11
4	W-6	Tracy	345	2	6	200	20	$ 17,000	$ 30,000	$ 47,000	$ 235	3	9	1	3	1	1.5	3	4.5	24	7
5	W-5	Blackhawk	120	1	3	100	17	$ 6,800	$ 12,000	$ 18,800	$ 188	3	9	2	6	1	1.5	3	4.5	24	7
6	G-1	Oreana	345	3	9	150	54	$ 45,900	$ 75,000	$ 120,900	$ 806	1	3	1	3	2	3	2	3	21	11
7	G-1	Ft Churchill/Blackhawk[1]	345	3	9	500	103	$ 87,550	$ 80,000	$ 167,550	$ 335	2	6	2	6	2	3	1	1.5	25.5	4
8A	G-3	Ft Churchill/Blackhawk[1]	345	3	9	500	98	$ 83,300	$ 80,000	$ 163,300	$ 327	2	6	1	3	2	3	1	1.5	22.5	10
8A+8B	W-8	Ft Churchill/Blackhawk[1]	345	1	3	500	160	$ 136,000	$ 80,000	$ 216,000	$ 432	1	3	1	3	2	3	1	1.5	13.5	20
8A+8B+8C	S-1	Ft Churchill/Blackhawk[1]	345	3	9	500	234	$ 198,900	$ 75,000	$ 273,900	$ 548	1	3	1	3	2	3	1	1.5	19.5	15
8C+8D+14	W-8	Harry Allen	230	1	3	200	184	$ 110,400	$ 17,500	$ 127,900	$ 640	1	3	1	3	3	4.5	3	4.5	18	16
8C+8D+15	W-8	McCullough	230	1	3	200	190	$ 114,000	$ 17,500	$ 131,500	$ 658	1	3	1	3	1	1.5	2	3	13.5	20
8D+14	S-1	Harry Allen	2x500	3	9	3000	110	$ 308,000	$ 50,000	$ 358,000	$ 119	3	9	1	3	2	4.5	3	4.5	30	1
8D+15[3]	S-1	McCullough	2x500	3	9	2000	116	$ 324,800	$ 92,500	$ 417,300	$ 209	3	9	1	3	2	1.5	2	3	25.5	4
9A[2]	W-2	Robinson	500	3	9	1000	54	$ 75,600	$ 42,500	$ 118,100	$ 118	3	9	2	6	1	1.5	3	4.5	30	1
9A+9B[2]	W-3	Robinson	500	2	6	1000	96	$ 134,400	$ 42,500	$ 176,900	$ 177	3	9	2	6	1	1.5	3	4.5	27	3
10[2]	S-2	Robinson	500	1	3	1000	128	$ 179,200	$ 42,500	$ 221,700	$ 222	3	9	2	6	1	1.5	3	4.5	24	7
11[2]	G-4	Robinson	345	1	3	150	97	$ 82,450	$ 30,000	$ 112,450	$ 750	1	3	2	6	1	1.5	3	4.5	18	16
12	W-1	Robinson	345	1	3	250	61	$ 51,850	$ 30,000	$ 81,850	$ 327	2	6	2	6	1	1.5	3	4.5	21	11
12	G-5	Robinson	345	1	3	250	61	$ 51,850	$ 30,000	$ 81,850	$ 327	2	6	2	6	1	1.5	3	4.5	21	11
13	W-4	Frontier	230	1	3	200	17	$ 10,200	$ 45,000	$ 55,200	$ 276	2	6	2	6	1	1.5	1	1.5	18	16
8A+8B+8C+8D+14[4]		West Tie - Harry Allen	345/2x500				344	$ 506,900	$ 132,500	$ 639,400											
8A+8B+8C+8D+15[4,5]		West Tie - McCullough	345/2x500				350	$ 523,700	$ 175,000	$ 698,700											

Number in parenthesis indicates the weight attributed to the criteria, rating is high to low with scoring 3-1
Line configuration (voltage and terminals) will be re-evaluated prior to construction
W-7 within an NCA - removed per BLM

1=MW limit includes the line from Ft Churchill to Blackhawk that is part of the 7th amendment to the 2006 NPC IRP
2=Line configuration may allow optimization if ENTI is in service prior to renewable development
3=Assumes ENTI Transmission line completed
4= West tie would be developed in stages as actual renewable project development warrants or supports the need for and cost justification of such segments
5= Currently limited to 600 MW. Network upgrades of $50 Million are assumed to provide deliverability of 2000 MW

Environmental Impact score:
3= Minimal mitigation, avoidance and/or alternatives
2= Considerable avoidance, mitigation or minor alternatives
1= Significant alternatives, avoidance and mitigation

Transmission Cost Score
1= Most expensive 1/3
2= Middle 1/3
3= Least Expensive 1/3

System Reliability Score
1= Radial Line
2= Part of System Line
3= System Line (Between two existing points)

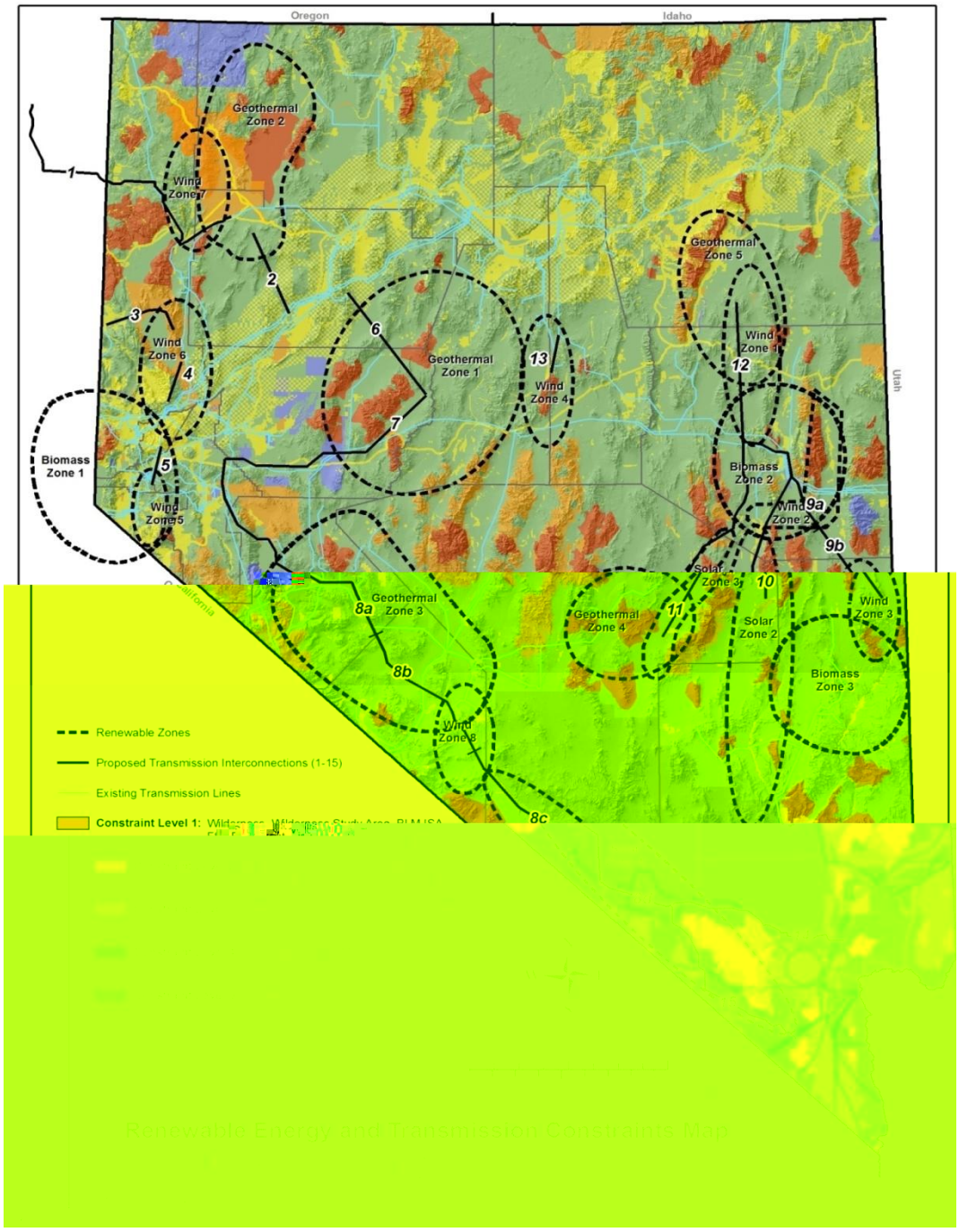
Transmission Utilization Score
1= Far from good Transmission
2= Near good Transmission
3= At good Transmission

Zone Resource Ratings
1= Resource mapping indicates technical potential in some portions of the zone, and some testing underway. Limited development interest to date.
2= Indication of strong resource potential, and moderate amount of development activity underway.
3= Significant concentration of high quality resources. Extensive leases / right-of-ways acquired by developers. Numerous potential sites under active development

[22] RETAAC Phase II http://www.retaac.org/phase-ii

Land use constraints were also examined.

Figure 3-14 RETAAC Phase II
Renewable Energy and Transmission Constraints Map



Military Analysis

Military airspace training and ground source radar restrictions as provided to RETAAC Phase I were reviewed specific to proposed interconnection centerline analysis. The Air Force Western Regional Office was contacted and the Study Group was advised that ground source radar would not be a constraint on transmission location. However, airspace training routes would need to be analyzed. Approximately 56% of the State is affected by military airspace restriction. Many of these defined training paths have existing transmission corridors. Project coordination is needed to understand specific transmission line constraints associated with proposed interconnections.

Airspace training flight paths were provided in 100 ft, 200 ft, and 500 ft levels of constraint. The centerline analysis of the proposed interconnects found that all but two (2), line segments 2 and 6, pass through defined zones with a 200 ft ceiling for possible airspace interference. Interconnections proposed and analyzed are assumed to be 200 – 500 kV lines. These line structures typically do not exceed 200 ft in height. Interconnection construction should be kept to less than 200 ft height and consultation with the military authorities is advised.

Three (3) proposed interconnections have intersections with defined military flight paths with a 100 ft ceiling to interference. These are line segments 8c and 8d and their alternative route line segment 14. Military training operations are initiated in this area from Creech Air Force Base, Nellis SAR and Nellis Air Force Base. More restrictive airspace requirements may exist in specifically sensitive training areas. Additionally, line segment 10 passes under a 100 ft ceiling flight path for 1.5 km on its southern tip. This intersection can be avoided by rerouting or shortening the length of line. Transmission lines built along these paths would be required to keep structure height less than 100 ft and consultation with the military authorities is advised.

Slope Analysis

A general slope analysis was completed for each segment using Geographic Information System (GIS). Based on general utility industry construction experience; slope was grouped into two (2) categories: less than 20% and greater than 20%. A high constraint was assigned to those segments which cross areas greater than 20% slope due to typical difficulties associated with construction and maintenance activities in this terrain. For example, transmission lines located on steep slopes can require more disturbance area from access roads due to slope stabilization and switchbacks and structure pads and footprints.

Land Management Constraints

This Study Group consisted of members representing the major land management agencies in Nevada. Their expertise and data was essential to the completion of the analysis. The constraints map constructed in RETAAC Phase I was reviewed and updated using the most recent information on land management. RETAAC Phase I categorization of constraint levels remained intact in Phase II with the exception of change by United States Forest Service on Roadless Areas. The constraint level intersections for the proposed interconnection segments were evaluated by the Study Group members and a Land Use Rating was assigned by consensus.

- Level 1 (Fatal Flaw) – This represents the highest constraint and would occur where legal status or designation would prohibit or most likely prohibit the construction and operation of transmission lines. Level 1 includes Wilderness, Wilderness Study Areas, Bureau of Land Management Instant Study Areas, Forest Service Recreation Areas, and Forest Service Research Natural Areas.

  Management agencies prohibit the construction of transmission facilities in the areas listed above. Clarification for Forest Service Recreation Areas and Forest Service Research Natural Areas was received through phone conversations with the Forest Service. It should be noted that existing transmission lines may be located in some of the designated areas listed above. Typically this occurs when an area is designated after transmission facilities have been constructed. This does not typically lower the constraints associated with siting additional transmission facilities through these areas.

- Level 2 (High Constraint) – These areas are determined to be less suitable for transmission lines because of unique, highly valued, or protected resources, ownership, and significant potential conflicts with the construction and operation of transmission lines. This level includes Native American Properties (Bureau of Indian Affairs); United States Forest Service inventoried Roadless Areas and Bureau of Land Management National Conservation Areas.

  Routing and siting transmission lines across tribal lands, Indian Trust Assets or near sensitive Native American resources can be a lengthy process subject to complicated and costly negotiations between various parties with interest to these lands. These lands were therefore assigned a high constraint. A high constraint was also assigned to the National Conservation Areas however these areas should be evaluated on an individual basis to determine specific restrictions.

- Level 3 (Moderate Constraint) – These are areas with potential effects to valued resources, resources assigned special status; or conflict with use. This level includes

privately owned land, Areas of Critical Environmental Concern, Military Managed Lands, and National Trails.

Privately owned land was assigned a moderate constraint due to the potential for difficulties with obtaining easements. Areas of Critical Environmental Concern were assigned a moderate constraint due to the wide range of sensitive resources for which Areas of Critical Environmental Concern can be designated. These resources (i.e. desert tortoise, geologic significance) may not preclude the authorization of right-of-way for the construction and operation of transmission lines, but may require negotiation of additional mitigation measures. These areas should be evaluated on an individual basis with the appropriate land manager to determine specific restrictions. Military managed lands were assigned a moderate constraint due to existing plans to build renewable projects and associated transmission on military lands. National Trails can typically be mitigated when siting transmission lines.

- Level 4 (Low Constraint) – These are areas of minimal resource conflicts. This level includes state and federally managed lands where specific constraints were not identified.

- Level 5 (Unresolved) – These areas are designated as "administrative restriction" by land management agencies. Site specific review of these should be conducted to determine constraints associated with transmission lines.

Areas designated "Administrative Restriction" was found to include lands managed by the following agencies:

- U.S. Fish & Wildlife Service
- Department of Defense
- National Park Service
- Bureau of Land Management
- State of Nevada
- U.S. Forest Service

While not all lands managed by the agencies listed above are included in "Administrative Restriction", these areas should be evaluated on an individual basis with the appropriate land manager to determine specific restrictions.

Wildlife constraints were analyzed with the centerline analysis using detailed information and current status maps from wildlife management agency Study Group members. The intersection of interconnection segments with wildlife constraints were rated in terms of impact and mitigation options and given a Wildlife Rating value by consensus. These maps

are not reproduced in this report in an abundance of caution for protection of sensitive areas.

Information on the RETAAC process as contributed to by the Nevada Department of Wildlife, BLM, U.S. Forest Service and the U.S. Fish & Wildlife Service are provided below.

Nevada Department of Wildlife

The Nevada Department of Wildlife's (NDOW) mission, in part, is "to protect, preserve, manage and restore wildlife and its habitat for their aesthetic, scientific, educational, recreational, and economic benefits to citizens of Nevada and the United States…" NDOW is the state agency responsible for the restoration of wildlife habitat and management of fish and wildlife resources and while it does not provide jurisdictional approval for proposed transmission line projects unless located on land owned or managed by NDOW, it works closely with federal land management agencies to provide input on the agencies' land management decisions. The NDOW participated in the RETAAC process and provided GIS resource data and technical assistance with wildlife and habitat concerns for the construction and operation of transmission lines.

The impacts to wildlife from power line construction and operation can be grouped into three (3) general categories:

- Loss of habitat on a temporary or permanent basis due to removal of vegetation and other habitat features, occupancy by a project component, erosion or invasion by weedy species. A specific kind of loss is fragmentation. This is when a large contiguous area of habitat is transected by a linear feature which effectively creates two smaller habitat areas separated by a band of unusable or high jeopardy ground. Conversion to a vegetative community lacking the values of the original plant community can also be classified as a loss because it can no longer support either the numbers or diversity of the pre-project wildlife occupants.
- Creating disturbances that could lead to avoidance (of water sources or other habitat components), nest abandonment, loss of habitat use, increased predation susceptibility and decreased productivity. These disturbances are usually temporary and occur during construction and maintenance activities when workers or the public are present. These disturbances are also the result of creating access to areas that were fairly isolated in the pre-project condition. New access or facilitated access from surface smoothing and vegetation removal are contributors.
- Mortality due to an incident occurring during construction and operation (from vehicles, site contamination, obstacles, holes and trenches), collision with project components (towers and wires), electrocution, loss of habitat, and advantages provided to predators.

NDOW provides the following recommendations for project proponents proposing to construct and operate transmission lines in the State of Nevada.

In addition to compliance with applicable federal, state, and local laws and regulations, NDOW recommends the use of best management practices to reduce wildlife impacts from proposed transmission line projects. The following general mitigation measure categories could be considered in proposed projects to reduce impacts to wildlife:

- Avoidance or exclusion
- An area excluded all or in part from project siting.
- A resource spanned or avoided by project components including structures, towers, access roads and similar disturbances.
- Relocated Project components.
- All or a portion of the project that is surveyed for the presence or absence of a species or habitat in order to identify areas to avoid. Surveys of suitable habitat should occur to coincide with the presence of the wildlife species of issue.
- Buffer zones created to protect a suitable area around a habitat feature to prevent disturbance.
- Seasonal restrictions
- Construction, maintenance and other specific activities prohibited in specific areas at specific times of the year, including but not limited to nesting, lambing, kidding, spawning, and/or migration.
- Timing restrictions coinciding with poor surface travel conditions.
- Re-vegetation and reclamation
- Re-vegetation (with plant species that benefit wildlife) of areas that were temporarily disturbed during the construction or operational phases of the project.
- Replacement of vegetative communities that are anticipated to be lost on a permanent basis due to occupancy by project components or blading of existing vegetation to facilitate construction activities. Replacement can occur in already disturbed areas of the project or in areas immediately adjacent to the project.
- Reclamation (re-contouring) of areas (such as bladed temporary access roads and crane pads) disturbed during construction or operation.
- Re-vegetation of disturbed areas to prevent the establishment of weedy plant species.
- Treatment of any established noxious weed populations to prevent their spread.
- Design modifications
- Application of design modifications to prevent bird electrocutions.
- Addition of devices applied to the power line to reduce impacts caused by perching, nesting, and collision.

- Use of tubular steel as opposed to lattice construction in areas of issue to reduce perching, nesting and entrapment of raptors, ravens and other large birds.
- Compensation for loss
- Compensation by replacement or offset for temporary or permanent loss of habitat for wildlife individuals incurred by projects as a result of construction or operational activities.

NDOW recommends mitigation measures to help facilitate the protection of specific wildlife species. Mitigation measures should be analyzed in detail during the proposed project planning and specific measures applicable to protection of certain species would be developed. For more information, please refer to: www.ndow.org.

Nevada Bureau of Land Management

The Nevada Bureau of Land Management (BLM) administers approximately 48 million acres of public land in Nevada, or approximately 67% of Nevada's land base. The multiple-use mission of the BLM includes authorizing and managing activities such as mineral development, energy production, recreation, and grazing, while conserving natural, historical, cultural, and other resources on public lands. The BLM's objective is to meet public needs for use authorizations such as right-of-ways, permits, leases, and easements while avoiding or minimizing adverse impacts to other resource values. Under the Federal Land Policy and Management Act Bureau of Land Management manages multiple resources and uses, including energy and minerals; timber; forage; recreation; wild horse and burro herds; fish and wildlife habitat; wilderness areas; archaeological and paleontological, and historical sites.

BLM participated in Phase I of the RETAAC report, providing input and statewide GIS data for the lands it manages. As a cooperator in Phase II of the Environmental and Land Use section of the RETAAC report, BLM assisted with the development of constraint levels and modification of electrical interconnections identified in Phase I to avoid Level 1 Constraints. BLM also cooperated in the effort to rate each of the proposed interconnections as they relate to land management and biological constraints.

Any of the proposed interconnection segments which cross BLM managed lands will need BLM approval before they can be constructed. In order to grant a right-of-way for a proposed action such as a transmission line, BLM must comply with federal regulations such as the National Environmental Policy Act, Endangered Species Act, National Historic Preservation Act, and others. This will require an environmental review and a study of potential impacts from the proposed project.

BLM was a lead federal agency in the identification of major utility corridors on federal lands in eleven (11) western states through the development of a Programmatic

Environmental Impact Statement. The West-wide Energy Corridor Programmatic Environmental Impact Statement was finalized in November 2008 and can be found at: http://corridoreis.anl.gov/documents/fpeis/index.cfm.

U.S. Forest Service

The Humboldt - Toiyabe National Forest provided GIS and related input into the RETAAC Phase I report. More extensive participation in the multi-agency collaborative process of the Phase II Environmental and Land Use sub-group provided the opportunity to make adjustments to prospective transmission routes which should minimize potential future land and resource management siting conflicts. Also during this effort the constraint level for Inventoried Roadless Areas (IRAs) on National Forest lands was changed from constraint Level 1 to Level 2. Agency direction for IRAs in Nevada is provided under the 2001 Roadless Conservation Rule.

United States Forest Service (USFS) commitment to support the development and transmission of energy resources is consistent with Presidential Executive Order 13212, which states, "…increased production and transmission of energy in a safe and environmentally sound manner is essential." The Executive Order further directs agencies to, "…take appropriate actions that will increase the production, transmission, or conservation of energy." Specific goals and objectives for the agency is provided in "USDA Forest Service Strategic Plan 2007-2012", which states "…Goal 2. Provide and Sustain benefits to the American people…Objective 2.3 Help meet energy resource needs."

Each proposed energy transmission project would also require a formal, Agency-approved project right-of-way that would contain project-specific requirements. The granting of a right-of-way would require a prior project-specific environmental and engineering review. Generally, the local administrative offices (United States Forest Service national forest) will address energy transport within the boundaries of their administrative areas.

The land use planning process serves as the means to formally allocate right-of-way areas on federally administered lands. The land use planning process is different for each agency, and the following highlights show the USFS conducts land use planning.

Land management plans guide the USFS in fulfilling its responsibilities for stewardship of the National Forest System. Land management plans are generally strategic and contain desired conditions, objectives, and guidance for project and activity decision making in the plan area, usually a national forest. Forest land management plans may be amended by Forest Supervisors.

However, the amendment of land use plans would not authorize parties to proceed with any site specific projects, or to carry out any activities in areas within the corridors, and accordingly will not result in any on-the-ground impacts that may significantly affect the

quality of the environment. If individual projects are sited, any applications for such projects would be subject to environmental review under applicable statutes, including but not limited to the Clean Water Act, Endangered Species Act, National Historic Preservation Act and others.

Consistent with this direction, in 2008 the USFS was a cooperating federal agency on the Programmatic Environmental Impact Statement, Designation of Energy Corridors on Federal Lands in the eleven (11) Western States led by the BLM and Department of Energy. This document includes a thorough discussion of BLM and Forest Service siting and National Environmental Policy Act procedures. For more information, please refer t o: http://www.corridoreis.anl.gov/eis/guide/index.cfm#vol1.

Specific proposed interconnection considerations include:

- Segment 9 follows the right-of-way of an existing 230kv power line through the Ward Mountain Management Area on the Ely Ranger District. Potential expansion of lines within this utility corridor would not be inconsistent with Forest-wide or Management Area specific direction from the Humboldt Forest Plan.
- Segment 11 includes a right-of-way of an existing 230kv power line, within the White Pine Management Area, on the Ely Ranger District. Potential expansion of lines within this utility corridor would not be inconsistent with Forest-wide or Management Area specific direction from the Humboldt Forest Plan. Particular consideration would need to be given to the adjacent Red Mountain Inventoried Roadless Area (15-13) near the existing utility corridor north of Highway 6, and to the nearby Wilhoites Inventoried Roadless Area (15-22) south of the existing utility corridor in the section of right of way south of Hwy 6.

For more information on the Toiyabe-Humboldt Forest, please refer to: http://www.fs.fed.us/r4/htnf/

U.S. Fish & Wildlife Service

The U.S. Fish & Wildlife Service participated in the RETAAC process and provided technical assistance regarding fish and wildlife resources. The following information was provided by the United States Fish and Wildlife Service within the jurisdiction of the Nevada Fish and Wildlife Office (Service) as it relates to the transmission planning process and the trust resources for which the Service is responsible. The following information is submitted pursuant to the Endangered Species Act of 1973, as amended (Act; 16 U.S.C. 1531 *et seq.*), Migratory Bird Treaty Act (MBTA; 16 U.S.C. 703), and the Bald and Golden Eagle Protection Act (BGEPA; 16 U.S.C. 668). Wetlands are afforded protection under Executive Orders 11990 (wetland protection) and 11988 (floodplain management), as well as section 404 of the Clean Water Act (CWA). Other fish and wildlife resources are considered under

the Fish and Wildlife Coordination Act, as amended (FWCA; 48 Stat. 401, 16 U.S.C. 661 *et seq*.), and the Fish and Wildlife Act of 1956, as amended (FWA; 70 Stat. 1119, 16 U.S.C. 742a-742j). Comments and recommendations from the Service are based on the information RETAAC has provided as well as our current knowledge of the fish and wildlife resources in Nevada. However, based on ever-changing biological information and the possibility that the proposed power lines may not be constructed for several years, the Service recommends project proponents contact their office when site-specific information is known to ensure compliance with current conservation measures and the laws and executive orders cited above.

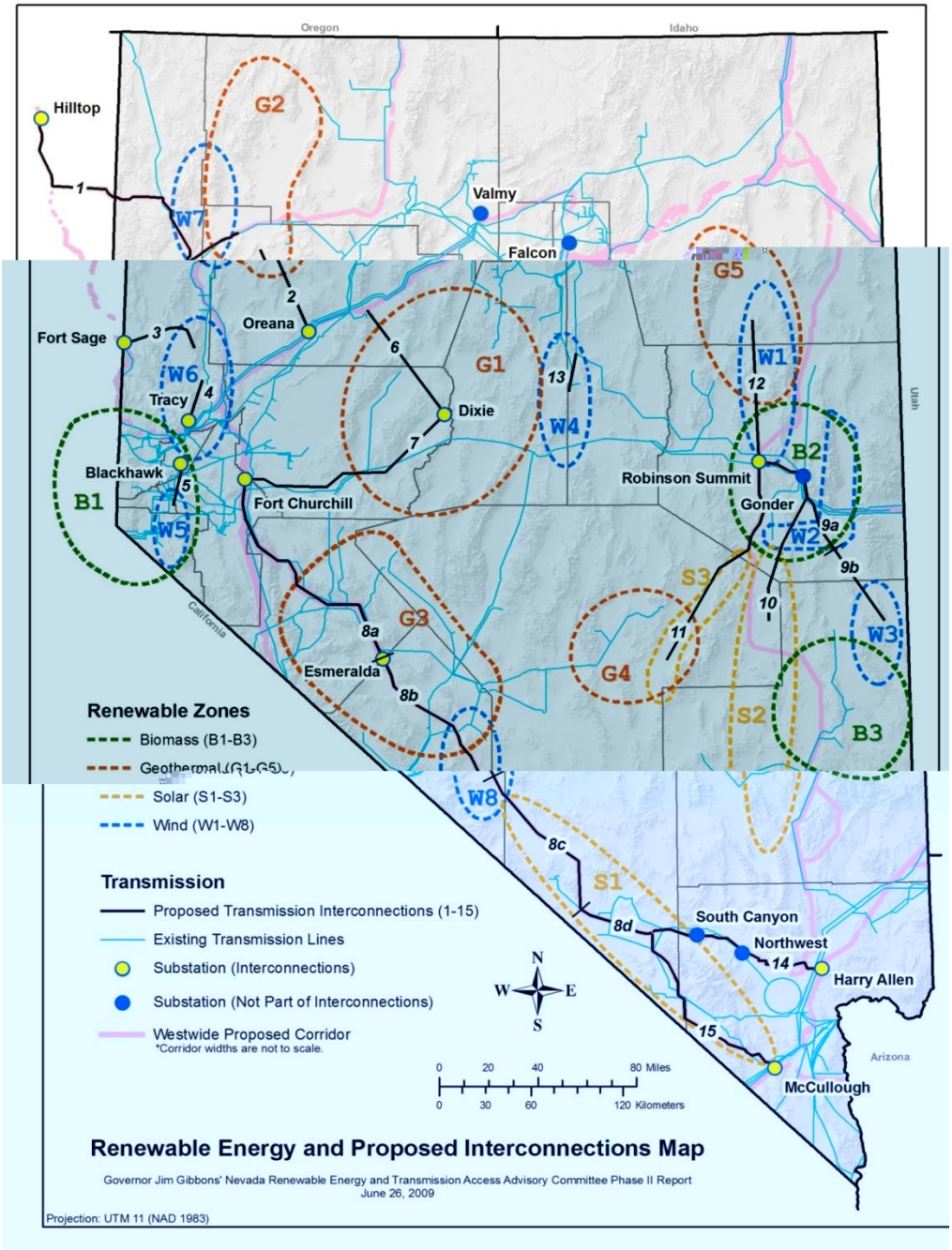
Power lines and power line construction can have both direct and indirect effects on wildlife and plant species, as well play an influential role in cumulative and synergistic impacts. Habitat loss, degradation, fragmentation, and conversion are all apparent concerns. Further power lines may facilitate the alteration of natural predator-prey dynamics or lead to direct mortality during construction and operation. Impact significance, however, will vary by species, with some being more easily avoided or minimized than others through proper project design. Early coordination with state and federal agencies is encouraged and will limit costly delays.

According to the U.S. Fish & Wildlife Service, the cumulative impact of renewable energy projects, including solar, wind, biomass, and geothermal energy across Nevada may have an impact on a variety of ecosystems of a magnitude never before observed or anticipated. The potential wide-spread loss, degradation, or fragmentation of habitats outside special management areas due to direct, indirect, or cumulative effects of numerous large-scale renewable energy projects and associated infrastructure on public lands places threatened and endangered species at lower probability of recovery and increased risk of extirpation or extinction. Additionally, it potentially raises the level of threat to sensitive species to the point where listing may be warranted. Therefore, it is critical that the siting and analysis of transmission infrastructure be evaluated at a landscape level concurrent with siting and analysis of associated energy generation facilities and a thorough assessment of the environmental impacts should be conducted.

Based on the general location of the potential transmission corridors, assumptions can be made as to the likely species and habitats that will be affected by development and these were considered in the sub-group wildlife impact review process. For every project specific development, however, a general framework of project review will be to first avoid potential impacts, then minimizes impacts, and lastly appropriately mitigate impacts.

For more information, please refer to: www.fws.gov

Figure 3-15 RETAAC Phase II
Renewable Energy Zones and Proposed Interconnections Map



Public Utilities Commission of Nevada Docket on the RETAAC Process

The PUCN codified the RETAAC process by opening Docket 09-07011[23] "Investigation and rulemaking and request for comments and proposed regulations regarding renewable energy zones, transmission plans, renewable developer commitments and other related utility matters in accordance with Assembly Bill 387". On January 28, 2010 in LCB File No. R146-09[24], the Commission adopted the renewable energy zones identified by the RETAAC process. The zones, as identified in the RETAAC process map are now part of Chapter 704 of the Nevada Administrative Code.

Transmission Cost Recovery

Cost recovery is one of the key barriers to the construction of new transmission. Who pays for the line? How much of the costs do rate payers shoulder, how much do shareholder or bond holders carry?

The PUCN is currently addressing cost recovery for NVE's On Line in the utility's Integrated Resource Plan Docket[25]. Cost recovery for other lines in Nevada will be determined by the Federal Energy Regulatory Commission[26]. Finally some lines will be

Nevada Energy Assurance Corporation

To help finance the transmission lines identified in the RETAAC process the Department of Business and Industry (B&I) has successfully created the Nevada Energy Assurance Corporation (NEAC). The NEAC is a first of its kind private enterprise non-profit renewable transmission company. This non-profit will influence and manage the development of studies on feasibility, economic analysis and financing for development of the necessary new transmission capacity throughout Nevada in order to facilitate development of the renewable energy resource zones identified in the RETAAC reports.

Table 3.5 RETAAC Phase II
Economic Feasibility and Renewable Energy Zone Priority Rankings

Transmission Segment	Zone	Terminals	Construction Cost ($ millions)	Economic Feasibility Ranking	REZP Ranking
8D+14	S-1	Harry Allen	$358.0	1	1
9A	W-2	Robinson	$118.1	2	1
2	G-2	Oreana	$26.8	3	4
9A+9B	W-3	Robinson	$176.9	4	3
8D+15	S-1	McCullough	$417.3	5	4
5	W-5	Blackhawk	$18.8	6	7
10	S-2	Robinson	$221.7	7	7
8A	G-3	Ft. Churchill/ Blackhawk	$163.3	7	10
12	G-5	Robinson	$81.9	9	11
4	W-6	Tracy	$47.0	10	7
7	G-1	Ft. Churchill/ Blackhawk	$167.5	11	4
13	W-4	Frontier	$55.2	12	16
3	W-6	Ft. Sage	$58.9	13	11

12	W-1	Robinson	$81.9	14	11
11	G-4	Robinson	$112.5	15	16
8A+8B	W-8	Ft. Churchill/ Blackhawk	$216.0	16	20
6	G-1	Oreana	$120.9	16	11
8A+8B+8C	S-1	Ft. Churchill/ Blackhawk	$127.9	18	15
1	G-2	Hilltop	$82.4	18	16
8C+8D+14	W-8	Harry Allen	$131.5	20	16
8C+8D+15	W-8	McCullough	$131.5	21	20

Exporting Nevada's Renewable Energy

RETAAC Phase II addressed the question of how the state could export its renewable energy to other states within the Western Interconnection. The result of this analysis was two maps. The first identified existing export opportunities (Figure 3-16), the second new opportunities (Figure 3-17).

The most logical export market for Nevada's renewable energy resources is California.

Figure 3-16 RETAAC Phase II
Existing Nevada Export Alternatives

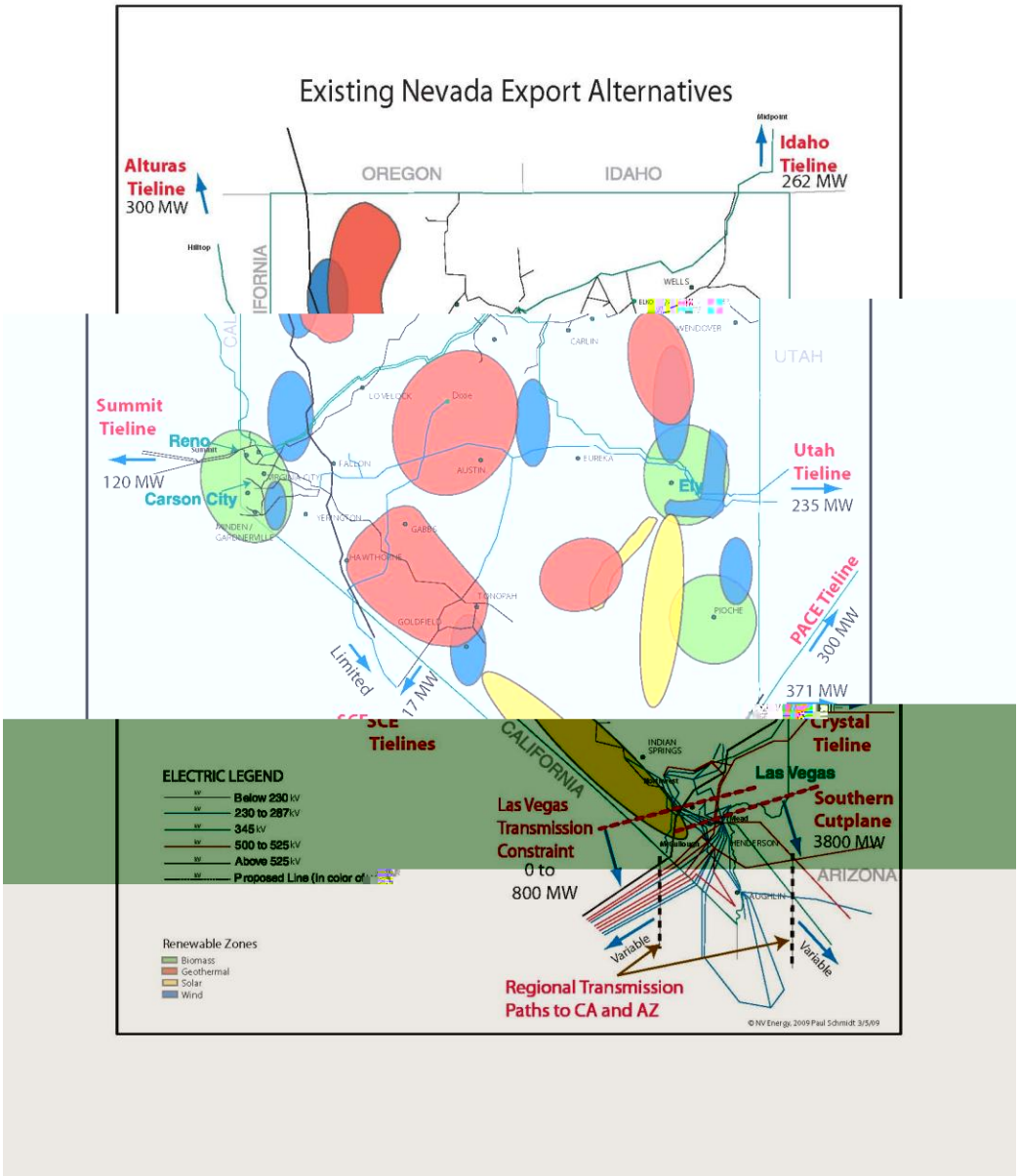
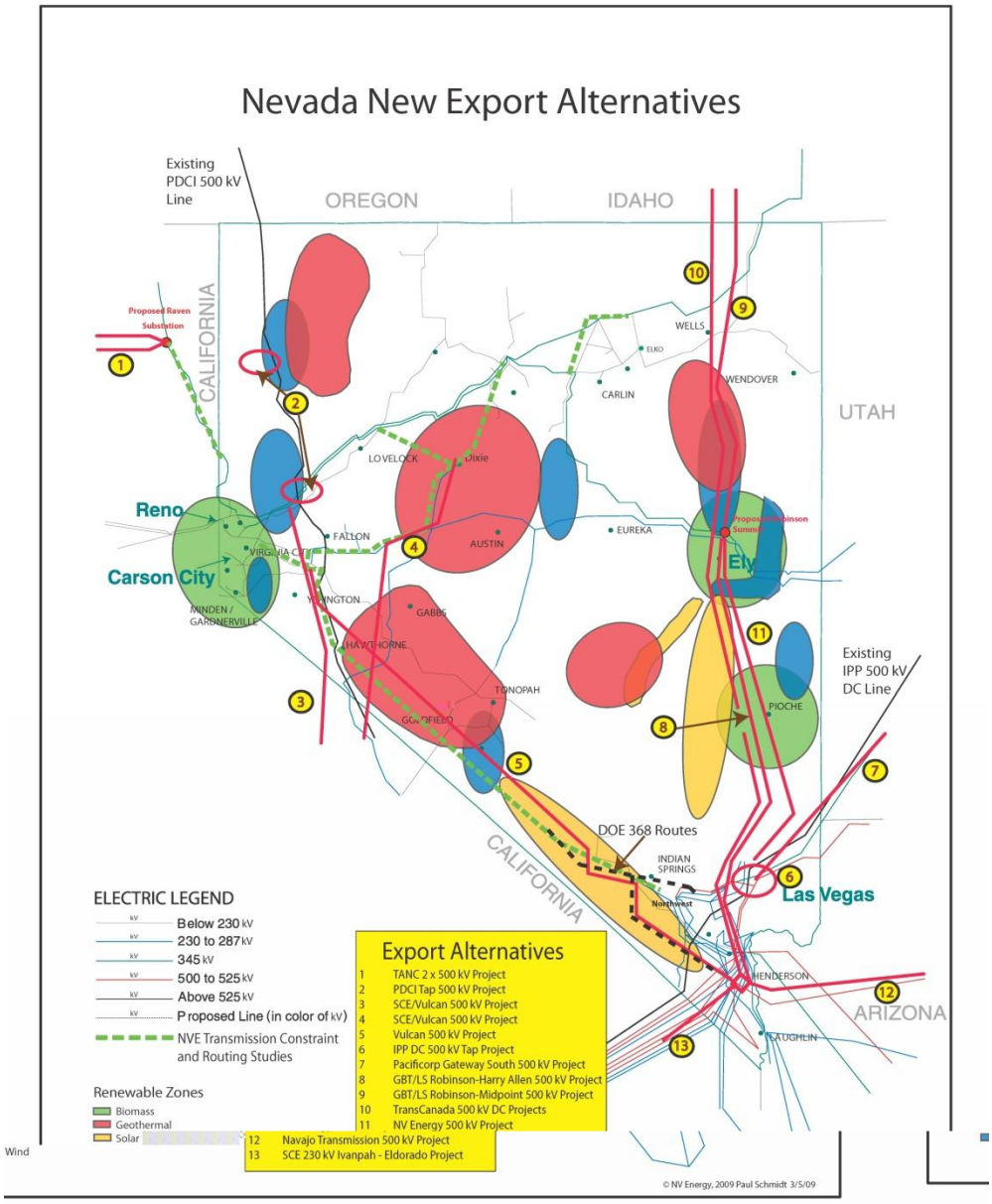


Figure 3-17 RETAAC Phase II
New Nevada Export Alternatives



Renewable Energy Transmission Initiative

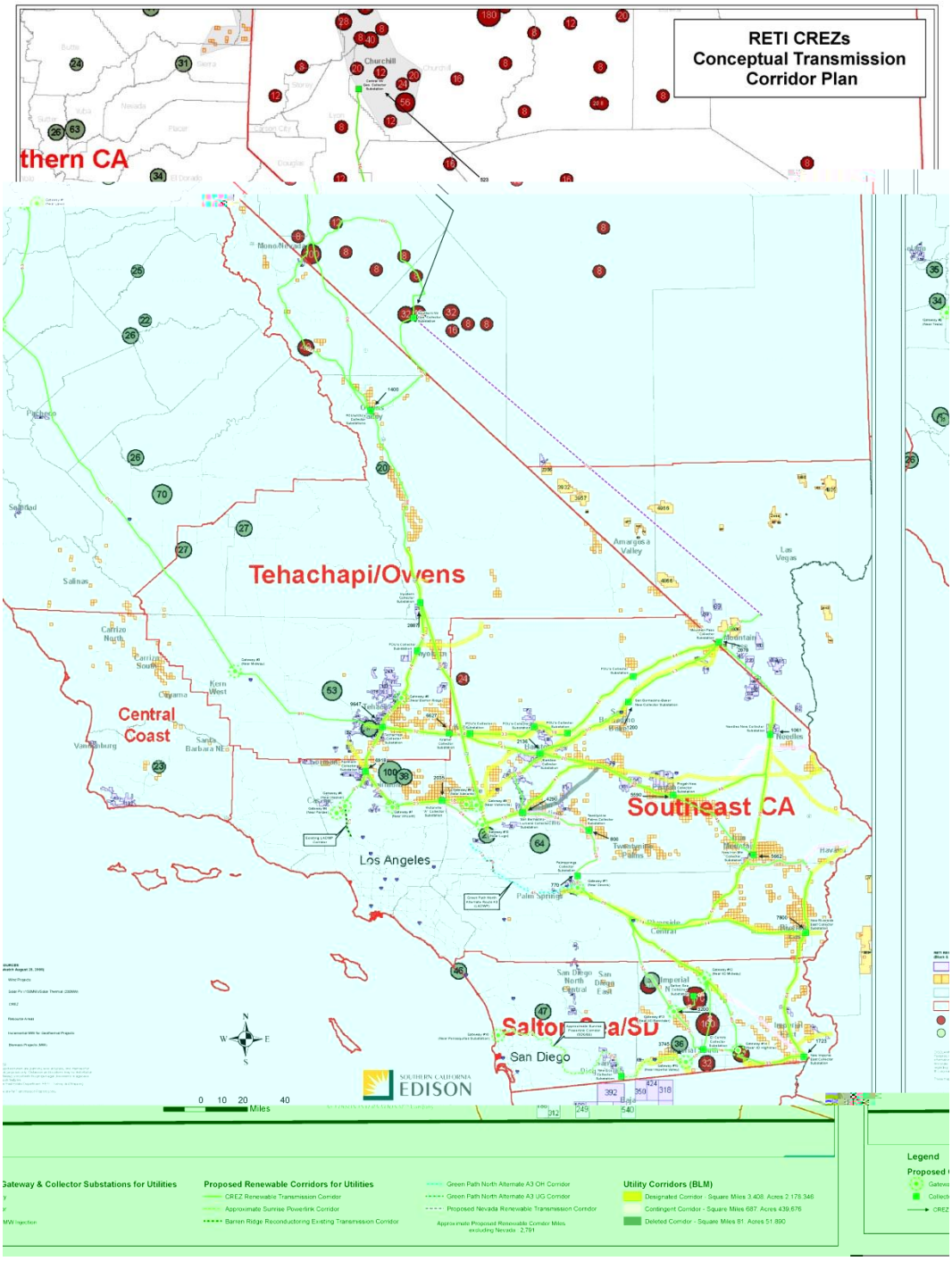
To identify the types, quantities and costs of importing renewable energy into California, the California Energy Commission initiated the Renewable Energy Transmission Initiative[31] (RETI). RETI identifies the transmission projects needed to accommodate California's renewable energy goals, support future energy policy, and facilitate transmission corridor designation and transmission and generation siting and permitting.

The most recent RETI report estimates Nevada has 18,558 MW of solar energy available for export to California, 1467 MW of geothermal, 1754 MW of wind and 299 MW of biomass. These estimates place Nevada slightly behind Arizona. More importantly, the report also estimates the cost of renewable energy from the two states is competitive. This makes transmission access the deciding factor between whether to purchase from Nevada or Arizona.

The Mountain Pass Gateway Substation (Figure 3-18 below) located south of Las Vegas has been designated as the collector point for renewable energy transfers to California. Arizona and southern Nevada—more specifically Nye[32] and Clark[33] Counties —are now engaged in a head-to-head competition to deliver to the Mountain Pass Gateway substation and other California transmission gateways.

[31] http://www.energy.ca.gov/reti/index.html
[32] http://www.nyecounty.net/
[33] http://www.accessclarkcounty.com/

Figure 3-18 Southern California Edison
RETI CREZ[34]s Conceptual Transmission Corridor Plan



[34] CREZ stands for Clean Renewable Energy Zones

Exporting from Nye County

To facilitate the export of renewable energy from Nye County, Nye County has initiated a "Transmission for Export" interconnection study of its own. The study will attempt to identify how Nye County can encourage transmission line developers and renewable energy generators to directly develop the transmission infrastructure needed to export electricity to California.

The initial phases of the project will: 1) survey and catalog all existing transmission segments in the areas of Nye and Esmeralda Counties proposed for solar, wind and geothermal projects; 2) tabulate the potential increase in generating capacity these projects would need; and 3) identify a series of potential local connectivity paths and existing line upgrades that would aggregate into larger capacity paths across the border.

As part of the ongoing study Nye County will: 1) work with transmission line developers to understand the economic realities of new or upgraded line projects and the business parameters of the public/private partnerships needed to get development financed; and 2) seek to understand the required approval and permitting processes of the myriad of federal, regional and state level agencies involved in transmission regulation.

Some of the transmission options available to Southern Nye County include:

- Possible upgrades of existing lines
- Possible new lines (see NVE and Western above)
    - One option would be a 500kV line that would be routed from Armargosa Valley directly to NV Energy's Northwest Substation[35]
    - Another option would be to route a line from Armargosa Valley to the Mead Substation on a route that is west and south of Las Vegas through Pahrump
- Utilization of transmission capacity on existing lines running from South of Las Vegas substations
- Valley Electric's proposed 230kV line which would connect Valley Electric's Sterling Substation with NVE's Northwest Substation

Options available to Northern Nye and Esmeralda Counties include the RETI proposed collector line from southern California to the Tonopah area, and upgrade to existing low voltage lines, and a 500kV line Vulcan Power Company[36] is planning to run through the Tonopah area.

The following maps (Figure 3-19 and 3-20) identify Nye and Clark County's existing utility corridors. To provide access to California markets transmission projects may be built along these – or other corridors.

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[35] For detailed maps of NV Energy's transmission system please see Volume II of this report.
[36] http://www.vulcanpower.com/

Figure 3-19
BEC Environmental, Inc.
Nye County and Clark County Utility Corridors

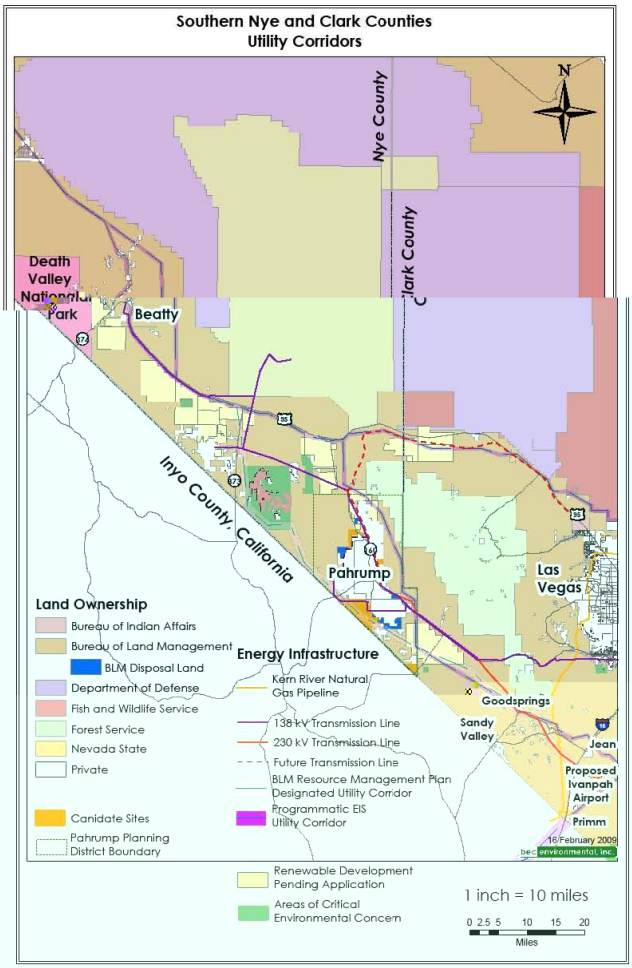
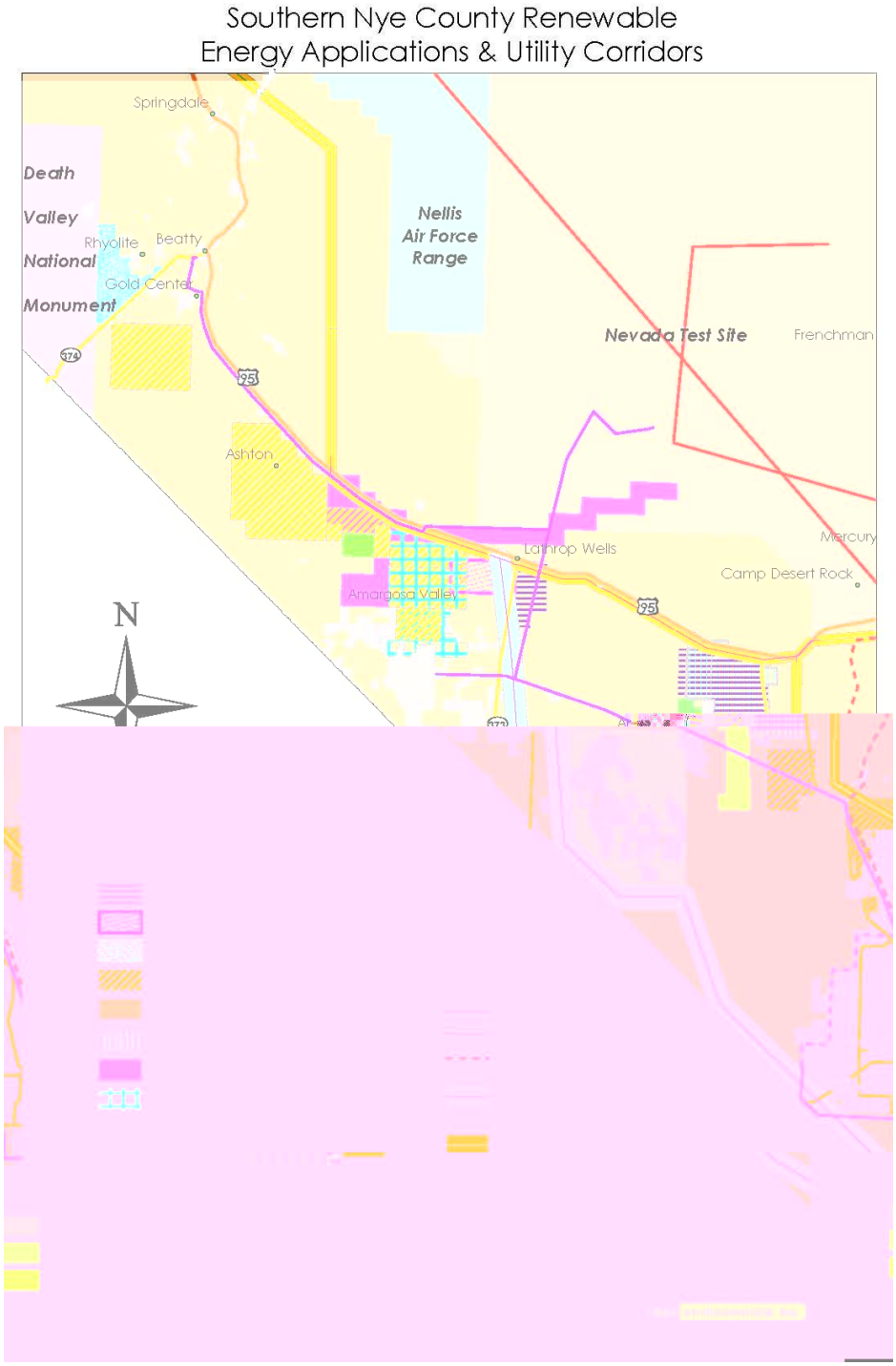


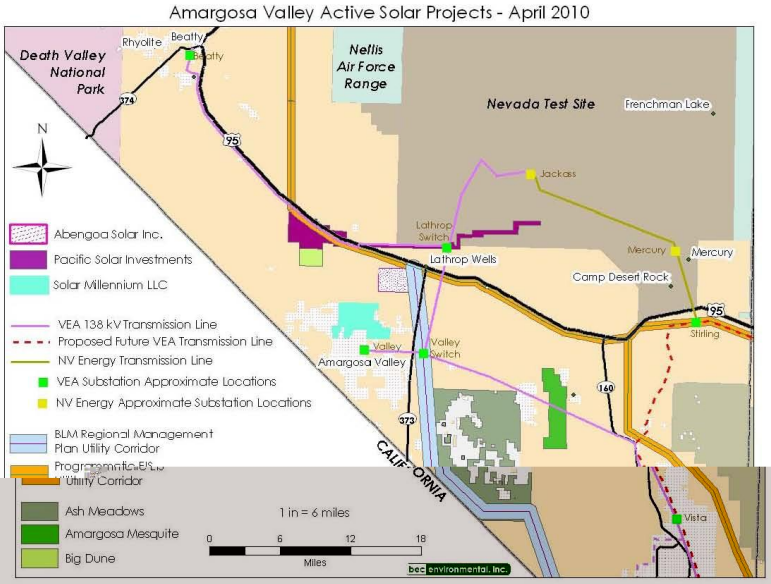
Figure 3-20 BEC Environmental, Inc.
Nye County and Clark County Utility Corridors



Exporting from Armargosa Valley

Armargosa Valley has over 6,000 project permits filed with the BLM[37]. Several of the projects have been "Fast Tracked[38]."

Figure 3-21 BEC Environmental, Inc.
Armargosa Valley Active Solar Projects



[37] http://www.blm.gov/nv/st/en.html
[38] http://www.blm.gov/wo/st/en/prog/energy/renewable_energy/fast-track_renewable.html

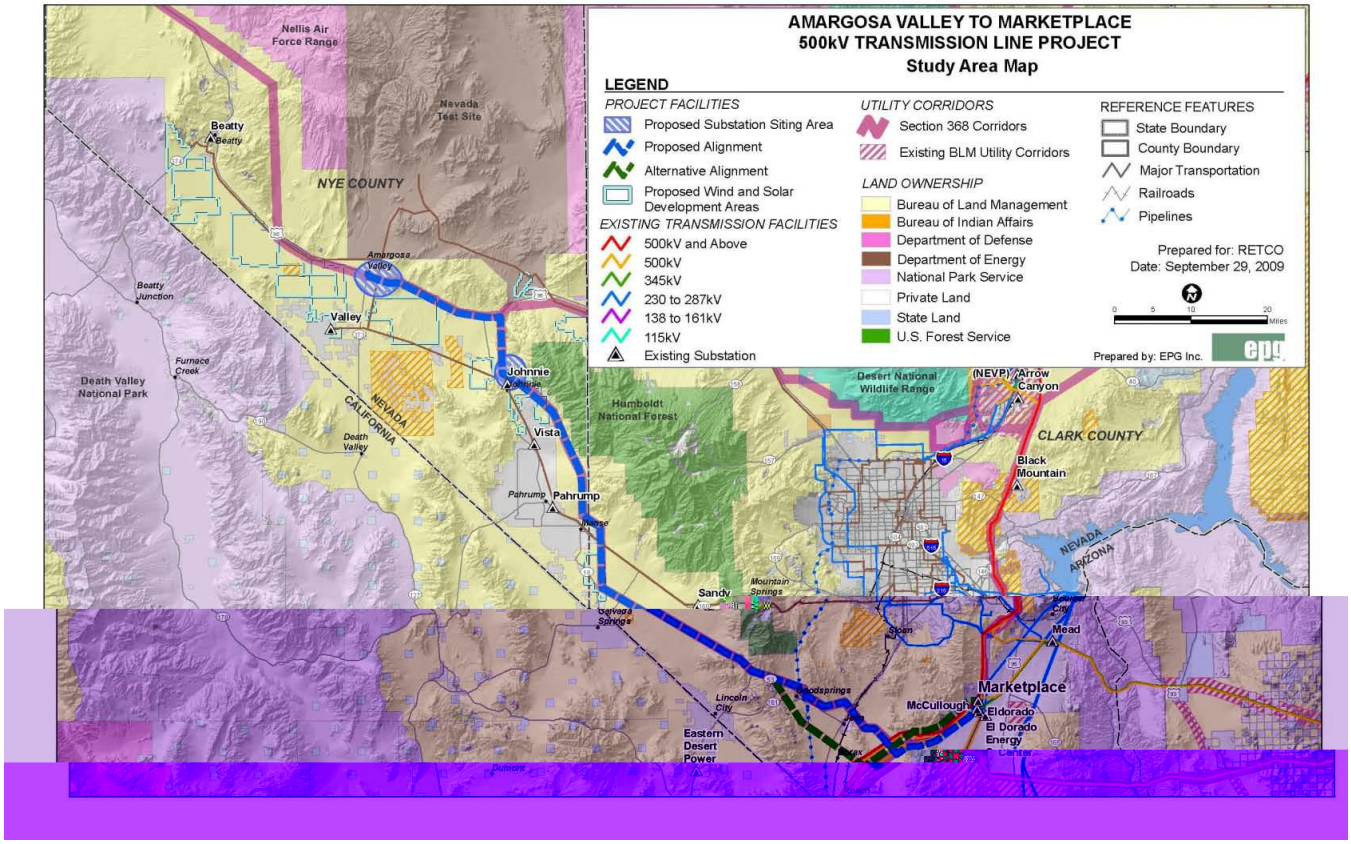
Some of the short term transmission solutions for renewable energy projects in the Valley include the following:

- Wheel via planned Valley Electric 54-mile, 230 kV line into Northwest Las Vegas.
- From Pahrump (Johnnie) over the hill to a new Stirling substation near Mercury/Desert Rock, then East on the South side of Highway 95.
- Longer term solutions include planning, permitting and development of the 368A Southern route that branches South from Highway 95 to Pahrump at Highway 160 or planning, permitting and development of the BLM multi-model corridor South out of Armargosa Valley along the California border on the Southwest edge of Pahrump and over to Ivanpah.
- One proposed transmission project utilizing the Nye and Clark County corridors and the Section 386 Energy Corridors—is the Solar Express Project. This proposed project is a 500kV line designed to deliver solar energy from a proposed "Solar Park" in Armargosa Valley.

The proposed project, primarily aimed at California's Southern California Edison[39], San Diego Gas and Electric[40], and PG&E[41] utilities would provide delivery to the CAISO, Los Angeles Department of Water and Power, Arizona utilities and NVE's delivery points.

[39] http://www.sce.com/
[40] http://www.sdge.com/index/
[41] http://www.pge.com/

Figure 3-22 Renewable Transmission Company Inc Armargosa Valley to Marketplace Study Area Map



West-Wide Energy Corridors (Section 386 Corridors)

The United States Department of Energy[42], the United States Department of the Interior Bureau of Land Management[43], the United States Department of Agriculture Forest Service[44], and the DOD[45] have issued a **final Programmatic Environmental Impact Statement[46] (PEIS)** that evaluates issues associated with the **designation of energy corridors** on federal lands in eleven (11) Western states.

These corridors play an important part in several independent transmission projects proposed throughout Nevada including proposals from Renewable Energy Transmission

[42] http://www.energy.gov/
[43] http://www.blm.gov/wo/st/en.html
[44] http://www.fs.fed.us/
[45] http://www.defense.gov/
[46] http://nepa.energy.gov/draft-eis0386.htm

Company's Solar Express Project (Figure 3-22 above), Nextera Energy[47] and the Path 15 DC Intertie project. The NSOE is following each of these projects. The map below identifies the proposed Section 368 Energy Corridors on Federal Lands in Nevada.

[47] http://www.nexteraenergyresources.com/

Figure 3-23 DOE
West-Wide Energy Corridors

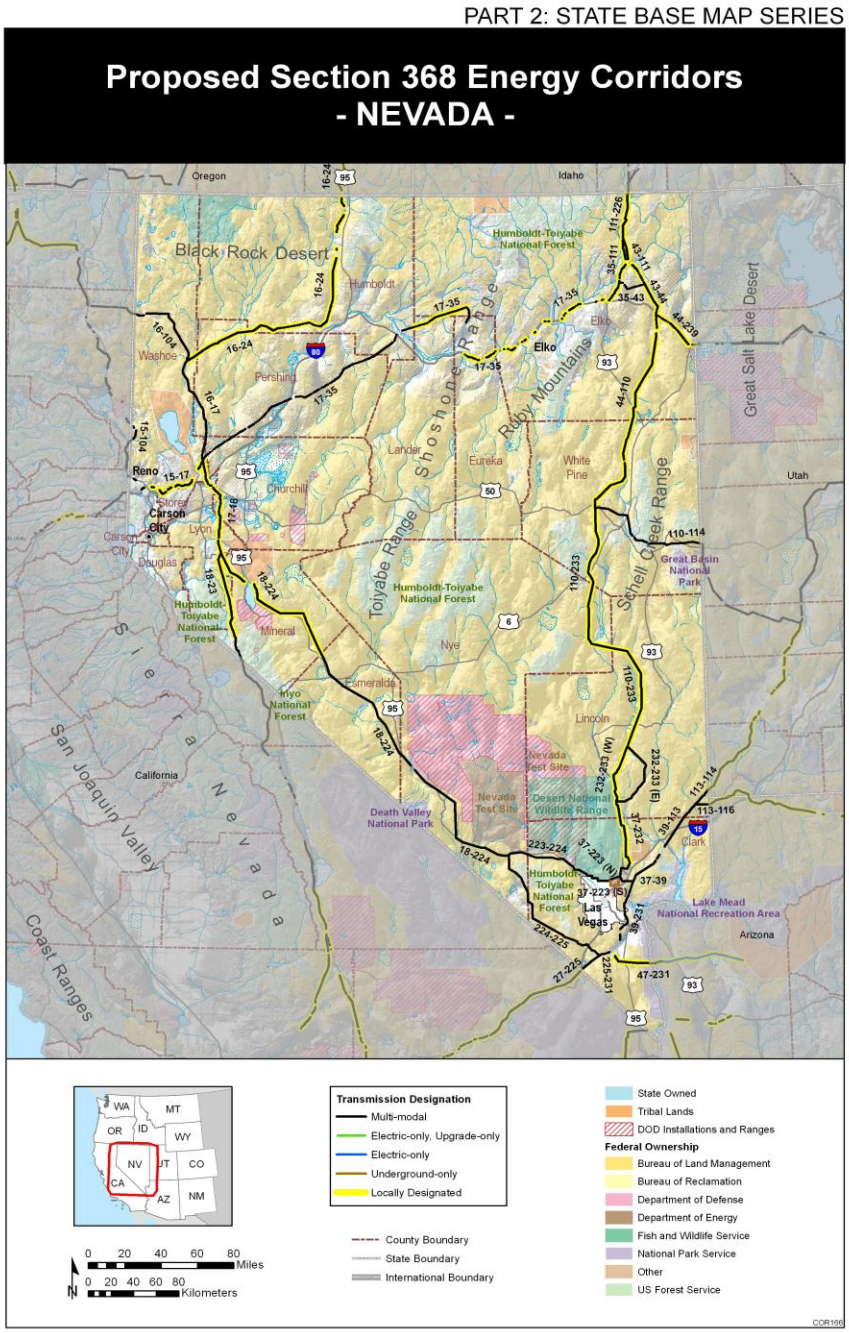
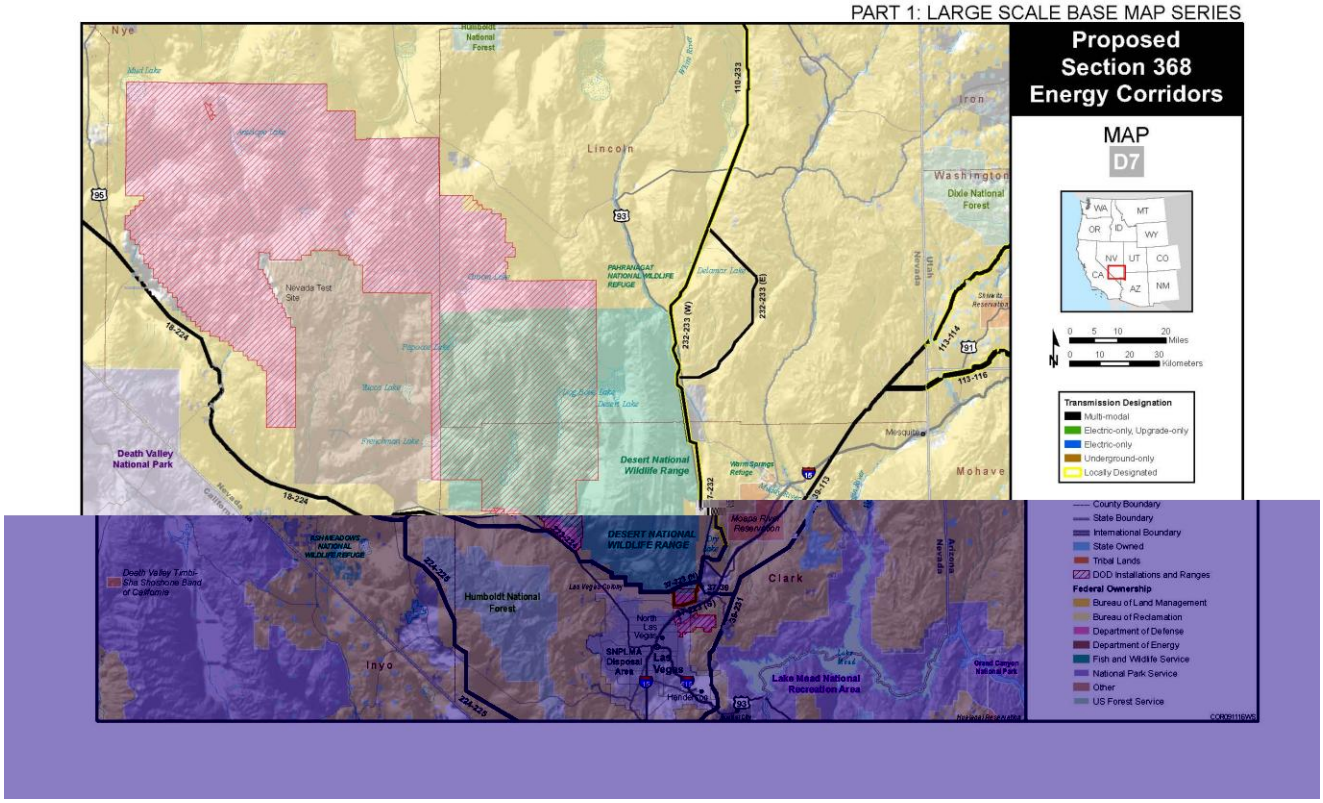


Figure 3-24 DOE
West-Wide Energy Corridors Southern Nevada



Siting and Permitting

One of the hurdles all these transmission projects will have to overcome is siting and permitting. There are multiple levels to transmission siting and permitting in Nevada including the Public Utilities Commission of Nevada's Utility Environmental Protection Act (UEPA), the National Environmental Policy Act[48] (NEPA), and of course the Bureau of Land Management's Environmental Impact Statement[49] (EIS).

The PUCN is the siting authority for all lines greater than or equal to 200kV. Under UEPA, if a utility is proposing a line for which there is no federal environmental analysis necessary, then the applicant may submit its application with a summary of the environmental analysis completed. If a federal analysis is necessary, the applicant must submit a summary of any studies the applicant anticipates will be conducted.

A permit may only be granted if the applicant can determine: 1) the nature of the probable effect on the environment; 2)the extent to which the facility is needed to ensure reliable

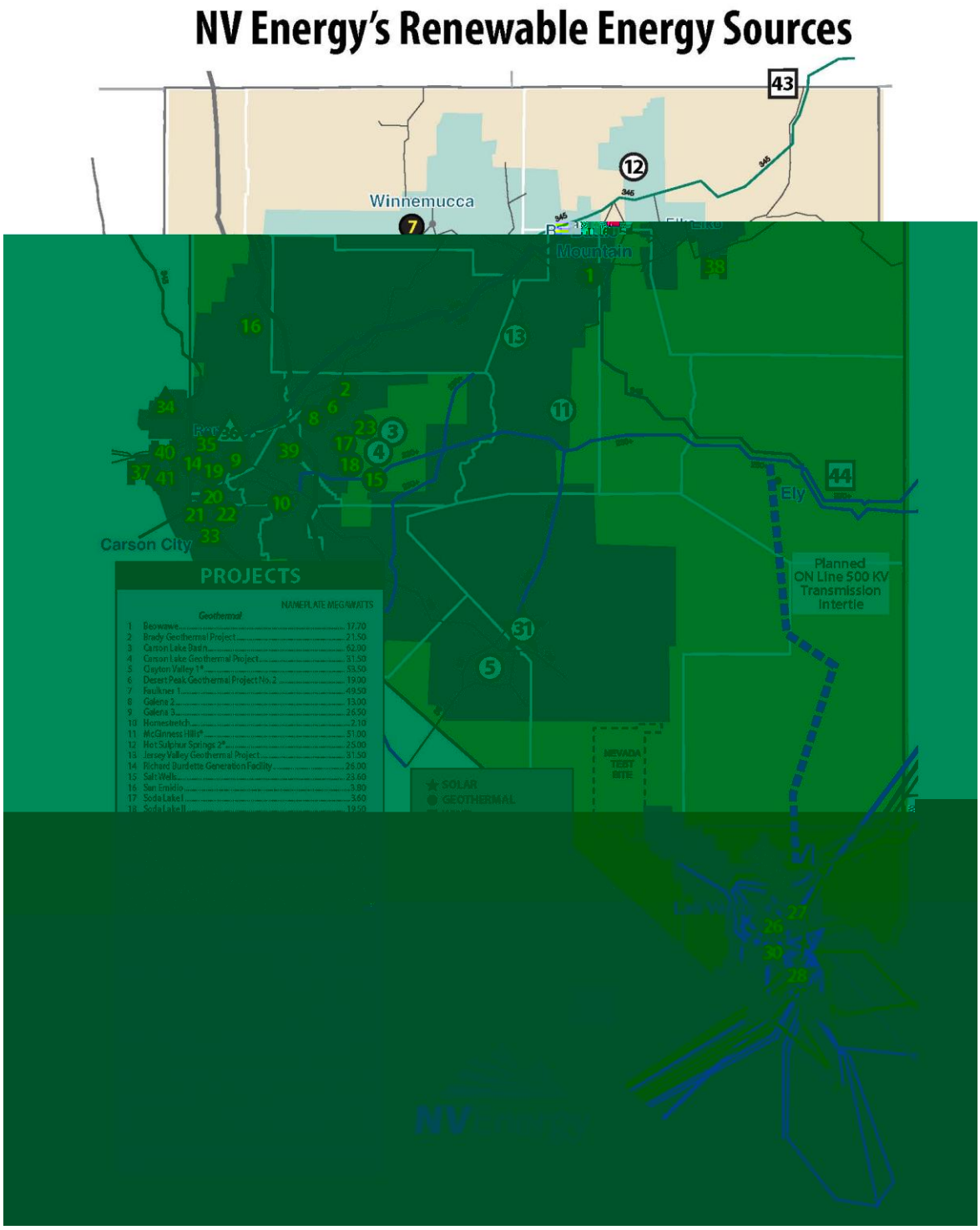
[48] http://www.epa.gov/compliance/nepa/
[49] http://www.epa.gov/oecaerth/nepa/eisdata.html

utility service to customers in the State; 3) that the need for the facility balances any adverse effect on the environment; 4) that the location of the facility as proposed conforms to applicable state and local laws and regulations and that the applicant has obtained (or is obtaining) all other permits, licenses and approvals required by federal, state and local statutes, regulations and ordinances; and 5) that the facility will serve the public interest.

The PUCN is the entity that communicates with other states and federal agencies and is charged with making joint investigations, holding joint hearings and issuing joint orders with other state's agencies when appropriate.

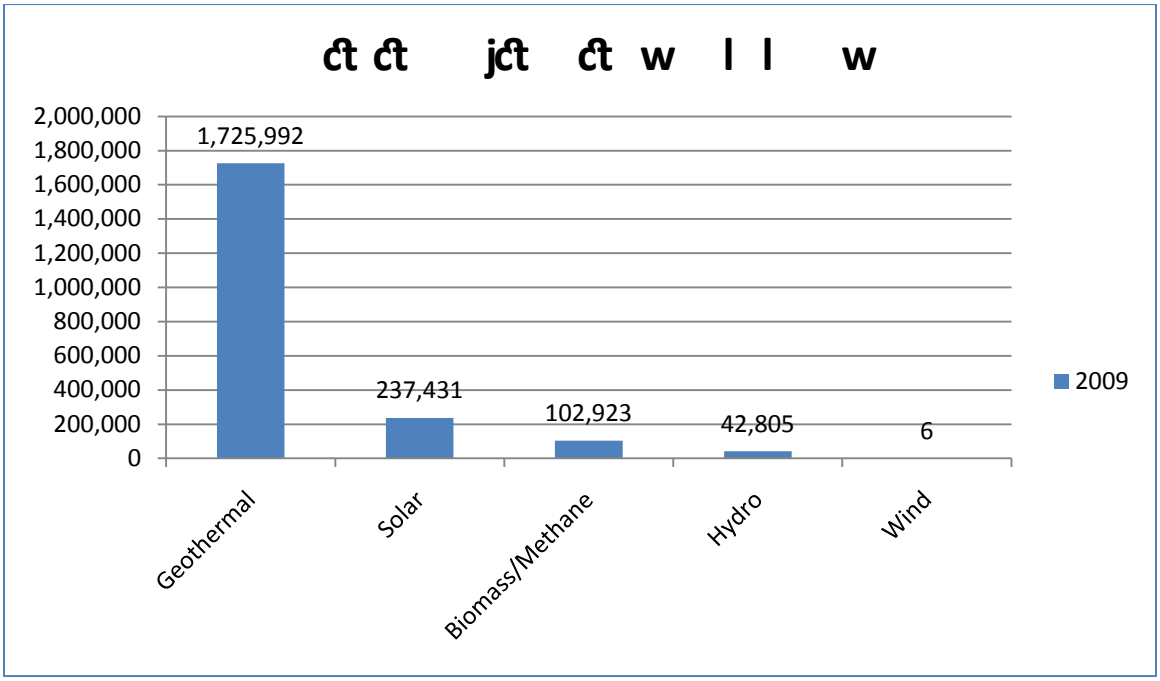
Renewable Energy Projects

Figure 3-25NV Energy Renewable Energy Sources



2009 Summary of Geothermal, Solar, Biomass/Methane, Hydro and Wind

Table 3.6 Summary of Renewable Energy in Nevada (MWh)



Geothermal

Second only to neighboring California, Nevada's 16 geothermal power plants have a combined 333 megawatts of electric production capacity, which over the course of a year provides about 7 percent of the state's electricity.[50]

Table 3.7 Geothermal in Nevada (MWh)

Beowawe	111,040
Beowawe SU	17,035
Brady (QF)	83,132
Brady SU	46,305
Desert Peak 2	97,738
Desert Peak SU	26,250
Faulkner 1	64,220

[50] http://www.nrdc.org/energy/renewables/nevada.asp

Faulkner 1 SU	20,253
Galena 2	83,266
Galena 2 SU	11,313
Galena 3	183,614
Galena 3 SU	47,000
Homestretch 1 (QF)	2,726
Homestretch 2 (QF)	2,524
Homestretch 3	247
Richard Burdette	159,444
Richard Burdette SU	32,323
Salt Wells	71,920
Salt Wells SU	25,676
San Emidio (Amor 2) (QF) USG NV LLC	16,572
Soda Lake I & II (QF)	59,108
Steamboat Hills (QF)	74,727
Steamboat Hills SU	19,648
Steamboat IA (QF)	6,858
Steamboat IA SU	1,046
Steamboat II (QF)	105,482
Steamboat II SU	43,416
Steamboat III (QF)	113,766
Steamboat III SU	44,788
Stillwater I (QF) shut down mid-January	431
Stillwater I 2008 SU Credit Purchase	14,351

Stillwater II	82,257
Stillwater II SU	57,517
Total Geothermal	**1,725,992**

Solar

Nevada has the highest solar energy potential in the nation and is already the number one state in per capita solar energy production.

Table 3.8 Solar in Nevada (MWh)

Fort Apache	1,700
Grand Canyon	1,615
Luce	2,645
Ronzone	4,005
Spring Mountain	2,700
Springs Preserve	2,128
Nellis AFB Solar Star (PV)	78,920
Nevada Solar One (NPC) (Thermal)	94,212
Nevada Solar One (SPPC) (Thermal)	44,335
Procaps Laboratory (PV)	626
PCL Covered Parking (PV)	2,660
Misc. Prior Year Purchases per Q2 ’09 Solicitation	1,886
Sub-Total Solar	**237,431**

Biomass/Methane

The U.S. Department of Energy rates Nevada's biomass resources as "fair." The State's climate and terrain are not suited for large-scale biomass production, but Nevada could still produce up to 250,000 dry tons of biomass each year, mostly from urban wood waste around Las Vegas and forest and mill residues from Douglas County.

Table 3.9 Biomass/Methane in Nevada (MWh)

State of Nevada, Dept. of Corrections (SU)	4,776
Sierra Pacific Industries (QF)	52,342
Sierra Pacific Industries SU (QF)	10,005
City of Sparks / Truckee Meadows Waste Water	6,121
Sierra Pacific Industries 2007 SU (QF)	13,952
Sierra Pacific Industries 2008 SU (QF)	15,727
Sub-Total Biomass/Methane	**102,923**

Hydro

Nevada currently has 124 MW Hydro-electric in production.

Table 3.10 Hydro in Nevada (MWh)

Fleish	15,007
Hooper (QF)	1,741
TCID New Lahontan (QF)	8,768
Verdi	5,955
Washoe	11,334
Sub-Total Hydro	**42,805**

Wind

Windy zones are dispersed around the edges of Nevada, and their potential total capacity of 5,740 megawatts ranks 21st in the nation.[51]

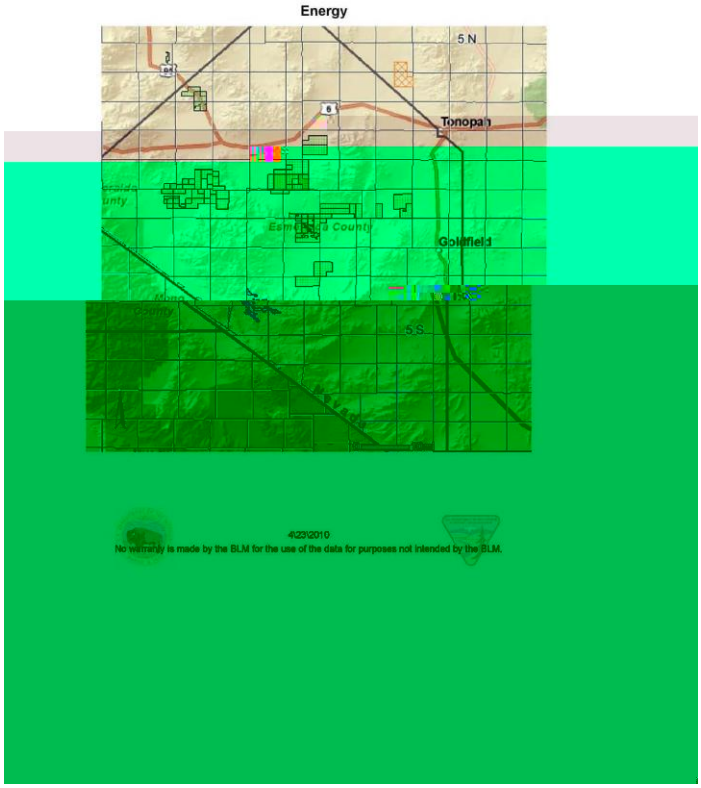
[51] http://www.awea.org/projects/projects.aspx?s=Nevada

Table 3.11 Wind in Nevada (MWh)

China Mountain (50% NVE Owned)	0
Spring Valley	0
Misc. Prior Year Purchases per Q2 ’09 Solicitation	6
Sub-Total Wind	**6**

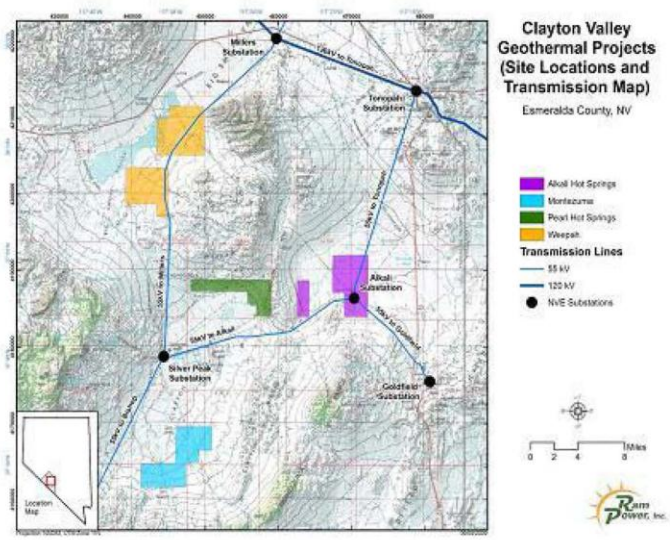
In addition to these projects, other projects are in various stages of development.

Figure 3-26 BLM[52]
Currently Issued Right of Ways for Solar, Wind and Geothermal Leases in Esmeralda County



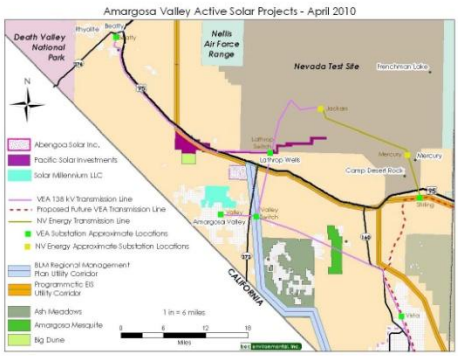
[52] Bureau of Land Management Right of Ways www.blm.gov

Figure 3-27 BLM[53]
Geothermal Projects in Esmeralda County



[53] Bureau of Land Management Geothermal Project www.blm.gov

Figure 3-28 BEC[54]
Active Solar Projects in Amargosa Valley



Project Descriptions

Solar Millennium

- Draft EIS: http://www.blm.gov/nv/st/en/fo/lvfo/blm_programs/energy/proposed_solar_millenium.html
- Local Interconnect Plan: VEA 230 KV line from an adjacent, VEA switchyard to the planned VEA Johnnie substation (all new)

Pacific Solar/Iberdrola

- Plan of Development (POD) (request from BLM)
- Local Interconnect Plan: New 20 mile (138) KV line parallel with existing 138KV line to VEA Substation at Lathrop Wells

AbengoaSolar

- POD (request from BLM)

BEC Environmental, Inc. Solar Projects http://becnv.com/renewableenergy.html

- Local Interconnect Plan: New 7.5 mile, 230 KV line across Hwy 373, then North parallel with existing VEA 138K to Lathrop Switch Station

Potential additional projects in Nye County with pending solar Right-of-Way applications are shown in Table 3.12:

Table 3.12 Pending Applications for Solar Right of Way in Nye County

Applicant	Project	MW	ROW Acres	NVN-S/N
AUSRA (now AREVA)	Lathrop Wells	140	4480	86,246
Cogentrix	Amargosa	1400	13,440	83,150
Cogentrix	Big Dune (SPEIS S/A)	3400	22,400	83,221
Cogentrix	Beatty	3400	12,800	83,220
Pacific Solar/Iberdrola	Amargosa South	500	7,700	84,446
Total		**8,840 MW**	**60,820 acres**	**420,283**

Limiting factors for these projects include transmission support and sustainable water resources.

The following tables (Figures 3-29 and 3-30) include all renewable energy projects on federal lands in all stages of development.

Figure 3-29 BLM[55]
Renewable Energy Project Table – Page 1

Project Name	Applicant	Application Date	Serial No.	Energy Type	Technology	District Office	Field Office	County	MW/GW	Video Miles	Video Towers / Facilities	NM Acres	PDA Review ECR	NEPA Category	EA EIS	ROD Yr. MO	DEIS NOA Date	FEIS NOA Date	ROD NOA Date	ROW Issue Date	Final Track	Advertised Acres	Special Interest
Alum	Sierra Geothermal Power Corp.		NVN-087302X	Geothermal		Battle Mountain	Tonopah	Esmeralda	73			9660									No		
Barren Hills	Barren Hill - Geo Power LLC		NVN-086230X	Geothermal		Carson City	Sierra Front	Lyon	55												No		
Beowawe	Terra-Gen Power, LLC		NVN-037230X	Geothermal	Binary - Geothermal	Elko		Eureka	16.6			5232	N/A								No		
Blue Mountain	Nevada Geothermal Power Inc.		NVN-082457X	Geothermal		Winnemucca	Humboldt River	Humboldt	49.5			3471									No	71	
Brady Hot Springs	Ormat Technologies, Inc.		NVN-058502X	Geothermal		Winnemucca	Humboldt River	Churchill	26			6820									No		
Buffalo Valley	Ormat Technologies, Inc.		NVN-085484X	Geothermal		Battle Mountain	Mount Lewis	Lander	30			2426									No		
Coyote Canyon	Terra-Gen Power, LLC			Geothermal		Carson City	Stillwater	Churchill													Yes		
Dead Horse	Ormat Technologies, Inc.		NVN-084239X	Geothermal		Carson City	Stillwater	Mineral	30			13803									No		
Desert Peak 1 & 2	Ormat Technologies, Inc.		NVN-021232X	Geothermal		Winnemucca	Humboldt River	Churchill	18												No		
Dixie Meadows	Terra-Gen Power, LLC			Geothermal		Carson City	Stillwater	Churchill				9968									Yes		
Dixie Valley	Terra-Gen Power, LLC		NVN-063282X	Geothermal		Carson City	Stillwater	Churchill & Pershing	67												No		
Gabbs Valley	Ormat Technologies, Inc.		NVN-084834X	Geothermal		Carson City	Stillwater		30												No		
Galena 2	Ormat Technologies, Inc.			Geothermal		Carson City	Sierra Front		15												No		
Galena 3	Ormat Technologies, Inc.			Geothermal		Carson City	Sierra Front		20												No		
Jersey Valley	Ormat Technologies, Inc.		NVN-085483X	Geothermal		Battle Mountain	Mount Lewis	Pershing & Lander	30												Yes	62.7	
McGinness Hills	Ormat Technologies, Inc.		NVN-084238X	Geothermal		Battle Mountain	Mount Lewis	Lander				7440	N/A				5/7/2010	9/8/2010	10/10/2010		Yes		
New York Canyon	Terra-Gen Power, LLC			Geothermal		Winnemucca	Humboldt River	Pershing													Yes		
Panther Canyon	Magma Energy Corp.			Geothermal		Winnemucca	Humboldt River	Pershing				5111									No		
Patua	Vulcan Power Co.		NVN-085288X	Geothermal		Carson City						8505									No		
Rosse River	Sierra Geothermal Power Corp.		NVN-085289X	Geothermal		Battle Mountain	Mount Lewis	Lander	26			3794									No		
Rock Hill	Ormat Technologies, Inc.		NVN-085297X	Geothermal		Battle Mountain	Tonopah														No		
Salt Wells	Enel North America, Inc.			Geothermal		Carson City	Stillwater		18.06			21864									No		
Salt Wells	Vulcan Power Co.			Geothermal		Carson City	Stillwater	Churchill	180												No		
San Emidio (Empire)	U.S. Geothermal Inc.		NVN-086820X	Geothermal		Winnemucca	Black Rock		3.6												No		
Silver Peak	Sierra Geothermal Power Corp.		NVN-084233X	Geothermal		Battle Mountain	Tonopah		15												No		
Smith Creek	Ormat Technologies, Inc.		NVN-084344X	Geothermal		Battle Mountain	Mount Lewis	Lander													No		
Soda Lake	Ormat Technologies, Inc.			Geothermal		Carson City	Stillwater	Churchill													No		
Soda Lake Complex (1 & 2)	Magma Energy Corp.		NVN-013230X	Geothermal		Carson City	Stillwater	Churchill	27.1												No		
Steamboat Hills	Ormat Technologies, Inc.		NVN-045235X	Geothermal		Carson City	Sierra Front	Washoe	14.41												No		
Stillwater	Enel North America, Inc.		NVN-058122X	Geothermal		Carson City	Stillwater	Churchill	41.3												No		
Trail Canyon	Ryser Technologies, Inc.			Geothermal		Battle Mountain	Mount Lewis	Nye													No		
Silver State South	NEXTLIGHT RENEWABLE POWER LLC	9/21/2006	NVN-085677	Solar	Photovoltaic (CPV)	Southern Nevada	Las Vegas	Clark	220	0	0	4250	Complete	EIS	N/A	7/21/2009	4/16/2010	9/9/2010	10/8/2010		Yes	4700	
Silver State North	NEXTLIGHT RENEWABLE POWER LLC	9/25/2006	NVN-085855	Solar	Photovoltaic (CPV)	Southern Nevada	Las Vegas	Clark	200	0	0	3850	Complete	EIS	N/A	7/21/2009	4/16/2010	9/9/2010	10/8/2010		Yes	2200	
Apex/North-East Las Vegas	Bright Source Energy Solar Partners	1/28/2008	NVN-084631	Solar	Concentrated Solar Power (CSP)	Southern Nevada	Las Vegas	Clark	1200	0	0	2000	In Partly Waiver	TBD							No	2200	
Iron Southern Nevada	Bull Ring Green Energy	3/18/2008	NVN-085117	Solar	Photovoltaic (CPV)	Southern Nevada	Las Vegas	Clark	500	0	0	3639		TBD							No	3982	
Nelson Southern Nevada	Bull Ring Green Energy	4/14/2008	NVN-085274	Solar	Photovoltaic (CPV)	Southern Nevada	Las Vegas	Clark	500	0	0	3117		TBD							No	3280	
Apex Clark County	Cogentrix Solar Services LLC	7/11/2008	NVN-085412	Solar	Concentrated Solar Power (CSP)	Southern Nevada	Las Vegas		240			2012									No	2012	
Indian Springs, Clark County	Cogentrix Solar Services LLC		NVN-085413	Solar	Concentrated Solar Power (CSP)	Southern Nevada	Las Vegas		1000			11520									No	11520	
Apex Northeast of Las Vegas	Cogentrix Solar Services LLC		NVN-085414	Solar	Concentrated Solar Power (CSP)	Southern Nevada	Las Vegas		1000			11240									No	11240	
Apex Northeast of Las Vegas	Cogentrix Solar Services LLC		NVN-085273	Solar	Concentrated Solar Power (CSP)	Southern Nevada	Las Vegas		1000			11040									No	11040	
Primera/Iron Nevada	Cogentrix Solar Services LLC		NVN-085088	Solar	Concentrated Solar Power (CSP)	Southern Nevada	Las Vegas		1000			8960									No	9000	
Muddy Mtn-Apex Otp, Clark County	Cogentrix Solar Services LLC		NVN-085111	Solar	Concentrated Solar Power (CSP)	Southern Nevada	Las Vegas		1000			10720									No	4700	
McCullough Pass Southern Nevada	Cogentrix Solar Services LLC		NVN-085229	Solar	Concentrated Solar Power (CSP)	Southern Nevada	Las Vegas		1000			13869									No	5100	
Apex/North-East Las Vegas	Nevada Power Co.		NVN-084552	Solar	Concentrated Solar Power (CSP)	Southern Nevada	Las Vegas		120			1775									No	1200	
Apex/North-East Las Vegas	First Solar		NVN-084232	Solar	Photovoltaic (CPV)	Southern Nevada	Las Vegas		400			5500									No	5500	
Northwest of Las Vegas Clark County	First Solar		NVN-084236	Solar	Photovoltaic (CPV)	Southern Nevada	Las Vegas		400			5800									No	5800	
Iron Southern Nevada	Power Partners Southwest LLC		NVN-084236	Solar	Concentrated Solar Power (CSP)	Southern Nevada	Las Vegas		250			13816.984									No	8650	
Apex Southern Nevada	Power Partners Southwest LLC		NVN-086519	Solar	Concentrated Solar Power (CSP)	Southern Nevada	Las Vegas		250			1751.44									No	1400	
Lathrop Wells, Nye County	Amargosa Solar Inc.		NVN-086571	Solar	Photovoltaic (CPV)	Southern Nevada	Pahrump		250			1920									No	1920	
Crystal & Jackass, Nye County	Acciona NV 1, LLC dba Amargosa Flats Energy, LLC		NVN-084734	Solar	Compact Linear Fresnel Reflector (CLFR)	Southern Nevada	Pahrump		140			3040									No	3040	
Lathrop Wells, Nye County	Acciona NV1LLC		NVN-086246	Solar	Parabolic Trough	Southern Nevada	Pahrump		140			4460.18									No	4460.18	
Ariel Road, Amargosa Valley, Nye County	Cogentrix Solar Services LLC		NVN-086458	Solar	Parabolic Trough	Southern Nevada	Pahrump		200			1000									No	1000	
Amargosa Nye County	Cogentrix Solar Services LLC		NVN-086150	Solar	Concentrated Solar Power (CSP)	Southern Nevada	Pahrump		1400			13440									No	13440	
Beatty, Nye County	Cogentrix Solar Services LLC		NVN-086220	Solar	Concentrated Solar Power (CSP)	Southern Nevada	Pahrump		1400			12800									No	12800	
Big Dune, Nye County	Cogentrix Solar Services LLC		NVN-086221	Solar	Concentrated Solar Power (CSP)	Southern Nevada	Pahrump		1400			22400									No	22400	
Johnnie Pahrump, Nye County	Gemtitans, Inc		NVN-086231	Solar	PV flat plate	Southern Nevada	Pahrump		500			13880									No	13880	
Amargosa South, Big Dune Area, Nye County	Bonitata dba Pacific Solar Investments, Inc.		NVN-084486	Solar	Photovoltaic (CPV)	Southern Nevada	Pahrump		500			7700									No	7700	
Amargosa North, Big Dune Area, Nye County	Bonitata dba Pacific Solar Investments, Inc.		NVN-084465	Solar	Photovoltaic (CPV)	Southern Nevada	Pahrump	Nye	300			7520									No	7520	
NTS-Mercury, Nye County	Johnson Controls Gov Svc LLC		NVN-086148	Solar	Parabolic Trough	Southern Nevada	Pahrump		140			3480									No	3480	
Mercury, Nye County	Nye County Solar 1 LLC		NVN-086217	Solar	Parabolic Trough	Southern Nevada	Pahrump		300			14180									No	14180	
Amargosa Farm Road, Amargosa Valley, Nye County	Solar Millennium		NVN-084233	Solar	Parabolic Trough	Southern Nevada	Pahrump		500			13850				2/12/2010	6/14/2010	8/4/2010			Yes	5250	
Hwy 95 Mercury	Southwest Solar Land Company		NVN-086782	Solar	Photovoltaic (CPV)	Southern Nevada	Pahrump					530									No	530	
Crescent Dunes	Tonopah Solar Energy	11/5/2008	NVN-086290	Solar	Concentrated Solar Power (CSP)	Battle Mountain	Tonopah		100	0	0	9680		EIS	N/A	6/8/2009					Yes	9680	
Patriot Solar Project	Solar Reserve, LLC dba Tonopah Solar Energy, LLC	10/2/2008	NVN-086930	Solar	Concentrated Solar Power (CSP)	Ely	Caliente	Lincoln	100	9		7680	9/1/2009	EIS			2/5/2010	2/1/2012	4/1/2012	5/1/2012	No	7680	
Hwy 160, Nye County	Acciona NV1LLC	12/8/2008	NVN-086248	Solar	Parabolic Trough	Southern Nevada	Pahrump		420			13280		EIS							No	13280	
Spector Range, Nye County	Acciona NV1LLC	10/9/2008	NVN-086249	Solar	Parabolic Trough	Southern Nevada	Pahrump					4480		EIS							No	4480	
Tonopah Airport	Solar Millennium	11/1/2010	NVN-84232	Solar	Parabolic Trough	Battle Mountain	Tonopah		500			4800		EIS							No	4800	Potential Indian Sites; ANWR Training Area; Water
Navy Solar	Navy Funding Cnrmt SW	1/15/2008	NVN-084854	Solar	Photovoltaic (CPV)	Carson City	Stillwater		4			37	12/11/2009	EA					1/11/2010	3/1/2010	No	37	
Luning Solar	Luning Solar Energy LLC	5/20/2008	NVN-086210	Solar	Photovoltaic (CPV)	Carson City	Stillwater		30			575	9/16/2009	EA					4/6/2009	8/16/2009	No	575	None Identified
Lower Moreno Mesa	Bright Source Energy Solar Partners		NVN-083914	Solar	Concentrated Solar Power (CSP)	Southern Nevada	Las Vegas	Clark	500			13030		EIS							No	6030	
Mud Lake, near Tonopah Airport, Nye County	Power Partners Southwest LLC	9/18/2008	NVN-086138	Solar		Southern Nevada	Las Vegas		250			3845									No	3106	ATCC

55 www.blm.gov

Figure 3-30 BLM
Renewable Energy Project Table – Page

Amargosa South, Big Dune Area, Nye County	Cogentrix Solar Services LLC	7/11/2008	NVN-086657	Solar	Parabolic Trough	Southern Nevada	Pahrump		720		7720		BLM								No	7780	
Nelson, NV, Clark County	Bright Source Energy Solar Partner	4/23/2009	NVN-088481	Solar	Concentrated Solar Power (CSP)	Southern Nevada	Las Vegas						BLM								No		
Morenci Mesa	Iberdrola dba Pacific Solar Investments, Inc.	12/7/2010	NVN-094407	Solar	Concentrated Solar Power (CSP)	Southern Nevada	Las Vegas		1000		11000		BLM								No		
Amargosa South, Big Dune Area, Nye County	Cogentrix Solar Services LLC	1/18/2007	NVN-086182	Solar	Concentrated Solar Power (CSP)	Southern Nevada	Las Vegas	Churchill	1000		11000		BLM								No		
Dry Lake, Clark County	Cogentrix Solar Services LLC	7/11/2008	NVN-086630	Solar		Southern Nevada	Las Vegas		250		11320		BLM								No		
Desert Spring, Clark County	Cogentrix Solar Services LLC	7/11/2008	NVN-086631	Solar		Southern Nevada	Las Vegas				2000		BLM								No		
Ariel Road, Amargosa Valley, Nye County	Cogentrix Solar Services LLC	7/11/2008	NVN-086633	Solar		Southern Nevada	Las Vegas				4700		BLM								No		
Amargosa Farm Road, Amargosa Valley, Nye County	Cogentrix Solar Services LLC	7/11/2008	NVN-086632	Solar		Southern Nevada	Las Vegas				3200		BLM								No		
West Oak Creek Station, Nelson, Clark County	Cogentrix Solar Services LLC	7/11/2008	NVN-086637	Solar		Southern Nevada	Las Vegas				19200		BLM								No		
Primm, Clark County	Cogentrix Solar Services LLC	7/11/2008	NVN-086639	Solar		Southern Nevada	Las Vegas				12000		BLM								No		
Desert Rock – NTS, Nye County	Cogentrix Solar Services LLC	7/11/2008	NVN-086640	Solar		Southern Nevada	Las Vegas				24000		BLM								No		
Clark County	Cogentrix Solar Services LLC	7/11/2008	NVN-086641	Solar		Southern Nevada	Las Vegas				1775		BLM								No		
Clark County	Cogentrix Solar Services LLC	7/11/2008	NVN-086651	Solar		Southern Nevada	Las Vegas				5500		BLM								No		
Clark County	Cogentrix Solar Services LLC	7/11/2008	NVN-086652	Solar		Southern Nevada	Las Vegas				3870		BLM								No		
Hwy 95 - Indian Springs, Nye County	Cogentrix Solar Services LLC	7/11/2008	NVN-086680	Solar		Southern Nevada	Las Vegas				11000		BLM								No		
Johnnie Amargosa, Nye County	Cogentrix Solar Services, LLC	7/11/2008	NVN-086602	Solar	Parabolic Trough	Southern Nevada	Pahrump		720		7040		BLM								No	7040	
Johnnie Pahrump, Nye County	Cogentrix Solar Services LLC		NVN-086626	Solar	Parabolic Trough	Southern Nevada	Pahrump		1000		13880		BLM								No	13880	
Amargosa Farm Road, Amargosa Valley, Nye County	Cogentrix Solar Services LLC		NVN-086654	Solar		Southern Nevada	Pahrump														No		
South Tonopah Airport	Solar Millennium		NVN-087940	Solar		Battle Mountain	Tonopah	Nye	400		7920										No		
Southwest Intertie Project	Great Basin Transmission, LLC		NVN-089210	Transmission		Ely	Egan		500	230	6439	Complete	TBD						4/8/2008		Yes	6439	
ON.Wind	NV Energy	7/11/2008	NVN-082376	Transmission		Ely	Egan	Multiple - Clark, Lincoln, White Pine, Elko	500	230	0 5722	Complete	BLM	N/A	11/10/2009	6/28/2010	6/21/2010				Yes	5722	
Blackrock to Reykovnee	Sierra Pacific Power Co	7/7/2008	NVN-090521	Transmission		Carson City	Sierra Front	Lyon, Carson and Douglas	120	30	486		BLM		7/31/2010	12/31/2010	2/28/2011	4/30/2011			No		Visual, Wetlands, Wildlife, Recreation
Salt Wells Cedar 500KV	Vulcan Power	1/18/2009	NVN-087795	Transmission		Carson City	Stillwater		230	20	128		BLM								No		NEPA Carson Lake, Final
Virginia Peak Wind Transmission	Virginia Peak Wind	11/28/2008	NVN-086930	transmission		Carson City	Sierra Front		120		20		BLM								No	1	Visual
Fort Sage Transmission Line	Sierra Pacific Power Co	9/24/2009	NVN-087958	Transmission		Carson City	Sierra Front		345	60	158		BLM		12/31/2010	9/30/2011	12/30/2011	1/31/2012			No		Visual, Cape prince
SE Vulcan Project - NV portion	Vulcan Power	9/17/2008	NVN-086563	Transmission		Carson City			500	230	2500		BLM								No		NEPA, Visual
Transwest Express	National Grid Transmission Services Corp.	2/20/2009	NVN-086732	Transmission		Ely	Caliente	Lincoln	500		0		BLM								No		ACEC in Caliente RO
Gateway South	Pacific Corp	2/20/2009	NVN-086734	transmission		Ely	Caliente		500		0										No		ACEC in Caliente RO
Searchlight Wind Energy, Searchlight, Nevada	Duke Energy	3/7/2008	NVN-084626	Wind		Southern Nevada	Las Vegas	Clark	200		5 24000	08/04/2009	BLM	N/A			10/8/2010				Yes	785	
Table Mountain Southwest of Las Vegas	Acciona		NVN-079120	Wind		Southern Nevada	Las Vegas		205		15 8200										No	200	
Castle Mountain Searchlight NV	Oak Creek		NVN-082729	Wind		Southern Nevada	Las Vegas		0		9 10149										No	904.47	
Laughlin Southern Nevada	Turning Point		NVN-088068	Wind		Southern Nevada	Las Vegas		100		4 5882										No	176.46	
Spring Valley Wind	Spring Valley Wind, LLC	2/21/2009	NVN-084148	Wind		Ely	Schell	White Pine	150		5 8565	N/A	BLM	2/12/2010	12/8/2009	2/8/2010		4/12/2009			No	665	
Pah Rah Range Generation	Ridgeline Nevada Energy LLC	8/28/2008	NVN-086113	Wind		Carson City	Sierra Front		400		167 9128		BLM		8/30/2010	3/31/2011	5/31/2011	6/30/2011			No	25	Visual, Noise, Wildlife
New Comstock	Great Basin Wind Energy LLC	4/21/2008	NVN-085186	Wind		Carson City	Sierra Front		230		71 3059		BLM		8/30/2010	3/31/2011	3/31/2011	5/31/2011			No	25	Virginia City Nat'l Historic Landmark, Visual, Noise, Wildlife
Antelope Wind Monitoring	Nevada Wind	11/28/2008	NVN-079476	Wind		Ely	Schell	White Pine			3 4210		TBD								No	4250	
Mesa Corral Pass, North Project	Windtal Developments USA LTD	2/25/2009	NVN-086795	Wind		Ely	Schell				0		TBD								No		
Muddy Pass, South Project	Windtal Developments USA LTD	3/9/2009	NVN-086796	Wind		Ely	Schell				0		TBD								No	8	
Invenergy	Invenergy	11/21/2007	NVN-081736	Wind		Ely	Schell				4911		TBD								No	4911	
Wasatch Wind	Wasatch Wind	8/6/2009	NVN-089438	Wind		Ely	Schell				0		TBD								No	8	
NV Wind Egan	Nevada Wind	12/22/2008	NVN-082764	Wind		Ely	Egan				4470		TBD								No	4470	
Flat Top Mesa	Pacific Wind Dev. (Acciona) Renewables		N-087970	Wind Development		Southern Nevada	Las Vegas	Clark			5089.44										No		
Wilson Creek (Wilson Table)	Nevada Wind	8/21/2008	NVN-086840	Wind Testing		Ely	Schell			12	9020		TBD								No	9020	
Pah Rah Testing	Ridgeline Nevada Energy LLC	9/4/2008	NVN-077755	Wind Testing		Carson City	Sierra Front			6	4056		CX					10/13/2007			No	1	None identified
Virginia Range	Ridgeline Nevada Energy LLC		NVN-078414	Wind Testing		Carson City	Sierra Front	Churchill		3	12943		CX					11/5/2007			No	1	None identified
Pah Rah Range	Lily Investment Holdings LLC	9/30/2015	NVN-080937	Wind Testing		Carson City	Sierra Front			2	1210		CX					9/30/2009			No	1	None identified
Virginia Range	Great Basin Wind Energy LLC	1/23/2008	NVN-081036	Wind Testing		Carson City	Sierra Front				3093		CX					11/28/2008			No	1	None identified
Dogskin Mtn	Iberdrola		NVN-084365	Wind Testing		Carson City	Sierra Front				5626		CX					10/13/2007			No	1	
Fort Sage	Nevada Geothermal Power Inc.	10/1/2014	NVN-081347	Wind Testing		Carson City	Sierra Front	Churchill		1	5261		CX					2/1/2006			Yes	1	None identified
Dogskin Mtn	Cliff Atkerson/Jackson Wind Generation	8/28/2008	NVN-082431	Wind Testing		Carson City	Sierra Front			1	5440		CX					4/4/2007			No	1	
East Pah Rah Range	Westwind Power Co.	11/8/2008	NVN-082812	Wind Testing		Carson City	Sierra Front			1	459		CX					4/9/2007			No	1	None identified
Pershing South	Westwind Power Co	11/8/2008	NVN-082813	Wind Testing		Carson City	Sierra Front			4	6320		CX					4/9/2007			No	1	None identified
Churchill Butte	Mountain Wind Energy	11/17/2008	NVN-082958	Wind Testing		Carson City	Sierra Front			1	2908		CX					3/26/2007			No	1	None identified
Mt. Siegel	Nevada Geothermal Power Inc.	11/12/2008	NVN-082890	Wind Testing		Carson City	Sierra Front			1	5139		CX					9/5/2007			No	1	None identified
Kleinwolf	Windpower LLC	5/13/2008	NVN-078139	Wind Testing		Carson City	Stillwater			1	1260		CX					4/14/2009			No	1	None identified
Wasatch	Wasatch Wind	6/4/2008	NVN-081611	Wind Testing		Carson City	Stillwater			1	8053		CX					9/30/2009			No	1	None identified
Table Mt	Windpower LLC	8/20/2015	NVN-078354	Wind Testing		Carson City	Stillwater			3	1247		CX					2/23/2007			No	1	None identified
Pine Nuts	Pine Nut Wind Energy LLC	2/3/2007	NVN-078128	Wind Testing		Carson City	Sierra Front			5	3976		CX					7/5/2007			No	1	None identified
Virginia Hills	Greenwing Pacific Energy Corp	3/9/2007	NVN-078478	Wind Testing		Carson City	Sierra Front			1	1213.8		CX				11/14/2007				No	1	None identified
Hot Springs Mt	Richard Williamson	8/16/2007	NVN-078303	Wind Testing		Carson City	Sierra Front			1	4546		CX					2/1/2010			No	1	None identified
Churchill Butte	Mountain Wind Energy	9/28/2007	NVN-084211	Wind Testing		Carson City	Sierra Front			1	7360		CX					5/8/2008			No	1	None identified
Virginia Peak	Alta Gas	6/20/2008	NVN-086748	Wind Testing		Carson City	Sierra Front			1	2000		CX					8/30/2008			No	1	None identified
Wilson Creek (White Rock)	Nevada Wind	9/24/2008	NVN-084477	Wind Testing		Ely	Schell			10	9000		TBD								No	9000	
Wilson Creek (Atlantic Summit)	Nevada Wind	8/21/2008	NVN-084476	Wind Testing		Ely	Schell			5	2950		TBD								No	2950	
Schell Creek Monitoring	Nevada Wind	8/28/2007	NVN-079651	Wind Testing		Ely	Schell			3	7500		TBD								No	7500	
Invenergy	Invenergy	10/24/2007	NVN-081631	Wind Testing		Ely	Schell			1	4400		TBD								No	4400	
Boulevard Associates	Boulevard Associates	7/31/2008	NVN-085549	Wind Testing		Ely	Schell			9	67771		TBD								No	67771	
NV Wind Robison Summit	Nevada Wind	8/20/2008	NVN-085847	Wind Testing		Ely	Egan			1	3500		CX				12/18/2007				No	3500	
ON.WTD	ON.WTD	5/12/2008	N-82041	Wind Testing		Ely	Egan			2	4537		Yes				9/1/2008	9/12/2008			No	4537	
Power Partners	Power Partners LLC	8/28/2008	NVN-088424	Wind Testing		Ely	Egan			4	4628		CX				11/1/2006	8/30/2008			No	4628	
Round Mt.	Greenwing Energy Management	10/24/2008	NVN-086201	Wind Testing		Battle Mountain	Tonopah			1	15000		BLM								No	25	Deer Winter Range
Silver Pass	Ridgeline Energy, LLC	5/29/2008	NVN-086209	Wind Testing		Battle Mountain	Tonopah			1	500		BLM								No	25	
Royalite (Beatty, NV)	Greenwing Energy Management / AltaGas	8/30/2007	NVN-084357	Wind Testing		Battle Mountain	Tonopah			1	9200		BLM								No	23	Historic Town Site, Desert Tortoise Overlap (FY-05/09 / 05/09 has a letter for selection submitted
Silver Pass	Pacific Wind Development LLC	3/25/2009	NVN-087324	Wind Testing		Battle Mountain	Tonopah				4200		BLM								No		
Wind Testing and Wind Energy Development Site	Pacific Wind Development, LLC		NVN-087957	Wind Testing		Southern Nevada	Las Vegas	Clark			2200										No		

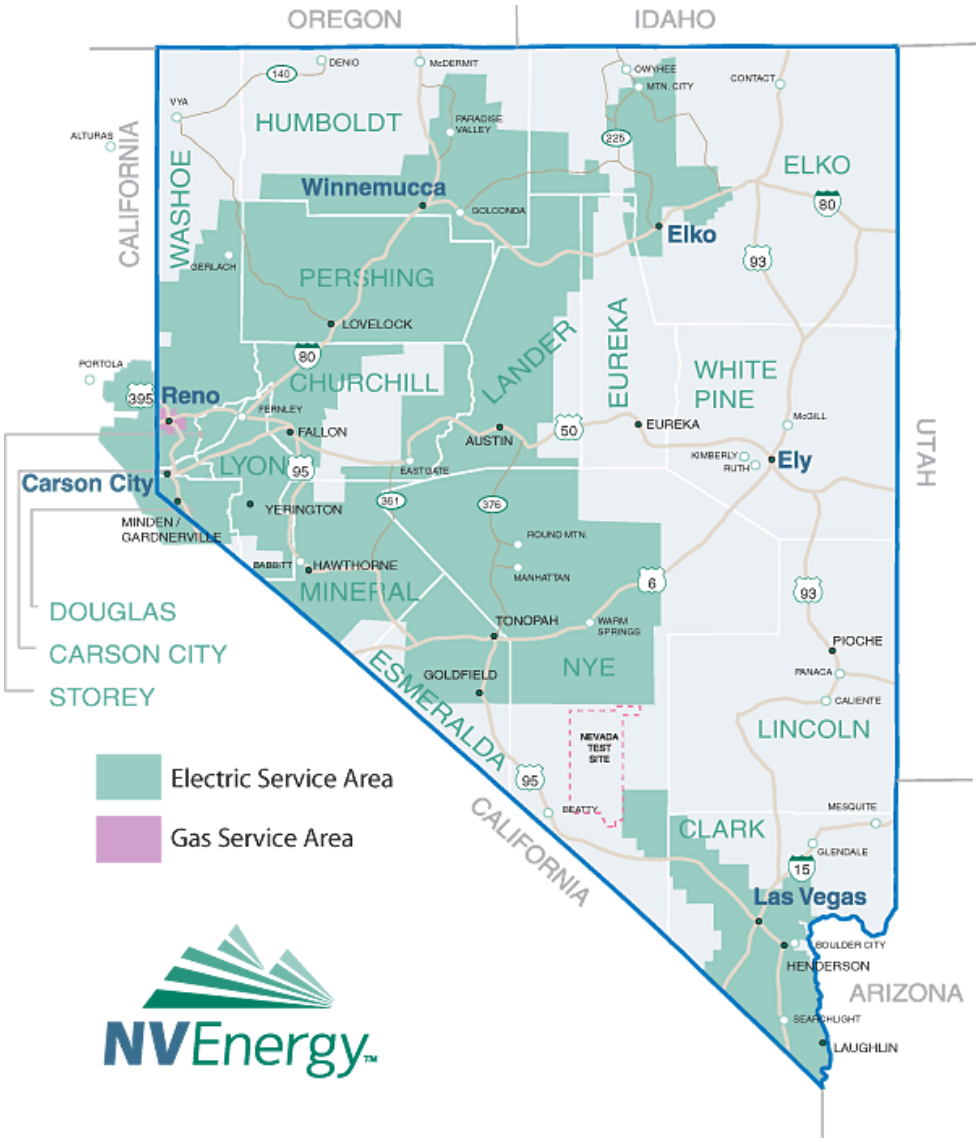
Electricity Supply

NV Energy

NV Energy Overview

Nevada Power Company (Nevada Power) located in southern Nevada and Sierra Pacific Power Company (Sierra Pacific) located in northern Nevada are jointly referred to as NV Energy (NVE). NVE provides electricity to 2.4 million citizens throughout Nevada and in northeastern California. From January 2006 to December 2009, they have increased their electricity generation from 2,423MW to 5,581 MW. Some notable accomplishments for 2009 include: 484,643 MWhs avoided; 1,013,354 metric tons of Co2 avoided; three (3) geothermal plants completed (adding 120 MW). NVE serves 54,500 square miles of service territory. They provide 91% of the total electricity to the State of Nevada. Figure 3-31 illustrates the service area of NVE.

Figure 3-31 NV Energy Service Area



Demand Side Management

Most major utility companies conduct programs to help their customers implement cost-effective energy efficiency and peak load reduction measures. These are called demand-side management (DSM) programs. They provide education, rebates, energy audits, and technical assistance. Effective utility DSM programs significantly reduce energy waste and lowers utility bills paid by customers. They also create jobs, since the implementation of energy efficiency measures is more labor intensive than the generation of electricity.

Leading electric utilities and third party DSM program implementers in the United States are saving at least 1% of electricity sales through DSM programs implemented each year. The leading states also have adopted decoupling of energy sales from their recovery of fixed costs, as well as performance-based incentives for utility shareholders.

NVE implements a wide range of cost-effective DSM programs for their customers, and Southwest Gas is just beginning to develop a DSM program. In 2008, the budget for NV Energy South's (NVES) four (4) largest DSM programs combined was $35.5 million, 79% of its total DSM budget. And the four (4) programs combined had a weighted-average benefit-cost ratio of 4.1, meaning they yielded economic benefits for customers of almost $150 million that were over four times the costs of the programs including participant costs.

NVE's very successful DSM programs in recent years have yielded energy savings equal to about 1.3% of total retail electricity sales from programs and measures implemented in 2008 alone. The potential for large DSM savings persists into the future. A May 2009 study prepared for NVES looked at the market potential for electricity savings through utility-sponsored efficiency programs targeting the utility's residential and small and medium sized commercial customers. The study estimated that 15.6% of the forecasted 2030 baseline energy consumption for these customer groups could be met through utility-sponsored DSM and demand-response programs.

Table 3.13 DSM

DSM	
Prior Year Carry Forward	161,467
Current Year Actual	1,254,275
Total DSM	**1,415,742**
Current Year DMS RPS Allowance	857,352
Current Year DSM Surplus to be Carried Forward	558,390

On July 1, 2009, NVES submitted a plan for satisfying its 2010-2012 resource needs. The plan was withdrawn and a revised plan was submitted on February 1, 2010. In the revised plan, the company reduced its proposed three-year basic DSM program budget from $328 million to $174 million (a 47% reduction).

The company appears to be slowing the rapid growth in the benefits from energy efficiency that it has been providing to its customers over the past 8 years. In its filing in July 2008, the company had offered to continue the highly cost-effective expansion of its DSM program. Nothing has changed since then to make the proposed expansion significantly less desirable. By the reduction in its DSM program offer, the company is cutting the net benefits to its customers by $236 million (roughly in half).

For the past nine years the Nevada Legislature and the PUCN have been wrestling with incentive regulation to encourage utilities to conduct all cost-effective DSM. Various combinations of decoupling and incentives have been applied to electric and gas utilities. A rulemaking docket is currently open at the PUCN addressing this issue for electric utilities. It is clear from the example above that utility incentive regulation in Nevada is not yielding the maximum benefit from DSM that could be achieved[56].

NV Energy Renewable Generations Program

Solar Summary

Program Year 2009-2010 (PY 2009/10) is the third year of the Solar Energy Systems Program (SolarGenerations). This program follows in the footsteps of the Solar Demonstration Program that ran for three (3) years beginning in 2004. This Annual Plan presents a review of the two previous program years (PY 2007/08 and 2008/09) and the current program year (PY 2009/10) through December 2009. The section dealing with PY 2009/10 results also includes a description of the RenewableGenerations team's efforts during calendar year 2009 to increase customer awareness of the program, and to increase participation and improve program performance. This approach provides a better overall review of the RenewableGenerations team's marketing, and education, and training efforts in program years 2008/2009 and 2009/2010.

Nevadans in unprecedented numbers adopted and benefited from renewable energy in calendar year 2009 through the SolarGenerations program. The year marked a sharp increase in installations of rooftop solar systems throughout the State in comparison to previous years. For PY 2009/10, a total of 979 applications were received and approved through December 2009 with a total proposed capacity of 14,277.2 kW. Of the total, 194 projects were completed during 2009 with a completed capacity of 1.4 MW.

The following are significant milestones that were achieved:

- The SolarGenerations program achievements included the largest school, public building, and church projects in the program, the largest monthly installation total, and the most kW installed in a calendar year making 2009 the strongest of any year since the program began in 2004.
- By early 2010, almost every residential customer that applied for the last two program years will have had the opportunity to construct with an approved reservation. Never before, has the waiting list been exhausted by the mid-point of the program year. This was accomplished through the customer outreach efforts that identified participants who were not likely to proceed to construction and that assisted them with the withdrawal process.

[56] Stephen Wiel, Sweep, Energy Efficiency Initiative Maximize DSM Impact

- RenewableGenerations reformatted the Application Change Form and Voltage Verification Form to reduce minor confusions and the number of forms that needed to be returned to the customer for correction. The RenewableGenerations team also

- NVE has worked to address customer concern regarding cost and the economic viability of individual projects by increasing the per project kilowatt caps to accommodate larger wind installation.
- NVE proposes in this plan to increase incentive levels with the incentive levels stepping down as kilowatt capacities for each step are achieved.
- The number of qualified wind generators was increased by expanding the number of sources for certifications.
- NVE will continue to work with the USDA and other organizations to identify additional funding sources to help prospective participants pay the upfront costs for wind energy systems.

In addition to these efforts, RenewableGenerations will focus its marketing efforts on schools, public buildings, and rural customers. These customers offer the greatest potential for wind projects. Schools and public building were selected because they will be eligible for federal stimulus funds and will have the ability to incorporate wind resources at a large number of sites. Customers in rural areas generally have space for larger wind generating systems and have fewer jurisdictional permitting issues. Outreach Managers will primarily focus their marketing efforts in rural areas that have a high quality wind resource and favorable local ordinances.

Hydro Summary

Program Year 2009-2010 (PY 2009/10) is the second year of the HydroGenerations program. NVE administers this program.

NVE created the HydroGenerations program in response to the 2007 Legislature's enactment of Senate Bill No. 437, which was codified in NRS 701B. NVE's strategy for the program has been twofold. First, while recognizing the constraints of implementing a waterpower program in a state with scarce water resources, NVE works to identify customers with potentially suitable sites. Second, NVE works individually with each participant in the program to assist them with project and program requirements. While NVE is encouraged by the interest in the program, to date two (2) engineered systems has been brought forth as potential projects due to the considerable efforts of the RenewableGenerations team to promote the HydroGenerations program and the interest of the customer who has been very supportive and flexible throughout the process. Although the program results are disappointing, the promotional effort has been successful in raising program awareness in the targeted group, Nevada's farmers and ranchers.

NVE will continue to identify customers with potential suitable sites, encourage participation in the program and to work individually with each approved participant to assist them with the program requirements. To reach the goal of installing at least 500 kW of waterpower capacity by 2012 as required by SB 358, NVE is proposing enhancements to the program to increase interest, participation and project completions. NVE sets forth the

following actions in this plan that is designed to coordinate with and build on the enhancements to the program that the PUCN has adopted with the changed regulations in LCB File No. R186-09.

- The incentive structure and level have been changed to increase participation in the program and increase the number of installations completed to meet the program goal of 500 kW by 2012. NVE is proposing in this filing a new and higher incentive for waterpower installations that do not qualify for net metering. This modification is intended to create an incentive that makes an installation that is selling the output of the waterpower generator to the company at the short term avoided cost rate roughly financially equivalent with the incentive for a waterpower generator installed in a net metering configuration. NVE has worked with the agricultural industry and has identified several other projects that may take advantage of the new incentive structure. The incentives for net metering participants are sufficient and are not proposed to be changed.
- NVE proposed in Docket No. 09-07014 that the capacity eligible for incentives be increased from 40 kW to 200 kW. The original level of 40 kW was set by the Task Force and the proposal to raise the limit to 200 kW was adopted in the revised regulations approved by the PUCN on January 27, 2010.
- Participation in the program has been impacted by Nevada's economic downturn. The agricultural communities have been significantly adversely impacted as commodity prices have dropped. The upfront expenditure by the participant is a contributing factor to lower than desired participation and project completions. As noted above, NVE is proposing to increase the incentive for installations that do not qualify for net metering. In addition to this effort to reduce the upfront costs, NVE will continue to work with other entities including the USDA to identify and potentially provide additional funding for HydroGenerations installations.

This plan provides the PUCN a comprehensive roadmap of how NVE proposes to manage this program in the coming program year. The first two years of administering this program have demonstrated that as a new initiative supporting the waterpower industry, participants, and potential participants this waterpower program must be flexible and adaptive to respond to the challenges that are encountered. NVE will therefore work with participants, contractors, and engineers to enhance and modify this plan and the delivery of the program during the program year within the approved budgets and incentive structures and as determined necessary to meet the goal of installing at least 500 kW by 2012.

Renewable Portfolio Standard

A federally-mandated Renewable Portfolio Standard (RPS) is expected in the near future. A majority of western states, including Nevada, have legislative requirements in place to generate power from renewable resources. Electric generation from renewable resources as of 2009 is at 4% of total electric generation when combining the western states. The following Table 3.14 summarizes the percentage of electricity generated from RPS for the western states.

Table 3.14 State Renewable Portfolio Standard Goal (in percentages)

State	2010	2015	2020	2025
California	20	26	33	33
Montana	10	15	15	15
Washington			15	
Oregon				25
Nevada	12	20	22	25
Utah				20
Arizona	2.5	5	10	15
New Mexico			20	
Colorado	5	15	20	20

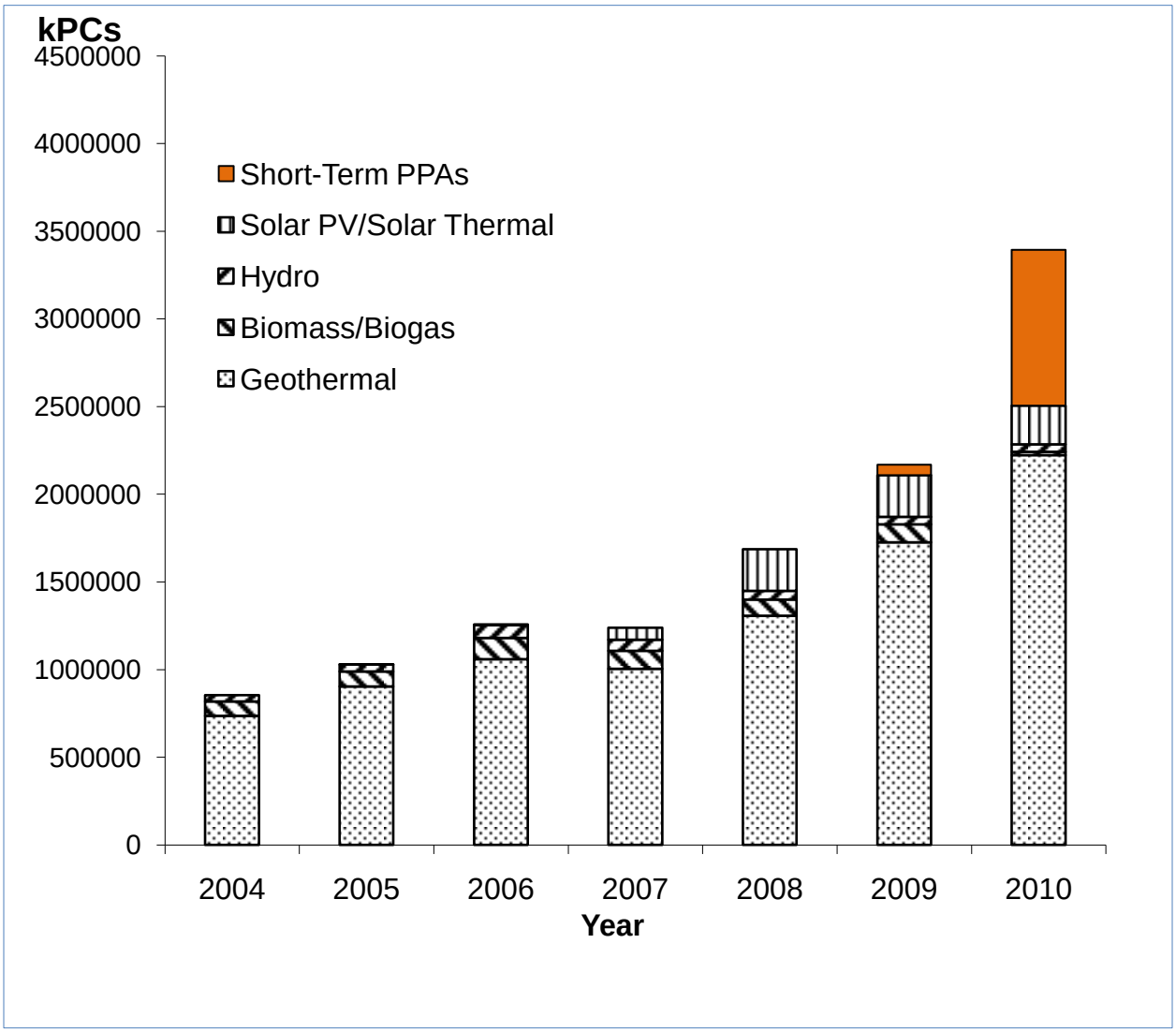
The following Table 3.15 represents 2008-2010 actual and projected values to accomplish the RPS.

Table 3.15 NV Energy RPS

NV Energy, Inc.	2008 Actual	2009 Actual	2010 Projected
Total Retail Sales (MWh)	29,653,562	28,578,386	28,495,480
RPS % Required	9%	12%	12%
Minimum Solar	5%	5%	5%

RPS %			
Total PC Requirement	2,668,821	3,429,406	3,419,458
Solar Requirement	133,441	171,470	170,973
DSM Allowance (25%)	667,205	857,352	854,865
Total PCs (all sources)	2,743,903	2,998,004	4,165,891
Surplus (Open Position)	75,082	(431,402)	746,433
Total Solar PCs	149,019	171,470	178,313
Solar requirement	133,441	171,470	170,973
Surplus (Open Position)	15,578	0	7,340
Projected Credits from 2010 short-term agreements	0	0	889,000
2010 Short-Term Credit applied to 2009 Open Position	0	512,925	(512,925)
Adjusted Surplus (Open Position	75,082	81,523	233,508

Figure 3-32 Portfolio Credits (in thousands) Produced by Energy Type 2004-2010



NVE listed challenges in obtaining their goals including finding viable energy source, permitting, financing, ad public opposition in siting facilities, particularly when new transmission lines will be required. Another topic of discussion is that natural sources of renewable energy potential in the West do not necessarily coincide with major centers of electricity demand. Nevada is a prime example in that the State's geothermal and wind energy is geographically set in the northern and central positions of the State. However, these areas are isolated from the load center in southern Nevada, for example, due to a lack of transmission.

Load Forecast

Load forecast is used to predict customer demand and plan for the addition of new resources to meet the demand as needed. Load forecasting is important for planning and operational decision conducted by utility companies. With supply and demand fluctuating and the changes of weather conditions and energy prices increasing by a factor of ten (10) or more during peak situations, load forecasting is vitally important for utilities. Short-term load forecasting can help to estimate load flows and to make decisions that can prevent overloading. Timely implementations of such decisions lead to the improvement of network reliability and to the reduced occurrences of equipment failures and blackouts.

On December 15, 2009, NVES filed their Energy Supply plan for 2010-2012. NVEN will be filed July 1, 2010. The following figure shows the actual sales for 2008 and 2009 and projected for 2010. Prices are expected to trend upward until 2014 and then stabilize.

Table 3.16 Sales for 2008-2009, projected sales for 2010

Year	Billed Sales in MWH	% Growth	Price per Kwh	Load factor based on Actual Peak MW
2008	21,572,455	-1.0%	$0.0662	46.4%
2009	21,204,523	-1.7%	$0.0684	45.1%
2010	NA	1.2%*	$0.0716	NA

*1.2 % growth is based on model statistics.

The price model for 2010 thru 2029, NVE's staff Economist is required to account for the effects of changes in prices of electricity and substitute fuels directly in the forecast models, as required by NAC 704.9225(2).

Other Electric Service Providers

There are fifteen (15) small rural electric utilities in Nevada, which together serve over 50% of the area of the State. These utilities are all publically owned and are rural electric cooperatives, municipal utilities, or general improvement districts. Rural electric cooperatives are chartered under federal laws associated with the Rural Utility Service, the successor agency to the more widely known as the Rural Electrification Administration (REA). Coops are member-owned non-profits that were originally established with loans from the REA; the coops were organized by the rural communities that they serve, areas which otherwise would not have received central service electricity – today Nevada's coops

are still democratically controlled by their members. Municipal utilities are chartered under NRS 710. Utilities Owned by Local Governments, and are owned by the citizens of the municipality and governed by their respective city councils or county commissions. Improvement districts, otherwise known in Nevada as power districts, are authorized under NRS 318, General Improvement Districts. A board that is elected from the utilities' consumers governs power districts. All of these providers are publically owned and not for profit, and are democratically run by their members or the consumers that they serve.

The following map, Figure 3-33, shows all the Rural Utilities in Nevada.

Figure 3-33 Rural Utility Service Areas

Rural Electric Cooperatives

Harney Electric

Headquartered in Burns, Oregon, Harney Electric Cooperative has 3,887 services over a 22,000 square mile territory (.6 consumers per mile of line). Most of this territory is in southeast Oregon; however, Harney's service territory also covers approximately 7,300 square miles of Humboldt County in Nevada, including the towns of McDermitt and Denio. In 2009 Harney supplied 173,396 MWh to its members, and had a peak demand of 57.8 MW.

In 2009, Harney purchased 192,193 MWh of power from the Bonneville Power Administration (BPA), which sells hydroelectric power from the Columbia River System. Harney has a long-term contract with BPA and is a full requirements customer, meaning that all of their power comes directly from Bonneville. Nearly 100% of this power is hydroelectric, though it may be supplemented by market power at varying amounts throughout the year. Harney also buys blocks of wind power and gives its members the option of purchasing this renewably generated electricity at a higher rate. Harney owns 2,564 miles of distribution line and 348 miles of 115 kV transmission line.

Harney has 1,221 member-customers to its 3,887 services. A relatively high percentage, 46%, of Harney's services buy power for irrigation and agricultural uses; 42% are residential; and 12% are commercial.

Energy Efficiency and Conservation Programs

Harney offers rebates for energy efficiency upgrades on irrigation equipment – rebates vary and are provided for a range of possible upgrades. Harney also provides education and outreach on conservation to its members and gives out free compact fluorescent lights to encourage energy efficiency.

Mount Wheeler Power

Headquartered in Ely, Nevada, Mt. Wheeler Power's service territory covers 13,200 square miles in eastern Nevada, including all of White Pine County, and parts of Elko, Eureka and Nye Counties. Mt. Wheeler Power also provides service to customers in three (3) western Utah counties – and has a total of 2,800 square miles of territory in Utah. Mt. Wheeler is an Electric Cooperative whose customers are all member-owners of the utility. Mt. Wheeler averages 2.25 customers per mile of line. In 2009 Mt. Wheeler supplied 468,239 MWh of power to its customers, and had a peak demand of 74 MW.

In 2009 Mt. Wheeler purchased 484,502 MWh of power, primarily from Deseret Power. Mt. Wheeler is a member of Deseret, which is regional transmission and generation cooperative.

Mt. Wheeler also has an allotment of hydroelectric power through the Western Area Power Administration (Western), primarily from the Glen Canyon Dam. In 2009, 86% of Mt. Wheeler's power was sourced from coal, 14% from hydroelectric, and .01% from wind.

Mt. Wheeler has approximately 7,400 services. By number of services in each class, 73.8% are residential, 1.6% is irrigation, 19.6% are commercial or industrial, and 5% are municipal or other. By kWh, only 14% of the electricity used by Mt. Wheeler's members goes to residential uses, whereas, 72% goes to commercial and industrial uses, including mining.

Mt. Wheeler has 1,887 miles of distribution line and 209 miles of 69 kV transmission line. In 2009 Mt. Wheeler installed smart meter technology throughout its system. These meters allow the utility to track energy consumption in real time and conduct meter readings remotely.

Due to the remoteness of its territory and the lack of commercial providers for Internet and other services, Mt. Wheeler Power also provides Internet as well as telephone and security systems to its members.

Energy Efficiency and Conservation Programs

Mt. Wheeler Power has an extensive rebate program for household appliances and commercial building systems.

In addition to rebates, Mt. Wheeler also offers incentives for customers to make weatherization improvements to their homes – utility financed low interest loans are available to all members for this purpose. For low-income consumers, Mt. Wheeler partners with the Rural Nevada Development Corporation (RNDC) to provide financial assistance for weatherization improvements.

Mt. Wheeler Power also offers rebates for consumers who install small solar and wind projects, and net metering is available for all services. Mt. Wheeler is currently in the research stages for a combined solar and wind installation demonstration project.

Penoyer Valley Electric Cooperative

Headquartered in Rachel, Nevada, Penoyer Valley Electric Cooperative serves only the town of Rachel and has a total of 60 services. In 2009 they supplied 1,016 MWh to their members, and had a peak demand of .24 MW (July 2009). Penoyer Valley is a wholesale customer of Lincoln Power District No. 1. They own three (3) miles of distribution line and no transmission line.

Plumas-Sierra Rural Electric Cooperative

Headquartered in Portola, California, Plumas-Sierra Rural Electric Cooperative (PSREC) has 8,380 services that provide electricity to 6,644 consumers. Approximately 370 of these services are in the western portion of Washoe County, and the rest are in Plumas, Sierra, and Lassen Counties in California. In total, PSREC serves a territory of 1,700 square miles. In 2009 PSREC supplied their members with 155,578 MWh of power and had a peak demand of 31 MW.

In 2009 PSREC purchased 170,000 MWh of power, 70% of which was bought on the open market, 26% was hydroelectric and 4% was geothermal. Following the loss of their contract with the Western in 2004 PSREC became a Generation and Transmission Utility; they began investing in generation to offset the cost of buying market power in California, and to ensure a more reliable power source. A 6 MW co-generation plant owned by PSREC will come online in 2010, and a 25 MW wind project is in the planning stages. The wind project, Black Mountain Wind, will have up to ten (10), 1.5 - 2.5 MW turbines. In addition, PSREC is investing in 12 miles of new transmission line. Currently, PSREC owns 1,130 miles of distribution line and 159 miles of transmission line.

Of PSREC's 6,644 consumers, 89% are residential, 9% are commercial, and 2% buy their power for agricultural uses.

Due to the remoteness of its territory and the lack of commercial providers for communications services, PSREC also has a communications subsidiary that provides high speed Internet, wireless satellite Internet, wireless phone service, and Direct TV to its members.

Energy Efficiency and Conservation Programs

PSREC offers an extensive rebate program to help its members increase energy efficiency in their homes. Rebates for replacement of old home appliances with Energy Star models are available from the utility, as well as Marathon energy efficient water heaters. CFL's are sold to coop members at a reduced rate or members can buy them and then receive a rebate. PSREC also finances the purchase of GeoExchange ground source heating and cooling systems for members and gives weatherization workshops. Free energy audits and water heater insulation blankets are also available.

Installation of residential solar generation systems qualifies PSREC members for rebates of up to $6,000; larger rebates are available for commercial consumers. Net metering is an option for all members who invest in small renewable generation projects on their homes and businesses.

Raft River Rural Electric Cooperative

Headquartered in Malta, Idaho, Raft River Electric Cooperative (RREC) has 4,737 services over a 5,950 square mile territory in Southern Idaho, Northern Utah and Northern Nevada. RREC's Nevada territory covers 2,500 square miles in the northernmost part of Elko County, including the towns of Owyhee and Jackpot. In 2009 RREC supplied 259,801 MWh to its members and had a peak demand of 75 MW.

In 2009 RREC purchased 276,789 MWh of power - 95% of which was hydroelectric; the remaining 5% was nuclear. RREC owns 1,918 miles of distribution line and 330 miles of 138 kV transmission line. RREC is a member of Pacific Northwest Generation Cooperative, which owns a 6 MW Landfill Gas plant and has invested in a wave-power demonstration project off of the Oregon coast. Also, RREC has contracted to maintain and build transmission for a 14 MW geothermal project located in their territory.

Of RREC's 4,737 services, 68% are residential, 12% are commercial, and 20% purchase power for agricultural uses.

Energy Efficiency and Conservation Programs

RREC has an extensive rebate program to incentivize customers to increase the energy efficiency of their homes, businesses, and farms. Rebates apply to Energy Star home appliances as well as energy efficient windows, ductless heat pumps and ground source heat systems; various rebates for irrigation equipment depending on size and specifications are also available. RREC is in the planning stages for a rebate program for lighting and weatherization rebates based on audits for kWh savings.

RREC has also partnered with RNDC to provide matching funds for weatherization of low-income households.

Net metering is offered for RREC members who invest in small renewable generation projects on their homes and businesses.

Surprise Valley Electric

Headquartered in Alturas, California, Surprise Valley Electrification Corporation (SVEC) provides electricity to 9,738 square miles in northeastern California, Southern Oregon and northwestern Nevada. Though SVEC territory covers 2,088 square miles in northern Washoe County, they only have ten (10) Nevada services and on average three (3) meters for every mile of line they own. SVEC is a member-owned cooperative; in 2009 they supplied 127,711 MWh of electricity to their consumers and had a peak demand of 38 MW.

SVEC buys 100% of its power from Bonneville Power Administration (BPA). In 2011/2012, BPA will be going to a two-tier wholesale rate and any purchases above utilities 2010 peaks will be priced according to what BPA pays for market rate power. In 2009 SVEC purchased 143,347 MWh, 79% was hydroelectric, 11% was from other sources, 9% was nuclear, and 1% was from renewable sources including biomass and waste, geothermal, small hydro, solar and wind. SVEC is in the planning stages for a 1-2 MW geothermal project located in their Oregon service territory.

SVEC owns 2,229 miles of distribution line and 227 miles of 69 kV transmission line. These lines bring power to 6,185 services, and 4,051 consumers, 80% of these are residential, 19% use power for agriculture, and 1% is commercial or municipal uses.

Energy Efficiency and Conservation Programs

SVEC has an extensive rebate program to incentivize its members to increase the energy efficiency of their homes, businesses, and farms. Rebates for upgrades to Energy Star home appliances are given in addition to rebates for Energy Star manufactured homes and energy efficient upgrades to irrigation equipment. SVEC also offers free compact fluorescent light bulbs, water heater blankets and home energy audits for their members. SVEC offers net metering for consumers who install small renewable systems on their home or business.

Valley Electric Association, Inc.

Valley Electric Association (VEA) provides electricity to 6,500 square miles in southern Nevada and a small portion of eastern California. Headquartered in Pahrump, Nevada, VEA is a member-owned electric cooperative that serves consumers in Nye, Esmeralda, Inyo, Mono, Clark and Mineral counties, including the towns of Sandy Valley, Pahrump, Beatty, Amargosa and Dyer. In 2009 VEA supplied its members with 470,239.5 MWh of power and had a peak demand of 114MW. That amount was down from 123 MW peak demand in 2007– the decrease is attributed to a combination of the rise in unemployment and home foreclosures, an increase in conservation, and a more moderate weather year.

The majority of VEA's power is market rate power (75%), the rest is hydroelectric (21%) and Western Replacement Energy, which includes hydroelectric and market rate power (4%).

VEA has 24,132 electric services that provide power to 16,800 consumers. To distribute power to these customers Valley owns 2,093 miles of distribution line and 287 miles of 230 kV and 138 kV transmission line.

Energy Efficiency and Conservation Programs

In an effort to partner with members to reduce energy consumption, in 2009 VEA initiated the largest Domestic Solar Hot Water Heating Program in the United States. This is one of the first programs in the country to offer installation, purchase, and maintenance of Solar

Hot Water Heaters for all electric utility customers, financed by the utility. VEA members pay for their water heaters through their electric bills over an average of a 14-year period, the cost of which is offset in part by savings from reduced consumption. VEA offers the units at cost to their members and financing at 0%. VEA has projected installation of 5,000 water heaters over the course of the program, and a reduction of 3,082 lbs of CO2 annually per unit.

VEA offers residential consumers free energy audits that include free CFL's and water heater blankets. VEA also sells Marathon energy efficient water heaters to members at a reduced cost.

In the year 2000, VEA installed smart grid technology throughout its system. VEA has a two-way automated metering system on 100% of its services. With this system, both customers and the utility can monitor energy consumption in real time. VEA will also be offering Google PowerMeter technology that will go online in the third quarter of 2010 – this will allow all members to further monitor their energy consumption.

Wells Rural Electric Company

Wells Rural Electric Company (WREC) is a rural electric coop headquartered in Wells, Nevada. WREC provides electricity to 5,849 consumers at 6,112 services in eastern Nevada and a small part of western Utah. WREC's territory covers 10,446 square miles in Elko and Eureka counties, and 108 square miles around the city of Wendover in Utah. In 2009 WREC supplied 819,458 MWh of power to its members and had a peak demand of 113 MW. Currently WREC buys its power from Bonneville Power Administration, but may look at other sources of power for load growth beginning after 2014. In 2010 BPA projects that power sources will be 78.8% hydroelectric, 11.6% nuclear, and 9.6% renewables and cogeneration. WREC's projected load growth for fiscal year 2010 is 1.4% – this forecast is based on a projected 1% growth in mining and 2.42% growth in non-mining loads. WREC owns one small hydroelectric generation project in its territory.

By number of consumers on WREC's system, 80% are residential, 18% are commercial, 1.5% is agriculture (irrigation), and .2% is industrial. However, large commercial and industrial (mining) uses consumed 84% of the kWh that WREC sold to members in 2009. WREC has approximately 4.5 customers per mile of line.

WREC delivers electricity to its consumers on 1,286 miles of distribution line and 60 miles of 69 kV and 138 kV transmission line that the utility owns.

WREC also provides Wireless and Satellite Internet services, as well as electrician services, and medical alert monitoring for its members.

Energy Efficiency and Conservation Programs

WREC offers an extensive rebate program for its members. Rebates for upgrades to Energy Star appliances are available for members as well as rebates for Energy Star manufactured homes and rebates for Energy Star light fixtures. To encourage weatherization improvements WREC offers incentives to replace insulation and install energy efficient windows, and has partnered with RNDC to provide weatherization for low-income individuals.

In addition to these measures WREC has installed a geothermal heating system at its headquarters and offers net metering to all small business and residential consumers.

Municipal Utilities

Boulder City

Boulder City Electric Utility (BCEU) provides power to the citizens of Boulder City, an area of 33.9 square miles. As a municipal utility, BCEU is owned by the citizens of Boulder City, and managed by a utility administrator who is appointed by the City Manager. In 2009 BCEU provided 177,602 MWh of power to its consumers, and had a peak demand of 50.8 MW (July 2009). Boulder City's average monthly peak demand is 33.4 MW.

BCEU owns no generation resources, but receives allocations of hydroelectric capacity and energy from the Hoover Dam and from the Salt Lake City Area Integrated Projects (principally Glen Canyon Dam), which are sufficient to meet 64% of its total energy needs. In 2009 however, due to the ongoing drought in the western US, actual hydroelectric deliveries amounted to only 55% of the City's total energy need. To supplement its hydroelectric allotment BCEU purchases the balance of its capacity and energy requirements on the market through the Colorado River Commission. BCEU also has a Supplemental Power Service contract with NVE. In 2009 55% of Boulder City's power was from hydroelectric, and 45% was from market sources. Boulder City's load forecast is 51.7 MW peak demand and 180,281 MWh annual demand in 2015; and 53.6 MW peak demand and 187,051 MWh annual demand in 2020.

BCEU provides power to 7,739 services, 88% of which are residential, and 12% commercial; by kilowatt-hour, 65% of Boulder City's power is consumed at residential services, and 35% commercial. This power is delivered through 137 miles of distribution line and 13.5 miles of 69 kV transmission line that is owned by the City.

Energy Efficiency, Conservation and Renewables

BCEU has established several programs to promote energy conservation, including rebates for commercial and residential air conditioners and coolers, swimming pool equipment, and conversion to gas hot water heaters. In addition BCEU also offers rebates for solar hot

water heaters and for installation of solar screen technology. BCEU provides net metering as an option for all of its residential and commercial customers.

City of Caliente

The City of Caliente's electric utility serves the residents of Caliente, Nevada. In 2009 Caliente had a peak demand of 3.3 MW (December 2009) and provided over 12 MWh of power to its consumers.

Caliente owns no generation resources, and buys all of its power wholesale from Lincoln County Power District No. 1. Caliente has 715 services to which it delivers power over 40 miles of distribution line.

City of Fallon

The City of Fallon's municipal electric utility serves the residents and businesses within the Fallon City limits, a total area of 3.8 square miles. The City of Fallon has 4,814 services and in 2009 had a peak demand of 18 MW. 84% of Fallon's electric utility consumers are residential and 16% are commercial. Currently Fallon has a transmission only contract with NV Energy and buys its power from the Utah Associated Municipal Power Systems (UAMPS). The City distributes this power over 47 miles of transmission line that it owns.

Over the past five years the City of Fallon has concentrated on system improvements to enhance reliability and reduce system losses. In 2008, the City constructed a new 60/12.5 kV substation, converted its 2.4 kV distribution system to 12.5 kV, and eliminated three 34.5 kV substations. These efforts dramatically reduced system line losses and improved reliability for the utility. Following these improvements Fallon is now focusing on energy efficiency and demand side programs.

Pioche Public Utility

Pioche Public Utility (PPU) is the municipal utility that serves the town of Pioche, Nevada; PPU is governed by the Lincoln County Commission. PPU has 548 services and buys all of its power wholesale from Lincoln County Power District No. 1. In 2009, PPU supplied approximately 8,593 kWh to the residents of Pioche and peak demand was 2.4 MW (January 2009). Of the 548 services on PPU's system 85% are residential and 15% are commercial.

General Improvement Districts

Alamo Power District # 3

The Alamo Power District #3 is a General Improvement District that was created to supply electricity to the citizens of Pahranagat Valley, in Lincoln County, Nevada.

The major population center is the town of Alamo where the utility is headquartered; however, the total service area is 125 square miles and also serves Ash Springs and Hiko. Alamo Power buys all of its power wholesale from Lincoln County Power District No.1. In 2009 Alamo supplied its customers with 14.6 MWh of electricity and had a peak demand of 3.96 MW, which occurred in February 2009. There was a slight increase in demand from 2008, attributed to an increase in commercial use from a new bed and breakfast in Alamo's service territory.

Alamo Power provides electricity to 697 services and 486 consumers. Of these consumers 90% are residential, 5% are commercial, and 5% buy their electricity for agriculture (irrigation). Alamo distributes power through 94 miles of distribution line and owns no transmission line.

Energy Efficiency and Conservation

To encourage conservation Alamo Power has moved from a declining rate structure to a flat rate structure. Alamo is currently in the research and data acquisition stage of a Peak Demand Reduction Program. The first phase will consist of education and outreach with the goal of increasing customer awareness of peak demand times and costs.

Lincoln County Power District # 1

Headquartered in Caselton, Nevada, Lincoln County Power District No. 1 (LCPD1) serves the entirety of Lincoln County plus a small portion of northern Clark County. In total, LCPD1 serves 10,655 square miles including four (4) electric utilities to which it is the wholesale provider. In 2009 LCPD1 provided 76,108 MWh to its 988 services. Lincoln's peak demand in 2009 was 18 MW.

In 2009, 100% of the power that Lincoln purchased was hydroelectric. Lincoln has capacity and energy entitlements to hydroelectric power generated at the Boulder Canyon Project (Hoover Dam). These entitlements, 98,248 MWh annually, were granted to Lincoln by the Colorado River Commission of Nevada (CRC).

In most years LCPD1's entitlements to hydroelectric power are sufficient to meet Lincoln County's needs. However, with the five-year drought that has affected the watersheds supplying the Colorado River system, hydroelectric power generation at Hoover Dam has

been significantly reduced. As a result, since November of 2005 Lincoln has been required to purchase power to replace and supplement the power it receives from the Hoover Dam. This supplemental power is market power that is purchased through the CRC.

In addition to federal hydroelectric power and replacement power from CRC, Lincoln has entered into a contract with NV Energy for supplemental power. Under this contract, Lincoln is able to purchase additional capacity and energy to meet its needs if Hoover Dam's power is not sufficient.

Lincoln has been contacted by numerous developers of renewable generation projects regarding the possible location of projects within LCPD1's service territory. Lincoln has established a formal, three-study process to evaluate the impact of these projects on Lincoln's system. To date, three developers have authorized Lincoln to fully evaluate their projects. Of these three, one developer has elected to proceed with construction of their project. This project is a 3 MW biofuel generation project scheduled to be in commercial operation by the fourth quarter of 2010. LCPD1 will transmit the energy produced at the biofuel plant to a third party purchaser.

From 2007 to 2008 net change in demand for power in Lincoln County was 6.11%. In 2009 energy sales and peak demand were both lower compared to 2008. This reduction was driven primarily by lower irrigation and mixed agricultural use sales in the month of August. Looking forward to 2010, Lincoln expects loads to remain fairly close to 2009 levels, adjusted for weather fluctuations. Lincoln's five-year forecast (2015) is for a projected 18.8 MW peak demand and 92,042 MWh in annual energy sales. Population trends in Lincoln County remain fairly low. The U.S. Census Bureau shows the population of Lincoln County in 2000 at 4,165 and the current population at 4,794. This represents an average annual growth rate of 1.58%. Because energy sales do not increase directly with population, Lincoln is projecting a 0.5% increase in base system sales, before consideration of specific point loads.

LCPD1 is the all requirements, wholesale provider to the four (4) local distribution systems within Lincoln County; these are Alamo Power District #3, The City of Caliente, Penoyer Valley Electric Cooperative, and Pioche Public Utility. The arrangement between LCPD1 and these systems is established by contract. Lincoln provides all necessary power supply services on an after-the-fact basis (i.e. they do not prescheduled or prepurchase power). LCPD1 also supports these distribution systems by providing linemen for emergency restoration and routine maintenance work when requested.

74% of Lincoln's services are residential, 16% are commercial or industrial, 9% use their power for agricultural or irrigation purposes, and 1% are resale (wholesale purchasers). Of these however, resale accounts for 50% of kWh demand and residential only 14%. This

power is delivered on 286 miles of distribution line and 247 miles of transmission line that LCPD1 owns. 6.1 miles of Lincoln's transmission line is 138 kV, the rest is 69 kV.

Energy Efficiency and Conservation Programs

Lincoln has established numerous programs and undertaken several activities to promote energy conservation and to improve energy delivery efficiency. These programs include system loss reduction efforts, high efficiency air conditioning rebates, compact fluorescent lighting, residential weatherization, and conservation education.

Overton Power District # 5

Headquartered in Overton NV, Overton Power District #5 (OPD) has 1,932 square miles of territory in northeast Clark County. Overton's territory includes the city of Mesquite and the towns of Bunkerville, Glendale, Logandale and Moapa; the district service area also includes Valley of Fire State Park, Moapa Indian Reservation, and portions of the Lake Mead National Recreation Area including Overton Beach and Echo Bay. Within this territory Overton provides power to 13,364 services and in 2009 supplied its consumers with 389,496 MWh of power and had a peak demand of 97 MW.

Overton Power District has the capacity and energy entitlements to hydroelectric power from the Colorado River Commission of Nevada (CRC). These entitlements are: Boulder Canyon Project (Hoover Dam): 19,514 kW and 48,882 MWh; and Salt Lake City Area Integrated Projects (CRSP): 15,629 kW and 34,670 MWh. OPD also has purchase power contracts with Shell Energy, SEMPRA and NV Energy for supplemental power. In 2009 Overton purchased 426,865 MWh of power, approximately 40% of that was from coal, 40% from natural gas, and 20% was hydroelectric. Due to the downturn in the economy and the loss of some businesses and homeowners in its territory, OPD's five-year forecast is projected to decrease to a 93.5 MW peak demand in 2015 and then increase to a 103 MW peak demand in 2020.

Three major developers of solar facilities have shown strong interest in developing projects within Overton Power's service territory; however, Overton has limited transmission capacity to accommodate large-scale generation projects. To remedy this situation OPD, together with Lincoln County Power District No. 1 and the Southern Nevada Water Authority, are in the planning stages for a 75 mile double circuit 230 kV transmission line. This line will meet the growing needs of the parties as well as provide interconnect opportunities for renewable energy projects in the 10 MW to 100 MW range.

Currently Overton owns 106 miles of 230 kV, 138 kV and 69 kV transmission line and 1189 miles of distribution line. Overton serves 22,364 consumers, 89% of which are residential, 11% are commercial, and .2% buys their power for irrigation/agriculture uses.

Energy Efficiency and Conservation Programs

Overton Power has developed a residential energy conservation guide along with residential and commercial energy audits to improve energy usage and efficiency. Overton has implemented rebates for small solar and wind installations and for ground source heating and cooling units. OPD also does outreach to the community to educate the public on how to conserve energy and increase energy efficiency. In addition Overton has received a grant from USDA to install a solar film demonstration project. Net metering is available for OPD's consumers.

Wholesale Electric Service Providers

Colorado River Commission (CRC)

The Colorado River Commission (CRC) is an agency of the State of Nevada. It is registered with FERC as a scheduling coordinator and is responsible for accepting and distributing power from Hoover Dam, as well as providing power for the Southern Nevada Water Authority and its associated water utilities, NVE and a specific list of industrial customers located near Hoover Dam. The Colorado River Commission of Nevada serves the communities of the State by responsibly managing and protecting our Colorado River water and power resources. Hydropower resources are acquired by the CRC from the federal dams on the Colorado River system and delivered both to CRC's wholesale utility customers and most of the CRC's large retail customers. The CRC further acquires additional power for its customers from the regional power market, resells and delivers that power to its customers when requested. The CRC's wholesale utility customers include the City of Boulder City, Lincoln County Power District, NV Energy, Overton Power District, and Valley Electrical Association. The CRC's retail customers include entities at the Basic Industrial Complex in Henderson, Nevada, the Southern Nevada Water Authority (SNWA) and some of SNWA's member agencies for water or wastewater facilities. (See NRS 538.041 – 538.251 and 704.787).

The CRC receives hydropower generated at federally owned hydroelectric power plants located at four (4) dams along the Colorado River; Glen Canyon, Hoover, Davis, and Parker Dams.

CRC'S WHOLESALE CUSTOMERS

As noted above, the CRC's wholesale utility customers that receive hydropower through the CRC include the City of Boulder City, Lincoln County Power District, NV Energy, Overton Power District, and Valley Electrical Association. The CRC delivers each utility's apportionment of hydropower and additional resources purchased for some of them from the regional power market. The wholesale utilities also self-generate power or secure resources directly from the regional power market to balance their overall portfolios. The

following Table 3.17 shows the sources of energy that were sold by the CRC during calendar year 2009 to its wholesale utility customers.

Table 3.17 CRC's Sources of Energy

Source of Supply (by CRC only)	MWh
Market Purchases	7,944
Federal Hydro	808,120
Total	**816,064**

This table does not reflect any self-generated power or non-hydroelectric power directly acquired by these wholesale utility customers beyond the resources acquired for them by the CRC.

CRC'S RETAIL IDUSTRIAL CUSTOMERS AT THE BASIC INDUSTRIAL COMPLEX

In addition to serving its wholesale utility customers, the CRC also supplies hydropower and power from the regional power market to a limited number of large retail industrial customers located at the Basic Industrial Complex in Henderson, Nevada.

The CRC is responsible for all of the power needs for the Basic Industrial Complex customers. The following Table 3.18 shows the sources of the power provided during calendar year 2009 to meet loads of those customers.

Table 3.18 Power Loads

Source of Supply	MWh
Market Purchases	**349,024**
Federal Hydro	**361,593**
Total	**710,617**

The following table 3.19 shows the hydro power from federal dams provided to SNWA by the CRC during calendar year 2009:

Table 3.19 Federal Hydro Power Provided

Source of Supply	MWh
Federal Hydro (Supplied by CRC)	109,593
Total Hydro to SNWA	**109,593**

The SNWA works in partnership with the CRC to secure energy supplies for certain designated water facilities pursuant to NRS 704.787. Energy supplies are also secured for the member agencies of the SNWA ("participating member agencies") for certain designated water and wastewater facilities. Energy for these designated facilities is supplied, in part, from assets that are owned by the SNWA and its participating member agencies. Additional energy resources are purchased from the CRS.

SOURCES OF POWER DELIVERED (Non-Hydro Power)

Power acquired from the regional power market (market power) is an undetermined generation source that cannot be associated with a particular type of fuel.

ENERGY AND DEMAND FORECAST FOR RETAIL INDUSTRIAL CUSTOMERS

The following table shows a ten-year energy and demand forecast for the CRC's retail customers at the Basic Industrial Complex:

Table 3.20 Demand Forecast

Year	Energy (MWh)	Demand (MW)
2010	783,485	100
2011	839,774	110
2012	941,468	121
2013	941,468	121
2014	941,468	121
2015	941,468	121
2016	941,468	121

2017	941,468	121
2018	941,468	121
2019	941,468	121
2020	941,468	121

ENERGY EFFICIENCY, CONSERVATION AND RENEWABLE ENERGY

All power acquired by the CRC is delivered either to their wholesale or retail customers; none is consumed by the CRC. While the CRC does not directly offer energy efficiency or conservation projects or directly participate in renewable energy projects, some of its wholesale and retail customers do both.

The CRC is committed to supporting its community in employing and promoting equitable and sustainable practices for the long-term benefit of managing and protecting Nevada's Colorado River resources. CRC value and promote sustainability practices through their partnerships with other agencies within Nevada and in the six (6) other Colorado River Basin states by participating in forums and programs dealing with power, water, and environmental issues. These issues include but are not limited to, increased efficiency of power generation, optimizing hydropower production, water conservation and efficiency of use, water quality, salinity control, water banking, and reservoir management and development.

Chapter IV Natural Gas Assessment

Natural gas in Nevada is used overwhelmingly for electricity generation, and over one-half of Nevada households use natural gas as their primary energy source for home heating. Interstate pipelines supply Nevada with natural gas from Utah and other neighboring Rocky Mountain States. The largest of these lines, the Kern River Gas Transmission pipeline from Wyoming, supplies the Las Vegas area as it passes through southern Nevada on the way to markets in Southern California. Nevada ships almost 70% of the natural gas it receives on to California.

Natural gas is moved from production areas in central-southwestern states, Rocky Mountain states and western Canada, via interstate pipelines to three (3) types of customers: "sales" customers (residential, commercial and sometimes industrial), "transportation" customers (generally commercial and industrial customers), and "power generation" customers. Sales customers receive gas from a Local Distribution Company (LDC) and typically pay a bundled price for the gas service they use. Transportation customers buy their gas commodity and gas transportation separately. They are usually large customers who may take gas from the LDC or directly from an interstate or intrastate transmission pipeline. Electric utilities and merchant power plants are the only major power generation customers, although some combined heat and power (CHP) installations or self-generating customers also need to take gas at the higher pressures needed for electric generation.

Natural Gas Fundamentals

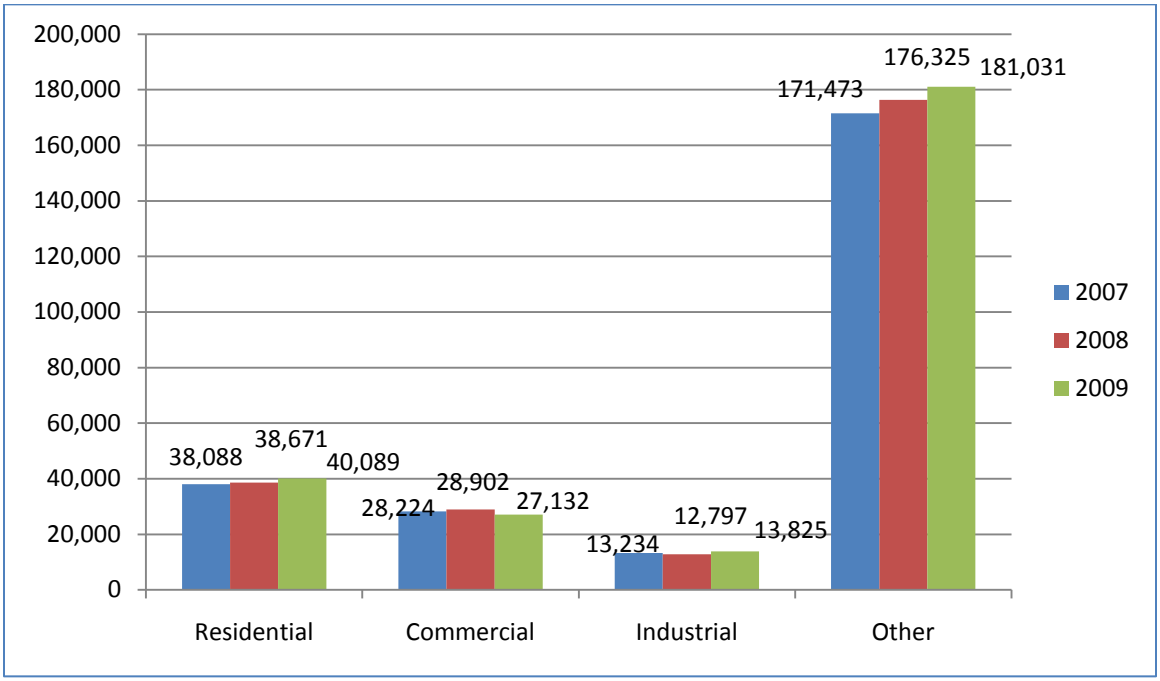
Natural gas was known as the "perfect fuel" some 25 years ago because it was reasonably available and transportable, and it was virtually non-polluting in the eyes of 1980 regulators and consumers. It was so perfect, in fact, that it was assumed to be in short supply and considered too valuable to be used to generate electricity. It was used as a heating fuel and as a feedstock in industrial processes. In such a world, the principal short-term variable was the weather; so, if suppliers could simply have enough storage to get through two or three weeks of unseasonably cold weather, natural gas prices would remain reasonably stable. As things turned out, this was generally the case. There were a few spikes, but after the mid-1980s natural gas prices typically hovered around $2.00 per mmBTU (million BTUs) and the spikes that did occur were relatively small and short-lived; that is, until about 1999 to 2000. During the 1990's abundant gas supplies and environmental benefits had all but removed the tacit proscription on natural gas powered electric generating stations. The concept of savings derived from electric deregulation, had become very popular in the middle of the previous decade.

Electric deregulation brought significant uncertainty to the relatively stable natural gas markets. It did this in two ways. First, the potential for substantial profits in electric markets caused a building boom in natural gas powered generators – the least expensive and fastest way to acquire electric capacity. In order to finance such plants, builders needed to assure investors that they had sufficient quantities of natural gas to power the plants being built. To do this, builders needed options on natural gas supply availability as well as delivery pipeline operating flexibility to match the operating cycles of their new plants. Second, natural gas electric power plants are relatively expensive to operate but easy to startup and shutdown. As a result, natural gas plants are often "on the margin"; that is, they are the plants that have the least predictable operating cycle. Therefore, the amount of fuel – natural gas – they need to operate is the most uncertain, which again introduces uncertainty and an opportunity for arbitrage.

Today, the natural gas companies in Nevada: Southwest Gas Corporation (SWG) and NV Energy (NVE); have adequate supplies of natural gas. Reno and much of the I-80 corridor in the north and Clark County in the south have sufficient access to natural gas commodity, as well as capacity for some additional growth in demand. Generally, those areas that are un-served with natural gas, such as Mesquite and Pahrump, would benefit substantially if it could be made available to them. Other areas, such as Elko, see future economic development tied to increased access to natural gas.

Since the 1990's through 2009, Nevada natural gas utilities were not required to file Gas Resource Plans; however, they annually file Gas Supply reports. These documents provide both an historical look at purchases in the previous regulatory year and a forecast for the coming year and beyond. Table 4.1 shows natural gas consumption during the past three years for both of SWG's systems and for NVE.

Table 4.1 Natural Gas Consumption History



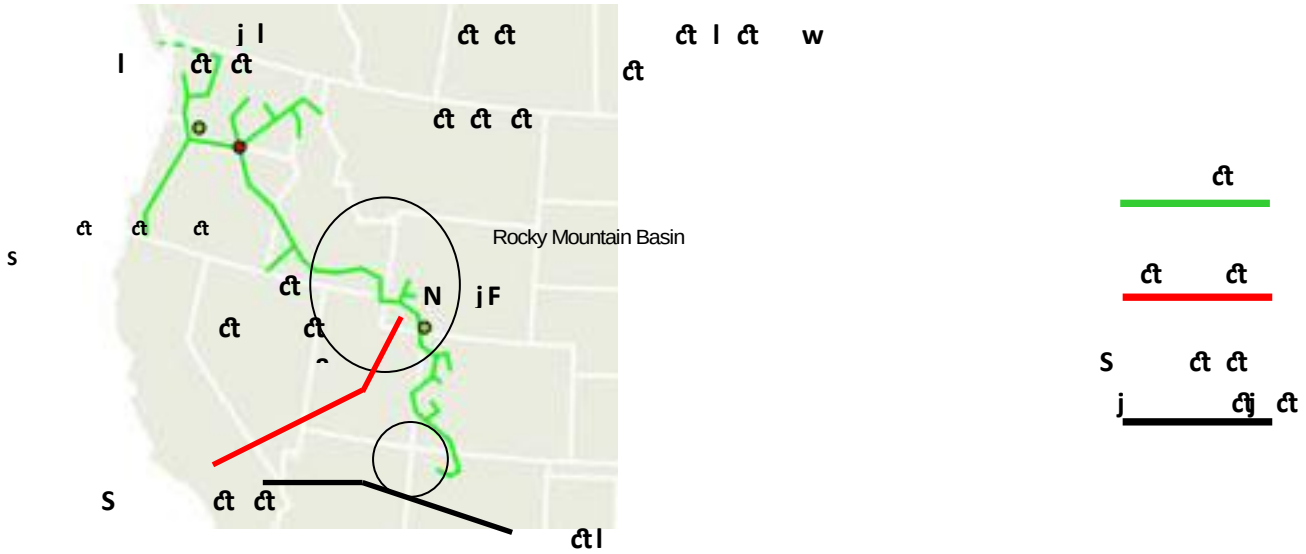
An LDC, as well as owners of gas fired generating facilities, typically purchases gas on one month or multiple month contracts. These contracts specify a daily volume of gas, but may have certain options available to the purchaser or the supplier. Gas may also be purchased such that a minimum and maximum take is specified, so-called "swing contracts." This allows large gas buyers some flexibility when the weather or other conditions cause the forecast to be off for the day. Gas may also be purchased on the spot market for a day or for multiple days. Large gas buyers have purchasing strategies that ensure a base amount of gas is purchased to cover loads that are constant and swing contracts to cover normal variations in weather driven gas demand. They also use the spot market to buy or sell commodity on days when it is economically advantageous to do so. Unlike electricity, natural gas deliveries can be somewhat flexible, and may be slowed down by "packing" transmission and distribution pipes, or speeded up by drawing down pressure in pipelines, which is also referred to as "drafting" the pipe. This "packing and drafting" of pipelines occurs daily and is offered by the pipeline operators as a "park and lend" gas commodity service. The amount of gas scheduled or requested for delivery on a pipeline is called a "nomination", while the amount of gas supply that is confirmed for delivery to a delivery point is called a "confirmation."

The purchase and delivery of natural gas involves arrangement for both the commodity, natural gas in a specific number of million BTUs (mmBTU), dekatherms (ten therms), or million standard cubic feet (mmscf) over a given time period; and the transportation of that gas from the point of purchase generally to the utility's "city gate." The city gate is the

point where an LDC's system connects to an interstate or intrastate pipeline. Also, the three units of gas volume (and therefore, energy) measurement are very close to the same quantity of gas and are sometimes used interchangeably.

SWG and NVE for northern Nevada typically come from four (4) basins: the Rocky Mountain, British Columbia, Western Canadian Sedimentary, and Saskatchewan Basins. These basins and their nominal basin delivery points; Opal, Sumas, and Kingsgate (Alberta and Saskatchewan), respectively are shown in Figure 4-1. SWG's supplies for southern Nevada typically come from basins in the Rocky Mountain, San Juan, Anadarko, and Permian Basins. In general the production of natural gas from Rocky Mountain basin is increasing significantly. Gas production in the Canadian provinces is holding steady due to the large number of wells being drilled to offset well production decline rates. Production from the basins located primarily in New Mexico, Oklahoma, and Texas is declining, as it has been for several decades.

Figure 4-1 Interstate Pipeline and Basin Supplies to Paiute Pipeline



Transport

According to the EIA, at least 84 natural gas pipeline projects were completed in 2008 in the continental U.S. These projects include new compression, laterals, looping, and extensions. Within the U.S. supply basins, the expected equalization of the difference in price between the Rockies and other basins has been slow to materialize as production continues to outpace the ability to transport the gas to market areas. Due to increasing Rockies production, several proposals had been introduced to build new natural gas pipelines sourced from the Rockies basin.

The Ruby Pipeline: Final EIS Released for proposed Ruby Pipeline Project

The Federal Energy Regulatory Commission (FERC) and Cooperating Agencies, including the Bureau of Land Management (BLM) and US Forest Service (USFS), have released the Final Environmental Impact Statement (EIS) for the Ruby Pipeline Project. Ruby Pipeline, LLC proposes to construct and operate approximately 678 miles of natural gas pipeline and ancillary facilities beginning near Opal, Wyoming, passing through northern Utah and Nevada and terminating near the California-Oregon Stateline in Klamath County, Oregon.

Construction is anticipated to begin in late spring 2010, and the estimated in-service date is March 2011. See Figure 4-2.

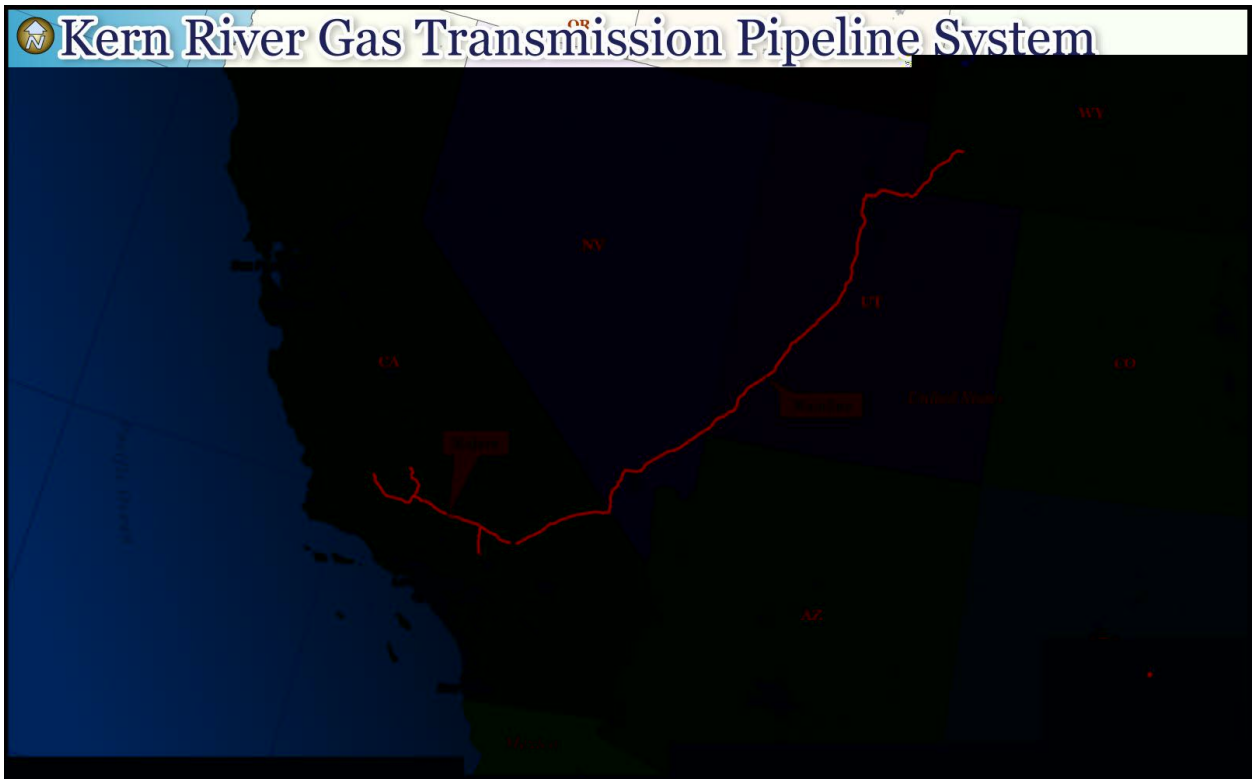
Figure 4-2 Ruby Pipeline

Kern River Pipeline Expansion (Figure 4-3): Currently the Kern River Pipeline has two expansions underway and one proposed expansion for increasing capacity out of the Rocky Mountains by a total amount of nearly 700,000 dekatherms (Dth) daily.

These expansions are:

1. The 2010 Expansion Project, expected completion on November 1, 2010. This expansion will increase the amount of natural gas transported on Kern River by approximately 145,000 Dth per day into southern California.
2. The Apex Expansion Project will increase the amount of natural gas transported on the Kern River by about 266,000 Dth daily. Completion date is November 2011.

Figure 4-3 Kern River Gas Transmission Pipeline



Demand

The main factors affecting natural demand in the western region during the action plan period are: (1) demand from electric power generation (to meet electric load), (2) gas demand from residential, commercial, and transportation sectors, and (3) heavy industrial demand for natural gas as a feedstock to produce products.

Demand for natural gas traditionally has been highly cyclical and depends significantly on the time of year, changing from season to season. Demand is highest during the coldest months of winter, the primary driver being the need for residential and commercial heating. Other factors affecting demand are: (1) fuel switching (determined by price in the marketplace), (2) gas burned in power plants to meet summer air-conditioning loads, and (3) the U.S. economy.

Southwest Gas Corporation

SWG is principally engaged in the business of purchasing, distributing and transporting natural gas to residential, commercial and industrial customers in the southwestern United States.

An investor-owned utility, SWG shares are traded on the New York Stock Exchange.

SWG has approximately 2,400 employees who serve more than 1.8 million customers in Arizona, Nevada and portions of California. The company added 5,000 customers in 2009.

Figure 4-4 SW Gas - Margin by Customer Class

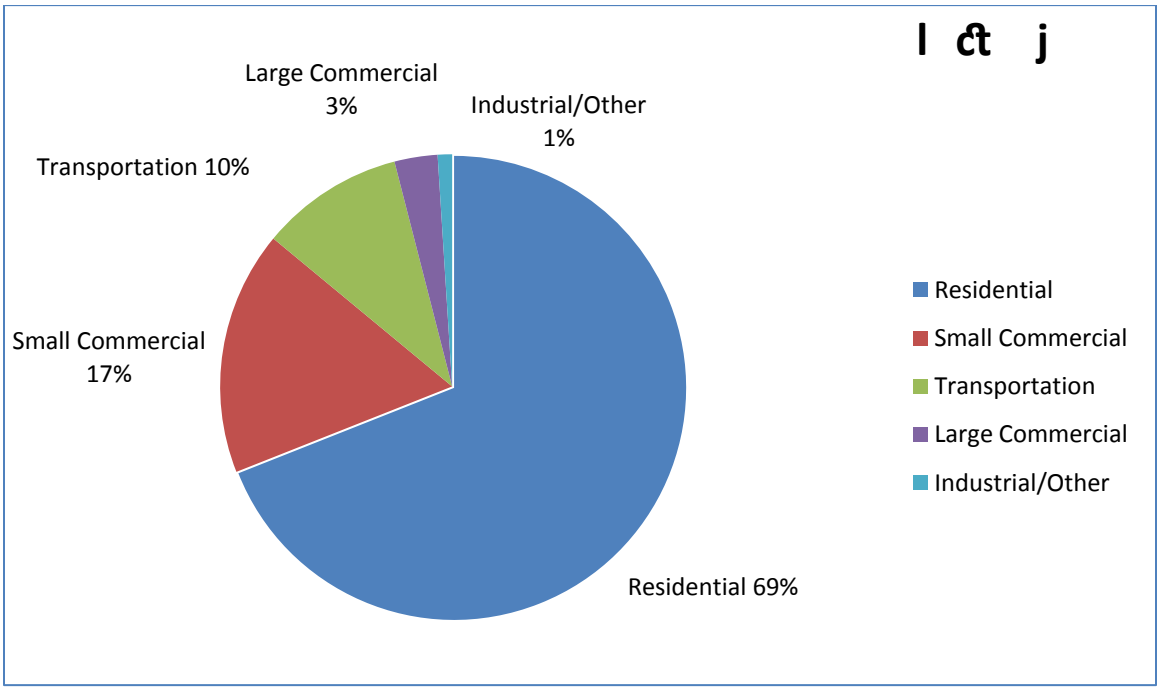
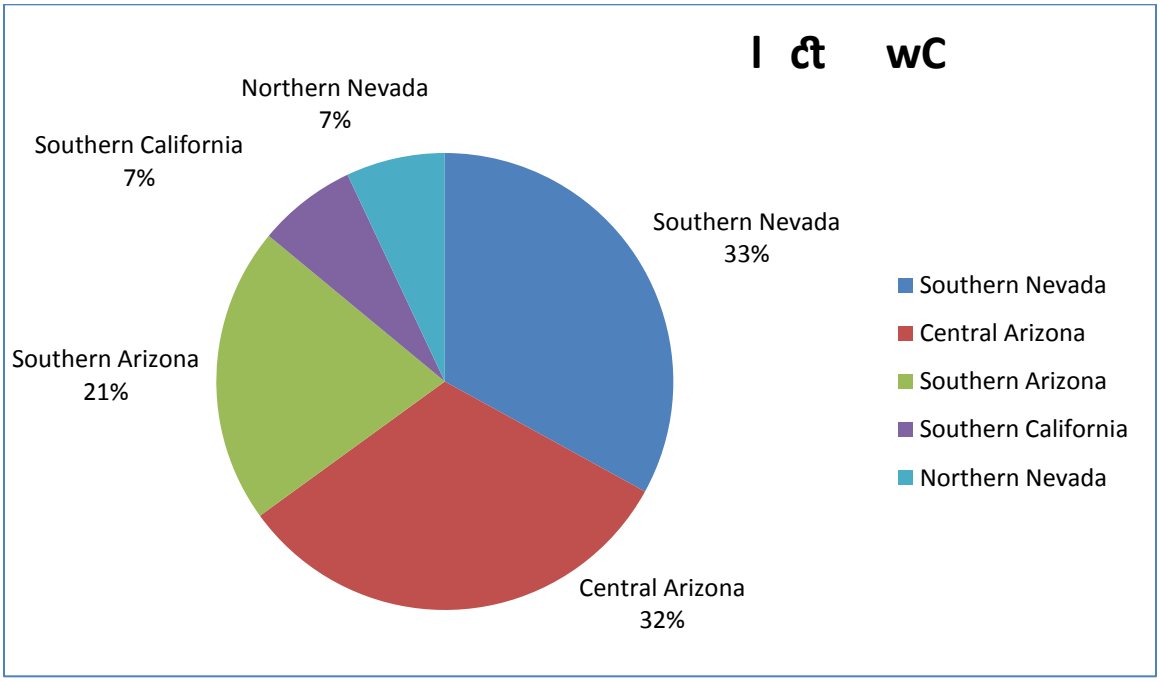


Figure 4-5 SW Gas - Customers by Division



Natural Gas Supply and Transmission

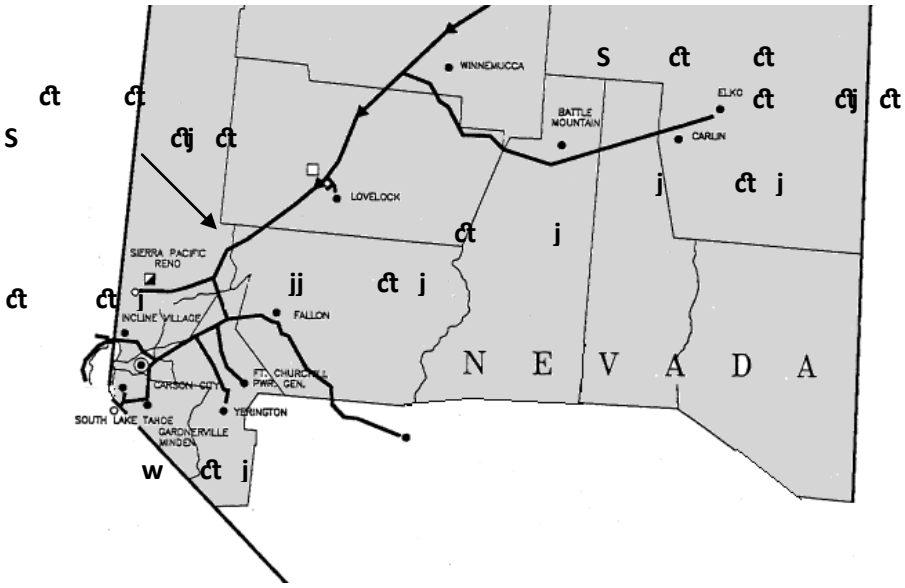
SWG's northern Nevada service territory receives natural gas by way of the Northwest and Tuscarora interstate pipelines that draw gas from the four (4) basins noted above, as well as the San Juan basin. Northwest delivers that gas to the Idaho-Nevada border where the Southwest owned Paiute Pipeline receives the gas and delivers it to northern Nevada customers through pipelines and "laterals." Figure 4-6 shows the five (5) major laterals that deliver natural gas to Elko, Reno, Carson City, and Fallon as well as a number of other communities along the various routes. Strategically located compressor stations along each major pipeline establish the flow of gas in these pipelines. A portion of the natural gas being transported provides fuel for the engines that supply power to these compressors.

Paiute and Tuscarora are physically interconnected, near Wadsworth, Nevada in Washoe County. This interconnection allows SWG and NVE operational flexibility in times of unusual demand, supply interruptions, or pipeline transport unavailability.

SWG's southern Nevada service territory can receive natural gas by way of three (3) interstate pipelines, the Kern River, El Paso and Transwestern pipelines. The Kern River Pipeline passes through Las Vegas, where it interconnects with the Southwest system. It then moves on into California and merges with the Mojave Pipeline to form the Kern-Mojave Pipeline, which serves southern California customers. The El Paso and Transwestern pipelines both pass south of Las Vegas, but provide natural gas to the Las Vegas area through a transmission pipeline system. Both of these pipelines terminate at the

Topock Compressor Station in Topock, Arizona from which natural gas is delivered into California. For the most part, these pipelines draw from the Permian, Anadarko and San Juan basins, while the Kern River pipelines draw primarily from the Rocky Mountain basin. This provides some degree of fuel diversity for the Las Vegas area and likely contributes to a relatively small basis differential (the difference in commodity price between the two basins).

Figure 4-6 Southwest Gas Paiute Laterals



Special System Constraints

During the last biennium, the two most important constraints in the SWG system were addressed. New Kern River capacity to the valley has provided the physical ability needed to keep up with customer demands, largely residential, in SWG's LDC in southern Nevada, and also meet the demands for industrial growth and the new natural gas electric generating stations in the south. The other constraint faced by SWG in the north was the inability to substantially increase supplies down the Paiute Pipeline without very significant investments on both Paiute and Northwest pipeline facilities. The interconnection with the Tuscarora Pipeline provides an additional source of supply.

SWG has no other significant physical barriers to meeting demands in northern or southern Nevada. Like many gas companies, however, it has continued to experience declining average gas usage by customers. This is positive in that it indicates greater efficiency, but it also has ratemaking consequences that SWG believes are harmful to its shareholders.

Southwest Gas Programs

Commercial Energy Efficient Equipment Rebate Program

The Commercial Equipment program encourages the purchase of higher efficiency natural gas water heaters, griddles, steamers, fryers, and combination ovens among both new and existing commercial customers by offering incentives. The high-efficiency commercial equipment included in this program use a large amount of energy; therefore, the potential for energy savings is great. However, initial equipment cost is an obstacle. This initial cost barrier can be overcome with appropriate financial incentives, coupled with education on the benefits of greater efficiency.

Large Commercial Energy Audit Program

The program provides an incentive of up to $5,000 per customer to aid in offsetting the cost of conducting an energy audit for all or a substantial portion of the customer's premises. It is estimated that a comprehensive energy audit for the targeted customer classes could cost up to $50,000 depending on the size and complexity of the customer's operation. The purpose of the energy audit is to identify potential energy conservation measures which could reduce overall energy consumption and increase energy efficiency through the study of the customer's existing equipment and building envelope.

Residential Energy Efficient Products Rebate Program

Incentives are offered to participating residential customers on qualified program measures. These measures include: high-efficiency natural gas furnaces, high-efficiency natural gas water heating appliances, ENERGY STAR® qualified clothes washers, high-efficiency natural gas clothes dryers, programmable thermostats, and "smart" low-flow showerheads. In addition to these incentives, Southwest has also developed a residential weatherization program that will offer incentives for window replacement, attic insulation, floor insulation, and duct sealing and insulation improvements. The weatherization program will only be available to SWG's southern Nevada customers.

Solar Thermal Advantage Rebate Program

The Solar Thermal Advantage Rebate (STAR) program is intended to encourage the purchase of solar thermal water heaters and solar thermal space heating utilizing certified collectors when installed in conjunction with a natural gas water heater and/or natural gas furnace. The primary objective of the STAR program is to increase awareness of solar thermal hot water and space heating systems; and to reduce natural gas usage by providing economically beneficial incentives to install the systems. Long-term customer energy savings can be realized throughout the life of the solar thermal equipment. The program is available for all residential customers and new home builders constructing homes within SWG's service areas.

Energy Star Home Program

The ENERGY STAR® (ESTAR) Home program is a single-family new construction program that offers an incentive for ENERGY STAR home inspections and certification. ESTAR is designed to increase residential energy efficiency through improved thermal shell construction, upgraded mechanical systems, and field verification. The program involves the recruitment of builders into the program who utilize a third-party contractor that: reviews their home plans, consults with them on effective construction techniques required to meet the ENERGY STAR guidelines, and inspects and tests the homes for compliance.

Southwest Gas Low-Income Energy Conservation Program

The Low-Income Energy Conservation program provides qualified limited-income customers with money-saving improvements that reduce energy use in their homes through home weatherization measures. The program is available to northern Nevada customers whose annual income is less than 200 % of the federal poverty income guidelines and is administered by SWG in conjunction with the Nevada Housing Division. The Nevada Housing Division manages the U.S. Department of Energy's statewide Weatherization Assistance Program in Nevada and sub-contracts with local community agencies to install the home weatherization measures. The home weatherization measures focus on four major categories: (1) duct repair; (2) infiltration control; (3) attic insulation; and (4) replacement of natural gas furnaces, which are not operational or pose a health hazard.

Planned Additions and Retirements

There are no major additions to or retirements from Southwest Gas.

NV Energy

NVE Gas is in the Reno area, as well as nearby portions of Washoe and Storey County.

Natural Gas Supply and Transmission

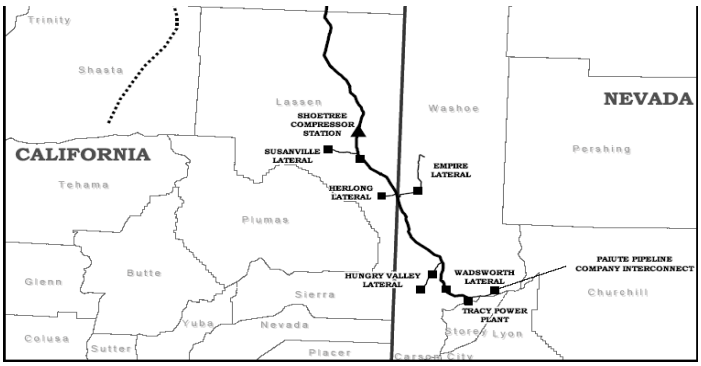
NVE supplies typically come from five (5) basins: the Rocky Mountain, San Juan Basin, British Columbia, Western Canadian Sedimentary, and Saskatchewan Basins. These basins and their nominal basin delivery points are; Opal, Sumas, and Kingsgate (Alberta and Saskatchewan). In general the production of natural gas from Rocky Mountain basin is increasing significantly. Supply from the other basins is considered to be holding steady or slightly declining.

NVE receives natural gas by way of the Northwest Gas Pipeline, an interstate pipeline that draws gas from three of the four basins noted above. Northwest delivers that gas to Idaho-Nevada border where the Paiute Pipeline receives the gas and delivers it to northern Nevada customers through a mainline and several laterals. The Western Canadian Gas supplies can flow to NVE through several paths; however, since Tuscarora was built, they

have generally flowed south through Washington and Oregon and to the California-Oregon border where the gas supplies flow into Tuscarora for delivery to the Reno-Sparks area. Figure 4-7 shows the three (3) laterals that deliver natural gas to Empire, Hungry Valley and Wadsworth. Mainline gas goes to Reno and the Tracy Power Plant. Strategically located compressor stations along the Tuscarora pipeline establish the flow of gas in the pipeline. A portion of the gas being transported provides fuel supply to the engines providing power to these compressors.

Paiute and Tuscarora are physically interconnected, near Wadsworth, Nevada in Washoe County. This interconnection coupled with the accompanying capacity expansion of the Tuscarora Pipeline, allows both SWG and NVE operational flexibility in times of unusual demand or supply interruptions.

Figure 4-7 Tuscarora Laterals



Special System Constraints

With the completion of the interconnection with Paiute in 2006 and the low variability in gas demand, compared with SWG territory, the NVE system is adequate to meet customer demands for the next several years. NVE has made operating adjustments, including the use of storage, swing contracts and the LNG processing facility that will allow it to respond to changes in customer demands, according to normal and reasonably expected conditions.

Planned Additions and Retirements

There are no major additions to or retirements from NVE.

Natural Gas Adequacy

Natural Gas Prices

Natural gas prices volatility, both daily and in the forward markets, stems from several market factors including weather, storage levels, equipment outages, and volatility in oil prices (where oil can be used as a fuel-substitute for natural gas).

Although natural gas prices were relatively low in 2009 (See Table 4.2), new drilling technology has the potential of making unconventional gas operations lucrative in terms of size and profitability.

Table 4.2 Nevada Natural Gas Prices

ct C jj ct S ctct						ct	ct
w ct	8.64	8.72	9.44	7.93			
ct ct j	14.31	14.17	13.33	13.18	11.94	16.39	22.71
l l ct j	12.12	12.03	11.21	10.91	10.10	14.46	20.37
j	12.00	11.77	11.10	11.28	5.87	9.75	14.14
ct jct ctj	10.13	9.99	9.24				
jct ct	6.79	6.31	8.26	5.39	5.47	9.17	13.57

Energy Efficiency/Conservation Opportunities

Opportunities for energy efficiency and energy conservation with natural gas generally come in three (3) areas. One of the most interesting, technically, is the recovery of the potential energy of high pressure gas through a pressure letdown system. The stored energy in high pressure gas is often wasted by throttling or bleeding pressure down to the lower operating pressure that most home and small commercial systems use. Several manufacturers now offer letdown turbines that capture this energy as electrical energy.

Another highly effective conservation measure comes from simply upgrading home heating systems. In the northern part of the State, two (2) of the most effective actions that can be taken are, 1) to replace a home furnace with a new 90 % efficient (or better) unit and 2) to have heating ducts sealed to prevent warm air from spilling into areas that do not need the heat. Insulation (helpful in hot and cold climates) and automatic thermostats are also effective in reducing the amount of natural gas expended for home heating.

Finally, larger commercial customers who need both heat and electricity in the right proportions can use combined heat and power (CHP), or what was once called "cogeneration." When the timing, the heat and the electrical demand are aligned, even small CHP units can rival the thermal efficiency of some large utility turbine-generators because most of the energy in steam power plants is rejected – thrown away – when the steam is condensed. CHP units use that heat for process or space heating and save both energy and water.

Propane, Fuel oil and Other Heating Fuels

Nevadans use a number of different fuels for home heating. Natural gas and electricity are by far the most widely used, but other common alternative fuels include propane, wood in various forms (chips, pellets, logs) and distillates, such as kerosene. When these fuels are purchased, rather than harvested, they are usually bought and sold in unregulated markets. Of the alternative fuels, only propane is, in some instances, regulated by the PUCN.

It is hard to know the extent to which these alternative fuels affect Nevadans. In most cases they are used because the expense of obtaining natural gas or electricity is very high – a common occurrence in rural locations.

Regional Considerations

Nevada is fully engaged in cooperative discussions with other western states on issues related to natural gas. For the most part these discussions concentrate on the adequacy of natural gas supplies for electricity generation. Nevada is represented by the NSOE, the PUCN and the utilities. Natural gas used by local distribution company service providers – SWG and NVE– has been the subject of successful state regulation for many years and is, therefore, not a significant part of these discussions.

The issue of adequacy of natural gas is closely related to the issue of electricity adequacy because natural gas is a significant fuel used in the generation of electricity. If natural gas supplies were inadequate for essential electricity generation, then the consequences would be felt well beyond any one State's borders; hence, the need for a regional approach.

Regional Organizations

NSOE and the PUCN, along with colleagues from the Bureau of Consumer Protection office and the natural gas utilities are called upon to engage their counterparts in other western states on electricity and natural gas issues. Much of the interaction among the states is directly in response to a greater willingness of the Western Governors Association to assert the interests of the western states in response to federal intentions to compromise those interests by proposing to exercise greater direct authority in western markets. In responding to the governors' directions, a fairly large number of organizations have emerged to perform analyses, communicate with Congressional Delegations, and basically

formulate a cogent position for the western states. These organizations are identified in the following paragraphs.

Western Governors Association

The Western Governors Association (WGA) is a forum established by the governors to explore and act jointly on issues of mutual interest or concern. Recent WGA activities include environmental issues (for example, joint action on the status of listing the sage grouse as an endangered species) and several energy issues. Energy issues are generally addressed by the WGA directly or through the Western Interstate Energy Board. The WGA has chosen to deal with the Clean and Diversified Energy resolution directly (this is the resolution that calls for the building of 30,000 MW of "clean and diversified energy" and the 20 % improvement of energy efficiency by 2020). In particular, it is not clear whether natural gas is part of the 20 % improvement in energy efficiency, or whether it will apply only to electric utilities.

Western Interstate Energy Board

The Western Interstate Energy Board (WIEB) is a non-profit organization established to implement some of the energy initiatives of the WGA. Issues that fall within the purview of WIEB include activities related to 1) the Western Interstate Nuclear Compact, 2) the WGA protocol on electric transmission siting in the west, and 3) a series of activities related to operational electric transmission issues and regional transmission organizations.

Discovery Efforts

There are no known discovery efforts ongoing in Nevada; however, the historical high average price of natural gas have spurred investment in new and existing resource development all around the world. High prices also provide the incentive to develop offshore fields even in areas where drilling and development have not, heretofore, been contemplated.

Elevated price levels can also spur expansion of LNG markets. Sustained prices above four dollars per mmBTU are likely enough that foreign gas resources can be exploited, compression facilities built, port facilities built in North America, LNG tankers built and used for transportation, legal issues confronted, and reasonable profits earned. Current natural gas prices are in the three to five dollars per mmBTU range.

Chapter V Transportation Fuels Assessment

Transportation fuels – gasoline, diesel, jet fuel and a group of versatile fuels called "distillates" – have been effectively deregulated for many years. This means that states and the federal government do not try – are not permitted to – 1) limit profits to a fixed percentage of company investments or sales, 2) require production of specific amounts of fuels at the refinery, 3) require distribution and storage of fuels at locations that seem appropriate to government regulators, or 4) demand access to a company's books and records without due cause. Consequently, the United States relies on market forces to allocate transportation fuels and provide incentives for new facilities.

The NSOE monitors the supply and demand for transportation fuels to determine that they are reasonably balanced and sustainable, but has no ability to require actions that might be viewed as helpful. The NSOE also actively engages refiners and distributors in voluntary actions that improve coordination and the flow of information, of course, without violating anti-trust laws. Finally, the NSOE maintains effective communications with the owner of the three (3) petroleum pipelines, Kinder-Morgan that deliver refined products to our major population centers. This is because many of the supply interruptions that have occurred are a result of pipeline problems.

It is clear that a long-term adequacy challenge exists in the supply of transportation fuels. Just as with natural gas, this challenge can be addressed by increasing supply or by decreasing demand – there are no regulatory solutions under existing laws. Unlike the situation with natural gas, Nevada has no ability to directly affect the supply of transportation fuels except in very limited circumstances, and the Governor does not intend to artificially reduce demand, nor is the NSOE studying such options. This assures that gasoline and other transportation products will be allocated by price.

Present System Description

Nevada's transportation fuel distribution system consists of the pipelines that move fuel from the refineries and the regional and local storage facilities to the bulk storage tank farms and retail outlets in Nevada.

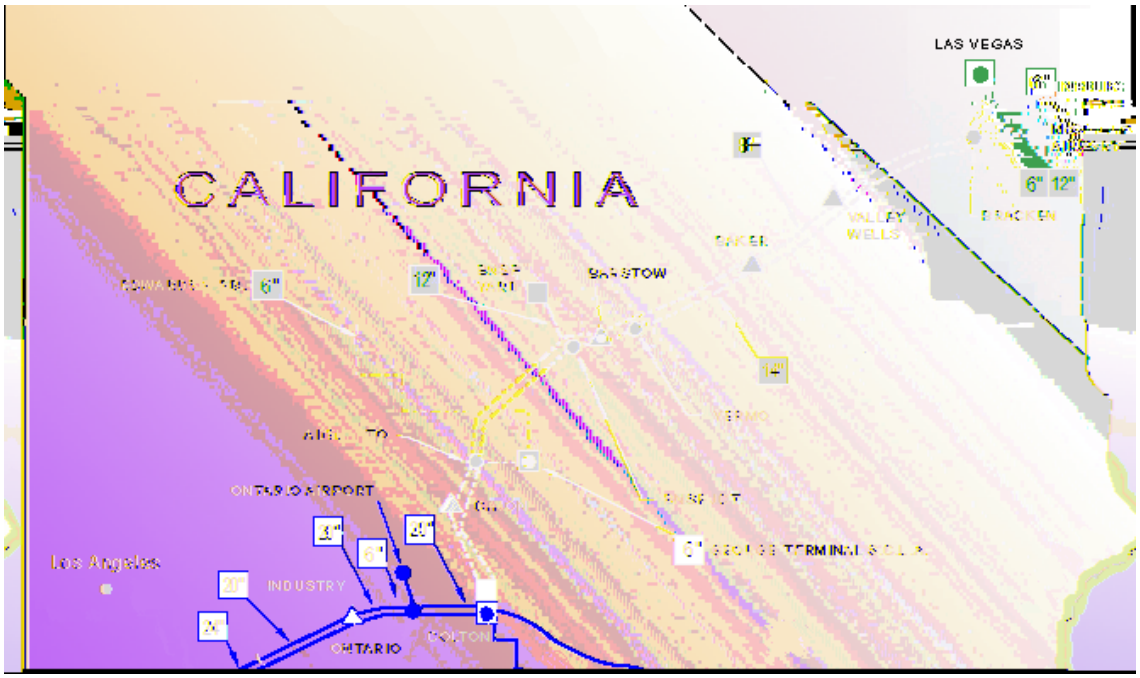
Kinder-Morgan Pipelines

For northern Nevada, products are supplied by a Kinder-Morgan pipeline that extends from Concord, Calif., through Sacramento, Calif., into the tank farm in Sparks, NV. It then continues to the Naval Air Station (NAS) in Fallon, Nev. Figure 5-1 is a map of the northern system.

Figure 5-1 Kinder-Morgan, Inc. Concord to Reno Pipeline System

For southern Nevada, products are supplied by two Kinder-Morgan pipelines that extend collinearly from Colton, Calif., into the North Las Vegas tank farm and McCarran International Airport. Nellis Air Force Base is also served by this system. Figure 5-2 is a map of the southern system.

Figure 5-2 Kinder-Morgan, Inc. Colton to Las Vegas Pipeline System



Both systems can deliver gasoline, diesel fuel, military and commercial jet fuels to the areas to meet consumer demand under normal conditions. In the north, the system has the capacity to meet the area needs without modification. In the south, the delivery system is reaching the maximum capacity and modifications are proposed to meet the immediate needs of the area, but as described in the Clark County Blue Ribbon Commission, this area is in critical need of alternative means of meeting southern Nevada needs in the future.

Since the northern Nevada system is sufficient for the near future, this discussion will concentrate on southern Nevada.

Changes made or suggested for southern Nevada should apply to the north when that system nears maximum capacity. Kinder-Morgan owns and maintains storage facilities at both ends of the pipeline (California and Nevada). Figure 5-3 shows the storage capacity in Sparks and in North Las Vegas. While Kinder-Morgan owns the pipeline and some storage facilities, it typically does not own any of the products it carries and stores. Product is owned by distributors, who may hold and sell the product themselves, or may store and deliver product to retail chains or independent gasoline stations.

The map, Figure 5-2, does not show exact locations or terminal names, but it correctly represents the general pipeline structure in Northern California and Nevada.

When the Kinder-Morgan pipelines are not able to supply products or when supplemental supplies are needed, it is possible to carry fuels into the Reno and Las Vegas markets using trucks and rail cars. Transporting products in this way is only a stopgap measure. It is very difficult to deliver enough fuel in this manner for the following reasons:

- There are not enough trucks that can be committed to this purpose for long periods of time,
- The number of available drivers is limited,
- Rail cars are not easily obtained and converted to this purpose in the short run, and
- Railroads are already unable to fulfill some of their customer demand with existing engines and crews

To the extent that these problems are overcome, two new challenges emerge:

- Gasoline's require different formulas in California, Las Vegas and Phoenix and are not interchangeable, and
- Truck drivers are limited in the number of consecutive hours they may drive

It is possible for the State Implementation Plan (SIP) administrator to request "enforcement discretion" from the US Environmental Protection Agency (EPA) to allow the use of non-conforming gasoline's under very unusual circumstances. Such authority, when granted, is limited in duration. Enforcement discretion has been requested in Nevada during a small number of events.

It is also possible to request a waiver of driver time limits from the US Motor Carrier Safety Administration in the US Department of Transportation. Doing so requires a declaration of emergency and presents a safety issue – driver fatigue – that is not easy to quantify. Nevada has not requested this type of waiver in the past.

Figure 5-3 Kinder-Morgan, Inc. Tank Storage & Delivery Capacity in Sparks and Las Vegas

Sparks Terminal

Note: Kinder Morgan's SFPP system consists of the North Line, which consists of approximately 864 miles of trunk pipeline in five segments that transport products from Richmond and Concord, Calif., to Brisbane, Sacramento, Chico, Fresno, Stockton and San Jose, Calif., and Reno, Nevada. The products delivered through the North Line come from refineries in the San Francisco Bay Area and from various pipeline and marine terminals.

Terminal Specification:

- 30 total acres
- 36 refined petroleum products tanks
- Total Storage Capacity: 645,997 barrels
- Range of Tank Sizes: 6,000 – 30,000 bbls
- Major Roadways: I-80, S. McCarran Blvd (NV-650)

Inbound Receipt Modes

- KMEP Concord to Rocklin to Reno
- 10" /8" / 6" pipeline

Loading Rack Services

- 3 truck loading racks
- Sorrento TMS-3000 rack automation
- Midgrade blending
- Ethanol (sequential) blending
- EPA detergent additive systems
- Diesel red dye injections services
- Ethanol truck offloading

Outbound Delivery Modes

- KMEP 6" pipeline to NAS Fallon

Commodities Handled

- Conventional Gas
- CARB ULSD
- EPA ULSD
- Turbine (Commercial Jet Fuel)
- JP-8 (Military Turbine Fuel)
- Ethanol

Las Vegas Terminal

Note: Kinder Morgan's approximately 550-mile CALNEV pipeline system transports gasoline, diesel and jet fuel from Los Angeles, Calif., refineries and marine terminals through parallel 14- and 8-inch diameter pipelines that originate in Colton, Calif., and extend to terminals in Barstow, Calif., and Las Vegas, Nev. The pipeline system also serves the Nellis Air Force Base in Las Vegas, NV, McCarran International Airport in Las Vegas, NV, and Edwards Air Force Base in the Mojave Desert in southeastern Calif.

Terminal Specification:

- 66 total acres
- 41 refined petroleum products tanks (includes 2 tanks at Nellis AFB)
- Total Storage Capacity: 1,183,730 barrels
- Range of Tank Sizes: 3,000 – 96,000 bbls
- Major Roadways: I-15, Craig Rd and Las Vegas Blvd North

Inbound Receipt Modes

- KMEP Colton to Las Vegas ML1 8" pipeline
- KMEP Colton to Las Vegas ML 14" pipeline

Loading Rack Services

- 15 loading lanes (12 active)
- Toptech rack automation
- Midgrade blending
- Ethanol (sequential) blending
- EPA detergent additive systems
- Diesel red dye injections services
- Railcar offloading of Ethanol

Outbound Delivery Modes

- KMEP Las Vegas Terminal to Nellis AFB Terminal 8" pipeline
- KMEP Las Vegas Terminal to McCarran Airport 8" pipeline

Commodities Handled

- EPA ULSD
- CBG (Clean Burning Gasoline)
- Conventional Gas
- JP-8 (Military Turbine Fuel)
- Turbine (Commercial Jet Fuel)
- Ethanol

About 10% of the volume of storage tanks is generally not available for distribution. This is the product located in the bottom (also referred to as "the heels", water settles to the bottom of the tank) of the tank. The appropriate SIP administrator has the authority to allow release of gasoline in the heels of tanks for distribution. This option requires a demonstration of need and has been exercised in Nevada.

Operation of the distribution market is functionally quite simple, but market economics can be complex. The reason is that storing product – maintaining inventory – costs money. The actual fee for storage, like the actual fee for transporting fuels, is relatively small per gallon of product delivered to a retail customer. What can become expensive is related more to the value of the product in the tank. In periods of rising retail prices, product in storage appreciates in value, but when prices are falling, the value of a distributor's inventory decreases. This means that successful distributors must be able to predict general price swings and take advantage of them to the extent possible. If prices are expected to fall, for example, a distributor might want to keep a small inventory. But this, too, represents some level of risk. A refinery or pipeline problem could quickly lead to fuel outages if, for example, only two days of inventory are maintained.

The distribution market, like other petroleum markets, is not regulated economically. This means that decisions about how much inventory to maintain are wholly within the discretion of the distributor and his retailers. Clearly, if the goal is to avoid fuel outages, large inventories are desirable. But there is no way for the State to require distributors to maintain a given quantity of fuel on hand. Who would take the price risk and pay for the lost value of inventory, if prices declined?

How much inventory is available, when a problem occurs is an all-too-frequent question? Some low-cost retail competitors may choose to hold small inventories as a way to give them a cost advantage over major company retail outlets. It seems simple enough to allow them to take the supply risk, but it is also important to recognize that when gas stations start placing signs on their pumps that they are out of gas, a different market mentality ensues. People begin to "top-off" their gas tanks and the demand for gasoline far exceeds normal draw down rates. This occurred in Phoenix in 2003. The consequence is a general supply crisis – panic-buying leads to excessive demand and outages at nearly all gasoline stations. What is not widely understood is that the largest amount of gasoline (and to a lesser extent, diesel) storage capacity in Nevada is in the tanks of automobiles. If customers top-off their tanks, there is not enough supply to keep up with demand in normal times, let alone during a pipeline shutdown.

It should be noted that jet fuel markets operate a little differently. Because airlines and airports work together to ensure adequate supplies of jet fuel, most airports, including McCarran and Reno-Tahoe, have more storage as a fraction of their daily draw down than

gasoline markets do. It is not uncommon for airports to maintain an inventory of a week or more at normal usage rates. Airlines also have the ability to truck in product and to change their fuel loading practices to minimize the loading of fuel at an airport where supplies have been curtailed.

Nevada has one small crude oil refinery that produces primarily asphalt and diesel fuel. The State relies on California refineries for nearly all its transportation fuels and three (3) petroleum product pipelines transport supply from California refining centers to the Las Vegas and Reno fuel markets. A new 400-mile pipeline has been proposed to connect Salt Lake City refineries to southern Nevada consumers, see below. Although total petroleum consumption is low, Nevada's jet fuel consumption is disproportionately high due to demand from airports in Las Vegas and Reno and from two military air installations. The Las Vegas metropolitan area requires the year-round use of a cleaner burning gasoline (CBG) blend, which is low volatility and contains oxygenates, and both the Las Vegas and Reno metropolitan areas require the use of oxygenated motor gasoline during the winter months (Clark County runs Nov 1 – Mar 31 and Washoe County runs Oct 1 – Jan 31).

UNEV Pipeline

The construction of the UNEV petroleum pipeline (Figure 5-4)— a 400-mile, 12-inch buried pipeline that will originate in North Salt Lake, Utah, and ship products to a terminal in Iron County, Utah, and a terminal in North Las Vegas, Nevada — is expected to begin soon. The Final Environmental Impact Study has been posted on the Federal Register and once the U.S. Bureau of Land Management, the lead agency on the project, issues it's Record of Decision, construction of the pipeline will begin. The plan is to begin construction of the pipeline in June 2010 and to have it completely built and operational by early 2011.

The pipeline, which is a common carrier pipeline, will receive product from connected sources in the Salt Lake City area, Wyoming and Montana. The pipeline will initially have the capacity to carry approximately 62,000 barrels per day of petroleum products but will have the capacity of 118,000 barrels per day with connected horsepower. Construction contractors are in place to build the pipeline once the Record of Decision is issued.

Figure 5-4 UNEV Pipeline

The pump station in North Salt Lake City, Utah is complete. The pump station is where product from all the shippers on the UNEV pipeline is received at low pressure and is moved through pumps to increase its pressure, which then enables it to push through the pipeline and travel to the terminal sites. The terminals are the mechanisms that allow the petroleum products to be delivered to the end-users and retail outlets in the area.

UNEV has purchased approximately 30 acres of land to build a terminal in Iron County, Utah. The terminal, which will include a tank farm and a truck loading rack, is about 98 % completed. UNEV has also purchased Musket's neighboring terminal which included about 10 acres and has tied it to the new terminal. All work on the terminal site is expected to be completed by July 2010. This terminal will have the capacity to hold approximately 200,000 barrels.

UNEV has purchased 53 acres of land to build a terminal in the KAPEX area of North Las Vegas, Nevada, newly named the Mountain View Industrial Park. The terminal, which will include a tank farm and truck loading rack, is about 75 % completed. All work on this terminal site is expected to be completed by August 2010. This terminal will have the capacity to hold approximately 330,000 barrels.

The UNEV pipeline will help satisfy the growing market needs in Southern Utah and Southern Nevada. Officials from Holly Corporation and Sinclair believe that the pipeline will help secure an energy future for these areas that will help the economy and everyone's quality of life.

Retail Market

The retail fuel market has not fully recovered to the fuel use levels of 2007 with the exception of Aviation gas. Gasoline is over 9% below 2007 usage levels; Aviation gas has just a little higher consumption than was used in 2007. Jet fuel (commercial) is 13.8% below 2007 levels. Diesel is 6% below 2008 levels, but 6% above 2007 levels. Alternative fuel use in 2009 has increased by 68% over the usage in 2008. The reduced fuel consumption in most cases relates to the economic situation in the State, especially in southern Nevada.

One of the advantages in the reduced fuel usage has been to relieve the pressure on the fuel delivery systems to the State and allow time for construction of a pipeline to deliver fuel to Nevada from another source. The construction of the UNEV pipeline into Nevada will be operational just in time to relieve the possible threat of fuel shortages in the Las Vegas area.

The alternative fuel situation has shown a continuous growth in the State. Ethanol consumption has increased dramatically each year as have biodiesel and compressed natural gas. Propane (LPG) use climbed in 2008 with only a slight reduction of use in 2009. Over 4% of fuel use in the State is an alternative. See Tables 5.1 and 5.2.

Table 5.1 Transportation Fuel (millions of gallons)

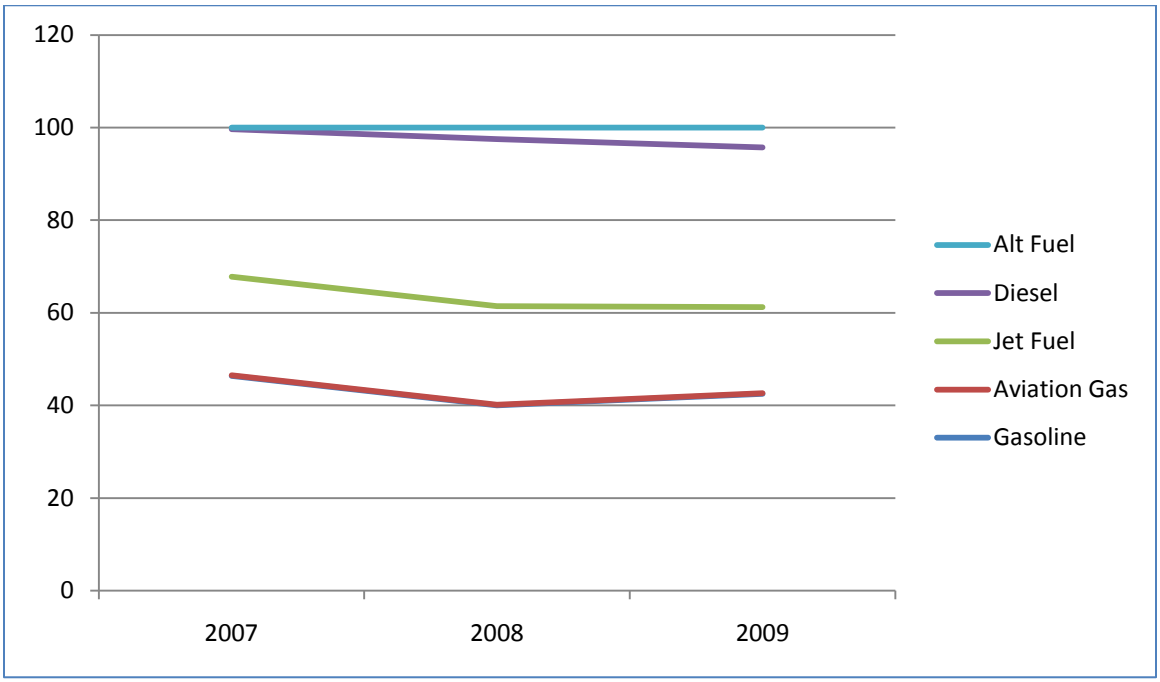
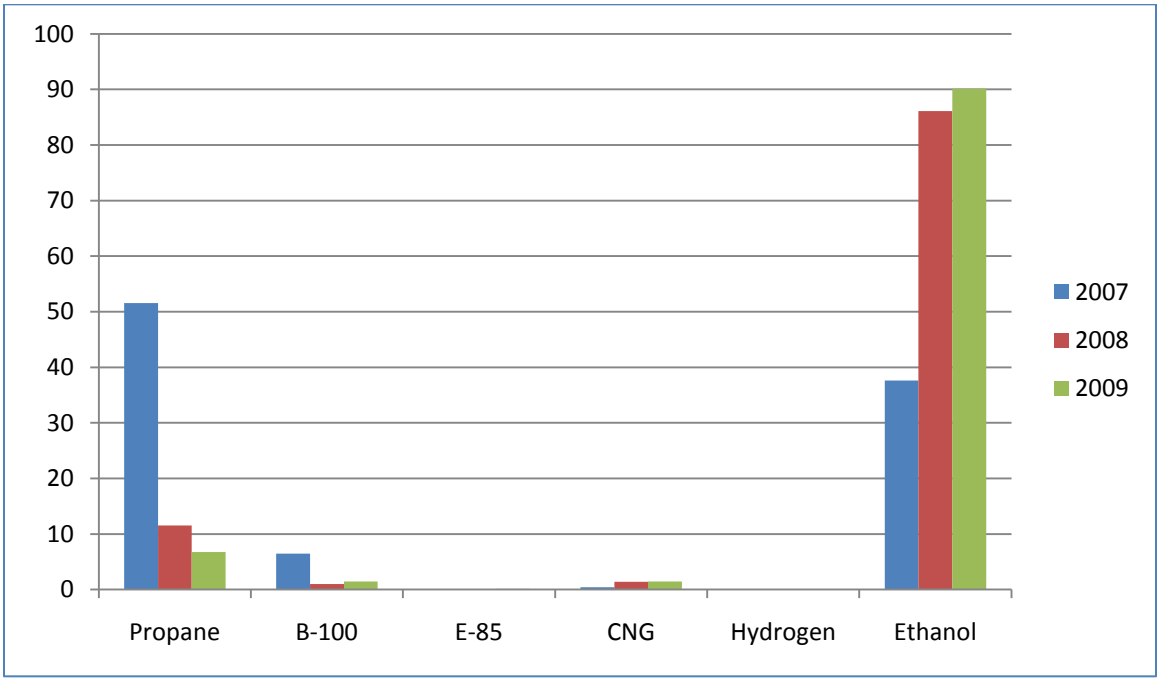


Table 5.2 Alternative Fuel (Millions of gallons)



Transportation Adequacy

The present pipeline systems are adequate as the fuel use is still less than what was used in 2007. With the anticipated completion of the UNEV pipeline in 2011, a recommendation of the Clark County Blue Ribbon Commission, Nevada will have additional source capacity and storage to meet future growth of demand. Fuel available from the Rocky Mountain market should be less costly than the present California market and should act as a price competition that may provide a stabilization catalyst for Nevada fuel costs.

Energy Efficiency/Conservation Opportunities

Market forces drive the price of transportation fuels, which means that they are allocated to customers using price signals. Plenty of fuel generally means that prices at the pump will be relatively low, whereas a fuel shortage usually means that prices will be high.

The most effective conservation tool for transportation fuels may be high gasoline prices. As noted above, the price of gasoline is a relatively complicated mix of what is occurring in four (4) semi-independent markets, markets in which the State of Nevada has very little direct influence. The roles for the NSOE in these markets are to assist in the management of supply interruptions and to provide consumers with information that may help them conserve fuel.

Energy efficiency, as applied to transportation fuels, deals primarily with the fuel efficiency of the automotive fleet. Here the State has very few direct responsibilities because the

federal government is responsible for fuel efficiency through the US Department of Transportation's Corporate Average Fuel Economy (CAFE) standards.

Short-term Actions to Minimize Fuel costs

Short-term conservation opportunities can be divided into actions drivers and the State and local jurisdictions may take action. For the most part, actions taken by drivers will be the most effective, because actions taken by law enforcement authorities are directed first to public safety. Below are some short-term actions you can take to minimize fuel cost:

- Tune your engine according to manufacturer's recommendations,
- Ensure that tire pressure is at least the minimum recommended by the tire manufacturer,
- When possible, avoid long idling times such as early morning warm-up (gasoline engines) or traffic delays,
- Check brakes as recommended by the manufacturer or whenever there are signs or sounds of the brakes rubbing during normal driving,
- Minimize unnecessary travel by carpooling and combining or eliminating trips,
- When accelerating, ensure that speed increases are gradual, except where safety requires a more rapid increase in speed, and
- Take public transportation, when possible.

Long-term Actions to Minimize Fuel Costs

Long-term conservation opportunities are directed at significant changes in life-style or major purchases. They represent the best opportunity for families to minimize the transportation fuel costs.

- Purchase a fuel-efficient automobile,
- Live near your place of work, and
- Choose a life-style and home location so that you can use public transportation.

The list of long-term actions is quite short and obvious. That said, these are fundamental life choices that are not made lightly. The consequence of making these changes, however, is dramatic. Shown below (Table 5.3) is a simple table that illustrates the number of gallons consumed and the cost of gasoline only for an individual who lives originally 35 miles from work and drives a large sport utility vehicle (the calculations assume that gasoline costs $3.00 per gallon, that the SUV gets 15 miles per gallon and the hybrid/diesel gets 45 miles per gallon).

These long-term changes are roughly ten times as effective as the short-term actions in saving fuel and money.

Table 5.3 Annual Fuel Savings by making Life-Style Choices (based on $3.00 per gallon)

Life-Style Change	Gallons Consumed	Cost
Old Commute: 35 miles to work, large SUV	1,213	$3,639.00
Purchase a hybrid or diesel automobile	404	$1,212.00
Move to within 5 miles of work	173	$519.00
Move to within 5 miles of work & purchase a hybrid or diesel automobile	58	$174.00

No maintenance penalty was assigned to the original, high-mileage vehicle, which would further increase the cost of the long commute.

Some states have attempted to encourage conservation with public service advertising (PSA) campaigns. There have been circumstances when PSAs have been very effective, for example, Ad Council sponsored, anti-drunk driving campaign in the middle 1980s. The effectiveness of that campaign, however, was linked to comprehensive and nearly uniform public support from state governments, activist groups and law enforcement agencies. It seems unlikely that a similar coalition can be formed in the near term for conservation of transportation fuels. For this reason, there is no recommendation for a program of PSA's.

Corporate Average Fuel Economy Standard

Corporate Average Fuel Economy (CAFE) is the required average fuel economy for a vehicle manufacturer's entire fleet of passenger cars and light trucks for each model year. It applies to passenger cars and light trucks with a gross vehicle weight rating (GVWR) of 8,500 pounds or less manufactured for sale in the United States. CAFE values are obtained using the same test data generated by the fuel economy tests used to determine the fuel economy estimates for the Guide and labels, but the test results are not adjusted to account for real-world conditions. Instead, the results from the city and highway tests are combined. EPA administers the testing program which generates the fuel economy data and determines the procedures for calculating the fuel economy values for CAFE. The National Highway Traffic and Safety Administration (NHTSA), which is part of the Federal DOT, are responsible for establishing and amending the CAFE standards for trucks. Congress sets the CAFE standards for cars. EPA reports the CAFE results for each manufacturer to NHTSA

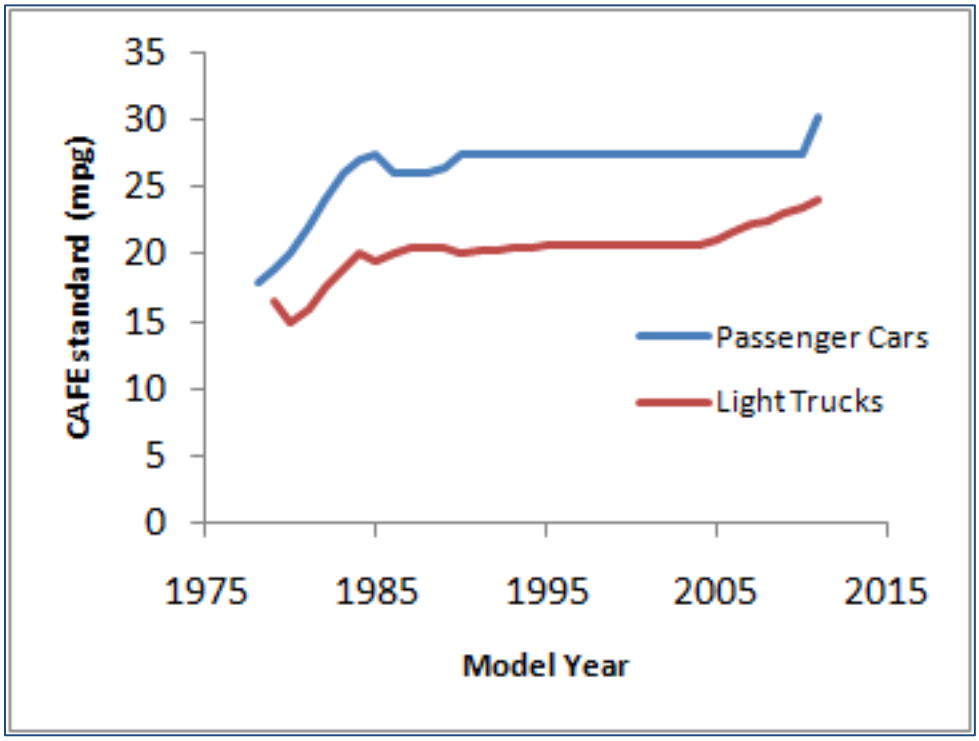
annually, and NHTSA determines if the manufacturers comply with the CAFE standards and assesses penalties as required.

Note: Starting this year with 2011 models, the federal government's fuel-economy standards, which have sat frozen for years, are going to get a big-time thaw—the biggest change since the Corporate Average Fuel Economy (CAFE) law was created in 1975.

The average fuel economy for cars must improve from the current 27.5 mpg, where it has been since 1990, to 37.8 mpg by 2016. The truck standard has to rise from 23.5 mpg to 28.8. This means cars must improve by 37 %, trucks by 23 %. Combined, cars and trucks in 2016 should average 34.1 mpg, up 35 % from the current 25.3 mpg—a jump of 5.1 % per year.

For 2016, expected car-fleet CAFE requirements will range from a low of 34.7 mpg for Jaguar/Land Rover (now owned by Tata) to a high of 40.8 mpg for Suzuki due to the small size of its cars. Porsche would have needed to make the largest increase in mpg; however, the fact that VW absorbed the sports-car company means there's a good chance that Porsche's fuel economy will now simply be part of the conglomerate's overall average. Truck standards are expected to range from 27.2 mpg (GM) to 31.9 mpg (Subaru).

Figure 5-5 CAFE Standards in miles per gallon



CAFE standards in miles per gallon for each model year from 1978-2011. In the early years, standards for the light trucks were optionally distinguished by drive train; only the combined option is shown here.

Disadvantages: As new CAFE standards seek to improve vehicle fuel economy, however, such standards cannot be implemented without impacting U.S. consumers. Some of the major consumer impacts include:

Implementation of new requirements from 2007-2011 will cost American consumers more than $6.71 billion in added vehicle expenses.

Increases in fuel economy will affect the cars being manufactured. Carmakers build lighter and smaller cars that burn less fuel to comply with CAFE standards, which may result in unintended safety consequences for the safety of drivers and passengers.

Since direct injection diesel engines are more fuel efficient, there will probably be more diesel engines available throughout a manufacturer's vehicle line-up; also turbo-charged or super-charged small engines maybe more prevalent in all ranges of vehicles. Present vehicles with V8 engines may have 6 cylinders or 4 cylinders turbo/super-charged direct injected engines.

Chapter VI Nevada State Office of Energy

The Nevada State Office of Energy (NSOE) is responsible for implementing federal energy polices within the State of Nevada. Those policies are established by the US Department of Energy (DOE).

Nevada's state energy policies are established by the Governor and the Legislature. Renewable energy, energy conservation and energy efficiency policies are developed in coordination with the Nevada Renewable Energy and Energy Conservation Task Force (NRS 701.350-701.380). The NSOE implements state energy policies on behalf of the executive branch of government.

Organization

The NSOE currently consists of fourteen positions.

Jim Groth, Director: directly responsible for recommending policies to the Governor. Mr. Groth is also responsible for working to bring energy related businesses to the State to assist in expanding our economic tax base; implements the policies adopted by the Governor and Legislature, manage NSOE activities and represents Nevada's energy interest among regional and national organizations. Mr. Groth's position is state funded.

Tina Burke, Deputy Director: is responsible for assisting the Director in all tasks, and for managing the administrative functions of the office. Mrs. Burke's position is state funded.

Peter Konesky, Energy Program Manager: serves as liaison to the Director of the Division of Emergency Management with respect to agency coordination on energy supply contingencies. He also assists the Director of the NSOE in monitoring electric and natural gas supply resource adequacy, and makes recommendations as necessary to the Director. He monitors and provides support to the State Energy Conservation Plan and assists the Commissioner in formulating the State Comprehensive Energy Plan. He administers the SEP Formula grant, the Clean School Bus USA, and Save Energy Now grants. Mr. Konesky's position is funded entirely by federal funds.

Robert Nellis, Energy Program Manager: Responsible for managing the State Energy Program activities under the American Recovery and Reinvestment Act of 2009 (ARRA). Programs include the Revolving Loan Program, State Buildings, Energy Efficient Schools, Energy Efficient Street Lighting & Traffic Signals, Alternative Fuel Infrastructure, and Energy Related Codes. Mr. Nellis is responsible for developing public-private partnerships to leverage the ARRA programs to further stimulate Nevada's economy beyond the life of the ARRA programs. Mr. Nellis' position is funded entirely with ARRA funds.

Tom Wilczek, Energy Program Manager: serves as program manager for the EECBG block grant and monitors the transference and expenditure of funds. He also manages the NSOE Energy Assurance program grant and makes recommendations as necessary to the NSOE Director. Mr. Wilczek's position is funded entirely by federal funds.

Lorayn Walser, Management Analyst II: Manages LEED Green Building Property Tax abatement program. She assists the Director in developing, adopting and updating regulation for the International Energy Conservation Code, LEED property tax abatement and home energy consumption. She also assists the engineer and management with grant monitoring and reporting as assigned. Mrs. Walser's position is federally funded.

Kevin Johnson, Management Analyst II: works on the ARRA State Energy Program (SEP) and Energy Efficiency and Conservation Block Grant (EECBG). Mr. Johnson manages and review all projects and promulgation of agreements between NSOE and entities as well as assists with federal and State reporting. Mr. Johnson's position is federally funded.

Tara Vogel, Renewable Energy Analyst: Manages the writing of the State Energy Report. Accomplishes various grant tasks as assigned including management of projects including technical assistance, policy compliance, and reporting. Responsible for the States forecasting for Energy needs of the State and projecting how these needs will be met over the short-term and long-term. Lead on State buildings and Schools under SEP ARRA. Ms. Vogel's position is federally funded.

Sean Sever, Outreach Coordinator: coordinates public information campaigns and marketing strategies for the energy office. He disseminates news releases; handles media requests and inquiries from various agencies and groups; serves as point of contact for public comments, input and questions regarding energy; and maintains the NSOE website. He also coordinates community outreach efforts, participates on various committees, educates the public with informational campaigns, provides technical assistance to the office, and monitors energy media stories. Mr. Sever's position is funded entirely by ARRA funds.

Catherine Gowen, Grants and Projects Analyst I: administers, monitors, controls, reviews and assesses grant and contract programs as assigned. She reviews and evaluates applications received for funding and recommends either approval or denial. She is also responsible for tracking funding sources. In addition, she prepares or assists in preparation of applications for federal funding, and submits approved applications to the funding sources. She provides technical assistance to funding recipients and conducts or assists in conducting classes or workshops to provide guidance to applicants and service providers regarding program requirements and regulation, policy and procedure compliance. Ms. Gowen's position is supported entirely by federal funds.

Stephanie Brooks, Accountant Technician I: serves as a custodian of all ARRA grant funding records and is responsible for reporting requirements to the Department of Energy and Government Accountability Office. Mrs. Brooks' position is funded entirely by ARRA funds.

In addition to these eleven positions, NSOE currently has 3 open positions, a Public Service Intern II, a Management Analyst II, and an Administrative Assistant II. These positions are supported entirely by federal funds.

Funding

The NSOE is funded largely by federal grants. To fund the NSOE, grant funds from DOE are transferred to a special federal account held in Nevada's name. When the NSOE needs to access the funds, the office asks the State of Nevada's Controllers Office to request that DOE release the funds to the State of Nevada. Then the Controller's Office puts the funds in the NSOE's budget account. For Fiscal Year 2009 (July 1, 2008 – June 30, 2009) the federal funds were sufficient to cover all operating cost including travel, with the exception of the Director's and Deputy Director's salary.

The federal grants which provide support to the NSOE for fiscal year 09 thru 10 are listed below (Table 6-1).

Table 6.1 Federal Grants Received

Grant	Amount Granted
Appliance Rebate	$2,495,000
ARRA EA	$438,573
ARRA SEP	$34,714,000
EECBG	$9,593,500
SEP Formula	*$192,000

*without match or carryover

Table 6-2 lists the NSOE's funding from other grants.

Table 6.2 Amounts from Other Grants Received

Grant	Activity	Amount Granted
Save Energy Now	Aims to drive a reduction of 25% or more in industrial energy intensity in 10 years	$50,000
Clean School Bus USA - EPA	Retrofit: fitted with a device designed to reduce pollution	$496,000

Federal Projects

Because the NSOE is funded almost entirely by federal grants, the office spends the majority of its time implementing federal programs. In some cases these federal programs overlap with the office's state mandates. Table 6-3 in the State Projects section below outlines the NSOE's state mandates. When the federal programs and the state mandate overlap, the NSOE is able to leverage federal funds to achieve state objectives.

SEP Formula Grant Overview

The primary goal of the SEP Formula Grant is to improve reliability and maintain affordability of energy supplies available for Nevada's residents, businesses and industries consistent with the need to protect the quality of Nevada's environment and human health. The secondary goals are to 1) achieve greater use of energy efficiency and conservation to minimize the need for growth and incremental cost (reflected in the price paid by consumers) of new energy supplies and related delivery infrastructure to serve Nevada's growing population and 2) promote awareness and development of the State's clean, renewable energy resources to increase Nevada's energy supply diversity and decrease its exposure to severe economic risk associated with the extent of dependency on limited supply resources and price volatility of fossil fuels.

Mandatory activities include:

- Lighting Efficiency Standards for Public Buildings
- Promoting Carpools, Vanpools, and Public Transportation
- Incorporating Energy Efficiency Criteria into Procurement Procedures
- Implementing mandatory Thermal Efficiency Standards for New and Renovated Buildings
- Permitting Right Turns at Red Traffic lights and Left Turns from a One-Way Street into a One-Way Street at a Red Light after Stopping

- Ensuring Effective Coordination among Various Local, State and Federal Energy Efficiency, Renewable Energy, and Alternative Transportation Fuel Programs within the State

Also mandatory is the Energy Emergency Plan. For more information on the Energy Emergency Management Plan, see page 178.

ARRA SEP Grant Overview

The State of Nevada will use its Recovery Act SEP funds for a series of clean energy initiatives, including the creation of a new revolving loan fund, building retro-fits, and transportation upgrades. The revolving loan fund will support community-scale and utility-scale renewable energy generation, energy efficiency and conservation projects, and energy saving performance contracting throughout the State. This financial mechanism will create a sustainable program that will provide loans for years to come, helping Nevada promote energy independence while protecting the State's environment.

Nevada also plans to implement energy efficiency retro-fits in state buildings and K-12 schools across the State. More than $16 million will be invested in LED lighting, lighting control, window performance technologies, and renewable energy technologies to reduce energy costs and consumption in these buildings. Nevada will also use its funds to create an energy-efficient traffic signals and street lights program. This program forms a partnership between the NSOE, the Nevada Department of Transportation, Regional Transportation Commissions, and the Nevada Department of Public Safety, to install energy-efficient LED traffic signals and street lights throughout the State, giving priority to high accident rate intersections. This funding will significantly reduce energy consumption and improve safety through greater visibility. Funding will also be provided for the adoption and implementation of the 2009 Residential and Commercial Building Codes.

EECBG Grant Overview

Cities and Counties: The ten (10) largest counties and the ten largest cities, by population, are awarded funding directly by DOE. These grants are independent of any grants of the NSOE and report directly to DOE and GAO on these grants. For the purposes of this program, Carson City County was considered a city. The remaining six (6) counties and nine (9) cities are included in the funding which was received by the NSOE. $3,724,316 was allotted to the cities and $2,104,161 was allotted to the counties using the population as the formula to determine the amount of funding to be allotted to each jurisdiction. The portion of the program that is the responsibility of the NSOE consists of six (6) counties (Esmeralda $115,000;Eurkea $145,000;Lander $530,000;Lincoln $300,000;Mineral $400,000; and Storey $400,000)* and nine (9) cities (Caliente $100,000;Carlin $210,000;Ely $395,000;Fallon $835,000;Lovelock $225,000;Wells $140,000;West Wendover $450,000;Winnemucca $690,000;

and Yerington $300,000)*. These funds may be used for energy efficiency and energy conservation projects, as well as development of renewable energy systems.

*The above funds have been adjusted and reallocated for 2010.

State Projects: The NSOE will be awarded funding under this program to provide energy efficiency, energy conservation and renewable energy projects which will benefit the citizens of the State of Nevada. Projects include:

- Nevada Emergency Vehicle Idle Reduction, $775,809*
- Natural Gas & Electricity Monitoring for State Owned Buildings, $221,720*
- Traffic Signals and Street Lighting, $722,170*
- Contingency Fund for City and County Projects, $1,157,862*
- Workshops, Training and Education to support Energy monitoring, Energy Efficiency and Energy Conservation Measures for State Buildings, $556,090*

*The above funds have been adjusted and reallocated for 2010.

Energy Assurance Grant

$438,573 has been granted to the NSOE to update and implement the State's Energy Assurance Plan. The plan is a document which outlines the structure for monitoring and overseeing energy demand and supply and to intervene, when directed, to ensure a reliable supply of electricity, natural gas, motor vehicle fuels, propane and other heating products to the citizens of Nevada. The detailed work plan provides for updating the existing Energy Emergency Plan to meet current DOE requirements, development of new energy use and disruption tracking systems, incorporating "smart grid" technology in the plan and tracking systems as the technology matures and comes into use in Nevada and development and outfitting of a room capable of handling the staff and personnel required to respond to any energy contingency which may develop through the implementation of the Energy Assurance Plan. This will include tracking computers, communications and associated hardware necessary to maintain data and information flows to decision makers, independent access to communications and data through satellites, backup electrical power to the building and associated furniture and supplies.

Appliance Rebate

Nevada is providing rebates to residents who purchase Energy Star certified refrigerators, freezers, washing machines and dishwashers. Participants must agree to replace and properly dispose of existing appliances with a new Energy Star qualified model. Proof of proper disposal is a requirement of this program. To participate, residents must apply on the appliance rebate website to have funds reserved for their purchase, and then submit the proper documentation after purchasing their equipment to receive their rebate. Rebates will be awarded in the form of a prepaid Visa card.

Wind Powering America

Wind Powering America activities in Nevada; include a wind working group, anemometer loan program, wind maps, a small wind consumer's guide, and state workshops.

Wind Working Group has been formed under Wind Powering America to identify specific state concerns, barriers, and obstacles to wind development in Nevada. The working group is a collaboration of government agencies, nonprofit organizations, businesses, and industries interested in wind development.

The Nevada Anemometer Loan Program has 10, 20-meter tower NRG anemometers on loan with two more that were just bought:

- Two are at Empire Farms 100 miles north of Reno,
- Two are at Eureka County for installation at a mine site,
- One is at Wild Horse reservoir 60 miles north of Elko,
- One is at a farm in Yerington which is south of Carson City,
- One is at a farm in Amargosa valley north of Las Vegas,
- One is 20 miles north of Reno, and
- Four are in the Las Vegas Area.

We have had requests for one at the Eureka County School District, one at a mining site along I80, one for Winnemucca, and one along I80, 60 miles east of Reno. We also have four (4), 50-meter towers in central Nevada that have been installed by the Western Regional Climate Center at the Desert Research Institute in central Nevada and at least four (4) more 20-meter towers that we get data from that are privately owned at a mine site north of Tonopah.

80-Meter Wind Map - The Department of Energy's Wind Program and the National Renewable Energy Laboratory (NREL) published a new wind resource map for the State of Nevada. The new wind resource map shows the predicted mean annual wind speeds at 80-m height. Areas with annual average wind speeds around 6.5 m/s and greater at 80-m height are generally considered to have suitable wind resource for wind development.

State Projects

In addition to its federal responsibilities, the NSOE has certain statutory responsibilities. However, these mandates are largely unfunded. Table 6.3 summarizes the NSOE statutory responsibilities and source of the funds to support the tasks.

Table 6.3 Nevada State Office of Energy

Statutory Responsibilities (NRS 701.150 – 701.230 & NRS 416.030)

NRS	Description	State Funding Provided	Federal Funding Provided
701.150	Director's responsibilities	½ Director's salary	0
701.160	"Status of Energy in Nevada Report"	0	Yes, SEP Formula Grant
701.170	Administration of gifts and grants Adoption of Regulation Execution of research contracts and cooperative agreements Participation in or creation of any non-profit corporation pursuant to Chapter 82 of NRS		0
701.180	Acquire & Analyze information on energy and to the supply, demand and conservation of its resources Follow the status of solar energy systems incentive program an wind energy system demonstration program Coordinate with The Authority, Consumer Affairs, PUCN	0 (all activities)	Yes, SEP Formula

	Review and evaluate information which identifies trends and permit forecasting of the energy available to the state Develop demand forecast for 5, 10 & 20 years Identify amount of energy available to meet demand Implications of forecast on demand & supply Sources of renewable energy available & effects Solicit and serve the as the point of contact for grants and other money from the Federal Government Study means of reducing wasteful, inefficient, unnecessary or uneconomical uses of energy Develop a comprehensive program for retrofitting public buildings with energy efficient measures Make determinations pursuant to NRS 111.239 or NRS 278.0208 within 30 days of receiving a request Carry out all other directives concerning energy that are prescribed by the Governor		
701.215	Prepare "Energy Reduction Plan" for state buildings	0	Yes, SEP Formula

	Reduce grid based energy purchases for state owned buildings by 20% by 2015		
701.230	Prohibit elec. resist. heating in Clark & Washoe counties	0	0
416.030	Support for Energy Emergency Preparation of Energy Emergency Planning	0	Yes, SEP Formula Grant and EA Grant

Status of Energy Report

To develop this report, the NSOE surveys the State's electric utilities, natural gas purveyors, and liquid fuel suppliers. This information is combined with information contained in NV Energy's Integrated Resource Plans, the Nevada Renewable Energy Conservation Task Force' Annual Reports, and a summary of the reports to and from the U.S. Department of Energy.

Administration of Grants / Adoption of Regulations / Bond Assistance

The NSOE administers grants and sub-grants that are issued to entities both in and out of the State. If federal funds are used, quarterly and semi-annual reports are made to the agency that supplies the funds. If state funds are used, status reports are provided in the Status of Energy in Nevada report.

The NSOE is also responsible for adopting the regulations necessary to implement legislative mandates. Descriptions of these activities are provided elsewhere in this report.

Acquire and Analyze Information on Energy

During the course of its activities, the NSOE acquires a great deal of information. This information comes from a variety of sources.

General renewable energy, energy conservation and energy efficiency information is acquired from the Renewable Energy and Energy Efficiency Authority and NVE. Geothermal information is acquired from the Division of Minerals and the Great Basin Center for Geothermal Energy (not the Desert Research Institute.)

Information about fossil fuel-based electricity, energy conservation and energy efficiency comes from NVE, the PUCN, and the State's electric cooperatives, municipalities and general improvement districts. Natural gas information is provided by NVE and SWG. Transportation fuels data is gathered from Kinder-Morgan.

Comprehensive State Energy Plan

The Comprehensive State Energy Plan by federal definition is the master plan and annual plan that are part of the SEP Formula grant funding application and is subject to review with the Governor every three years by the Secretary of Energy.

State Energy Reduction Plan for State-Owned Buildings

The NSOE is the lead agency and central point of contact for the Energy Reduction Plan for State Government buildings. In that capacity, the NSOE must established the standards for energy conservation and develop the State Energy Reduction Plan.

Prepare Petroleum Allocation & Rationing Plan

This plan is part of the DOE's responsibilities given to the State under the SEP Formula grant and is an integrate part of the Energy Emergency Plan and Energy Assurance Plan that the NSOE is required to prepare. NRS 701.210 gives the responsibility to the Energy Commissioner which conflicts with the federal grant.

Prepare an Energy Reduction Plan for State Buildings

This mandate requires the NSOE to develop a plan; a 20% reduction in grid-based electrical energy consumption by 2015 for state owned buildings.

Renewable Energy Tax Abatements

Tax abatements are one of a State's principal economic tools. Good economic tools balance the revenue loss-gain equation ensuring that the interests of the State and the counties are both met over the lifetime of the project. Nevada's renewable energy and transmission tax abatement program provides two types of abatements; local sales and use tax, and a property tax.

The partial local sales and use tax abatement includes:

- Is available for three (3) years following the date of approval
- Purchaser is only required to pay sales and use taxes imposed in Nevada at the rate of 2.6% (effective through June 30, 2011)
- Purchaser is only required to pay sales and use taxes imposed in Nevada at the rate of 2.25% (effective July 1, 2011 – Jun 30, 2049)
- Purchases is the facility owner, contractor, and/or the subcontractors who purchase taxable materials (related to the construction of the facility or on behalf of the facility owner) and report and remit tax to the Nevada Department of Taxation
- All materials subject to the general sales and use tax laws that are associated and integral to the facility will be eligible for the abatement

The Partial Property Tax Abatement includes:

- Is available for 20 fiscal years immediately following the date of approval
- Is equal to 55% of the taxes on real and personal property payable by the facility each year

Prepare a Green Building Standard

During 2006, the NSOE adopted the LEED Green Building rating standard. AB 621 was passed by the 2007 Nevada Legislature, and regulations (NAC 701A .010 - 701A.290) were adopted in order to establish the eligibility and application process for partial property tax abatement. As of December 31, 2009 the NSOE has approximately 33 applications for the green building program.

Table 6.4 Certificate of Eligibility and Applications for 2009

Certificate of Eligibility Issued	Applications Registered with NSOE
Palazzo Resort	3893 Howard Hughes Parkway
Western America Commerce Center	Durango Commons Office Building Two
Somersett Town Center	The Shops at Summerlin Centre
Venetian	Courtyard – Summerlin
Boyd Shared Services Laundry Facility	Residence Inn
United Construction	Barnes & Noble
MGM ARIA Hotel Tower	Harley Davidson Financial
MGM ARIA Convention Center	Faciliteq
MGM ARIA East Podium	Westin Casuarina
MGM Vdara Condominium/Hotel	Cashman Equipment
MGM Crystals Retail	Harrah's / Cesar's Tower
MGM Veer Towers	Palazzo Condominiums
MGM Mandarin Oriental	MGM Harmon Hotel & Spa
Molasky Corporate Center	Fountainebleau
JC Penney Reno Distribution Center	Aquarius Apartments Phase Two 12/30

Lexus of Las Vegas	302 E. Carson Street
	YWS Office Building
	Bellimo Controls
	Lexus of Henderson
	Sam's Town
	Sun Coast Hotel
	Orleans Hotel & Casino
	Sunrise Hospital
	Southern Hills Hospital
	Mountain View Hospital
	FedEx Las Vegas
	Levi's Henderson Distribution Center
	WMS Gaming

Adopt regulations for Building Energy Conservation

The 2006 International Energy Conservation Code (IECC) has been adopted. Along with the newly created (2009 Legislative Session) Renewable Energy and Energy Efficiency Authority, NSOE is working toward adoption of the 2009 IECC. ARRA funding has been provided for the adoption process which will include education for stakeholders in the building industry, as well as local government building officials. The SEP Formula grant activities also cover this area of responsibility.

Prohibition of Electric Resistance Heating in Clark & Washoe Counties

The office handles approximately 6-10 requests a year. Most recent requests are for businesses. This prohibition should be eliminated and leave it up to each jurisdiction to decide if electric resistance heating is something they want.

Energy Emergency Management Planning

The NSOE is in charge with the responsibility of maintaining a current energy emergency response plan. The plan has established roles for the energy office staff as well as a series of protocols to be used in working toward the declaration of an energy emergency by the

Governor. The NSOE has been designated by the Governor as the office to coordinate all functions in the event of an energy emergency, and has been assigned responsibilities under the State Comprehensive Emergency Management Plan's Emergency Support Function #12 ("energy annex") by the Nevada Division of Emergency Management. These responsibilities are expected to be supported on an on-going basis, and will include review and revision of the plan, as appropriate. This is a mandatory function specified by the DOE in the SEP Formula grant.

Public Works Board Regulation R134-06

The NSOE is part of the SPWB committee that reviews proposals to certify which companies will be allowed to do Performance Contracts for energy conservation.

Appendix

Governor's Renewable Energy Executive Orders

In 2007 to 2010, Governor Gibbons issued five executive orders, these executive orders are:

1) Encouraging the Development of Renewable Energy Resources in Nevada (February 16, 2007)
2) Establishing the Nevada Climate Change Advisory Committee (April 10, 2007)
3) Establishing the Nevada Renewable Energy Transmission Access Advisory Committee (RETAAC)-Phase I (MAY 9, 2007)
4) Establishing the Nevada Renewable Energy Transmission Access Advisory Committee (RETAAC) – Phase II (June 12, 2009)
5) Establishing the Nevada Economic Development Inter-Agency Task Force (April 7, 2010)

The executive orders and press releases are posted at (**http://gov.state.nv.us/GibbonsEnergy/**)

Department of Energy Letter

Department of Energy
Washington, DC 20585

May 19, 2010

Jim Groth
Director
Office of the Governor
Nevada State Office of Energy
755 North Roop Street, #202
Carson City, NV 89701

Dear Mr. Groth:

Your team was kind enough to spend time with us earlier this month to discuss your American Recovery and Reinvestment Act State Energy Program projects. We know an hour is a lot to ask during this busy time, and we appreciate it.

I was particularly pleased to hear of the great successes Nevada has achieved to date. Your program metrics tell the story, as Nevada is in a small group of states that have 100 percent of their award through the NEPA process and 75 percent or more of those funds already obligated. At this rate, Nevada is on track to exceed the program's June obligation goals and to do so well in advance of the deadline. These accomplishments are a testament to your team's strong planning and management. DOE applauds Nevada's State Energy Office for your success and commends your hard work. We look forward to hearing about Nevada's outstanding record of Recovery Act expenditures.

If we can be of any assistance in supporting your continued success, please do not hesitate to let us know.

Keep up the good work.

Mark Bailey
Director, State Energy Program

cc: Robin Reedy, Chief of Staff
Assemblywoman Debbie Smith
Senator Michael Schneider

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Glossary of Acronyms, Terms, Definitions & Conversion Factors

Glossary of Acronyms and Terms

ACLM – Air-Conditioning Load Management

APS – Arizona Public Service

bbl/day – Barrels per day

Bcf – Billion cubic feet

Bcf/d – Billion cubic feet per day

BLM – Bureau of Land Management

BPA – Bonneville Power Administration

CAFÉ – Corporate Average Fuel Economy

CAISO – California Independent System Operator

CBG – Clean Burning Gasoline

CCSN – Community College of Southern Nevada

CFR – Code of Federal Regulations

CHP – Combined Heat and Power

COB – California/Oregon Border

CREPC – Committee on Regional Energy Policy Coordination

DSM – Demand Site Management

Energy Star – Energy efficient equipment, appliances and structures that meet federal guidelines

EPA – Environmental Protection Agency

EVAMP – East Valley Master Plan

FOCUS – Facility Operator Certification for Utility Systems

GGE – Gasoline Gallon Equivalent

GWh – Giga Watt hours

HVAC – Heating Ventilation and Air-Conditioning

IPC – Idaho Power Company

IPP – Independent Power Producer

IRP – Integrated Resource Plan

Jet-A – Commercial Aircraft Turbine fuel

JP-8 – Military Turbine fuel

kV – kilo Volts or one thousand volts

kWh – kilo Watt hours

LADWP – Los Angeles Department of Water and Power

LDC – Local Distribution Company

LED – Light Emitting Diode

LEED – Leadership in Energy and Environmental Design

LLC – Limited Liability Corporation

LNG – Liquid Natural Gas

MAP – Management Assistance Partnership

mcf – Thousand cubic feet

mmBtu – Million BTU

mmcf – Million cubic feet

mmscf – Million standard cubic feet

MW – Mega Watt

MWh – Mega Watt hour

NAS – Naval Air Station

NDEP – Nevada Division of Environmental Protection

NGA – National Governor's Association

NHTSA – National Highway Traffic Safety Administration

NRS – Nevada Revised Statutes

NSHE – Nevada System of Higher Education

NSO – Nevada Solar One

NSOE – Nevada State Office of Energy

NVEN – NV Energy North

NVES – NV Energy South

PC – Portfolio Credits (also, personal computer)

PG&E – Pacific Gas & Electric

PL – Public Law

PPA – Power Purchase Agreement

PS – Portfolio Standard

PSA – Public Service Announcement (also, power supply assessment)

PUCN – Public Utility Commission of Nevada

PV – Photo-Voltaic

REA – Rural Electrification Administration

REC – Renewable Energy Credit

RETAAC – Governor's Nevada Renewable Energy Transmission Access Advisory Committee

RFP – Request for Proposal

RFQ – Request for Qualifications

RPS – Renewable Portfolio Standard

RUS – Rural Utility Service

SAM – Supply Adequacy Module

SCE – Southern California Edison

SEER – Seasonal Energy Efficiency Ratio

SIP – State Implementation Plan

SRP – Salt River Project

SUV – Sport Utility Vehicle

SWIP – Southwest Inter-tie Project

UEPA – Utility Environmental Protection Act

U.S. – United States

U.S.C. – United States Code

VARS – Valley Area Routing & Sighting

WAPA – Western Area Power Administration

WECC – Western Electricity Coordinating Council

WGA – Western Governors Association

WIEB – Western Interstate Energy Board

WIRAB – Western Inter-connection Regional Advisory Body

WPEA – White Pine Energy Associates

WPES – White Pine Energy Station

Definitions

British thermal unit (Btu) is the amount of energy in the form of heat which will raise the temperature on one pound of water one degree Fahrenheit. One Btu is equal to 252 calories.

Calorie is the amount of energy in the form of heat, which will raise the temperature of one gram of water one degree Centigrade.

Coal is measured in tons.

Cooling degree days are relative measurements of outdoor air temperature and are obtained by subtracting an established base temperature of 65 degrees Fahrenheit from the mean daily temperature.

Energy is the ability to do work. It is stored in various forms, including chemical energy in biomass, coal and oil, nuclear energy in uranium, and gravitational energy in water used in hydroelectric plants, the wind and the sun.

Heating degree days are relative measurements of outdoor temperature and are obtained by subtracting the mean daily temperature from an established base temperature of 65 degrees Fahrenheit.

Petroleum products are measured in either gallons or barrels. A barrel contains 42 gallons.

Natural Gas is measured in either Mcf (1,000 cubic feet) or in therms. One Mcf contains approximately ten therms or one million Btu.

Watt is a unit of power, or rate of energy delivery, of one joule per second, or equivalently, one ampere of electric current delivered across a potential of one volt.

Wood is usually measured in either tons or cords. A cord is an amount of stacked wood measuring 8 feet x 4 feet x 4 feet. The weight of a cord of wood varies according to the type of wood and its moisture contents, but is estimated at 1.5 to 2 tons. A face cord is 8 feet x 4 feet x 16 inches. Common usage is three face cords to a full cord.

Conversion Factors

Average Energy Content of Various Fuels

1 kilowatt hour of electricity……..3,413 Btu

1 cubic foot of natural gas……1,008 to 1,034 Btu

1 therm of natural gas…….100,000 Btu

1 gallon of liquefied petroleum gas (LPG)…….95,475 Btu

1 gallon of crude oil…….138,095 Btu

1 barrel of crude oil……...5,800,000 Btu

1 gallon of kerosene or distillate oil……...135,000 Btu

1 gallon of middle distillate or diesel fuel oil……...138,690 Btu

1 gallon of residual fuel oil……..149,690 Btu

1 gallon of gasoline……125,000Btu

1 gallon of ethanol……84,4000 Btu

1 gallon of methanol……..62,800 Btu

1 gallon of gasohol (10% ethanol, 90% gasoline)…….120,900 Btu

1 pound of coal……8,100 to 13,000 Btu

1 ton of coal……..16,200,000 to 26,000,000 Btu

1 ton of coke…….26,000,000 Btu

1 ton of wood…….9,000,000 to 17,000,000 Btu

1 standard cord of wood……..8,000,000 to 24,000,000 Btu

1 face cord of wood……6,000,000 to 8,000,000 Btu

1 pound of low pressure steam (recoverable heat)…….1,000 Btu

Measurement Conversion

1 short ton = 2,000 pounds = 6.65 barrels (crude oil)

1 metric ton = 2,200 pounds

1 barrel (bbl) = 42 gallons = 5.615 cubic feet = 159 liters

1 Mcf = 1,000 cubic feet

1 therm = 100,000 Btu

1 thousand Btu (KBtu) = 1,000 Btu

1 million Btu (MMBtu) = 1,000,000 Btu

1 quad = 1,000,000,000 MMBtu

1 kilowatt hour (kWh) = 1,000 watt hours

1 megawatt hour (MWh) = 1,000 kWh or 1,000,000 watt hours

1 gigawatt hour (GWh) = 1,000 MWh or 1,000,000,000 watt hours

1 gallon = 4.524 pounds liquefied petroleum gas

1 standard cord of wood = 8 feet x 4 feet x 4 feet = 125 cubic feet = approx. 4,000 lbs.

1 face cord of wood = 8 feet x 4 feet x 16 inches = 42.7 cubic feet = approx. 1,333 lbs.