
# Clark County Department of Air Quality
# Ozone Advance Program
# Progress Report

**July 2016**

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# List of Acronyms and Abbreviations

## Acronyms

| | |
|---|---|
| AVERT | Avoided Emissions and Generation Tool |
| DAQ | Clark County Department of Air Quality |
| EPA | U.S. Environmental Protection Agency |
| GOE | Governor's Office of Energy |
| NAAQS | National Ambient Air Quality Standard |
| NDOT | Nevada Department of Transportation |
| NEI | National Emissions Inventory |
| NRS | Nevada Revised Statute |
| RPS | Renewable Portfolio Standard |
| RTC | Regional Transportation Commission of Southern Nevada |
| WESTAR | Western States Air Resources Council |
| WRAP | Western Regional Air Partnership |

## Abbreviations

| | |
|---|---|
| CO | carbon monoxide |
| $CO_2$ | carbon dioxide |
| MW | megawatt |
| MWh | megawatt-hour |
| NOx | nitrogen oxides |
| ppb | parts per billion |
| $SO_2$ | sulfur dioxide |
| tpy | tons per year |
| VOC | volatile organic compounds |

# 1. Introduction

The Clark County Department of Air Quality (DAQ) enrolled in the U.S. Environmental Protection Agency (EPA) Ozone Advance program on June 12, 2013. The program's goals are to ensure that maintenance and attainment areas offer continued health protection, to better position those areas to remain in attainment, and to efficiently direct available resources toward actions to address ozone and its precursors.

DAQ appreciated the comments and ideas from EPA Region 9 staff in preparation of the development of our path forward for 2016 under the Ozone Advance program. The department is actively exploring some of the suggestions and ideas outlined in the comment letter while other projects are investigated, although time constraints prevented their implementation. DAQ's primary focus in 2016 is public outreach, e.g., creation of a public outreach website and possible participation in the Air Quality Flag Program. Future projects may include the use of Federal Highway Administration funds to acquire more hybrid or electrical vehicles. EPA staff comments provided several ideas to investigate, some of which may be implemented in time for inclusion in the 2017 update of this plan.

## Current Attainment Status

Clark County is currently in attainment/unclassifiable for the 2008 8-hour ozone standard, but may be designated as a nonattainment area for the 2015 ozone standard. By law, the state of Nevada uses hydrographic areas to define airsheds for regions of attainment, unclassifiable, and nonattainment.

The Clark County ozone design value history in Figure 1-1 shows a downward trend from 2007 through 2011; then design values increased in 2012, 2013, and 2014. However, the design value went down in 2015. The design value for 2013, 2014, and 2015 was 75 parts per billion (ppb)**,** which is above the 2015 standard of 70 ppb.

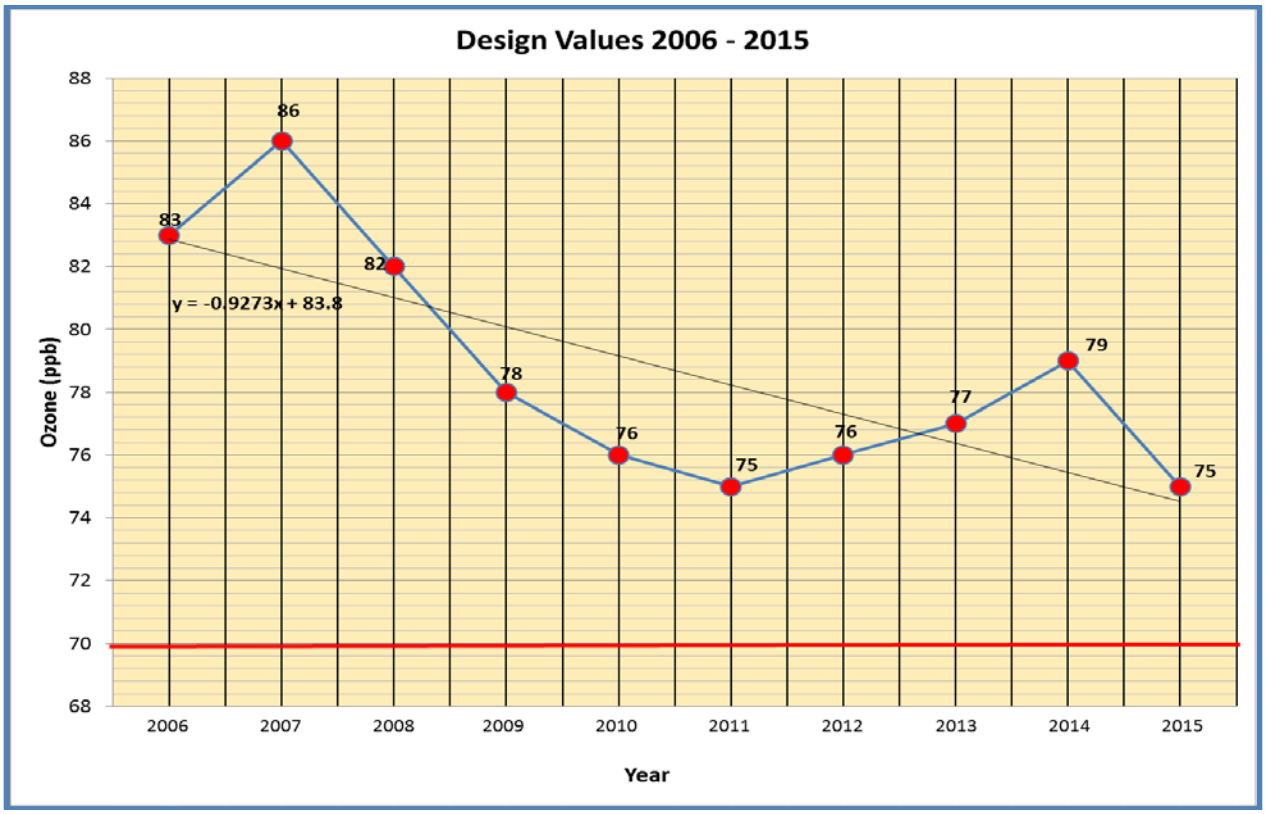



**Figure 1-1. Ozone Design Value History.**

## Impacts of Meteorological Conditions on Ozone Concentrations

High ozone events in Clark County generally occur during weather patterns characterized by high pressure. Regional wind fields are also influenced by the local terrain, which channels winds through passes, slopes, and valleys. Such slope-and-valley wind systems are local, thermally-driven flow circulations created in complex terrain like the Las Vegas Valley. These systems directly affect the transport and dispersion of pollutants.

According to historical data collected at McCarran International Airport,[1] the highest average wind speeds in Clark County occur in the early spring (April–May), the same months that ozone concentrations increase rapidly. Figure 1-2 shows average wind speeds during the year.

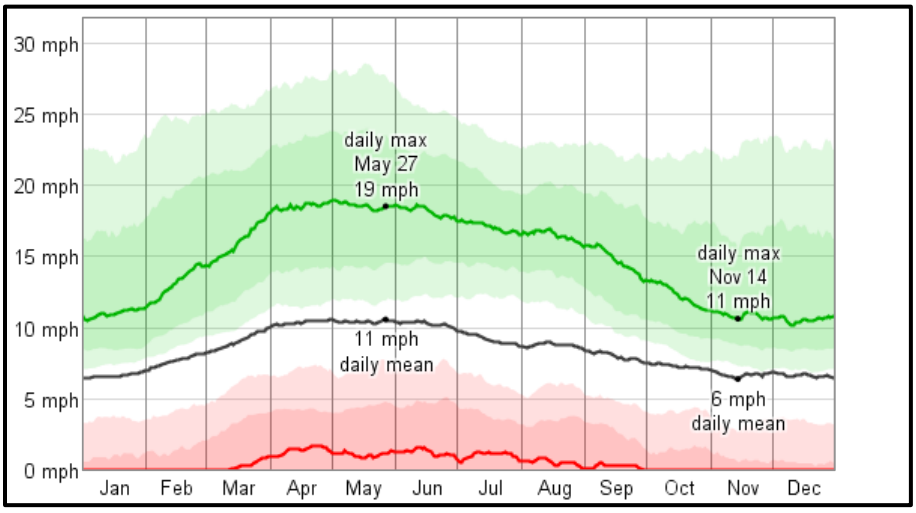



**Figure 1-2. Average Wind Speeds at McCarran (1989–2012).**

The figure delineates average daily minimum (red), maximum (green), and average (black) wind speeds with percentile bands: the inner band shows the 25$^{th}$–75$^{th}$ percentile, while the outer band shows the 10$^{th}$–90$^{th}$ percentile.

## Wind Directions over the Entire Year

The most common wind direction in the Las Vegas Valley is out of the southwest, from which the wind blows 22 percent of the time; other common wind directions are from the south (21 percent) and the west (13 percent). The least common wind directions are from the southeast and northwest (4 percent each). The same data shows winds mostly come from the south-southwest.

Figure 1-3 shows the fraction of time the wind blew from various directions during the year. Values do not add up to 100 percent because the wind direction is undefined when the wind speed is zero.

[1] http://weatherspark.com/averages/30697/Las-Vegas-Nevada-United-States

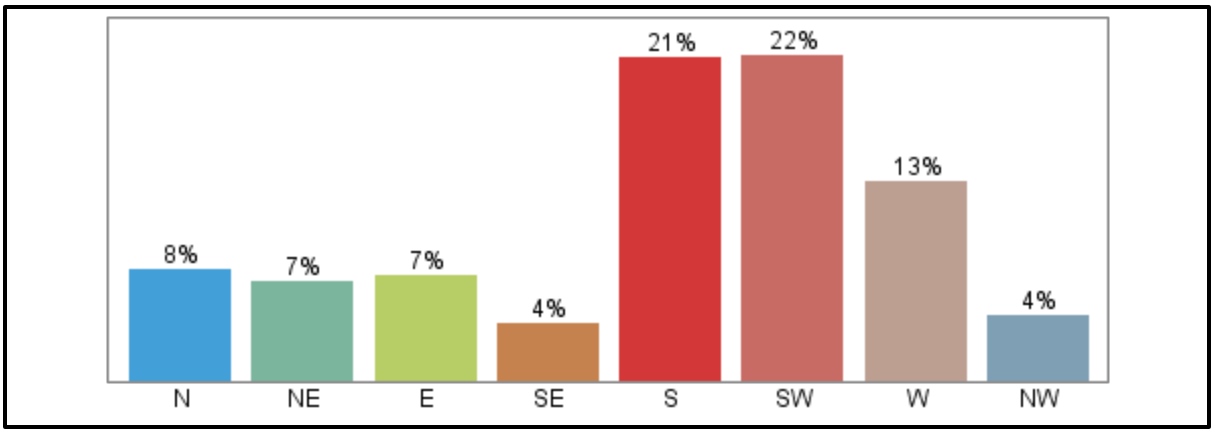



**Figure 1-3. Wind Direction over the Entire Year.**

### Fraction of Time Spent with Various Wind Directions

Figure 1-4 shows the fraction of time the wind blew from various directions on a daily basis. As with Figure 1-3, the stacked values do not always add up to 100 percent because the wind direction is undefined when the wind speed is zero.

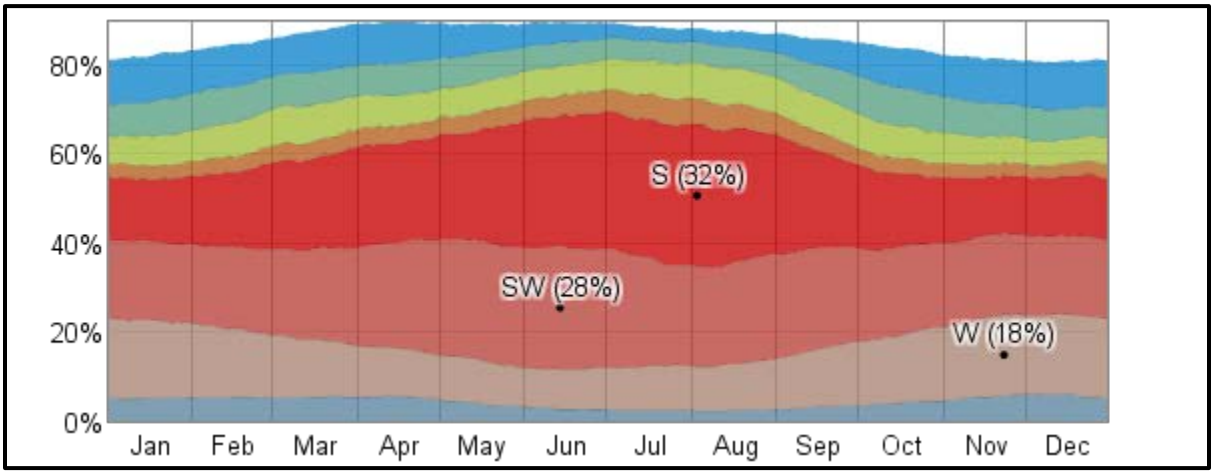



**Figure 1-4. Fraction of Time of Wind Directions on a Daily Basis.**

The northwest quadrant of the Las Vegas Valley typically experiences the highest levels when ozone concentrations in Clark County are elevated. Stagnant conditions over California's population centers often increase ozone concentrations; the predominant wind flow can transport this ozone to southern Nevada, contributing to exceedances throughout the Clark County network. Figure 1-5 shows the predominant airflow in Clark County, which generally enters from the south (following I-15) and exits to the northwest (following U.S. Highway 95).

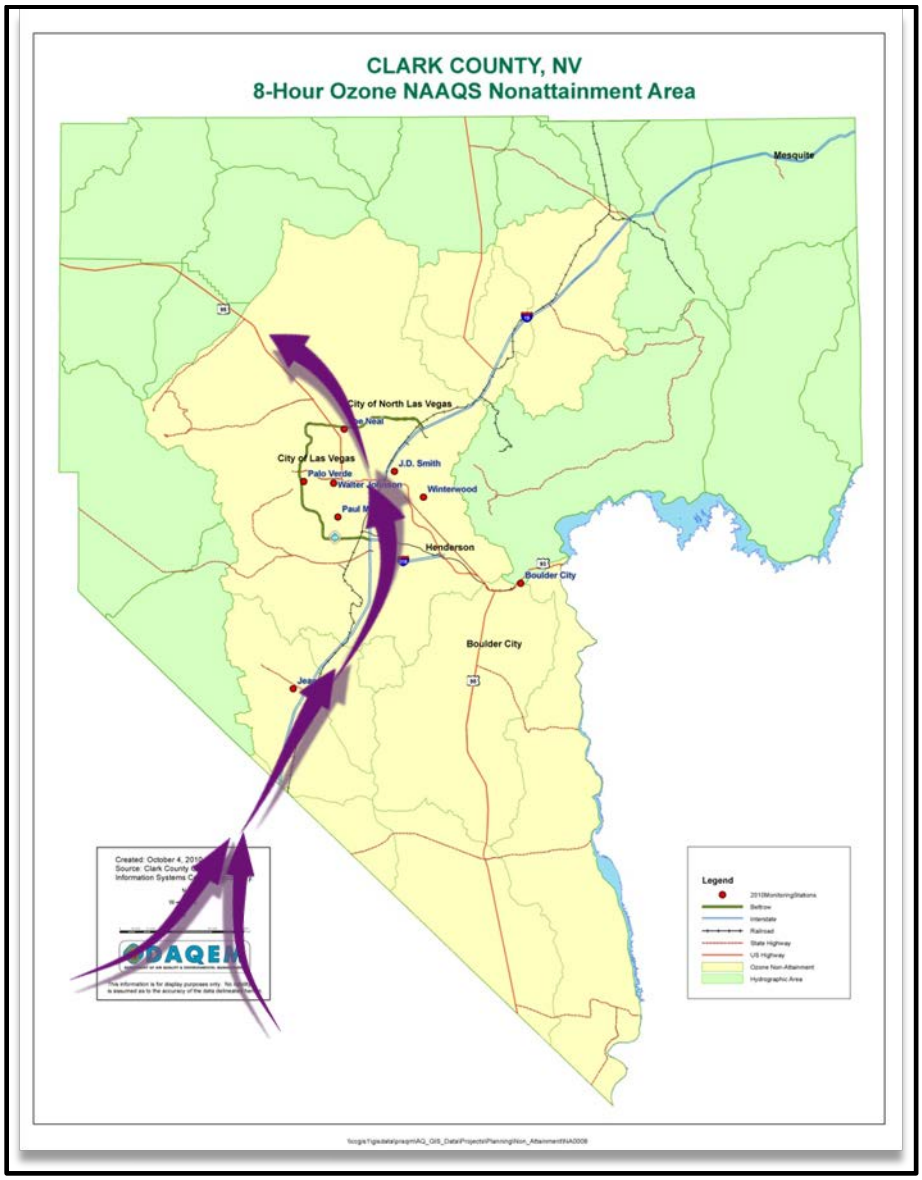



**Figure 1-5. Airflow in Clark County.**

DAQ studies have confirmed ozone transport from Southern California into Clark County; however, the contribution from local versus transported ozone is difficult to quantify without extensive regional modeling analyses.

## Ozone Health Effects and Sources

Ozone is a gas composed of three oxygen atoms that occurs both in Earth's upper atmosphere (stratosphere) and at ground level (troposphere). Ozone in the stratosphere, which extends upward from 6 to 30 miles, occurs naturally and protects life from harmful ultraviolet rays. In the troposphere, ozone is a pollutant that poses a significant health risk, especially for children, the elderly, and people with chronic illnesses. It may also damage crops, trees, and other vegetation.

Ground-level ozone is not usually emitted directly into the air, but formed through chemical reactions between nitrogen oxides ($NO_x$) and volatile organic compounds (VOCs) in the presence of sunlight. Vehicle exhaust, emissions from commercial and industrial sources, gasoline vapors, chemical solvents, and natural sources emit $NO_x$ and VOCs. Since sunlight is an important formative factor, ozone pollution is usually a summertime problem.

Natural (biogenic) sources, mostly trees, produce much of the VOCs (also called hydrocarbons) that contribute to ozone production in Clark County. In cities, man-made (anthropogenic) VOCs also contribute to ozone production. Sources of anthropogenic VOCs include unburned gasoline fumes from gas stations and cars, industrial emissions, and consumer products such as paints, solvents, and the fragrances in personal care products.

The reaction of atmospheric nitrogen at the high temperatures produced when fuels are burned creates $NO_x$. Power plants, highway vehicles (the major contributor in urban areas), and off-road equipment (e.g., construction equipment, lawn care equipment, boats) are major sources of $NO_x$. Other contributions come from small, widely distributed sources ("area sources"), such as fires and natural gas-fired hot water heaters.

Ozone can irritate lung airways and cause an inflammation that resembles sunburn. Symptoms include wheezing, coughing, pain when taking a deep breath, and difficulty breathing during exercise or outdoor activities. Children and those with respiratory problems are particularly susceptible, but even healthy people who are active outdoors can be affected. Repeated exposure to ozone pollution over many months may cause permanent lung damage. Even when concentrations are low, ozone pollution may aggravate asthma, reduce lung capacity, and increase susceptibility to respiratory illnesses like pneumonia and bronchitis.

Ground-level ozone may also affect plants and ecosystems. It interferes with the ability of plants to produce and store food, which makes them more susceptible to disease, insects, harsh weather, and other pollutants. This in turn can impact crop and forest yields. In addition, ozone can damage the leaves of trees and other plants.

Ozone source categories include:

**Biogenic**: Trees and other natural sources.

**Mobile**: Vehicles traveling on paved roads, e.g., cars, trucks, buses, and motorcycles.

**Nonroad**: Vehicles not traveling on paved roads, e.g., construction, agricultural, and lawn care equipment, motorboats, and locomotives.

**Point**: "Smokestack" sources, such as industry and utilities.

**Area**: VOC sources not falling into the above categories, including gas stations, dry cleaners, print shops, and consumer products. For $NO_x$, this includes forest and residential fires, natural gas-fired hot water heaters, etc.

# 2. Emission Sources

DAQ submits emission inventory data to EPA for stationary, area, on-road, and non-road sources. Most of this is based on local data, from figures submitted by source facilities or estimates made using population data. Biogenic emissions are calculated using the Model of Emissions of Gases and Aerosols from Nature (i.e, MEGAN model).

EPA includes these emission inventories in the National Emissions Inventory (NEI), which contains data not only for criteria pollutants, but also for hazardous air pollutants (some of which are VOCs). The following sections focus on $NO_x$ and VOCs, considered the precursors for ozone; 2011 data is used because EPA has not yet certified DAQ's 2014 data. Tables 2-1 and 2-2 provide $NO_x$ and VOC data for four source categories: stationary, on-road, non-road sources, and biogenics. (Figures 2-1 and 2-2 illustrate the data in these tables.) The stationary source group includes point and area sources. Biogenic emissions contribute substantially to VOC emissions, so they are listed as a separate category.

**Table 2-1. $NO_x$ Emissions for 2011**

| Source Category | 2011 |
|---|---|
| Stationary | 8,542 |
| On-road | 28,965 |
| Non-road | 13,654 |
| Biogenic | 555 |
| **TOTAL** | **51,716** |

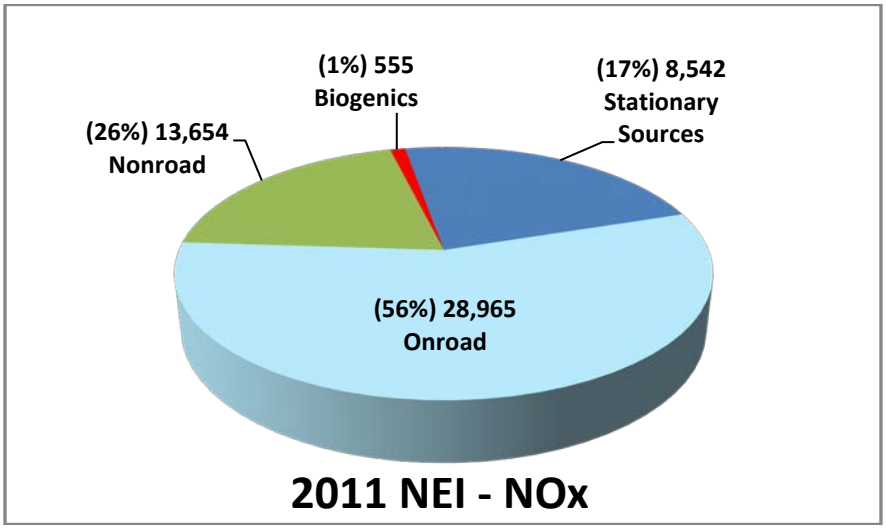



**Figure 2-1. $NO_x$ Source Apportionment.**

**Table 2-2. VOC Emissions for 2011**

| Source Category | 2011 |
|---|---|
| Stationary Sources | 16,592 |
| Onroad | 12,176 |
| Nonroad | 8,838 |
| Biogenic | 146,405 |
| **TOTAL** | **184,010** |

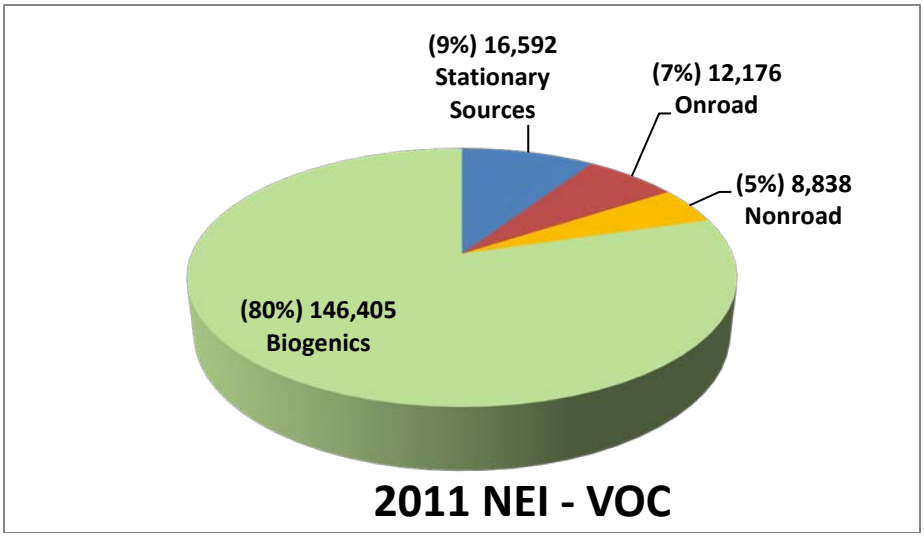



**Figure 2-2. VOC Source Apportionment.**

## Emissions and Source Categories

Tables 2-3 and 2-4 list TIER 1 $NO_x$ and VOC emission data, respectively, for 2011. Vehicles (on-road and non-road) make up the two highest categories of $NO_x$ emissions, accounting for about 82% of the 2011 total in Clark County. Biogenics make up the highest category of VOC emissions, accounting for 80 percent of the 2011 total. Solvent utilization is the second-highest category, followed by on-road vehicles.

**Table 2-3. $NO_x$ Emissions in 2011**

| TIER 1 NAME | NOx | % of Total |
|---|---|---|
| Highway vehicles | 28,965.50 | 56.01 |
| Off-highway | 13,653.92 | 26.4 |
| Fuel comb. – elec. util. | 3,788.70 | 7.33 |
| Fuel comb. – other | 2,173.90 | 4.2 |
| Other industrial processes | 1,484.25 | 2.87 |
| Fuel comb. – industrial | 986.63 | 1.91 |
| Biogenics – vegetation & soil | 554.70 | 1.07 |

| TIER 1 NAME | NOx | % of Total |
|---|---|---|
| Waste disposal & recycling | 34.63 | 0.07 |
| Miscellaneous | 33.45 | 0.06 |
| Petroleum & related industries | 19.38 | 0.04 |
| Storage & transport | 20.54 | 0.04 |
| Solvent utilization | 0.36 | 0.00 |
| Metals processing | 0.20 | 0.00 |
| **TOTAL** | **51,716.20** | 100.00 |

**Table 2-4. VOC Emissions for 2011**

| TIER 1 NAME | VOC | % of Total |
|---|---|---|
| Biogenics – vegetation & soil | 146,405.00 | 79.56 |
| Highway vehicles | 12,175.92 | 6.62 |
| Solvent utilization | 12,675.41 | 6.89 |
| Off-highway | 8,838.12 | 4.8 |
| Storage & transport | 1,899.92 | 1.03 |
| Fuel comb. – other | 608.74 | 0.33 |
| Other industrial processes | 497.77 | 0.27 |
| Miscellaneous | 340.28 | 0.18 |
| Waste disposal & recycling | 313.10 | 0.17 |
| Fuel comb. – elec. util. | 227.02 | 0.12 |
| Fuel comb. – industrial | 13.29 | 0.01 |
| Petroleum & related industries | 11.26 | 0.01 |
| Metals processing | 4.76 | 0.01 |
| **TOTAL** | **184,010.59** | 100.00 |

The Reid Gardner power plant, owned by NV Energy, contributed 81 percent of the utility $NO_x$ total in 2011, or 3,066 tons per year (tpy) (Table 2-5).

**Table 2-5. Emissions for Reid Gardner**

| | TPY | Percent |
|---|---|---|
| **NEI 2011 Utilities** | 3,788.70 | 100.00% |
| Reid Gardner utility boilers 2011 | 3,066.02 | 81% |
| Reid Gardner utility boilers 2013 | 1,847.85 | 60% |
| Reid Gardner utility boiler 2015 | 524.23 | 28% |

Nevada Senate Bill 123, passed in June 2013, accelerated the retirement of Reid Gardner Generating Station, which will significantly reduce $NO_x$ emissions in Clark County. Three of the plant's four units closed in 2014, and the remaining unit will close in 2017. The law required 350 MW of the plant's 800 MW operating capacity to be replaced with renewable energy facilities; the rest was replaced with two natural gas-fired plants.

According to EPA's Air Markets Program Data,[2] total 2011 $NO_x$ emissions in Clark County were 3,789 tpy, with Reid Gardner contributing 3,066 tpy, or 81 percent. In 2013, Reid Gardner $NO_x$ emissions were 1,848 tpy, a reduction of 60 percent from 2011 levels (Table 3-5). In 2015, $NO_x$ emissions from Reid Gardner's remaining unit were 524 tpy, a reduction of 28 percent from 2013.

## Source Apportionment Modeling

DAQ studies have shown that interstate transport (mostly from California) significantly impacts Clark County. Transport from Asia and stratospheric ozone intrusions also contribute to ozone concentrations. Although it is challenging to quantify transport contributions from any of these sources, DAQ plans to perform source apportionment modeling to identify sources that affect ozone concentrations in the county.

Past modeling indicates that Clark County's background ozone concentration is 40–45 ppb. Modeling also shows that transport into Clark County from inside and outside the United States may run between 20–40 ppb, depending on the episode.

[2] http://ampd.epa.gov/ampd/

# 3. Stakeholders

DAQ continues to engage with stakeholder groups and provide a forum to review and comment on state implementation plans, Exceptional Event Rule demonstration packages, county rule-makings, and other documents. Stakeholder groups include members of the regulated community, environmental groups, other Clark County communities, state agencies, and EPA.

**The Southern Nevada Fleet Association** is a nonprofit group whose goal is to improve vehicle efficiency and reduce operating costs by advancing clean technologies, networking between agencies, and providing opportunities for education and training.

**The Metropolitan Planning Subcommittee** assists the Executive Advisory Committee in preparing recommendations to the Regional Transportation Commission of Southern Nevada (RTC). The subcommittee considers transportation planning and programming issues that require investigation and analysis.

**The Southern Nevada Regional Planning Coalition** was created in 1999 by Senate Bill 436, then further refined in January 2000 by interlocal agreements between the County of Clark, the City of Las Vegas, the City of Henderson, the City of North Las Vegas, the City of Boulder City, and the Clark County School District Board of Trustees under the authority of Nevada Revised Statute (NRS) 277.180. The coalition prepares a biennial report on air quality policies and implementation plans adopted by DAQ, including ozone implementation plans and policies. The Coalition recently completed the "Southern Nevada Strong" regional plan, which includes policies that provide for alternative modes of transportation.

The **Advisory Committee on Control of Emissions from Motor Vehicles** was established by the 2013 Nevada Legislature in NRS 445B.830, as amended by Senate Bill 148. The committee was charged to:

- Establish goals and objectives for the program for control of emissions from motor vehicles.
- Identify areas where funding should be made available.
- Review and make recommendations concerning regulations adopted pursuant to NRS 445B.770.

Committee members are appointed by the deputy director of the Nevada Department of Motor Vehicles and meet at least quarterly. See Nevada Administrative Code 445B.853–857 for details.

**The Western States Air Resources Council (WESTAR)** was founded in 1988 by eight state air agencies, and has since grown to fifteen states plus several local and tribal air quality agencies. It was formed to promote the exchange of information between states, share resources for the common benefit of members, and serve as a forum for discussing regional air quality issues of common concern. WESTAR changed its bylaws in 2013, allowing DAQ to join as an ex-officio member, and the department is a very active participant now that ozone transport has become a regional

issue. During meetings and conferences, WESTAR discusses possible control measures and other ways to reduce $NO_x$ and VOC emissions.

The council is an excellent platform to exchange information with agencies outside of Clark County and to evaluate their control programs. Its purposes are to:

- Promote the exchange of information related to the control of air pollution for use in state and federal activities, as authorized by air quality statutes and regulations.
- Develop processes and procedures for consideration by Western states, federal land managers, and EPA to meet air quality objectives and protect environmental resources.
- Discuss air quality issues of common concern.
- Report on the status of efforts undertaken to achieve air quality objectives.
- Establish work groups, task forces, etc., to investigate specific topics and recommend a course of action for council members.
- Adopt resolutions and policy statements for council member implementation or use during the development of local, state, and federal programs, regulations, and laws.

**The Western Regional Air Partnership (WRAP),** formed in 1997, is a membership organization supporting Western regional air quality analyses and the planning needs of its members. WRAP is a voluntary partnership of states, tribes, federal land managers, local air agencies, and EPA whose purpose is to understand current and evolving regional air quality issues in the West. WESTAR and WRAP have joined together in a partnership.

The issues WRAP addresses include, but are not limited to:

- Implementation of, and future planning for, the Regional Haze Rule.
- Air quality issues related to ozone, particulate matter, nitrogen deposition and critical loads, mercury, and other pollutants.
- Emissions sources from all sectors, both domestic and international.
- The effects of air pollution transport.
- The effects of climate change on regional air quality.

To address these issues, WRAP develops, maintains, and shares databases; supports technical analyses; and provides access to data and results from various information sources to produce consistent, comparable, and complete results for use by individual members and agencies.

**The Southern Nevada Home Builders Association** has received several prestigious awards for its work on local environmental issues, including protection of multispecies habit, air quality, dust control, and water and energy conservation. DAQ is a member of its community planning and infrastructure committee, which meets regularly to discuss issues of land use, environment, air and water quality, and other categories important to home builders in Clark County.

**DAQ Air Quality Planning Division and Monitoring Division Committee** membership is comprised of DAQ personnel who meet monthly to discuss air quality data-related concerns, key projects related to meeting and maintaining the criteria pollutant NAAQS, and other issues related to EPA regulatory requirements. The committee examines issues with local and transported ozone, particulate matter, and other criteria pollutants, and recently supervised a study of summer ozone patterns in Clark County. It reviews DAQ's Monitoring Network Plans, monitor sitings, Exceptional Event Rule demonstration packages, data analyses, special sampling needs (e.g., for fireworks and wildfires), and other reports and projects that require oversight.

**The Nevada Air Quality Agencies Consortium** includes representatives from EPA Region 9, the Nevada Division of Environmental Protection, DAQ, and Washoe County's Air Quality Management Division. These agencies meet or have conference calls semiannually to discuss environmental issues in Nevada and the requirements of upcoming regulatory documents and reports. Issues the consortium covers include ozone transport, the Ozone Advance Program, implementation plans, and exceptional events.

Table 3-1 lists stakeholder organizations and their meeting frequency.

**Table 3-1. Stakeholder Organizations and Frequency of Meetings**

| Name of Organization | Frequency of Meetings/Teleconferences |
|---|---|
| SNFA | Every other month |
| MPS | Every other month |
| SNRPC | Monthly |
| SNHBA | Monthly |
| ACCEMV | Quarterly |
| WESTAR | Semiannually |
| WRAP | Semiannually |
| AQPMC | Monthly |
| NAQAC | Semiannual meeting or teleconference |

# 4. Energy Programs Update

## Renewable Energy

In 2014, Nevada ranked second in the nation in utility-scale electricity generation from geothermal energy and third from solar generation (http://www.eia.gov/state/print.cfm?sid=nv). Those two sources together accounted for 11 percent of Nevada's net electricity generation that year (http://www.eia.gov/state/?sid=NV). This is due in part to Nevada's Renewable Portfolio Standard (RPS) (NRS 704.7801), which requires electric utilities in the state to generate, acquire, or save a certain percentage of electricity annually using renewable energy systems or energy efficiency measures. The law was amended in 2009 to require a 25 percent contribution from renewable energy by 2025, and to increase the solar element from 5 to 6 percent of the total beginning in 2016. The 2005 Nevada Legislature determined that energy efficiency measures can be used to comply with up to 25 percent of the annual RPS requirement; however, half of that 25 percent must come from measures installed at residential locations.

The RPS, along with federal grants, has been the driver for many renewable energy projects in Nevada. This section summarizes the status of major renewable energy projects operating, under construction, or in development in 2015, categorized by type.

### *Solar*

Nevada ranked third nationally in solar capacity installed in 2015 (417 MW). A total of 1,240 MW put Nevada fifth nationally in the category of total installed solar capacity. There is enough solar generation in the state to power 191,000 homes (http://www.seia.org/state-solar-policy/nevada).

Figures 4-1 and 4-2 show the energy capacity installed and the energy generated, respectively, in 2014. "Nameplate capacity" is the maximum rated electric output a generator can produce under specific conditions; "generation" is the amount of electricity a generator produces over a specific time. In 2014, 1,478 MW of solar energy were installed and 4,230 thousand megawatt-hours (MWh) were generated.

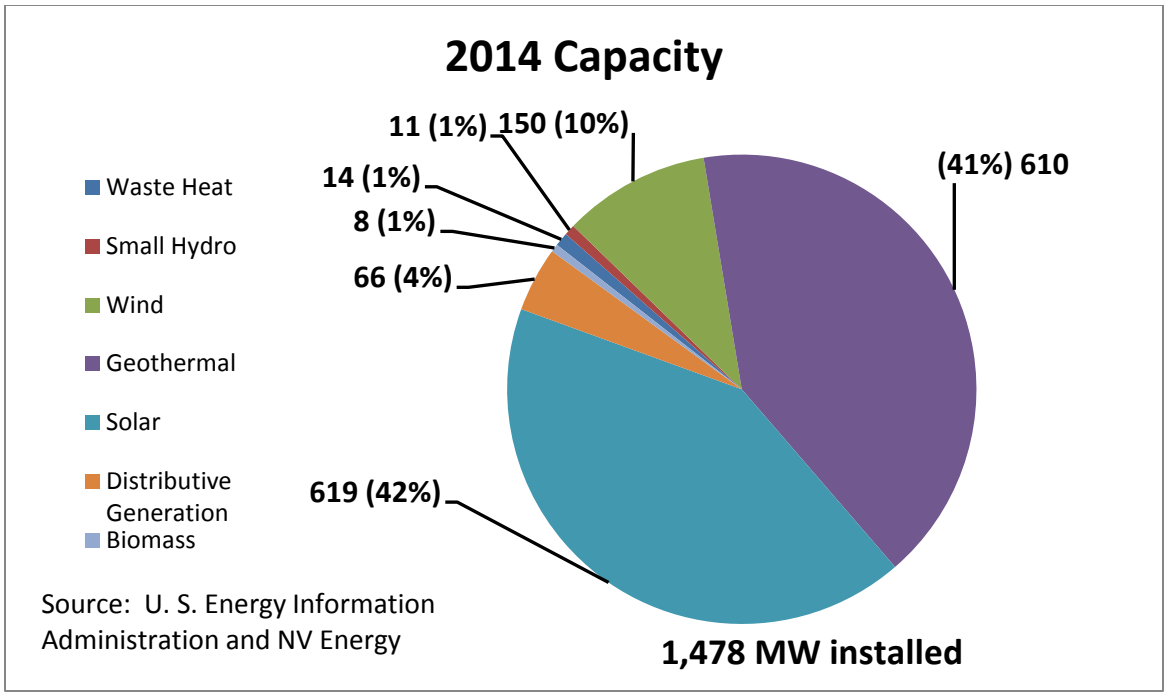



**Figure 4-1. Renewable Capacity.**

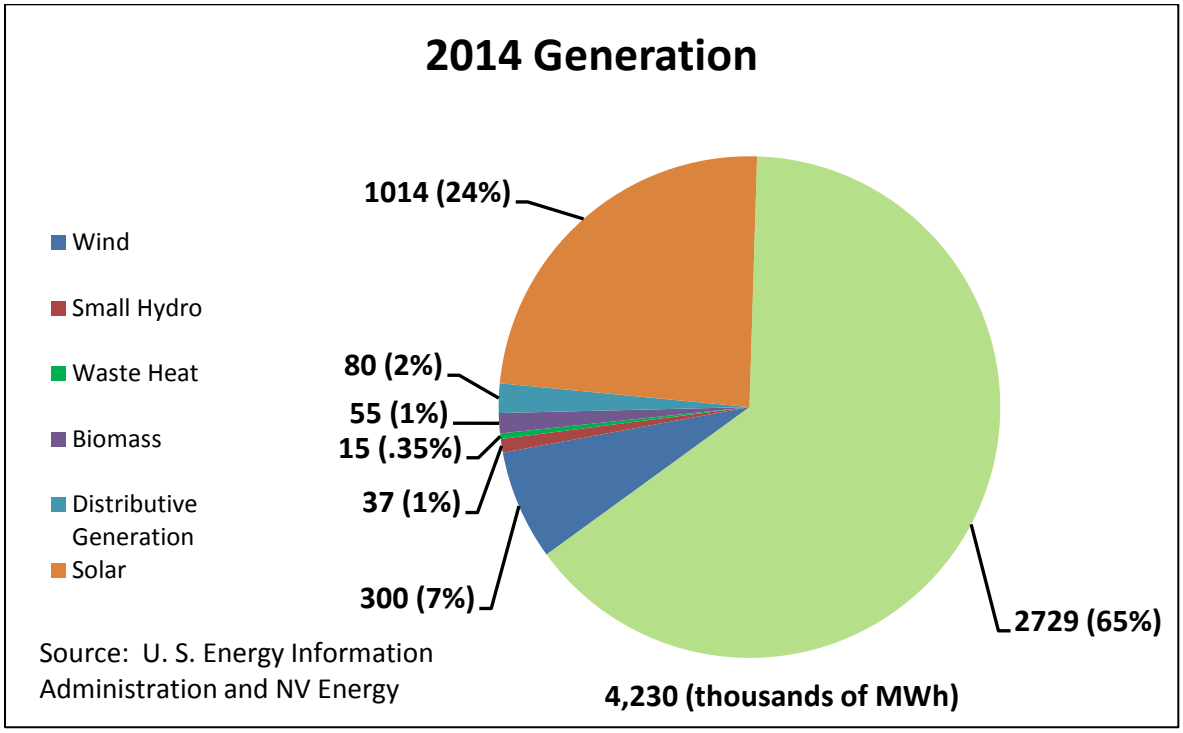



**Figure 4-2. Renewable Generation.**

## Ongoing Projects

Table 4-1 lists Nevada solar projects that began the development process before 2015. All are currently operating or approaching the completion of construction.

**Table 4-1. Ongoing Solar Generating Projects in Clark County**

| Owner | Plant Name | Nameplate Capacity[1] | Power Purchase Agreement | Status |
|---|---|---|---|---|
| American Capital/ Searchlight Solar LLC | Searchlight Solar I | 21.5 MW | NV Energy | Completed Dec 2014 |
| First Solar/Moapa Southern Paiute Solar | Moapa River Tribal Solar Project (formerly K-Road) | 310 MW | LA Dept. Water & Power, City of Burbank | Construction |
| First Solar/Nextera | Silver State Solar South | 250 MW | SoCal Edison | Began operating Nov 2015 |
| Sempra Energy | Copper Mountain 2 | 150 MW | PG&E | Began operating Apr 2015 |
| | Copper Mountain 3 | 250 MW | Southern California Public Power Authority | Began operating Apr 2015 |
| | Copper Mountain 4 | 94 MW | SoCal Edison | Construction |

[1]All plants listed use photovoltaic panels.

### 1. Searchlight Solar Project

American Capital Energy, in partnership with D.E. Shaw, Bright Plain Renewable Energy, and Signal Energy, completed the Searchlight solar project in December 2014. American Capital has a 20-year Power Purchase Agreement (PPA) with NV Energy for power supplied by this plant.

### 2. K-Road Solar Project (now the Moapa Southern Paiute Solar Project)

In September 2013, First Solar acquired the 250 MW Moapa solar project from K Road Power Holdings. In conjunction with the Moapa Paiute tribe, First Solar created Moapa Southern Paiute Solar, LLC to build and own the project. Located 50 miles northeast of Las Vegas on the Moapa River Indian Reservation, it is the first, and largest, utility-scale solar project approved for tribal land in North America.

The project has in place a 25-year PPA with the Los Angeles Department of Water and Power. Construction began in April 2015, and commercial operations are expected to begin by the end of 2016. When fully operational, it will generate enough solar energy to serve the needs of about 100,000 homes per year, displacing approximately 178,000 metric tons of carbon dioxide annually—the equivalent of taking about 34,000 cars off the road (http://www.firstsolar.com/en/About-Us/Projects/Moapa-Southern-Paiute-Solar-Project).

### 3. Silver State South Solar Project

Shortly after the 50 MW Silver State North Solar Project began operations at Primm in 2012, Nextera Energy proposed an adjacent Silver State South Solar Project. First Solar began construction on the 250 MW plant in the fall of 2014, with operations underway by March 2016. The plant's power is sold to Southern California Edison under a 25-year PPA. It is expected to generate enough electricity to power 80,000 homes per year, displacing approximately 150,000 metric tons of carbon dioxide annually—the equivalent of taking nearly 30,000 cars off the road (http://www.nexteraenergyresources.com/pdf_redesign/silver_state.pdf).

### 4. Copper Mountain Solar 2, 3, & 4

The Copper Mountain Solar complex is built and operated by Sempra U.S. Gas & Power under PPAs with California power companies. When Copper Mountain 1, the first plant, began operations at the end of 2010, it was the largest PV plant (48 MW) in the entire U.S. Sempra then began construction of Copper Mountain 2, which was completed in two phases: a 58 MW plant that began operations in December 2012 and a 94 MW plant that began operations in April 2015, for a combined total of 150 MW. In 2013, Sempra broke ground on Copper Mountain 3, a 250 MW plant that began operations in the summer of 2015. Once commercial operations were fully underway on Copper Mountain 2 and 3, Sempra announced Copper Mountain 4. Construction on the 94 MW plant began in late 2015, with operations expected to begin in 2016. Each succeeding facility was, at the time of its dedication, the largest PV facility in the world.

### 5. City of Las Vegas

In 2014, the Governor's Office of Energy (GOE) loaned the city $1.2 million to build three solar parking structures: one in the East Yard, one in the West Yard, and one at the Durango Hills YMCA. The GOE estimates these structures, completed in 2015, will produce 1.2 million kilowatt-hours of power annually, reducing greenhouse gas emissions by an estimated 23.8 million pounds of carbon dioxide during the first 20 years of operation (http://energy.nv.gov/Media/Press_Releases/2014/New_Solar_Systems_Will_Help_City_Beat_Heat_and_Save_Energy/).

## New Projects

Table 4-2 lists Nevada solar projects proposed or in development in 2015. The second project at Nellis Air Force Base, the Nellis Solar Array II, is listed because it was proposed and completed entirely in 2015.

**Table 4-2. New Solar Generating Projects in Clark County**

| Owner | Plant Name | Nameplate Capacity[1] | Power Purchase Agreement | Status |
|---|---|---|---|---|
| BrightSource Energy | Sandy Valley Solar Project | 1,000 MW | Unknown | Proposed |
| First Solar/Aiya Solar | Aiya Solar Project | 100 MW | Moapa Paiute Tribe | Development |
| First Solar/Playa Solar | Switch Station 1 & 2 / Playa Solar[2] | 100 MW | NV Energy | Construction in 2016 |

| Owner | Plant Name | Nameplate Capacity[1] | Power Purchase Agreement | Status |
|---|---|---|---|---|
| First Solar/Snow Mountain Solar | Snow Mountain Solar Project | 100 MW | Unknown | Development |
| Invenergy Solar | Harry Allen Solar Energy Center[2] | 130 MW | Unknown | Development |
| Nextera Energy | Sandy Valley Solar Project | 250 MW | Unknown | Proposed |
| NV Energy | Dry Lake Solar Energy Center[2] | 150 MW | Unknown | Development |
| SunPower | Nellis AFB Solar Array II | 15 MW | Nellis AFB | Began operating Nov 2015 |
| SunPower/Boulder Solar | Boulder Solar | 200 MW | NV Energy | Construction |

[1]All plants listed use photovoltaic panels.
[2]BLM Solar Energy Zone project.

## 1. Solar Energy Zones

In October 2012, the U.S. Department of the Interior finalized a program to streamline the development of utility-scale solar plants on public lands in six Western states, including Nevada. As part of this effort, in 2013 the BLM established 19 Solar Energy Zones (SEZs), each with access to existing or planned transmission facilities. In June 2014, the BLM auctioned off six parcels in Nevada's Dry Lake SEZ, selecting three developers—First Solar, Invenergy, and Nevada Energy—that proposed three projects:

- Invenergy – Harry Allen Solar Energy Center, 130 MW (Parcel 1)
- First Solar – Playa Solar Project, 200 MW (Parcels 2, 3, & 4)
- NV Energy – Dry Lake Solar Energy Center, 150 MW (Parcels 5 & 6)

Environmental assessments were completed in late 2014, and BLM issued a final approval of the three projects in June 2015. Construction of the Playa Solar Project is scheduled to begin in June 2016; the other two projects are still in the development stage. The three projects combined are expected to generate around 440 MW of electricity, enough to power 132,000 homes.

## 2. Aiya Solar Project

After construction began on the Moapa Southern Paiute Solar Project in 2015, First Solar began working with the Moapa Band of Paiutes on the 100 MW Aiya Solar Project, which will be located near the gateway to the Moapa River Indian Reservation on Highway 168, about 40 miles north of Las Vegas. The project's draft Environmental Impact Statement was published in May 2015; construction is expected to begin in 2016 and take 12–15 months.

### 3. Playa Solar Project (previously Switch Stations 1 & 2)

In November 2014, Switch Inc.—one of the state's largest energy users—filed an application with the Public Utilities Commission of Nevada to withdraw from Nevada Power Co. so it could buy renewable energy on the wholesale market. In June 2015, the commission denied Switch's application; a month later, Switch and NV Energy reached a deal whereby NV Energy would contract for a 100 MW solar array to generate power for Switch completely from renewable energy. (When the sun is down, Switch will use the utility's geothermal and wind resources to power its operations.) The centers will be used not only by Switch but also more than 1,000 collocated clients, delivering green credentials to many companies that use Switch's data centers.

In December 2015, NV Energy filed a request to add a second (80 MW) solar array. First Solar will build both plants in its Dry Lake SEZ, renaming them Playa Solar 1 and 2. Construction should be finished by the end of 2016, with commercial operations scheduled to begin in 2017. (http://lasvegassun.com/news/2015/jul/14/switch-and-nv-energy-hash-deal-end-battle/)

### 4. Snow Mountain Solar

After construction began on the Moapa Southern Paiute Solar Project in 2015, First Solar began working with the Las Vegas Paiute Tribe on the 100 MW Snow Mountain Solar Project, which will be located on the Snow Mountain Reservation U.S. Highway 95, in the northwestern Las Vegas Valley. The Environmental Impact Statement is still being drafted.

### 5. Sandy Valley Solar

Two projects have been proposed for Sandy Valley: Nextera Energy Resources has purchased land along State Highway 160 for a 250 MW solar power plant, and BrightSource Energy is planning a 1,000 MW plant farther south. Neither project has a start date.

### 6. Nellis Solar Array II

SunPower completed construction on a 19-megawatt solar power plant at Nellis Air Force Base to partner with a 13.2-megawatt solar power plant it built at Nellis in 2007. According to the U.S. Air Force, the two Nellis plants combined represent the largest photovoltaic system in the U.S. Department of Defense. (http://www.acc.af.mil/News/ArticleDisplay/tabid/5725/Article/660195/nafb-powered-by-sun-installation-unveils-dods-largest-solar-array.aspx)

### 7. Boulder Solar Project I & II

SunPower acquired the 100 MW Boulder Solar project, formerly the Midland Solar Project, from Korea Midland Power Co. early in 2015. Construction began in December under a 20-year PPA with NV Energy, and the company expects the plant to be operational by 2017. NV Energy estimates that, when completed, the plant could provide enough electricity to power 60,000 homes. According to estimates provided by the U.S. Environmental Protection Agency, it can be expected to offset nearly 192,000 tons of carbon dioxide emissions annually.

### 8. Projects in Nearby Counties

Two solar plants are being built in Nye County: Crescent Dunes and Sunshine Valley. Crescent Dunes, a concentrated thermal solar facility with a capacity of 110 MW, began test runs in October 2015 with an eye to full-fledged operations in 2016. Sunshine Valley is a PV proposed by First Solar for Amargosa Valley, 90 miles northwest of Las Vegas, also with a capacity of 110 MW. Construction is slated to begin in January 2019.

The Lincoln County Power District brought a 90-MW community solar power generating plant online in July 2015. The plant, located in Panaca—approximately 165 miles northeast of Las Vegas—is the first community solar plant in Nevada.

## *Other Renewables*

Nevada has 27 operating geothermal plants, none of which are located in Clark County. The state also has one commercial wind project, Spring Valley, which began operating in White Pine County in 2012. All of this 152 MW project's output is sold to NV Energy. (https://en.wikipedia.org/wiki/List_of_power_stations_in_Nevada)

# Energy Efficiency

**Ongoing Projects**

### 1. Nevada Governor's Office of Energy

The GOE oversees state energy programs (under NRS 701 and 701A), advises the governor on energy policy, and administers grant/rebate programs using state and federal funds. NRS 701.215 required the director to prepare an energy reduction plan that directs state agencies, departments, and other entities in the Executive Branch to reduce grid-based energy purchases for state-owned buildings by 20 percent in 2015. NV Energy documented a 16.4 percent reduction in energy use in the 93 percent of state-owned buildings it services between 2007 and 2015 (Figure 4-3). (http://energy.nv.gov/uploadedFiles/energynvgov/content/About/GOE_2015_EnergyReport_Feb%2024.pdf)

In 2015, the GOE awarded a 4-year contract to Lucid Design Group, Inc., to run energy management information software that will organize, track, benchmark, analyze, and report all usage and costs related to energy consumed and purchased by the state. This will allow the office to track energy consumption in individual buildings and work with facility managers to identify energy wasters and implement energy-savings programs using real-time data.

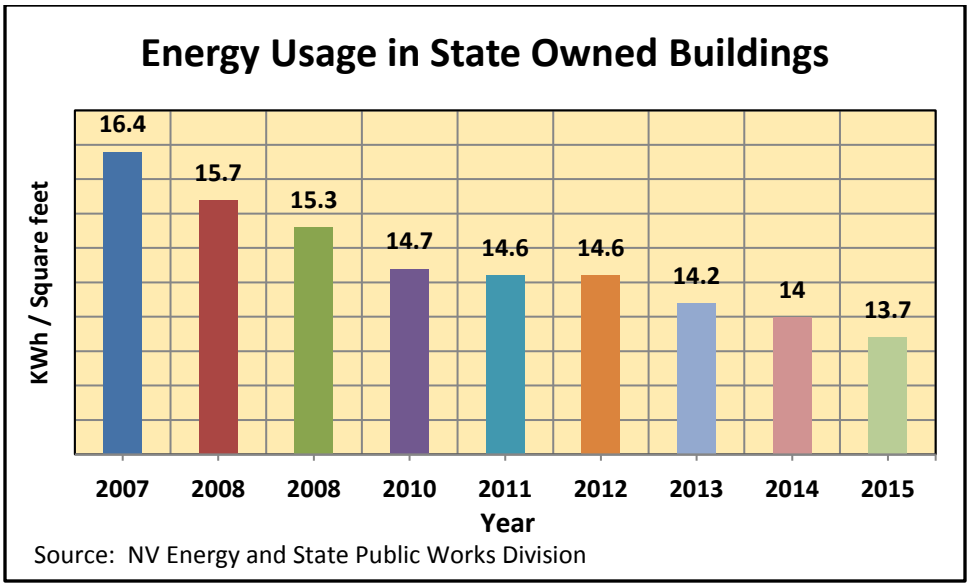



**Figure 4-3. Energy Reductions in State-Owned Buildings.**

## 2. City of Las Vegas

In a press conference just before Thanksgiving 2015, Mayor Carol Goodman announced a plan to make Las Vegas the first city of its size (2 million) to be powered completely by renewable energy. City management will work with NV Energy to use a mix of energy-efficiency programs, a large-scale solar project, and a purchasing agreement to reach its goal. The city will make the switch in January 2017, pending approval by the state's Public Utilities Commission. (http://lasvegas-sun.com/news/2015/nov/24/city-of-las-vegas-plans-to-go-to-100-percent-renew/)

## 3. Reid Gardner Station Shutdown

NV Energy is in the process of decommissioning and demolishing units 1, 2, and 3 (100 MW each) at Reid Gardner, which were shut down at the end of 2014. It contracted with two natural gas-fired plants, Las Vegas Cogeneration (274 MW) and Sun Peak (222 MW), to replace that generating capacity. The fourth unit (257 MW) will be decommissioned in 2018. The closure of this plant will significantly reduce $NO_x$ emissions in Clark County.

Senate Bill 123 also required the utility to replace 350 MW of the plant's capacity with renewable energy. To fulfill this requirement, NV Energy has entered into PPAs for 100 MW of power from the Moapa Southern Paiute Solar Project, 100 MW from the Aiya Solar Project, 15 MW from the Nellis Solar II Array, and 150 MW from its Solar Energy Center in the Dry Lake SEZ.

## 4. Clean Energy Project

Clean Energy Project, Inc. is a nonprofit organization focused on promoting the benefits of clean, renewable energy in Nevada. Its major initiative is the annual National Clean Energy Summit, hosted by Senate Minority Leader Harry Reid; past speakers have included Bill Clinton, Arnold Schwarzenegger, and President Obama.

For Earth Day 2014, Clean Energy Project released the Buy Green List to inform consumers of businesses "that have taken initiative in advancing the clean energy economy by supporting clean energy policies and implementing energy saving practices." (cleanenergyprojectnv.org) To be listed, companies must:

- Sign a pledge supporting clean energy practices in Nevada including increased clean energy generation, increased energy saving practices, and improved energy efficiency;
- Sign up for NV Energy's MyAccount program to easily track energy usage;
- Sign up for NV Energy's paperless billing service; and
- Agree to implement a number of energy-saving practices within their company and educating employees how to be more energy smart.

### 5. Pollution Prevention Grant Program

DAQ has committed to participate in a multistate collaborative effort to demonstrate safe, low-VOC, low-toxicity alternatives for industrial cleaning applications under EPA's 2016-2017 pollution prevention grant cycle. The project will demonstrate proposed alternative, safer cleaners for repair and maintenance cleaning, batch-loaded cold cleaning, and vapor degreasing. The ultimate goal is to convince facility owners to switch to water-based products, reducing VOC emissions from industrial facilities.

## Mobile Sources

### Ongoing Projects

### 1. Project NEON

In November 2015, NDOT awarded Kiewit Infrastructure West Co. the contract to reengineer the U.S. 95/I-15 interchange near downtown Las Vegas. These two freeways carry more than 300,000 vehicles daily (a tenth of Nevada's population), and that number is projected to double by 2035. NDOT expects Project Neon to reduce crashes and other travel delays, bringing down idling times and $NO_x$ emissions. The project has six phases, with the initial groundbreaking held in April 2016. It includes High-Occupancy Vehicle lanes between U.S. 95 and I-15, along with better connections to surface streets into the downtown area. Completion of all six phases is scheduled for 2019. (http://ndotprojectneon.com/learn/overview/)

### 2. Boulder City Bypass / Proposed I-11

The Boulder City Bypass involves road improvements to U.S. Highway 93, a major commercial corridor and the only route through Boulder City. The project broke ground in April 2015. It is set to be the second phase in the proposed Interstate 11, designated by Congress in the 2015 Fixing America's Surface Transportation Act, which will connect Las Vegas and Phoenix. State and federal agencies are conducting preliminary studies, and an exact route has yet to be determined;

however, the highway is slated to include both this project and the Hoover Dam Bypass, completed in 2010 (http://ndotprojectneon.com/learn/overview/).

U.S. 93 carries more than 30,000 vehicles per day through the main street of Boulder City. This bypass will allow traffic to flow through the area without the typical stoplights and congestion associated with the current main street route.

## 3. Clark County Fleet

The County has 2,775 vehicles, 539 of which are hybrids—in fact, *Automotive Fleet* magazine rated Clark County sixth in the nation in percentage of hybrids in its fleet, at 19 percent. The fleet contains seven 2016 Chevy Volts and 82 SmartWay vehicles—cars and trucks that EPA has certified for improved fuel efficiency and reduced environmental impact.

Club Ride

In April 2015, EPA honored RTC's Club Ride program with a Clean Air Excellence Award, which "recognizes and honors outstanding innovative efforts to help make progress in achieving cleaner air." Club Ride is a free program designed to improve air quality by encouraging commute alternatives, such as carpooling, vanpooling, riding public transit, walking, bicycling, compressed work weeks, and telecommuting. It has partnered with nearly 300 employers to register more than 34,750 commuters in Clark County. Highlights include 59 tons of carbon monoxide and 2,324 tons of greenhouse gases reduced; nearly 6 million vehicle travel miles removed from the road; and 10,758 new commuters welcomed to the program in 2015.

## 4. Congestion Mitigation and Air Quality Improvement Program

DAQ submitted three proposals for program funds, and the electric vehicle purchase project was selected. This project has six phases. In Phase 1 (FY15), DAQ acquired eight electric vehicles and eight charging stations for the county fleet. In Phase 2 (FY16), DAQ purchased two vehicles with department funding. In Phase 3 (FY17), DAQ will purchase eight electric vehicles with CMAQ funding. Phases 4 (FY18), 5 (FY19), and 6 (FY20) will each see five more electric vehicles added to the fleet, for a total of 33. All vehicles purchased will be Chevrolet Volts. Table 4-3 shows total vehicle emission reductions expected by 2020, and Table 4-4 shows total emissions reduction compared with a mid-size gasoline car.

**Table 4-3. Electric Vehicle Emission Reductions**

| **Pollutant** | **Emission Reductions** (kg/day/vehicle) | **Emission Reductions** (kg/day/all vehicles) | **Total Emission Reductions over Vehicle Life** (kg/all vehicles) |
|---|---|---|---|
| VOCs | 0.02 | 0.59 | 2,475 |
| CO | 0.14 | 4.69 | 19,517 |
| $NO_x$ | 0.02 | 0.58 | 2,393 |

**Table 4-4. Emission Reduction Comparison**

| Pollutant | Reduction |
|---|---|
| VOCs | 70% |
| $NO_x$ | 60% |
| **Average:** | **66%** |

### 5. Anti-Idling Regulation

Section 45 of the Clark County Air Quality Regulations, "Idling of Diesel Powered Motor Vehicles," prohibits idling of diesel-powered trucks or bus vehicles for more than 15 consecutive minutes. The only exemptions are for emergency vehicles; vehicles used to repair or maintain other vehicles; vehicles stopped because of traffic congestion on a highway or street; vehicles whose engines must idle to perform a specific task, such as trenching or hoisting; and any vehicle that is idling while maintenance procedures are being performed at a repair facility.

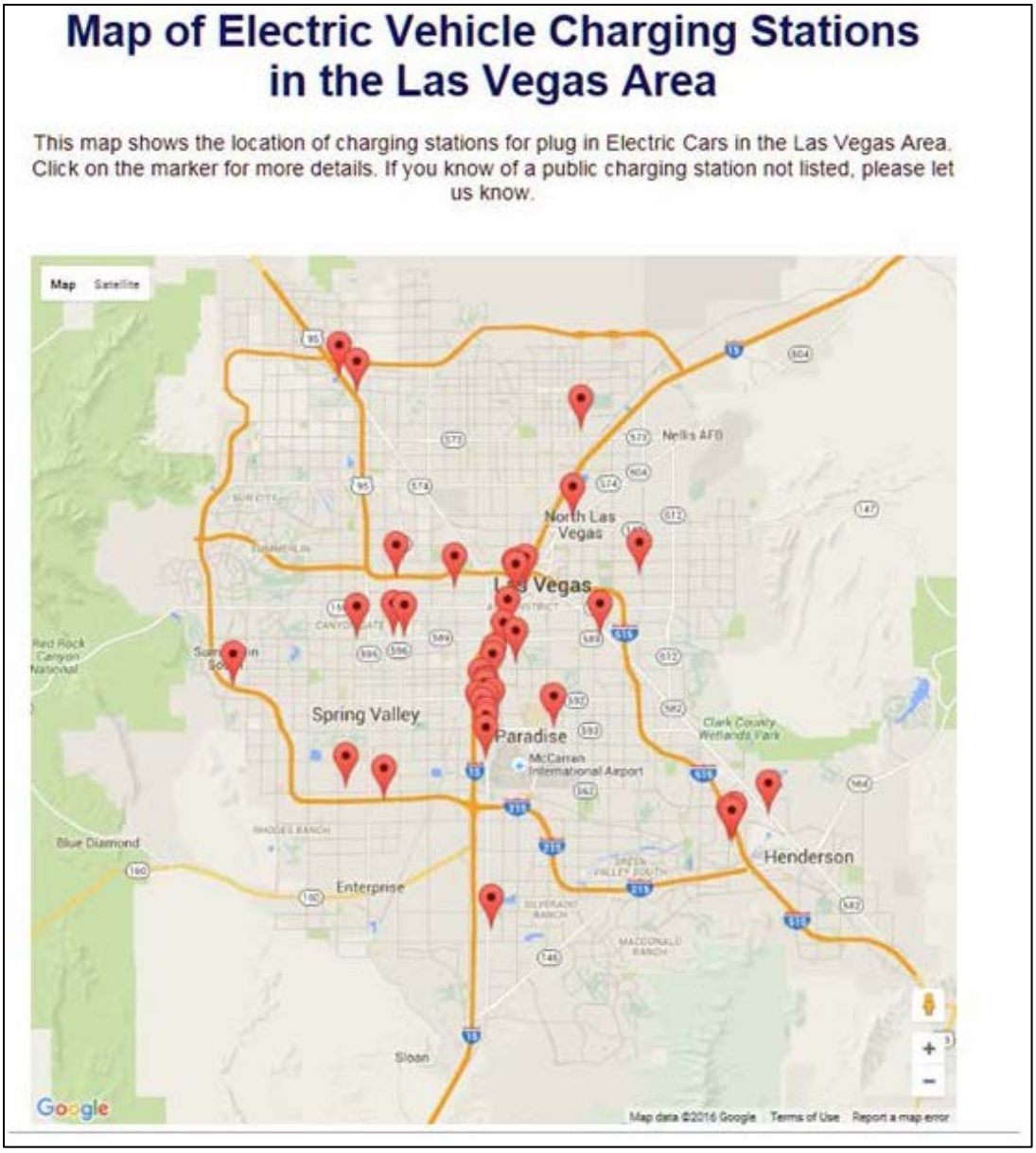
## New Initiatives

### 1. Nevada Electric Highway

The first leg of the Nevada Electric Highway was announced on June 16, 2015, as a joint venture between the GOE, NV Energy, and Valley Electric Association. The highway is a joint effort to expand Nevada's infrastructure for charging electric vehicles. Using federal and state grants, the three will partner with businesses along U.S. Highway 95 to provide charging stations in Indian Springs, Beatty, Tonopah, Hawthorne, and Fallon. The Beatty location, at the Eddie World gas station, began service in February 2016. Each location will receive funding to install two Level 2 chargers and one Direct Current Fast Charger; in return, business owners will provide free charging services for the first five years. NV Energy will monitor the stations to determine usage and compensation rates. Once completed, the four stations will allow owners of extended-range electric and hybrid vehicles to drive the full distance between Las Vegas and Reno, 437 miles (http://nevadaeva.org/nevada-charging-station-infrastructure-continues-growth/).

### 2. Electric Vehicle Charging Stations

Clark County hosts more than 40 electric vehicle charging locations (http://www.a2zlasvegas.com/transportation/ev/) of which the majority are free to the public. The Clark County Government Center site, for example, has 9 stations, and many other charging centers are available across the Las Vegas Valley (Figure 4-5). The state's other major urban area, Reno/Carson City, has several charging centers, and another four stations are located in northern Nevada along I-80.




Source: http://www.lasvegasmaps.com/recreation/ev_charging.html

**Figure 4-5. Map of Electrical Vehicle Charging Stations in the Las Vegas Area.**

# 5. Outreach

The goal of DAQ's public education and outreach program is to create citizen awareness and interest in air quality, transform behaviors and habits, and encourage voluntary actions to reduce air pollution. For instance, the public can sign up for EnviroFlash alerts on the department website. Every year, Clark County issues a season-long ozone advisory that tells the public about ozone's health effects and suggests ways to reduce ozone pollution. DAQ also provides daily air quality reports and forecasts on its website, along with real-time monitoring data. DAQ also engages with outside organizations that focus on public outreach and communication. DAQ has developed a calendar that provides information and tips about typical local air quality issues.

Last year, DAQ redesigned brochures on specific air quality topics and issues, identified outreach opportunities, reviewed outreach materials from other agencies, and gave away promotional items at outreach events. To reach a broader audience, DAQ is targeting events that do not necessarily have an environmental purpose. Below is a list of recent DAQ outreach activities.

- January 2015 – Meet Your Customer Day
- February 2015 – Black History Month Festival at the Springs Preserve
- March 2015 – Senior Expo and Health Exposition
- March 2015 – Springs Preserve Annual Plant Sale and Green Expo
- April 2015 – Ask the Expert Day at the Clark County Government Center
- April 2015 – GREENFest (Earth Day celebration) at Downtown Summerlin
- May 2015 – Science and Technology Expo
- May 2015 – Better Breeders Club
- May 2015 – Jazz in the Park
- June 2015 – Jazz in the Park
- August 2015 – Back to School Fair at Lorenzi Park
- September 2015 – Neighborhood Block Party
- September 2015 – Senior Health Fair at Santa Fe Station
- September 2015 – Women's Day Out Exposition at Santa Fe Station
- September 2015 – Southern Nevada Home Builders Association Exposition
- October 2015 – Pedal to the Metal
- October 2015 – Henderson Community Exposition
- October 2015 – Get Outdoor Nevada Day
- November 2015 – American Lung Association Walk/Run at Kellog-Zayer Park
- November 2015 – Henderson Stroll and Roll
- November 2015 - Clark County Health Fair at the Clark County Government Center
- December 2015 – Henderson Winter Festival
- January 2016 – Meet Your Customer Day at the Clark County Government Center
- February 2016 – Black History Month Festival at Springs Preserve
- February 2016 – Diva's Day Out at the South Point Casino
- February 2016 – Health Plan of Nevada/Southwest Medical Associates Senior Health Exposition at the Suncoast Casino
- April 2016 – Spring Plant Sale and Green Living Exposition at Springs Preserve
- April 2016 – Parenting Exposition in Downtown Summerlin

- April 2016 – Real Estate Exposition (1)
- April 2016 – Spring Green Up at the Las Vegas Wash
- April 2016 – Nevada State College/UNLV Festival of Communities
- April 2016 – Children's Festival at Winchester Park
- April 2016 – National Pet Day at Downtown Summerlin
- April 2016 – Real Estate Exposition (2)
- April 2016 – Las Vegas Free to Breath 5k Run/Walk at Sunset Park
- April 2016 – Green Festival in Downtown Summerlin

The goal of outreach is to communicate the department's purpose to the community through public, private, and business events in a professional, informative, and friendly manner. DAQ believes it is essential to educate the public to allow people to make informed decisions about their health and welfare. For example, DAQ tells people about EnviroFlash, where they can sign up for air quality forecasts. DAQ also lets people know that near-real time monitoring data is available on the department's website. DAQ believes that its education and outreach program is very important, so management has expanded efforts to address pollution education aimed at reducing impacts on human health.

## *Ozone Action Days*

This voluntary initiative asks county residents to take additional preventive actions when high ozone levels are predicted. Under certain weather conditions, Clark County meteorologists can forecast when ground-level ozone may exceed health standards. On those days, Clark County faxes an air quality message to media outlets, government agencies, and other Ozone Action Day[3] participants. The department also makes Ozone Action Day messages and daily forecasts available to the public on its Web site.

## *Air Quality Flag Program*

DAQ is in the process of scoping an Air Quality Flag Program mirroring EPA's AIRNow program. The goal is to educate the community about air quality and its impacts on human health by using brightly colored flags—based on EPA's Air Quality Index—to notify Clark County residents about outdoor air quality conditions each day.

[3] *Clark County Nevada Ozone Redesignation Request and Maintenance Plan,* Section 4.4.2.5.

# 6. Emission Reductions

DAQ used EPA's AVoided Emissions and geneRation Tool (AVERT) to calculate emission reductions since 2015 significantly attributable to renewable energy and energy efficiency programs. Table 6-1 updates the projects completed in 2015 and their generating capacities.

**Table 6-1. Renewable Energy Projects**

| Type | Project | MW |
|---|---|---|
| ***Solar*** | Copper Mountain 2 | 150 |
| | Copper Mountain 3 | 250 |
| | Copper Mountain 4 (not counted in total until completed–est. 2016) | 94 |
| | Crescent Dunes | 110 |
| | Moapa Southern Paiute Solar | 250 |
| | Nellis Solar Array II | 15 |
| | Mountain View Solar | 20 |
| | Searchlight Solar | 17.5 |
| | *Solar Total* | *812.5* |
| ***Wind*** | Spring Valley | 152 |
| | *Wind Total* | *152* |

Table 6-2 shows the corresponding input file for the AVERT model.

**Table 6-2. Inputs for AVERT Model**

| | | |
|---|---|---|
| **Enter EE impacts based on the % reduction of regional fossil load** | | |
| Reduce generation by a percent in some or all hours | | |
| Apply reduction to top X% hours | 0% | % of top hours |
| Reduction % in top X% of hours | 0.0% | % reduction |
| **And/or enter EE impacts distributed evenly throughout the year** | | |
| Reduce generation by annual GWh | 0 | GWh |
| **OR** | | |
| Reduce each hour by constant MW | 0.0 | MW |
| **And/or enter annual capacity of RE resources** | | |
| Wind Capacity | 152 | MW |
| Utility Solar PV Capacity | 812.5 | MW |
| Rooftop Solar PV Capacity | 0 | MW |

Note: EE = energy efficiency; RE = renewable energy; GWh = gigawatt-hour.

According to the model, renewable energy generation in 2015 displaced 411,600 MWh, which equals a reduction of 55,100 pounds (27.5 tpy) of $NO_x$. During the ozone season, renewables displaced a total of 38,300 pounds (19.2 tons) of $NO_x$ in Clark County (Table 6-3). Figures 6-1 through 6-3 show the monthly emission reductions in $SO_2$, $NO_x$, and $CO_2$. Table 6-4 summarizes the values shown in the figures.

**Table 6-3. Model Outputs**

| Peak Gross Generation Post-EERE (MW) | Annual Gross Generation Post-EERE (MWh) | Annual Displaced Generation (MWh) | Annual Displaced NOx (lb) | Annual Displaced $CO_2$ (tons) | Ozone Season Displaced NOx (lb) | Ozone Season, 10 Peak Days Displaced NOx (lb) |
|---|---|---|---|---|---|---|
| 4,215 | 18,535,800 | -411,600 | -55,100 | -187,300 | -38,300 | -200 |

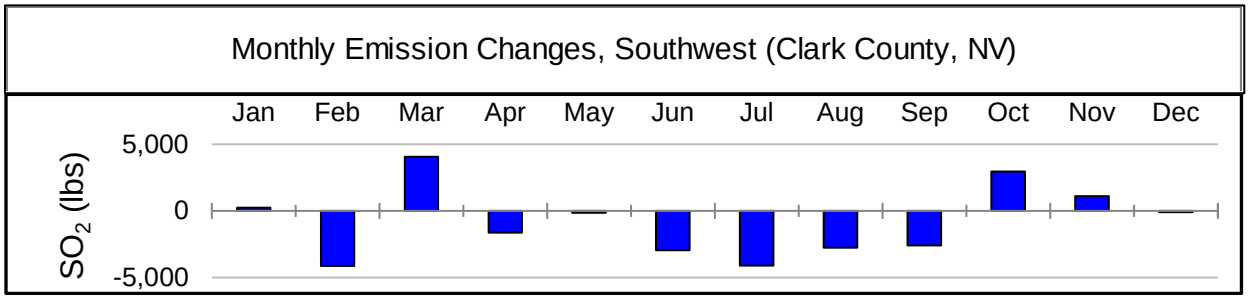



**Figure 6-1. Monthly $SO_2$ Reductions.**

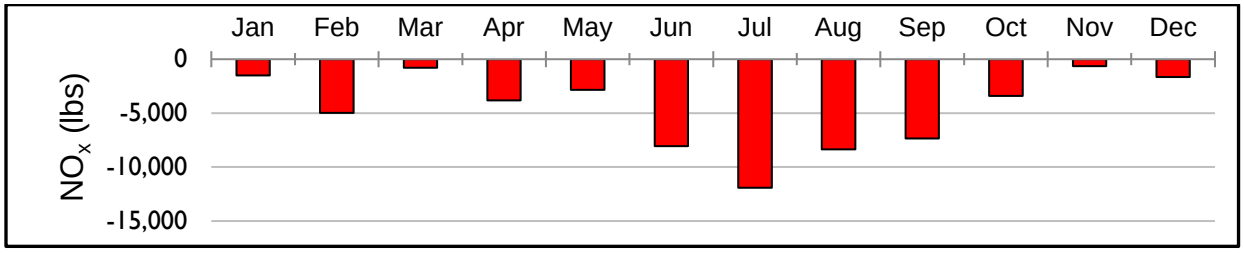



**Figure 6-2. Monthly $NO_x$ Reductions.**

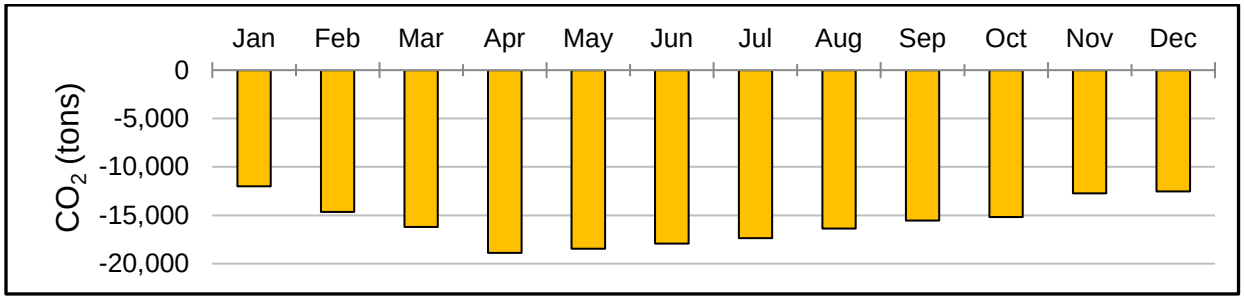



**Figure 6-3. Monthly $CO_2$ Reductions.**

**Table 6-4. Monthly Emission Changes, Southwest (Clark County, NV)**

| | Gen (MWh) | $SO_2$ (lbs) | $NO_x$ (lbs) | $CO_2$ (tons) |
|---|---|---|---|---|
| **Jan** | -28,600 | 200 | -1,500 | -12,000 |
| **Feb** | -32,800 | -4,100 | -5,000 | -14,600 |
| **Mar** | -37,500 | 4,100 | -800 | -16,200 |
| **Apr** | -43,300 | -1,600 | -3,800 | -18,900 |
| **May** | -42,200 | -100 | -2,800 | -18,400 |
| **Jun** | -37,200 | -3,000 | -8,000 | -17,900 |
| **Jul** | -32,300 | -4,100 | -11,900 | -17,400 |
| **Aug** | -32,500 | -2,800 | -8,400 | -16,400 |
| **Sep** | -31,300 | -2,600 | -7,300 | -15,500 |
| **Oct** | -34,700 | 2,900 | -3,400 | -15,200 |
| **Nov** | -30,400 | 1,100 | -700 | -12,700 |
| **Dec** | -29,600 | -100 | -1,700 | -12,500 |
| ***Total*** | *-412,000* | *-10,000* | *-55,000* | *-188,000* |

Note: Negative numbers indicate displaced generation and emissions. All results are rounded to the nearest hundred. A dash indicates a result greater than zero but lower than the level of reportable significance.

# 7. Conclusion

Clark County as a community is striving to reduce VOC and $NO_x$ precursors through mandatory and voluntary control measures, including the installation and use of renewable energy and energy efficiency measures. Many organizations in Clark County are making great strides to reduce precursor emissions. Private companies and departments at all levels of government provide county residents with a variety of emission reduction programs. Future federal regulations for mobile sources, in conjunction with scheduled highway improvement projects, will further reduce $NO_x$ emissions in the county.

However, several factors out of DAQ's control have a significant impact on ozone concentrations in Clark County. Although some measures do not seem to have an immediate result, changes will be noticeable in the near future, and will help Clark County to meet and maintain the ozone NAAQS. DAQ will continue to research and evaluate control measures.