



**Clark County Department of Air Quality  
Ozone Advance Program  
Progress Report  
Update**

**July 2017**

**(Page Intentionally Left Blank)**

## Table of Contents

1. Introduction.....	1-1
2. Emission Sources .....	2-1
3. Stakeholders.....	3-1
4. Energy Programs.....	4-1
5. Outreach.....	5-1
6. Emission Reductions.....	6-1
7. Conclusion .....	7-1

## List of Tables

Table 2-1. NO <sub>x</sub> Emissions for 2014 (tons).....	2-1
Table 2-2. VOC Emissions for 2014 (tons) .....	2-2
Table 2-3. NO <sub>x</sub> Emissions in 2014 (tons) .....	2-2
Table 2-4. VOC Emissions in 2014 (tons).....	2-3
Table 2-5. NO <sub>x</sub> Emissions for Reid Gardner.....	2-4
Table 3-1. Stakeholder Organizations and Frequency of Meetings.....	3-3
Table 4-1. Clark County Solar Projects .....	4-2
Table 4-2. Chevy Volt Emission Reductions.....	4-8
Table 4-3. Chevy Malibu Hybrid Emission Reductions .....	4-8
Table 4-4. Emission Reduction Comparison—Chevy Volt.....	4-8
Table 4-5. Emission Reduction Comparison—Chevy Malibu Hybrid.....	4-8
Table 6-1. Renewable Energy Projects .....	6-1
Table 6-2. Annual Displacement .....	6-2

## List of Figures

Figure 1-1. Fourth-Highest Annual Ozone Value by Year (2007–2016). .....	1-2
Figure 1-2. Ozone Design Value History (2007–2016). .....	1-2
Figure 1-3. Average Wind Speed (1980–2016). .....	1-3
Figure 1-4. Average Wind Direction (1980–2016). .....	1-4
Figure 1-5. Airflow in Clark County. ....	1-4
Figure 2-1. NO <sub>x</sub> Source Apportionment. ....	2-1
Figure 2-2. VOC Source Apportionment. ....	2-2
Figure 4-1. Nevada Renewable Capacity and Generation. ....	4-1
Figure 4-2. Energy Reductions in State-Owned Buildings. ....	4-5
Figure 4-3. I-11 Boulder City Bypass Project. ....	4-7
Figure 4-4. Nevada Electric Highway. ....	4-9
Figure 4-5. Electrical Vehicle Charging Stations in the Las Vegas Area. ....	4-10
Figure 6-1. Inputs for AVERT Model. ....	6-1
Figure 6-2. Monthly Displacements. ....	6-2

## List of Acronyms and Abbreviations

### Acronyms

AQS	Air Quality System
CMAQ	Congestion Mitigation and Air Quality
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
PPA	power purchase agreement
PV	photovoltaic
RPS	Renewable Portfolio Standard
RTC	Regional Transportation Commission of Southern Nevada
SEZ	Solar Energy Zone
WESTAR	Western States Air Resources Council
WRAP	Western Regional Air Partnership

### Abbreviations

CO	carbon monoxide
CO <sub>2</sub>	carbon dioxide
kW	kilowatt
kWh	kilowatt-hour
MW	megawatt
MWh	megawatt-hour
NO <sub>x</sub>	nitrogen oxides
ppb	parts per billion
ppm	parts per million
VOC	volatile organic compound

## 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. As Clark County enters its fifth year of participation in the program, DAQ continues to investigate innovative ways to reduce precursors to ozone formation and new ways to reach out to and educate the public.

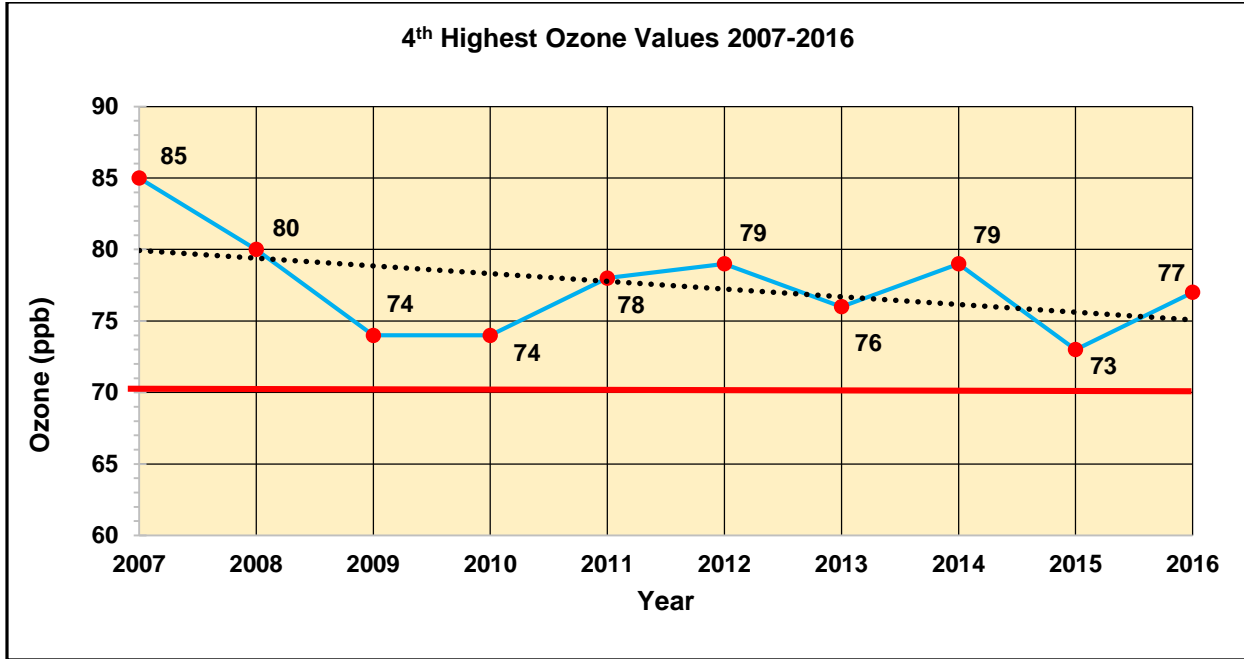
For the 2017 update, DAQ's primary focus is public outreach, which will include creating a public outreach website and exploring participation in the Air Quality Flag Program. Future projects may include the use of Federal Highway Administration Congestion Mitigation and Air Quality (CMAQ) improvement funds to acquire more hybrid or electric vehicles. EPA staff comments provided several ideas to investigate, some of which may be implemented in 2017 and forward.

### Current Attainment Status

Clark County is currently in attainment/unclassifiable for the 2008 8-hour ozone National Ambient Air Quality Standard (NAAQS) of 75 parts per billion (ppb). The "Area Designation Recommendations for the 2015 Ozone NAAQS for Clark County," in support of the EPA process for implementing the 2015 8-hour ozone standard of 0.070 ppm, was submitted in September 2016. Based on the monitoring data, parts of Clark County do not meet the 2015 8-hour standard of 70 ppb and will be designated nonattainment. By law, the state of Nevada uses hydrographic areas to define airsheds for regions of attainment, unclassifiable, and nonattainment.

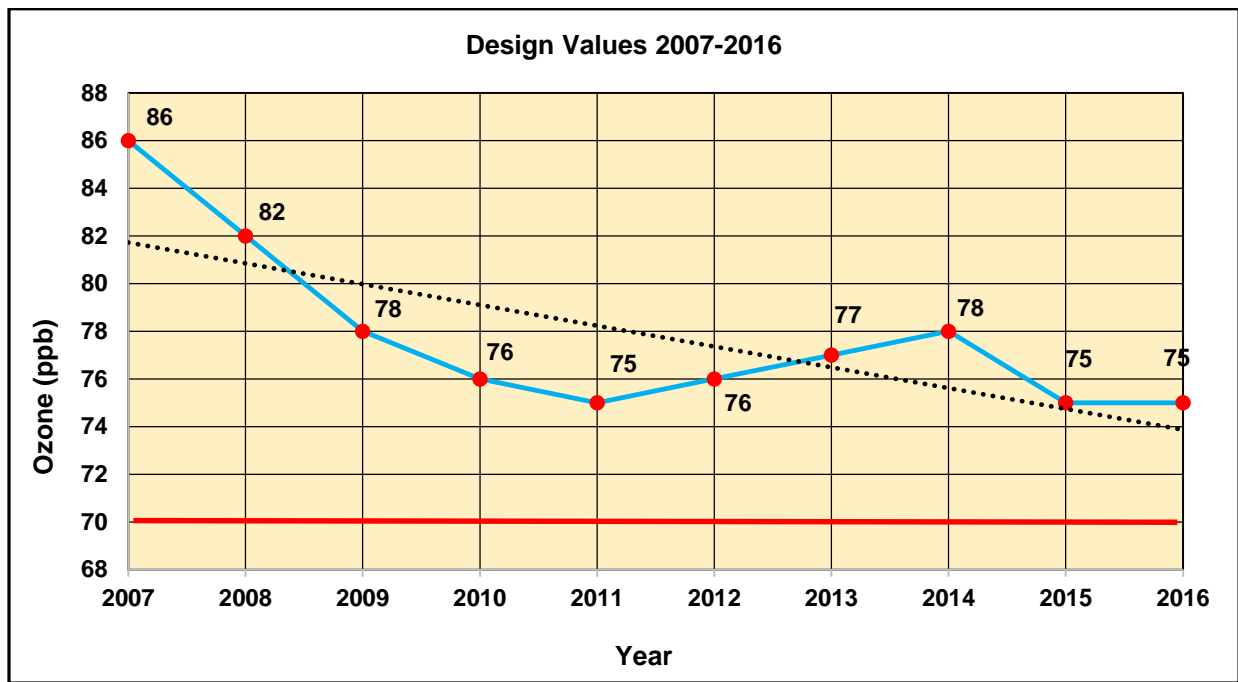
Figure 1-1 shows Clark County's fourth-highest annual ozone history for 2007–2016. These values make up the design value calculations. The fourth-highest value for the respective year is averaged with two other years for a three-year average to derive the design value for the most current year and complete three years of quality assured data.

Clark County's ozone design value history (Figure 1-2) 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, and remained constant in 2016, at 75 ppb. The design value for 2015 and 2016 is 75 ppb, 5 ppb above the 2015 8-hour ozone standard of 70 ppb.



**Data Source:** EPA's Air Quality System (AQS) AMP480 Design Value Report ID 1552601, May 4, 2017.  
**Note:** 2015 NAAQS (70 ppb) depicted as a red line.

**Figure 1-1. Fourth-Highest Annual Ozone Value by Year (2007–2016).**



**Data Source:** EPA's AQS AMP480 Design Value Report ID 1552601, May 4, 2017.  
**Note:** 2015 NAAQS (70 ppb) depicted as a red line.

**Figure 1-2. Ozone Design Value History (2007–2016).**

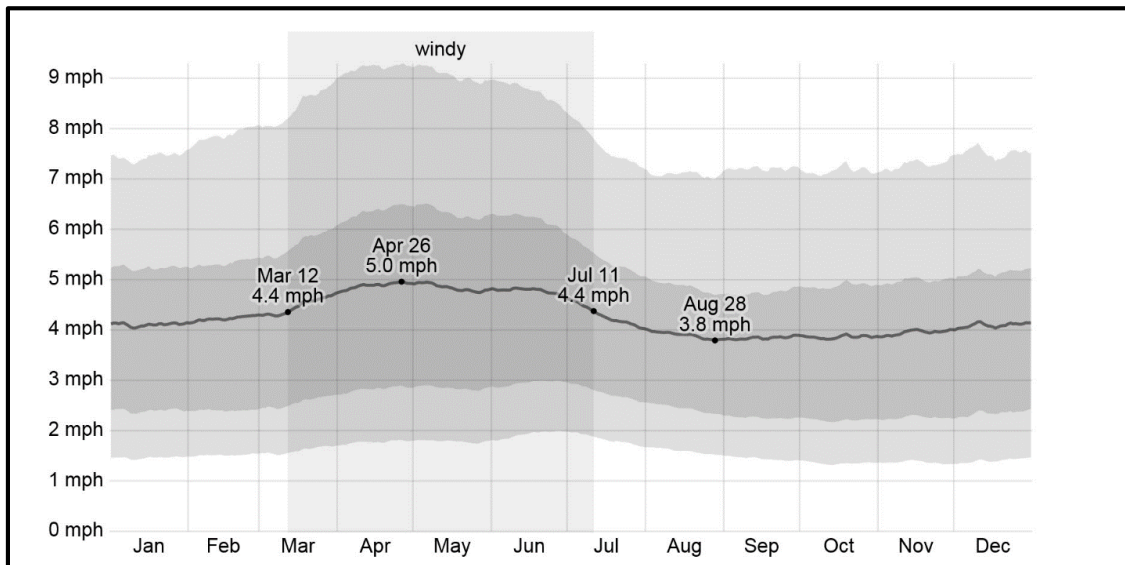


## Impacts of Meteorological Conditions on Ozone Concentrations

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.

### Wind Speeds

According to historical data collected in the Las Vegas Valley from 1980–2016, the highest monthly average wind speeds occur between mid-March and mid-July (Figure 1-3), the same time period that ozone concentrations are highest in Las Vegas. The average of mean hourly wind speeds is depicted by a dark gray line. The 25<sup>th</sup> to 75<sup>th</sup> percentile band is shown by a dark gray shade, while the 10<sup>th</sup> to 90<sup>th</sup> percentile band is indicated by a light gray shade.

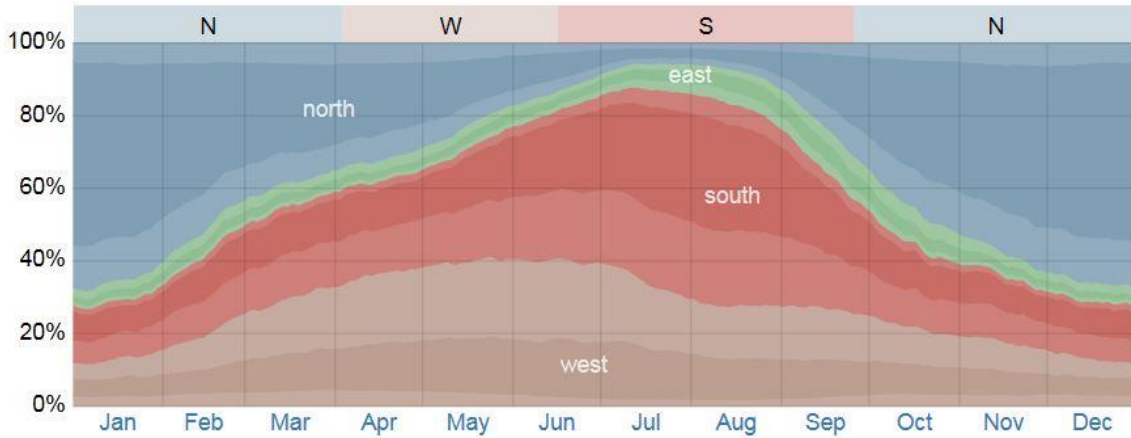


**Data Source:** <http://weatherspark.com/averages/30697/Las-Vegas-Nevada-United-States>.

**Figure 1-3. Average Wind Speed (1980–2016).**

### Average Wind Direction

Figure 1-4 shows the average wind direction over the entire year. The figure excludes hours in which the mean wind speed is less than 1 mile per hour. The dark colors represent the four cardinal directions (north, east, south, and west); the lightly tinted areas represent the intermediate directions (northeast, southeast, southwest, and northwest). The most common wind direction in the Las Vegas Valley is from the southwest.



Data Source: <https://weatherspark.com/y/2228/Average-Weather-in-Las-Vegas-Nevada-United-States>.

Figure 1-4. Average Wind Direction (1980–2016).

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

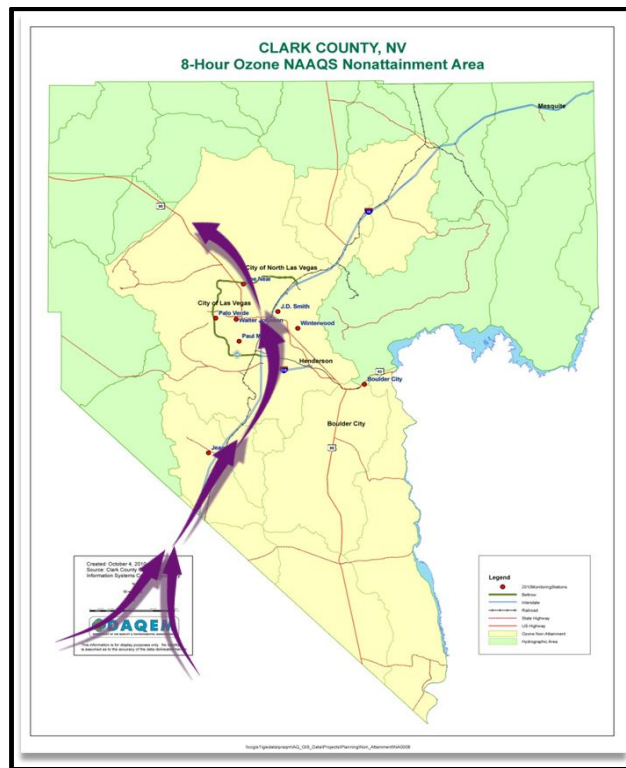


Figure 1-5. Airflow in Clark County.

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

## **Ozone Health Effects and Sources**

Ozone, a gas comprised of three oxygen atoms, 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. Ozone may also damage crops, trees, and other vegetation.

Ground-level ozone is not usually emitted directly into the air, but is formed through chemical reactions between nitrogen oxides (NO<sub>x</sub>) 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<sub>x</sub> 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 formation 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 fragrances in personal care products.

The reaction of atmospheric nitrogen at the high temperatures produced when fuels are burned creates NO<sub>x</sub>. 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<sub>x</sub>. Other contributions come from small, widely distributed sources ("area sources"), such as fires and natural gas-fired 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 because it interferes with the ability of plants to produce and store food, making them more susceptible to disease, insects, harsh weather, and other air pollutants. Stressed vegetation can impact crop and forest yields.

Ozone source categories include:

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

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

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

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

**Area:** VOC sources, including gas stations, dry cleaners, print shops, and consumer products, and NO<sub>x</sub> sources, including forest fires, residential fires, and natural gas-fired water heaters.

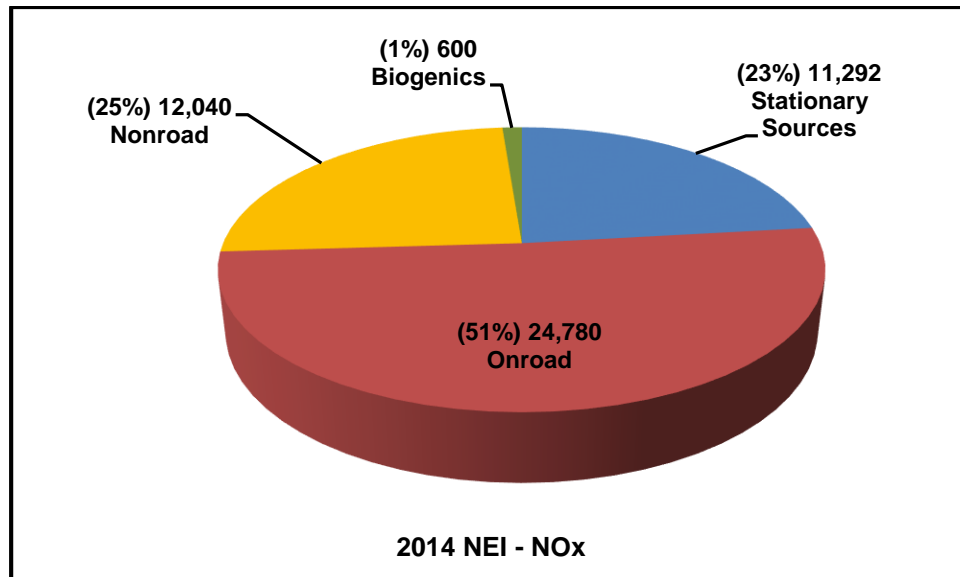
## 2. Emission Sources

DAQ submits emission inventory data to EPA for stationary, area, on-road, and non-road sources. Most of this emission information is based on local data, figures submitted by source facilities, or estimates made using population data.

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<sub>x</sub> and VOCs, considered the primary precursors for ozone. Tables 2-1 and 2-2 provide NO<sub>x</sub> and VOC data for four source categories: stationary, on-road, non-road, and biogenics. Figures 2-1 and 2-2 illustrate the data in these tables. The stationary source group includes point and area sources.

**Table 2-1. NO<sub>x</sub> Emissions for 2014 (tons)**

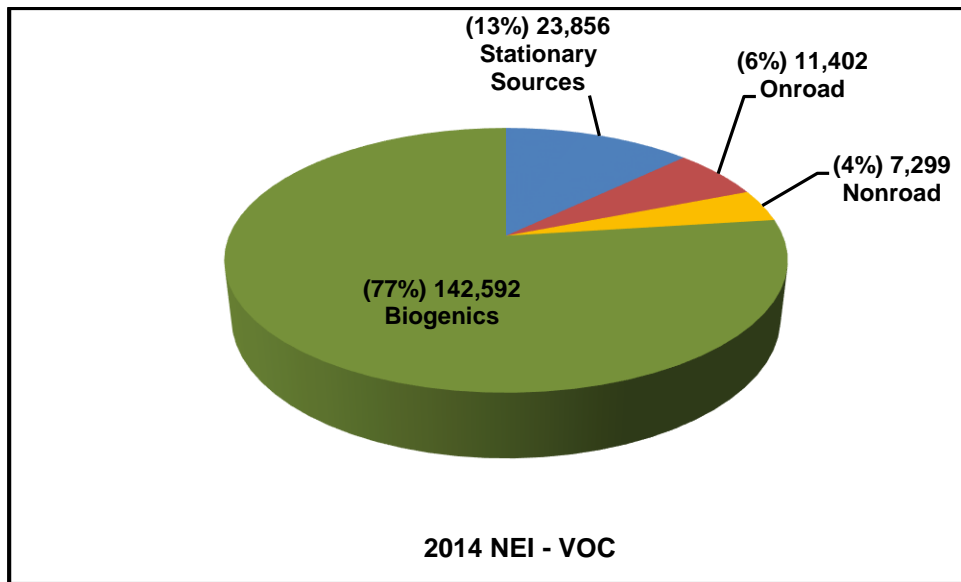
Source Category	2014 Emissions
Stationary	11,292
On-road	24,780
Non-road	12,040
Biogenic	600
<b>TOTAL</b>	<b>48,712</b>



**Figure 2-1. NO<sub>x</sub> Source Apportionment.**

**Table 2-2. VOC Emissions for 2014 (tons)**

Source Category	2014 Emissions
Stationary Sources	23,856
Onroad	11,402
Nonroad	7,299
Biogenic	142,592
<b>TOTAL</b>	<b>185,149</b>



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

## Emissions and Source Categories

Tables 2-3 and 2-4 list TIER 1 NO<sub>x</sub> and VOC emission data by tons per year, respectively, for 2014. Vehicles (on-road and non-road) make up the two highest categories of NO<sub>x</sub> emissions and account for 76 percent of the 2014 total in Clark County. Biogenics make up the highest category of VOC emissions, accounting for 77 percent of the 2014 total. Solvent use is the second-highest category of VOCs, followed by on-road vehicles.

**Table 2-3. NO<sub>x</sub> Emissions in 2014 (tons)**

TIER 1 NAME	NO <sub>x</sub>	% of Total
Highway vehicles	24,780	51
Off-highway	12,040	25
Fuel comb. – elec. util.	4,924	10
Fuel comb. – other	2,615	5
Other industrial processes	1,791	4

TIER 1 NAME	NO <sub>x</sub>	% of Total
Fuel comb. – industrial	1,049	2
Biogenics – vegetation & soil	600	1
Waste disposal & recycling	868	2
Miscellaneous	16	<1
Petroleum & related industries	21	<1
Storage & transport	5	<1
Solvent utilization	2	<1
Metals processing	<1	<1
<b>TOTAL</b>	<b>48,711</b>	

**Table 2-4. VOC Emissions in 2014 (tons)**

TIER 1 NAME	VOC	% of Total
Biogenics – vegetation & soil	142,592	77
Highway vehicles	11,402	6
Solvent utilization	17,127	9
Off-highway	7,299	4
Storage & transport	3,263	2
Fuel comb. – other	846	<1
Other industrial processes	196	<1
Miscellaneous	136	<1
Waste disposal & recycling	1,969	1
Fuel comb. – elec. util.	285	<1
Fuel comb. – industrial	14	<1
Petroleum & related industries	18	<1
Metals processing	2	<1
<b>TOTAL</b>	<b>185,149</b>	

According to EPA’s Air Markets Program Data website,<sup>1</sup> total 2014 NO<sub>x</sub> emissions in Clark County equaled 4,272 tons per year, with Reid Gardner Generating Station contributing 3,673 tons per year, or 86 percent (Table 2-5).

Nevada Senate Bill 123, passed in June 2013, accelerated the retirement of the Reid Gardner Generating Station, significantly reducing NO<sub>x</sub> emissions in Clark County. Three of the plant's four units closed in 2014, and the remaining unit closed in March 2017.

<sup>1</sup> <http://ampd.epa.gov/ampd/>

**Table 2-5. NO<sub>x</sub> Emissions for Reid Gardner**

	Tons per Year
NEI 2014 Utilities	4,272
Reid Gardner utility boilers 2014	3,673
Reid Gardner utility boiler 2015	524
Reid Gardner utility boiler 2016	406

In 2015, Reid Gardner NO<sub>x</sub> emissions were 524 tons per year, a reduction of 86 percent from 2014 levels. In 2016, NO<sub>x</sub> emissions from Reid Gardner were 406 tons per year, a reduction of 89 percent from 2014 levels (Table 2-5).

### **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 levels in Clark County. 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.



### 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 and actions. 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, and was further refined in January 2000 by inter-local 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 completed the “Southern Nevada Strong” regional plan, which includes policies that provide for alternative modes of transportation.

The Nevada **Advisory Committee on Control of Emissions from Motor Vehicles** was established in June of 1990 by the Nevada State Legislature. The committee was charged to:

- Establish program goals and objectives for control of motor vehicle emissions.
- Identify areas where funding should be made available.
- Review and make recommendations concerning adopted regulations.

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. The council’s 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.

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<sub>x</sub> and VOC emissions. The council has been an excellent platform to exchange information with agencies outside of Clark County and to evaluate their control programs.

**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 information from various 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 habitat, 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 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 site locations, 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 biennially to discuss environmental issues in Nevada and the requirements of upcoming regulatory documents and reports.

**Nevada Air Agencies** including the Nevada Division of Environmental Protection, DAQ and Washoe County’s Air Quality Management Division have a monthly teleconference to discuss the air quality issues pertaining to the State of Nevada. Issues the teleconference covers include, but are not limited to 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
Southern Nevada Fleet Association	Every other month
Metropolitan Planning Subcommittee	Every other month
Southern Nevada Regional Planning Coalition	Monthly
Southern Nevada Home Builders Association	Monthly
Advisory Committee on Control of Emissions from Motor Vehicles	Quarterly
Western States Air Resources Council	Semiannually
Western Regional Air Partnership	Semiannually
DAQ Air Quality Planning Division and Monitoring Division Committee	Monthly
Nevada Air Quality Agencies Consortium	Biennial
Nevada Air Agencies	Monthly

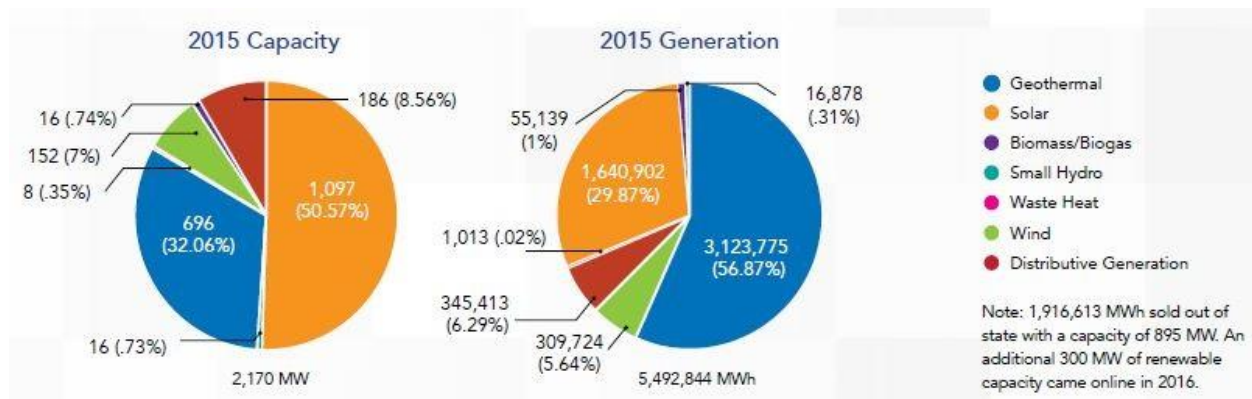
## 4. Energy Programs

In 2015, Nevada ranked second in the nation in utility-scale electricity generation from geothermal energy, and fifth from solar energy (<http://www.eia.gov/state/print.cfm?sid=nv>). Those two sources together accounted for 13.5 percent of Nevada’s net electricity generation in 2015. 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 through 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 percent of the total to 6 percent 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, half of which 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.

### Solar

Figure 4-1 shows the energy capacity installed and the energy generated, respectively, in 2015. “Nameplate capacity” is the maximum rated electric output a generator can produce under specific conditions. “Generation” is the amount of electricity a generator actually produces over a specific time. In the year 2015, 2,170 megawatts (MW) of renewable energy were installed and 5,493,000 megawatt-hours (MWh) were generated ([http://energy.nv.gov/uploadedFiles/energynv.gov/content/About/2016\\_StateOfNevada\\_StatusOfEnergyReport.pdf](http://energy.nv.gov/uploadedFiles/energynv.gov/content/About/2016_StateOfNevada_StatusOfEnergyReport.pdf)).



Data Source: 2016 State of Nevada Status of Energy Report (Governor's Office of Energy).

Figure 4-1. Nevada Renewable Capacity and Generation.

Nevada ranked fourth nationally in solar capacity installed in 2016 (984 MW). A total of 2,191 MW put Nevada fourth nationally in the category of total installed solar capacity. There is enough solar generation in the state to power 372,000 homes (<http://www.seia.org/state-solar-policy/nevada>).

Large retailers (such as Target) have adopted solar energy at their facilities in Clark County (<http://www.seia.org/research-resources/solar-means-business-2016>). The Mandalay Bay Resort Convention Center has installed photovoltaic (PV) systems with 5,000 kilowatts (kW) of solar capacity at their location in Las Vegas. The Venetian Hotel and Casino features 680 solar PV panels with a peak output of 116 kW. Swedish retailer IKEA installed the state’s largest single-use retail rooftop solar array ([http://www.ikea.com/us/en/about\\_ikea/newsitem/051316-IKEA-Las-Vegas-Grand-Opening](http://www.ikea.com/us/en/about_ikea/newsitem/051316-IKEA-Las-Vegas-Grand-Opening)).

### Solar Projects

Table 4-1 lists solar generating projects in Clark County.

**Table 4-1. Clark County Solar Projects**

Owner	Plant Name	Nameplate Capacity	Power Purchase Agreement	Status
American Capital/ Searchlight Solar LLC	Searchlight Solar I	20 MW	NV Energy	Began operating January 2015
First Solar/Moapa Southern Paiute Solar	Moapa Southern Paiute Solar Project	250 MW	LA Dept. Water & Power	Began operating March 2017
NextEra Energy Re- sources	Silver State South Solar Energy Center	250 MW	SoCal Edison	Began operating December 2016
Sempra Energy	Copper Mountain 2	150 MW	PG&E	Began operating July 2012
	Copper Mountain 3	250 MW	Southern California Public Power Authority	Began operating May 2014
	Copper Mountain 4	94 MW	SoCal Edison	Began operating December 2016
SunPower	Nellis AFB Solar Array II	15 MW	Nellis AFB	Began operating February 2016
SunPower	Boulder Solar I	100 MW	NV Energy	Began operating December 2016
	Boulder Solar II	50 MW	NV Energy	Began operating February 2017
First Solar Playa Solar	Playa Solar 1 (Switch Station 1)	79 MW	NV Energy/Switch	Under construction
	Playa Solar 2 (Switch Station 2)	100 MW	NV Energy/Switch	Under construction
First Solar	Aiya Solar Project	100 MW	Unknown	Under development
First Solar	Snow Mountain Solar Project	100 MW	Unknown	Under development
Nextera Energy	Yellow Pine Solar	250 MW	Unknown	Under development

## **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. Searchlight Solar I started operation in the first quarter of 2015. American Capital has a 20-year power purchase agreement (PPA) with NV Energy for power supplied by this plant.

## **2. Moapa Southern Paiute Solar Project (K-Road 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 a 25-year PPA with the Los Angeles Department of Water and Power. Construction began in April 2015, and commercial operations began in March of 2017. It generates enough solar energy to serve the needs of about 110,000 homes per year, displacing approximately 341,000 metric tons of carbon dioxide (CO<sub>2</sub>) annually—the equivalent of taking about 73,000 cars off the road (<http://www.firstsolar.com/Resources/Projects/Moapa-Southern-Paiute-Solar-Park>).

## **3. Silver State South Solar Project**

Silver State South Solar is owned and operated by NextEra Energy. First Solar began construction on this 250 MW plant in the fall of 2014, and operations began in December 2016. The plant's power is sold to Southern California Edison under a 20-year PPA. It is expected to generate enough electricity to power 80,000 homes per year, displacing approximately 150,000 metric tons of CO<sub>2</sub> annually—the equivalent of taking nearly 30,000 cars off the road (<http://www.nexteraenergyresources.com/news/contents/2016/120816.shtml>).

## **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. Sempra 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. In 2013, the company broke ground on Copper Mountain 3, a 250 MW plant that began operations in the summer of 2014. Construction on the 94 MW Copper Mountain 4 plant began in late 2015, with operations beginning in the fourth quarter of 2016 (<http://www.semprarenewables.com/energy-solutions/solar>).

## **5. Nellis Solar Array II**

SunPower completed construction on a 15 MW solar power plant at Nellis Air Force Base in February 2016. The solar plant will displace 27,000 tons of CO<sub>2</sub> emissions annually (<http://www.acc.af.mil/News/ArticleDisplay/tabid/5725/Article/660195/nafb-powered-by-sun-installation-unveils-dods-largest-solar-array.aspx>).

## **6. Boulder Solar I & II**

SunPower began construction on the 100 MW Boulder Solar I project in January 2016 under a 20-year PPA with NV Energy, and the plant began operation in December 2016. Boulder Solar II is a 50 MW project that began commercial operation in February 2017 (<https://www.nvenergy.com/company/mediaroom/newsdetail.cfm?n=136960>).

## **7. Playa Solar 1 and 2 (previously Switch Stations 1 & 2)**

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, the BLM established 19 Solar Energy Zones (SEZs). In June 2014, the BLM auctioned off six parcels in Nevada's Dry Lake SEZ for the following three projects:

- Harry Allen Solar Energy Center, 134 MW (Invenergy)
- Playa Solar 1 & 2 Projects, 180 MW (First Solar)
- Dry Lake Solar Energy Center, 150 MW (NV Energy)

Environmental assessments were completed in late 2014, and BLM issued a final approval of the three projects in June 2015. The three projects combined are expected to generate approximately 460 MW of electricity, enough to power 132,000 homes.

Playa Solar 1 (79 MW) and Playa Solar 2 (100 MW) are under construction by First Solar, which has a PPA with NV Energy.

## **8. Aiya Solar Project**

First Solar has been working with the Moapa Band of Paiutes on the 100 MW Aiya Solar Project, which will be located about 40 miles north of Las Vegas on the Moapa River Indian Reservation. A record of decision approving the project's Environmental Impact Statement was published in September 2016. Construction will take between 12 and 15 months.

## **9. Snow Mountain Solar**

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, 15 miles northwest of Las Vegas Valley. The Environmental Impact Statement is still being drafted.

## **10. Yellow Pine Solar**

Yellow Pine Solar is a 250 MW project proposed for Sandy Valley along State Highway 160, 32 miles west of Las Vegas. The project is under development.

## Energy Efficiency and Renewable Energy

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

The Nevada Governor’s Office of Energy (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 requires 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 16.5 percent reduction in energy use between 2007 and 2016 in 93 percent of the state-owned buildings it services (Figure 4-2). ([http://energy.nv.gov/uploadedFiles/energynv.gov/content/About/2016\\_StateOfNevada\\_StatusOfEnergyReport.pdf](http://energy.nv.gov/uploadedFiles/energynv.gov/content/About/2016_StateOfNevada_StatusOfEnergyReport.pdf))

Lucid Design Group, Inc., under a 4-year contract with the GOE, has been running energy management information software that will organize, track, benchmark, analyze, and report out all usage and costs related to energy consumed and purchased by the state. This has allowed the GOE to track energy consumption in individual buildings, work with facility managers to identify energy waste, and implement energy-saving programs using real-time data.

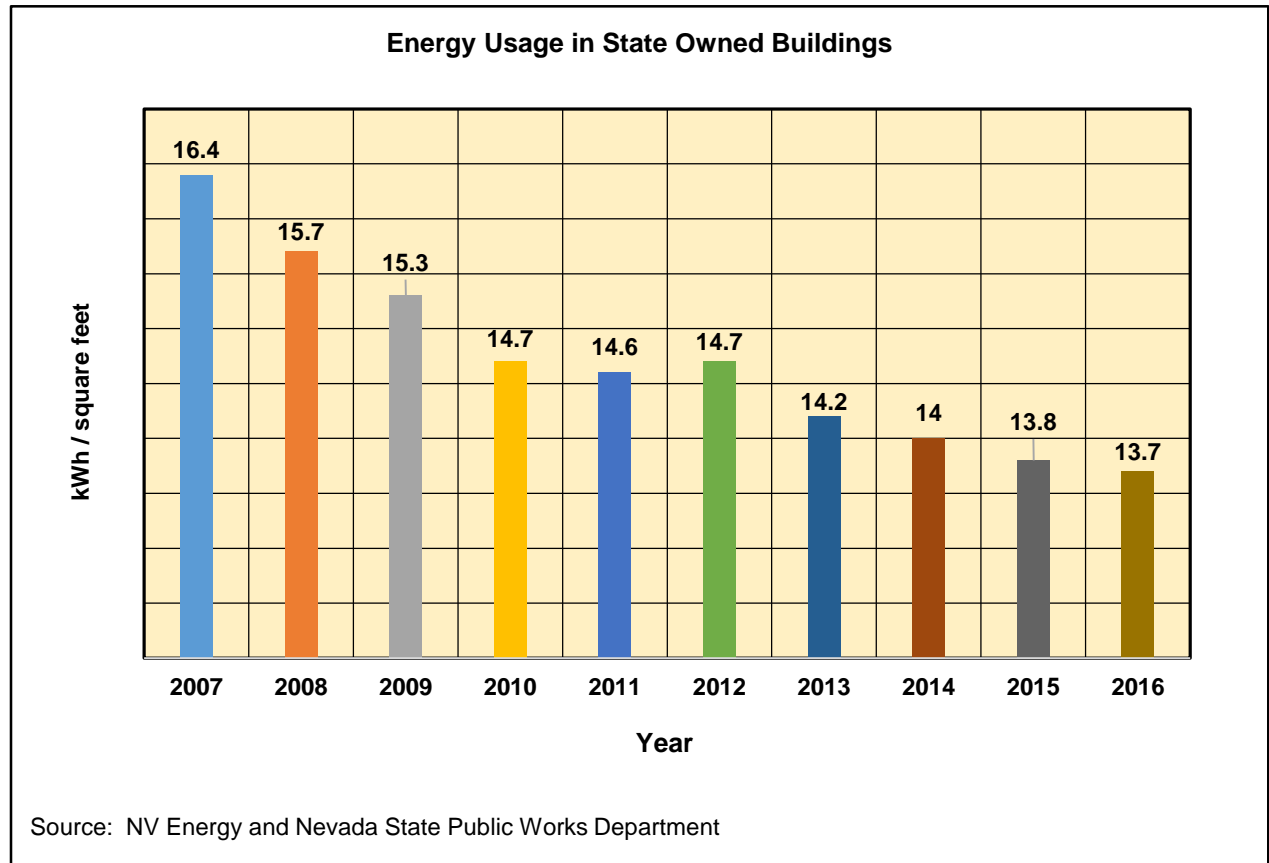


Figure 4-2. Energy Reductions in State-Owned Buildings.



## 2. City of Las Vegas

The City of Las Vegas receives 100 percent of its power from renewable energy sources ([https://www.lasvegasnevada.gov/portal/faces/wcnav\\_externalId/ci-sustainability?\\_adf.ctrl-state=jxmvxmkyd\\_4&\\_afLoop=37189238560815288](https://www.lasvegasnevada.gov/portal/faces/wcnav_externalId/ci-sustainability?_adf.ctrl-state=jxmvxmkyd_4&_afLoop=37189238560815288)) after entering into a Renewable Energy Agreement with NV Energy. The city now runs more than 140 facilities—everything from City Hall to parks to streetlights—on clean energy.

The city also powers on-site facilities with solar panels in the City Hall plaza, solar shade canopies at city parks, and solar arrays on city-owned building roofs and at the wastewater treatment plant. Beginning in October 2017, the city will begin drawing 2 MW of power from Hoover Dam.

## 3. Clean Energy Project

Clean Energy Project is a nonprofit, nonpartisan organization focused on promoting the benefits of clean, renewable energy in Nevada. It publishes the Green Business Guide 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](http://cleanenergyprojectnv.org)). Companies must do the following to be listed in the Green Business Guide:

- 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 teach employees how to be more energy-smart.

## 4. Pollution Prevention Grant Program

DAQ has committed to participating in a multistate collaborative effort to demonstrate safe, low-VOC, low-toxicity alternatives for industrial cleaning applications during EPA’s upcoming 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

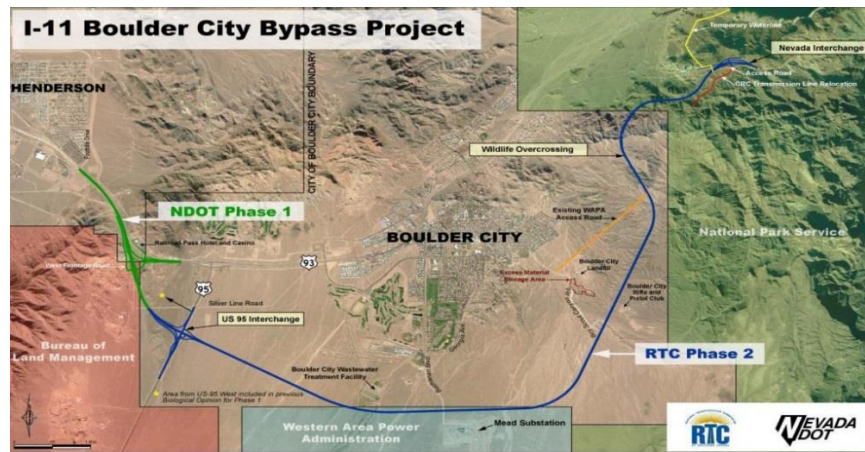
### 1. Project NEON

Project Neon will widen 3.7 miles of Interstate 15 between Sahara Avenue and the U.S. 95/I-15 interchange near downtown Las Vegas. This stretch of I-15 is the busiest in Nevada, carrying more than 300,000 vehicles daily—a number projected to double by 2035 (<http://ndotproject-neon.com/learn/overview/>). Project NEON is expected to reduce accidents and other travel delays, bringing down idling times and NO<sub>x</sub> emissions. The project includes High-Occupancy Vehicle

lanes between U.S. 95 and I-15, along with better connections to surface streets into and out of the downtown area. Construction began in July 2016 and is scheduled for completion in 2019.

## 2. Boulder City Bypass / Proposed Interstate 11

The Boulder City bypass involves road improvements to U.S. Highway 93, a major commercial corridor and the only route through Boulder City. Construction began in May 2015; NDOT is constructing the 2.5-mile Phase 1 portion of I-11 from Railroad Pass to U.S. 95 (Figure 4-3), while the RTC is constructing the 12.5-mile Phase 2 route from U.S. 95 to U.S. 93, near the Hoover Dam bypass bridge. Construction should be complete by January 2018 (<http://i-11nv.com/>).



Data Source: <https://www.nevadadot.com/projects-programs/road-projects/interstate-11>

Figure 4-3. I-11 Boulder City Bypass Project.

U.S. 93 carries more than 34,000 vehicles per day through the main street of Boulder City. The Boulder City bypass will allow traffic to flow through the area without the stoplights and congestion associated with the current main street route.

## 3. Clark County Fleet

The county has 2,837 vehicles, 492 of which are hybrids. The fleet contains ten Chevy Volts and 126 SmartWay vehicles—cars and trucks that EPA has certified for improved fuel efficiency and reduced environmental impact.

## 4. 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, e.g., carpooling, vanpooling, walking, bicycling, public transport, compressed work weeks, and telecommuting. It has partnered with nearly 350 employers to register more than 40,000 commuters in Clark County. Successes of the program include the reduction of 72 tons of carbon monoxide (CO) and 3,046 tons of greenhouse gases; the removal of nearly 7.2 million vehicle travel miles from the road; and the addition of 9,696 new commuters in 2016. RTC

awarded a “Bronze Partnership” certificate of appreciation in 2016 to DAQ in recognition of its efforts to support the Club Ride Program.

### 5. Congestion Mitigation and Air Quality Improvement Program

DAQ used CMAQ funding to purchase 4 Chevrolet Volts (plug-in hybrid electric vehicles) and 12 Chevy Malibus (hybrid electric vehicles) in Phase 1 (fiscal year 2017 [FY17]) of the electric vehicle purchase project. In Phase 2 (FY18), DAQ will purchase 3 Chevrolet Volts and 12 Chevy Malibu Hybrids. In Phase 3 (FY19), DAQ will purchase 3 Chevrolet Volts and 11 Chevy Malibu Hybrids. The three phases combined will purchase 45 vehicles. Tables 4-2 and 4-3 show total vehicle emission reductions expected by 2020 by vehicle type, and Tables 4-4 and 4-5 show total emissions reduction compared with a midsize gasoline car.

**Table 4-2. Chevy Volt Emission Reductions**

Pollutant	Emission Reductions (kg/day/vehicle)	Emission Reductions (kg/day/all vehicles)	Total Emission Reductions over Vehicle Life (kg/all vehicles)
VOCs	0.005	0.055	228
CO	0.071	0.712	2,962
NO <sub>x</sub>	0.005	0.046	192

**Table 4-3. Chevy Malibu Hybrid Emission Reductions**

Pollutant	Emission Reductions (kg/day/vehicle)	Emission Reductions (kg/day/all vehicles)	Total Emission Reductions over Vehicle Life (kg/all vehicles)
VOCs	0.003	0.105	436
CO	0.040	1.395	5,807
NO <sub>x</sub>	0.003	0.096	401

**Table 4-4. Emission Reduction Comparison—Chevy Volt**

Pollutant	Reduction
VOCs	80%
NO <sub>x</sub>	73%
<b>Average:</b>	<b>77%</b>

**Table 4-5. Emission Reduction Comparison—Chevy Malibu Hybrid**

Pollutant	Reduction
VOCs	43%
NO <sub>x</sub>	43%
<b>Average:</b>	<b>43%</b>

## 6. Anti-Idling Regulations

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 idling while maintenance procedures are being performed at a repair facility.

## 7. Nevada Electric Highway

The Nevada Electric Highway is a joint venture between the GOE, NV Energy, and the Valley Electric Association to expand Nevada’s infrastructure for charging electric vehicles. Using federal and state grants, the three partner with businesses along U.S. 95 to provide charging stations in Indian Springs, Beatty, Tonopah, Hawthorne, and Fallon (Figure 4-4). The Beatty location 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 437 mile distance between Las Vegas and Reno (<http://nevadaeva.org/nevada-charging-station-infrastructure-continues-growth/>).

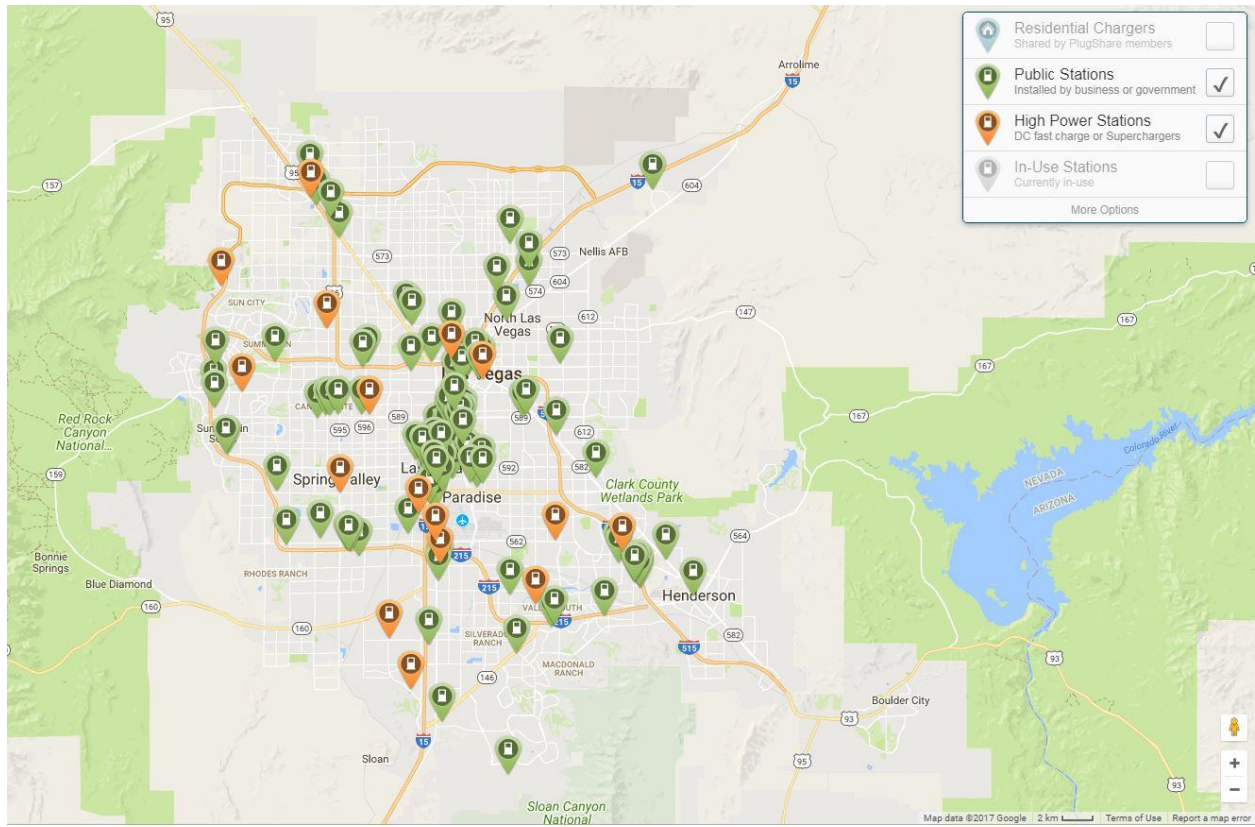


Data Source: <http://www.nvenergy.com/ev>

Figure 4-4. Nevada Electric Highway.

## 8. Electric Vehicle Charging Stations

Clark County has more than 130 electric vehicle charging locations (<http://www.nevadaeva.org/evse-locator-map>), the majority of which are free to the public. The Clark County Government Center has 9 stations, and many other charging centers are available across the Las Vegas Valley (Figure 4-5).



Data Source: <https://www.plugshare.com/>

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

## 5. Outreach

The goal of DAQ's public information and education 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 air quality forecasts and 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, and engages with outside organizations that focus on public outreach and communication. And the department produces a calendar with information and tips about local air quality issues.

In recent years, DAQ has updated brochures with current information on specific air quality topics and issues, identified outreach opportunities, reviewed outreach materials from other agencies, and given away promotional items as reminders. To reach a broader audience, the department will continue to target events that may not have an environmental purpose. Below is a list of DAQ outreach activities from May 2016 to June 2017.

### Outreach Events

- May 7, 2016, Mother's Day Weekend Women's Festival, Downtown Summerlin
- May 7, 2016, Las Vegas Science & Technology Festival, Cashman Center
- May 7, 2016, Boulder City's 29<sup>th</sup> Annual Spring Jamboree
- May 14, 2016, Jazz in the Park, Clark County Government Center
- May 21, 2016, American Patriot Fest
- May 28, 2016, Jazz in the Park, Clark County Government Center
- June 4, 2016, Father's Day Sports Expo, Downtown Summerlin
- August 6, 2016, Cox Communications Back to School Fair, Galleria Mall
- August 13, 2016, Cox Communications Back to School Fair, Meadows Mall
- August 13, 2016, Ward 5 Back to School Fair, Lorenzi Park
- August 20, 2016, Cox Communications Back to School Fair, Boulevard Mall
- August 23, 2016, Free to Breathe Run/Walk, Sunset Park
- August 27, 2016, Cox Communications Back to School Fair, Downtown Summerlin
- September 24, 2016, Springs Preserve Asian Heritage Celebration



- October 1, 2016, Health and Fitness Expo, Shops at Summerlin
- October 7, 2016, Construction Career Day, UNLV
- October 7 & 8, 2016, Golf Jam 2- Taylor Made Golf Experience
- October 13, 2016, Bureau of Reclamation Safety and Occupational Health Fair, Boulder City
- October 15, 2016, Get Outdoors Nevada Day, Lorenzi Park
- October 15, 2016, Henderson Community Expo
- November 12, 2016, Henderson Stroll ‘N Roll
- November 12, 2016, American Lung Association- Lung Force Walk & Sponsorship
- November 16 and 17, 2016, Clark County Health Fair
- January 28, 2017, 5<sup>th</sup> Annual Centennial Hills Expo, Northwest Career Technical Academy
- February 4, 2017, Mardi Gras Vegas, Springs Preserve
- February 18, 2017, Black History Month Festival, Springs Preserve
- February 22, 2017, Young at Heart Senior Expo, Suncoast Hotel & Casino
- February 25, 2017, My Health and Wellness Expo, Santa Fe Station
- February 25, 2017, Diva’s Day Out, World Market Center
- April 1, 2017, Spring Plant Sale and Green Living Expo
- April 22, 2017, Nevada Green Alliance “GREENFEST,” Downtown Summerlin
- April 27, 2017, Dia Del Nino, Springs Preserve
- May 6, 2017, Las Vegas Science & Technology Festival, Cashman Center
- May 6, 2017, Ohana Festival, Springs Preserve
- May 20, 2017, 2<sup>nd</sup> Annual Las Vegas Free to Breathe 5k Run/Walk, Sunset Park
- May 20, 2017, Ice Cream Festival, Springs Preserve
- May 27, 2017, Jazz in the Park, Clark County Government Center

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 educating the public is essential to allow people to make informed decisions about their health and welfare. At outreach events, DAQ will inform people about EnviroFlash and the availability of near-real time monitoring data 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**

The Ozone Action Days program is a voluntary initiative that asks county residents to take additional preventive actions when high ozone levels are predicted. Clark County meteorologists can forecast when ground-level ozone may exceed health standards; on those days, Clark County faxes air quality messages to media outlets, government agencies, and other Ozone Action Day<sup>2</sup> participants. The department also makes Ozone Action Day messages and daily forecasts available to the public on its website.

## **Air Quality Flag Program**

DAQ is in the process of scoping an Air Quality Flag Program mirroring EPA's AIRNow program. The goal of the Air Quality Flag Program 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.

---

<sup>2</sup> *Clark County Nevada Ozone Redesignation Request and Maintenance Plan*, Section 4.4.2.5.



## 6. Emission Reductions

DAQ used EPA’s **A**Voided **E**missions and gene**R**ation **T**ool (AVERT) to calculate emission reductions in 2016, which were significantly attributable to renewable energy programs. Projects completed in 2016 and their generating capacities are listed in Table 6-1. Figure 6-1 shows the corresponding input file for the AVERT model (v1.5\_03-01-17).

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

Type	Project	MW
Solar	Copper Mountain Solar 4	94
	Nellis AFB Solar Array II	15
	Boulder Solar I	100
	NRG Solar Las Vegas MB1	5
	Total	214

**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
<b>OR</b>		
Reduce each hour by constant MW:	0.0	MW

**And/or enter annual capacity of RE resources**

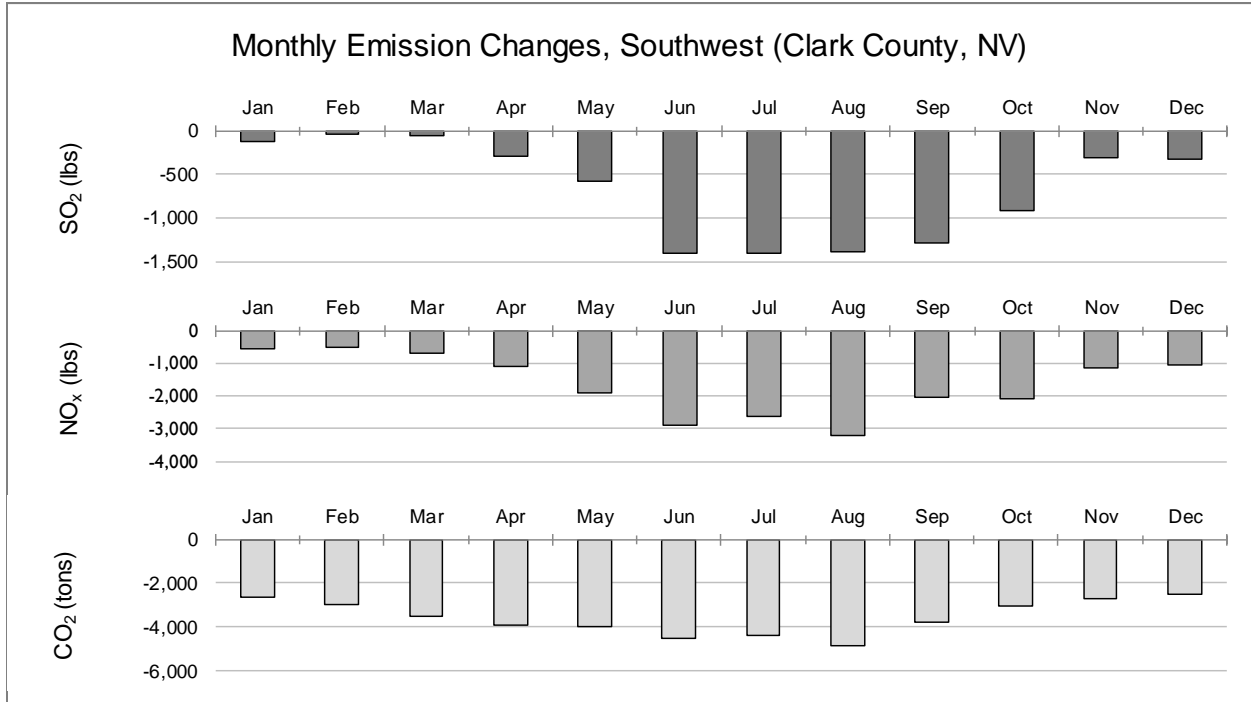
Wind Capacity:	0	MW
Utility Solar PV Capacity:	214	MW
Rooftop Solar PV Capacity:	0	MW

**Figure 6-1. Inputs for AVERT Model.**

According to the model, renewable energy generation in 2016 displaced 85,460 MWh, which equals a reduction of 19,900 pounds of NO<sub>x</sub>. During the ozone season, renewable energy displaced a total of 12,670 pounds of NO<sub>x</sub> in Clark County (Table 6-2). Figure 6-2 shows the monthly emission reductions for specific criteria pollutants.

**Table 6-2. Annual Displacement**

Peak Gross Generation Post-EERE (MW)	Annual Gross Generation Post-EERE (MWh)	Annual Displaced Generation (MWh)	Annual Displaced NO <sub>x</sub> (lb)	Annual Displaced CO <sub>2</sub> (tons)	Ozone Season Displaced NO <sub>x</sub> (lb)	Ozone Season, 10 Peak Days Displaced NO <sub>x</sub> (lb)
4,487	22,711,260	-85,460	-19,900	-43,040	-12,670	-60



Note: Negative numbers indicate displaced generation and emissions.

**Figure 6-2. Monthly Displacements.**

## **7. Conclusion**

Clark County as a community is continually striving to reduce VOC and NO<sub>x</sub> 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<sub>x</sub> emissions in the county.

DAQ will continue to research and evaluate other control measures, and will research and implement alternative ways of communicating ozone precursor reduction issues through public outreach. These concerted efforts on federal, state, and local levels should help Clark County meet and maintain the ozone NAAQS.