

Energy Report

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BACKGROUND

Authority

In accordance with Nevada State Law, Clark County is required to prepare a master plan “for the physical development of the city, county or region” (NRS) 278.150. In addition, and through a comprehensive state legislative package, the State of Nevada has drafted a set of provisions that have facilitated the adoption of an aggressive renewable energy (RE) effort.

Objectives of this Report

The Clark County Sustainable Energy Report provides high level background, analysis and recommendations as the basis for the new Sustainable Energy Chapter within the Conservation Element of the Comprehensive Plan. The Report provides an inventory of the existing local energy supply and forecasts future needs and demands of electricity, natural gas, fuels and alternative and renewable sources of energy. The goal of the Element is to help Clark County, in partnership with the Southern Nevada utilities providers, meet the current and future energy needs of its citizens in an efficient and sustainable manner.

Overview

This section of the Report is a high level introduction to the subject of Energy in Clark County, Nevada. It focuses on where we are today and sets the stage for the Analysis and Recommendations.

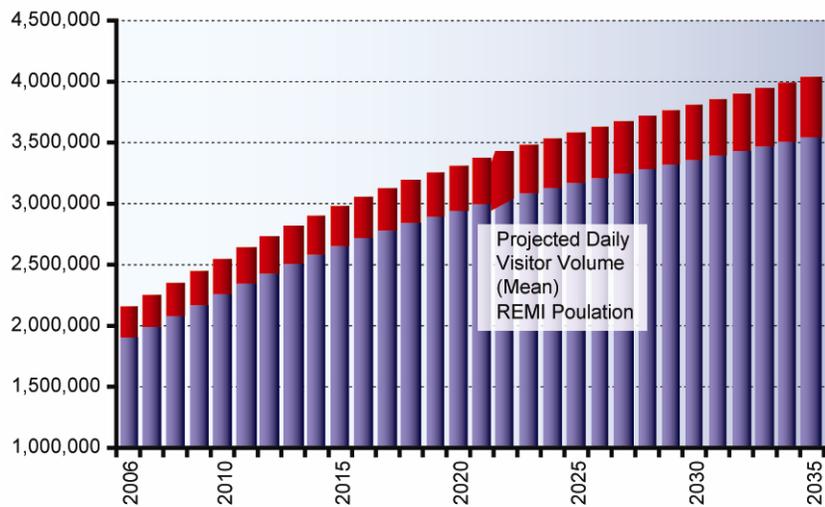
For some time, Clark County has been taking an active role in energy conservation. Prior to this planning effort, Clark County adopted the “Clark County Energy Management Strategy” and an “Energy Management Policy”. The purpose of these two items was to encourage energy conservation throughout County-owned facilities, heighten public awareness, and promote alternative and sustainable renewable sources of energy.

Local companies, organizations and the overall marketplace are already taking innovative leadership roles to improve fuel economy, increase spending on new construction technologies, and to provide venture capital for alternative sources of energy generation such as wind and solar technology. In addition, financial incentives in the form of grant, loan, and rebate programs for renewable energy installations are available from federal, state, utilities, nonprofits, and public/private partnerships.

Energy Use in Clark County

Clark County is one of the fastest growing counties in the United States. Over the last fifteen years, Clark County has had an average population growth rate of 5.6 percent a year. As of 2006, an average of 5,700 people were added to the local population every month.

Figure 1. Residents and Visitors Population Forecast



Source: Comprehensive Planning, Las Vegas Convention and Visitor Authority

By the year 2035, the population of Clark County is projected to be just over 4 million.¹ This increase in population will generate large energy demands, especially in the areas of indoor climate control, resort and entertainment, land uses, and transportation.

- **Climate Control:** High summer temperatures in Southern Nevada cause people to use large amounts of electricity to cool their homes and businesses. Peak electrical demand in the summer assuming normal temperatures is typically 45 to 50 percent higher than average during the months of June, July and August. The area's relatively mild winters cause a much lower, yet significant, demand for natural gas and electricity during the months of December, January, and February. This peak is usually from 10 to 15 percent higher than average.
- **Land Uses:** The area's economic growth and, in particular, casino resort development with its associated uses will generate a tremendous need for more energy. At the same time, the employment demand generated by these developments will require more residential units and the consequential development of commercial services, resulting in a greater demand for energy.
- **Transportation:** As a consequence of the development of different land uses, an increase in the number and length of vehicle trips will occur. Effective transportation policies combined with effective land use policies can reduce automobile travel. Options for reducing transportation energy consumption include: shifting traffic to more efficient modes, encouraging carpooling and vanpooling, reducing demand by reducing passenger miles (through land use planning, telecommuting and other methods), increasing energy conservation efficiency (smaller and more efficient vehicles), and improving traffic design and control.

Alternative and Renewable Energy
Energy can be produced from conventional or alternative sources, some of which are renewable (naturally replaced or replenished). **Alternative sources** include the "renewables": biomass (wood or crops such as sugar), hydropower, hydrogen, wave action, wind, and recovered waste (solid, liquids and gases), solar, and geothermal. **Conventional sources** are usually considered to be non-renewable energy sources such as the fossil fuels-coal, gasoline, oil, natural gas and nuclear.

Electricity

To assess electricity use, it is important to understand how energy is measured. Electricity is commonly measured in watts (W) and watt hours. While watts describe the rate at which energy is being consumed at a given moment, watt-hours measure the total amount of energy consumed or produced over time. So, one watt-hour (Wh) is 1 watt consumed or produced in one hour.

A kilowatt (KW) is 1,000 watts and is used to describe the power use from appliances such as refrigerators, hair dryers, and water heaters. A megawatt (MW) or a million watts, describes the power used in large buildings and produced by some power plants. Large power plants generate in the gigawatt (GW), or billion watts, range. Terawatts (TW), or a trillion watts, are used to describe community-wide or nation-wide uses.²

Providers

Map 1 shows the companies licensed to provide electrical services in Clark County. Nevada Power Company(NPC) has been serving the Las Vegas Valley since 1906. Nevada Power Company (NPC) is a wholly owned subsidiary of Sierra Pacific Resources (SPR), an investor owned corporation with operating subsidiaries engaged in the energy and utility service business. Overton Power District #5 was established in 1924 to currently serve a portion of Clark County, Nevada, including the City of Mesquite, and the unincorporated communities of Bunkerville, Moapa, Glendale, and Moapa Valley (Logandale and Overton).

¹ Combined population refers to visitors and residents, as projected by Clark County Comprehensive Planning.

² Union of Concerned Scientists, http://www.ucsusa.org/clean_energy/renewable_energy_basics/offmen-measuring-energy.html

Valley Electric Association was established in 1965 and provides service to communities in Northwest and South Clark County. These areas include the communities of Lovell Canyon, Mountain Springs, Sandy Valley and Trout Canyon.

Electricity Provided

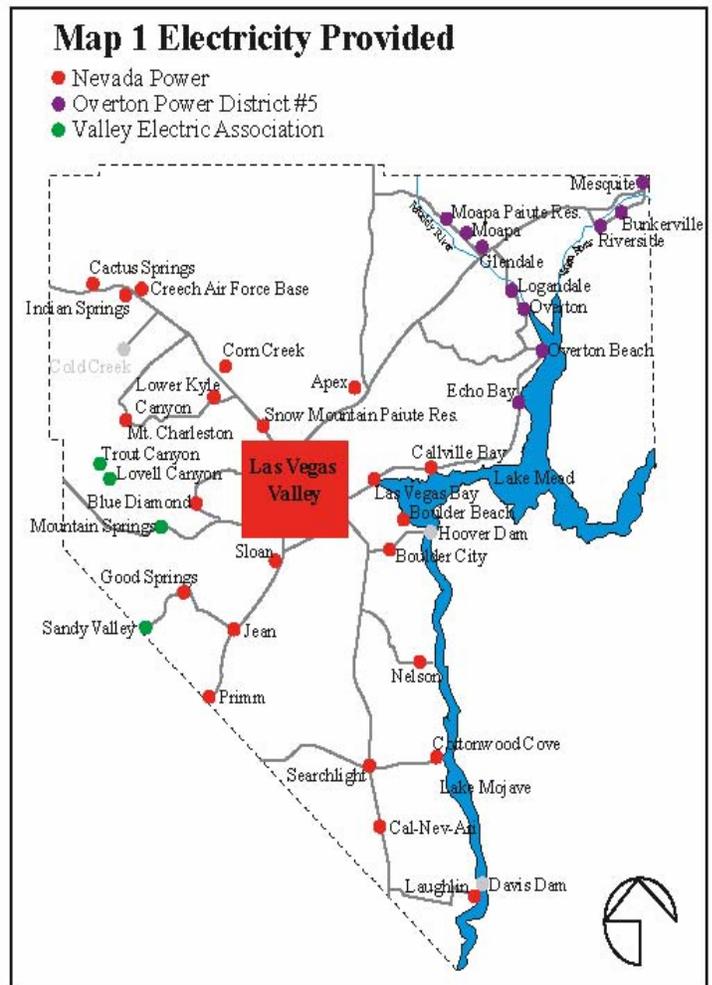
There are six major non-renewable power plants located in the County.³ Together with Hoover Dam⁴, they generate only 40% of the electricity needed locally. To meet the total demand, electricity is purchased and imported to the area through a network of transmission lines. The three licensed providers supply this electricity to their retail customers. The total amount supplied by these companies in 2006 was: 25.9 TWh by Nevada Power; 95 MWh by Overton Power District 5; and 4.4 MWh by Valley Electric Association.⁵ In 2006, the annual per capita consumption of electricity was 12,000 kWh, and a typical home used 18,750 kWh per year⁶.

Alternative Energy

In the last few years, local electricity production from alternative sources has increased. Solar One, a solar thermal facility, located close to Boulder City, is currently providing an average of 64 MW. All of the energy produced by Solar One, is purchased by Nevada Power for local customers. Nellis Air Force Base is finalizing a photovoltaic facility which will provide 20 MW. The Clark County School District produces an additional 50 kW with several photo voltaic systems installed at local schools.⁷ Clark County Department of Real Property Management has recently installed a 30kWh photo-voltaic system at Spring Mountain Youth Center.

Natural Gas

Natural gas can be measured in a number of different ways. As a gas, it can be measured by the volume it takes up at normal temperatures and pressures, commonly expressed in cubic feet. Production and distribution companies commonly measure natural gas in thousands of cubic feet (Mcf), millions of cubic feet (MMcf), or billions of cubic feet (Bcf). While measuring by volume is useful, natural gas can also be measured as a source of energy. Like other forms of energy, natural gas is commonly measured and expressed in British thermal units (BTU). One BTU is the amount of natural gas that will produce enough energy to heat one pound of water by one degree at normal pressure. To give an idea, one cubic foot of natural gas contains about 1,027 BTU's. When natural gas is delivered to a residence, it is measured by the gas utility in 'therms' for billing purposes. A therm is equivalent to 100,000 BTU's, or just over 97 cubic feet, of natural gas.



³ Utilities Element of the Clark County Comprehensive Plan, 2005.

⁴ Hoover Dam produces 2.4 GW at peak production but only 10% of this electricity is available locally due to existing contracts.

⁵ Public Service Commission Annual Report, 2006.

⁶ Nevada Power Corporation.

⁷ Current production is shown at Nevada Power's web site <http://www.solargenerations.com/realtime.html>

Comprised primarily of methane, natural gas is odorless and colorless when it comes out of the ground. After impurities are removed, the natural gas is introduced into the 1.3-million-mile interstate pipeline system where it is transported to the service areas of local distribution companies like Southwest Gas. Southwest Gas, in turn, delivers the gas to homes and businesses in the communities it serves.

Providers

Southwest Gas and the Kern River Gas Transmission Company provide natural gas service to Clark County (most areas). Southwest Gas is one of the fastest-growing natural gas distribution companies in the nation. Kern River supplies large industrial users such as power generation plants.

Natural Gas Provided

Southwest Gas and the Kern River Gas Transmission Company provided a combined average volume of 150 billion cubic feet in 2005. In 2006, the annual per capita consumption of natural gas was 38,000 cubic feet, and a typical 2,000 square foot house used 15,200 cubic feet per year.

Alternative energy

Currently, there is no local production of alternative natural gas. However, there may be opportunities in the future for natural gas generation from refuse and sewer waste.

Fuels

Fuels include gasoline, diesel, aviation fuel, oils and coal. The liquid fuels and some coals (when crushed and mixed with water) are transported by pipelines from refineries or compression stations to end users. Solid coal is used as fuel in several electrical power generating stations and is delivered to end users via rail.

Providers

The CALNEV Pipeline is owned and operated by Kinder Morgan Energy Partners. The CALNEV pipeline is a 550-mile refined products pipeline system that moves jet fuel, diesel, and gasoline from refineries in California to users in California and Clark County. The pipeline owned by Peabody Energy Corporation transports coal to Clark County from mines in Colorado.⁸ Solid coal is shipped to Clark County via the Union Pacific Railroad from mines throughout the United States, Canada, and overseas.

Fuels Provided.

The pipeline system serves Clark County with over 130,000 barrels of gasoline, diesel and jet fuel per day. Just over 8.5 million tons of coal was delivered to local users in 2006.

In 2006, the annual per capita consumption of petroleum fuels was 15 barrels or 825 gallons per year (1 barrel contains 55 gallons). In 2006, the typical local family used approximately 2,062 gallons of gasoline per year.

Alternative Fuels

Currently, there is no local production for alternative fuels. However, there may be opportunities in the future for alternative fuels production from waste oils and other processes.

⁸ The Peabody Energy Corp. Pipeline supplied coal slurry to the Mohave Generating Station in Laughlin which ceased operations in 2006.

ANALYSIS

This section describes the community’s trends on energy supply, use and potential opportunities.

Electricity

The enormous population growth and development in Southern Nevada has led to large increases in the demand for electricity. As shown in Figure 2, growth in the number of electricity consumers in Clark County has spurred substantial growth in demand over the last decades and the growth is expected to continue in the coming decade.

Demand Forecast

As shown in Figure 2, electricity demand is expected to increase from 25.9 TWh in 2006 to approximately 50 TWh in 2035. Per capita consumption is estimated at an average of 12,000 kWh per year. Nevada Power’s system sales are projected to grow at an average annual rate of 1.9 to 2.1 percent.

Figure 2: Electricity Demand

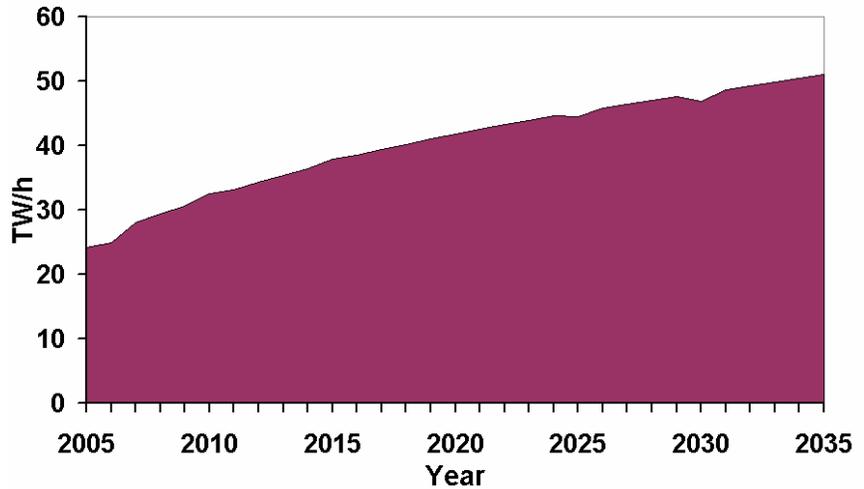
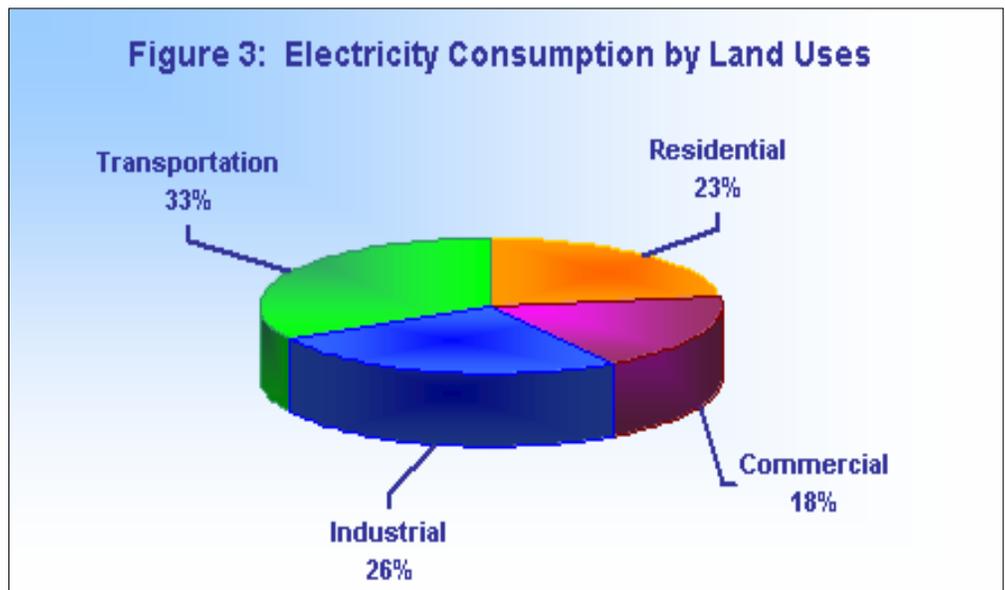


Figure 3 shows current electricity use in Southern Nevada by type of land use.

Local Production

Electrical generation in Clark County amounted to 25.9 TWh in 2006. More than 96% of this was produced by burning natural gas, coal, or was hydroelectric power supplied by Hoover Dam. Southern Nevada does not have significant deposits of fossil fuels and, so far, very few geothermal resources have been discovered. Therefore, nearly all the local electricity is obtained from energy “imports”. However, the area’s climate does lend itself to a variety of potential alternative energy sources and solar energy and wind energy seemingly being the more viable. Being in the Mojave Desert, the low elevation areas of Clark County typically receive at least 84% of the potential solar radiation. Put another way, these areas usually have only 16% cloudy days a year! Currently solar energy is captured by converting light directly to electricity (photovoltaic) and by collecting and concentrating heat.

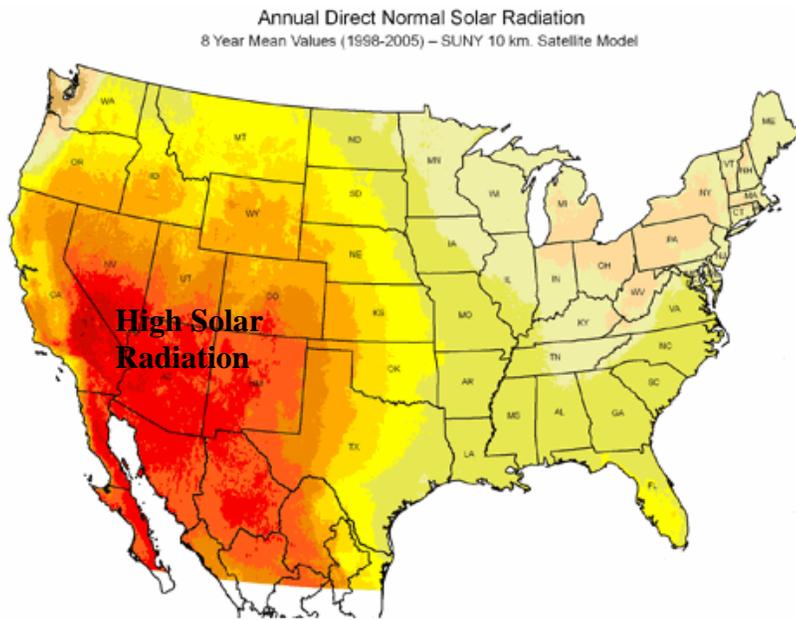
Figure 3: Electricity Consumption by Land Uses



Photovoltaic Technology: Clark County with the implementation of the renewable portfolio standards program is committed to encourage a “sustainable community”, the Clark County Go Solar program represents the next logical step in this community wide effort. It includes ways to save energy by making homes and businesses more efficient and it includes ways to produce energy by encouraging the installation of solar panels on individual buildings and on community sites throughout Las Vegas valley. Its goal is take a big step toward being energy self- sustained by 2020.

Solar Thermal Technology: Solar One, located in Clark County, is providing 64 MW of electricity. This level of energy generation will provide electricity to about 40 thousand households.

Wind Power Technology: With current technology, wind power becomes cost effective when the wind speed is between 5 and 35 miles per hour more than 40% of the time. The challenge is to find a location where these conditions happen most of the time. In Southern Nevada, these locations are usually on or near mountain ridges or in canyons that tend to funnel the wind. In the right places, wind turbines can be used as stand-alone applications, or they can be connected to a utility power grid or even combined with photovoltaic (solar cell) system. Stand-alone turbines are typically used for water pumping or communications. Homeowners and rural areas can also use turbines to generate electricity. For utility-scale, a large number of turbines are usually built in a cluster to form a wind farm. However, there are no large scale wind generating systems currently operating in Southern Nevada. In addition, the issues of constructing transmission lines to areas of high wind potential, and interference with aircraft radar systems will need to be avoided.



Geothermal Technology: The main advantage of geothermal generation is that it is relatively constant and can operate at a fixed output for many days at a time. The principal weakness of geothermal is the resource. Unfortunately, no significant geothermal sources have been found in Clark County.⁹

Legislative Requirements for Electricity Generation

The Nevada Legislature addressed the issue of renewable energy several times during their recent sessions. The 2007 legislative session required large electric providers in the state to acquire actual renewable electric generation or purchase renewable energy credits so that each utility meets the following standards (called Renewable Portfolio Standards).¹⁰ Five percent of the total RPS requirements should be provided by solar energy.

Renewable Energy Portfolio Standards

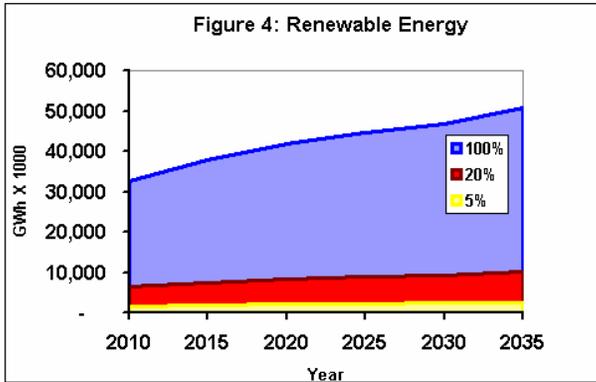
- 2005 and 2006 6 percent
- 2007 and 2008 9 percent
- 2009 and 2010 12 percent
- 2011 and 2012 15percent

⁹ Status of Energy in Nevada Report 2007. Nevada State Office of energy.

¹⁰ Democratic Energy. Communities and Governments Working on our Energy Future. <http://newrules.org>

- 2013 and 2014 18 percent
- 2015 & beyond 20 percent

Figure 4 forecasts the amount of renewable electricity generation needed to meet 5%, 20%, and 100% of total production. These figures are forecasted projection independent from the figures expected by the implementation of the Renewable Portfolio Standards.



The chart illustrates the ideal development of renewable energy production from a 5 percent output to a 100 percent output by the year 2035.

These projections assumed technological improvement, market penetration, and a reduction of cost in technology acquisition.

Natural Gas

The enormous population growth and development in Southern Nevada has also led to large increases in the demand for natural gas. As shown in Figure 5, growth in the number of consumers in Clark County has fueled substantial growth in demand over the last decades. Significant increases in demand are expected in the coming decades.

Demand Forecast

The forecast projects growth from about 150 Billion Cubic Feet (BCF) in 2005 to about 350 BCF in 2035.¹¹ Overall use per person is also expected to increase to 90,000 cubic feet by the year 2035.¹²

Figure 5: Natural Gas Demand

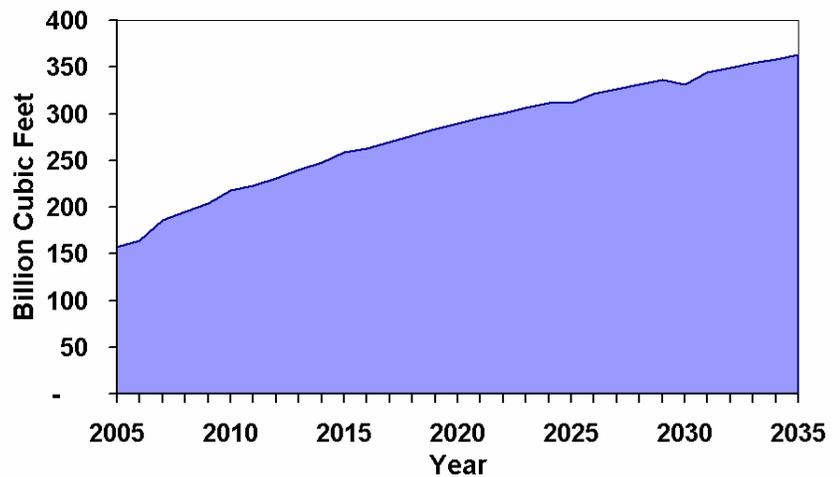
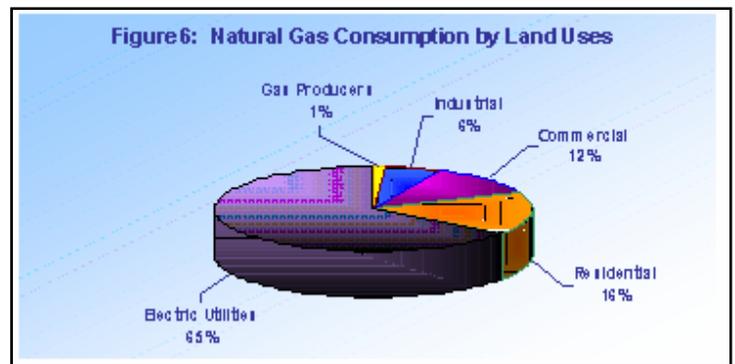


Figure 6 shows natural gas consumption by land use type. Interestingly, 65% of local consumption is by electric power generation. Residential land uses are the second largest use and this is primarily for heating and cooking.

Local Production

No significant fossil fuel deposits or natural gas resources have been found in Clark County. However,



¹¹ The data indicating consumption pattern and forecast has been provided by the Nevada Department of Energy. Population forecast with projection to year 2035 has been provided by the Population Element –Clark County Comprehensive Planning Department.

¹² The data from SW Gas has been provided by the Nevada State Energy Report

there may be opportunities in the future for natural gas generation from refuse, sewer waste or other sources. The closed Sunrise Landfill which is in the process of final capping, could provide significant opportunities for methane production. Sewer plants and other recycling facilities may be instrumental in generating alternatives to natural gas.

Fuels

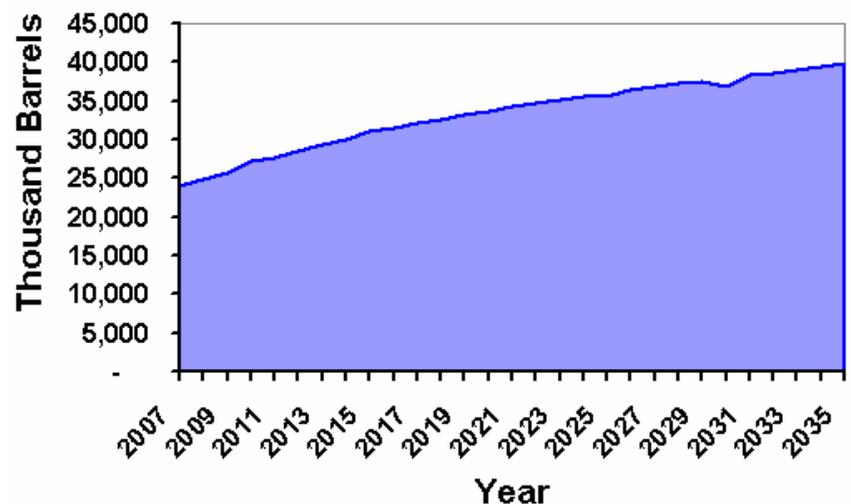
Demand Forecast

Population growth and development in Southern Nevada has also led to large increases in the demand for various types of fuels. These are primarily gasoline, diesel and aviation fuel used in transportation. The forecast projects an increase in fuel consumption from about 25,000 barrels in 2007 to about 40,000 barrels in 2035. Per capita consumption by 2035 is expected to be 20 barrels¹³ per year (1,100 gallons a year, or 91.6 gallons at month, or 23 gallons at week). Figure 7 shows the use of fuels by land use type or major use area.

Local Production

There are opportunities in the future for local recycling of vegetable oils or animal fats into biodiesel. International research and development continues into production of renewable fuels such as ethanol and hydrogen. The Regional Transportation Commission, Clark County School District and other public entities with large transportation fleets, will be great candidates for alternative fuels.

Figure 7: Gasoline Consumption



Conservation

Life Style Change	Gallons Consumed	Gallons Conserved
Old Commute: 35 miles to work, large SUV 15mpg	1,213 gallons	
Purchase a hybrid automobile 45mpg	404 gallons	809 gallons
Move to within 5 miles of work	173 gallons	1040 gallons
Move to within 5 miles of work & purchase a hybrid automobile 45mpg	58 gallons	1155 gallons

The previous sections have shown the forecasts for Clark County’s future energy needs. Obviously, it costs money to produce and transport energy. Wasted energy also costs money. One of the goals of the Energy Element is to identify methods to reduce energy waste inefficiencies. By doing this, the community can reduce overall consumption, lower costs, and potentially reduce pollution.

Electricity:

Constructing more energy-efficient buildings and retrofitting existing buildings can provide an estimated 10 percent reduction in electricity use.

¹³ A barrel contain 55 gallons.

This would be a savings of about 5.5 TWh by 2035.¹⁴

Natural Gas:

Southwest Gas Company is promoting a local conservation program based on an overall efficiency savings of 15%.¹⁵ This would amount to an estimated 60 BCF by the year 2035.

Fuels:

The use of mass transportation system, and carpooling combined with mixed use and compact development can contribute significantly to fuel savings. Table 1 illustrates the number of gallons that could be saved locally by the average person.

Issues

Codes and regulations

Local governments can provide a variety of incentives and support for the development and implementation of alternative energy production and energy conservation. These could include:

- Home energy assessment toolkits to understand ways to maximize energy conservation and potential retrofitting
- Promotion of standardized solar system packages for retrofits to existing residential buildings
- New provisions in the Unified Development Code for energy efficiency and green building design
- Tax and fee incentives

Technology Changes

As energy costs increase, the search for cleaner and more efficient energy sources will undoubtedly continue. Clark County will need to be aware, involved and flexible in the use and promotion of new and effective energy sources and building techniques.

Solar Energy

Clark County is uniquely well suited to the use and development of solar energy due to our climate and geography.

The solar industry continues to grow steadily as costs for solar systems decline in the expanding markets for renewable energy. Since the late 1990s, the market for solar energy from photovoltaic cells has grown at an annual rate of 20%. The solar industry estimates that growth rates above 25% annually are possible, resulting in a \$27 billion market by 2020. This market growth would result in a U.S. solar industry that could employ 150,000 people by 2025. Solar energy can become a major high-technology growth industry that contributes significantly to our regional's economic growth.

Wind Energy

Currently, the industry is encountering serious production challenges. High demand for wind turbines coupled with manufacturing complexities has created a production back log of between 3 to 5 years.¹⁶

¹⁴ Energy Efficient Systems from the Integrated Green Globe Technology www.thegbi.org

¹⁵ Tips and Savings are provided by Southwest Gas Corporation.

¹⁶ International Seminars Integrated Resource Planning, August 10, 2007.

Fossil Fuels

Nevada has very limited fossil fuel resources and imports all of its natural gas and coal from other states.

Air Quality

Burning of fossil fuels is a primary contributor to air pollution, both chemically and in the creation of air-borne particles.

Fuels

There are strong seasonal fluctuations in gasoline prices, with prices highest in the summertime when demand for gasoline is highest.¹⁷ This impacts Southern Nevada because this increases costs to travelers.

Economics

Net Importer

Considering direct fuel use along with fuels used to generate electricity, Nevada imports more than 95% of its energy.¹⁸ This means that a substantial amount of money flows to business and workers outside the state.

Costs

Electricity prices have risen significantly in Nevada in recent years. The current average price for electricity in the state is 10.5 cents per kWh, compared to 6.2 cents per kWh in 2000 prior to the western energy crisis. A large part of the increase in electricity price can be attributed to an over reliance on power generated from natural gas. Natural gas prices have risen even more dramatically in recent years. Households in Nevada were paying over \$12 per thousand cubic feet for gas in mid-2004, about twice as much as households paid for gas in 2000. High and volatile natural gas prices are also affecting electricity prices and are expected to persist for a number of years. Currently 70% of the power generated in Southern Nevada relies on natural gas as a fuel source. Diversification of fuels sources and an aggressive implementation of renewable energy are integral to any strategy for stabilizing electricity rates in Southern Nevada.

When government, households, and businesses cut energy expenses, people have more disposable income to spend on other priorities or programs. Local schools can spend more money on education instead of paying excessive energy costs. Local governments can use funds to improve existing services.

¹⁷ Oil Intelligence Link Incorporated – USA Retail Gasoline Price Market & Consumption Trend. April 30th, 2007.

¹⁸ 2005 Nevada Status Report , Nevada State Office of Energy, Office of the Governor

RECOMMENDATIONS

Policy Recommendations

The following policies are recommended for inclusion in the Clark County Comprehensive Plan. It is recommended that these policies be included in and replace the current “energy conservation” chapter from the Conservation Element of the Comprehensive Plan.

- Clark County supports sustainable developments that promote energy efficiency and conservation.
- Clark County supports the development of clean, safe, and reliable alternative fuels.
- Clark County supports energy conservation through land use planning principles that encourage compact urban development, public transportation, and improved air quality.
- Clark County supports the reduction of energy consumption and promotes energy conservation planning for institutional buildings and government facilities.
- Clark County supports the development of local alternative energy resources, providing opportunities for regional economic expansion.
- Clark County supports regenerative and recycling programs that will contribute to source reduction, reuse, recycling and waste combustion.
- Clark County supports partnerships and cooperation with local, regional and federal agencies to further promote energy conservation and efficiency, renewable energy projects and sustainable development.
- Clark County encourages regional efforts to promote an integrated sustainable energy plan.
- Clark County supports the development of regional and state wide infrastructure that will efficiently deliver energy to citizens of Clark County.

Work Program Recommendations

1. Clark County Real Property Management Department should continue its role in implementing prior energy conservation policies and any subsequent policies enacted by the Board of County Commissioners.
2. Clark County Real Property Management Department should continue leading Clark County’s effort to provide opportunities for government energy conservation, energy efficiency, and renewable energy.
3. Continue to streamline, assess and update, as appropriate, regulations, fees, and policies which promote energy conservation, energy efficiency, and retrofitting of existing buildings.
4. Develop incentives for alternative sources of energy production such as: geothermal, wind, and solar.
5. Continue to identify appropriate locations for solar and wind energy production in the County.
6. Develop partnership with local public utility companies for the development of large scale renewable energy generation facilities.
7. Develop a comprehensive recycling program.

Glossary

Alternative Fuels

Fuels that can replace ordinary gasoline. Alternative fuels may have particularly desirable energy efficiency and pollution reduction features. Alternative fuels include compressed natural gas, alcohols, liquefied petroleum gas (LPG), and electricity. The 1990 Clean Air Act encourages development and sale of alternative fuels.

Energy Efficiency Building (EEB)

An integrated framework of design, construction, operations and demolition practices that encompasses the environmental, economic, and social impacts of buildings. Energy Efficiency Building practices recognize the interdependence of the natural and built environments and seek to minimize the use of energy, water, and other natural resources and provide a healthy, productive indoor environment.

Renewable Energy

Energy obtained from sources that are essentially inexhaustible, unlike, for example, the fossil fuels, of which there is a finite supply. Renewable sources of energy include wood, waste, geothermal, wind, photovoltaic, and solar thermal energy.

Sustainable development

"Meeting the needs of the present without compromising the ability of future generations to meet their own needs" - The World Commission on Environment and Development, The Brundtland Commission, 1987. Sustainable development seeks to balance human development, growth, and equity with ecological stewardship.