

# Coconino County Comprehensive Plan Energy Element

## *Approved by the Board of Supervisors*

### July 10, 2012

### Introduction

Reliable, clean energy is critical to the health, safety and welfare of residents in Coconino County. It affects the availability of potable water, economic development and the general way of life. The County has a responsibility to be a leader in innovative and responsible energy management while creating a secure and clean energy portfolio. Worldwide, a number of concurrent factors have contributed to a strong interest in increasing energy efficiency and the development of renewable energy. These include:

- The increasing cost of oil and other energy sources,
- The decline in the availability of nonrenewable resources,
- The potential for economic growth through the expansion of green jobs
- The conservation of water, including through the energy-water nexus
- Concerns about the effects of human-caused climate change

Another factor is the ability to avoid other negative effects of fossil fuel and uranium extraction and energy generation such as:

- Smog and declining air quality
- Respiratory ailments and other health impacts
- The release of toxins such as mercury and other greenhouse gases
- Water and ground pollution
- Impacts to wildlife and ecosystems
- The management and storage of toxic and radioactive materials, including locally mined ore

The energy-water nexus refers to the fact that the production of energy requires large volumes of water while the treatment and distribution of water is equally dependent upon readily available, low-cost energy.

Locally, there has been an increase in interest in developing renewable energy projects as well. Permits for residential wind and solar installations have become a regular occurrence and, as of 2011, utility-scale wind and solar energy projects have been approved through Conditional Use Permits. These requests have identified complicated tradeoffs regarding the need for clean, renewable energy projects and their effects on viewsheds, neighbors, wildlife, vegetation, natural quiet and the land.

This Energy Element also articulates the goals of the Coconino County Sustainable Building Program that works to promote energy conservation and efficiency in new and existing buildings. This Element promotes the development of locally produced and used, renewable energy projects by establishing County policies that provide guidance for the expansion of renewable energy while avoiding, minimizing and mitigating negative impacts.

### The Conservation Framework Relationship

The goals and policies of this Element consider all five ecological principles and eleven conservation guidelines defined in the Conservation Framework. This Element is specifically tied to Conservation Guideline G, conserving the use of non-renewable and critical resources, which calls for the conservation of resources such as water and reduction of our reliance on

nonrenewable resources such as oil, coal and petroleum. Decisions about energy projects are also influenced by Guidelines A, C, and E. Guideline A calls for the assessment of impacts to be considered in a landscape context. Guideline C addresses the avoidance or mitigation of human use on ecological processes and the landscape. Guideline E speaks to minimizing the fragmentation of large contiguous areas of wildlife habitat.

## Our Vision & Purpose

Our County vision supports growth while protecting natural resources. This Element establishes policies that emphasize the value of our distinctive natural landscapes and promote the conservation of natural resources while encouraging development of sustainable buildings and renewable energy sources. As growth continues, we envision using creative approaches to ensure the efficient use of energy, and to create a diverse, renewable and clean energy portfolio. Energy goals and policies related to transportation can be found within the Circulation Element.

## Current Energy Picture

In the decade from 2000 to 2010 Coconino County's population grew by 16%<sup>1</sup>. That growth along with an increase in per capita energy consumption is increasing demand on energy providers. In 2009, Arizona ranked 46<sup>th</sup> amongst the 50 states in energy consumption per capita and 24<sup>th</sup> for total energy consumption. Arizona's primary energy sources in 2008 were petroleum (30%), coal (25%), natural gas (22%), nuclear (17%) and renewable (6%). Renewables include hydropower, wood, solar, geothermal and combustion of waste materials. Energy consumption by use in Arizona in 2009 was 34% for transportation, 28% for residential purposes, 24% for commercial, and 14% for industrial according to the Southwest Energy Efficiency Project<sup>2</sup>.

Traditional energy sources make up the majority of energy generation in Coconino County. Traditional energy includes fossil fuel powered electricity generation such as natural gas and coal power as well as nuclear power. Significant environmental concerns exist in relation to traditional energy development. These concerns range from health impacts such as the emission of mercury and the effects of microscopic particles on respiratory systems to the global climate-altering effects of greenhouse gases.

The majority of electricity generated in Coconino County comes from coal. The coal supply is mined in open pits by Peabody Coal on the Navajo and Hopi Reservations and in New Mexico. The coal is then burned to create energy, providing inexpensive and reliable power. Navajo Generating Station, NGS, outside of Page produces 2,250MW of energy and is one of the largest coal plants in the country. The plant supplies energy to Arizona, New Mexico, and California, and is the energy source for pumping water in the Central Arizona Project. According to Salt River Project, the utility responsible for operating NGS, the Kayenta mine and NGS together employ 1,000 people. Navajo Generating Station faces several big issues in the next decade as

<sup>1</sup> U.S. Bureau of the Census. 2010. *Profile of General Population and Housing Characteristics*

<sup>2</sup> Southwest Energy Efficiency Project. 2011. *Arizona Energy Fact Sheet: Energy Efficiency and Energy Consumption*. [www.swenergy.org](http://www.swenergy.org)

its lease expires in 2019 and the EPA is requiring additional technology to clean up haze-related pollution that could cost in excess of \$1 billion dollars.

Significant federal investment has been allocated to assist in “clean coal” technologies, which are designed to make the large-scale burning of coal more efficient and reduce pollution including but not limited to carbon dioxide, sulfur dioxide and nitrogen oxides. The effectiveness of these technologies is still being researched. However, small-scale carbon off-setting, through the planting of biomass, can be an effective approach to balancing an individual’s carbon output because plants act as natural air filters. Green roofs and increasing native vegetation are common examples. The choice of biomass should be carefully considered to manage invasive species and water usage.

Natural gas is an expanding energy sector that is applauded for having less of an environmental impact than other fossil fuels. However, hydraulic fracturing or “fracking,” a method by which gas is extracted using chemicals to create fractures in subsurface rock layers, has recently come under scrutiny for potential water contamination and possible correlation to increased seismic activity. Fracking operations, along with natural gas, oil and coal production, are considered mineral extraction and are currently exempt from County oversight.

Nuclear power is another traditional energy source. While some consider nuclear power to be a clean energy source due to its lack of emissions, it has other environmental impacts related to the mining and processing of uranium, as well as the disposal of depleted nuclear fuel. Although there are no nuclear power plants in Coconino County, there are uranium mines and mining claims near the Grand Canyon. The federal government has placed a 20-year moratorium on new uranium mining claims near the Grand Canyon, however it does not affect proven, existing claims or continued development of 11 uranium mines. Counties have no jurisdiction over mining operations larger than five acres. Nonetheless, issues related to uranium mining have impacts on areas of high importance to Coconino County. They include impacts to water supplies and long-term health issues such as have occurred on the Navajo Nation. Protection of Coconino County’s water resources is a high priority as outlined in the Water Resources Element of the Comprehensive Plan. Protecting the health and safety of citizens is a primary concern as well.

Other impacts of traditional energy use are financial and environmental costs as resources diminish. Additionally, any new facility would have impacts to wildlife, water resources, viewsheds, air quality, and would have land disturbance. Rising energy costs affect all aspects of the cost of living including transportation, housing and food. The steady increase in population and use of energy-driven technology in Arizona, as well as nationally and internationally, will continue to increase demand for energy, placing greater pressure on natural resources to meet future energy demands if significant investment is not put into renewable resources.

Land disturbance is the alteration of the natural landscape including grading and impacts to vegetation and soils.

**Goal: Increase the use of technologies and strategies to reduce pollution, environmental degradation, and negative health impacts associated with energy sources.**

**Policies:**

1. The County supports the use of available, proven technologies that eliminate or minimize negative human and environmental impacts for power production facilities. *Conservation Guidelines, H, I*
2. The County supports technologies and procedures that protect air quality and visibility, viewsheds, public health, and the conservation of water. *Conservation Guidelines: C, G, H, I*
3. The County will promote the development of small-scale carbon-off-setting techniques through the Sustainable Building Program. *Conservation Guidelines: B, C, I*

**Energy Conservation and Efficiency**

Reducing energy consumption involves both energy conservation – the idea of doing with less or doing without, and energy efficiency – the idea of getting more out of less by employing technologies that perform while using fewer resources.

Reducing energy consumption has environmental, economic and social benefits. Lowering energy consumption can reduce environmental impacts such as wildlife, vegetation and land disturbance, as well as air and water pollution. Because most of the energy generated in Coconino County is from fossil fuels, reducing energy consumption would also reduce nitrogen oxide, sulfur dioxide, mercury and carbon dioxide emissions, and significantly reduce water use. Economically, reducing energy use saves money and minimizes the effects of utility rate increases. Increasing energy conservation through behavior change is the most affordable and therefore immediately achievable energy policy.

Energy conservation means reducing demand through changes in behavior. Actions as simple as turning off the lights, driving less, riding a bike, and installing programmable thermostats are all energy conservation strategies. While these changes may seem minor, if every household in the county adopted such strategies, the reduction in energy could be as large as removing 80,000 vehicles from the road for a single year according to EPA Clean Energy Resources.

Social benefits include gains to health and wellness related to clean air and water. These two concepts, energy conservation and energy efficiency, present viable opportunities for residents and businesses to reduce their overall energy consumption.

There are regulatory measures that guide conservation and efficiency. Public electric utility companies regulated by the Arizona Corporation Commission are required to develop Demand Side Management programs that promote energy efficiency and are required to achieve annual energy savings of at least 22% by 2020. Gas utilities will be required to achieve an annual energy savings of at least 6% by 2020. To encourage energy efficiency in new construction, Coconino County adopted the 2006 International Energy Conservation Code that set new standards for insulation, air sealing and energy efficient windows. The County is working towards adopting the 2012 IECC which will increase efficiency by 30% over the 2006 codes.

Other efforts are done on a voluntary basis. Many of Coconino County's builders have embraced building to the ENERGY STAR standard. Individual owners and builders have participated in the County's Sustainable Building Program and utilize the County's checklist to achieve a Sustainable Building Award. This can increase the value and marketability of a home or business while saving a considerable amount in energy costs over the life of a building.

The County has implemented a number of no-cost programs to encourage residents and small businesses to pursue energy efficient technologies as well as make green building more financially attractive. These services include consultation, plan review, educational resources, code and field support, marketing, publicity and awards as well as educational programs, workshops and events. There are a number of other incentives the County hopes to implement pending future resources, including reduced fees on permits, secured loan support for energy efficient and renewable energy residential projects, energy efficiency and renewable energy rebates.

Low-cost building techniques can significantly reduce a building's energy consumption. One technique is passive solar design which encompasses the efficient siting and orientation of buildings to provide optimal southern exposure, and the use of glass on the south side of buildings with eave overhangs that provide winter sun into the building and summer shading. Thermal mass is used to store the solar heat generated. The quality of insulation also affects the efficiency buildings. Other aspects of passive solar design include thermal blinds, energy efficient glazing, day lighting, ventilation and the use of vegetation for shading techniques. Typically, passive solar measures do not add considerably to the overall cost of building and incidental costs are quickly recovered through energy savings. Coconino Community College and the Sustainable Building Program both provide a number of courses and training opportunities on energy efficient construction methods.

Substantial energy savings can also be achieved through retrofitting existing buildings. Major overhauls as well as small changes can make an impact. Energy audits can identify inefficient energy usage and recommend cost-effective means to improve building performance. Both electric and natural gas utilities have instituted such programs. The County Sustainable Building Program has partnered with other agencies to provide basic weatherization services to County residents and will continue to pursue funding opportunities for such programs.

Reducing energy consumption is a high priority for the County because it will reduce demand on existing infrastructure, save money and reduce the need for new infrastructure and its associated impacts.

**Goal: Reduce energy consumption by increasing energy conservation and efficiency.**

**Policies:**

1. Coconino County shall be a leader in reducing energy consumption, and shall strive for buildings to be energy self-sufficient.

2. In order to increase awareness of opportunities for citizen action, the County shall continue educational programs for energy conservation and efficiency through the Sustainable Building Program and coordination with educational institutions. The County shall also support educational opportunities for workforce programs, job training, and employment opportunities such as the Energy Efficiency Conservation Corp.  
*Conservation Guidelines: I*
3. Proposed subdivisions, commercial, industrial, multifamily residential and public and semi-public uses shall consult with the Sustainable Building Program prior to review by the Planning & Zoning Commission and Board of Supervisors. The review will include consultation on site location, project layout for maximum solar gain, building design, energy efficiency and conservation of resources. *Conservation Guidelines: A, B, C, G, I*
4. The County shall support, foster and adopt building efficiency programs and energy standards that reduce per capita consumption. Programs include the International Energy Conservation Code, building weatherization projects, national programs such as ENERGY STAR and LEED and local programs such as County Sustainable Building Program and the Regional Network for Energy and Water Sustainability. *Conservation Guidelines: G, H, I*
5. The use of Energy Star and/or other energy efficiency standards and technologies is strongly encouraged for all buildings. *Conservation Guidelines: G, I*
6. The County shall be a model of sustainable design and energy efficiency in the construction of new County buildings and renovations. *Conservation Guidelines: B, C, G*
7. The County encourages energy conservation that is economically feasible in both new and remodel construction through the development of incentive programs and support for incremental retrofits. *Conservation Guidelines: G, I*
8. The County will assist residents of all income levels to identify achievable strategies that reduce energy consumption. *Conservation Guidelines: G*
9. The reduction of energy consumption is encouraged through the conservation of water including establishing an assured 100 year water supply and water catchment for all buildings

### **Creating Energy Generation**

While working to reduce energy consumption is the most effective goal for the County, additional energy generating sources will be needed to meet the current and future growth in demand. Clean and renewable energy technologies are a rapidly growing segment of the energy sector. These sources contribute to a sustainable future for all communities by creating energy independence and security through diversification and local energy production. In January 2011, The President called for producing 80% of energy from clean sources by the year 2035 and a national Renewable Energy Standard is under consideration. In 2006, the Arizona Corporation

Commission adopted the Renewable Energy Standard and Tariff requiring all regulated utilities to generate 15% of their electricity from renewable resources by 2025, up from 6% in 2008. The use of alternative energy sources within Coconino County has been expanding due to the effects of these policies and the availability of more than 300 days of sunshine and moderate wind resources. The County supports new generation from clean, renewable sources.

Two major systems of renewable energy generation are distributed and utility-scale production. Distributed energy is the generation of electricity in small amounts in lots of places. For example, residents and businesses putting photovoltaic panels on their rooftops, wind turbines on their property and ground source heat pumps in their yards. Utility-scale energy generation is defined as the production of energy with the intent of producing power in excess of 120% of the energy used for on-site consumption such as the Perrin Wind Farm and the Cromer Elementary School portion of the APS Community Power Project. These projects tend to have more significant impacts on surrounding communities and the natural environment than distributed energy systems.

Net-energy generating buildings will be an important part of future development. These buildings generate more energy than they use by combining conservation and efficiency measures with on-site power production. They can supply nearby developments with their excess power to help limit the needs of expanding electric grid infrastructure and associated impacts.

Renewable energy technologies are evolving at a rapid pace. New strategies for reducing impacts to the natural environment, wildlife, viewsheds, natural quiet and land disturbances are being developed. Industry and its technologies are ever changing and it is critical to ensure the best practices of the day are being implemented.

### *Distributed Energy Systems*

The number of distributed wind and solar energy systems county-wide has grown because photovoltaic technology is rapidly becoming more efficient and more affordable due to an increase in incentives from utility companies and tax benefits. Prior to that, the most common use of alternative energy had been the incorporation of solar and wind technologies on remote properties that were not connected to the existing electrical grid. Today, frequently used systems consist of wind turbines and photovoltaic solar arrays that generate no more than 3-4 kilowatts, about the amount of energy used at a single family residence. They can be used to provide primary power or by utility customers to reduce the amount of electric power that needs to be purchased.

One example of a distributed, utility-owned project is the solar array at Cromer Elementary School. There, 1560 panels produce 871 kW of energy (1000 kilowatts is equal to 1 Megawatt of energy).

Distributed systems can also be owned by a utility company. In 2010, Arizona Public Service initiated the Community Power Project in the Doney Park area to conduct a study of the impacts of many distributed systems on the grid. The project includes the installation of utility-owned photovoltaic systems on single family dwelling rooftops. While the solar panels are located on

individual residences, APS remains the owner. These homeowners have granted easements to APS in exchange for a fixed rate on their energy bills for twenty years.

Putting solar panels on rooftops is permitted under current codes, requiring only a building permit. An Accessory Wind Energy Ordinance was approved by the Board of Supervisors in 2008. The Ordinance permits turbines meeting height requirements of the underlying zoning and requires a Conditional Use Permit for turbines that exceed zoning height limits or for the placement of more than three turbines on a property. For any distributed energy system that is beyond an accessory use of the site, and intends to create more energy than can be used on the property, a Conditional Use Permit will be required to mitigate potential impacts. This was the case for a portion of the Community Power Project located at Cromer Elementary School that would generate more power than used on-site.

Accessory Wind is a system designed as a secondary use to existing buildings or facilities, wherein the power generated is used primarily for on-site consumptions

Page | 8

Regulatory issues can arise regarding “rights to light”. This is the potential of neighboring properties to be developed in a way that places shadows across one’s property, limiting the effectiveness of solar power technologies. One way to resolve some of these challenges is to have solar easements granted by neighbors ensuring that defined areas will not contain any light blocking obstructions. While more than 30 states have solar easement provisions, Arizona does not. The subdivision process can help ensure that properties are designed to maximize solar potential of each site.

Other distributed energy technologies include solar water heaters and ground source heat exchange pumps (also called geexchange systems). Solar water heaters reduce energy demand, resulting in as much as a 25% cost savings over electrically heated water systems alone. As of 2011, there has been an increase in the number of permits issued for such systems. Small-scale geexchange energy extraction is possible for buildings through the use of ground source heat pumps. These use the constant earth temperature at shallow depths for home heating and cooling. This process requires digging onsite trenches which can be laid under landscaping or parking lots. In 2011, the first residential geexchange energy project in the Coconino County was completed.

Distributed energy systems can minimize the impacts of transmission lines and land disturbance by making use of existing transmission and already disturbed lands. This reduces impacts to wildlife and other natural resources as well as disperses the impacts of energy generation across the community.

**Goal: Utilize wind and solar resources by encouraging distributed energy systems.**

**Policies:**

1. The County will review codes and ordinances on a regular basis to assure adaptability to changing technology in distributed energy systems.
2. Distributed energy systems located at the point of use and on disturbed lands near existing substations and transmission are encouraged because they reduce the amount of

- infrastructure and land disturbance required for energy generation. **Conservation Guidelines: C, E**
3. The County will continue to explore and facilitate the installation of distributed energy systems for homeowners and small businesses.
  4. Protection of solar access and site plans that maximize the potential for distributed solar will be considered in the design and approval of new projects. **Conservation Guidelines: A**
  5. The County will continue to monitor permitting process for distributed energy systems to make it more streamlined, affordable and predictable to customers while maintaining responsible development of such systems.
  6. An energy generating system with the intent of producing energy beyond an accessory use of the site, in excess of what is typically consumed by such a use, will require a Conditional Use Permit. In review of such proposals, the goal and policies outlined in Utility-Scale Wind and Solar should be implemented as appropriate. **Conservation Guidelines: B, C**
  7. The County will encourage job training programs and other educational opportunities to create a workforce of experts in distributed energy systems.

### ***Utility-Scale Wind and Solar***

The County has experienced a considerable increase in interest in utility-scale wind and solar projects. There are at least two dozen meteorological wind test towers that have been approved and constructed in various parts of the county since the early 2000's. The 40-turbine Sunshine Wind Farm, near Meteor Crater, was approved by the Board of Supervisors in 2005 but has not been constructed as of 2012. The Perrin Wind Farm, consisting of 62 turbines, was approved in 2011 and operational as of January 2012. Utility-scale solar was approved in 2011 at Cromer Elementary School and at an APS substation in Doney Park.

Utility-scale wind and solar projects are supported by several components of the County Comprehensive Plan. They have the potential to sustain the economic viability of working ranches, to create jobs, to protect and conserve water resources, to improve air quality and human health, compliment other sustainable goals and policies of the Comprehensive Plan. While energy generation from local, clean, renewable sources is essential, there are potential negatives associated with projects.

The location of utility-scale projects can greatly alter their impact on wildlife. Utility-scale wind facilities have been associated with the direct mortality to a range of avian and bat species during breeding, wintering, and migratory phases of their life cycles. Proper siting of wind facilities and mitigation strategies, such as adjusting the speeds at which turbines are allowed to turn, can minimize impacts to wildlife. There are multiple solar energy technologies including

An example of mitigation is off-site habitat acquisition or restoration or financial support for relevant wildlife research.

photovoltaic and solar thermal generation, as well as mounting options that can increase effectiveness of photovoltaic panels, each of which have significantly different impacts on the landscape. Ground-mounted utility-scale solar facilities may require extensive clearing of vegetation, grading and fencing. These facilities thus have the potential to eliminate or fragment large areas of intact habitat for a range of wildlife species and to disrupt wildlife movement corridors. Utility-scale rooftop projects avoid and minimize these impacts to land and wildlife. Therefore siting of utility-scale wind and solar projects on previously disturbed lands having low value for wildlife is ideal. Given that avoidance, minimization and mitigation of such impacts is often difficult, adequate pre-construction research leading to proper siting of utility-scale solar and wind facilities is critical.

Some utility-scale projects can have affiliated water impacts that conflict with existing goals and policies because of the potential for significant water concerns including evaporation ponds that may attract wildlife, and hydrology and water runoff concerns. Some solar technologies use steam driven turbines that require significant water resources. In general, wind energy requires little water consumption and has minimal impacts on watersheds. Due to the arid environment of the County, water intensive use is not favored.

Other impacts associated with utility-scale wind and solar include the introduction of noxious weeds, large area land disturbance, the construction of new roads and infrastructure, impacts on scenic viewsheds from tall turbines and photovoltaic panel reflectivity, and potential impacts on neighbors including noise, lighting and reduction of property values. These impacts are taken seriously in Coconino County. For example, as the Diablo Canyon Rural Planning Area Plan states, “The County has been aggressive in its attempts to protect the visual integrity of the County, with a comprehensive sign code adopted in 1981, a billboard ban in 1986 and cell tower ordinances... cell tower applicants have been encouraged to look for sites on the south side of I-40 because the view of the peaks is on the north side.”

The County also has an extensive Lighting Ordinance to protect dark skies, which are a valued natural resource. Light pollution-free dark skies are treasured by many residents, visitors to National Parks and other county attractions and are a critical resource to the historic and growing astronomical research industry. Current ordinances protect dark skies but also have the benefit of energy conservation by requiring directed night lighting and capping lumen output. Utility-scale wind towers are subject to federal requirements regarding safety lighting for aviation. Promising new technologies in development such as radar-activated warning lighting have the potential to greatly reduce impacts to dark skies from wind turbines. Projects should minimize the impacts of these lights while meeting federal requirements.

The need for new transmission lines and substations shall be considered in project approval as well. These auxiliary facilities have similar impacts to the projects themselves such as large area land disturbance, wildlife collisions, fragmentation of habitat, disturbance of panoramic viewsheds, nighttime lights, noise and impacts on neighbors. Building fewer and shorter transmission lines and substations can considerably reduce these impacts and therefore, it is preferable for projects to be located as close as possible to existing interconnection points. In order to protect viewsheds, burying transmission lines is preferred.

From a zoning perspective, utility-scale renewable energy projects have been treated the same as public utility installations, through issuance of Conditional Use Permits in the rural zones. This process allows the placement of conditions to avoid, minimize and/or mitigate the impacts of proposed projects as a requirement of approval. It allows the establishment of criteria, standards and requirements to obtain permits, creates monitoring standards, and establish procedures for decommissioning. This approval process allows the County to evaluate factors and criteria specific to each project proposal.

Information required by the County to approve utility-scale wind and solar projects includes pre-construction data on existing wildlife conditions, inventories of historic and archeological resources, transmission availability and interconnection studies, construction-related impact mitigation such as dust, weeds, erosion and impacts on existing roadways, and plans for post-construction monitoring studies in accordance with guidelines from independent agencies and experts. Examples include U.S. Fish and Wildlife Service, AZ Game and Fish Department, and the Natural Resource Conservation Service. Depending on the project, any number of expert entities may be solicited for advice regarding water and other County resources. This information is essential for decision-making bodies to make educated choices.

Because of the potential impacts to Coconino County residents, the natural environment, and wildlife species and habitat, clear distinct benefits to the community are necessary for utility-scale project approval. These benefits can be in the form of revenue generation, economic stimulus, job creation, energy security and improved air and water quality and health impacts. The ability of developers to identify these attributes and any other benefits of proposed utility-scale projects is critical.

As outlined in Guidelines for Decision Making, individual projects shall be assessed in a landscape context, considering the effects of decisions cumulatively and over time. This process involves looking at all features of projects including transmission lines and substations as well as how different projects across landscapes interact in terms of impacts on migration corridors, scenic viewsheds and neighbors. It also considers the need for additional energy generation.

**Goal: Develop efficient and appropriate wind and solar energy generation while avoiding and minimizing impacts to the natural environment, wildlife and community character.**

**Policies:**

1. The siting of utility-scale projects and transmission lines shall consider: the protection of viewsheds, the potential for noise disturbances to adjacent residential areas, the conservation of species, habitats and water resources, the preservation of pre-historical and historical sites, the conservation of scenic corridors, and the protection of the character of public lands. Underground collection lines are strongly encouraged.

*Conservation Guidelines: B, C, D, E, F, G, H, I*

2. The cumulative impacts of all components of projects including substations and transmission, as well as the impacts of multiple projects on a landscape, shall be a consideration in the approval process. *Conservation Guidelines: A, J, K*
3. The County supports the development of utility-scale projects on disturbed lands with low value to wildlife and requiring minimal alteration of native vegetation and topography, and that are as close as possible to existing transmission interconnections. *Conservation Guidelines: B, C, E, G, H*
4. Utility-scale energy projects that allow for continuation of traditional land uses such as ranching and hunting shall be preferred over projects that assume all use of the land. The ability to retain multiple uses of the land, including rooftop installations or agreements to keep ranches intact, is ideal.
5. Early consultation with appropriate agencies is required in order to assess existing soils and vegetative ecotypes, to develop construction mitigation practices, to create restoration and re-vegetation plans, as well as to create short and long term plans to mitigate erosion, invasive species, and loss of optimum habitat for wildlife and commercial grazing. Appropriate plans may include Conservation Plans, Habitat Restoration Plans, and Integrated Weed Management Plans.
6. Project sites that conflict with critical wildlife habitat, sensitive species, movement corridors, riparian areas and areas of significant topographic relief such as canyons and cliffs should be avoided. Pursuing projects in these areas will require extensive data collection and mitigation measures to reduce the risk of mortality, fragmentation of habitat and significant long-term displacement of wildlife. *Conservation Guidelines: D*
7. Early and ongoing consultation with Arizona Game and Fish Department and U.S. Fish and Wildlife Service to assess potential wildlife impacts and develop appropriate biological surveys and reports such as Avian and Bat Protection Plans, Eagle Conservation Plans, and pre-construction study plans in accordance with agency recommendations is required prior to project approval. Project approval may require addressing concerns revealed in these reports. *Conservation Guidelines: A, C, J, K*
8. The County encourages utility-scale renewable energy projects that engage in innovative research and operational procedures that are consistent with current best practices and scientific knowledge. These may include the use of radar activated lighting, wildlife study designs that include off-project comparison sites, turbine curtailment during migratory periods and other practices designed to improve the understanding of, or reduce project impacts.
9. Approval of meteorological test towers is supported under guidance from Arizona Game and Fish Department and the US Fish and Wildlife Service for gathering of critical information but does not imply future approval of wind turbines.

10. Available tools to mitigate impacts to adjacent residential uses, habitat, wildlife, watershed, views, dark skies and other resources, including low impact construction practices such as minimizing infrastructure foot prints, limiting grading and sensitivity to timing related to wildlife habitats, shall be implemented. Visual warning systems that utilize radar to activate aviation safety lights are preferred for all projects unless superceded by Federal regulations. *Conservation Guidelines: C*
11. In order to protect water supplies, projects that use less water or reclaimed water during operation shall be preferred over more water intensive systems and additional impervious surface area created by a project shall be considered in project approval. *Conservation Guidelines: G, H*
12. In order to balance impacts of projects on residents and the natural environment, the County prefers projects that can demonstrate significant energy benefit and local and regional benefits. Conditional Use Permit renewals will be required to demonstrate how they are specifically benefiting Coconino County. *Conservation Guidelines: K*
13. Decommissioning bonds or similar provisions and/or plans are considered key components of projects. *Conservation Guidelines: J, K*
14. Site restoration and reclamation plans shall be considered in project approval.
15. Conditional Use Permits for utility-scale projects shall include conditions with timelines to ensure that current, best practices and technologies are applied. Updating to current best practices and technologies may be required upon extension or renewal.
16. All projects shall implement and maintain extensive public communication to address public comments and community concerns in the pre-approval phase and as necessary throughout the life of the project.
17. The County will create an enduring, interdisciplinary Energy Advisory Committee (EAC) to help review and analyze development proposals and their supporting documentation for proposed projects to provide technical support to the Planning and Zoning Commission and the Board of Supervisors. The EAC will also oversee the implementation of approved projects and conditions of approval, including the development of project-specific management plans such as Avian and Bat Protection Plans, weed management/restoration plans, and required mitigation measures. *Conservation Guidelines: A, C, J, K*
18. The County will encourage legislative changes necessary to allow groups of citizens to create renewable energy special districts.

### ***Biomass***

Biomass fuel is a potential renewable energy source in Coconino County. Biomass includes the use of renewable materials, such as wood, plant material and agricultural wastes. On a residential scale, the most common example is burning wood or wood pellets for heat. Biomass

can also be used to generate electricity either through direct combustion or gasification of biomass material.

Tree thinning to reduce fire risk and improve forest health in the ponderosa pine forests creates an opportunity for biomass energy. As of late 2011, the US Forest Services' Four Forests Restoration Initiative in northern Arizona would increase the availability of small diameter ponderosa pine trees, therefore making the supply of biomass materials more predictable for commercial projects. Current forest management practices are to burn slash piles onsite. However, if this biomass could be distributed to residents for firewood or to a utility-scale facility, there would be energy production benefits for Coconino County.

Page | 14

The use of excess forest and woodland material is encouraged for biomass and to create health forests. Disturbance issues related to the creation of new roads and invasive species and should be mitigated.

The collection of gases created from decomposition occurring in landfills can be an energy source. Gases are pumped to an engine which powers a generator connected to the electric grid. Benefits include reducing methane released into the atmosphere and turning a liability into an asset to be sold. As of 2012, Cinder Lakes Landfill is the only feasible location for such a facility.

The burning of trash can create energy. If not done properly, however, this can release heavy metals, toxins and other emissions with health concerns and effect air quality and viewsheds. Stringent oversight for such facilities would be required to avoid negative impacts to humans, wildlife and the environment.

Consideration of a utility-scale project requires a Conditional Use Permit. Particular concerns include air emissions, heavy use of the site and transportation of materials. Location near a residential community is discouraged unless emissions could be eliminated or adequately minimized. Because utility-scale biomass power generation will produce both emissions and require transportation of fuel, impacts on residential communities, environmental issues and other established uses must be considered and minimized. As of 2011, no utility-scale biomass processing plants exist in Coconino County.

**Goal: Support the development of clean biomass energy.**

**Policies:**

1. The development of biomass energy facilities is supported if impacts on nearby communities, wildlife, air quality and the natural environment can be avoided, minimized or mitigated. *Conservation Guidelines: C, I*
2. The County supports biomass energy through the distribution of forest thinning materials to residents for firewood and utility facilities.

3. Studies to demonstrate the impacts on public health and air quality are important in the approval of utility-scale biomass energy projects and should be developed in coordination with expert entities. *Conservation Guidelines: C, I*
4. The County shall be stringent concerning air pollution, viewsheds, clear skies, collection methods, land disturbance and emissions when considering utility-scale projects. *Conservation Guidelines: G*
5. The County shall encourage residents to replace existing wood stoves and fireplaces with EPA-approved units *Conservation Guidelines: C, I*

### ***Additional Utility-Scale Energy Sources***

Hydroelectric power is another source of energy. Glen Canyon Dam is the only hydroelectric power plant in Coconino County, with a generating capacity of 1,300 MW of electricity. While there are no air emissions, there are considerable environmental impacts to the river corridor and ecosystems both up and downstream. Micro generation in small channels is a developing technology. However, Coconino County has few perennial streams and rivers so development of any new hydroelectric plants is unlikely.

Geothermal energy utilizes the high temperatures deep within the earth as an energy source. Benefits of geothermal power include energy reliability and minimal impact on air quality, land disturbance and viewsheds. The average temperature at about four miles in depth in the county is 175 to 200 degrees Celsius, warm enough for utility-scale geothermal production. However, at this time, development is likely not economically viable because extraction is difficult due to the depth of the heat in Coconino County. However, many experts believe that Coconino County has some of the highest potential in Arizona for a utility-scale geothermal plant because of volcanic vents. Geothermal technology is rapidly evolving and funding sources are increasing the potential for a future facility.

New technologies are emerging at a rapid pace. The County is looking to weigh the benefits against the costs in regards to the positive and negative impacts on human health, wildlife, water use and quality, economic development, vegetation, erosion, noise, views, dark skies and other treasured elements of Coconino County when considering projects.

**Goal: Diversify Coconino County's energy portfolio through the responsible expansion of additional renewable energy sources.**

### **Policies:**

1. The County will continue to research and support education on the various alternative energy resources and options.
2. The County encourages the use of alternative energy projects to serve off-grid communities.

3. Research and development of other alternative energy sources is encouraged as long as negative impacts to humans, wildlife and the natural environment are avoided, minimized or mitigated. *Conservation Guidelines: C, I*
4. The County supports safe, clean methods of energy generation that have clear benefits to outweigh potential negative impacts.