# ENERGY

VII

Energy use has a direct impact on the community's economic development, public health, safety, air quality, and environment. How the region's land uses are designed plays a major role in energy conservation and efficiency. For example, compact development leads to driving less and walking more, smart site design takes advantage of solar gain, and green building techniques use less energy to heat and cool buildings. *Flagstaff Regional Plan* policies encourage increased energy efficiency as well as expanded production and use of renewable energy.

Inside this Chapter:



## Our Vision for the Future

By 2030, successful efficiency and conservation measures have contributed to reduced energy consumption in the region, while renewable energy production has increased.

## Energy Efficiency

City and County buildings have gone through rigorous energy evaluations and efficiency retrofits. For the City of Flagstaff, this has resulted in a 42 percent annual savings in natural gas, electric, and water, which is more than $335,000 annually.

*Photo by: Colin McKay*

In addition, both the City and County have been proactive in developing programs and codes promoting energy efficiency in new buildings and the retrofitting of existing structures. The region's programs and codes promote energy conservation and efficiency through education and outreach. Coconino County's Sustainable Building Program Checklist, which certifies "sustainable" construction projects, requires standards above the International Energy Code baselines (refer to http://www.coconino.az.gov/comdev.aspx?id=148). This program also supplies research on the latest technologies and provides fact sheets on weatherization, insulation, efficient appliances, and annotated lists of local, state, and federal incentives for energy efficiency. Energy efficiency education is incorporated into many sustainable building programs taught at Coconino Community College and Northern Arizona University. The Flagstaff Unified School System recognizes energy efficiency in school buildings as a cost savings and as a component of K-12 energy education.

*Photo by: Mark and Kate Sorensen*

Continual efforts to ensure energy-efficient buildings, whether new or retrofit, is one of the most effective cost savings a home or building owner can realize. Well over half of homes in Flagstaff were built before 1994, when building codes began to regulate minimum insulation standards. The homes built before this may or may not have insulation. "Basic efficiency upgrades" include sealing ducts, adding weather stripping, increasing or adding insulation, insulating the water heater and hot water pipes, adding a programmable thermostat and changing heating, ventilation, and air conditioning filters. This is estimated to save a homeowner 15 to 25 percent in energy costs. With funding through the Federal Recovery Act of 2009, the City of Flagstaff's Sustainability Program has partnered with the County's Sustainable Building Program and Coconino County Community Services to promote residential energy efficiency retrofits throughout the region (also refer to the Flagstaff Zoning Code, Section 10-30.70 "Residential Sustainable Building Standards"). Arizona Public Service (APS) also offers weatherization programs for its customers. Northern Arizona University has incorporated energy efficiency through its "green construction" and sustainability initiatives (refer to www.green.nau.edu).

76% of residents either agree or strongly agree that city codes should maximize energy efficiency.

- 2010 Community Values Survey

| **Flagstaff Total Housing Units:** | **26,058** | |
|---|---|---|
| Year Structure Built | | |
| Built 2005 or later | 1,641 | 6% |
| Built 2000 to 2004 | 3,827 | 15% |
| Built 1990 to 1999 | 5,357 | 21% |
| Built 1980 to 1989 | 6,361 | 24% |
| Built 1970 to 1979 | 4,462 | 17% |
| Built 1960 to 1969 | 1,848 | 7% |
| Built 1950 to 1959 | 1,545 | 6% |
| Built 1940 to 1949 | 211 | 1% |
| Built 1939 or earlier | 806 | 3% |

*SOURCE: U.S. Census Bureau, 2009-2011 American Community Survey*

One of the greatest users of energy in the Flagstaff region is transportation. Single-occupant vehicles are a significant user of energy for transportation, and represent an opportunity to improve overall energy efficiency. Transportation energy efficiency can be achieved by strengthening use of travel alternatives such as public transit, bicycling, and walking, and decreasing the population's auto dependency through smarter development patterns. Recognizing the cold winter weather here, alternative travel could be made easier with bus stops closer to activity centers and student housing close to campus.

## EFFICIENT USE OF ENERGY GOALS AND POLICIES

**Goal E.1. Increase energy efficiency.**

### Education

Policy E.1.1. Promote and encourage innovative building practices through instruction on efficient building materials and methodology.

Policy E.1.2. Support workforce training for the installation and maintenance of energy-efficient technologies.

Policy E.1.3. Empower all community members to make smarter energy choices through education and incentives.

### Building

Policy E.1.4. Promote cost-effective, energy-efficient technologies and design in all new and retrofit buildings for residential, commercial, and industrial projects.

Policy E.1.5. Promote and encourage the expansion and use of energy-efficient modes of transportation:

a. Public transportation
b. Bicycles
c. Pedestrians

Policy E.1.6. Develop land use regulations promoting land use patterns that increase energy efficiency.

Policy E.1.7. Support policies and programming that reduce electricity, natural gas, and water consumption in order to conserve natural resources and reduce financial costs.

Policy E.1.8. Incorporate alternative energy conservation and renewable energy systems in applicable codes.

Policy E.1.9. Develop standards and guidelines to guide builders, architects, and developers toward optimal building, water use, and energy performance.

Policy E.1.10. Incentivize energy efficiency and renewable energy technologies in construction projects.

Policy E.1.11. Identify financing mechanisms to support water and energy efficiency improvements in public, residential, commercial, and industrial sectors.

Policy E.1.12. Promote indigenous and local building materials and structures as climate-adaptable energy efficiency prototypes.

### Transportation

Policy E.1.13. Promote and encourage the use of fuel-efficient vehicles that use renewable fuels.

## Renewable Energy

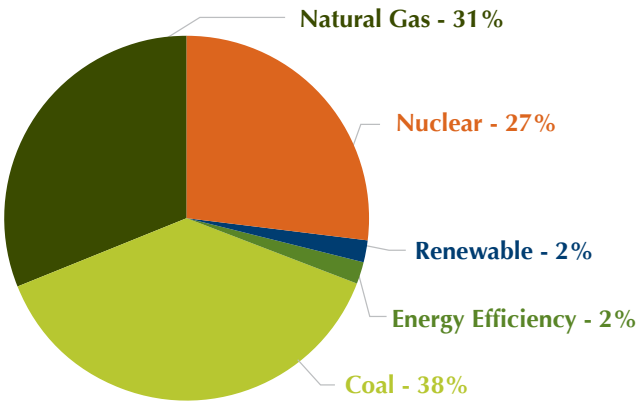
Small-scale wind and solar facilities are already permitted uses within the region. Since 2002, approximately 742 renewable energy systems including photovoltaic systems, solar water heaters, turbines, passive solar sunrooms, and geothermal systems have been installed in the region, according to City and County building permit records.

Community members are pursuing renewable energy projects for several reasons:

1. To reduce reliance on corporate providers
2. To have an impact on greenhouse gas reduction
3. To take advantage of local, state, and federal tax incentives
4. To provide energy to those who live "off the grid" and rely on renewable energy, many in the region's rural areas.

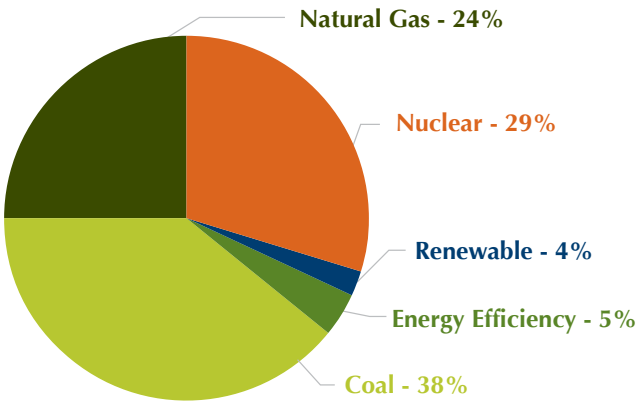
Renewable energy sources include passive solar, photovoltaic panels, solar hot water, solar thermal generators, wind turbines, biomass, and geothermal energy. Due to its elevation, northern Arizona has the capacity for greatest solar gain in the state. The region's wind resources are deemed adequate for residential wind projects. Another renewable fuel already used extensively is wood for home heating. With the availability of a large volume of trees from forest thinning projects this resource is also being explored for biomass energy production. The Forest Service obtained clearance on the necessary environmental analysis to allow for long-term, large-scale thinning contracts that could allow for expansion of this type of energy source. The Greater Flagstaff Forests Partnership ascertained in its 2002 Preliminary Feasibility Assessment for a Biomass Power Plant in Northern Arizona that there is adequate forest fuel available on a long-term basis for supplying a new 5-megawatt (MW) biomass power plant.

**APS Energy Mix - 2009**




*SOURCE U.S. Census Bureau, 2009-2011 American Community Survey*

**APS Energy Mix - 2012**




*SOURCE: APS 2012 Integrated Resource Plan*

The region may have an abundance of these raw energy resources, and while APS is extending transmission systems to areas with photovoltaic and wind potential, the inadequacy of the existing energy grid is a significant challenge to large-scale renewable energy generation. Current renewable energy production for APS is two percent with a goal of 16 percent by 2025. This is in line with the community's goal to use more renewable energy.

Northern Arizona University has mapped optimal commercial wind turbine locations, and is in the process of mapping residential locations. Large-scale wind production (100 MW) has been installed in Coconino County, and additional capacity is likely to be built within the region. Most small-scale wind turbines are located in the Doney Park area, which has been identified through studies as having a significant wind resource.

Large-scale wind and solar projects are likely to be developed in the county, where there are large tracts of land with adequate wind resources. The locations for these facilities are outside of the *Flagstaff Regional Plan* boundaries in the more remote areas. As possible suppliers to properties within the plan boundary, transmission lines into this area may be necessary, and grid capacity needs must be addressed.

*Photo by: Bill Ferris*

Our community supports incentives for recycling, the use of green construction materials, the preservation of habitat, and the use of existing structures.

- 2010 Community Values Survey

## RENEWABLE ENERGY GOALS AND POLICIES

**Goal E.2. Expand production and use of renewable energy.**

Policy E.2.1. Promote renewable energy sources that reduce demand upon fossil fuels and other forms of generation that produce waste.

Policy E.2.2. Preserve opportunities for development of renewable energy resources in the planning process.

Policy E.2.3. Promote renewable energy pilot programs as a showcase to educate the public and the development community.

Policy E.2.4. Encourage small-scale renewable energy production and use on the local level on appropriate residential, commercial, and industrial parcels.

Policy E.2.5. Pursue, promote, and support utility-scale renewable energy production such as biomass facilities, solar electricity, wind power, waste-to-energy, and other alternative energy technologies.

Policy E.2.6. Collaborate with local tribes to develop renewable energy opportunities on tribal lands.

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