

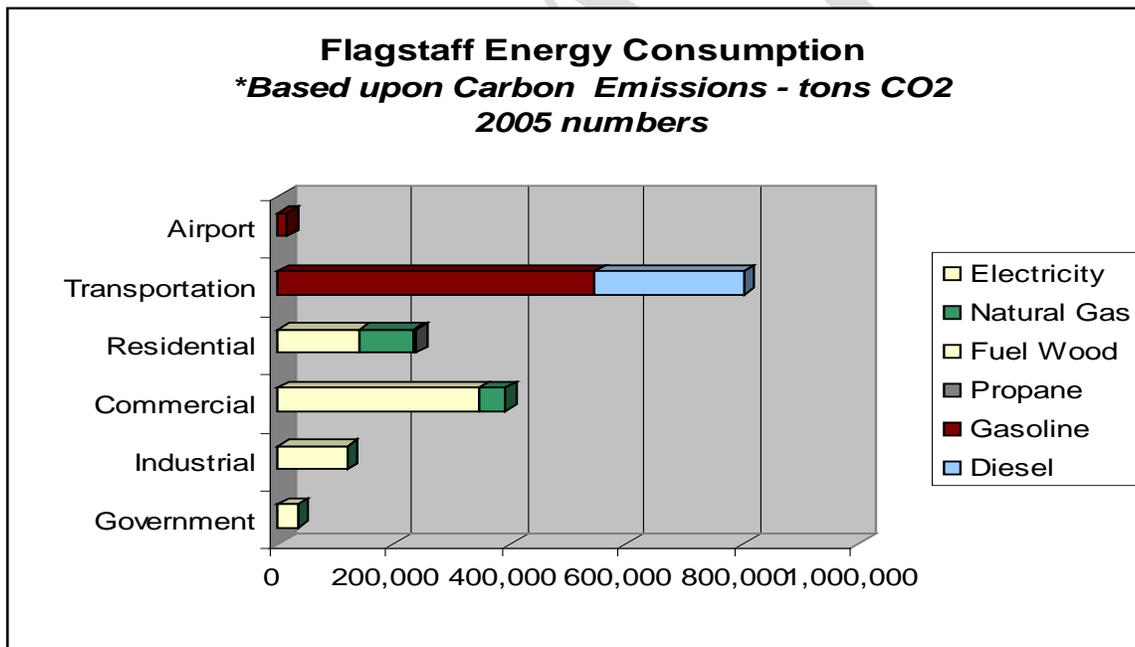
Flagstaff Regional Plan – DRAFT ENERGY ELEMENT – updated 4/14/2010

INTRODUCTION

Traditional energy consumption can be reduced by making better land use and transportation decisions within the Region as well as by increasing energy efficiency and encouraging the development of renewable energy sources. The benefits of long-term energy sustainability include improvements in our local economy, reliable and secure energy supplies, reduced dependence on imported energy sources, and positive environmental impacts.

The Regional Plan seeks to increase energy efficiency in building technologies as well as in transportation and land use. While total energy demand is likely to increase in the next 20 years, the community may actually reduce its overall energy consumption through efficiency. This is the simplest way to a neutral or net reduction in energy consumption.

The Regional Plan seeks to increase production of renewable energy, both at the individual and commercial scale, because the majority of energy used in the Flagstaff Region comes from non-renewable sources. These include electricity generated from coal and nuclear power plants, natural gas and propane for heating and cooking, and oil and gasoline for motor vehicles. The primary consumers are commercial/industrial and residential users, with the former consuming nearly 70% of all energy within the Region.¹



Source: Greenhouse Gas Emissions Management Report (2008) – Flagstaff Sustainability Program

Note: Carbon Emissions are a proxy for energy used

¹ Source cited here

Insert graphics displaying total energy used in FMPO area: electricity, natural gas, etc.

RELATIONSHIP TO REGIONAL PLAN VISION & GUIDING PRINCIPLES

Energy supply is an important component of a successful community. Increasing energy efficiency and the use of renewable energy further the vision for *“intellectual, environmental and economic vitality”* by encouraging the development of new products and technologies locally, reducing the community’s reliance on non-renewable supplies, and maintaining a consistent energy supply through diversification. The following goals and policies address many of the primary Guiding Principles of this plan. At the forefront is the principle of sustainability, which includes and enhances the principles of healthy ecosystems, environmental protection, smart growth and quality development, and creating a vibrant economy.

A. Energy Efficiency

Decreasing the amount of energy used by promoting the wise use of energy is the most economical solution to reduce climate change, promote energy independence, and increase economic vitality. Both the City and County have been proactive in developing programs and codes to promote the energy efficiency in new buildings and the retrofit of existing structures. As the region’s population increases, there will be greater demands for energy which is why our public and private planning decisions should focus on efficiency.

The Region’s programs and codes promote energy efficiency through **education and outreach**. The Sustainable Building Program Checklist², which certifies “sustainable” construction projects, requires standards above the International Energy Code baselines. 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 at both Coconino Community College³ and Northern Arizona University⁴. The Flagstaff Unified School System has recognized energy efficiency in school buildings as a cost savings as well as a component of K-12 energy education.⁵

Continual effort to ensure energy efficient **buildings**, whether new or retrofit is the most effective cost savings a home or building owner can realize. With funding through the Federal Recovery Act of 2009, through the Department of Energy, 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. Both City and County buildings have gone through rigorous energy evaluations and efficiency retrofits. For the City, this has resulted in a 42% annual savings in natural gas, electric and water, which is more than \$335,000 annually. [How much was the initial investment?] APS will also be offering weatherization programs for their customers.⁶ Northern Arizona University has incorporated energy efficiency through its ‘green construction’ and sustainability initiatives.⁷

Directing energy efficient changes onto the region’s approximately 26,000 housing units⁸ and approximately 3,200 businesses⁹ could affect and upgrade approximately 20-30% of our built environment. Focusing on housing only, about 4000 homes were built after 1994¹⁰, when building codes began to regulate minimum insulation standards. The homes built before this may or may not have insulation. ‘Basic efficiency upgrades’ are assumed as sealing ducts, adding weather stripping, increasing or adding insulation, insulating the water heater and hot

Flagstaff Total housing units	26,162	
YEAR STRUCTURE BUILT		
Built 2005 or later	1,153	4%
Built 2000 to 2004	4,129	16%
Built 1990 to 1999	5,072	19%
Built 1980 to 1989	5,882	22%
Built 1970 to 1979	4,672	18%
Built 1960 to 1969	2,075	8%
Built 1950 to 1959	1,937	7%
Built 1940 to 1949	507	2%
Built 1939 or earlier	735	3%

* Source: Census.gov

² <http://www.coconino.az.gov/comdev.aspx?id=148>
³ Note CCC programs here
⁴ Note NAU programs here
⁵ Note FUSD programs here
⁶ www.acs.com/
⁷ <http://www.green.nau.edu/buildings.html>
⁸ Census 2000 with projected growth
⁹ <http://www.city-data.com/business/econ-Flagstaff-Arizona.html>
¹⁰ City of Flagstaff Building Permit records

Flagstaff Regional Plan – DRAFT ENERGY ELEMENT – updated 4/14/2010

water pipes, adding a programmable thermostat and changing the HVAC filter. This is estimated to save a homeowner 15-25% in energy costs.¹¹

How the Region's **land uses** are designed plays a major role in energy 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 buildings. Both Regional Plan policies and the City's Zoning Code play a role in the urban form of our community and both encourage efficient land use or 'smart growth' principles.

One of the greatest uses of energy in the Flagstaff Region is for **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. These are individual choices, yet the urban form can greatly influence the choices people make.

Energy efficiency is also the best way to reduce costs for utility providers and their customers. APS considers energy efficiency to be part of their 'power portfolio' and has specific goals to increase energy efficiency.

¹¹ Building Official / local architectural estimates

Flagstaff Regional Plan – DRAFT ENERGY ELEMENT – updated 4/14/2010

Goal E1: Increase Energy Efficiency

Policies:

Education

1. Promote and encourage innovative building practices through instruction on efficient building materials and methodology with the collaboration of government, Flagstaff Unified School District, Northern Arizona University, Coconino Community College, and community partners.
2. Support workforce training for the installation and maintenance of energy efficient technologies.
3. Empower all community members to make smarter energy choices through education and incentives.

Building

4. Promote energy efficient technologies and design in all new and retrofit buildings for residential, commercial and industrial projects.

Transportation

5. Promote and encourage the expansion and use of energy efficient modes of transportation.
 - a. Public transportation
 - b. Bicycles (Flagstaff Urban Trail System; bike lanes; bicycle parking)
 - c. Pedestrians (sidewalk grid, crosswalks, street planting strips and medians, underpasses)
6. Promote and encourage the use of fuel efficient vehicles and vehicles that use renewable fuels and/or electricity. *[Proposed items below to be moved to 'strategies']*
 - a. Promote the installation of hybrid vehicle re-fueling stations in convenient and accessible locations.
 - b. Encourage the installation of hybrid vehicle re-fueling stations in cooperative arrangements with other Arizona municipalities.
 - c. Promote the installation of super-compact parking spaces in the highest value locations.

Community Indicators (or measures & progress) – how will we know if we are successful?

Ex: Increase Energy Efficiency by ____% by 2020; define what this means (energy use per capita) & how it is measured (APS)

Ex: Increase Public Transit ridership by ____% by 2020; (NAIPTA)

Ex: ____% increase of consumer change from traditional vehicles to hybrid or electric vehicles. (ADOT)

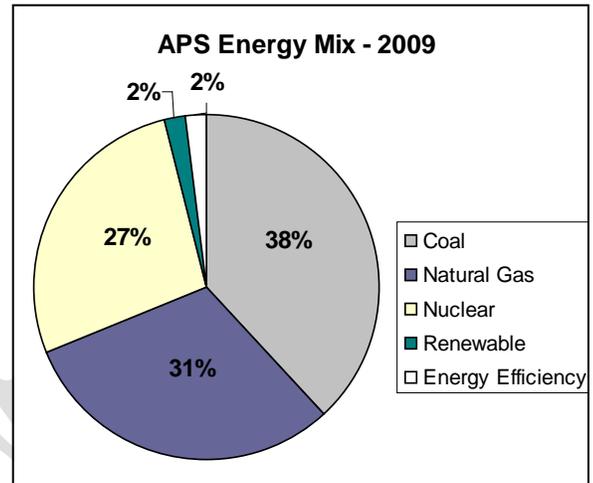
B. RENEWABLE ENERGY

At the small and large scale, the Flagstaff Region could further its use of passive solar, photovoltaic panels, solar hot water, solar thermal generators, wind turbines, biomass, and geothermal. Northern Arizona has the greatest **solar** gain capacity in the state because of elevation.¹² The region’s **wind** resources are deemed adequate for residential wind projects.¹³ Another renewable fuel already used extensively is **wood** for home heating. This resource is also being explored for **biomass** energy production, especially with the availability of a large volume of trees from forest thinning projects. The Forest Service is currently working on methods to clear 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 (GFFP) have ascertained that there is adequate forest fuel available on a long-term basis for supplying a new 5 megawatt (MW) biomass power plant.¹⁴

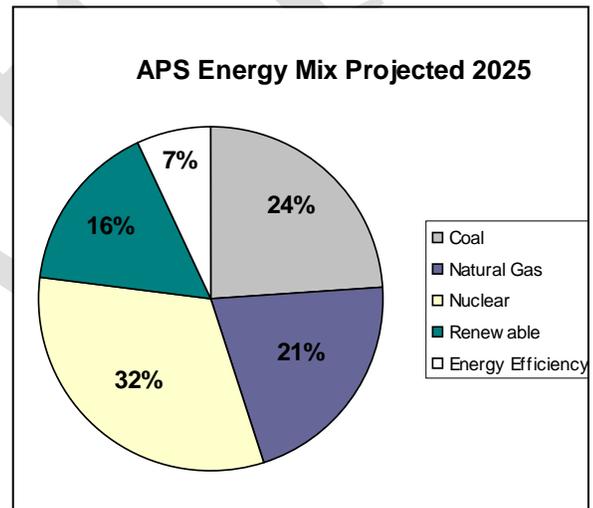
The Region may have an abundance of these raw resources, and APS is extending transmission systems to areas with photovoltaic and wind potential, yet the inadequacy of the existing energy grid is a significant challenge to large scale renewable energy generation. Current renewable energy production for APS is 2%; their goal being 16% by 2025. This is in line with the community’s goal to tap into and use more renewable energy.¹⁵ There are ongoing discussions about a biomass facility for the Bellemont Area.

Small scale wind and solar are already permitted uses within the Region. Since 2005, there have been approximately 260 photovoltaic systems (each producing approximately 2-5 Kw), 74 solar water heaters, 28 turbines, 16 passive solar sunrooms and one geothermal system installed in the Region¹⁶.

Northern Arizona University (NAU) has mapped optimal commercial wind turbine locations and is in the process of mapping residential. Large scale wind production is unlikely to happen in the region; most small scale wind turbines are located in the Doney Park area, which has been identified through studies as having a wind resource. NAU is currently installing MET towers



Arizona’s Energy Future: APS Resource Plan 2009 through 2025



Arizona’s Energy Future: APS Resource Plan 2009 through 2025

Community’s goals of overall energy mix here

¹² NAU Solar studies website:

¹³ NAU Wind energy studies website

¹⁴ Preliminary Feasibility Assessment For A Biomass Power Plant in Northern Arizona: Greater Flagstaff Forests Partnership Prepared by: TSS Consultants November 11, 2002 Final Report

¹⁵ http://www.aps.com/files/various/ResourceAlt/Resource_Plan_-_Presentation_sFinal.pdf

¹⁶ City of Flagstaff and Coconino County Building Permits records

Flagstaff Regional Plan – DRAFT ENERGY ELEMENT – updated 4/14/2010

(measuring the wind) to calculate wind energy generation potential at residential levels.

Community members are pursuing renewable energy projects for several reasons, including: 1) to be green and 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; and 4) to provide energy to those who live 'off the grid' and rely on renewable energy. Even though Flagstaff is urban, the region is rural. The Flagstaff Region is also home to a local manufacturer of small wind energy systems (Southwest Windpower) which is both a community resource and asset. Large scale wind and solar projects are likely to begin developing in the County as there are many areas currently under study. The locations for these facilities are outside of the Regional Plan boundaries in the more remote areas, yet they are possible suppliers to properties within the plan boundary. While the generation may be outside of the planning area, transmission lines could come through this area.

Private large scale renewable energy production projects (and potential Kw production)

- Sunshine Wind Energy Project – outside of planning area; has yet to find a purchaser for the power (and potential energy Kw)
- Grapevine Wind Energy Project – still in early planning stage, no approvals have yet been sought for this project, outside planning area (and potential energy Kw)
- Red Gap Ranch – outside planning area (and potential energy Kw)

City renewable energy projects completed:

- 2004-2008 municipal buildings energy efficiency overhaul
- Green energy purchase (11% of energy purchased)
- Wildcat Waste Water Treatment Center installed a cogeneration system, which combusts digester gas to produce energy (2.55 million kilowatts of electricity by 2012 – annual?)
- Flagstaff AquaPlex uses solar hot water heating for the pool facilities (235,000 KW annual)
- Flagstaff City Hall – 13KW solar system

County renewable energy projects completed:

- Solar audit on all County building for potential PV's
- Green energy purchase (20% of energy purchased)

Northern Arizona Renewable Energy Purchasing Group (NAREG): partners, how much, etc.

APS has upgraded existing utility infrastructure with 'Smart Grid' technology. The majority of homes and businesses within the Region are now equipped with "Smart Meters," which allow customers to analyze their energy use and calculate their carbon footprint (www.aps.com). Every APS consumer has the opportunity to purchase 'green power' through the Green Choice program. ____ (number of percent) of the region's community members currently participate in this program.

The Arizona Corporation Commission (ACC) approved Renewable Energy purchase requirements for public utility providers ____%.

Goal E2: Expand production and use of renewable energy

Policies:

1. Promote renewable energy sources over non-renewable energy sources for the entire range of all land uses. residential, commercial, industrial, institutional, and both indoor and outdoor recreational uses.

Flagstaff Regional Plan – DRAFT ENERGY ELEMENT – updated 4/14/2010

2. Pursue, ~~and~~ promote, and support commercial scale renewable energy production such as biomass facilities, solar electricity, wind power, waste-to-energy and other alternative energy technologies.
3. ~~Further develop public~~ Promote education in both the public and private sector so that renewable energy production and use is incorporated into everyday learning.
4. Pursue, promote and reward small scale renewable energy production and use on the local level at individual residential, commercial and industrial parcels.
5. Support workforce training for renewable energy installation and maintenance.
6. Expansion and development of transmission grid infrastructure which supports renewable energy production.

Community Indicators (or measures & progress) – how will we know if we are successful?

Ex: A biomass energy production facility has been successfully built in the region by 2020.

Ex: Individual green energy purchase has increased from ____%(currently) to ____% by 2020.

Proposed Strategies

Instead of every policy being related to a set of strategies, we are recommending that we keep a tally list of all suggested strategies related to each element at the end of the document. The goal being that many of the strategies can be combined and one strategy may very well implement a number of elemental goals or policies. The same strategy may influence multiple elements. Instead of a list of hundreds of strategies, we may be able to boil it down to a number of meaningful strategic tools which implement multiple policies.

1. Build upon our energy efficient retrofit program and develop an extensive efficiency upgrade program for existing buildings and the widest possible audience.
2. Promote the publication of energy costs for all structures on MLS listings.¹⁷
3. Reward innovative land use and energy efficient planning techniques.
 - d. Development clustering, building orientation, multiple use facilities, and appropriate building material for construction.
 - e. Provide economic incentives to shift to higher efficiencies. – What does it take to cause a market shift? Development and innovation is a partnership and a balancing act. Relationship to Economic Development.

¹⁷ Site another community example of this