SUSTAINABLE PINAL

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December 2011

SUSTAINABLE PINAL CITIZEN TASK FORCE

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Table of Contents

Executive Summary

The attached recommendations towards a Sustainable Pinal County are made to the Pinal County Board of Supervisors for adoption and implementation. The four topic areas were set by the Pinal County Board of Supervisors. The sixteen recommendations are made by a Pinal Citizen's Task Force appointed by the Supervisors to address the topic areas.

Five of the recommendations are designated by the Task Force as priorities. The priority recommendations are clearly marked with an (**) within each topic area. If adopted, they are to be mandated.

Six related recommendations apart from the topic areas are considered by the Task Force to be integral to a successful Sustainability Program for Pinal County.

Topic Area A: Energy Conservation: New Homes, Commercial/Office/Industrial, LEED and other Standards

Immediate

- Require all new homes, new commercial/office/industrial construction to meet the current level of Energy Star requirements.
    - In existing platted subdivisions (residential), which have infrastructure installed (roads, water/sewer lines, etc.), meeting the Energy Star requirements would only be encouraged. These subdivisions would have to meet the minimum County adopted energy code.

Next Step

- ** Adopt the International Green Construction Code (IGCC) to apply to all residential, commercial, office and industrial building, including the referenced ICC 700 (International Code Council residential "green" building program). This code is due to be available for adoption and use in spring 2012.
    - Adopted version should be localized to maximize energy efficiency for the Pinal County environment.

Topic Area B: Approval Process for Green Electricity Production

- ** Change current Comprehensive Plan policy for utility scale "green" electricity production applications allowing them to be submitted as a Non-major Comprehensive Plan Amendment rather than a Major Comprehensive Plan Amendment.
- Develop regulations for a Pinal County renewable Energy Overlay Zone- permissible in all property zones, which would include a public review process.

Topic Area C: Water Conservation: New Homes and New Commercial/Office/Industrial Buildings

- ** Require all new homes to be plumbed for water reclamation and gray water use.
- ** Require developments/subdivisions which have their own reclamation (sewage) plant be plumbed for, and use, a full water reclamation system. (A "system" is one in which there is complete reclaimed water piping from plant to all occupied structures).
- ** Implement a Pinal County Landscape Ordinance for new homes and commercial projects which requires low water use plants from the current Active Management Area (AMA) list (areas outside of an AMA would use the Tucson AMA list).
- Do not permit private swimming pools, private and public water features, unless they are in a development which is using a water reclamation system.
- Encourage rain water harvesting.
- Provide retention/detention area "credits" for commercial development which uses "porous" pavement technology. (Porous pavement surfaces allow for absorption of rainfall thus reducing the need for storm water retention facilities).

Topic Area D: Heat Island Mitigation through Reduced Parking Lot Sizes

- ** Update the current (new) Parking Ordinance (already cited) to add landscaping requirements. The amount of landscaping space required should closely match the amount of space no longer required when comparing the old parking ordinance and the new parking ordinance.
- ** Require that landscaping for parking lots include one tree per 4 parking spaces.
    - Require that trees be a minimum of 24" box trees with a trunk size of no less than 2".
    - Require that plants be selected from a plant list available from the appropriate AMA. If the development is outside of an AMA, plants should be selected from the list for the Tucson AMA.
- Parking shade structures would still be allowed, in place of the tree requirement, but must generate the same minimum shade coverage.
- Encourage underground, understructure and or multi-level parking structures.
- As technology and affordability continues to improve, Pinal County should encourage the use of cool pavement materials as well as the use of cool roof-top technology.

Related Recommendations

- Hire a Sustainability Director.
- Offer expedited plan/permit review for "beyond the code" projects.

- Develop Baseline information on recommendations, so that improvement/success can be measured.
- Offer Sustainability Certificates for development that goes “beyond the code”.
- Encourage cool roofs, including “green” roofs.
- Develop an education/outreach effort to drive success for the sustainability recommendations.

Introduction

The Sustainable Pinal Citizen Task Force (Task Force), appointed by the Pinal County Board of Supervisors, is comprised of nine individuals with varying credentials, education, and experience. Although Task Force members come from diversified personal and professional backgrounds, they all contributed input based on their assigned task: Provide recommendations that meet the specific sustainability criteria delegated by the Pinal County Board of Supervisors that are effective, tailored to Pinal County and will maximize benefits per tax dollar spent. The Task Force members chose to examine the short term as well as the extended long-term implications and effects of each of their recommendations. Task Force members were cognizant of the delicate balance we are challenged with in regard to the economic, environmental and cultural impacts of sustaining natural resources for current and future generations. Therefore, the premise for all decisions was based with the sincere consideration of what is in the "best" interest of Pinal County.

The intent of the recommendations from the Task Force is in harmony with the goals, objectives and policies of sustainability expressed in the 2009 Pinal County Comprehensive Plan. In particular, Chapter 7 entitled "Environmental Stewardship" parallels many of the recommendations made here. The Task Force believes the recommendations, which are highlighted in this report, will assist the County in achieving and/or surpassing the identified goals and objectives of the Comprehensive Plan. Please see Appendix A for related Comprehensive Plan goals, objectives and policies.

Task Force Background

The Pinal County Board of Supervisors (Board) adopted the Comprehensive Plan update in 2009, which included significant citizen and stakeholder input with over 46 "events" and over 2000 participants. Through this process, there was a realization that Pinal County has an opportunity to become a leader in environmental stewardship.

With this in mind, the Board adopted Resolution No. 0033110-SPP, creating the Sustainable Pinal Program. The Sustainable Pinal Program created a Sustainable Pinal Citizen Task Force (Task Force) which had the following parameters:

- Composed of three citizens from each Supervisor District appointed by the Board and one staff member who will serve as Chairman
- Meets for a maximum of sixteen (16) months
- Makes a recommendation to the Board

In guiding the Task Force, the Board also kept in mind that sustainability can represent many different things. To address this issue and focus the Task Force, the Sustainable Pinal Program outlined the key sustainability issues that the Task Force was to address in their recommendations. They are:

- Energy Conservation
    - New Homes
    - New Commercial/Office/Industrial Buildings
    - LEED (Leadership in Energy and Environmental Design) and other standards
- Approval process for Green Electricity Production
- Water Conservation
    - New Homes
    - New Commercial/Office/Industrial Buildings
- Heat Island Mitigation through Reduced Parking Lot Sizes

Additionally, the Sustainable Pinal Program directed the Task Force to consider the following questions for each of their recommendations:

- Will it be effective?
- Is it tailored to Pinal County?
- Will it maximize benefits per tax dollar spent?

The Task Force began meeting monthly in June 2010. To become more educated on the topic areas, the Task Force invited experts to present pertinent information at their monthly meetings. These educational presentations took place from June 2010 through April 2011. The information presented allowed the Task Force to gather current topic information and educate themselves on those issues and compare how other jurisdictions were addressing sustainability and applying best practices within their communities.

These subject matter experts included representatives from:

- Global Water
- Arizona Department of Commerce
- Pinal County Water Augmentation Authority
- Arizona State University
- Pima County
- Maricopa County
- Western Bio-Energy
- GreenStreet Development
- Home Builders Association of Central Arizona
- Arizona Public Service
- City of Tucson
- Salt River Project

In addition to information presented by the various topic experts, Pinal County Planning and Development staff presented the Task Force with comparisons outlining how other governmental jurisdictions address sustainability.

Meeting agendas, minutes and presentations are available on the Pinal County website. These support documents can be viewed at http://www.pinalcountyaz.gov/Residents/GoingGreen/Pages/CitizenTaskForce.aspx

Topic Area A: Energy Conservation: New Homes, Commercial/Office/Industrial, LEED and other Standards

Overview

According to the Department of Energy, buildings accounted for approximately 40 % of energy consumption in 2008. Pinal County took initial steps to facilitate energy efficiency throughout the County by adopting the International Energy Conservation Code (2006 edition) in February 2007. According to figures provided by Arizona Public Service Company, a typical home in the Arizona desert uses approximately 14,000 kWh of electricity per year at an average annual cost of $1,470 (see Chart 1).

If just 200 Arizona Public Service customers purchased an Energy Star® home, the annual energy savings would be enough to light every home in Payson for a year.

APS presentation December 20, 2010

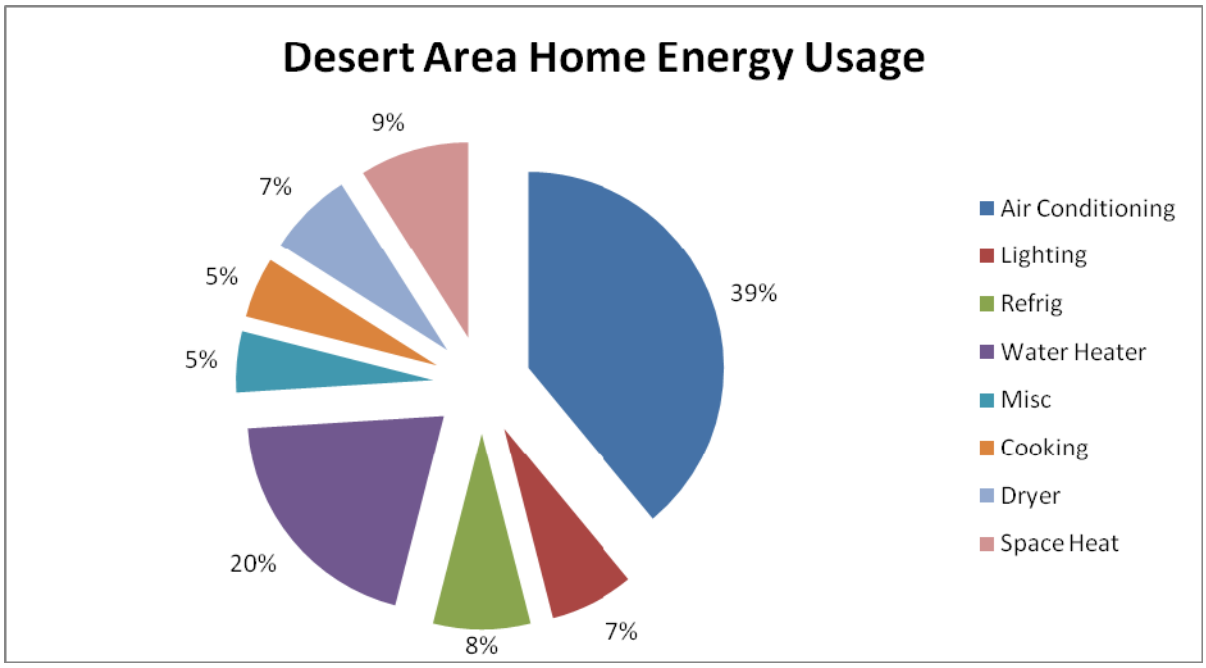
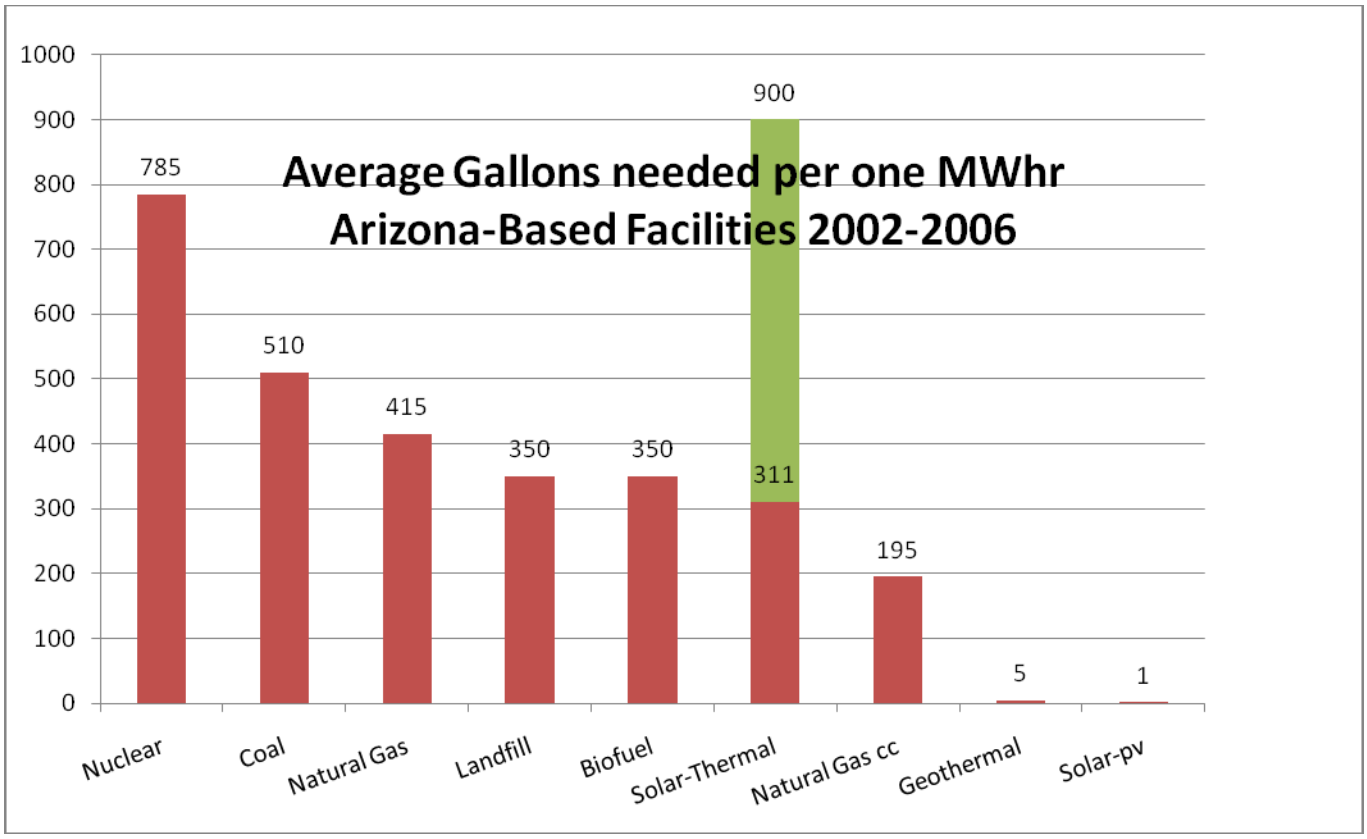


Chart 1

Reducing energy consumption through the use of new technology and/or changing energy use patterns is a popular and cost effective way to reduce the amount of energy needed. In fact, beginning in 2010, Arizona's public utilities are required to achieve annual energy savings of at least 22% - measured in kWh - by 2020, with the savings to increase incrementally as a percent of retail energy sales in each prior calendar year to reach that goal. Reducing the actual use of energy through conservation methods and new technology is also less expensive than creating new generation capabilities from renewable resources.

Energy use has a significant impact on water use. The chart below illustrates that the most common power generation technologies being used today are large users of water. Reducing power consumption conserves water.



Note: Solar thermal generation differs in its water use based on the water cooling method – water or air cooled.

Chart 2: (Dr. Martin J. Pasqualetti presentation November 22, 2010)

Energy efficiency is typically addressed in one of three ways: codes, standards and/or rating systems.

- Energy Codes include:
  IECC - International Energy Conservation Code,
  IGCC - International Green Construction Code,
  ICC700 - International Code Council residential "green" building code - separate offerings of the International Code Council, whose International Building Code (**IBC**) is widely adopted by most Building departments.
- Standards - **ASHRAE** (American Society of Heating Refrigerating and Air-Conditioning Engineers), which is considered a Standard, has its own "beyond the code" energy guidelines. These guidelines are often included in whole or in part in some of the above codes. Additionally, these standards are often included as part of "beyond the code" programs that encourage energy conservation practices which go above and beyond the basic building code and;

- Rating Systems include "LEED" offered by the US Green Building Council and "Energy Star" developed by the Department of Energy. There is much overlap between these programs as well as differing requirements with associated costs. Each of these programs is continually updated, in acknowledgment of the competitive marketplace for energy ratings.

Other Jurisdictions

- The 2006 IECC had been adopted by many jurisdictions including Pinal, Pima, Coconino and Yavapai Counties as well as the City of Tucson.
- The cities of Phoenix, Scottsdale and Mesa have recently adopted or are adopting the IGCC code in a localized format for their jurisdictions.
- Other jurisdictions researched were encouraging voluntary "beyond the code" energy efficiency.

Task Force Recommendations

Immediate

- Require all new homes, new commercial/office/industrial construction to meet the current level of Energy Star requirements.
    - In existing platted subdivisions (residential), which have infrastructure installed (roads, water/sewer lines, etc.), meeting the Energy Star requirements would only be encouraged. These subdivisions would have to meet the minimum County adopted energy code.

Next Step

- Adopt the International Green Construction Code (IGCC) to cover all residential, commercial, office and industrial building, including the referenced ICC 700 (International Code Council residential "green" building program). The IGCC code is due to be available for adoption and use in the spring of 2012.
    - Adopted version should be localized to maximize energy efficiency for the Pinal County environment.

Energy Conservation Recommendation(s) Supporting Discussion:

Overview:

Since buildings are responsible for approximately 40% of the energy used (as indicated in the Overview), the Task Force discussion was geared towards achieving the highest impact. There are numerous building rating systems available to the building industry. However, the Task Force was of the opinion that the approach to selecting a

high degree of energy efficiency, while being economical to adopt and implement. The Task Force had a discussion on LEED, Energy Star, IECC, IGCC as current building energy standards and the economics of adopting these. There was discussion of incentives, such as expedited plan review, to encourage home owners and developers to adopt "green" building practices. The conclusion was that LEED is a time consuming and costly option, whereas Energy Star is a more cost effective government backed program.

IECC was adopted by the County in 2006. The IGCC is a more comprehensive code modeled after LEED and will be available for adoption in 2012. Moreover, staff would have to be trained and the County would need sufficient time to gather stakeholder comments to adjust the 2012 IGCC to meet the local climatic requirements. With this as the basis of information, the Task Force believes that in order for effective implementation, the adoption of these standards should be the "next step".

Immediate

Require all new homes, new commercial/office/industrial construction to meet the current level of Energy Star requirements.

Since the Energy Star is a nationally recognized program ratified by US DOE and EPA, and has standards that are 20-30% more efficient than standard building types, its adoption by the County in the short term as a base standard will raise the quality of buildings built in the County. This does not preclude individual developers from building to LEED or other available "green" building standards. Since the County has already adopted the IECC, this would continue as a basic requirement for all buildings built in the County.

Next Step

Adopt the International Green Construction Code (IGCC) to cover all residential, commercial, office and industrial buildings.

As discussed above, the Task Force believes that the IGCC will probably be one of the most comprehensive "green" building standards. The Task Force recommends that the Building Safety Department create a "sustainability code" advisory committee that can assist the department in reviewing the IGCC and suggest amendments that are locally applicable. The Building Safety Department would train staff in the implementation of IGCC. However, the Task Force also recommends that in the future, if there is a building rating system that has more stringent sustainability standards compared to IGCC, the County should consider adopting those standards.

Will it be effective?

Effectiveness of the recommendations depends on the degree of compliance. An Energy Star home or a building designed to meet "green" building standards, such as LEED, is at least 15% - 25% more energy efficient than the one built to the International Residential Code. This reduction in energy directly translates to reduction in the annual

peak utility demand. However, with the new IGCC, it is anticipated that buildings designed to meet IGCC will be more energy efficient than Energy Star rated buildings. Since the IGCC is a new national standard, and since no prior data on the effectiveness of the Codes is currently available, the County may have to undertake monitoring of projects to establish the level of effectiveness of the adopted codes and its impact on annual peak utility demand reduction.

Is it tailored to Pinal County?

The immediate recommendation is relevant to the climatic region of Pinal County. However, the next step recommendation related to the adoption of the IGCC may have to be studied and amended to meet Pinal County specific needs and requirements.

Will it maximize benefits per tax dollar spent?

The adoption and implementation of the recommendation will have a net positive effect. However, the County may have to spend additional dollars to undertake the adoption of IGCC with the goal of making it relevant to Pinal County.

Topic Area B: Approval Process for Green Electricity Production

Overview

In order for an applicant to develop a utility scale "green" electricity production facility in Pinal County today, a project may need a Major Amendment to the County's Comprehensive Plan. This process allows staff and the public to review the proposal to ensure its compatibility with the goals and vision of the Comprehensive Plan. Major Amendments are only considered once per year. A Non-major amendment to the Comprehensive Plan can be considered at anytime of the year and can run concurrent with rezoning proposals. Furthermore, in most cases, an applicant for a "green" electricity production facility would have to rezone the subject property to allow the "green" electricity production facility uses on the property.

> The Arizona state statutes define a "Major Amendment" as a "substantial alteration of the County's land use mixture or balance as established in the County's existing Comprehensive Plan Land Use element for that area of the County**."**
>
> *Pinal County Comprehensive Plan*

For the purpose of this section, "green" electricity and "renewable energy" production are used interchangeably. Both terms are used to identify electricity production projects that do not require conventional fossil fuel or nuclear power.

According to the CATS HV 2016 Transmission Study, the energy requirement for every 100,000 people who move into our County is estimated at 394 megawatts.

Pinal County Electricity Need

Population Growth	Additional Electricity Required
100,000	394 megawatts
500,000	1,970 megawatts
1,000,000	3,940 megawatts
2,000,000	7,880 megawatts
3,000,000	11,820 megawatts

Pinal County, in a cooperative effort with local utility companies, communities, and regional stakeholders, is committed to making certain that the County's future energy needs are secured. Pinal County's Comprehensive Plan policies support leadership in renewable energy without compromising natural resources and/or sensitive environmental areas.

Other Jurisdictions

- Mohave County has adopted an Energy Overlay Zone Ordinance. This ordinance covers a wide spectrum of utility scale development including solar, wind and biomass.
- Gila Bend has adopted a Solar Field Overlay Zone Ordinance. This ordinance only pertains to utility scale solar developments.

Task Force Recommendations

- Change current Comprehensive Plan Policy for utility scale "green" electricity production applications allowing them to be submitted as a Non-major Comprehensive Plan Amendment rather than a Major Comprehensive Plan Amendment.
- Develop regulations for a Pinal County renewable Energy Overlay Zone- permissible in all property zones - which would include a public review process.

Approval Process for "Green" Electricity Production Recommendation(s) Supporting Discussion:

The Task Force listened to presentations from representatives of: 1) APS and SRP on current projects and incentive programs, 2) Pinal Power, LLC, the new biomass facility being constructed in the City of Maricopa, 3) ASU regarding the Energy/Water Nexus, 4) Pima and Maricopa counties on their projects and policies, and 5) Pinal County staff regarding the county's existing zoning application and approval process, as well as information on other jurisdictions' regulations and permitting.

Future population growth projections indicate that a considerable increase in energy requirements will be needed. The Task Force recognized the opportunity for making recommendations that could propel renewable energy production and use in Pinal County. Discussions on balancing recommendations with respect to our County's limited water resources and designated environmentally sensitive areas were the baseline for decisions.

Task Force members considered that the approval process time period can have a major influence on the ability to attract investor funding and/or potential contracts, because most parties won't commit until the zoning is in place. In an effort to reduce the application approval process time, the Task Force recommended changing Pinal County's existing ordinance requirement from a Major Comprehensive Plan Amendment to a Non-major Comprehensive Plan Amendment for "green" electricity production facilities.

Existing solar and renewable energy overlay zones in Arizona were examined. Pinal County staff provided copies of the Gila Bend Solar Field Overlay Zone and Mohave County's Energy Overlay Zone. The Task Force was particularly interested in Mohave County's Energy Overlay Zone and recommended that it be used as a model. There

was one significant difference, however, that the Task Force would like to see in Pinal County's Renewable Energy Overlay Zone: the permitting of renewable energy production in "all" zones. The type and size of the renewable energy production project can be defined in the general provisions of the Renewable Energy Overlay Zone Ordinance. The Task Force unanimously agreed to recommend developing a Pinal County Renewable Energy Overlay Zone for "all" property zones – as long as it goes through the public process.

Will it be effective?

The Task Force recommendation allowing utility scale "green" electricity production applications be submitted as a Non-major Comprehensive Plan Amendment rather than a Major Comprehensive Plan Amendment, would effectively provide an additional incentive for renewable energy production projects in Pinal County. The current Pinal County application approval process requires a Major Comprehensive Plan Amendment. The example given: a facility over 160 acres constructed in a designated Comprehensive Plan area, could take up to12 months for a Comprehensive Plan amendment and an additional four (4) to five (5) months for zoning approval. If the property was a Non-major Comprehensive Plan Amendment, it could take five (5) months to 16 months for approval.

The proposed Renewable Energy Overlay Zone would provide "green" electricity production applicants very specific, detailed information regarding Pinal County's guidelines and requirements. This proposed document would define Pinal County's ordinance, facilitating the approval process for both the County and the applicant.

Is it tailored to Pinal County?

In the Generation and Transmission section of the Comprehensive Plan, Goal 7.7 was the guiding influence for the proposed recommendations: "Support the provision of adequate energy for the future while protecting the natural environment and resources" (See Appendix A). The intent of the proposed Pinal County Renewable Energy Overlay Zone would be to position renewable energy projects in suitable and appropriate locations that benefit Pinal County without adversely affecting the environment, public health, and vital natural resources specific to our region.

Will it maximize benefits per tax dollar spent?

County residents, regional stakeholders and communities expressed repeatedly in the comprehensive planning process that they supported renewable energy production in Pinal County (see Comprehensive Plan Goal 7.6 in Appendix A). By securing energy for future use from renewable sources, Pinal County will grow sustainably - benefiting the economy without compromising our environmental resources and/or the public health of our citizens. The Task Force recommendations recognize the importance of the

public review process - and if adopted by the Board of Supervisors - will facilitate the implementation of the goals and objectives of the Comprehensive Plan.

What other possible recommendations were discussed and not recommended and why?

A Pinal County comprehensive planning map for prospective utility scale "green" electricity production was considered. The proposed map would provide recommended locations offering detailed information on criteria, such as: 1) existing transmission lines and substations, 2) applicable zoning and size, 3) sensitive environmental areas, and 4) existing and planned growth and transportation corridors. If existing utility service providers have already drafted such a map, it was determined that a Renewable Energy Overlay Zone could address these criteria in its general provisions section.

Topic Area C: Water Conservation: New Homes and Commercial/ Office/Industrial

Overview

Pinal County continues to be one of the fastest growing counties in the U. S. (2nd in 2010). In a study provided to the Pinal County Water Element Comprehensive Plan Amendment and Water Element Citizen Task Force (Water Task Force) there are approximately 500,000 additional single family lots available to be developed (have gone through some form of entitlement process) in both unincorporated and incorporated areas. Given this information it is anticipated Pinal County will continue to grow rapidly. Using water wisely is an important tool for the continued sustainability of Pinal County.

Pinal County is not a water provider. Instead Pinal County is mandated by state statute to guide water availability through supporting or affirming policy.

Current research and reports (from the Water Task Force and the Arizona Department of Water Resources) concerning water supplies in Pinal County indicate that:

- Groundwater supplies are limited, and the current demand for water may be approaching the physically available 100-year supply in some areas of the county.
- Renewable water supplies can offset some of the County's dependence on groundwater. However, even with full utilization of the County's renewable supplies, additional renewable supplies will be needed.
    - Renewable water supplies in Pinal County can be utilized more fully.
    - Renewable water supplies generated within Pinal County are relatively inexpensive to acquire and distribute compared to imported water supplies (e.g. Central Arizona Project (CAP) water). There are two types of renewable water supplies in the County:
        - Effluent generated from the treatment of wastewater ("reclaimed water").
        - Surface water from the Gila River.

According to the Arizona Department of Water Resources, Pinal County water use is still dominated by agricultural uses, 80% in 2006 (of which roughly 50% is met by the use of CAP water not considered a long term supply in Pinal County). Municipal and industrial uses account for about 5% of water usage with virtually all water being supplied by groundwater and agriculture. Indian land utilizes the remaining 15%.

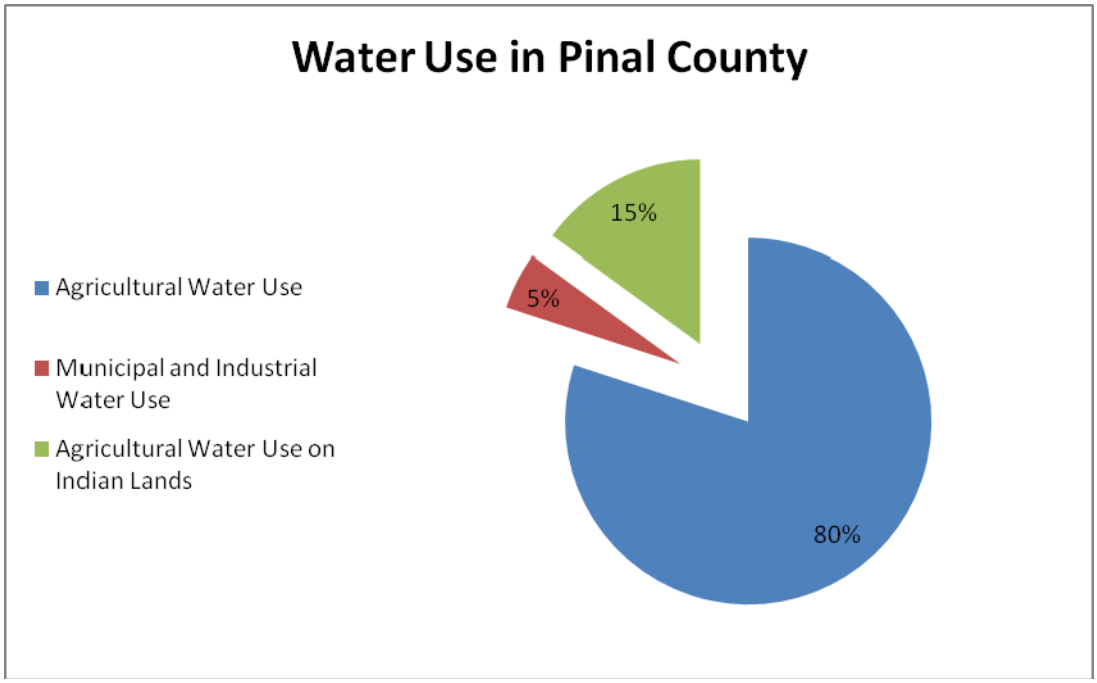


Chart 3

The majority of residential water use is for outdoor landscaping (see Chart 4).

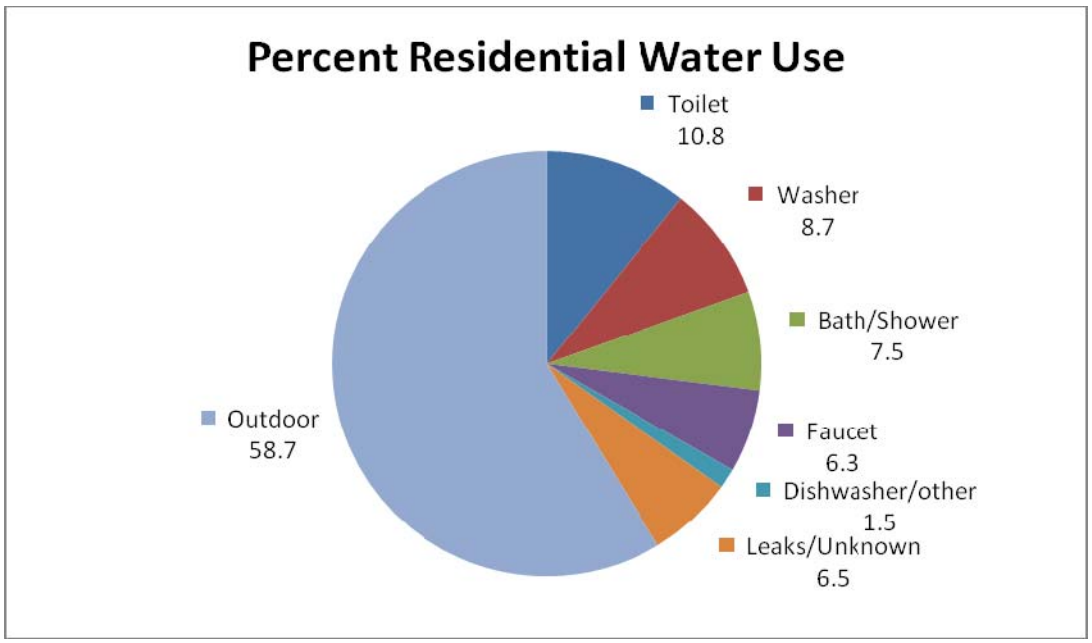


Chart 4 (Global Water presentation September 23, 2010)

Other Jurisdictions

In researching how other jurisdictions address the issue of water conservation, three strategies were practiced, in addition to policy guidelines in their respective Comprehensive/General plans:

- Landscape ordinances requiring choices of low water use plants.
- Water conservation and efficiency rebates (e.g., rebates for water saving appliance purchases, removing turf landscape).
- Water conservation education and marketing programs.

The City of Tucson has also incorporated a Gray Water Ordinance in its water conservation planning, requiring all new home construction be pre-plumbed for gray water use.

In those jurisdictions that use rebates and education/marketing tools, the one common denominator was that these jurisdictions also owned and operated their own water utility. As described earlier, this is not the case for Pinal County.

Task Force Recommendation(s)

- Require all new homes to be plumbed for water reclamation and gray water use.
- Require developments/subdivisions which have their own reclamation (sewage) plant be plumbed for, and use, a full water reclamation system. (A "system" is one in which there is complete reclaimed water piping from plant to all occupied structures).
- Implement a Pinal County Landscape Ordinance for new homes and commercial projects which requires low water use plants from the current Active Management Area (AMA) list (areas outside of an AMA would use the Tucson AMA list).
- Do not permit private swimming pools and private and public water features, unless they are in a development which is using a water reclamation system.
- Encourage rain water harvesting.
- Provide retention/detention area "credits" for commercial development which uses "porous" pavement technology (Porous pavement surfaces allow for absorption of rainfall thus reducing the need for storm water retention facilities).

Water Recommendations Supporting Discussion

- Require all new homes to be plumbed for water reclamation and gray water use.

The Task Force recognizes that not all subdivisions will occur in areas that presently have access to sewers and that not all sewer providers are currently capable of processing effluent to reuse standards. As ground water becomes an increasingly valuable commodity over the next several decades, this situation may change significantly. Retro-fitting and re-plumbing an existing house to utilize reclaimed and/or gray water can be cost prohibitive. However, based on discussions with representatives of the home building community, installation of these features as part of new construction

adds only $1,500 to $2,000 to the overall cost. This amount equates to 1% to 1.33% of the cost of a $150,000 home in 2011.

- A full water reclamation system would be required of developments/subdivisions when it has its own reclamation (sewage) plant.

Outdoor and toilet uses account for roughly 70% of domestic water consumption (see Chart 3). Substituting reclaimed water for these uses will reduce the volume of virgin ground water otherwise expended for non-potable consumption. The cost of a "full" or total reclaimed water system (purple pipe) from the wastewater treatment plant through the distribution system to the customer services and within the homes is relatively minor compared to the totality of the land and infrastructure costs associated with a new development. The costs to the community to retrofit these facilities at a future date are significantly greater.

- Implement a Pinal County Landscape Ordinance for new homes and commercial structures. Require low water use plants from the appropriate AMA. If the development is outside of an AMA, plants should be selected from the Tucson AMA list.

As indicated in Chart 4, approximately 60% of water use is for outdoor purposes. Reducing the amount of water used for landscaping yields direct reductions in water consumption. Incorporated communities throughout Pinal County have had low water landscape ordinances in place for a number of years, which have been favorably accepted by residential developers. Use of the current AMA plant list within the central and western Pinal County areas is consistent with the Arizona Department of Water Resources (ADWR) conservation goals for the Pinal AMA. The use of the Tucson AMA list is appropriate for the eastern portion of Pinal County, which shares similar geographical and physiological characteristics with the Pima County area.

- Restrict private swimming pools and private and public water features, unless they are in a development which is using a water reclamation system.

Over the past fifty years, in-ground back yard swimming pools have become a ubiquitous feature for new and existing residential communities, which have in many instances supplanted the community pool. Random sampling of newer subdivisions throughout the county indicated that there is roughly one (1) pool per four (4) homes. A typical backyard pool uses 15,000 to 25,000 gallons of potable water with its initial filling. In a community of 10,000 people, this equates to an excess of 18 million gallons of drinking water or enough to meet the yearly needs of about 400 persons.

Water loss to evaporation and backwashing may exceed 5,000 gallons annually. Every several years the existing water in a pool is generally replaced as salts and dissolved solids accumulate to unacceptable levels consuming an additional 15,000 to 20,000 gallons of drinking water. With EPA applying increasingly stringent water quality

standards for drinking water, the associated treatment costs incurred by water providers and passed through to consumers, makes the continued installation of in-ground back yard pools a questionable practice.

- Encourage rain water harvesting.

As indicated previously, outdoor water uses constitute roughly 60% of the residential water budget. Rain water harvesting for landscape use is a low tech methodology for augmenting nonrenewable potable water resources.

- Provide retention/detention area "credits" for commercial development which uses "porous" pavement technology ("porous" pavement takes on some of the retention/detention capacity; therefore less retention/detention area is needed.)

Porous pavements capture rainfall that would otherwise flow into onsite storm water retention basins. The County currently requires that these retention basins be sized to hold a calculated volume of water based on the given site area that would drain to the basin. Since porous pavements absorb the rain and allow it to permeate into the pavement subsoil structure, the volume of storm water contributing to these basins is reduced proportionally. Consequently, the required size of the basins should be reduced accordingly.

Will it be effective?

Pinal County has finite ground water resources, unpredictable surface water resources and limited access to renewable supplies through the Central Arizona Project and effluent reuse. All potable water needs countywide are currently met by public and private water providers through groundwater pumping. The proposed Task Force recommendations target practical methods of reducing residential and commercial water consumption of mined groundwater for non-potable uses. All reductions in non-potable uses of groundwater will permit a corresponding increase in residential and commercial development thereby extending the duration of economic growth within Pinal County. If and when renewable surface water supplies are developed within Pinal County, these supplies will have to undergo substantial and costly treatment processes in order to be suitable for potable water use. Implementation of the Task Force recommendations will help insure the efficient and effective use of these resources.

Is it tailored to Pinal County?

Pinal County is not a water provider and is preempted by the Arizona Corporation Commission and the Arizona Department of Water Resources from regulating water providers with respect to matters of water supply development and potable water consumption. However, by implementing the Task Force recommendations Pinal County can play a pivotal role in extending the County's finite water supplies for future growth without adversely impacting near term development.

Will it maximize benefits per tax dollar spent?

The adoption and implementation of the recommendations will have a limited short term impact on tax dollars. It is anticipated that the initial costs incurred by the County will be confined to modifying the current building and development codes to incorporate the Task Force recommendations. Once these recommendations have been adopted the ongoing implementation will occur as part of the normal plan review and building permit process. There will not be any ongoing expenditure of tax dollars for the recommended improvements as those costs will be borne by developers and builders.

Topic Area D: Heat Island Mitigation through Reduced Parking Lot Sizes

Overview

Heat Island mitigation is defined by the Environmental Protection Agency (EPA) as built up areas that are hotter than nearby rural areas. Buildings, roads and other infrastructure replace open land and vegetation. Surfaces that were once permeable and moist generally become impermeable and dry, which tends to hold the heat in for longer periods of time. Heat Islands lead to higher peak time energy usage, higher air conditioning costs, higher levels of air pollution and greenhouse gas emissions. Mitigation of the heat island effect is generally accomplished using one of three strategies:

What is an Urban Heat Island?

- On a hot summer day, roofs and pavement can heat to temperatures 50-90°F hotter than air.
- The annual mean air temperature of a city with 1 million people or more can be 1.8–5.4°F (1–3°C) warmer than its surroundings
- On a clear, calm night, however, the temperature difference can be as much as 22°F (12°C).

Reducing Urban Heat Islands: Compendium of Strategies: see http://www.epa.gov/heatisland/

- Increasing tree and vegetative cover.
- Installing green roofs (roof gardens) and cool roofs (reflective).
- Using cool pavements (reflective and permeable pavements).

Other Jurisdictions

The City of Tucson addresses the heat island effect of parking lots by requiring one tree for every four parking spaces in their landscape ordinance. Many other jurisdictions are encouraging the use of cool pavement materials and cool roofs through the development process.

Pinal County Parking Ordinance

Pinal County updated the Off-Street Parking and Loading Ordinance 2.140 (Parking Ordinance) in 2010. The new parking ordinance reduces the amount of required parking space(s) for commercial/industrial development by lowering the number of parking spaces required for each square foot of commercial/industrial space. The table below shows approximate amounts of parking area saved comparing the old requirements with the new requirements.

	Old Ordinance	New Ordinance
Offices	1/200 sq ft of floor	1/300 sq ft of floor
Shopping Center	1/200 sq ft of floor	1/250 sq ft indoor floor + 1/5000 sq ft outside sales

Table 1

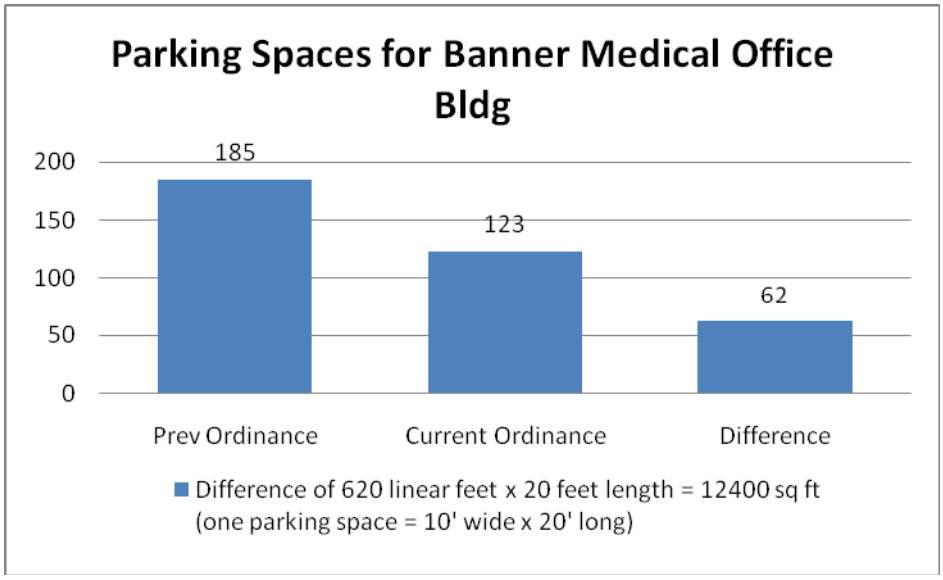


Chart 5

The changes made to the Parking Ordinance were intended to better reflect actual parking needs of commercial and office uses. A side benefit of making this change was a reduction in the overall amount of pavement required in these parking lots, thus diminishing the heat island effect. The Task Force believes the following recommendations build on the changes to the Parking Ordinance with the addition of shade and landscape requirements for parking areas. The recommendations for landscaping continue the focus of using native, low water use and drought tolerant plants mentioned in Topic C: Water Conservation recommendations.

Task Force Recommendation(s)

- Update the current (new) Parking Ordinance (already cited) to add landscaping requirements. The amount of landscaping space required should closely match the amount of space no longer required when comparing the old parking ordinance and the new Parking Ordinance.
- Require that landscaping for parking lots include one tree per 4 parking spaces
  - Require that trees be a minimum of 24" box trees with a trunk size of no less than 2".
  - Require that plants be selected from a plant list available from the appropriate AMA. If the development is outside of an AMA, plants should be selected from the list for the Tucson AMA.
- Parking shade structures would still be allowed, in place of the tree requirement, but must generate the same minimum shade coverage.
- Encourage underground, understructure and or multi-level parking structures.
- As technology and affordability continues to improve, Pinal County should encourage the use of cool pavement materials as well as the use of cool roof technology.

Heat Island Mitigation through Reduced Parking Lot Sizes Recommendation(s) Supporting Discussion

Will it be effective?

Effectiveness relates to the degree of heat buildup at the surface and in the air above a developed area. Achieving 100% effectiveness would mean the total temperature profile would be the same post-development as pre-development. However, other research efforts have shown that if the recommendations for shading, cool roofs, green spaces, and cool pavements are widely adopted, heat islands can be avoided or minimized.

Is it tailored to Pinal County?

The recommendations are tailored to the climate of the Southwest and based on studies done in various areas of Arizona (e.g. Tucson, Gilbert, and Prescott). They are especially relevant to Pinal County in that it is far easier to prevent heat islands from forming than to eliminate them. There is no data that suggests Pinal County has significant heat islands at this time, but given current projections, the population centers expected would create them.

Will it maximize benefits per tax dollar spent?

The adoption and implementation of the recommendations do not depend on tax dollars as costs will be borne by developers. The amount of additional money required to implement the recommendations depends somewhat on the choice of the technology chosen.

What other Heat Island Mitigation recommendations were discussed and not recommended and why?

The Task Force considered requiring (versus encouraging use of) cool pavements and cool roofs. It was felt by the Task Force that this requirement could add cost to the county by way of inspections and enforcement.

Related Sustainability Recommendations

During discussions of recommendations for the Sustainable Pinal Program, the Task Force identified additional recommendations integral to a successful, more encompassing Sustainability Program for Pinal County.

- Hire a Sustainability Director:
  - In order for Pinal County to move towards a more sustainable future, guidance and direction will be needed from an in-house staff expert. It is difficult for the Task Force to suggest the addition of staff during the current economic environment. The Task Force envisions this position as one that can assist the County as it implements the sustainability recommendations as well as driving sustainability within the Pinal County government. The Task Force sees an opportunity for this new position to assist in driving sustainability practices with potential cost savings that far exceed the salary expense of the position. Please see Appendix B for the recommended qualifications and job description.
- Offer expedited plan/permit review for "beyond the code" projects
  - For some projects, especially those on a large scale, expedited plan review offers time and resource savings, giving the sustainable developer a competitive advantage over their competitors.
- Develop baseline information on recommendations, so that improvement/success can be measured.
  - The Task Force believes that the recommendations that have been made serve both the County and its residents well. They also understand that in order for success to be shown, proper benchmarks and baseline information must be gathered for future quantitative evaluation.
- Offer Sustainability Certificates for development that goes "beyond the code".
  - The Task Force believes that positive reinforcement of those who are developing in extremely sustainable ways should be recognized and promoted.
- Encourage cool roofs, including "green" roofs.
  - The Task Force believes that the heat island effect is a detriment to Pinal County residents. The Task Force understands the importance of other related heat island solutions and sees immense potential for these technologies to combat the heat island effect and therefore should be encouraged and promoted.
- Develop an education/outreach effort to drive success for the sustainability recommendations.
  - Pinal County has an opportunity to be a leader in sustainability. Public outreach and education efforts will assist Pinal County in taking full advantage of this opportunity through such efforts as newsletters, website and brochures.

Implementation of Recommendations

The Task Force recommendations are made with the long term benefit of Pinal County and its residents in mind. The Task Force understands that not all of the recommendations can, or should, be implemented at the same time. With this in mind, the Task Force identified seven (7) recommendations, which were prioritized in order of importance. The Task Force believes that these items will have the most significant impact for long term sustainability within Pinal County; they address all four (4) of the Board of Supervisors topic areas. Implementation of the recommendations in this report will serve as the cornerstone of a sustainability initiative, which will showcase Pinal County as a sustainability leader while benefiting Pinal County residents for many years to come.

Implementation Priority

- ** Implement a Pinal County Landscape Ordinance for new homes and commercial projects which requires low water use plants from the current AMA list (areas outside of an AMA would use the Tucson AMA list).
- ** Update the current (new) Parking Ordinance (already cited) to add landscaping requirements. The amount of landscaping space required should closely match the amount of space no longer required when comparing the old Parking Ordinance and the new Parking Ordinance.
- ** Require that landscaping for parking lots include one tree per 4 parking spaces.
    - Require that trees be a minimum of 24" box trees with a trunk size of no less than 2".
    - Require that plants be selected from a plant list available from the appropriate AMA. If the development is outside of an AMA, plants should be selected from the list for the Tucson AMA.
- ** Adopt the International Green Construction Code (IGCC) to apply to all residential, commercial, office and industrial building, including the referenced ICC 700 (International Code Council residential "green" building program). The IGCC is due to be available for adoption and use in spring 2012.
    - The adopted version should be localized to maximize energy efficiency for the Pinal County environment.
- ** Require all new homes to be plumbed for water reclamation and gray water use.
- ** Require developments/subdivisions which have their own reclamation (sewage) plant be plumbed for, and use, a full water reclamation system. (A "system" is one in which there is complete reclaimed water piping from plant to all occupied structures.)
- ** Change current Comprehensive Plan policy for utility scale "green" electricity production applications allowing them to be submitted as a Non-major

Comprehensive Plan Amendment rather than a Major Comprehensive Plan Amendment.

Appendix A

Sustainability references from the Pinal County Comprehensive Plan .

Topic Area A: Energy Conservation: New Homes, Commercial/ Office/Industrial, LEED and other Standards

Chapter 7 Environmental Stewardship-Conservation (page 277)

Goal 7.4 Improve the energy efficiency of structures in Pinal County

Objective 7.4.1 Improve the energy efficiency of new construction and the existing building stock through building codes and processes.

Policy 7.4.1.1 Maintain the most up to date International Building Codes (IBC) and International Energy Conservation Code (IECC) and provide training for staff to implement.

Policy 7.4.1.2 Encourage the expansion of energy efficient building practices.

Policy 7.4.1.5 Require that 20% of all homes in developments larger than 100 dwelling units meet Energy Star or other energy efficiency standards.

Objective 7.4.2 Reduce energy demand through community design.

Policy 7.4.2.1 Encourage developments that use energy smart site design (e.g., solar orientation, cluster development).

Topic Area B: Approval Process for Green Electricity Production

Chapter 7: Environmental Stewardship Pages 272 to 283

Goal 7.6 Expand renewable energy in Pinal County

Objective 7.6.1 Support small scale renewable energy projects

Policy 7.6.1.1 Support statewide policy that provides property tax credits for renewable energy facilities on individual homes and businesses from net assessed valuation calculations.

Policy 7.6.1.2 Assess current codes so they are supportive in permitting small scale renewable energy projects. Explore ways to reduce barriers caused by homeowner's association restrictions.

Policy 7.6.1.3 Work with developers and energy providers to design neighborhoods with optimum solar orientation.

Policy 7.6.1.4 Support state and federal incentive programs for the development of renewable energy infrastructure for individuals and businesses.

Policy 7.6.1.5 Develop/amend ordinances to protect solar access through sensitive building orientation and for property owners, builders and developers wishing to install solar energy systems.

Policy 7.6.1.6 Support the transmission of renewable energy from sources within and outside of Pinal County.

Objective 7.6.2 Support the growth of renewable energy in Pinal County

Policy 7.6.2.1 Identify through specific area planning potential locations for renewable energy projects.

Policy 7.6.2.2 Support the attraction of renewable energy providers through the County's economic development strategy.

Policy 7.6.2.3 Work with economic development proponents to develop education and training programs for renewable energy employment opportunities.

GENERATION AND TRANSMISSION

Goal 7.7 Support the provision of adequate energy for the future while protecting the natural environment and resources.

Objective 7.7.1 Identify and protect potential sites and corridors for new energy generation and transmission facilities.

Policy 7.7.1.1 Work with energy providers through the specific area planning process to identify appropriate locations and buffering of future projects.

Policy 7.7.1.2 Work with energy providers to co-locate where possible facilities such as transmission lines, pipelines, substations, and terminals.

Policy 7.7.1.3 Encourage the adoption of designated generation and transmission and facility sites and corridors in future updates to County and municipal planning documents to protect against incompatible development and to maximize increased capacity.

Objective 7.7.2 Protect water and environmental resources

Policy 7.7.2.1 Monitor the evaluation process by other agencies of all proposals for new generating facilities to determine long-term impacts on water resources.

Policy 7.7.2.2 Support innovative designs for new generating facilities that minimize water use.

Policy 7.7.2.3 Explore innovative water re-use strategies.

Policy 7.7.2.4 Discourage facilities from locating in designated environmentally sensitive areas and encourage facilities to be in context with viewsheds and waterways.

Objective 7.7.3 Provide information to citizens and the development community regarding future energy facilities

Policy 7.7.3.1 Keep up to date information about locations of existing and potential new generation and transmission facilities on the County Web site.

Policy 7.7.3.2 Review development proposals along with short and long range plans of energy providers to ensure an understanding of where facilities may be and to keep prospective residents and businesses informed.

Objective 7.7.4 Maintain cooperative working relationships with energy providers

Policy 7.7.4.1 Hold a biannual "energy summit" bringing together providers, landowners and key county staff and leadership to discuss future plans and update one another on current planning and trends.

Policy 7.7.4.2 Work closely with energy providers during the evaluation of development plans to access cumulative, County-wide impacts on energy availability and reliability.
Policy 7.7.4.3 Coordinate with energy providers in the implementation of the Growth Areas element to ensure energy infrastructure is adequate to support growth and infrastructure development.
Policy 7.7.4.4 Encourage involvement of energy providers in area planning processes.
Policy 7.7.4.5 Continue to participate in regional energy planning forums such as the CATS Group.

Topic Area C: Water Conservation: New Homes and Commercial/ Office/Industrial

Chapter 7: Environmental Stewardship-Water Resources (p259)

Objective 7.2.2: Encourage the maximum conservation of water resources currently available within Pinal County. The County can encourage the conservation and efficient use of water supplies. In addition, the County government can play a significant role in encouraging the reuse and underground storage of reclaimed wastewater.
Policy 7.2.2.2: Consider requiring as a condition of its approval for new wastewater treatment facilities located within Pinal County that the applicant also would be required to demonstrate and implement a program for the direct reuse by turf, industry and agriculture and/or underground storage, (either direct or indirect recharge) of reclaimed water within Pinal County.

Topic Area D: Heat Island Mitigation through Reduced Parking Lot Sizes

Chapter 7: Environmental Stewardship-Water Resources (p259)

Goal 7.2 To protect the long-term water supply for Pinal County

Objective 7.4.2: Reduce energy demand through community design
Policy 7.4.2.2: Encourage Sonoran-friendly landscaping in developments to provide shade
Policy 7.4.2.3: Work with municipalities to avoid the development of heat islands through land use planning, open space preservation between developments, site design and building materials and colors.

Appendix B

Pinal County Sustainability Director

General Description

The Sustainability Director for Pinal County will facilitate the development of strategies and policy direction regarding efficient resource use and conservation, environmental quality and materials/waste management, environmental equity, and green business development. This position reports to the County Manager and supports all County departments on actions to improve the County's environmental performance. This person will assist the County Manager in institutionalizing sustainability as a County value by ensuring that the concept of sustainability (long-term thinking that considers the multiple impacts of actions on the environment, social equity, and the economy) is integrated into all County policies and activities.

Work Performed

- Create a permanent sustainability program that grows and improves over time.
- Organize a community process to develop a comprehensive sustainability plan for the County.
- Make recommendations regarding implementation of policies and procedures.
- Educate County management, supervisors, and staff on the reasons for, and benefits of, environmentally and socially responsive operations. Support the cultural development of a strong sense of sustainability in county programs and operations.
- Assist departments in the research of best practices for sustainable operations in fields as diverse as sustainable land use planning, green building, facilities management, renewable energy, transportation, environmentally responsible purchasing, waste management and recycling, water conservation, and community engagement.
- Help the County develop innovative, inter-departmental programs that save money, support local businesses and create jobs, improve quality of life, and protect the environment and public health.

- Identify socially and environmentally responsive best practices throughout County operations, and work with department managers to collaboratively implement identified project priorities. Direct the activities of an internal County "Green Team" to develop these best-practices and track implementation.
- Monitor the progress of all County department sustainability projects and work with departments to develop a Sustainability Scorecard to track progress in achieving sustainable operations.
- Assist with the development of a green building program and other programs, both voluntary and regulatory, to improve the environmental sensitivity and sustainability of development and other private sector activities.
- Serve as lead author, and manage the production of, an annual sustainability report.
- Develop programs to diffuse knowledge on sustainable design, practices, policies, etc. especially as related to sustainable development and economic and environmental sustainability. Organize public access to data, conferences, workshops, seminars, lectures, exhibits and other programs.
- Work closely with public relations staff to communicate the County's sustainability goals and accomplishments to elected officials, staff, other jurisdictions, stakeholder groups, and the community.
- Develop collaborations and partnerships with the private sector, community and interest groups, and other agencies. Pursue grants and other funding, and recognition/awards, where appropriate.
- Through effective and efficient planning and coordination ensure that County activities complement related initiatives by other organizations. Evaluate the applicability and appropriateness of County participation in International, National, State, or Regional sustainability initiatives.
- Develop and monitor benchmarks and performance measurements which demonstrate the county's sustainable program accomplishments.
- Assist the County Manager and other staff in the effective and timely accomplishment of program deliverables.
- Provide strategic guidance to increase the effectiveness of programs and activities.

QUALIFICATIONS

- Minimum Qualification(s) Required. Graduation from an accredited college or university with a Bachelor's Degree in Environmental Science, Industrial Hygiene, Environmental Engineering, Sustainability, or a related field. Seven to nine years of progressively responsible experience in the management and administration of environmental and/or sustainability programs, including at least two years in a supervisory capacity.

Preferred/Desirable Qualification(s)

- Graduation from an accredited college or university with a Master's Degree is preferred. Experience dealing with the public is highly desirable.

ESSENTIAL FUNCTIONS

- Communication: Communicates with the general public, other County employees, vendors, management, contractors, the media, regulatory agencies, and public officials in order to provide guidance and information on environmental and sustainability concerns.
- Prepares written documents, council reports, studies, proposals, budget documents, letters, memos, leads meetings etc., to convey and analyze information to management, Board of Supervisors, subordinate staff, and the general public.
- Provides written and verbal direction to Environmental and Sustainability Division staff.
- Produces written documents such as policies, procedures, and methods for developing or improving Countywide environmental and sustainability programs. Coordinates environmental and sustainability policies and technical activities with legal staff to develop and implement strategies to obtain County objectives.
- Reviews proposed laws/rules and develops programs in conjunction with the County Attorney's Offices to represent the County and the public's interest in the legislative and rule making process.

References

2016 Transmission Study: Impacts of Ten-Year Plan Transmission Projects and Sensitivity to Local Load Growth: Presentation for Central Arizona Transmission System – High Voltage "CATS HV" A sub-committee of SWAT by K. R. Saline & Associates, PLC, August 13, 2007.

Arizona Department of Water Resources, May 13, 2011, *Pinal Active Management Area Draft Demand and Supply Assessment.*

Arizona Public Service Company, *APS Solutions for Business Program:* Presentation to the Sustainable Pinal Citizen Task Force by Wayne Dobberpuhl, November 22, 2010.

Arizona State University*, The Energy/Water Nexus*: Presentation to the Sustainable Pinal Citizen Task Force by Professor Martin J. (Mike) Pasqualetti, November 22, 2010.

Global Water, *Water Challenges & Opportunities*: Presentation to the Sustainable Pinal Citizen Task Force by Ed Borromeo, September 23, 2010 .

Pinal County, 2009, *We Create Our Future: Pinal County Comprehensive Plan*, November, 2009.

Reducing Urban Heat Islands: Compendium of Strategies, http://www.epa.gov/heatisland/.