

**Greater Tucson Strategic Energy Plan Working Group
Options to Achieve a New Energy Future
November 2006**

Pima Association of Governments (PAG) established the Greater Tucson Strategic Energy Plan working group, composed of members of the Tucson-Pima Metropolitan Energy Commission (MEC), members of the business community and the public, which, for the past year, has explored concepts to be included in a new Strategic Energy Plan for the greater Tucson region. This plan is required to be developed by PAG to fulfill the terms of a Memorandum of Understanding between PAG and the U.S. Department of Energy.

The Strategic Energy Plan will outline the current challenges we face and the importance of energy to our local economy. Most importantly, the Plan will suggest a series of options aimed at reducing overall energy demand and increasing the use of renewable sources of energy. The working group has compiled an options document that identifies a number of approaches that, if implemented, would move the greater Tucson region in the direction of achieving a more balanced energy portfolio with far greater reliance on conservation and alternative sources of energy.

The PAG/MEC working group believes that the Regional Council should have the opportunity to consider these options at this time due to the increasing importance of energy issues on the national agenda. We believe that much more can be accomplished and implemented at the state and local levels to transform energy production and use in fundamental ways. Doing so will lead to less reliance on imported petroleum and the greater utilization of renewable energy sources. The options we have developed are essential to achieving the critically important goal of energy diversification necessary to insulate ourselves from future energy shocks.

The set of possible options fall into several main categories: Initiatives, Infrastructure, Conservation and Efficiency, Transportation, and Energy Generation. Initiatives represent actions that government can take to encourage or promote renewable energy and energy efficiency. Infrastructure applies to the development of systems that build in a high level of energy conservation and/or on-site generation. Conservation and Efficiency will focus on efforts that can avoid the use of energy or which use the least amount of energy necessary to produce a desired result. Recommendations in the Transportation category will identify strategies to pursue fuel flexibility and to encourage energy awareness. Finally, Energy Generation identifies strategies to use more renewable energy sources in the production of energy.

A. Initiatives

1 Promote urban infill through zoning and other policy positions.

The creation of a vibrant city core surrounded by urban "village" centers is highly desirable in terms of energy policy. Increasing population density within urban centers, supported by appropriate zoning policy, would provide choices allowing increased energy efficiency. Putting services and amenities within walking/biking distance, while providing efficient transportation options, would provide choices promoting energy savings. As an example, Rio Nuevo seeks to develop two of Tucson's principle centers of employment (Downtown and the University of Arizona) by promoting appropriate infill and providing efficient transport options.

2 Reduce property tax assessed valuation for energy efficiency/renewable energy equipment.

Fiscal policy choices can affect the investment in renewable energy sources. For example, solar energy tax credits were recently adopted by the state (HB 2429) which apply to businesses. Another feature of the law is to eliminate state and local sales taxes that would otherwise apply to the purchase and installation of solar energy equipment. Additionally, the new law allows the value of solar systems to be excluded from assessed valuations of commercial and industrial property.

3 Adopt fiscal policies to provide incentives to use renewable energy systems.

Fiscal policies can dramatically affect choices regarding the selection of renewable energy system. There are a wide variety of options that can be considered. For example, British Columbia has tax breaks for bikes, alternatively fueled vehicles, materials used to conserve energy, and energy efficient furnaces, water heaters and heat pumps. The tax incentives are automatically received at the time of purchase. These breaks have facilitated increased purchases of eligible technologies, including a six-fold increase in qualifying water heaters between 2000 and 2005 from 116 to 689 and an increase in the number of efficient furnaces from 2,457 in 2000 to 8,671 in 2005.

4 Adopt policies that provide incentives for the use of more energy efficient modes of transportation.

Incentives to participate in carpools or to use public transportation have long been used to encourage commuters. More recently, commuters using alternatively fueled vehicles with special license plates are allowed to use carpool lanes on freeways. The opportunity exists to provide incentives for commuters to further encourage the use of alternative transportation modes. For example, incentives can include adjusting parking rates at public facilities to favor hybrid vehicles, electric plug-ins at parking stalls can be provided, and preferable parking areas can be designated for vehicles that are more energy efficient.

5 Create and implement a “Regional Solar Initiative” to highlight the value of retrofitting homes and commercial buildings with solar energy systems.

Solar energy is abundantly available in the greater Tucson area. Greater public awareness of the availability and effectiveness of solar energy can lead to greater utilization of solar energy systems. Local jurisdictions can provide important leadership by engaging in a cooperative effort to promote solar energy. Opportunities exist for creating awareness by instituting a citizen award program, pursuing a regional public awareness campaign, and implementing a variety of outreach efforts.

6 Promote energy conservation and renewable energy options as community values.

Substantial reductions in energy consumption can be achieved simply by not wasting energy. Conservation is largely a product of two main factors: awareness and cost. Once they understand that wasting energy has serious environmental and national security consequences, individuals will tend to reduce their energy consumption. Once they pay for wasteful uses of energy, people tend to conserve more. As energy costs escalate and the security of oil supplies is increasingly in doubt, renewable energy options offer tangible benefits and move us away from energy sources that are much more environmentally destructive.

As a community, we can move toward a future that is inherently less polluting and one that increasingly relies upon renewable energy sources. We must retain our existing energy sources for the foreseeable future, but they can and should be augmented and replaced, if only to attain greater flexibility. By engaging the community and articulating a future vision, the utilization of energy systems that encourage conservation and the use of renewable energy sources can become a value against which other sources are weighed.

7 Ensure that planning decisions do not preclude or inhibit a diversity of positive energy solutions for the community.

Planning in newly developing areas should integrate appropriate infrastructure to avoid precluding the use of energy efficient and renewable energy systems.

8 Promote governmental action at all levels requiring utilities to increase the percentage of energy derived from renewable energy sources.

The Arizona Corporation Commission (ACC) has proposed regulations that will require regulated utilities to obtain 15% of the energy they provide to customers from renewable sources by 2025. To help fund this program, residential and commercial customers are charged an additional incremental fee. This program is not yet formally adopted and action is pending with the ACC.

Renewable energy standards, similar to that being considered in Arizona, are being widely adopted by other states and in other countries.

- *Pennsylvania has adopted a Renewable Energy Portfolio Standard (RPS) which mandates that by 2020, 18% of all retail energy generated must come from renewable sources.*
- *In 1999, Texas enacted its Renewable Energy Portfolio Standard —requiring 2,000 megawatts (MW) of new renewable energy capacity by 2009—as part of legislation that restructured the state’s electricity market. Today, the Texas RPS is one of the most effective and successful in the nation. The state is ahead of its annual requirement schedule with nearly 1,200 MW of new renewable energy already installed.*
- *In 2004, voters in Colorado adopted an initiative that requires the state's largest utilities to obtain 3% of their electricity from renewable energy resources by 2007 and 10% by 2015 as well as establish a standard net metering system for homeowners and ranchers with small solar photovoltaic (PV) systems to connect to the power grid. The measure also calls for 4% of the mandated amount of renewable energy to originate from solar resources.*

To date, 24 states have enacted renewable electricity standards or renewable energy funding programs to achieve a greater reliance on renewable energy sources. California may have the most ambitious program. In 2002, California established its Renewable Portfolio Standard Program, with the goal of increasing the percentage of renewable energy in the state's electricity mix to 20% by 2017. In January 2006, the California Public Utilities Commission created the California Solar Initiative. This new incentive program, for renewable systems of less than one megawatt, begins in January 2007 and provides a total of \$2.9 billion over ten years.

The United States Senate has endorsed a measure to increase the Department of Defense's consumption of renewable –energy. This measure sets a statutory goal for the department of acquiring 25% of its electricity from renewable energy sources by the year 2025. Additionally, Sen. Jeffords has introduced legislation to establish a national renewable energy standard.

European countries are also strongly supporting renewable energy standards. Germany and Spain have been leaders in this effort and Ireland just recently (June 2006) increased its target for renewable energy generated electricity from 13.2% to 15% by 2010. Wind energy is being used to meet most of that requirement. In 2004, the installed capacity of wind farms in Ireland was 339 megawatts (MW). By the end of 2005, wind generation had risen by 46% to 496 MW. A further rise to 736 MW is expected by the end of 2006. In Germany, adoption of the new policy has led to the development of 110,000 solar PV systems, 2,000 biomass plants, 6,000 small hydro plants, 16,500 wind turbines, and 45,000 jobs in the wind industry.

The movement toward greater use of renewable energy is a global phenomenon. The provincial government of Victoria, Australia has recently adopted a target of 3,274

gigawatt hour (GWh) of renewable electrical energy by 2016. This target would represent 60% of new installed energy.

9 Modify building codes to require specific provisions that promote renewable and efficient energy options including, among others:

- **Require new construction to offer plumbing connections to use solar water heaters, avoiding costly retrofitting.**
- **Require new construction to offer wiring provisions that would allow future adaptation to use solar energy to minimize the cost of retrofitting.**
- **Adopt standards that increase the utilization of passive solar daylighting systems and passive winter heating.**
- **Require all new buildings to have programmable thermostats.**
- **Require some commercial facilities, e.g., furniture showrooms, to maintain designated temperatures when closed.**
- **Promote optimal solar orientation in new construction (length facing north and south, and windows minimized and appropriately shaded on the south and west).**

The incremental cost of providing plumbing and wiring connections to allow a homeowner to later add solar hot water or electrical systems is very small and can provide substantial savings when such systems are added. Using passive solar systems is helpful to reduce energy consumption. Some commercial buildings do not need to maintain cool temperatures when closed and would benefit by realizing cost savings. By simply optimizing the orientation of buildings before construction, it is possible to gain up to a 25% savings in energy costs.

10 Establish a goal to reduce energy use by governmental institutions by \$1 million over 10 years.

The City of Tucson has adopted the Sustainable Energy Standard, and Pima County is scheduled to adopt it January 1, 2007. The City of Portland, Oregon took on this challenge in 1990 by focusing first on its internal buildings and facilities with a program called the City Energy Challenge. A goal was established to cut City government energy bills by \$1 million within ten years. The City Council was anxious to capture significant potential savings and believed it was important to set an example for residents and businesses. By 2000, more than 90% of the objectives in the plan have been achieved, including reducing City energy bills by \$1.1 million annually for a total reduction of more than \$7 million since the inception of the program.

11 Promote the use of renewable energy systems through permit prioritization and reduced fees.

As an incentive, commercial and residential retrofits and new construction should be offered a higher priority in terms of permitting and, if possible, reduced fees for permits.

12 Develop educational programs to promote the linkage between water conservation and reduced energy usage.

Energy is required to treat water and pump water to users. If only a relatively small amount of water were harvested from rainfall events and used for local irrigation, the demand on groundwater supplies would be reduced and energy savings would be realized as less water would have to be pumped to customers. Water can also be saved if energy generation at conventional power plants is reduced. For each kilowatt-hour of electricity not generated, 2/3 of a gallon of water can be saved.

13 Establish a centralized capability to pursue energy-oriented grant opportunities, providing all jurisdictions within the county with the ability to seek and obtain grants that promote energy efficiency.

There are many potential grants available to communities to pursue energy saving options. A centralized office should be established to coordinate grant opportunities and to serve as a resource for coordinating and preparing grant applications.

14 Create a position within each government entity (or a centralized office serving all jurisdictions) to act as Energy Manager to implement energy efficiency, energy conservation, and renewable energy projects and to track the progress of energy programs.

The role of an Energy Manager is to provide the initiative and guidance necessary to focus local government efforts to achieve energy efficiencies and to implement strong energy strategies. This is a complex area of policy, but steps taken to achieve energy efficiencies result in immediate and tangible cost savings.

15 Endorse the creation of grant funding at the state and federal government levels to support a program for the installation of renewable energy systems at residences.

A similar program has been initiated in the United Kingdom which provides funding for residential housing to install renewable energy systems, including photovoltaic panels and solar hot water systems.

B. Infrastructure

1 Require that all new governmental facilities incorporate the use of active and passive solar systems in their design.

Although the incremental cost to add solar systems will raise capital construction costs significantly, downstream benefits can be achieved through energy conservation.

2 Promote opportunities to increase the use of solar photovoltaic and other energy systems to supplement grid-connected systems.

There are many potential locations where solar photovoltaic and/or wind energy systems can be utilized within an urban setting. Systems located in some areas (rooftops, city parks, parking facilities, etc.) could provide on-site power from renewable fuels.

3 Sponsor pilot and demonstration projects to promote the use of cool pavements.

Surface temperatures are warmer in urban areas due to building and road materials' ability to retain heat. By implementing cool pavement technologies, the availability and desirability of this approach can be demonstrated. In turn, this will encourage a greater acceptance and utilization of this strategy to achieve energy savings. For example, porous concrete is currently a Best Management Practice for the U.S. Environmental Protection Agency's Heat Island Reduction Initiative.

4 Increase trees and vegetation to screen buildings to reduce the amount of heat radiation they absorb.

Promote and enhance programs offered by Tucson Clean and Beautiful, Trees for Tucson and Tucson Electric Power that provide shade trees for residences. Trees for Tucson has provided over 70,000 trees in the past 16 years to residents, neighborhoods and schools. As urban areas expand, programs providing education and incentives to increase canopy coverage are imperative to maintain clean air quality and reduce health issues related to increased heat. Tree plantings along roadway improvements and retrofitting existing transportation corridors would increase canopy coverage over paved and urban areas and provide clear benefits to reduce heat island signatures and energy use.

5 Establish provisions for the use of less heat absorbing materials in parking lots.

Local government, through the building code process, should develop a standard for the use of more reflective materials in new and renovation projects. Parking lot surfacing and resurfacing should be given the highest priority given the large acreage involved and the disproportionate contribution to surface air heating from asphalt pavements. Street paving would also benefit from using materials that are more reflective. Local governments should investigate the potential for using these more reflective materials and, when appropriate, incorporate provisions in design standards

to achieve this result. Requirements should be considered to achieve greater shade coverage for parking lots during the hottest hours of the day.

6 Develop a Regional Green Infrastructure Plan.

A Regional Green Infrastructure Plan would connect urbanized transportation corridors to a variety of destinations, both within urban areas and outlying rural open space. The corridors would provide alternative transportation means (bicycle and pedestrian pathways) to decrease reliance on motor vehicles. The Greenways would also provide energy utilization avoidance through additional tree plantings. Trees provide air quality, stormwater and energy benefits.

C. Conservation and Efficiency

1 Adopt and promote the latest version of the International Energy Conservation Code.

New buildings have the potential to be as energy efficient as we can make them. While there are some practical constraints due to costs, an average residential or commercial building can be designed and constructed to achieve substantial energy savings at a reasonable cost. Design standards are a critical element in ensuring that every new building is more energy efficient than buildings constructed at the beginning of this decade. Pima County is scheduled to adopt the 2006 version as of the first of 2007

.2 Adopt a model energy code for all new municipal construction to achieve a 50%, or greater, reduction in energy consumption.

New construction represents the ideal opportunity to incorporate energy efficient design elements. Integrating various energy efficiencies during initial design offers the potential to achieve significant lifetime energy savings. The City of Tucson has already formally adopted this policy, and other communities should consider whether it would be appropriate for their new construction.

3 Conduct a bi-annual energy audit to track progress in meeting energy goals.

The use of an energy audit to identify energy efficiencies or systems that can be converted to a reliance on alternative fuels is a critical step that every organization should consider and implement. Ideally, an energy audit can be conducted every year to identify additional options that become available due to new installations and rising energy prices and to capture previously unrecognized energy saving opportunities.

4 Promote the use of Commercial Green Building Rating Systems.

The Leadership in Energy and Environmental Design (LEED) Rating System is a product of the U.S. Green Building Council that provides a complete framework for assessing building performance and meeting sustainability goals within a 6 category rating

system. The categories are the following: Sustainable Sites, Water Efficiency, Energy and Atmosphere, Materials and Resources, Indoor Environmental Quality, and Innovation and Design. Based on a point system with four levels of criteria, a registered project can attain a Certified, Silver, Gold or Platinum rating, depending on points achieved. Other rating systems exist, but LEED is probably the most recognizable. The value of endorsing a consistent and recognized set of standards allows for comparisons and uniformity in assessing the effectiveness of energy saving programs.

5 Expedite building permits and reduce permit fees for projects that incorporate energy efficiency/renewable energy designs and equipment.

Offering an incentive to incorporate energy efficiency/renewable energy concepts is useful in creating a demand for systems that may add some incremental cost but which are offset from benefits gained through project expediting or lower project costs. Even where the cost savings may be negligible, the existence of incentives may be sufficient to overcome an initial reluctance to incorporate energy efficiency/renewable energy design features.

6 Encourage commercial building owners and developers to benchmark and upgrade their buildings to at least the Energy Star level.

ENERGY STAR is a joint program of the U.S. Environmental Protection Agency and the U.S. Department of Energy to promote the use of energy efficient products and practices. ENERGY STAR qualified homes are at least 15% more energy efficient than homes built to the 2006 International Energy Conservation Code (IECC). ENERGY STAR qualified homes can include a variety of energy efficient features, such as effective insulation, high performance windows, tight construction and ducts, efficient heating and cooling equipment, and ENERGY STAR qualified lighting and appliances. Energy star benchmarking is available for some commercial buildings, including offices, K-12 schools, grocery stores, hotels and acute care and children's hospitals. Buildings not eligible for Energy Star designation should be encouraged to achieve a specific energy reduction – for example, 10% within five years, 20% within ten years.

7 Establish a regional Green Building Task Force to promote awareness of existing programs and how they can be used to advance energy savings concepts.

Many efforts are currently under way across the nation to improve building efficiencies. A Green Building Task Force can help to coordinate and share information among all sectors of the building community to achieve a shared understanding of what is possible and the benefits to be gained by pursuing energy efficiency strategies.

8 Establish a Facility Manager Recognition Program to highlight achievements of existing commercial/industrial facilities that reduce their energy footprint.

Establishing a venue for the recognition of exceptional achievement in producing energy savings is an important step to foster community-wide awareness of the importance of energy conservation. By recognizing the achievements of facility

managers in producing energy savings, lessons can be shared and the benefits of energy savings more generally communicated.

9 Adopt and/or enforce advertising signage codes that require signage to be off when businesses are closed.

Advertising signage that is lit after business hours, and especially in early morning hours or during the day, would appear to represent a waste of energy. Increasing the awareness of businesses to the costs and limited benefits involved in signage lighting and the potential energy savings that can result from curtailed use should be pursued.

10 Improve maintenance and operating practices of water systems to be energy efficient.

Conduct an energy audit at each water supply and wastewater treatment facility to ensure that opportunities to gain efficiencies or to convert to an alternative fuel are identified.

D. Transportation

1 Promote electrification of transportation.

Our growing dependence on imported oil for transportation fuels is the critical issue confronting transportation. Electric streetcars once formed the core of urban transportation in cities across the United States. The classic example is the now lost "red cars" of Los Angeles that formed a comprehensive and efficient transportation system. Red cars were supplanted in the 1950s by buses, and the loss has been keenly felt. Although a considerable infrastructure is required, non-reliance on petroleum fuels is a substantial benefit of using electrically driven vehicles for mass transportation. Both energy and air quality benefits are derived from the electrification of major routes.

Electrification of transportation also provides another powerful argument for significant ramping up of solar and wind electric generating capacity, thereby facilitating the use of these new "portfolio" energy sources for transportation and reducing the global greenhouse effects attributable to transportation fuels. The metropolitan region should increase investment in electric and hybrid-electric cars, trucks, conventional buses, trolley buses, express buses, and all forms of rail, including streetcars, light rail and heavy rail.

2 Commit to advance purchase agreements for plug-in hybrid electric vehicles for fleet service.

Perhaps the greatest single advance to transform our reliance on petroleum-based fuels will come from the availability of the plug-in hybrid vehicle. Manufacturers are considering production of this vehicle but are seeking advance orders to ensure its

viability. Making a commitment to purchase a limited number of these vehicles will encourage their eventual availability.

3 Increase the utilization of alternative fuels in all sectors of transportation to reduce consumption of gasoline and diesel fuels.

The use of alternative fuels such as biodiesel and E85 provide an immediate opportunity to lessen our reliance on imported petroleum and to gain improvements in air quality. Sun Tran has converted the major portion of its fleet to Compressed Natural Gas (CNG) fuel, and biodiesel and E85 are becoming more available. The University of Arizona has established its own E85 fueling station, significantly increasing the potential of E85 use in the greater Tucson area. Many opportunities exist to convert additional segments of the transportation sector to these alternative fuels with availability being the only limiting factor.

4 Support initiatives that create incentives for alternate fuel production and use.

Recently, an extension was approved of the federal JOBS bill that allows blenders of ethanol and biodiesel fuels to apply for and receive a tax credit for each gallon of ethanol and biodiesel they sell for the next ten years. Earlier this year, a new law was approved in Arizona allowing a property tax reduction for biodiesel manufacturing facilities. These are just two of many examples of governmental bodies adopting legislation that promotes alternate fuel production and use. Support for policies and initiatives that increase alternative fuel options is necessary to expand and develop the alternative fuel industry.

5 Increase the availability of alternative fuels by promoting the installation of alternative fuel storage and delivery systems.

Alternative fuels such as ethanol and biodiesel have the potential to reduce the importation of petroleum for transportation. A major impediment to their greater use is the relative scarcity of locations where these alternative fuels can be obtained. Policies that result in the use of alternative fuels should be pursued.

6 Increase signage to identify alternative fuel service locations.

The current relative scarcity of locations where alternative fuels are available limits public perception regarding the practicality of alternative fuel vehicles and inhibits the use of those fuels. As more and more vehicles use alternative fuels, it is important to provide information to drivers that will allow them to easily locate service stations that provide alternative fuels. Roadside signage is an important element in developing public confidence in the availability of alternative fuels. To the extent possible, local and state government should coordinate to produce improved signage at the earliest opportunity.

7 Encourage training of mechanics to convert vehicles to alternative fuel use.

Many vehicles can be converted to use alternative fuels; however, doing so requires special training and equipment. Encouraging training opportunities may allow for a greater number of vehicles to be converted in a shorter time frame.

8 Major centers of employment should become the focus for mass transportation availability.

Route plans should be reviewed to ensure that large centers of employment are viewed as the focus for delivery of service. By providing service focused on major employment centers, commuters who do not use mass transportation will have more realistic choices.

9 Adopt policies to reduce per capita energy consumption for transportation.

Vehicle use is predominately single occupancy, especially during commutes. Policies that encourage carpooling or the use of van pools for commuting to work contribute to energy savings. Monetary incentives that reduce parking fees for vans and carpools is one example.

10 Reduce single passenger vehicle trips through significantly increasing opportunities to use other modes of mobility, including walking, biking, vans, buses, fixed route transit, and ride-sharing.

The creation of alternative modes of travel is a critical factor to reduce reliance on vehicles. While many alternative modes already exist, they are limited in effectiveness by a variety of factors. Identifying these impediments is necessary to create a plan to remove them and to enhance alternative transportation options.

11 Promote transit-oriented development in both existing and new developments through significant increase in multimodal transportation infrastructure investments.

The lack of adequate bus shelters for pedestrians or their placement at locations that do not meet rider needs inhibits use and contributes to a mass transit system that is not as effective as it might otherwise be. A variety of similar disincentives exist that could be addressed by increasing the priority of mass transit service within the community during the community planning process.

12 Improve and increase scheduling of mass transit.

One of the greatest inhibitors to the use of mass transit is the lack of adequate service to meet the needs of long-distance commuters. The goal should be to achieve a commute time that does not lengthen a commute to exceed 15 minutes of what it would be in a private vehicle. By providing service to long-distance commuters, substantial fuel savings can be realized as well as reductions in traffic congestion.

13 Park and Ride locations should be sited to encourage their safe use and to engender confidence that vehicles will be safe and not subject to vandalism or theft.

Users of Park and Ride facilities should not have to trade their safety or the protection of their property when they opt to use mass transit. If there is the reality or perception that Park and Ride facilities are not safe, their use will be sharply curtailed and "optional" commuters who would use the Park and Ride option may chose to opt-out.

14 Park and Ride lots need to be designed to ensure maximum safety and, where appropriate, crosswalks should be provided and signage improved.

A Park and Ride facility may be situated in a less than ideal location to promote public safety, and crossing a busy street to reach a bus stop may be very difficult. In such instances, crosswalks with adequate safety signage should be installed to encourage use of the facility.

E. Energy Generation and Distribution

1 Achieve greater utilization of distributed generation from renewable sources to provide energy.

Both solar and wind technologies are currently being used to generate and return power to the electric grid. Presently, the use of these systems is not widespread. However, a variety of policies to encourage the use of solar and wind technologies can be adopted to increase the portion of energy supplied by these alternative energy sources.

Solar panel technology is now highly reliable and increasing in acceptance. Solar panels produce energy that can be used onsite or returned to the electrical grid for general use. Solar panels are passive and, once installed, emit no pollutants and have the potential to supply a substantial amount of energy.

Distributed energy generation is the utilization of small- scale renewable energy generation systems at multiple sites, both residential and commercial. The systems can provide energy for on-site use, as well as deliver energy to the grid for general use. By providing generation at the point of use, the need for transmission and distribution services can be reduced. This can provide additional resiliency and reliability to the grid

and may defer and/or eliminate the need for investment in the transmission and distribution infrastructure.

2 Achieve greater utilization of distributed generation from highly efficient, fossil fuel-based systems to provide energy.

Fossil fuel-fired distributed energy systems, especially Combined Heat & Power Systems (CHP), are an important resource for generating energy. However, there may be negative air quality impacts involved with distributed generation facilities powered by fossil fuels in urban areas. Permitting procedures or other public processes should review the potential environmental impact of such facilities.

3 Achieve greater utilization of renewable energy at centralized energy facilities.

Tucson Electric Power has established a large solar photovoltaic array at its Springerville facility which is providing energy for customers. Another solar concept now operational north of Tucson (and gaining wider acceptance) are solar concentrators (troughs) that heat oils which then transfer that heat for use in conventional power generation.