



## Environmental Integrity Focus Area Energy & Climate Change Element

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Prepared for the Environmental Integrity Working Group Meeting on August 19, 2011, by the Plan Tucson Team, Planning and Community Development Division, City of Tucson Housing and Community Development Department, **Note:** This is a working document that may be further refined as Plan Tucson proceeds and additional information and input is obtained.

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### I. Introduction

This working document presents background information for the discussion of energy and climate change policy for Plan Tucson, the City of Tucson's General Plan now underway.

### II. Background and City Role

There are many issues related to energy and climate change facing our region. Most of our electricity comes from coal-fired power plants. When coal is burned, the primary emission released is carbon dioxide (CO<sub>2</sub>), a known greenhouse gas that contributes to global warming. Rising regional temperatures are expected to increase demand for air conditioning in the southwest and this in turn will require more coal-fired electricity which will further contribute to greenhouse gas emissions. Increased demand for electricity in a warming climate also increases water demand for both electric power plant cooling and for irrigation for landscaping and agriculture that will become increasingly stressed as temperatures rise.

Regional growth will drive increased power consumption that will either come from additional coal-fired generation or from clean sources of renewable energy or both. Choices made today in regional utility investment practices will determine what power sources we will rely upon during the coming decades and whether or not we add to the production of greenhouse gases. The rising cost of conventional energy supplies (coal, oil, natural gas) will translate into higher utility charges for all sectors. The cost of delivering water will also rise. As warming temperatures become the norm, precipitation patterns in the Colorado River watershed may affect the future availability of Colorado River water thus adding to regional stresses that are related to climate change.

Water and energy use are interconnected in many ways as increases in water efficiency often result in energy savings and vice versa. Similarly, inefficiency in water use often carries with it a higher energy and greenhouse gas price tag. Thus, companies, organizations, and even individual water customers can achieve energy and greenhouse gas savings through more efficient water use practices.

While the City of Tucson does not regulate or manage energy utilities, it can promote energy conservation and the use of the renewable energy through its transportation and land use policies, development standards and building codes. The City can also set a strong example for energy conservation through internal practices. A Pima Association of Government's greenhouse gas inventory found that 3% of the community's CO<sub>2</sub>e was attributable to the City of Tucson's operations.



### III. A Sustainable Future

The Pima Association of Governments (PAG) and Metropolitan Energy Commission (MEC) have developed a Strategic Energy Plan aimed at reducing overall energy demand and increasing the use of renewable sources of energy. The recommended options can move the region in the direction of a more sustainable energy future. The set of possible options recommended by the PAG/MEC working group 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.

As a result of the Mayor and Council’s adoption in 2008 of a Framework for Advancing Sustainability, a Climate Change Citizen’s Advisory Committee was created to address the multiple dimensions of climate change in a strategic manner. The Committee is charged with the creation of a Climate Change Mitigation and Adaption Plan (MAP), currently in progress, that will include recommendations and action steps to achieve the City’s greenhouse gas emissions reduction commitments under the 2006 Mayors Climate Protection Agreement.

### IV. Recent Energy & Climate Change Initiatives

The following documents represent recent initiatives and studies that have direct impact on future City of Tucson energy and climate change policy. These initiatives are presented below. The 2001 General Plan can be found on the City website, [cms3.tucsonaz.gov/hcd/plans](http://cms3.tucsonaz.gov/hcd/plans).

#### **Recent City of Tucson Initiatives Related to Energy and Climate Change**

Document	Year	Policies & Recommendations (web links)
Arizona Revised Statutes - Title 9 Cities and Towns - Section 9-499.14 Renewable energy incentive districts; definition	2010	<a href="http://law.onecle.com/arizona/cities-and-towns/9-499.14.html">http://law.onecle.com/arizona/cities-and-towns/9-499.14.html</a>
Great Tucson Solar Development Plan	2009	<a href="http://www.pagnet.org/documents/solar/SolarDevPlan2009-01.pdf">http://www.pagnet.org/documents/solar/SolarDevPlan2009-01.pdf</a>
Tucson Solar Integration Plan	2009	<a href="http://cms3.tucsonaz.gov/files/energy/Solar%20Plan%20Final.pdf">http://cms3.tucsonaz.gov/files/energy/Solar%20Plan%20Final.pdf</a>
Framework for Advancing Sustainability	2008	<a href="http://www.tucsonaz.gov/ocsd/docs/CMS1_032816.pdf">http://www.tucsonaz.gov/ocsd/docs/CMS1_032816.pdf</a>
Solar Ready Ordinance	2008	Solar PV: <a href="http://cms3.tucsonaz.gov/files/dsd/PFPrep.pdf">http://cms3.tucsonaz.gov/files/dsd/PFPrep.pdf</a> Solar Hot Water: <a href="http://cms3.tucsonaz.gov/files/dsd/GET READY FOR SOLAR.pdf">http://cms3.tucsonaz.gov/files/dsd/GET READY FOR SOLAR.pdf</a> ;
Arizona Corporation Commission Energy Standards	2006	<a href="http://www.azcc.gov/divisions/utilities/electric/environmental.asp">http://www.azcc.gov/divisions/utilities/electric/environmental.asp</a>

U.S. Mayors Climate Protection Agreement, endorsed by Mayor and Council	2006	<a href="http://www.usmayors.org/climateprotection/documents/mcpAgreement.pdf">http://www.usmayors.org/climateprotection/documents/mcpAgreement.pdf</a>
Arizona Climate Change Action Plan	2006	<a href="http://www.azclimatechange.gov/download/O40F9347.pdf">http://www.azclimatechange.gov/download/O40F9347.pdf</a>
Greater Tucson Strategic Energy Plan	2005	<a href="http://www.pagnet.org/documents/GTSEP/AltEnergy-Options-accept-PAGRC-final.pdf">www.pagnet.org/documents/GTSEP/AltEnergy-Options-accept-PAGRC-final.pdf</a>
Sustainable Energy Standard Ordinance 101782005	2005	<a href="http://cms3.tucsonaz.gov/files/agdocs/20050706/july6-05-404a.pdf">http://cms3.tucsonaz.gov/files/agdocs/20050706/july6-05-404a.pdf</a>

## V. Definitions:

**Alternative Energy:** Energy derived from nontraditional sources (e.g., compressed natural gas, solar, hydroelectric, wind).

**Carbon Dioxide Equivalent (CO<sub>2</sub>e):** A metric measure used to compare the emissions from various greenhouse gases based upon their global warming potential (GWP). Carbon dioxide equivalents are commonly expressed as "million metric tons of carbon dioxide equivalents (MMT<sub>CO2Eq</sub>).\" The carbon dioxide equivalent for a gas is derived by multiplying the tons of the gas by the associated GWP. The use of carbon equivalents (MMTCE) is declining.

$$\text{MMT}_{\text{CO2Eq}} = (\text{million metric tons of a gas}) * (\text{GWP of the gas})$$

**Climate Change:** Climate change refers to any significant change in measures of climate (such as temperature, precipitation, or wind) lasting for an extended period (decades or longer). Climate change may result from:

- natural factors, such as changes in the sun's intensity or slow changes in the Earth's orbit around the sun;
- natural processes within the climate system (e.g. changes in ocean circulation);
- human activities that change the atmosphere's composition (e.g. through burning fossil fuels) and the land surface (e.g. deforestation, reforestation, urbanization, desertification, etc.)

**Emissions:** The release of a substance (usually a gas when referring to the subject of climate change) into the atmosphere.

**Greenhouse Gas (GHG):** Any gas that absorbs infrared radiation in the atmosphere. Greenhouse gases include, but are not limited to, water vapor, carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), ozone (O<sub>3</sub>), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF<sub>6</sub>).

**Ozone (O<sub>3</sub>):** Ozone, the triatomic form of oxygen (O<sub>3</sub>), is a gaseous atmospheric constituent. In the troposphere, it is created both naturally and by photochemical reactions involving gases resulting from human activities (photochemical smog). In high concentrations, tropospheric ozone can be harmful to a wide range of living organisms. Tropospheric ozone acts as a greenhouse gas. In the stratosphere, ozone is created by the interaction between solar ultraviolet radiation and molecular oxygen (O<sub>2</sub>). Stratospheric ozone plays a decisive role in the stratospheric radiative balance. Depletion of

stratospheric ozone, due to chemical reactions that may be enhanced by climate change, results in an increased ground-level flux of ultraviolet (UV-) B radiation.

**Ozone Depleting Substance (ODS):** A family of man-made compounds that includes, but is not limited to, chlorofluorocarbons (CFCs), bromofluorocarbons (halons), methyl chloroform, carbon tetrachloride, methyl bromide, and hydrochlorofluorocarbons (HCFCs). These compounds have been shown to deplete stratospheric ozone, and therefore are typically referred to as ODSs.

**Renewable resource:** A natural resource that can be produced, regrown, or reused fast enough to keep up with how quickly it is used. Wind, tides, and solar energy, for example, are in no danger of running out and can be consumed by people virtually forever. In contrast, fossil fuels such as coal take millions of years to develop naturally and are considered nonrenewable.

*All definitions from the U.S. Environmental Protection Agency (<http://www.epa.gov/climatechange/glossary.html>)*