

# *Tucson Electric Power Company*

Response to R14-2-703 Utility Reporting Requirements  
of the  
Arizona Corporation Commission

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## **ENVIRONMENTAL PORTFOLIO STANDARD MID-YEAR 2007**

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**AUGUST 2007**



A UniSource Energy Company

**P.O Box 711  
Tucson, Arizona 85702**

**DEMAND-SIDE MANAGEMENT &  
RENEWABLES PROGRESS REPORT  
MID-YEAR 2007**

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# ENVIRONMENTAL PORTFOLIO STANDARD PROGRAMS

## EXECUTIVE SUMMARY

The ACC has mandated under the Environmental Portfolio Standard (“EPS”), R14-2-1618, that any Load Serving Entity shall derive a percentage of its total retail energy sold from new solar resources or environmentally-friendly renewable electricity technologies whether that energy is purchased or generated by the seller. The percentage changes each year, increasing to a maximum of 1.1% in 2007 and remaining the same through the life of the standard. In 2007 the percentage is 1.10% of which at least 60% must be derived from solar electric generation.

At the Arizona Corporation Commission Staff (“Staff”) meeting on January 6, 2004, the Commissioners directed Staff to hold a series of workshops to consider four issues related to the Environmental Portfolio Standard Rules (A.A.C. R14-2-1618). The four issues identified by the Commissioners were:

1. A discussion of increasing Environmental Portfolio Standard (“EPS”) funding levels.
2. Elimination of the EPS Expiration Date.
3. Restoration of Demand Side Management (“DSM”) funding.
4. Allocation of funding among various technologies.

Staff commenced the workshop series on March 5, 2004. The last and fifth Workshop was June 25, 2004. A Staff report proposing changes to the EPS was issued January 21, 2005. A proposed draft EPS Rule was issued in late April 2005 and was the topic of discussion at Commission meetings held on June 2 and 3, 2005. A new renewable energy standard rule was approved by the ACC and will be effective on August 14, 2007. The new program is called the Renewable Energy Standard and Tariff (REST).

### Renewable Generating Capacity

This report covers TEP’s progress for January 1, 2007 through June 30, 2007, and includes cumulative reporting from January 1, 1997. As of June 30, 2007, TEP had installed or supported installation of a total of **11,581 kW** of renewable generating capacity, which has generated 300,584,557 **kWh** of renewable energy and generated 167,207,802 **kWh** of renewable credits using the appropriate multiplying factors in the EPS since January 1, 1997. The following tables will summarize capacity, program costs and requirements of the EPS.

### EPS Program Results Summary

Since 1999, TEP has spent \$34,605,614 on renewable energy development programs in support of developing renewable generation resources to meet the annual energy percentage goals of the EPS. In return, TEP has received revenues of \$32,997,725 for these programs. Thus, TEP has spent **\$1,607,889** more than revenues received in our best effort to meet the annual solar energy percentage goals of the EPS. EPS surcharge collections effectively began in March 2001, and the annual retail energy reported for EPS purposes has been prorated to a 10-month year in 2001 for the purpose of this report.

TEP has successfully met the EPS requirement for “Other” credits every year of the EPS and carried a surplus of 109,044,282 kWh of “Other” credits into July 2007. However, TEP was only able to meet **37%** of its “Solar Electric” goals for the period January - June 2007 and **43%** of its “Solar Electric” goals for the program through June 30, 2007, and carried a deficit of 94,399,159 kWh of Solar credits into July 2007. Overall, TEP met **62%** of its EPS renewable energy goals for the period January - June 2007, and has met **67%** of its total EPS renewable energy goals through June 2007.

### SunShare & Net Metering

TEP offers the SunShare hardware buy-down program, with ACC approval, to its customers. Since the program was offered in 2001, **218** customers have purchased our Option 2 package, which is a solar kit offered by TEP at a pass through cost. This represents **624.89** kW DC. **154** customers qualified for, and joined, the SunShare Option 1 or Option 3 program through June 30, 2007 with a total installed DC capacity of **311.21** kWp. The net program total is **372** SunShare participants through June 30, 2007. There is currently **936** kW DC of customer sited, installed PV capacity as part of the SunShare or customer partnering programs.

In 2001, TEP offered, with Commission approval, a net metering option for owners of photovoltaic (“PV”) systems of less than 5 kW AC in size. TEP requested, and the Commission approved in March 2003, an increase in the maximum size of a PV generation system qualifying for net metering to 10 kW AC and expanded the eligible technologies to include wind generation up to that size. As of June 30, 2007, **316** PV customers have qualified and enrolled in the net metering program. No wind customers have yet enrolled in net metering. These PV customers have a combined net capacity of 832 kWdc.

### GreenWatts

GreenWatts is an ACC approved TEP green power purchase program that enables interested supporters to pool funds and invest directly in the creation of green power. Each GreenWatt is sold in “blocks” of 20 kWh per month. Revenues from GreenWatts are used for installing more community based solar generation. At the end of June 30, 2007, TEP has commitments from 2,357 residential customers, amounting to adoption of 5,070 blocks and **41** commercial customers who have adopted **744** total blocks of green energy.

Total revenues produced to date are **\$79,366.80** from commercial customers and **\$367,862.96** from residential customers for total revenue of **\$447,229.76**. All of these funds have been or soon will be applied to installation costs of additional community based PV systems installed in the Tucson area, such as at the Tohono Chul Museum, the City of Tucson’s Hayden Udall Water Treatment Facility, Reid Park Zoo, Hohokum Middle School, Tucson Botanical Gardens, Safford Middle School, Palo Verde High School, Clements Center, Project MORE, Tucson Audubon Society, Civano School, Vail Empire High School, Doolen Junior High and Davidson Middle School among others.

Renewable Energy Resources and Renewable Resource Survey Systems

TEP continues to operate a system of 15 renewable resource survey systems. This includes eight 40-meter high fixed wind survey towers at locations in Arizona. TEP continues to evaluate a wide range of renewable energy options for the future, including landfill gas, biomass, wind, digester gas, geothermal and solar thermal electric conversion.

Past Environmental Resource Development Goals

TEP achieved its voluntary goal of having 5 MW of renewable generating capacity by the end of the year 2000, which was derived from the ACC's 1992 Integrated Resource Planning Procedures.

### Summary of EPS Requirements

| Description  | Cumulative Thru<br>12/31/06 | Reporting Period<br>Jan-Jun 07 | Cumulative Thru<br>06/30/07 |
|--|-----------------------------|--------------------------------|-----------------------------|
| Retail Sales, kWh  | 49,780,999,806              | 4,357,763,827                  | 54,138,763,633              |
| TEP EPS Requirement (1.10%<br>of retail sales for 2007), kWh                 | 352,794,779                 | 47,935,402                     | 400,730,181                 |
| “Other” Credits Needed To<br>Meet EPS Requirements(40%<br>in 2007)           | 152,758,614                 | 19,174,161                     | 171,932,775                 |
| “Solar Electric” Resource<br>Credits Needed to Meet EPS<br>Requirements      | 200,036,166                 | 28,761,241                     | 228,797,407                 |
| Landfill Gas Project “Other”<br>Credits                                      | 358,545,096                 | 13,068,292                     | 371,613,388                 |
| "Solar Electric" Resource<br>Credits   | 85,563,076                  | 10,573,301                     | 96,136,377                  |
| Wind Credits Purchased   | 21,135                      | 0                              | 21,135                      |
| Wind Generated Credits   | 430                         | 1,655                          | 2,085                       |
| "Other" Credits Purchased  | 0                           | 0                              | 0                           |
| “Solar Electric Manufacturing”<br>Credits Obtained from Global<br>Solar, kWh | 2,331,942                   | 0                              | 2,331,942                   |
| Sales of “Other” Credits, kWh  | -90,659,551                 | 0                              | -90,659,551                 |
| Purchases of “Solar Electric”<br>Credits                                     | 21,065                      | 0                              | 21,065                      |
| Total "Solar Electric" Credits   | 87,916,083                  | 10,573,301                     | 98,489,384                  |
| Total "Other " Credits   | 267,907,110                 | 13,069,947                     | 280,977,057                 |
| Excess “Solar Electric” Credits<br>Above Meeting EPS<br>Requirements, kWh    | -76,211,219                 | -18,187,940                    | -94,399,159                 |
| Excess “Other” Credits Above<br>Meeting EPS Requirements,<br>KWH             | 115,148,496                 | -6,104,214                     | 109,044,282                 |

### Summary Of Renewable Generation And Capacity

| Type of Generation             | kW Capacity | Cumulative Generation, kWh | Cumulative Extra Credits, kWh | Cumulative Renewable Credits, kWh |
|--------------------------------|-------------|----------------------------|-------------------------------|-----------------------------------|
| Landfill Gas                   | 5,500       | 258,989,081                | 112,624,307                   | 371,613,388                       |
| Solar PV                       | 6,079       | <b>41,594,086</b>          | 54,582,800                    | 96,176,886                        |
| Solar Trough                   | 0           | 0                          | 0                             | 0                                 |
| Small Hydro-Electric           | 0           | 0                          | 0                             | 0                                 |
| Wind Generation                | 2           | 1390                       | 695                           | 2085                              |
| Total Other                    | 5,502       | 258,990,471                | 112,625,002                   | 112,625,002                       |
| Total Solar Electric           | 6,079       | <b>41,594,086</b>          | 54,582,800                    | 96,176,886                        |
| Total Solar Electric and Other | 11,581      | 300,584,557                | 167,207,802                   | 467,792,359                       |

### Summary of Program Expenditures

| Program                                  | Program Costs       |                   |                             |
|--|---------------------|-------------------|-----------------------------|
|  | Thru 12/31/06       | Period Jan-Jun 07 | Life of Program Thru Jun 07 |
| Solar Electric                           | \$33,767,052        | \$676,784         | \$34,443,836                |
| Solar Thermal                            | \$0                 | \$0               | \$0                         |
| Geothermal                               | \$0                 | \$0               | \$0                         |
| Wind **                                  | \$161,778           | \$0               | \$161,778                   |
| Hydro                                    | \$0                 | \$0               | \$0                         |
| Other Technologies                       | \$0                 | \$0               | \$0                         |
| Marketing **                             | \$291,128           | \$33,535          | \$324,663                   |
| Hardware Buydown Program - Option 1,3 ** | \$543,925           | \$325,143         | \$869,068                   |
| SunShare Option 2 Revenue **             | \$2,366,033         | \$17,783          | \$2,383,816                 |
| SunShare Materials Cost **               | \$3,769,553         | \$139,359         | \$3,908,912                 |
| <b>Total TEP Renewables Program</b>      | <b>\$33,928,830</b> | <b>\$676,784</b>  | <b>\$34,605,614</b>         |

\*\* These expenditures included in Solar Electric expenditure data.

**Summary of Program Revenues – June 30, 1007**

| Description                         | Period Thru<br>12/31/06 | Period 1/1/07<br>Thru 6/30/07 | Life of<br>Project | 2007 Retail Energy<br>Sales MWH |
|-------------------------------------|-------------------------|-------------------------------|--------------------|---------------------------------|
| GreenWatts Total                    | \$397,635               | \$49,595                      | \$447,230          | -                               |
| Allocation of SBC<br>Total          | \$15,120,000            | \$1,230,000                   | \$16,350,000       | -                               |
| Residential Surcharge<br>Total      | \$7,372,231             | \$682,809                     | \$8,055,040        | 1,772,709                       |
| Small Commercial<br>Surcharge Total | \$7,324,062             | \$649,888                     | \$7,973,950        | 1,723,532                       |
| Large Commercial<br>Surcharge Total | \$159,443               | \$12,062                      | \$171,505          | 963,591                         |
| Renewables<br>Surcharge Total       | \$14,855,736            | \$1,344,759                   | \$16,200,495       | 4,459,832                       |
| Total EPS Program<br>Revenues       | \$30,373,371            | \$2,625,354                   | \$32,997,725       | -                               |

## **SOLAR THERMAL ELECTRIC GENERATION**

### PROGRAM DESCRIPTION

The purpose of the Solar Thermal Electric Generation Development Program is for technology review and economic assessment of the use of large scale solar thermal electric generators both in combination with existing thermal generating stations and in stand alone generating station applications. This includes solar resource assessment at a couple of possible solar trough sites in Arizona.

TEP reviewed the addition of Thermal Solar Trough produced heat to the condensate cycle of Springerville Generating Station Unit #1 (“SGS #1”) and Unit #2 (“SGS #2”).

In addition, during 2002, TEP received and evaluated a proposal for installation of a solar dish generation system and an opportunity to install a stand alone solar trough generation system.

There has been no significant testing activity in this area in 2004, 2005 or 2006, but interest from private developers for a large solar thermal generation project in Arizona or a neighboring state has been increasing based on a number of contacts with potential developers.

### PROGRAM CHANGES FOR 2007

There are no changes planned for 2007. Resource and system economics evaluation will continue.

## LANDFILL GAS AND BIOMASS / BIOGAS PROJECT

### PROGRAM DESCRIPTION

The purpose of the Landfill Gas and Biomass Project program is to develop existing landfill gas and biomass / biogas resources into reliable, cost effective environmentally sensitive electric generation fuel sources. The program's purpose is also to find and economically use existing biomass / biogas resources to produce electric energy.

### PROGRESS AND PARTICIPATION

In August 1999, TEP and the City of Tucson started electric production from the installation of a nominal 5 MW Landfill Gas System at the Los Reales Landfill in Tucson, Arizona. The landfill gas is piped from the landfill to the Irvington Unit 4 Generating Station where it is co-burned with coal and/or natural gas. During the very dry year of 2003, the average energy produced from landfill gas was 3,741 kW, and in 2004 the average energy production from landfill gas was 3,679 kW. However, based on previous generating performance exceeding a monthly average of 6,000 kW during periods of normal atmospheric moisture, and an expectation that repairs and improvements to the landfill gas collection system will be made by the landfill gas vendor in 2005 will continue through 2007, TEP is claiming 5,500 kW of landfill gas capacity in the Executive Summary.

To date (1999 through June 30, 2007) the project has displaced the use or production of the following:

|                                 |                |
|---------------------------------|----------------|
| <b>Tons of Coal Not Burned</b>  | <b>119,411</b> |
| <b>Tons of CO2 Not Produced</b> | <b>175,135</b> |
| <b>Tons of SO2 Not Produced</b> | <b>1,051</b>   |

There were no costs beyond those expected of normal fueled generation from the operation of the landfill gas to energy system in 1999, 2000, 2001, 2002, 2003, 2004, 2005 or 2006. Thus, there are no expenses against the EPS surcharge or other sources of renewable generation revenue. EPS credits produced have been reported by TEP to meet EPS annual credit requirements, sold to other utilities providing additional revenue for solar generation development or banked for the future. The current status of EPS landfill gas generation production credits are reported in the EPS Program Executive Summary.

### PROGRAM CHANGES FOR 2007

TEP continues to review additional landfill gas to energy projects as well as a number of biomass / biogas waste-to-energy opportunities. An ongoing technology search continues to find efficient technologies to convert a number of biomass products into electricity in a safe, reliable, cost-effective manner. The search will continue to locate technically feasible, economically advantageous and environmentally appropriate methods for converting forest waste, biogas and agricultural by-products into electricity. Landfill gas production enhancements were installed in 2005 at the Los Reales Landfill in Tucson.

| <b>2007 Landfill Gas Generation Summary</b>   |                |                 |              |              |            |             |                     |
|---|----------------|-----------------|--------------|--------------|------------|-------------|---------------------|
|   | <b>January</b> | <b>February</b> | <b>March</b> | <b>April</b> | <b>May</b> | <b>June</b> | <b>Year to Date</b> |
| <b>Landfill Gas Burned-Mscf From Operating Summary</b>                              | 35             | 45              | 50           | 49           | 50         | 47          | 276                 |
| <b>Landfill Gas Ave Btu/scf From Operating Summary</b>                              | 476            | 483             | 480          | 469          | 465        | 464         | 473                 |
| <b>Landfill Gas Heat Input- MMBtu Calculated From Op Summary</b>                    | 16,660         | 21,723          | 24,000       | 22,981       | 23,250     | 21,808      | 130,422             |
| <b>Unit 4 Net Heat Rate From Operating Summary</b>                                  | 9,628          | 11,079          | 11,188       | 10,592       | 10,190     | 10,678      | 10,559              |
| <b>MMBtu of Landfill Gas From Invoice</b>   | 16,656         | 21,723          | 24,000       | 22,976       | 23,260     | 21,791      | 130,405.70          |
| <b>Landfill Gas Generation in kWh Calculated From Data Above</b>                    | 1,729,923      | 1,960,758       | 2,145,156    | 2,169,280    | 2,282,723  | 2,040,738   | 12,328,578          |
| <b>Monthly U4 Service Hours From Operating Summary</b>                              | 529.80         | 669.87          | 740.53       | 720.00       | 744.00     | 714.00      | 4,118               |
| <b>Average Landfill Generation Capacity in kW - Calculated</b>                      | 3,265          | 2,927           | 2,897        | 3,013        | 3,068      | 2,858       | 2,994               |
| <b>Cumulative 2007 Landfill Gas Generation in kWh - Calculated</b>                  | 1,729,923      | 3,690,681       | 5,835,836    | 8,005,116    | 10,287,840 | 12,328,578  | 12,328,578          |
| <b>Unit #4 Coal Heat Value HHV in Btu/lb - Operating Summary</b>                    | 9,862          | 10,278          | 10,432       | 10,321       | 10,321     | 11,163      | 10,396              |
| <b>Coal Displaced by Landfill Gas, in Tons, Calculated</b>                          | 844.4          | 1,056.8         | 1,150.3      | 1,113.1      | 1,126.8    | 976.0       | 1,045               |
| <b>2007 Cumulative Coal Displaced By Landfill Gas in Tons</b>                       | 844.4          | 1,901.2         | 3,051.5      | 4,164.6      | 5,291.4    | 6,267.5     | 6,267               |
| <b>CO<sub>2</sub> Emissions Deferred by Burning Coal in Tons - 40% Fixed Carbon</b> | 1239           | 1550            | 1687         | 1633         | 1653       | 1432        | 1,532               |
| <b>2007 Cumulative CO<sub>2</sub> Emissions Deferred by Burning Coal - Tons</b>     | 1239           | 2788            | 4476         | 6108         | 7761       | 9192        | 9,192               |
| <b>SO<sub>2</sub> Emissions Deferred by Burning Coal in Tons - 0.44% Sulfur</b>     | 7              | 9               | 10           | 10           | 10         | 9           | 9                   |
| <b>2007 Cumulative SO<sub>2</sub> Emissions Deferred by Burning Coal - Tons</b>     | 7              | 17              | 27           | 37           | 47         | 55          | 55                  |
| <b>Period Hours Available</b>   | 744            | 672.00          | 744          | 720          | 744        | 720         | 4,344               |
| <b>On Line Availability (Service) Hours</b>   | 529.8          | 669.87          | 740.53       | 720          | 744        | 714         | 4,118               |
| <b>Percentage on Line</b>   | 71.21%         | 99.68%          | 99.53%       | 100.00%      | 100.00%    | 99.17%      | 94.80%              |

## **WIND RESOURCE DEVELOPMENT**

### PROGRAM DESCRIPTION

The purpose of the Wind Resource Development Program is for wind resource information gathering, technology review and economic assessment of the use of wind energy for electric generation both in combination with existing generating stations and in stand alone generating station applications.

Wind monitor stations have been installed by TEP throughout Arizona. At the end of June 2007, TEP was receiving data from eight, 40 meter survey towers and ground level wind data at an additional five fixed and two mobile monitor installations. While initial plans were to develop sites for an additional six monitor stations, results of the wind data collected from the existing monitor sites has left some doubt about the economic viability of the wind in the general region of the monitor sites, so the planning for development of additional wind monitor sites is on hold pending receipt of more wind data from the existing sites. The bulk of the monitoring is being performed in eastern Arizona around SGS. TEP has monitored the sites where customers have indicated an interest in the development of wind resources.

### PROGRAM CHANGES FOR 2007

TEP installed a 1.8 kW beta version Southwest Windpower grid connected wind turbine on June 13, 2006. TEP plans to continue evaluating the data from existing wind survey sites, reviewing geographic information to predict new potential wind resource sites and licensing sites for installation of wind and solar resource monitor instrumentation. This data will be used for evaluation of possible wind generation locations and for evaluation of bids received in response to a renewable energy RFP issued in mid 2007. The data will also be used to find tools for mitigating the effect on the reliability and stability of the electrical grid from the intermittency of wind generation. Detailed wind speed data was placed into the public domain through Northern Arizona University and is updated annually.

## **SOLAR PV RESOURCE DEVELOPMENT**

The TEP Solar PV program is designed to develop large utility scale distributed PV generation systems as well as provide incentives and support for TEP customers to install PV on their premises in a safe, economical manner, which maximizes electrical production from the sun. The large utility scale installations provide the opportunity for cost savings through long-term purchases from specific manufacturers and to reduce the cost of solar components through bulk purchasing for the customer based systems.

The goal of the program is to best meet the annual solar electric generation energy requirements of the EPS within the limited funding provided by the EPS while providing sufficient long-term PV demand to drive down PV component costs during the term of the EPS, and to provide feedback to PV component makers to help them improve the safety, reliability and performance of their products to help move the PV industry to product maturity.

### **PROGRESS AND PARTICIPATION**

#### *Small Utility Supported Distributed Generation*

Installation of small TEP supported distributed generation systems throughout Tucson has been successful in providing energy in support of EPS solar credit goals and in developing public interest in solar energy. To date 233 kW DC of small TEP supported and maintained PV systems have been installed on customer premises or TEP property. Some GreenWatts revenues are used for support of solar installations in the Tucson area, such as at the Tohono Chul Museum, Pima Air Museum, Safford Middle School, Palo Verde High School, Hohokum Middle School, Tucson Botanical Gardens, Clements Center, Project MORE, Tucson Audubon Society, Civano School, Vail Empire High School, Davidson Middle School, among others.

#### *Customer Partnering Distributed Generation*

TEP has partnered with customers, notably the City of Tucson, to install medium sized customer owned and sited PV systems totaling 103 kW DC. However, there are a limited number of customers with available funding to support these types of projects.

#### *SunShare*

TEP offers the SunShare hardware buy-down program, with ACC approval, to its customers. Since the program was offered in 2001, there have been more than 1977 expressions of interest. To date, there have been **372** participants installing PV systems. Of these participants, **16** have chosen Option 1, **218** have chosen Option 2, and **138** have chosen Option 3. There is currently 936 kW DC of customer sited, installed PV capacity as part of the SunShare program.

#### *Net Metering*

In 2001, TEP offered, with Commission approval, a net metering option for owners of PV systems of less than 5 kW AC in size. TEP requested, and the Commission approved in March 2003, an increase in the maximum size of a PV generation system qualifying for net metering to 10 kW AC and expanded the eligible technologies to include wind generation up to that size. As of June 30, 2007, **316** PV customers have

qualified and enrolled in the net metering program. No wind customers have yet enrolled in net metering. PV customers have a combined net capacity of 832 kWdc. To further simplify customer sited PV and wind installations, in addition to net metering, TEP also offers simple interconnection requirements for small customer located PV and wind systems.

#### Summary of PV Programs

In summary, the TEP Solar PV program, in response to ACC's EPS annual renewable energy production requirements, has effected the installation or assisted in the development of 6079 kW DC of solar PV generating resources in Arizona.

#### PROGRAM CHANGES FOR 2007

The 2007 renewable program includes planned installation of 5 kWp DC at Operating Headquarters in Tucson and an expected minimum of 400 kWp DC in SunShare systems and customer partnering opportunities. The ACC passed into law the Renewable Energy Standard and Tarrif (REST) in 2007, to be effective August 14<sup>th</sup>. To meet these new requirements, TEP is developing a Renewable Energy Action Plan (REAP) in 2007, to be filed by October 2007. Also, TEP is developing a Renewable Energy Credit Purchase Program (TEP-RECPP) to provide customer incentives and provide a program which will support the development of renewable resources. TEP is planning that the new programs will be in place during the first half of 2008.