

## **Measure: City of Tucson Energy/Water Performance Contracting (E12)**

When capital funds are unavailable for energy or water saving investments with a strong positive rate of return, energy service companies are able to provide the financing through contract mechanisms that can guarantee annual savings. The contracts frequently include an extensive audit to define the investments with the highest returns.

This measure calls for the City of Tucson and other organizations in Tucson with sufficiently large energy and water use to justify an EPC to maximize their use of EPCs to maximize their energy and water efficiency and minimize GHG emissions.

Emission reduction potential by 2020:	10,471 tCO <sub>2</sub> e/yr.
Percentage of goal (2012):	0.14%
Percentage of goal (2020):	0.46%
Total annual average implementation costs 2013-2020:	\$384,500/yr. paid to ESCO
Entity that bears the costs of implementation:	ESCO finances improvements; City of Tucson pays ESCO to achieve savings
Cost/Savings per tCO <sub>2</sub> e:	Savings in 2020 of \$193/tCO <sub>2</sub> e
Net annual savings in 2020:	\$2.023 million
Entity that realizes the financial return:	City of Tucson and ESCO
Equitability (progressive/regressive, income/revenue neutral, etc):	Neutral
Potential unintended consequences:	City revenue loss compared to city self-financing the efficiency investments

## **Background information:**

While energy/water *conservation* can be done without capital investments (e.g. turning lights off), energy/water *efficiency/productivity* frequently requires a capital investment, typically from borrowed funds unless a one-time-only grant (e.g. ARRA) or private sector equity injection is available.

Energy Performance Contracting (EPC) is a well-established system for maximizing capital funds for energy/water investments at minimal cost or reduced risk to the borrower since the capital is provided by a third party (typically a for-profit company) that will also assume most of the risk of the project's success at reducing energy/water use. The EPC company, generally called an Energy Service Company (ESCO), retains a negotiated share of the utility bill savings from the energy/water efficiency investment to generate its profits.

The ESCO client, in this case the City of Tucson and other Tucson organizations with a large energy/water footprint, avoids the need to borrow energy efficiency investment funds and avoids the risks associated with the investments achieving their projected savings. A typical commitment for the client would be to pay its existing levels of utility bills (with a built-in rate escalator) for a period of time during which the ESCO investment is paid off, after which the client enjoys all of the cost savings.

EPC projects typically begin with an audit of the potential energy/water savings that will be cost-effective over the lifetime of the investment and total costs of capital for the project, after which EPC negotiations occur concerning timing of the investments, risks assumed by the building owners and the ESCO, and other financial details.

Both energy and water savings investments are eligible, and both have GHG reduction potential. Water usage requires energy to treat and distribute water and handle wastewater, causing an indirect source of GHG emissions.<sup>1</sup> Heating water requires direct (natural gas) or indirect (electricity) GHG emissions. Likewise, generation of energy, particularly electricity generated by coal- or nuclear-thermal powerplants, consumes large amounts of water. In other words, any energy saved also saves water, and any water saved also saves energy and GHGs.

A preliminary analysis of the Tucson Convention Center (TCC) identified potential savings. Retrofits of lighting systems, air circulation and water fixtures were estimated to annually save 7.6 million kWh, 150,000 therms of natural gas and 936,000 gallons of water. Though every building is different, similar savings per interior square foot are likely to be possible.

## **Status Quo / Business as Usual:**

For various reasons, it is very difficult for governments or businesses to dedicate the capital needed to achieve maximum energy and water efficiency at any one time. The

potential of addressing potential investments with a strong rate of financial return on a piecemeal basis can cost far more than addressing all the opportunities at once.

The business as usual scenario, particularly in the difficult economic times of 2011, is likely to be a very piecemeal approach to energy and water conservation investments. This analysis assumes that only 5% of the investments needed to maximize energy and water conservation would be accomplished each year, compared to the 100% that could be accomplished in 2011 through an ESCO arrangement.

For example, a US Federal facility was found to require ~\$9 million of investment for high rate of return energy and water conservation retrofits. If \$500,000 were obtained every year for 18 years, the additional energy and water costs incurred would cost ~\$2 million more than an ESCO contract that provided ~\$800,000/year guaranteed savings from existing utility bills.<sup>2</sup>

If such opportunities were not a big win/win for both parties, the ESCO industry would not be growing and thriving.

### **Description of Measure and Implementation Scenario:**

The City of Tucson would maximize the energy and water efficiency of its buildings by pursuing EPC agreements.

An option for this measure is for the City of Tucson to develop incentives for other public / private sector buildings to use EPCs, if incentives are shown to be necessary through further market analysis.

The City has two fundamental options to maximize the energy/water efficiency of its buildings: self-finance or use the EPC process to finance through an ESCO. This report addresses the latter strategy, although it is likely that if the City were to self-finance the improvements, it would reap more of the financial rewards.

ESCO contracts are typically executed for several buildings with similar investment needs. The most likely implementation scenario is that in partnership with ESCOs, the City will identify several bundles of buildings for EPC contracts.

### **Has the Measure been implemented elsewhere and with what results:**

**Houston TX:** The City of Houston TX has recently used EPC contracts to address energy efficiency in its buildings through the Clinton Climate Initiative. The first contract in 2009 concerned seven buildings where an investment of \$9.6 million by Schneider Electric will provide the City with annual savings of \$720,000.

In Phase 2, announced April 2010, Schneider Electric's investment of \$23 million in 19 facilities is expected to result in City savings of \$1.8 million annually for 15 years, after which savings are fully captured by the City. The Phase 2 project includes 1.65 million square feet, including city hall.<sup>3</sup>

**Aurora CO:** The City of Aurora CO has used an EPC contract with Johnson Controls to reduce its city center utility costs ~20% through a \$4 million investment. The company has also assisted the City in maximizing the energy savings potential of the existing systems at the Center, saving ~\$15,000/year. The City Council voted in 2007 to require LEED Gold achievement by all new construction and major building renovation projects in order to maximize energy and water cost savings and employee comfort.<sup>4</sup>

**Charleston SC:** The City of Charleston's sustainability initiative resulted in an EPC with Johnson Controls that will save \$18.5 million over 15 years through water, energy and operational savings. The project is estimated to reduce water use by 40% and reduce CO2 emissions by 10,000 tons per year.<sup>5</sup>

### **Energy/Emission analysis:**

This analysis assumes that all City buildings will be subject to an EPC contract that will improve energy efficiency by 25%, with one-quarter of buildings included in a bundle each year for four years starting 2012 (allowing 2011 for EPC contracting).

By this measure, City facilities will on average be 25% less carbon intensive by the beginning of 2016, allowing one year for each phase of improvements to be completed (it is possible that the improvements could be completed faster – which should be done by the City if feasible).

Water use by the City is not a significant source of GHGs and so it not addressed, though the City's water operations were found to be far more important in the City's GHG footprint at 114,118 tCO<sub>2</sub>e – meaning that GHGs associated with water deserve their own reduction initiative.

The City's buildings inventory includes ~6.18 million square feet of interior space. Pima County manages an additional ~243,000 square feet located on City property, but this measure only analyzes City operations.

The PAG 2010 inventory reports that in 2008, City facilities emitted 41,884 tCO<sub>2</sub>e. This analysis assumes that the 41,884 is reduced 25% to 31,413. The emission savings in 2020 are the

### **Climate Change Impact Summary in tCO<sub>2</sub>e.**

COT 1990 Citywide GHG emissions (baseline):	5,461,020
MCPA 7% reduction target for COT:	5,078,749
2012 BAU GHG emissions projection:	7,000,000

2020 BAU GHG emissions projection:	7,343,141
GHG emissions reduction to meet 7% goal (2012):	1,921,251
GHG emissions reduction to meet 7% goal (2020):	2,264,392
Contribution of this Measure:	End of 2012: 2617; in 2020: 10471

## **Economic analysis:**

### **Measure Costs**

We assume that the ESCO contractor will keep 20% of the savings achieved by the City. By the end of 2020, the ESCO will have earned \$3.07 million.

### **Measure Savings**

The PAG GHG inventory shows the City's facility-related energy use in 2008 to be 152,512 million BTUs from electricity and 64,713 from natural gas usage.

This analysis assumes that electricity and natural gas rates will increase 2.4% per year, though the US Energy Information Administration predicts natural gas prices will remain stable.<sup>6</sup>

At the average price of natural gas sold to industrial customers in Arizona of \$7.79 per thousand cubic feet in 2010,<sup>7</sup> City of Tucson's annual natural gas bill is estimated at ~\$5.3 million in 2013.

We assume that the average price paid by the City of Tucson is presently \$0.07/kWh. City of Tucson's electricity bill is estimated at \$3.28 million in 2013.

The City's savings in 2020 is estimated at \$2.02 million.

City cost savings 2013 through 2020 are estimated at \$12.3 million. If the ESCO efficiency investments have a 20 year lifetime, the City's savings will add up to ~\$52.13 million by 2036.

### **Net Economic Impact**

Measure Costs 2011-2020: \$3.07 million  
Measure Savings 2011-2020: \$12.3 million  
Net Savings 2011-2020: \$9.23 million

Savings per tCO<sub>2</sub>e saved in 2020: \$193  
Savings per tCO<sub>2</sub>e saved 2013-2020: \$136

We apply the 1.5 multiplier impact to these savings because it is likely that the savings, whether they accrue to citizens in the form of lower taxes, or to other City uses will have a higher economic multiplier than the expenditures on energy. The net impact of the 2011-2020 savings is projected \$13.8 million.

**Co-benefits:**

Reduced pressures on City budgets for utility bills, which could lead to lower taxes or the ability to fund other citizen needs.

A secondary benefit, which has accrued to some organizations that mount energy efficiency strategies, is that City employees become more aware and competent at spotting energy and water efficiency opportunities, which could increase savings from this measure.

**Equitability:**

Neutral – there are no significant consequences for the financial well-being of Tucson citizens, aside from saved costs by City government.

**Potential unintended consequences:**

If the City self-funded the efficiency improvements, it might be able to keep more of the financial savings – depending on interest rates and other administrative costs of the self-funding process.

## **Endnotes**

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<sup>1</sup> For example, Colorado Springs Utilities of Colorado Springs, Colorado estimated that about 5,200 kilowatt hours are required to treat, pump and wastewater treat one million gallons of municipal water. Source: Steve Doty, Colorado Springs Utilities, email correspondence.

<sup>2</sup> Personal experience of Christopher Juniper, Westmoreland Associates, 2009.

<sup>3</sup> Schneider Electric press release, “City of Houston Commits to Sustainable Future, Kicks Off \$23 million Energy Efficiency Project with Schneider Electric,” April 22, 2010, at: [Schneider-electric.us](http://www.schneider-electric.us).

<sup>4</sup> Johnson Controls, City of Aurora CO Case Study, at: [www.johnsoncontrols.com](http://www.johnsoncontrols.com).

<sup>5</sup> Jeffrey Van Ess and Tricia Kuse, Johnson Controls White Paper, “Savings Multiplied: Conserving Water and Energy to Maximize Efficiency and Reduce Emissions,” 2010, at: [www.johnsoncontrols.com](http://www.johnsoncontrols.com).

<sup>6</sup> US Department of Energy, Energy Information Administration, “Outlook 2010 with Predictions to 2035,” 2010, available at [www.eia.gov](http://www.eia.gov).

<sup>7</sup> US Energy Information Administration, Natural Gas Monthly, December 2010, at: [http://www.eia.doe.gov/natural\\_gas/data\\_publications/natural\\_gas\\_monthly/ngm.html](http://www.eia.doe.gov/natural_gas/data_publications/natural_gas_monthly/ngm.html).