

**Measure:** Promotion of Energy Efficiency Through New Construction Permitting (E10)

Offer rebates on new home construction permits for homeowners/developers that utilize Energy Star appliances including:

- a. Refrigerators
- b. Dishwashers
- c. Clothes Washers
- d. Central Air-Conditioning.

The Committee asks Westmoreland to analyze mandating the use of energy efficient AC units only. That analysis can be found at the end of this section; the summary is in the table below.

**COT ARRA RFP Summary (MANDATE ENERGY EFFICIENT AC UNIT):**

Emission reduction potential by 2020:	45,111 tCO <sub>2</sub> e
Percentage of goal (2012):	0.47%
Percentage of goal (2020):	2.0%
Total annual average implementation costs:	\$1.7 million over 10 years
Entity that bears the costs of implementation:	Purchasers of AC units
Savings per tCO <sub>2</sub> e over life of program:	\$74 / tCO <sub>2</sub> e (Net savings to community)
Net annual savings:	\$1.7 million over 20 years
Entity that realizes the financial return:	Homeowner
Equitability (progressive/regressive, income/revenue neutral, etc):	Income neutral
Potential unintended consequences:	None Identified

## **Background information:**

The previous reporting to the City of Tucson on this measure confused two distinct energy efficiency programs. The primary program researched was the Ft. Collins, CO based Zero Interest Loans for Conservation Help (ZILCH loans). This program allows homeowners to qualify for no-interest loans to help cover the capital costs for energy efficient home improvements. The maximum overall loan amount is \$2,300, which cannot exceed more than 80% of the project cost, for energy efficiency and energy conservation.<sup>1</sup> The cost of the projects are calculated on the total amount less rebates offered through the utility company's Electric Efficiency Program (EEP).<sup>2</sup>

The second program previously researched was another Ft. Collins based incentive in which residential building permits are discounted for utilizing "system analysis" programs to demonstrate the new home meets local energy codes.<sup>3</sup> This incentive does not necessarily translate to home energy savings, as it is just a way to illustrate that local codes have been met.

Nevertheless, the US Green Building Council lists permit fee reductions as one way to spur energy efficiency in new construction.<sup>4</sup> Cities around the nation are taking notice. For example, the City of Asheville, NC has a "Green Building Incentive" program for residential buildings.<sup>5</sup> Also, San Diego, CA has a similar program where not only are permit fees reduced if certain criteria are met, but plan check times are reduced.<sup>6</sup> Incentivizing energy efficiency upgrades through rebates on building permits is a relatively low-cost and revenue-neutral path to increasing technology uptake while decreasing local emissions.

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

Offer rebates on new home construction permits for homeowners/developers that utilize Energy Star appliances including:

- a. Refrigerators
- b. Dishwashers
- c. Clothes Washers
- d. Central Air-Conditioning.

To make the program cost neutral, increase the City of Tucson building permit fee schedule to cover costs of the rebates. The median cost of a new home in Tucson is approximately \$157,000.<sup>7</sup> Given the City of Tucson residential building permit fee rate schedule, the resulting building plan review revenue per home is approximately \$2,000.<sup>8</sup> Inline with the City of Asheville's payment schedule, the permit fee shall be paid in full and the rebates will be credited at the time of certificate of occupancy once the energy appliance installation is verified.

The implementation scenario assumes that participation will increase from 25% to 75% over the course of the next decade. New home construction is estimated to average 3,500 with an occupancy rate of 90% consist with other analyses in this report.

### **Business As Usual:**

There are currently over 19,000 Energy Star qualified homes in the greater Tucson area, with over 700 qualified during October 2009 through September 2010.<sup>9</sup> Therefore, it is estimated that at least 25% of homes are already utilizing energy efficiency measures. Of course, if the Green Building Incentive program is initiated, it is assumed that these homes will utilize the program but their resulting savings will not benefit the City's abatement efforts.

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

The City of T. Collins, CO has implemented a \$75 "Fee Reduction" to all residential building permit fees for those who use either the E-Star or ENERGY SCORECARD for showing that the new build complies with the local energy codes.<sup>10</sup> However, as described above this program doesn't necessarily lead to energy savings for the homeowner. The Cities of Ashville, NC and San Diego, CA have implemented different programs under the same title of "Green Building Incentives". Although neither program exactly mimics the measure analyzed herein, the theory is the same- to spur energy efficiency and energy conservation measures by incentivizing the building permit process. In the case of Ashville, the rebates, paid at the time of certificate of occupancy, are relatively small financial incentives for energy efficiency.<sup>11</sup> San Diego not only offers financial incentives but expedited permitting times as well.<sup>12</sup> Documentation on GHG savings associated with these programs could not be found.

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

The implementation scenario assumes that participation will increase from 25% to 75% over the course of the next decade and that all homeowners/developers install all four appliances:

- a. Refrigerators
- b. Dishwashers
- c. Clothes Washers
- d. Central Air-Conditioning (CAC).

The energy savings associated with these appliances are calculated from the savings and costs outlined by the Energy Star Program and are as follows:<sup>13</sup>

<b>Appliance</b>	<b>Cost</b>	<b>Annual Energy Usage (kWh)</b>
<i>Refrigerator</i>		
Energy Star	\$1,180	507
Conventional	\$1,150	634
<i>Dishwasher</i>		
Energy Star	\$550	294
Conventional	\$538	368
<i>Clothes Washer</i>		
Energy Star	\$750	536
Conventional	\$492	787
<i>CAC (4 ton)</i>		
Energy Star	\$3,735	5,106
Conventional	\$3,179	6,779

New home construction is estimated to average 3,500 with an occupancy rate of 90% consistent with other analyses in this report. Energy costs are assumed to rise per the energy forecast included in the appendix of this report, and the energy savings difference between the Energy Star appliance and the conventional are assumed to remain constant throughout the life of the program.

GHG emission abatement calculations were performed assuming a 10-year life to all appliances covered by the permit fee rebate, and only those emissions above and beyond the 25% of homes estimated to already be installing Energy Star are counted (ie, beyond business as usual- BAU).

To increase from the current 25% of new builds installing Energy Star appliances to 75% by 2020, 142 occupied homes have to be added to the program per year. The total participating new homes will be the amount added (ie, 142 in the first year, 284 the second year, etc.) plus the estimate 25% already participating (ie, 788).

With the above listed energy savings and the quantity of new homes per year needed to hit the 2020 target of 75%, the resulting energy savings in 2020 is over 16.5 million kWh resulting in an abatement of 14,181 tCO<sub>2</sub>e.

<b>Contribution analysis:</b>		
COT 1990 Citywide GHG emissions (baseline): <sup>14</sup>	5,461,020	tCO <sub>2</sub> e
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	
<i>Promotion of Energy Efficiency Through New Construction Permitting</i>		

Contribution of E10 Promotion of Energy Efficiency Through New Construction Permitting (2020):	14,181	tCO <sub>2</sub> e
% 2020 Contribution of E10 Promotion of Energy Efficiency Through New Construction Permitting:	0.63	%

**Economic analysis:**

The economic analysis assumes a rebate structure as follows:

<u>Appliance</u>	<u>Rebate</u>
<i>Refrigerator</i>	\$20
<i>Dishwasher</i>	\$10
<i>Clothes Washer</i>	\$200
<i>AC (4 ton)</i>	\$300

Therefore, the total amount of rebates, offered at the time of completion, for an individual home is \$530. The City would need to cap the total amount of rebates offered such that the program remains revenue neutral. The program would be suspended for the balance of the year once funds are expended. To cover the costs of the program the residential permits fees would increase from the current rate of approximately \$2,000 by \$192 in the first year of the program increasing incrementally to \$902 in 2020.

Given these inputs, three different costs/savings indicators are calculated. The first impact is the cost to those not participating in the program to cover the rebates. The second is the cost savings to the participants by way of lower energy bills over the 10-year life of the appliances. And, the third is the net cost between the two. All calculations are based on what happens beyond BAU.

The total costs to run the program through 2020 (ie, those costs to cover the rebates) are \$8.3 million. The emissions abated over the life of all appliances installed under the program totals 141,814 tCO<sub>2</sub>e. The net annualized cost to run the program is \$830K. The cost per tCO<sub>2</sub>e to run the program is:

- **Cost** per tCO<sub>2</sub>e = **\$58.57 / tCO<sub>2</sub>e**

The savings to the participants by way of lower energy bills over the 10-year life of the appliances total over \$16.5 million. The resulting savings per tCO<sub>2</sub>e to homeowners are:

- **Savings** per tCO<sub>2</sub>e = **\$116.42 / tCO<sub>2</sub>e**

The net savings to the community over the life of the appliances totals over \$8.2 million, which calculates to the annualized savings over 20 years to \$410K. The net savings per tCO<sub>2</sub>e to the community are:

- **Savings** per tCO<sub>2</sub>e = **\$57.86 / tCO<sub>2</sub>e**

We use the 1.5 multiplier to estimate the net positive impact on the City of Tucson economy from energy or water savings. This results in a net economic impact estimate of \$12.3 million.

### **Co-benefits:**

The co-benefits include Increased demand for new technology and a more stable energy grid by lowering demand (especially peak demand associated with AC units)

### **Equitability:**

There are no apparent equitability issues.

### **Potential unintended consequences:**

None identified.

### **AC ONLY ANALYSIS:**

At the request of the Climate Change Advisory Committee, Westmoreland analyzed mandating the installation of Energy efficient AC units. Using the numbers above for the AC unit and mandating that all new home construction utilize an energy efficient AC unit with a life of 10-years (assumed to be, on average, 3,150 homes per year), the following are the outputs:

Total tCO<sub>2</sub>e over life of program (2011-2030): 451,108  
Total costs to implement (capital) (2011-2020): \$17.5 million  
Total savings as a result of lower energy usage (2011-2030): \$50.8 million  
Net savings: \$33.2 million  
Net savings per tCO<sub>2</sub>e: \$74  
Total capital costs per tCO<sub>2</sub>e: \$38.82  
Net impact to community using economic multiplier of 1.5: \$49.9 million.

*General Note: All references retrieved October through January of 2011 unless otherwise noted.*

## **Endnotes:**

- <sup>1</sup> [http://www.fcgov.com/utilities/img/site\\_specific/uploads/ZIL\\_Project\\_Table.pdf](http://www.fcgov.com/utilities/img/site_specific/uploads/ZIL_Project_Table.pdf)
- <sup>2</sup> [http://www.fcgov.com/utilities/img/site\\_specific/uploads/eep.pdf](http://www.fcgov.com/utilities/img/site_specific/uploads/eep.pdf)
- <sup>3</sup> <http://www.fcgov.com/building/energy-code.php>
- <sup>4</sup> [http://www.eoearth.org/article/Green\\_Building\\_Standards](http://www.eoearth.org/article/Green_Building_Standards)
- <sup>5</sup> [http://www.ashevillenc.gov/uploadedFiles/Departments/Buidling\\_Safety/Permit%20Fees%20for%202010-2011.pdf](http://www.ashevillenc.gov/uploadedFiles/Departments/Buidling_Safety/Permit%20Fees%20for%202010-2011.pdf)
- <sup>6</sup> <http://www.co.san-diego.ca.us/dplu/greenbuildings.html>
- <sup>7</sup> [http://azstarnet.com/real-estate/article\\_e712a40b-7723-50ac-b742-88d4107a12b7.html](http://azstarnet.com/real-estate/article_e712a40b-7723-50ac-b742-88d4107a12b7.html)
- <sup>8</sup> Derived from: <http://cms3.tucsonaz.gov/files/dsd/DevStd105.pdf>
- <sup>9</sup> [http://www.energystar.gov/index.cfm?fuseaction=new\\_homes\\_partners.showAreaResults&s\\_code=AZ&msa\\_id=338](http://www.energystar.gov/index.cfm?fuseaction=new_homes_partners.showAreaResults&s_code=AZ&msa_id=338)
- <sup>10</sup> <http://www.fcgov.com/building/energy-code.php>
- <sup>11</sup> [http://www.ashevillenc.gov/uploadedFiles/Departments/Buidling\\_Safety/Permit%20Fees%20for%202010-2011.pdf](http://www.ashevillenc.gov/uploadedFiles/Departments/Buidling_Safety/Permit%20Fees%20for%202010-2011.pdf)
- <sup>12</sup> <http://www.co.san-diego.ca.us/dplu/greenbuildings.html>
- <sup>13</sup> Spreadsheet with assumptions are downloaded from:  
[http://www.energystar.gov/index.cfm?c=products.pr\\_find\\_es\\_products](http://www.energystar.gov/index.cfm?c=products.pr_find_es_products)
- <sup>14</sup> PAG Regional Greenhouse Gas Inventory- 2010