

Pima County Government Operations GHG Emissions Target & 2020 Forecast

Pima County GHG Emissions Baseline: Year 2007 = 142,591 Metric Tons CO₂¹

GHG Reduction Goal: Not to exceed 2007 emission levels in 2020²

	<u>kWh³</u>	<u>Metric Tons CO₂⁴</u>
New GHG Emission Estimates from 2007 - 2020		
New building electricity use ⁵	23,394,294	16,801
New building water use ⁶	98,503 [plus 11,741 therms]	130
New building waste generation ⁷	[452 tons]	62
Employee commutes ⁸	[21,810,501 miles]	11,538
Ball field lighting ⁹	513,000	368
Street lighting ¹⁰	493,480	354
Wastewater operations ¹¹	21,257,560	<u>15,266</u>
Total		44,519

GHG Emissions Reductions Anticipated from 2007 - 2020		
25% landfill diversion rate ¹²	[1,509 tons]	208
7.5 MW solar generation ¹³	16,559,235	11,892
Digester gas methane generation ¹⁴	24,797,537	17,809
Electricity savings from Downtown Complex and Bank of America Bldg. energy audit ¹⁵	8,234,150	5,913
Natural gas savings from Downtown Complex and Bank of America Bldg. energy audit ¹⁶	[137,621 gas therms]	688
Fleet vehicle conversion of 308 cars from gas to hybrids ¹⁷	N/A	1313
Reduce water use by 15% in County facilities ¹⁸	84,121 [plus 10,027 therms]	110
B of A building (11,956 ccf)		
Adult Detention Center (125,534 ccf)		
Downtown Govt. Complex (13,972 ccf)		
All others combined (rough assumption: 151,462 ccf)		
30% employee participation in Transportation Demand Management Program ¹⁹	[12,480,000 miles]	6,602
Total		<u>44,535</u>

Summary Forecast for 2020		
2007 Baseline Emissions		142,591
Total new GHG emissions anticipated to be generated in 2020		+44,519
Total amount of GHG emissions anticipated to be reduced by 2020		<u>-44,535</u>
Estimated 2020 Metric Tons of CO₂		142,575
Net Reduction from 2007 Baseline		-16

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- ¹ PAG Regional Greenhouse Gas Inventory (Nov. 2008). See <http://www.pagnet.org/documents/Air/GreenhouseGas-2009-10-Addendum.pdf> .
- ² This goal is modeled, in part, after the Arizona Climate Change Action Plan (Aug. 2006), which recommends maintaining 2000 levels by 2020; reducing 2000 levels by 50% by 2040. The County is using 2007 as the baseline year, consistent with available CO₂ emissions data in the PAG Greenhouse Gas Inventory. A target beyond 2020 was not established at this time because of the expected onset of new technologies, increased water and energy efficiency measures, and other factors that should be evaluated closer to the year 2020 in order to establish an ambitious, yet reasonable, target based on updated circumstances.
- ³ Measurements are expressed in kilowatt hours unless shown in brackets. Units other than kWh are not included in the sum totals.
- ⁴ Most kWh were converted to metric tons of CO₂ using the EPA's Greenhouse Gas Emissions calculator at www.epa.gov/cleanenergy/energy-resources/calculator.html
- ⁵ Includes County facilities constructed between FY 2008 – 2010 and facilities to be constructed under the 2004 and proposed 2011 Bond Programs. Please see spreadsheet attachment entitled, "New Sources of GHG Emissions for County Operations 2007-2020."
- ⁶ Id. Tucson Water estimates that for every 1 gallon of water consumed, .002475 kWh of electricity and .000295 gas therms (1 therm = 29.3 kWh) are used to pump, treat, and deliver that water. 39,799,350 gallons of water multiplied by .002475 = 98,503 kWh. 39,799,350 x .000295 = 11,741 therms. (Asia Philbin, Tucson Water, as relayed to Suzanne Cotty of PAG, 2009).
- ⁷ Formula assumes new facilities will generate 442 tons of waste a year (1 pound of waste generated per 1 square foot each year). Source: Spreadsheet provided by Eric Ponce, Facilities Management. .138 metric tons of CO₂ are generated by every one ton of waste (formula derived from calculations provided by Suzanne Cotty in #12 below).
- ⁸ The PAG 2007 Emissions Inventory identified the total employee commute "drive alone" miles to be 30,189,499. The 2020 estimate is based on the following assumptions: 8000 employees commuting an average of 130 miles a week (based on the 2010 Pima association of Governments TDM survey) for 50 weeks = 52,000,000. 52,000,000 – 30,189,499 = 21,810,501 additional miles potentially traveled in 2020. The CACP model used by PAG, with the default vehicle fleet composition, finds that 21,810,501 miles will produce 11,538 metric tons of CO₂ equivalent. Footnote 19 shows how the vehicle miles traveled are adjusted based on a projected 30% employee participation rate in the County's Transportation Demand Management Program.
- ⁹ Estimate of new lighted fields from 2007 to 2020 prepared by George Kuck of NRPR, July 8, 2010.
- ¹⁰ Assumes 4 traffic signals installed a year for 13 years (52 total), per Don Pittinger, Department of Transportation.
- ¹¹ RWRD estimates 2020 kWh use = 111,000,000. FY 2009 kWh use is 89,742,440. This means that between FY 2009 and FY 2020 21,257,560 more kWh will be used. Source: Wendy Gort of RWRD email of July 2, 2010.
- ¹² Assumes County will achieve target of reducing waste by 25% over FY 2007-2008. 1,509 tons of waste estimated to be recycled in 2020, including waste generated from new facilities in #7 above. Suzanne Cotty of PAG used ICLEI's Clean Air and Climate Protection Model (CACP; 2003) to calculate greenhouse gas generated by 1398 tons of waste. Then staff applied the same formula to the additional 111 tons of waste expected to be recycled from the new facilities in #7 above.
- ¹³ Assumes County reaches 15% renewable energy target by 2020, instead of 2025.
- ¹⁴ RWRD estimates 39,609,171 kWh of digester gas use in FY 2020. FY 2009 use was 14,811,634. Therefore, projected increase in methane gas use is 24,797,537 kWh, which equals 17,809 fewer metric tons of CO₂ emissions. Source: Wendy Gort of RWRD email of July 2, 2010.

¹⁵ Assumes full implementation of Sebesta Blomberg Investment Grade Energy Audit, p. 7 of 112, dated March 24, 2010.

¹⁶ Id.

¹⁷ Assumes County will achieve 50% conversion of non-Sheriff fleet vehicles to alternative fuels by 2020 (or 571 of 1141 vehicles). Emission reductions shown are based on converting 308 Ford Taurus 2010 models to 2010 Toyota Prius models (County already had 263 alternative fuel vehicles in FY 2009). The Taurus was used as a representative vehicle only. 2010 models were used for estimation purposes. 1 Prius = 3.8 tons/ CO₂ a year and 1 Taurus = 8.5 tons/ CO₂ a year. See www.fueleconomy.gov.

¹⁸ Assumes County will achieve 15% reduction in water use by 2020 rather than 2025, the target established by the Board of Supervisors. FY 2009 water use in three of the County's largest facilities/complexes is used as the baseline. Source: Marc Lynn of Facilities Management in email dated June 24, 2010. Although water use in the hundreds of remaining County facilities and parks is not known pending the acquisition of utility management software, it is assumed for the purposes of this forecast that all other facilities combined consume 151,462 ccf (an amount equal to the 3 specified facilities). 1 ccf = 748 gallons of water. Tucson Water estimates that for every 1 gallon of water consumed, .002475 kWh of electricity and .000295 gas therms are used to pump, treat, and deliver that water. (asia Phillbin, Tucson Water, as relayed to Suzanne Cotty of PAG, 2009). 302,924 ccf used x 15% water reduction = 45,439 ccf x 748 gallons = 33,988,372 gallons of water saved. 33,988,372 x .002475 kWh = 84,121 kWh saved. 33,988,372 gallons x .000295 therms = 10,027 gas therms saved.

¹⁹ Assumes 30% of 8,000 employees participate in Transportation Demand Management programs, with 15% of those using alternative travel modes every day of the week, and 15% using alternative travel modes three days a week. The average employee commute per week is 130 miles, based on the 2010 TDM survey. Therefore, 1,200 employees eliminate 7,800,000 drive alone miles a year (1200 x 130 x 50 weeks = 7.8 million). An additional 1,200 employees eliminate 4,680,000 drive alone miles a year (1200 x 78 x 50 = 4.68 million). Total drive alone miles eliminated a year = 12,480,000. The CACP model used by PAG, with the default vehicle fleet composition, finds that 12,480,000 miles will produce 6,602 metric tons of CO₂ equivalent.