

Appendix D

Government Greenhouse Gas Emissions Reductions in 2015
Target Year Measures Listing
Summary Table

Sector	Measure	Reduction			Full Description of Measure	Notes, Assumptions
		Energy (kWh/yr)	Emission (tonnes eCO ₂ /yr)	Cost (U.S. \$/yr)		
Buildings	Install window film on western exposed glass	88,000	47	\$8,580	Reduces heat gain from afternoon sun.	Average reduction from 1997-2007
	Insulation improvements	291,000	156	\$28,373		Average reduction from 1997-2007
	LEED-NC certification project	317,800	170	\$30,986	Initiated project to obtain LEED-NC certification at the South Regional Library	In October, 2007, the South Regional/BCC Library became the first building in Broward County to earn LEED (Leadership in Energy and Environmental Design) from the United States Green Building Council. The project's final LEED rating reflects 35 documented and approved points, which corresponds to the Silver certification level under the LEED for New Construction. A total of 5 points were earned under the Energy and Atmosphere category with annual energy savings documented to be 317,800 kWh/year.
	Plant trees around buildings	325,000	174	\$31,688	Provide shading to buildings and use native plants to reduce irrigation needs.	Energy reduction based on a 5% savings in kWh/yr and a total building of approximately 3,250,000 SF. In 2004, 43% implemented, assume 100% implementation by 2015.
	Install building/office occupancy sensors	150,000	80	\$14,625	Turns lights off when there are no people in the room.	Average reduction from 1997-2007
	Install energy efficient motors in air handlers and elevators	80,250	43	\$7,824	Used mostly on air handlers.	Average reduction from 1997-2007
	Install energy efficient exit sign lighting	1,240,000	663	\$120,900		Average reduction from 1997-2007
	Install variable frequency drives for motors that have part load usage	762,000	407	\$74,295	Reduces motor speed when motors do not need to be running at maximum.	Average reduction from 1997-2007
	Optimization of HVAC system efficiency by renovating chillers	260,695	139	\$25,418		Energy recution calculated from Terminal 2/3 and Terminal 4 chiller plant. Calculation based on cost savings per year of output/efficiency rating of new chillers versus older chillers. In 2007, this measure was 50% implemented, expected to be 100% implemented by 2015.
	Perform energy efficient building lighting retrofits.	11,355,000	6,070	\$1,107,113		Average reduction from 1997-2007

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	Perform heating, cooling and ventilation system retrofits	12,764,000	6,823	\$1,244,490	Chillers, boilers, fans, pumps, belts, fuel-switching from electric to gas heating.	Perform heating, cooling and ventilation system retrofits (e.g., chillers, boilers, fans, pumps, belts, fuel-switching from electric to gas heating. Average reduction from 1997-2007
	Split Packaged/Direct Expansion (DX) Air Conditioning Systems	527,000	282	\$51,383	Smaller air conditioning units.	Average reduction from 1997-2007
Vehicle Fleet	Conversion to use of Ultra Low Sulfur diesel Fuel for buses.	0	0	\$0	Conversion to ULSD will only reduce emissions of SO ₂ and PM ₁₀ .	In estimation of a level of capacity for Broward County Transit, the following formulas were used: Annual passenger miles/annual revenue miles x number of seats = % capacity. Then multiply by the number of seats for passengers/vehicle. Fixed Route bus = 40 seats, Community Bus = 20 seats, Paratransit = 8 seats.
	Use of B20 Biodiesel instead of normal diesel in special fleet.	0	259	-\$13,190		Biodiesel (B20) costs more than regular diesel, \$0.10/gallon more. Using 2007 data and assuming no growth in next 8 years. Fleet energy/fuel use is based on technology standards rather than energy reductions, thus it is not possible to predict what will occur in the future.
	Use of CNG vehicles instead of gasoline vehicles.	139,002	84	\$44,823		Using 2007 data and assuming no growth in next 8 years. Fleet energy/fuel use is based on technology standards rather than energy reductions, thus it is not possible to predict what will occur in the future.
	Use of electric vehicles (EV) instead of gasoline vehicles.	5,724	1	\$463		Using 2007 data and assuming no growth in next 8 years. Fleet energy/fuel use is based on technology standards rather than energy reductions, thus it is not possible to predict what will occur in the future.

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	Use of hybrid electric vehicles instead of gasoline vehicles.	216,147	57	\$18,266		Based on emissions rating, these vehicles qualify as SULEV vehicles. Also changed default mpg from 30 to 50 based on Broward County hybrid fleet. Using 2007 data and assuming no growth in next 8 years. Fleet energy/fuel use is based on technology standards rather than energy reductions, thus it is not possible to predict what will occur in the future.
	Use of propane (LPG) vehicles instead of gasoline vehicles.	69,633	27	\$19,535		Using 2007 data and assuming no growth in next 8 years. Fleet energy/fuel use is based on technology standards rather than energy reductions, thus it is not possible to predict what will occur in the future.
	Provide fixed route bus service	58,090,055	14,889	-\$9,273,488		Transit bus mpg = 3.5 mpg. Ridership on average 12 people/day, with more during commute hours and less in the middle of the day. From previous on-board surveys that we have conducted, it was stated that 80% of our riders did not have a car available to them during the time they were using the bus service. Assume 20% + 50% of remaining 80% would travel by personal vehicle to their destination otherwise, thus 60% would travel by passenger vehicle to their destination. Therefore, we used VMT by transit buses x 60% x 12 individual trips (vs. 12 people on 1 bus trip) to calculate the individual VMT that would have been traveled by passengers had the Fixed Route Bus Service not been provided. While Broward County pays for the bus fuel, the 2007 Fare Revenue was \$19,728,982 (including passes and cash on board). That is more than double the cost of the fuel for these vehicles.
Employee Commute	Carpool to Courthouse	314,040	83	\$0		No cost savings to Broward County since cost of commute vehicles (personal vehicles) covered by employees. 16 carpools (32 employees). Assuming 40 miles RT and 240 workdays a year.
	Carpooling to Governmental Center	1,216,906	322	\$0		No cost savings to Broward County since cost of commute vehicles (personal vehicles) covered by employees. 62 carpools (124 employees). Assuming 40 miles RT and 240 workdays a year.

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	Overnight Vehicle Assignments (OVA) in Pollution Prevention and Remediation Division	56,429	15	\$0	Overnight Vehicle Assignments (OVA) to start work from home rather than come into the office to pick up a vehicle each day.	No cost savings to Broward County since cost of original commute vehicles (personal vehicles) covered by employees. Start work from home rather than come into the office to pick up a vehicle each day.
	Broward County East/West Government Center Connector Express Bus Service.	385,865	108	-\$8,232	Broward County East/West Governmental Center Connector Express Bus Service	Fully funded by Air Quality Federal Grant for two years at a cost of \$500,000 for the project. 140 riders per day, 14 miles RT, 140 miles per day. 10 mpg. BEWE uses B20 diesel fuel.
	Employee Mass Transit Riders	4,857,809	1,284	\$0		275 employees use mass transit (BC buses or Tri-rail). BC government does not pay for Tri-rail nor pay extra for employee commuters using fixed bus route. Assuming 40 miles RT, 240 workdays a year, and 20 mpg average fuel efficiency for previously used passenger vehicles.
Streetlights	Install Light Emitting Diode (LED) traffic signals	13,539,000	7,238	\$1,320,053	Replace incandescent lamps with energy-efficient LED.	
Water/Sewage	Fine bubble diffusers in 'C' module	2,628,000	1,405	\$256,230	This project replaces the mechanical aerators (900HP) with fine bubble diffusers, which operate with 500HP blowers resulting in an energy savings of 400HP or 2.628 million KWH per year.	The liquids treatment at the NRWWTP consists of four secondary treatment modules (A, B, C & D), each with a design capacity of 20 million gallons per day. Secondary treatment includes aeration and clarification. Initially, the aeration process was accomplished in each module with four 300 HP mechanical aerators. On the average at the NRWWTP, each module would utilize 900 HP for normal aerator operation. This savings was achieved at a capital cost of about \$4,500,000.
	Reclaimed water usage as process waters	4,599,000	2,459	\$448,403	A 10 million gallon per day reclaimed water plant was added at the NRWWTP to further polish the treated effluent to allow its use for landscape irrigation and process water.	This reclaimed water plant includes filtration and disinfection at a cost of about \$10,000,000, which replaces potable drinking water from the Broward County District 2A Water Treatment Plant for these uses and results in an average energy savings of 4.599 million KWH per year. In 1990 12% implemented, assume 100% implementation by 2015.

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Waste	Provide recycling service to all unincorporated area single family and multifamily residences. (Mixed Recyclables)	N/A	7,411	\$324,880		This measure accounted for because Broward County controls recycling program for unincorporated areas.
	Provide recycling service to all unincorporated area single family and multifamily residences. (Paper-Household)	N/A	11,791	\$573,965		This measure accounted for because Broward County controls recycling program for unincorporated areas.
	Paper Reduction: Metropolitan Planning Organization (MPO) Community Involvement Roundtable (CIR) Packages reduced from 55 to 35	N/A	0	\$36		CIR packages reduced from 55 to 35 pages. Weight calculated based on 20 lb bond paper (8.5" x 11", 75 g/m ²). This cost savings does not include the savings due to reduced purchasing of ink, toner, electricity used by printers, etc. Based on 20 lb bond paper, 8.5" x 11", 75 g/m ² . (Standard paper ussd by EPD/AQD). Paper size is 0.0603 m ² . (8.5" = 0.2159 m and 11" = 0.2794 m.) Multiply this by the mass/area and you will find that a sheet of 20 lb bond paper weighs 0.00992 lb. (Note: For this calculation used 2000 lbs in 1 Ton (Short, USA) from www.onlineconversion.com. Assuming cost of paper is \$0.60/lb (based on AQD cost for paper) and the cost to dispose of the paper in the landfill is \$0.047/lb (P. Foye), total savings is ~\$ 0.647/lb.
	Paper Reduction: MPO Packages first reduced from 120 to 85 in 2004 and then from 85 to 55	N/A	4	\$690		MPO packages reduced from 120 to 85 pates in 2004, then from 85 to 55 pages. See notes for Paper Reduction: CIR Packages.
	Paper Reduction: MPO Technical Coordinating Committee (TCC) Packages reduced from 95 to 80	N/A	0	\$33		TCC packages reduced from 95 to 80 pages. See notes for Paper Reduction: CIR Packages.