

**CARBON
REDUCTION
CHALLENGE:
CITY OF
NORCROSS**

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Introduction

- Recommendation: To reduce carbon emissions and electricity costs for (3) City of Norcross Facilities with thermostat setpoint adjustment and an HVAC retrofit specifically for City Hall.
- City Hall: 2-3 thermostat degree change in summer months
- Public Works: 2-3 thermostat degree change in summer months
- Norcross Cultural Arts & Community Center 1-2 degree change in both

Estimated Carbon Emissions Reduced:

50,000 lbs of CO₂ (1,040 trees planted)

Estimated Annual Cost Savings:

\$7,000

Background & Motivation

The City of Norcross is a model sustainable city with certifications from the Atlanta Regional Commission, the Xerces Society, and the Arbor Day Foundation.

Among the Greenhouse Gases, Carbon Dioxide (CO₂) is the primary greenhouse gas emitted through human activities that are responsible for the greenhouse effect contributing to climate change. Extreme weather conditions due to climate change affect communities and City of Norcross mitigating carbon emissions and the harmful effects of climate change show citizens and other communities.

The savings from the recommendations of implementation of proposed projects will allow the City of Norcross to pursue more sustainability initiatives and solutions.



Carbon Reductions and Cost Savings:

- Carbon Emissions per kilowatt (kWh) = **0.98 lbs of CO₂**
- According to, U.S. Energy Information Administration, the avg. price of electricity for commercial buildings is **\$0.127/kWh**

Temperature Adjustments

	Summer/Winter Thermostat Setpoint	Degree Change	Summer Setpoint (degrees F°)	Winter Setpoint (degrees F°)	Annual Savings	Carbon Reduction (lbs. of Co2)
City Hall	72/72	2	74	72	\$2,740.28	21,145.49
	72/72	3	75	72	\$4,110.42	31,718.23
Public Works	72/72	2	74	72	\$1,343.22	10,365.06
	72/72	3	75	72	\$2,014.88	15,547.49
NCCAC	69/78	1	70	77	\$82.95	641.08
	69/78	2	71	76	\$165.90	1,281.17
Total Savings for 1 degree adjustments in Cold and Warmer months (NCCAC)					\$82.95	641.08
Total Savings for 2 degree adjustments in Cold and Warmer months (All)					\$4,249.40	32,791.72
Total Savings for 3 degree adjustments in Cold and Warmer months (City Hall & Public Works)					\$6,125.3	47,265.72

Figure 1: Estimated savings: 3 percent savings for 1 degree change in temperature.

Carbon Reductions and Cost Savings (contd.)

HVAC Retrofit

- **Total Annual Savings: \$761.50**
- **Total Annual Energy Savings:** $6003.25 \text{ kWh} - 5254.69 \text{ kWh} = 748.56 \text{ kWh}$
- **Total Carbon Reduced:** $\$761.50 / \$0.127 = 5996.06 \text{ kWh} * 0.98 \text{ lbs of CO}_2 = 5,876.14 \text{ lbs of CO}_2 \text{ reduced}$

NPV = -PV(interest rate, years, yearly savings) - initial investment

$$= -PV(.09, 15, 761.50) - \$8600 = -\$2,461.79$$

- Simple payback: initial investment / yearly savings:
- **Return on Investment (ROI)** = $(\$761.50 / \$8,500) * 100 = 8.95\%$

Total Annual Savings: $761.50 + \$4,249.40$ (2 degree adjustments) = \$5,010.90 in savings

Total Annual Savings: $761.50 + \$6,125.30$ (3 degree adjustments at City Hall & Public Works) = \$6,886.8 in savings

Total Annual Savings: $761.50 + \$165.90$ (2 degree adjustments at NCCAC) + $\$6,125.30$ (3 degree adjustments at City Hall & Public Works) = \$7,052.70

Total Carbon Reduced: $47,265 + 5,876.14 = 53,141 \text{ lbs of CO}_2 \text{ reduced}$

Co-Benefits

- Points for Green Communities Recertification under Innovation, Education, and Energy Efficiency categories
- Marketing Opportunity (ie "Norcross gets Cool with new HVAC units that will save on electricity bill...you can too!")
- Education Opportunity for community members, employees, and local businesses to reduce their electricity usage and carbon emissions.
- Employees' thermal comfort is maintained as well as improved
- More room in budget spending for more sustainability and wellness projects

Thank You!

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