City of Syracuse Sustainability Plan

COLLABORATIVE PLAN FOR SUSTAINABLE QUALITY LIVING

Bureau of Planning & Sustainability

- Responsible for planning, coordination and execution of Mayor's sustainability initiatives, major planning and urban design projects.

- Interdepartmental coordination for effective and efficient implementation of Mayor's agenda.

Bureau of Planning & Sustainability

- Planning Focus Areas

  -Smart growth -Land Use

  -Integration of cross-departmental planning

  -Public Art -Brownfield redevelopment

  -Environmental Planning

- Sustainability Focus Areas

  -Energy -GHG emissions reduction

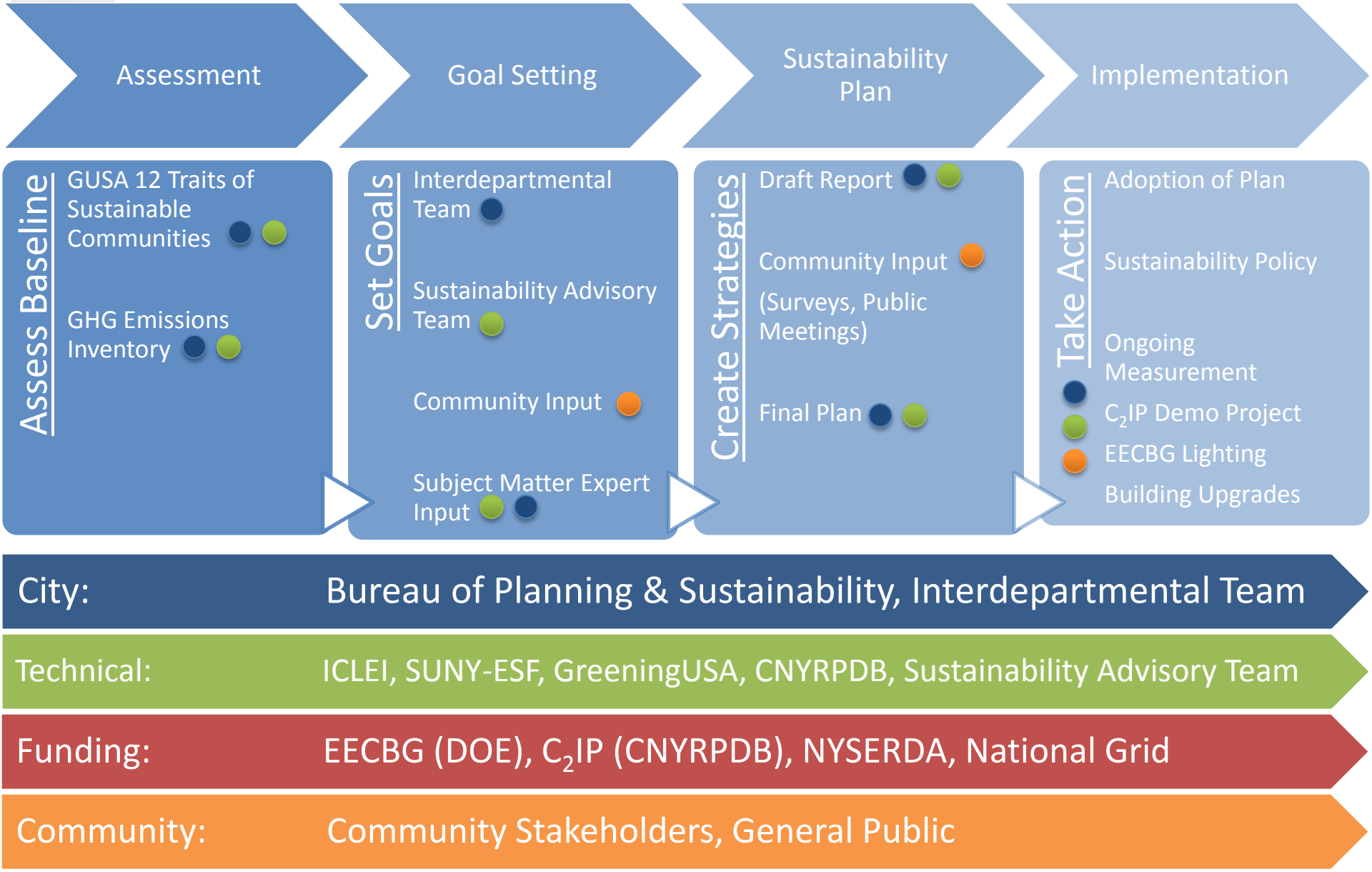
  -Environment -Stormwater management

  -Green building -Education & Outreach

  -Natural resource protection -Sustainability Plan

Sustainability Plan

Sustainability Plan

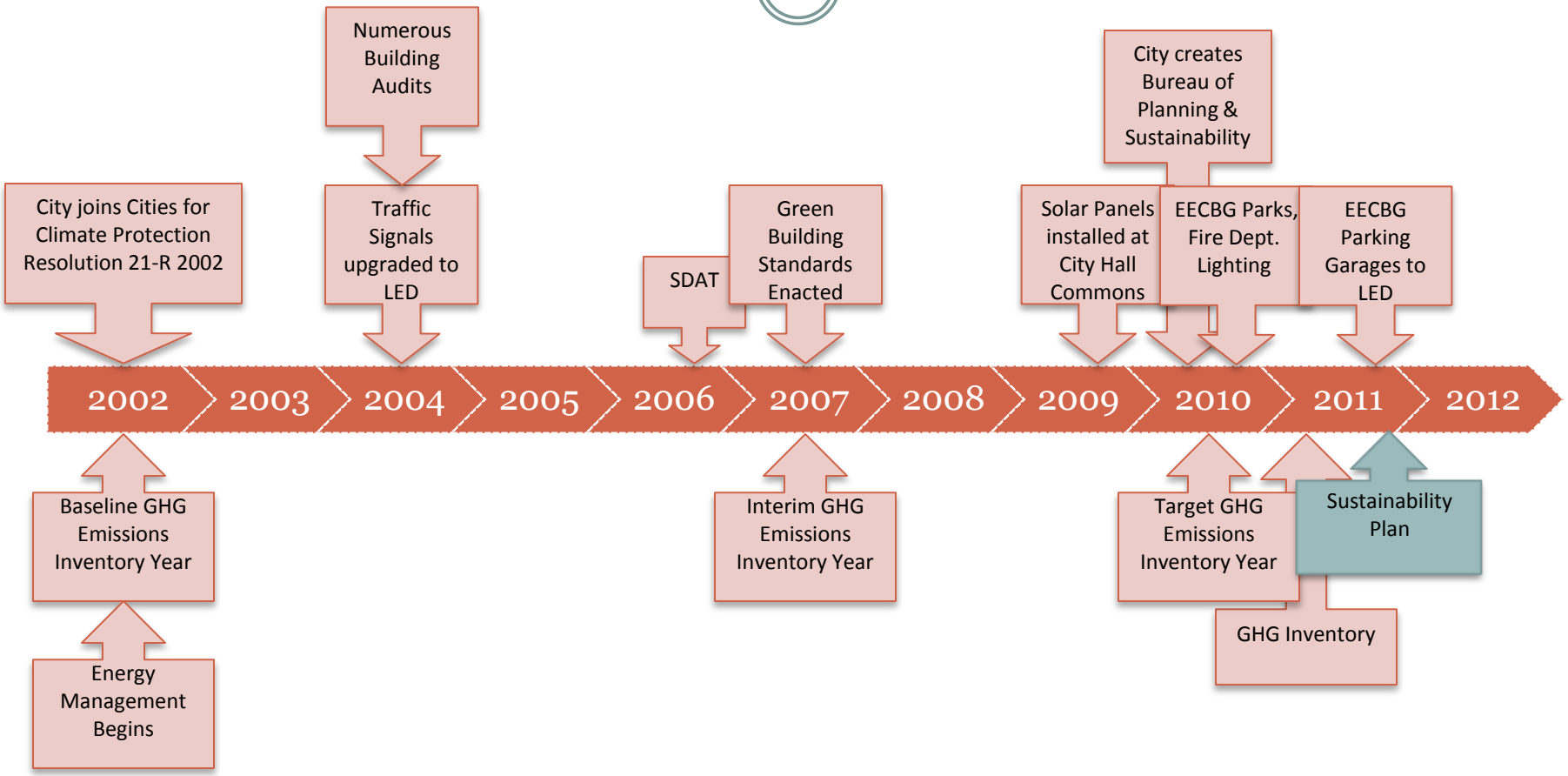


City:	Bureau of Planning & Sustainability, Interdepartmental Team
Technical:	ICLEI, SUNY-ESF, GreeningUSA, CNYRPDB, Sustainability Advisory Team
Funding:	EECBG (DOE), C_2IP (CNYRPDB), NYSERDA, National Grid
Community:	Community Stakeholders, General Public

Assessment

- History of Green Initiatives
- GreeningUSA 12 Traits
- Greenhouse Gas Emissions Inventory

Sustainability Initiatives Timeline



Making Sense of the Data

- GreeningUSA
  - 12 Traits of Sustainable Communities
- ICLEI-Local Governments for Sustainability
  - 5 Milestones
- Climate Change Innovation Program
  - Green House Gas Emissions Inventory

12 Traits of Sustainable Communities

1. Governmental Leadership in Sustainability
2. Local Economic Resilience
3. Sustainable Land Use Planning & Natural Resource Preservation
4. Sustainable Transportation & Mobility Systems
5. Water Related Infrastructure Systems
6. Green Buildings and Housing
7. Energy from Non-Fossil Fuels
8. Waste Material Management
9. Culture, Arts and Entertainment
10. Quality Public Education
11. Public Health and Safety
12. Community Engagement

12 Traits© and Sustainability Significance Measures by Category

Categories Sustainability Traits	A) Local ENVIRONMENTAL Significance	B) Local ECONOMIC Significance	C) Local Social EQUITY Significance
1. Governmental Leadership in Sustainability by Executive, staff, and legislators.	**Carbon Footprint / Greenhouse Gas Emissions Reduction**	**Community Bond Rating**	**Voter Registration Levels**
2. Local Economic Resilience with diversified economic base.	**Air Quality Index**	**Employment Mix**	**Level of Employment**
3. Sustainable Land Use Planning and Resource Preservation that is integrated, balanced, and diversified.	**Developed Area / Open Area**	**Sprawl Index**	**Owner Occupied Housing Units**
4. Sustainable Transportation & Mobility Systems with numerous options.	**Complete Streets**	**Commuting Options**	**Housing & Transportation Affordability Index**
5. Water Related Infrastructure Systems addressing long and short term quantity and quality**.**	**Potable Water Quality**	**Waste Water Processing**	**Community wide Green Infrastructure**
6. Green Buildings and Housing that are environmentally and energy responsive.	**Green Buildings per capita**	**Green Construction Jobs**	**Housing Affordability**
7. Energy From Non-Fossil Fuels with localized and centralized sources**.**	**Green Electrical Power**	**Green Energy Businesses**	**Energy Affordability through LIHEAP**
8. Waste Material Management that is holistic and value based.	**Landfill Diversion**	**Business Recycling**	**Public Place Recycling**
9. Local Culture, Art and Entertainment that is well rounded and inclusive	**Green Event Planning**	**Economic Impact**	**Diversity of venues and events**
10. Quality Public Education that teaches sustainability	**Environmental Education / Sustainability Curriculum**	**Public Sustainability Education**	**Graduation Rates**
11. Public Health and Safety based on clean, safe, healthy, places.	**Public Recreation Facilities**	**Health and Safety Workforce**	**Crime Rate**
12. Community Engagement and participation by citizens.	**Environmental Organizations**	**Business Engagement**	**Diverse Participation**

Greenhouse Gas Emissions Inventory

- Planning & Sustainability
- City Departments
  - SyraStat
  - Facilities
  - Engineering
  - DPW
  - Purchasing
  - Fire
  - Aviation
  - Water
- Technical Support
  - SUNY-ESF
  - ICLEI
  - CNY Regional Planning and Development Board
  - Energy Automation
  - National Grid

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ESF

ICLEI Local Governments for Sustainability

RPDB Central New York Regional Planning & Development Board

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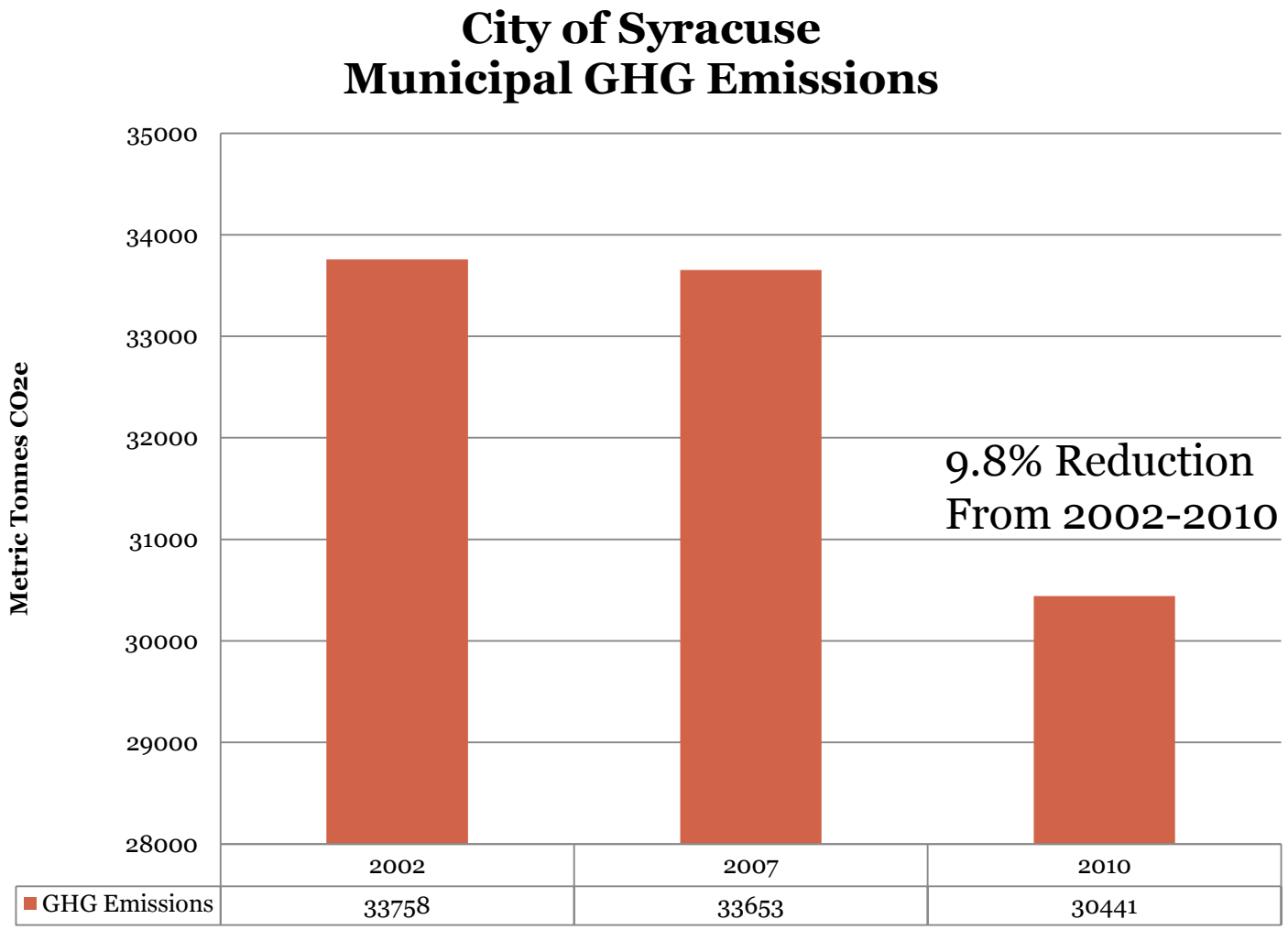
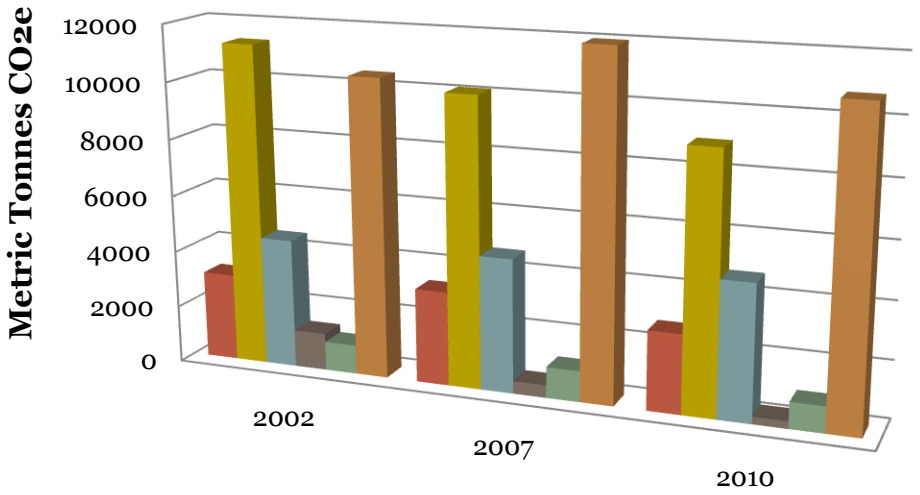
GHG Emissions Inventory



GHG Emissions Inventory



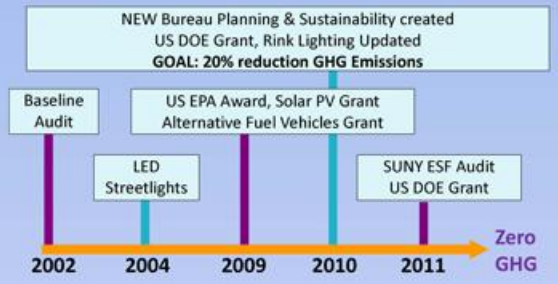
	2002	2007	2010
Buildings	3077	3305	2771
Vehicle Fleet	11327	10124	8987
Street Lights	4553	4697	4734
Traffic Lights	1309	444	260
Water Department	1020	1087	920
Aviation	10469	11988	10759

2010 Syracuse Municipal Buildings Greenhouse Gas Emissions Inventory

DeFrees BA[1], Li R[2], Liu L[1], Morgan HK[1], Peters CL[3], Smardon RC[2], Stack KP[3]
[1]Department of Environmental Science, [2]Department of Environmental Studies, [3]Department of Sustainable Construction Management & Engineering, SUNY College of Environmental Science and Forestry, Syracuse, NY, 13210

ABSTRACT

We evaluated greenhouse gas emissions (GHG) for municipal buildings assumed to be under the City of Syracuse operational control using the International Local Government GHG Emissions Analysis Protocol (ICLEI). This protocol is designed to support a consistent, transparent and accurate GHG emissions report. Direct and indirect emissions were calculated for all six internationally recognized GHG's regulated under the Kyoto Protocol, then converted to tonnes of CO_2 equivalent (CO_2e). Data were provided by the City's Bureau of Sustainability and Planning.



ESSENCE

- Our project sought to create a transparent, verifiable process to quantify GHG emissions and develop a GHG profile for the City of Syracuse as a tool to assist management in their efforts to transition to a post carbon world.

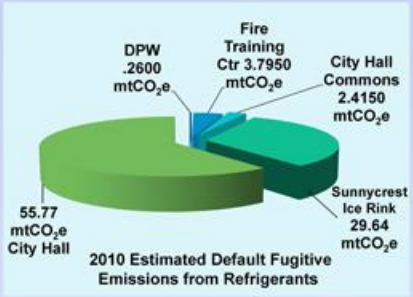

Photo credit: www.syracuse.com

GUIDANCE

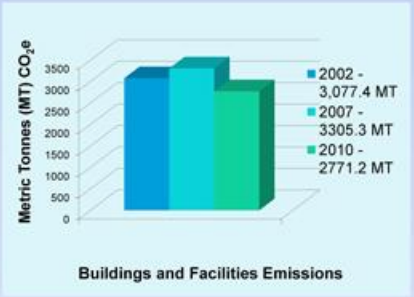
- **Strategic plan and roadmap** to reduce GHG – input from community and academia
- **Targeted milestones and roadmap** – each department accountable – reward when goals achieved
- **City Metabolism dashboard** – a real-time, online tool – to measure emissions
- **Monthly educational forums** to share best management practices (BMP) across the disciplines – forums to have authority to implement policies that impact behavioral changes
- Mitigation measures to establish reduction **target of Zero GHG emissions**

CONCLUSION

Our team identified numerous areas where the City can develop better tracking mechanisms to accurately measure GHG emissions under its control. Reliable emissions data should be tracked in a consistent, transparent manner that can be reproduced and is adaptable to changing conditions. Policy and behavioral changes can only be made when we are aware of the root cause and unintended consequences of GHG emissions and their related environmental impact.

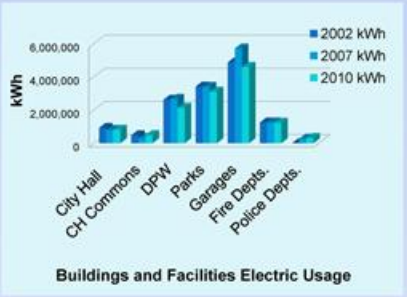


2010 Estimated Default Fugitive Emissions from Refrigerants



Buildings and Facilities Emissions

Buildings and Facilities Natural Gas Usage



Buildings and Facilities Electric Usage

GHG Global Warming Potential vs CO_2	GWP
Carbon dioxide (CO_2)	1
Methane (CH_4)	21
Nitrous oxide (N_2O)	310
Hydrofluorocarbon (HFC)-134a (refrigerant)	1,300

Source: US EPA

CARBON DIOXIDE EQUIVALENT

A metric measure used to compare the emissions from various greenhouse gases based upon their global warming potential (GWP). Carbon dioxide equivalents are commonly expressed as "metric tonnes of carbon dioxide equivalents ($MTCO_2e$)."

Source: US EPA

To learn more about our research project.
http://www.syracuse.ny.us/planning_and_sustainability.aspx

Syracuse Greenhouse Gas Audit: Vehicle Fleet

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Timothy J. Pede, Wendy R. Getman — Environmental Science
Jonathan Watterson — Landscape Architecture

ESF State University of New York College of Environmental Science and Forestry
Syracuse New York

Abstract

Using Version 1.0 of ICLEI's Local Government Operations Protocol, we calculated CO_2, N_2O, CH_4, and HFC emissions from vehicle and mobile sources for the City of Syracuse, NY. Our baseline, interim, and inventory years were 2002, 2007, and 2010 respectively. The results were reported to Syracuse's Bureau of Planning and Sustainability in CO_2 equivalents, and included a set of recommendations for how to reduce future vehicle emissions. The data concluded that GHG emissions from mobile sources have decreased 21 percent from 2000 to 2010, and 11 percent from 2007 to 2010.

Introduction

Transportation is the fastest-growing source of U.S. greenhouse gas emissions that contribute to climate change, accounting for 47 percent of the net increase in total U.S. emissions since 1990[1]. In 2008, transportation sources contributed approximately 27 percent of total U.S. greenhouse gas emissions[1]. As part of Central New York's participation in the U.S. Environmental Protection Agency's Climate Showcase Community program, the Syracuse City Government has begun an initiative to inventory its municipal greenhouse gas (GHG) emissions. This report outlines the results of the highway and non-highway emissions and provides recommendations for how to reduce GHG emissions going forward.

Objectives

- Calculate the mobile emissions of the City of Syracuse for its GHG audit
- Create a reproducible process for calculating City of Syracuse mobile GHG emissions
- Develop a list of mitigation recommendations for the City of Syracuse

Scope

This GHG audit encompassed:

- Scope 1 mobile **combustion** emissions
- Scope 1 fugitive emissions from mobile **air conditioning**

The following departments' directly owned and operated mobile sources were calculated:

- Department of Public Works (DPW)
- Fire Department
- Engineering
- Parks
- Police Department
- Water Department

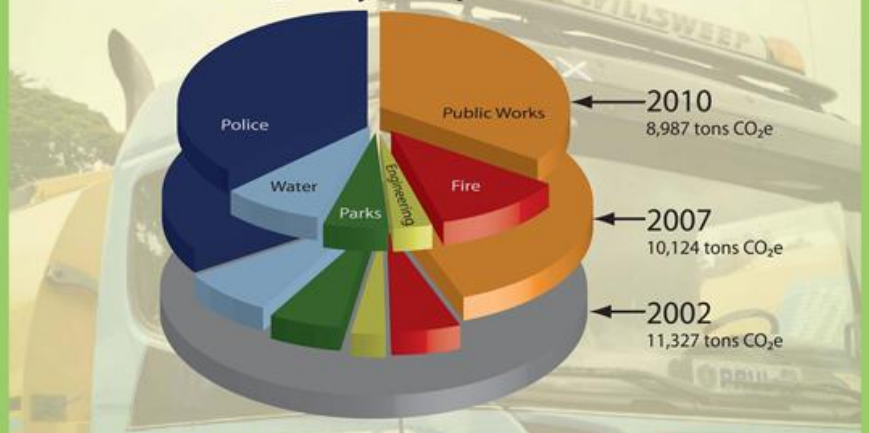
References

1. Green Future Now. 2011. "Climate Change." 6 March 2011 http://greenfuturesnow.net/information/ClimateChange.aspx

2. Morelli, M. "$500,000 federal grant targets greenhouse gases in Central New York Communities." The Post-Standard. 14 June 2010. 6 March 2011

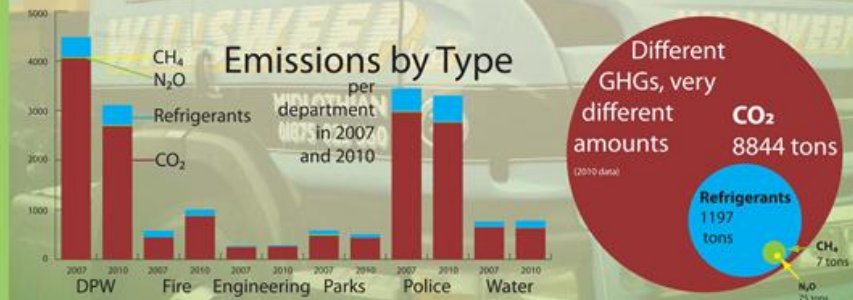
3. Onondaga County Resource Recovery Agency (OCCRA). n.d. Identifying and Quantifying OCRRA's Mobile Source Greenhouse Gas Reduction Opportunities. Syracuse, NY.

CO_2e by Department



Emissions by Type

per department in 2007 and 2010



Methods

CO_2

To calculate the CO_2 emissions for highway and non-highway sources, the total annual fuel consumption for each vehicle was multiplied by the appropriate emission factor from the LGOP manual, and divided by 1,000. We used aggregate data to calculate the 2002 CO_2 emissions from mobile combustion for unleaded and diesel fuel.

N_2O and CH_4

N_2O and CH_4 emissions from individual highway vehicles were calculated by multiplying the annual mileage and the appropriate emission factor, and dividing the product by 1,000,000. For non highway vehicles, we multiplied annual fuel consumption by the emission factor and divided by 1,000,000. 2002 N_2O and CH_4 emissions could not be calculated because only aggregate data (no individual vehicle information) was accessible.

Air Conditioning

To calculate refrigerants for highway vehicles, we used the NAPA Auto Parts Guide to estimate the average charge for each vehicle type per department. We multiplied this number by the emissions factor and the annual time in use, added 1, and divided the total by 1,000. Non-highway vehicles were assumed not to have A.C. We estimated 2002 fugitive emissions from mobile air conditioning for highway vehicles using the 2007 vehicle fleet data, omitting all post-2002 vehicles.

CO_2 Equivalents (CO_2e)

To obtain a total emission calculation in CO_2 equivalents, we multiplied N_2O, CH_4, and HFC vehicle emissions by the appropriate Global Warming Potential. We then summed the total CO_2 equivalents for each vehicle by department and overall.

Results

Departments that reduced GHG 2007-2010

DPW: 1369.18 metric tons (11%)
Parks: 78.04 metric tons (13%)
Police: 147.18 metric tons (4%)

Departments that increased GHG 2007-2010

Fire: 424.37 metric tons (42%)
Engineering: 14.37 metric tons (5%)
Water: 18.95 metric tons (2%

Total GHG reduction 2002-2010:
2339.95 metric tons (21%)

Discussion

While the reduction in overall GHG emissions is certainly commendable, the use of estimations in both the Fire 2007 and the 2002 calculations could explain some of the difference. Although the 2007 Fire Department emissions were calculated using aggregate data and we were unable to determine N2O and CH4 emissions, adding these missing emissions would not have made a significant difference. Another factor affecting the overall totals is the estimation of refrigerant emissions for all three years. Because we do not know the exact amount of refrigerant leaked from each vehicle, we overestimated the total. We attempted to alleviate the difference between years by using the same calculation method for each year. Overall, **the City's reduction in GHG emissions should be rewarded and continued in order to reach its goal: reducing emissions by 2,400 metric tons by 2012**[2].

Conclusion

The following mitigation strategies can reduce GHG[3]:

Reduce GHG emissions

- Reduce highway speeds
- Avoid idling vehicles
- Keep tire pressure high
- Buy hybrid vehicles
- Use biodiesel fuel
- Use low-resistance tires
- Monitor emissions & efficiency

Offset GHG emissions

- Purchase carbon "credits"
- Reforestation / carbon sequestering

Comprehensive Green-House Gas Emission Inventory for Syracuse Hancock International Airport

Collaborators: Rachell Kayen, Timothy Sardone, Justin Towers, Rigoberto Melgar, Ashley Gasky, Aaron Kobler, Kevin Siragusa, Shawn Ganz

Abstract:

This project aims to quantify and evaluate the greenhouse gas emissions of Hancock International Airport. The airport is owned and operated by the City of Syracuse, NY. For the purposes of this study the scope is limited only to greenhouse gas sources owned by the city. It therefore excludes the emissions contributions of airlines and other private companies operating within the confines of the airport. By compiling data such as gasoline, natural gas, electricity consumption, etc. this study aims to calculate emissions from the six most common greenhouse gases, CO_2, H_20 (g), NO_2, SO_2, CH_4 and CO, in terms of CO_2 equivalents. By comparing our findings with 2010, with the base years of 2002 and 2007, this study will aid in the formulation of a climate action plan for the City of Syracuse.

Methods:

Data calculation for total carbon dioxide equivalency (CO_2e) for the Syracuse Hancock Airport was completed in a multiphase process that began with data extraction. Data was provided by the City of Syracuse from the years of 2002, 2007, and 2010. Provided to us were compendiums for gas and electric usage as well as the vehicle fleet data. Stationary and Mobile refrigerants were given to us over email correspondence by Airport and City Officials.

Once we obtained the data, we used the equations below to calculate the total CO_2 equivalent (CO_2e) emissions:

Calculating Indirect Emissions from Electricity Use
Total CO_2 Emissions metric tons
=Electricity Use MWh x Emission Factor ($lbsCO_2MWh$) ÷2,204.62 (lbs/ metric tons)

Calculating Indirect Emissions for Natural Gas Use
Total CO_2 Emissions metric tons
=Energy Consumed MMBtu x Emissions Factor $kgCO_2MMBtux$ 0.001 (metrictonskg)

Calculating Direct Vehicle Emissions
CO_2 emissions=Fuel Consumed gallonsx Emission Factor $kgCO_2$gallon÷1,000 metric ton

Note: The equations were altered to accommodate for both CH_4 and NO_2 by using their corresponding emission factors. We then multiplied the emissions by the global warming potential (GWP) to get the CO_2e.

Objectives

- ➡Identifying the range and scope of analysis at the airport.
- ➡Quantify all emissions sources under the proper ICLEI protocol.
- ➡Create a full greenhouse gas inventory of the emission scopes.
- ➡Use the ICLEI formulas to calculate CO2 equivalents of all scopes.
- ➡Apply the calculated CO2e for the airport to the entire city inventory.
- ➡Use compiled data to facilitate admission into the ICLEI standards.

Scope

The boundaries of this project consist of analyzing the city owned and operated activities within Hancock Airport.

The ICLEI protocol breaks down the emissions into 3 categories: scope 1, scope 2, and scope 3.

For the purposes of this project we focused solely on Scopes 1 and 2.

Scope 1: Consisted of the airport vehicle operations via direct mobile emission.

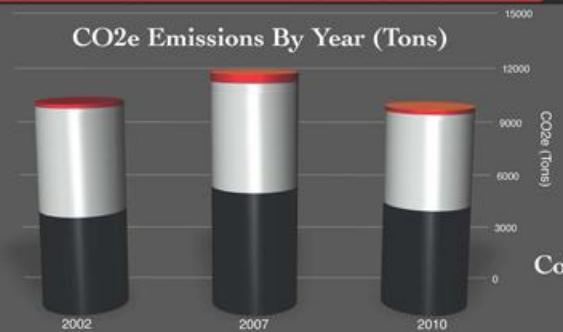
Scope 2: Consisted of airport building operations via indirect emissions acquired through the electric and gas providers.

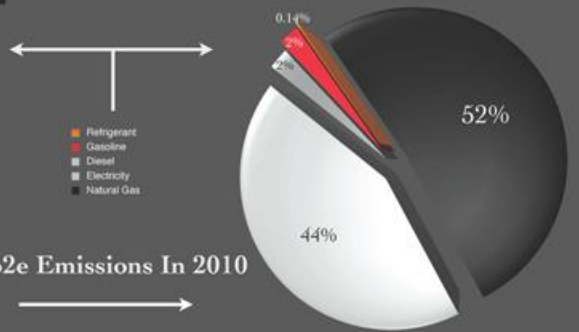
Scope 3: Not applicable for municipal airport operations.

Results:

After computing the data provided for the years of 2002, 2007, and 2010 we found the greenhouse gas emissions in CO_2 equivalent tons released by all municipally owned and operated airport facilities and vehicles for each year. The total emissions from the use of natural gas for the buildings was 5002.818 tons of CO_2e in 2002, 6062.474 tons of CO_2e in 2007, and 5195.482 tons of CO_2e in 2010. The total emissions from electricity use was 5150.637 tons of CO_2e in 2002, 4884.665857 tons of $C0_2e$ in 2007 and 4488.465248 tons of CO_2e in 2010. The total emissions from diesel use from vehicles was 235.31 tons of CO_2e in 2002, 446.93 tons of CO_2e in 2007, and 215.04 tons of CO_2e in 2010. The total emissions from gasoline use from vehicles in 2002 was 381.22 tons of CO_2e, 430.60 tons of CO_2e in 2007, 429.77 tons of CO_2e in 2010.

Aerial View of Airport





The Good News

- The City of Syracuse is already working on many of these recommendations in collaboration with the community.
  - Sustainability Plan
  - Land Use Plan
  - Green Infrastructure projects
  - Open space/community garden discussions
  - Deconstruction discussions
  - Public space recycling efforts
  - Complete Streets, Bicycle lanes, etc.

Thank you!