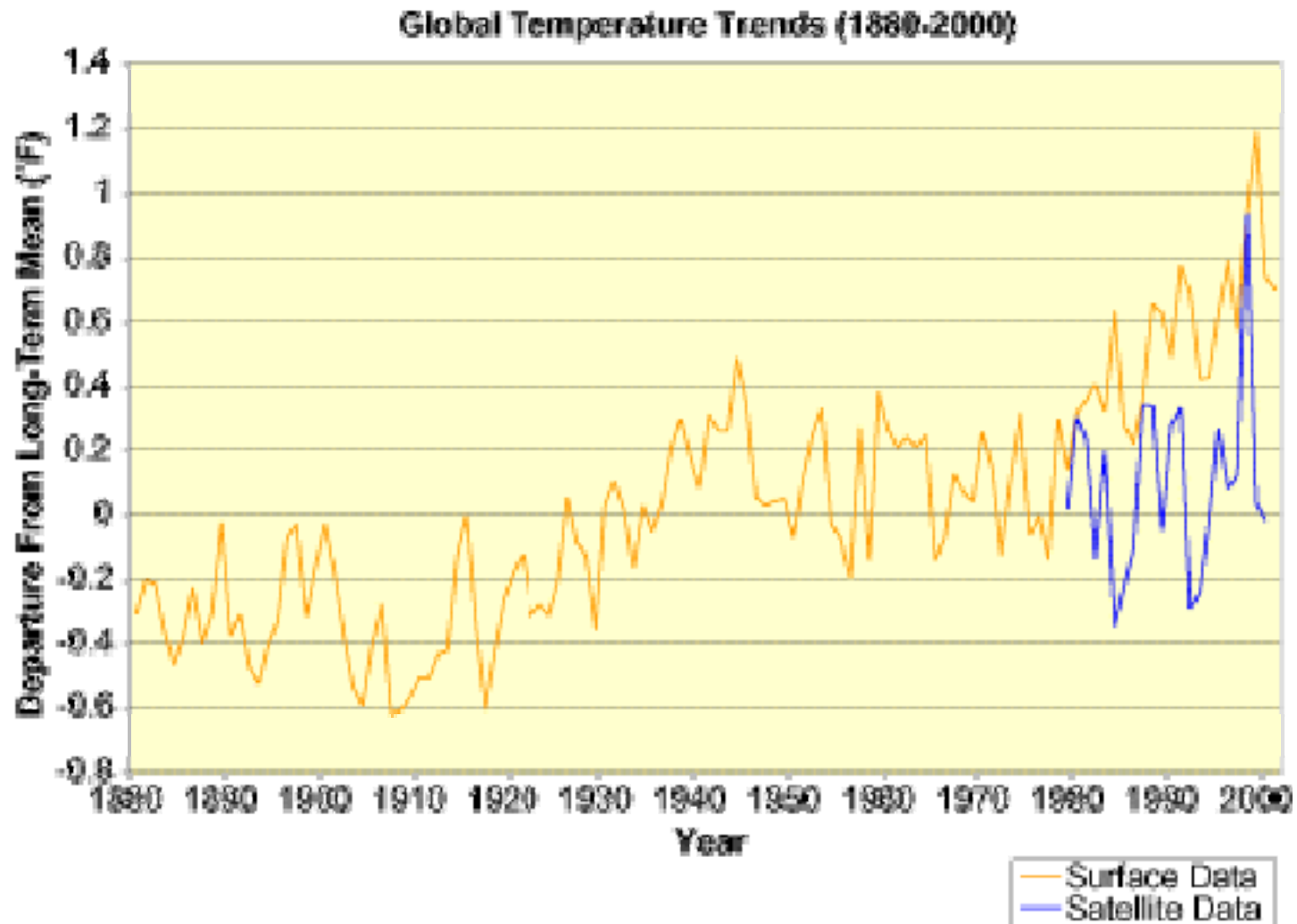




***WASTE MANAGEMENT AND CLIMATE CHANGE  
New York SWANA***

***June 5, 2008***

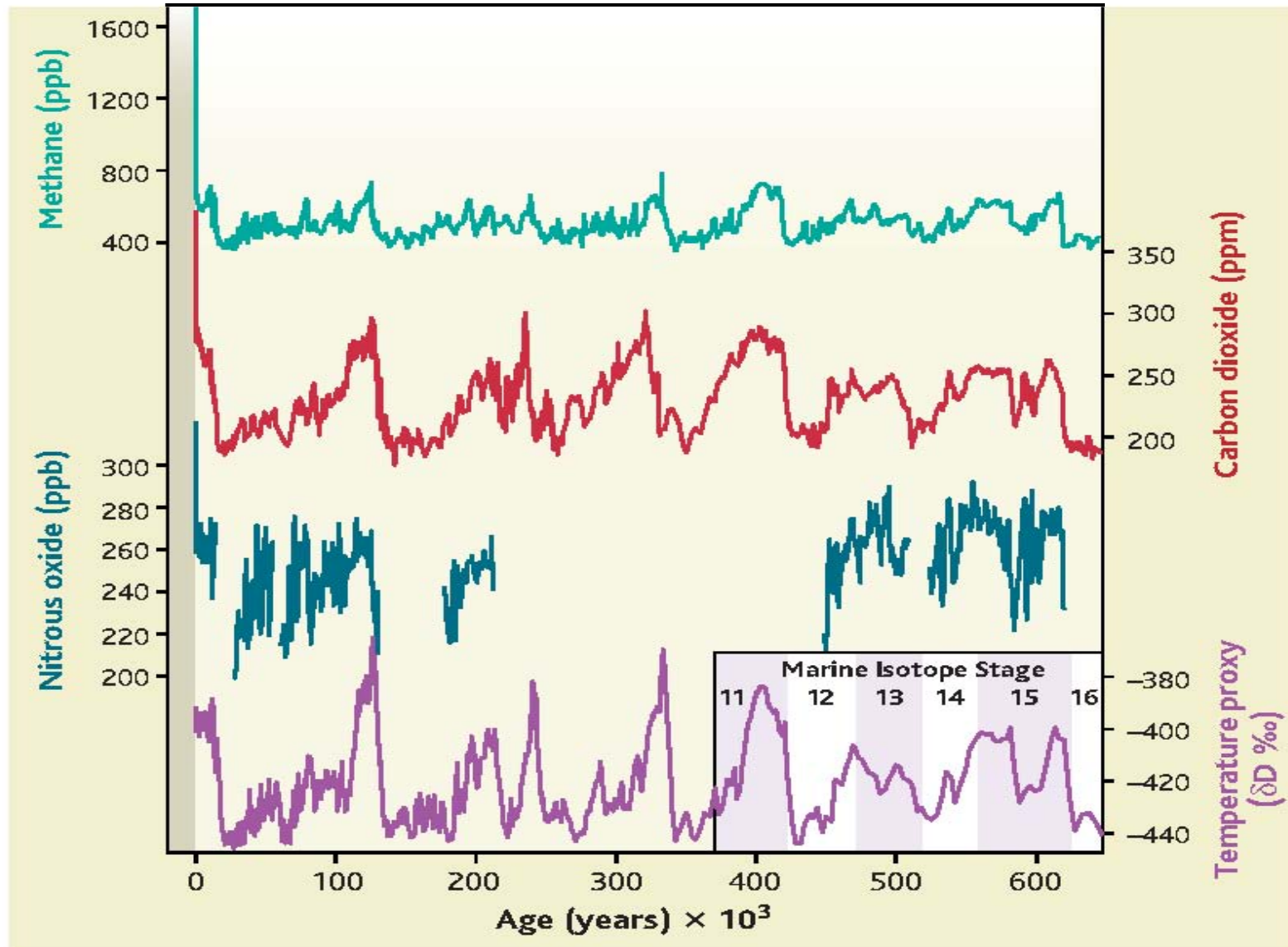
# Current Temperature Trends



Surface Data Source: National Climatic Data Center, 2001.

Satellite Data Source: John R. Christy, University of Alabama in Huntsville, and Roy Spencer, National Aeronautics and Space Administration.

# 630,000 years of Gases and Temperatures



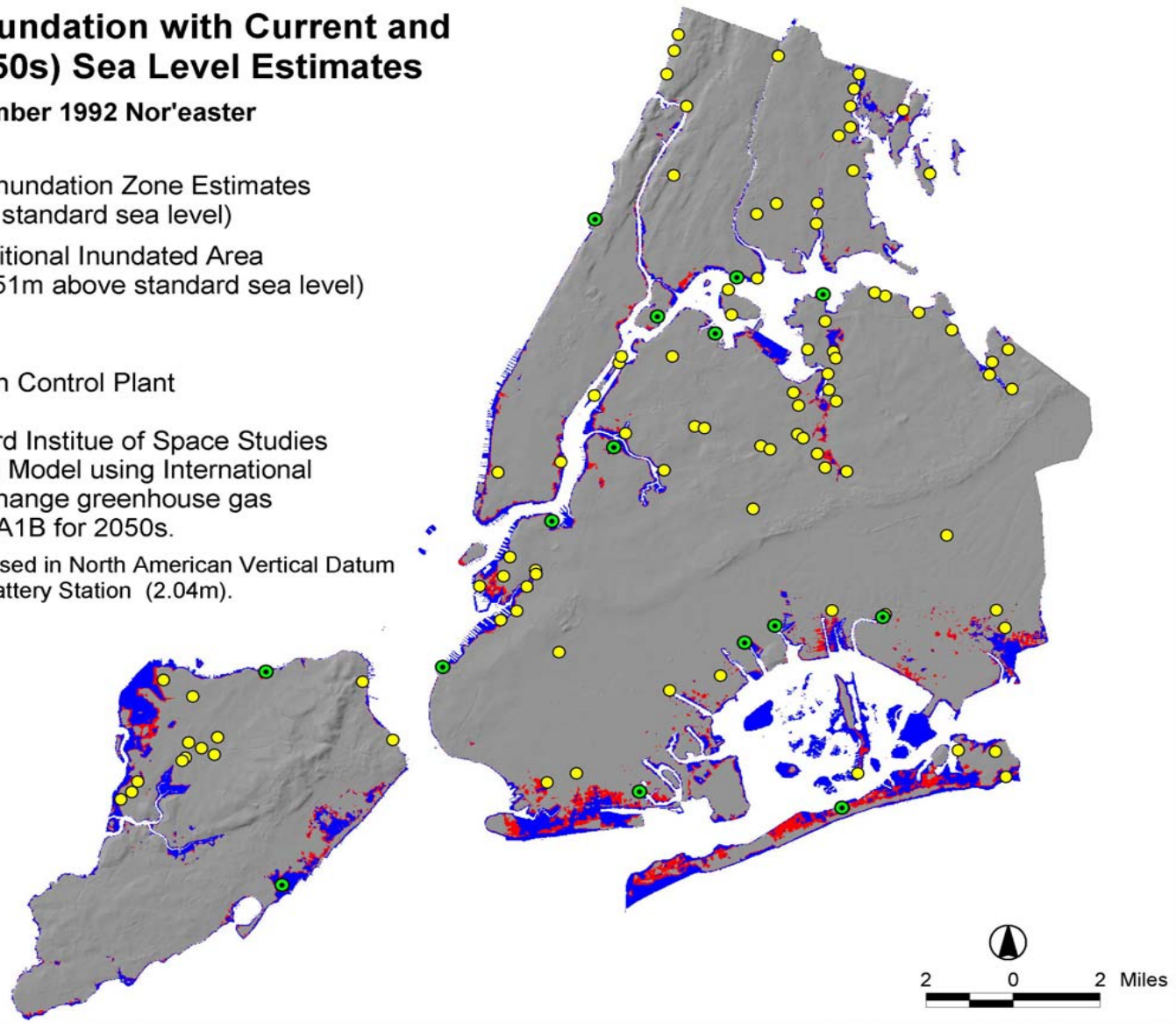
# Comparing Inundation with Current and Projected (2050s) Sea Level Estimates

Case Study: December 1992 Nor'easter

- Experienced Inundation Zone Estimates (2.04m above standard sea level)
- Projected Additional Inundated Area IPCC A1B (2.51m above standard sea level)
- Pump Station
- Water Pollution Control Plant

Based upon Goddard Institute of Space Studies Atmospheric-Ocean Model using International Panel on Climate Change greenhouse gas emission scenario A1B for 2050s.

Standard Sea Level based in North American Vertical Datum Max elevation at the Battery Station (2.04m).



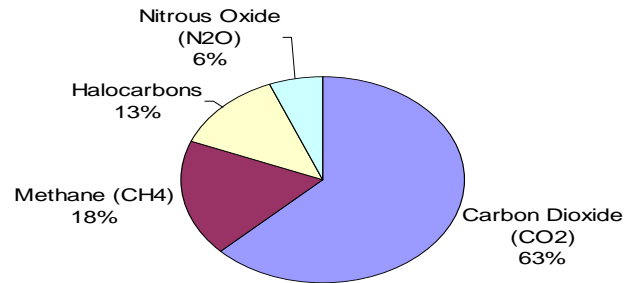
# Climate Change

**“Most of the observed increase in globally averaged temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic (man-made) greenhouse gas concentrations”**

(Intergovernmental Panel on Climate Change - IPCC 2007)

**Carbon dioxide and methane are the two major GHGs causing global warming**

(IPCC 2001, 2007)

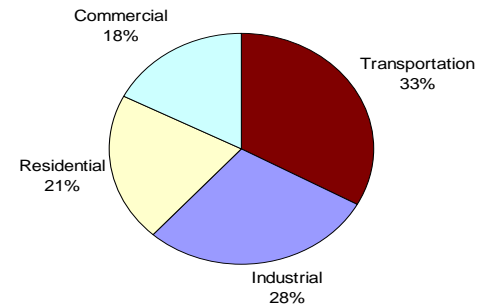


**Carbon dioxide and methane together are 81% of the accumulated GHGs**

**Methane is over 20 times more potent than Carbon Dioxide**

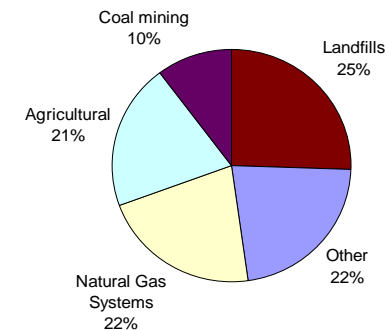
**Reduction of both is required**

## Sources of Carbon Dioxide



**40 % of carbon dioxide is from fossil fuel combustion for electricity (EPA 2004)**

## Sources of Methane



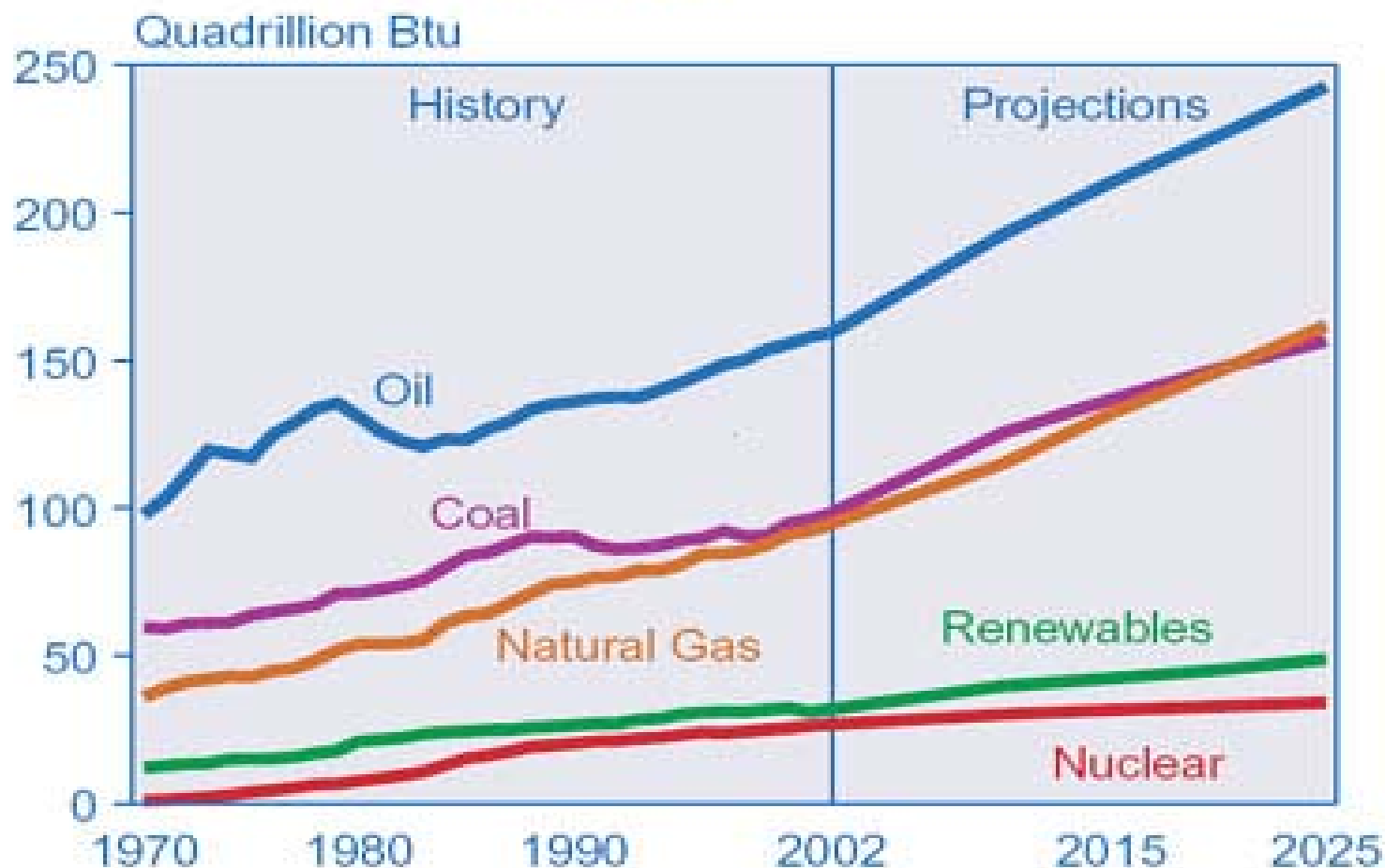
**Landfills are the major source of man-made methane EPA 2004**

**Figure 7. World Marketed Energy Consumption, 1970-2025**



Sources: **History:** Energy Information Administration (EIA), *International Energy Annual 2002*, DOE/EIA-0219(2002) (Washington, DC, March 2004), web site [www.eia.doe.gov/iea/](http://www.eia.doe.gov/iea/). **Projections:** EIA, *System for the Analysis of Global Energy Markets* (2005).

**Figure 10. World Marketed Energy Use by Fuel Type, 1970-2025**



Sources: **History:** Energy Information Administration (EIA), *International Energy Annual 2002*, DOE/EIA-0219(2002) (Washington, DC, March 2004), web site [www.eia.doe.gov/iea/](http://www.eia.doe.gov/iea/). **Projections:** EIA, *System for the Analysis of Global Energy Markets* (2005).



**2004 estimated energy use and gross domestic product for the United States, China, and India.**

<b>TABLE 1</b>	<b>GDP \$Trillions</b>	<b>GDP Current Growth Rate</b>	<b>Energy Use Quadrillion Btus</b>	<b>Energy Use *CAGR 2000-2004</b>	<b>Btu/\$GDP</b>
<b>United States</b>	11.71	3.2%	100.4	0.4%	8,573
<b>China</b>	7.26	10.7%	59.6	11.3%	8,206
<b>India</b>	3.32	9.2%	15.4	3.8%	4,643

Sources: United States GDP from Bureau of Economic Analysis, U.S. Dept. of Commerce. China and India GDP from CIA World Factbook via Yahoo.com. Current economic growth rates from [www.CIA.gov](http://www.CIA.gov). Energy data from Energy Information Administration.

\*CAGR – Compounded Annual Growth Rate



## Too Warm? Too Much Fossil Fuels?

Must Solve:

- Efficiency
- Transportation
- Diversity of
  - Energy Supply
  - Approaches



## New York Solid Waste Management

- Reduce, recycle
- Waste Disposal Options, after local recycling:
  - Landfill in our state
  - Landfill in another state
  - Combust it at a local waste processing facility
  - Combust at a waste processing facility in another state



## How to Choose?

- Lowest Cost?
- Least Environmental Impact?
- Demonstrated Technology?
- Self Sufficiency?
- Lowest Greenhouse Gas Emissions?
- Least Fossil Fuel Energy Use?
- Most Recycling?



## A Suggestion:

- Science based decision-making
- A common impact and performance assessment approach
- Valuation of costs to the Commons
- Public Policy rationalization of holistic thinking



## Elements of Waste Management

- Program development, route selection, markets, disposal
- Contracting, contract execution
- Collection
- Equipment maintenance
- Cost control



## Solid Waste Management

*An early leader in minimizing climate change*

- Recycling
- Capture and combust methane from landfills
  - Flares
  - Engines
- Thermal destruction
  - No methane
  - Anthropogenic carbon – ‘white coal’
  - Biogenic carbon – biomass – carbon neutral
  - Metals recovery



## The Value of Recycling

### Recycle One Ton

Aluminum Cans

Office Paper

Newspaper

Steel Cans

### Reduce GHG Emissions by

13.7 tons

4.3 tons

2.5 tons

1.7 tons

- Savings versus landfilling

Source: USEPA



## How Solid Waste Management Can Do More:

- Make less waste
- Choose efficient options
- Choose less GHG options over more GHG options
- Demonstrate Leadership



# Program Planning

- Design Recycling Program
  - PR
  - Public places
  - Walk the talk
- Disposal
  - Thermal Distribution
    - Kwh/ton
    - Ferrous (-50 lb/ton) / Non-Ferrous (-20 lb/ton) recovery
    - District heating
  - Landfilling
    - Fill sequence
    - Cover execution
    - Gas collection execution
    - Kwh/ton
    - District heating



## Reusable vessels





## Collection and Other Equipment

- Efficiency, Efficiency, Efficiency
- Hybrid
- Alternate fuels
- Maintenance
  - Metrics
    - Tire pressure
    - Combustion efficiency
    - Brake drag
- Operational Practices
  - Routing
  - Idling



## WTE vs. Long Haul

	1.1 MM Tons Net Savings		
	Truck	Rail	Barge
Fossil Fuels (annual)	1.24 MM barrels	1.13 MM barrels	1.14 MM barrels
Ferrous for Production (project) <sup>(1)</sup>	25,380 tons	31,654 tons	15,561 tons
Fe/Non-Fe Recovery (annual) <sup>(2)</sup>	22,000-33,000 tons	22,000-33,000 tons	22,000-33,000 tons

Notes:

<sup>(1)</sup> The "project" is defined as a 20 year period and required equipment replacement of containers and trucks after 10 years.

<sup>(2)</sup> Based on a WTE recovery rate of 2 to 3 percent





## Ethanol Energy Balances

	Energy Balance (renewable output to fossil input)
Sugarcane, Brazil	10.2
Sugar beet, Europe, 2003	2.1
Corn, U.S., 2006	1.4
Cellulose ethanol, U.S.	10.0

Source: Science, Vol 315, 9 February 2007



## Covanta Long Island Power Make and Energy Balance

Town	Kwh/ton	Energy Balance
Babylon	470	114
Hempstead	597	315
Huntington	564	141

**Note: Preliminary data – Do not Cite or Quote.**

***Calculations based on supplemental fuel input only; does not evaluate energy input to construct a facility or for the fuel used to transport waste, facility reagents, or employees.***



## Summary

- Solid Waste Management led in reducing climate change
- Many choices to improve efficiency, reduce GHG effect
- Leadership is important

