A Global Strategy for Managing Greenhouse Gas Emissions

Achieving our 5-year Climate Leader Commitment in 3 years

Kristin Zimmerman, PhD
General Motors
Environment and Energy Policy

Outline:

- GM's Global Footprint & GHG Management Protocol
- GM's Global Inventory Management Plan & GHG Management/Reporting Policy
- What to do…How to collect the data
- Voluntary Partnerships: Reaching our Goal
- Examples: Energy Star and WasteWise
- Publicly Reporting GHG emissions: EPA, DOE
  - Progress reports – Results

GM's Corporate Responsibility Report

GM's Global Footprint

One Company – One Voice

Who we are and how we operate -

- Globally integrated business operating under the Global Sullivan Principles and GM Core Values including Winning with Integrity
- GM's Reputation and Image are balanced across environment, economics, social, product, and the brand…and represented in a continuously updated web-based -

  Global Corporate Responsibility Report
- One Global GHG Management Protocol, Implementation Plan, and Reporting Policy.

GM's Global GHG Management Protocol –

A Systems Approach

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GENERAL MOTORS CORPORTATION

ENVIRONMENT & ENERGY

GREENHOUSE GAS (GHG) INVENTORY MANAGEMENT PLAN for GM's Global Operations

2004

General Motors Corporation
Public Policy Center
Environment and Energy
300 Renaissance Center
Mail Code: 482-C27-C22
Detroit, MI 48265

GM's Global GHG Management Protocol – The EPA Inventory Management Plan:

Sample

	Inventory Plan Component	Detail Required	Information contained within the following pages illustrates GM's approach for managing its ghg inventory.
	Proponent Information		
1.	Company Name	Legal Name of Entity	General Motors Corporation
2.	Address	Physical and mailing address	300 Renaissance Center Mail Code: 482-C27-C22 Detroit, MI 48265
3.	Contact	Contact Name and title	Kristin B. Zimmerman, Manager Energy & Environment Strategy
4.	Contact information	Contact information (Telephone/fax/email)	Ph: (313) 665-9164 Fx: (313) 665-0746 kristin.b.zimmerman@gm.com
	Boundary Conditions		
	Organizational		
5.	Inclusion of Partially Owned or Controlled Assets	Describe the basis (% ownership, degree control, etc.) for reporting emissions data from partially owned or controlled assets. All of GM's voluntary programs with commitment targets use 2000 as the base year. I.E. EPA Climate Leaders – a 10% reduction in Direct emissions from the burning of fuels and indirect emissions from the purchase of electricity and steam.	GM reports GHG emission data based on an ownership and/or a management/operational control basis for all of its operations. GM believes that GHG Emissions should be reported for those facilities under management control rather than reporting a portion of emissions based on equity share. *Management Control means at least a 50% equity position, at least 50% Representation on the Board and/or management of the operation:* ✓ Full Ownership Implies Management/Operational Control: Report all Emissions ✓ Joint Ownership: Report if under Management/Operational Control. Partners should determine, up-front, who will be reporting to avoid double counting. ✓ Leased Facility: Report under Management/Operational Control. (i.e. The Renaissance Center – a non-mfg facility) GM's North American Footprint includes facilities that are: fully operational, idled, shutdown, closed. Acquisition of a facility will shift the baseline. The Baseline will not shift due to organic growth (i.e. shifts in production). The attached IMP refers specifically to GM North American Facility boundaries in 2003.

GM's Global *GHG Management/Reporting Policy*

GHG emissions will be managed for those facilities under financial/management control rather than managing a portion of emissions based on equity share. *Management Control means at least 50% equity position, at least 50% representation on the Board and/or management of the operation*:

- ✓ **Full Ownership Implies Management Control: Report all Emissions**
- ✓ **Joint Ownership: Report if under Management Control. Partners should determine, up-front, who will be reporting to avoid double counting.**
- ✓ **Leased: Report if greater than 0.1% of annual facility total CO2 emissions (or more than 30,000 metric tons CO2 per year)**

What to do: You can not manage what you do not measure…so…what should you be measuring?

Facility Energy and Environmental Metrics:

- monthly electricity bills
- monthly gas bills
- fuel bills (for manufacturing only)
- trash bills
- water and,
- waste management
- paper purchases…why?

How to Collect the Data

Manually:

- Report Monthly Electricity Bills
- Report Monthly Gas Bills

BAE 2004 U.S. Data	Jan	Jan	Feb	Feb	Mar	Mar	Apr	Apr
	UNITS	TBTU	UNITS	TBTU	UNITS	TBTU	UNITS	TBTU
NATURAL GAS (MCF)*	500		500		500		550	
PROPANE (GALS)	10000		8000		7000		8000	
SOLID WASTE (TONS)	15		15		15		15	
LIQUID WASTE (GALS)	6000		6000		4000		4000	
LANDFILL GAS (MCF)								
ELECTRICITY (KWH)	200000		300000		300000		300000	
WATER (GALS)								

TOTAL CO_2 Emitted (MM tons CO2)	2002	2003	2004	% change
	4,874.38	4,111.59	1,143.26	15.65%

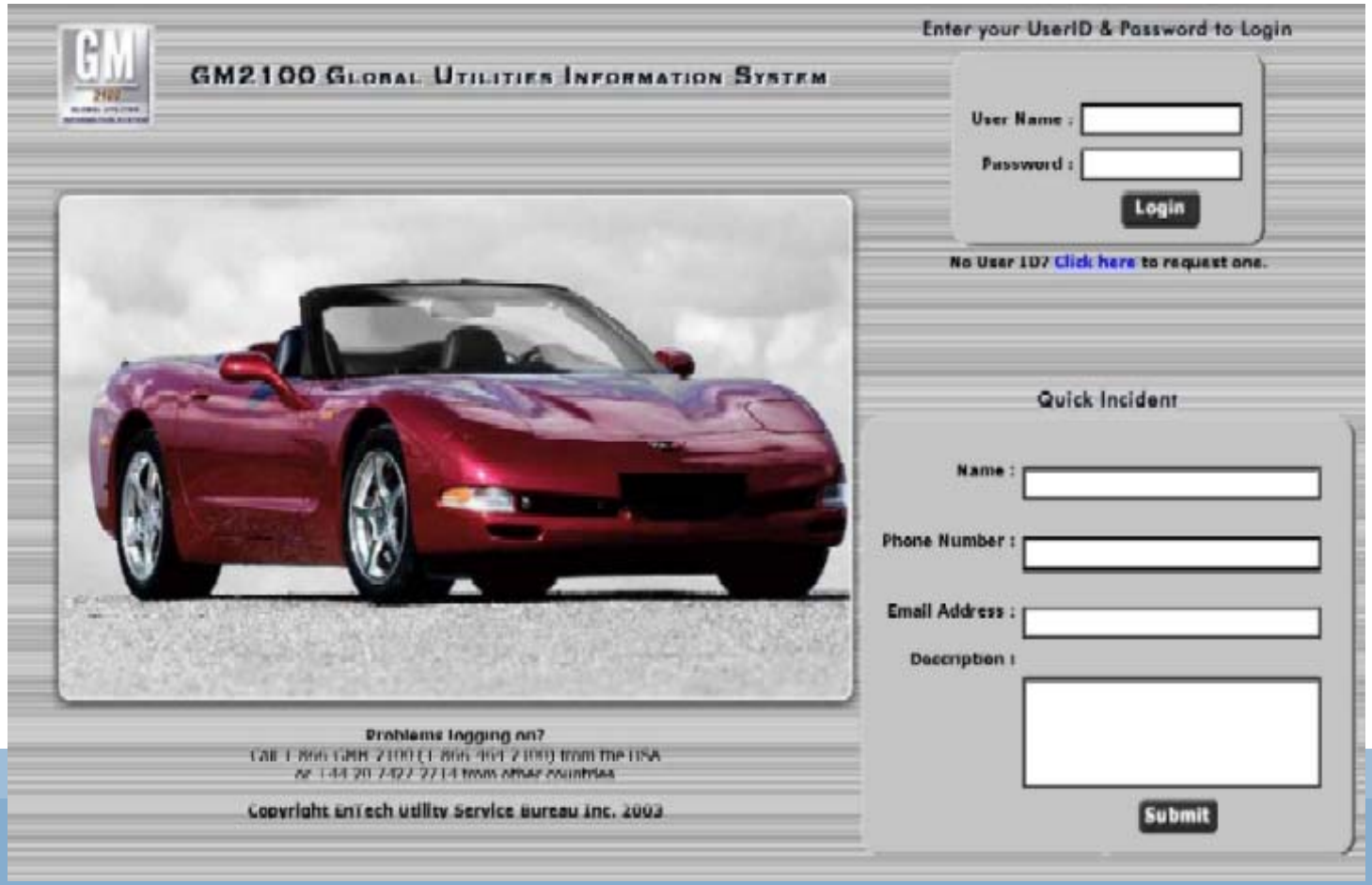
* Actual Usage = Total Purchase - Total Sold

How to Collect the Data

Electronically:

- 24/7 web-based or
- local computer database controlled

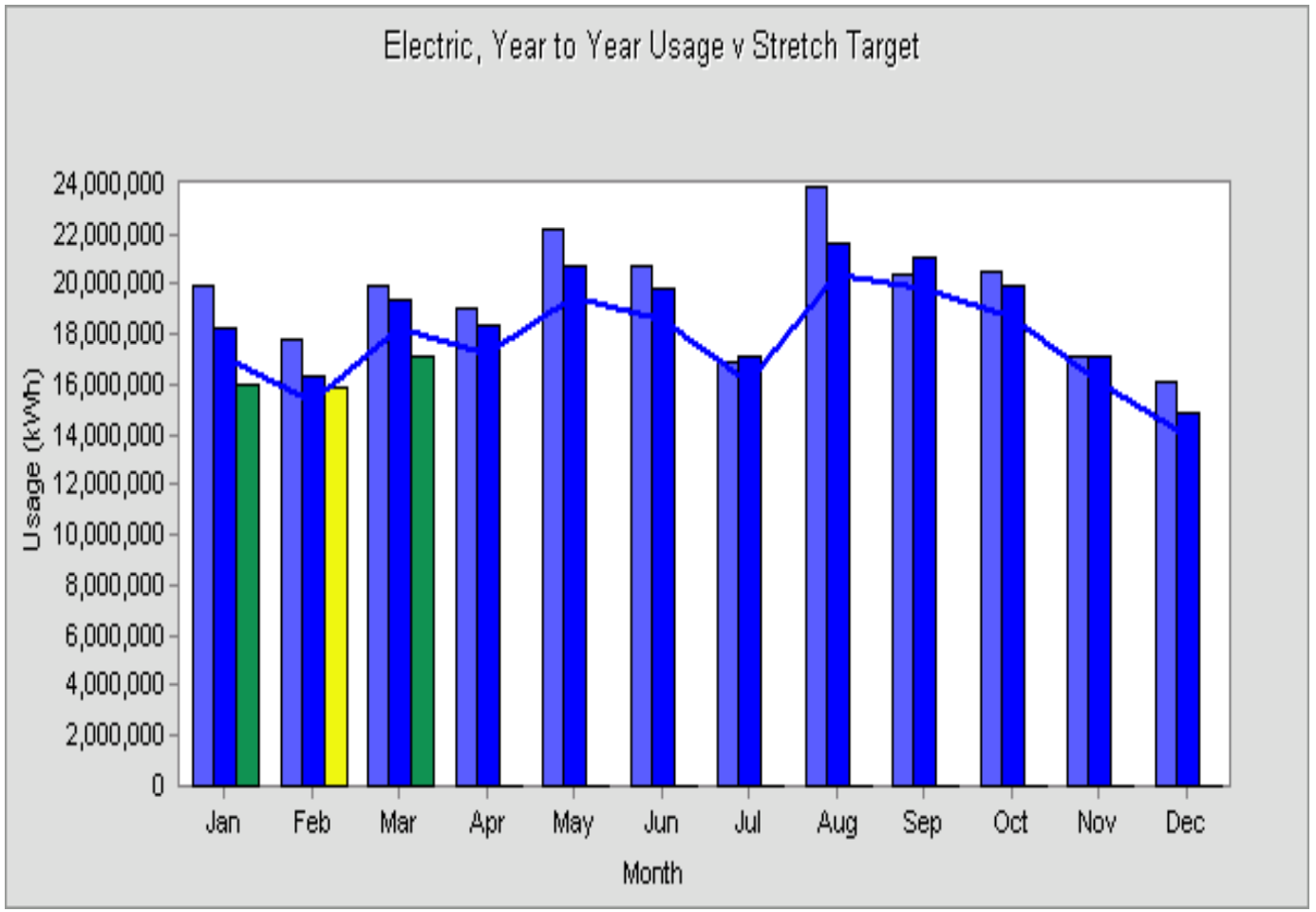
GM 2100



How to Collect the Data: Electronically

GM 2100

Sample Trend Chart



What to do : You can not manage what you do not measure…so…what should you be measuring?

Product Energy and Environmental Metrics:

- Fuel Economy
- Vehicles Produced and Vehicles Sold (annual)
- Fuel used (E85, BioDiesel, Gasoline, Diesel, H2)
- % Recycled Content
- ELV protocol for dismantling and closed loop processing
- Waste Management-Manufacturing Process

What can the Consumer do to share the Responsibilit y?

Calculate the greenhouse gas emissions of your car or truck, estimate your annual fuel costs, and see how GM vehicles compare to the competition.

Click on the image to enter the GHG Calculator

GM GMability close

Vehicle Fuel Economy and CO_2 Calculator

2005 U.S. EPA Rating

CHEVROLET MALIBU compared to TOYOTA CAMRY		
Compare other vehicles >>		
Fuel Economy	**CHEVROLET MALIBU**	**TOYOTA CAMRY**
Fuel type	Regular	Regular
MPG (city)	24	24
MPG (highway)	35	34
MPG combined	**28**	**28**
Calculated annual fuel cost*	***1009***	***1009***
Annual CO_2 emissions in metric tons, based on 15,000 miles driven	***4.75***	***4.75***
CO_2 emissions in metric tons** based on 536 and 536 gallons, respectively, of fuel consumed	***4.75***	***4.75***
Customize fuel costs and CO_2 emissions>> Customize based on your driving behavior >>		
Vehicle Data		
EPA size class	MIDSIZE CARS	MIDSIZE CARS
Engine size (liters)	2.2	2.4
Cylinders	4	4
Transmission	Auto(L4)	Auto(L5)
Drive	Front	Front
Gas guzzler***?	No	No

GM

Where are you most apt to find GHG management opportunities?…Voluntary Partnerships

EPA Program Links

CLIMATE LEADERS
U.S. Environmental Protection Agenc

The Climate Leaders Umbrella

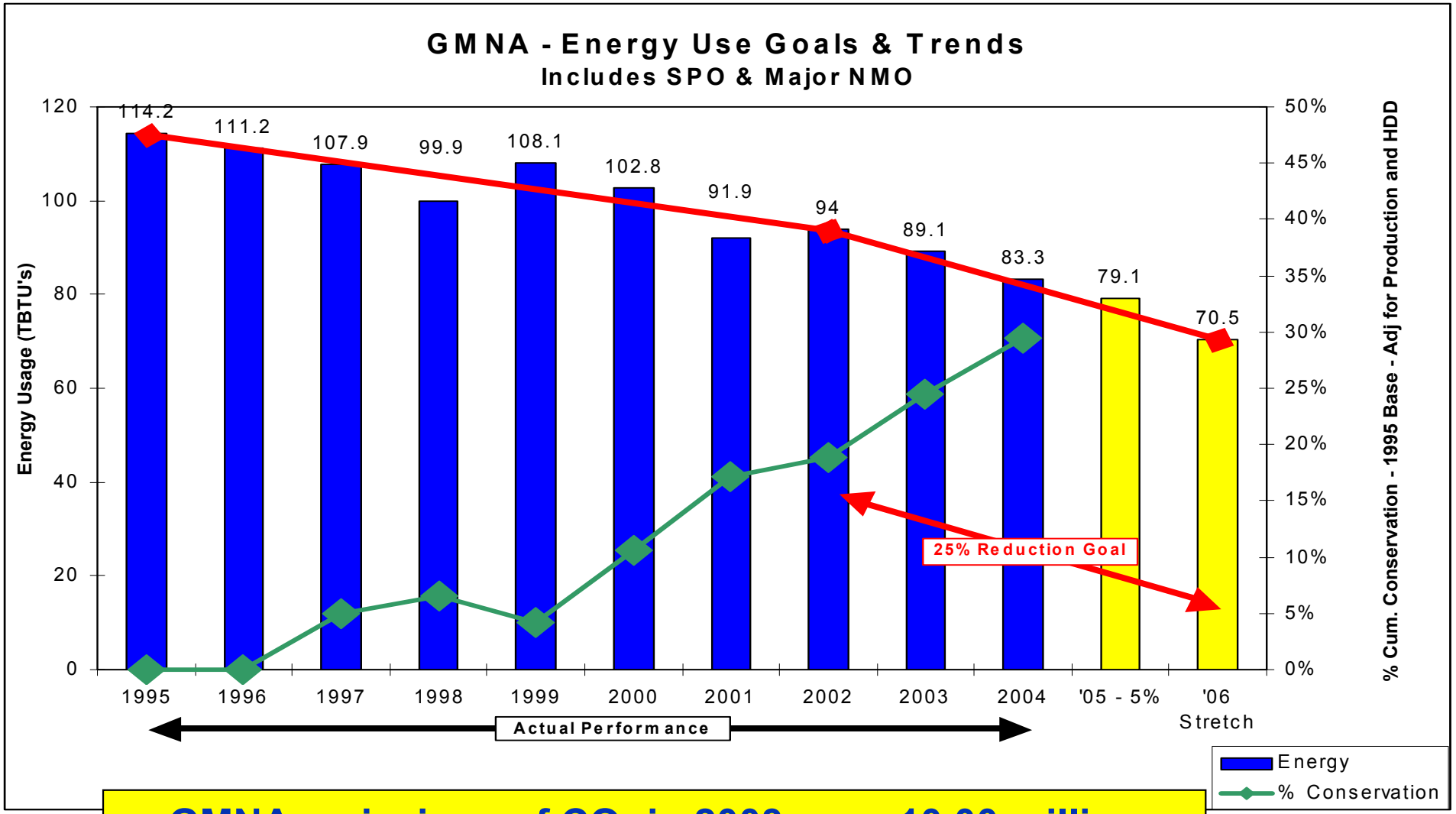
Climate Leaders is a new voluntary EPA industry-government partnership that encourages companies to develop long-term comprehensive climate change strategies. Partners set a corporate-wide greenhouse gas (GHG) reduction goal and inventory their emissions to measure progress. By reporting inventory data to EPA, partners create a lasting record of their accomplishments, identify themselves as corporate environmental leaders, and strategically position themselves as climate change policy continues to unfold.

Examples of Voluntary Partnerships-Climate Leaders Progress Report: Summary Form

Corporate Goal Tracking	Base Year (original)	Base Year (date adjusted)	Year 2		Year 3		Year 4	
Year	2000	--	2001		2002		2003	
ABSOLUTE EMISSIONS GOAL TRACKING								
	CO_2-e (metric tons)	CO_2-e (metric tons)	CO_2-e (metric tons)	% change from base yr	CO_2-e (metric tons)	% change from base yr	CO_2-e (metric tons)	% change from base yr
Total U.S. Emissions	10	0	10	-6.1%	10	-5.5%	9	-11.0%
Total Non-U.S. Emissions	1	0	1	-9.2%	1	-9.2%	1	-17.3%
Total Absolute Emissions	11	0	11	-6.4%	11	-5.9%	10	-11.6%
Goal Year Absolute Emissions Target								
Total Reductions from Offsets	0	0	0	N/A	0	N/A	0	
NORMALIZED EMISSIONS GOAL TRACKING								
	CO_2-e (metric tons)	CO_2-e (metric tons)	CO_2-e (metric tons)	% change from base yr	CO_2-e (metric tons)	% change from base yr	CO_2-e (metric tons)	% change from base yr
Total U.S. Emissions	--	--	--	--	--	--	--	--
Total Non-U.S. Emissions	--	--	--	--	--	--	--	--
Total Absolute Emissions	--	--	--	--	--	--	--	--
	0	0	0	% change from base yr	0	% change from base yr	0	% change from base yr
Total U.S. Normalization Factor Value				--		--		--
Total Non-U.S. Normalization Factor Value				--		--		--
Total Normalization Factor Value	--	--	--	--	--	--	--	--
	CO_2-e / NF Units	CO_2-e / NF Units	CO_2-e / NF Units	% change from base yr	CO_2-e / NF Units	% change from base yr	CO_2-e / NF Units	% change from base yr
Total U.S. Normalized Emissions	--	--	--	--	--	--	--	--
Total Non-U.S. Normalized Emissions	--	--	--	--	--	--	--	--
Total Normalized Emissions	--	--	--	--	--	--	--	--
Goal Year Normalized Emissions Target								
Total Normalized Reductions from Offsets	--	--	--	N/A	--	N/A	--	N/A
Total Normalized Reductions from Sold Electricity	--	--	--	N/A	--	N/A	--	N/A

11.6%

Examples of Voluntary Partnerships-Climate Leaders Progress Report: GM North America



GMNA emissions of CO_2 in 2003 were 10.00 million metric tons, an 11.7% decrease from 2000 levels. These emissions equate to 74.4% of GM's global CO_2 emissions from 81% of our global facilities

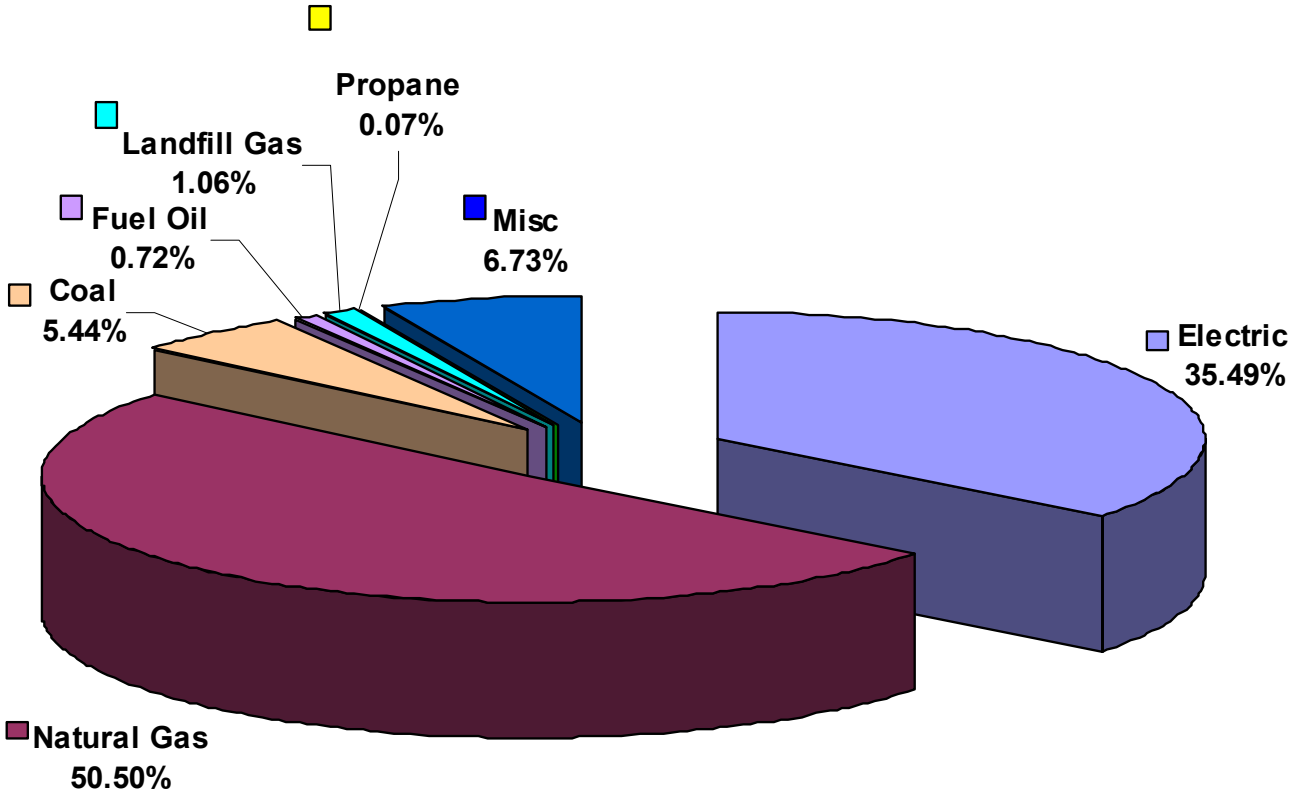
Reaching our Goal: How did we do it? :EPA Energy Star

Energy Star and GM:

- Largest vehicle manufacturer
- Manufacture in 32 countries
- Vehicles sold in 192 countries
- Employees – 325,000 worldwide
- Energy Star – Partner of the year 2002
- Energy Star – 2004: Sustained excellence in energy management

Examples of Voluntary Partnerships

GM North America (NA) – 2003 Energy Consumption by Fuel



Examples of Voluntary Partnerships

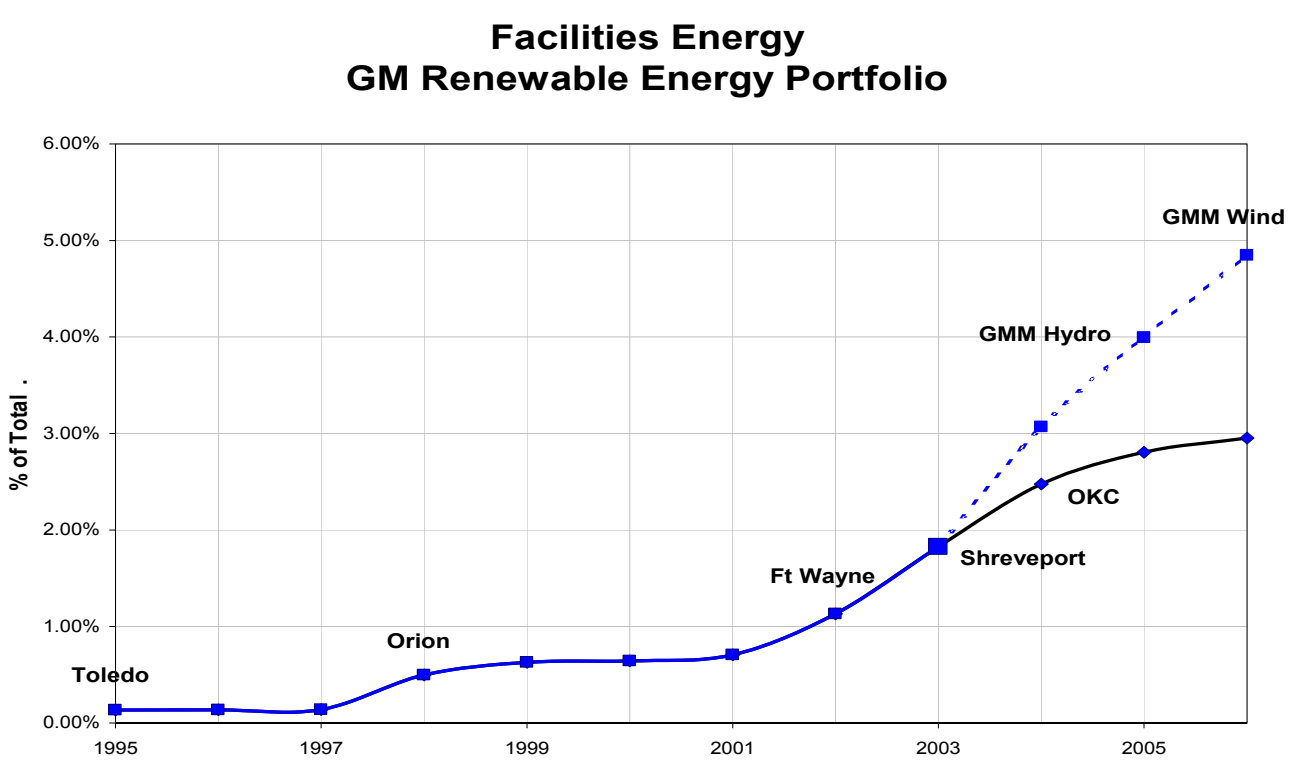
GM North America Energy Cost Savings Performance

Jan 2000	Sept 2004
103.4 Trillion BTUs	82.4 Trillion BTUs

Current Average Rate: $8.67 /MMBTU

Savings: $182 Million/ Year

Energy Star Example:



GM is increasing the component of renewable energy in its energy portfolio. Currently 1.5 Trillion BTU of GM's energy requirements are met by renewable energy.

GM is the largest industrial user of landfill gas for Thermal Energy in the United States.

Reaching our Goal: How did we do it? EPA WasteWise

- U.S. facilities - Partners since March 1994
- Since 1994, we've recycled…
  - 40 thousand tons of plastics
  - 306 thousand tons of wood
  - 437 thousand tons of paper
  - 14.4 million tons of metals
- In just the past 2 years, we've reduced the amount of waste generated annually by…
  - 100 thousand tons

WasteWise Example:

2003 WasteWise Climate Profile: General Motors Corporation

Greenhouse gases (GHGs) are emitted at nearly every stage of a product's life cycle, including during waste management. How we choose to manage this waste has significant implications for GHG emissions. Alternative waste management practices, such as waste prevention and recycling, can result in significant reductions in GHG emissions.

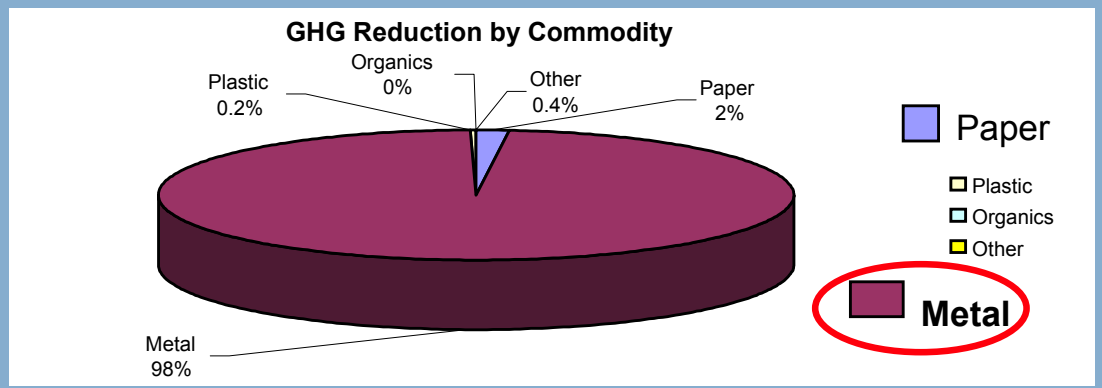
This profile describes the GHG emission reductions achieved as a result of recycling and waste prevention activities. Please note that these calculations use CO2 equivalents rather than carbon equivalents as the baseline emissions generated by landfilling waste. Emission reductions represent the difference between this baseline and the GHG emissions resulting from alternative waste management practices.

GHG Reduction Summary

Waste Management Activity	*GHG Emission Reductions (MTCO2E)*	*Approximately equal to:*		
		The annual emissions from the use of central air conditioning in households	*The annual carbon dioxide stored by this many acres of established, rapidly growing trees*	*The annual emissions from the power consumption in households*
Waste Prevention	103,657	134	849.99	13,475
Recycling	4,839,256	6,243	39,681.90	629,103
TOTAL	4,942,912	6,376	40,531.88	642,579

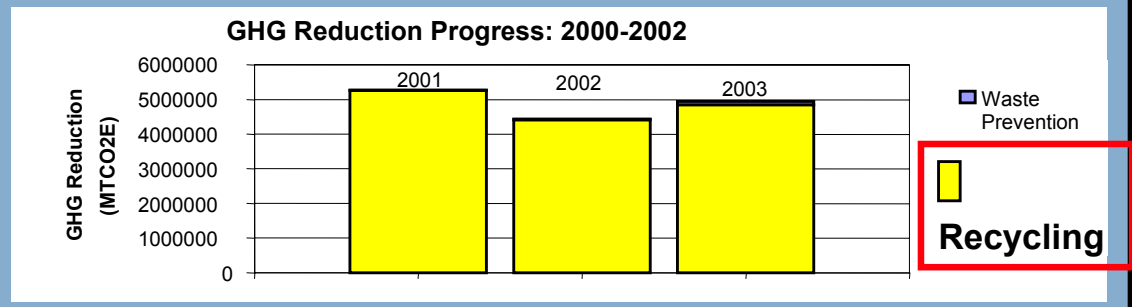
GHG Reduction by Commodity

Commodity	*GHG Reductions (MTCO2E)*	*Percent of Total*
Paper	75,899	1.5%
Metal	4,852,078	98.2%
Plastic	14,861	0.3%
Organics	0	0.0%
Other	75	0.0%
TOTAL	4,942,912	100.0%



GHG Reduction Progress: 2000-2003

Waste Management Activity	*2001*	*2002*	*2003*
	GHG Reductions (MTCO2E)		
Waste Prevention	8,972	19,289	103,657
Recycling	5,264,905	4,413,361	4,839,256
TOTAL	5,273,877	4,432,650	4,942,912



Climate Change

CASE STUDIES

EPA WASTE WISE
Preserving Resources, Preventing Waste

General Motors—Reducing Its Environmental Footprint

Maintaining its position as the world's largest automotive manufacturer is no small task for WasteWise partner General Motors (GM). One way the company demonstrates its leadership is by decreasing its environmental footprint through waste reduction efforts. For years, GM has worked hard to improve its waste reduction efforts and continues to learn and implement new initiatives in waste prevention and recycling. Through its participation in the U.S. Environmental Protection Agency's (EPA's) WasteWise program, GM continues to learn that every bit of waste reduced decreases greenhouse gas (GHG) emissions from its facilities.

> "GM strongly supports these types of voluntary initiatives. It is partnerships like WasteWise that allow us to produce considerable results in reducing greenhouse gas emissions while continuing our waste reduction efforts."
>
> —Elizabeth A. Lowery, GM Vice President, Environment and Energy

Every stage of a product's life cycle—extraction, manufacturing, distribution, use, and disposal—contributes to the concentration of GHGs in the Earth's atmosphere, and GM considers all of these phases when investigating ways to decrease its burden on the environment. The company's activities are based on two main goals: 1) to reduce GHG emissions and 2) to prevent waste and increase recycling, which also tend to further GHG emissions reductions. Through WasteWise and another prominent EPA voluntary program—Climate Leaders—GM is decreasing its facilities' GHG emissions through waste reduction and other means.

As part of GM's efforts to prevent waste, increase recycling, and reduce GHG emissions, GM continuously tracks and analyzes its activities. GM calculates that it has decreased its generation of wastes targeted by the WasteWise program by 35 percent (including a 54 percent drop in non-recyclable material disposal) between 1998 to 2002. According to EPA's WAste Reduction Model, also known as WARM—a tool that allows

(Continued on back page)

Examples of Voluntary Partnerships – Global REACH

- DOE 1605b: GHG Reporting Guidelines/Registry
- DOE Climate VISION (started in 2003)
- The Business Roundtable (BRT) Climate RESOLVE (started in 2003)
- US Climate Partnership Association
- EPA Climate Leaders (started in 2002)
- EPA Combined Heat and Power Partnership
- World Resources Institute Green Power Market Development

- EPA Energy Star
- EPA WasteWise
- EPA Green Power Partnership
- EPA Landfill Methane Outreach
- EPA Best Workplaces for Commuters
- EPA Suppliers Partnership for the Environment (SP)
- Great Lakes Renewable Energy Association

Other Global Activities

- Canadian Voluntary Challenge Registry
- UK - Vauxhall Motors
- Australian Greenhouse Gas Challenge

Example:
Rebuild America Program

An Innovative Approach to Leveraging Philanthropic Giving

Greenhouse Gas (GHG) Footprint
Fairview Elementary School

815 N. Fairview
Lansing, 48912
Tara Fry, Principal

ENERGY ANALYSIS (2002)*

Total Sq. ft.: 28, 368

Energy Source	UNITS	MBTU	Cost/Unit	Cost
NATURAL GAS (MCF)*	2.71	0.27	$0.468	$13,04 9.34
LIQUID WASTE (GALS)	334,000	0.042	$9.128	$3,052.25
WATER CONSERVED(GALS)**	2,100			
ELECTRICITY (KWH)	121,202	413.66	$0.073	$8,793.22

Total Energy Cost for the Building $24,894.81

* *All data used from 2001 -2002, Lansing School District*

** *Water data from Granger Recycling Center Environmental Report for 2003*

RECYCLING/REUSE INITIATIVES (2002)

Recycling data from Granger Recycling Center Environmental Report for 2003

Category	Office Paper	White Ledger	Newspaper	Magazines	Card board	Baled Cardboard
Metric Tons	0.27					

CO2 SUMMARY REPORT

CO2 Emissions (2002)	Direct	Indirect (purchased electricity)	Recycling/ Reuse (metric tons CO2 reduced)	Total (metric tons CO2)
Fairview Elementary	4,258	87	(1.29)	4,345

Opportunities for Energy Efficiency Improvements

Proposed Improvements	Description	Projected Energy Savings	Projected Dollar Savings
Lighting Retrofit	T12 to T8 lighting upgrade		
HVAC/Boiler EMS	Implement HVAC/Boiler EMS		
New Boiler	New -smaller package boiler with adjustable outside air settings		
New Windows	Install energy efficient windows		
Day/Night Thermostats	Suggested for implementation		

Comments:
Fairview Elementary School has a supportive parent group that would like to have Energy Efficiency Improvements performed.

Reporting:

DOE 1605b

- Two-Tiered System
  - Report
  - Register

- Large Emitters
- Small Emitters

Registered Reductions

GM's Response

FIGURE 1
VOLUNTARY REPORTING OF GREENHOUSE GASES
REPORTING AND REGISTERING EMISSIONS AND EMISSIONS REDUCTIONS

All Reports.

All voluntary reporting entities provide:

1. Baseline Entity Statement (ES) fully documenting operational boundaries on the basis of: **§ 300.5**
   - Legal structure, managerial structure, and financial structure; **§ 300.4(a)(1)**
   - Examines ownership and control of leased and partially owned facilities; **§ 300.5(a)(6)**
   - Confers with other entities to ensure no double-counting; and **§ 300.5(a)(6)**
   - Statement of changes to the entity statement for each reporting year. **§ 300.5(c)**
2. Certification statement indicating: **§ 300.10**
   - Report is accurate and complete on the basis of the ES and consistent with all prior year reports;
   - All information reported follows the calculation methods described in the revised General and Technical Guidelines;
   - Verifiable records will be kept for a minimum of 3 years; and
   - Report was/was not independently verified.

All reports must describe emissions, sequestration, and reductions using the calculation methods described in the revised General and Technical Guidelines.

All emissions reductions and removals must have occurred after December 31, 1990. **§ 300.9(a)**

EIA accepts the report (**reported reductions**).

Registration

To register reductions, entities must demonstrate that the emissions reductions and removals occurred after December 31, 2002. **§ 300.7(b)**

Large emitters (average annual emissions of more than 10,000 tons CO_2 equivalent) must provide:

- Entity-wide Emissions Inventories of:
  - Direct emissions; **§ 300.6(b)**
  - Indirect emissions associated with purchased energy; **§ 300.6(c)**
  - Sequestration; **§ 300.6(d)**
  - Describe de minimis emissions excluded from emission & sequestration inventories; **§ 300.6(e)**
- Calculate net entity-wide reductions on the basis of all changes in an entity's emissions, avoided emissions and sequestration, plus any emission offsets. **§ 300.7**

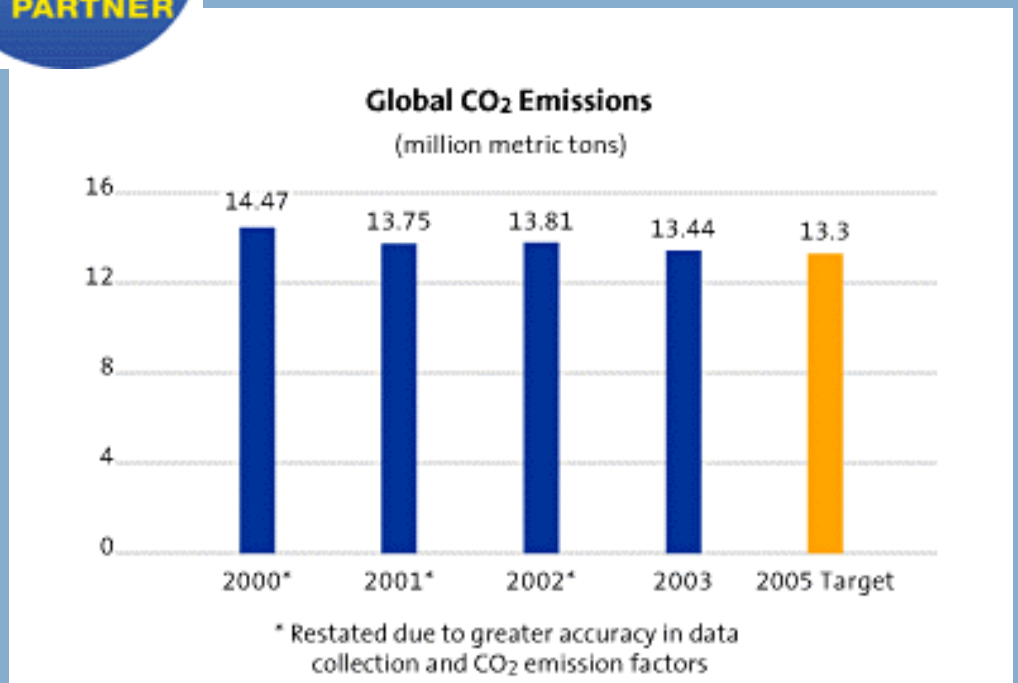
Small emitters (average annual emissions of less than 10,000 tons CO_2 equivalent) must provide:

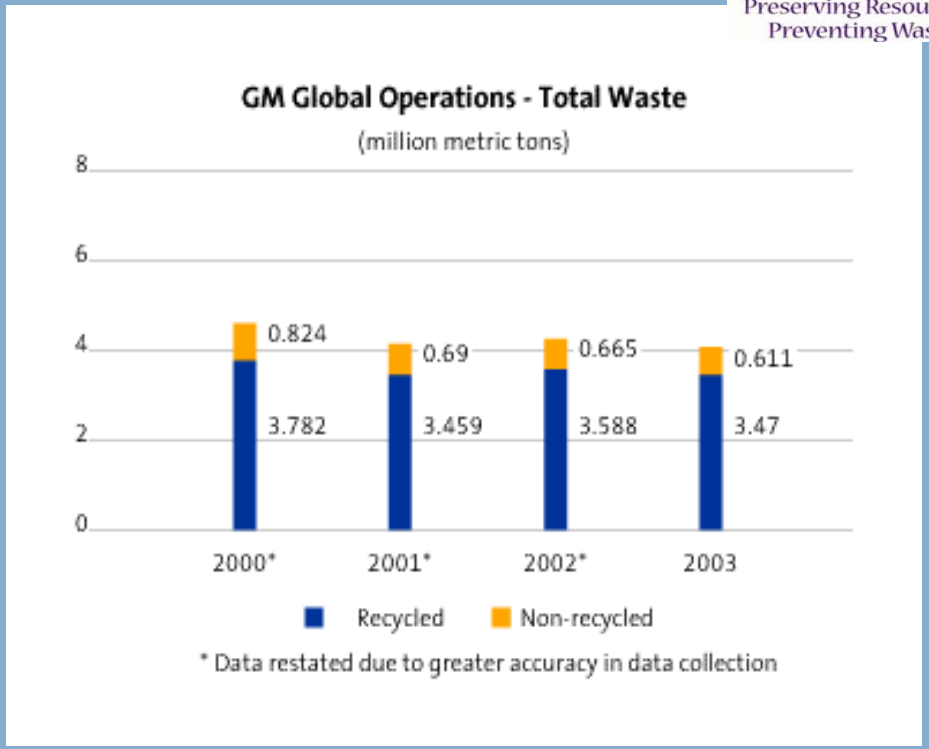
- A complete assessment of annual emissions and sequestration associated with the type of activity(ies) being reported;
- Determine the associated reductions; and
- Certify that the reductions reported were not caused by actions likely to cause increases in emissions elsewhere within the entity. **§ 300.7(b)**

EIA accepts the report and registers the eligible emission reductions (**registered reductions**).

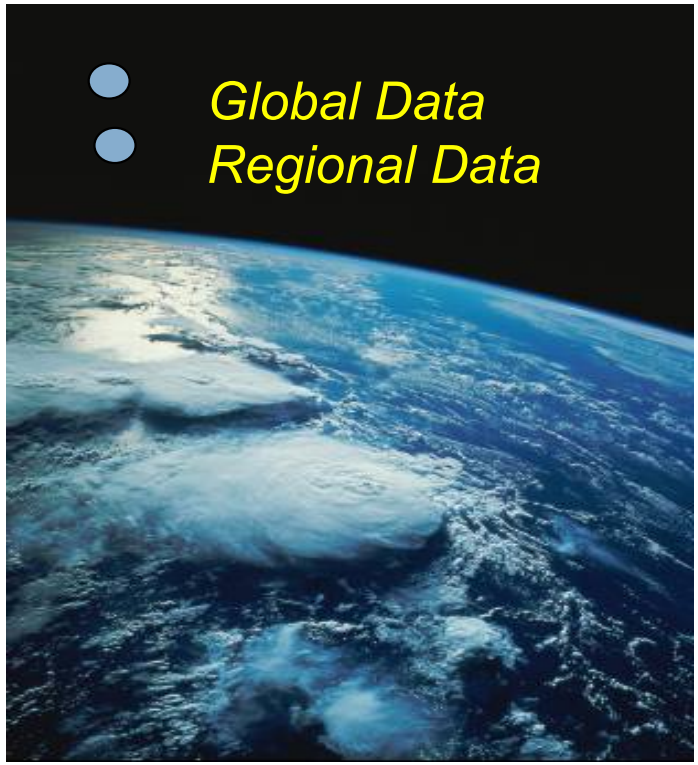
Results: *Energy and Environment*

Local Action – Global Progress





GM's 2004 Globally Integrated Corporate Responsibility Report: *One Company – One Voice*



www.gmresponsibility.com

The 2004 report leads with GM's global activity and allows the user to search areas of interest within a GM region and/or GRI indicator

- Our Message
- Performance at a Glance
- Our Company
- Our Products
- Environmental Performance
- Economic Performance
- Social Performance

Globally Managing Greenhouse Gas Emissions

"A Systems Approach"

Summary

- GHG Management Globally starts Locally
  - Monitor and Collect GHG Data
  - Determine Baseline Emissions and Reductions
  - Set both Internal and Public Targets
  - Measure Performance Against Targets

A closed loop