

**Action Plan Update
for
Manufacturing and
Assembly Facilities**

prepared for

**Canada's Climate Change
Voluntary Challenge and Registry**

prepared by

General Motors of Canada Limited
Environmental Activities
1908 Colonel Sam Drive
Oshawa, Ontario

October 31, 2002



General Motors Environmental Principles

As a responsible corporate citizen, General Motors is dedicated to protecting human health, natural resources and the global environment. This dedication reaches further than compliance with the law to encompass the integration of sound environmental practices into our business decisions.

The following environmental principles provide guidance to General Motors personnel worldwide in the conduct of their daily business practices:

1. We are committed to actions to restore and preserve the environment.
2. We are committed to reducing waste and pollutants, conserving resources and recycling materials at every stage of the product life cycle.
3. We will continue to participate actively in educating the public regarding environmental conservation.
4. We will pursue vigorously the development and implementation of technologies for minimizing pollutant emissions.
5. We will continue to work with all governmental entities for the development of technically sound and financially responsible environmental regulations.
6. We will continually assess the impact of our plants and products on the environment and the communities in which we live and operate with a goal of continuous improvement.



General Motors of Canada Limited

President and General Manager

October 31, 2002

Mr. Bob Flemington, P. Eng.
Canada's Climate Change Voluntary Challenge and Registry Inc.
170 Laurier Avenue West, Suite 600
Ottawa, Ontario
K1P 5V5

Dear Mr. Flemington:

General Motors of Canada Limited (GMCL) is proud of our environmental performance and on this basis submits its seventh update to the Voluntary Challenge and Registry Inc. (VCR). At GMCL, we have a serious commitment to "deeds, not words" when it comes to continuous improvement of environmental performance in all aspects of our facilities, products and services.

Further to GMCL's original letter of intent and the submission of our Action Plan dated November 1995, I would like to reiterate GMCL's strong support of the VCR's objectives and the voluntary approach to seeking reductions in GHG emissions. In addition to our original letter of intent and Action Plan, GMCL has submitted an annual update in 1996, 1997, 1998, 1999, 2000 and 2001. Our consistent and regular reporting record confirms our commitment to tracking and reducing our GHG emissions.

With the commitment, creativity and innovation of our employees, GMCL has significantly reduced our emissions of CO₂. From 1990 through 2001, GMCL's overall emissions of CO₂ from manufacturing facilities have been reduced by 37%. This achievement is based on the corporation's ongoing focus on the need to conserve energy in order to reduce environmental impact and reduce costs. This focus has led to the implementation of many large and small energy conservation projects as well as the review and incorporation of energy efficient technologies in our processes. We encourage all employees to find ways to implement the GM Environmental Principles in their daily responsibilities.

Our plan is to continue to reduce energy consumption compared to 1995 as a base year by at least 25% by 2005. This builds on our previous target of a 20% reduction by 2002, which we are on track to meet. The highly competitive and global nature of the automobile industry prevents us from publishing details of the specific methods we plan to use to achieve these continuing reductions.

Facility emissions are correlated with production levels. We are continuing to pursue new and additional production opportunities for a number of our facilities. If possible we will endeavour to undertake these new opportunities without increasing total CO₂ emissions. However, if production volumes increase more rapidly than our ability to achieve offsetting energy savings then total energy consumption and GHG emissions will increase. Factors affecting our production plans include consumer demand for automobiles, consumer preference (i.e. between makes, models, size and optional equipment content), and competition between facilities for product allocation. GMCL is striving for continuous improvement in the environmental performance of our facilities.

GMCL continues its commitment to the VCR with the submission of our 2001 update. In 2001, we were very proud to be recognized by VCR with the "Leadership Award for the Automotive Manufacturing Sector" as well as our continued "Gold Champion Level Reporter" status. In order to achieve success and assist industry in finding cost-effective ways to reduce our impact on the environment, voluntary initiatives need substantial participation and we hope that other companies will take up the challenge offered by the VCR.

Sincerely,

A handwritten signature in black ink that reads "Michael A. Grimaldi". The signature is written in a cursive, flowing style.

Michael A. Grimaldi

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Introduction

GM has made the goal of reducing the environmental impacts of its products and processes a top priority. General Motors of Canada Limited (GMCL) recognizes Canada's international commitments related to climate change. In order to meet these goals, significant changes in the behavioural and consumptive patterns of all Canadians will be necessary. GMCL continues to be committed to the voluntary approach since it will encourage us to explore new and innovative technologies and assist in bringing them to our operations and to the customer in the most cost effective manner.

This submission is GMCL's seventh update to the VCR and highlights our progress in reducing greenhouse gas emissions from our facilities. As part of the report, we have shared a number of energy efficiency and conservation initiatives we have undertaken to help reduce emissions from our operations. In addition to energy efficiency and conservation projects GMCL has realized efficiencies through rationalization of production over this time period. While producing more vehicles today than in 1990, there are fewer plants in operation, which inherently lends to additional energy efficiencies. Significant progress has been achieved to date as can be seen in Figure 1 and Table 1.

Figure 1: CO₂ Generation Including CO₂ Generated From Electricity Consumed

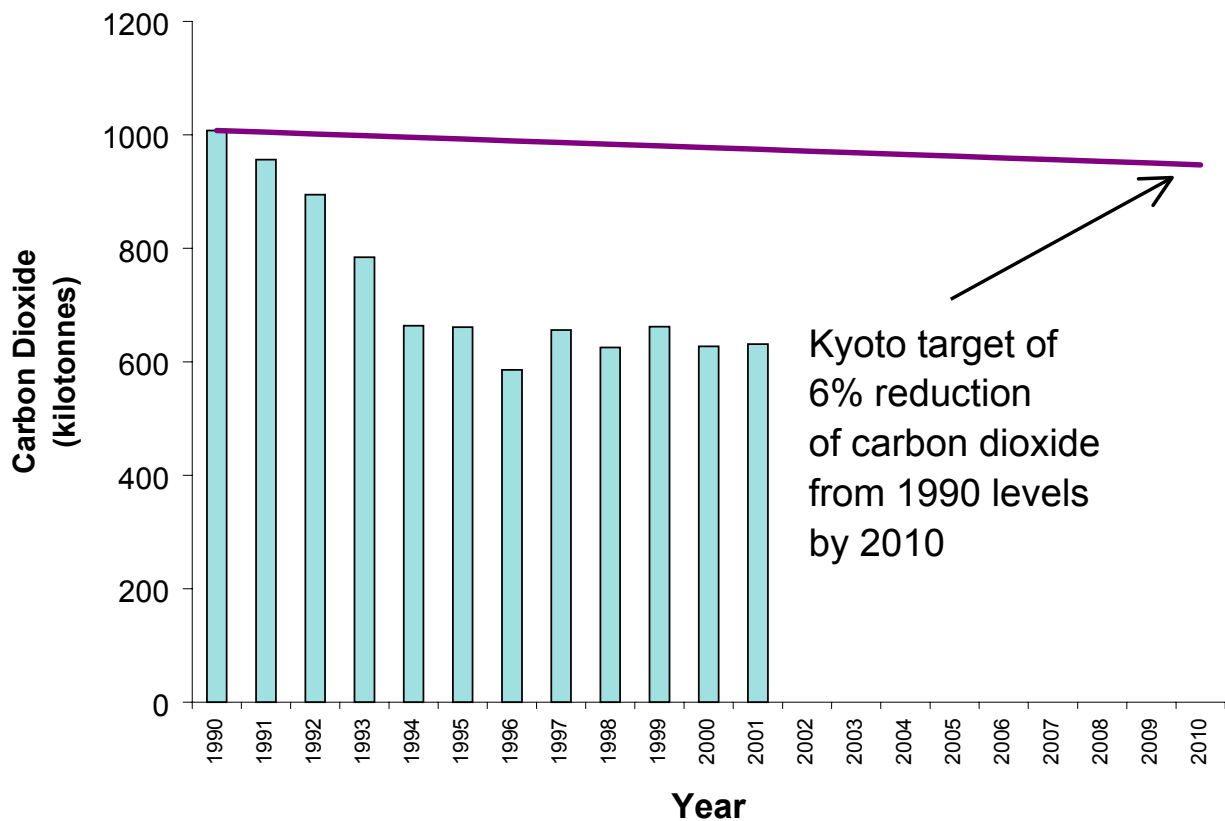


Table 1: CO₂ Generation for GMCL Manufacturing Facilities (kilotonnes)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
On-site Generation	733	678	645	664	547	543	464	489	410	425	449	365
Including Electricity	1008	956	895	784	663	661	586	656	625	662	627	631

For the period 1990 to 2001:

- Total energy consumption has been reduced by 41%
- Energy intensity normalized to vehicle production has been reduced by 34% for car assembly and by 25% for truck assembly
- CO₂ emissions associated with GMCL energy consumption have decreased 37% over the period 1990 through 2001 and 50% if CO₂ from purchased electricity is not factored into the total.
- Energy efficiency initiatives have saved 534 million kWh and avoided 239 kilotonnes of CO₂ emissions.

The automotive industry and GMCL specifically have made great strides in reducing greenhouse gas emissions from our products and our facilities and we are committed to seeking further reductions. GMCL has a clear and consistent track record of disclosing greenhouse gas emissions performance from our facilities and the story has been one of clear and consistent reductions. We believe this report will provide sufficient information to the VCR for GMCL to remain a “Gold Champion Level Reporter”.

Organization Profile and Performance

General Motors of Canada Limited (GMCL) is Canada's largest industrial manufacturer of passenger cars, light trucks, locomotives and automobile components. GMCL is the country's largest exporter with a workforce of 26,000 employees operating vehicle assembly and component fabrication plants, as well as parts distribution, sales and service centers. Today, GMCL has the capacity to manufacture more than one million units annually, exporting 85% of this production primarily to the United States. Total vehicle assembly production for the 2001 calendar year was 830,485 cars and light duty trucks.

Manufacturing Operations

Oshawa, Ontario

Car Assembly Plant 1 & 2 – Chevrolet Impala sedans, Monte Carlo coupes, Buick Century and Regal sedans. The Plant will soon add Pontiac Grand Prix production. Plant 1 operates on 3 shifts.

Truck Assembly Plant – GMC and Chevrolet extended cab version of the full-size, four-door, two-wheel and four-wheel drive light duty pickup trucks. The Plant operates on 3 shifts.

Other Manufacturing Plants – Batteries, suspension components, exterior sheet metal stampings

Ste. Thérèse, Quebec

Car Assembly Plant – Chevrolet Camaro coupes and convertibles; Pontiac Firebird, coupes and convertibles.

Due to overcapacity, this facility was closed in August 2002.

St. Catharines, Ontario

Engine Plant – 4.9L, 5.3L and 5.7L aluminum GEN III V-8 engines and various engine components. The Plant will soon add a new V-6 engine.

Components Plant – Transmission final drive and differential assemblies, rear axles, front suspensions, brake and drum assemblies and components

Windsor, Ontario

Transmission Plant – Four-speed electronic, front-wheel drive automatic transmissions, components for other corporate transmissions.

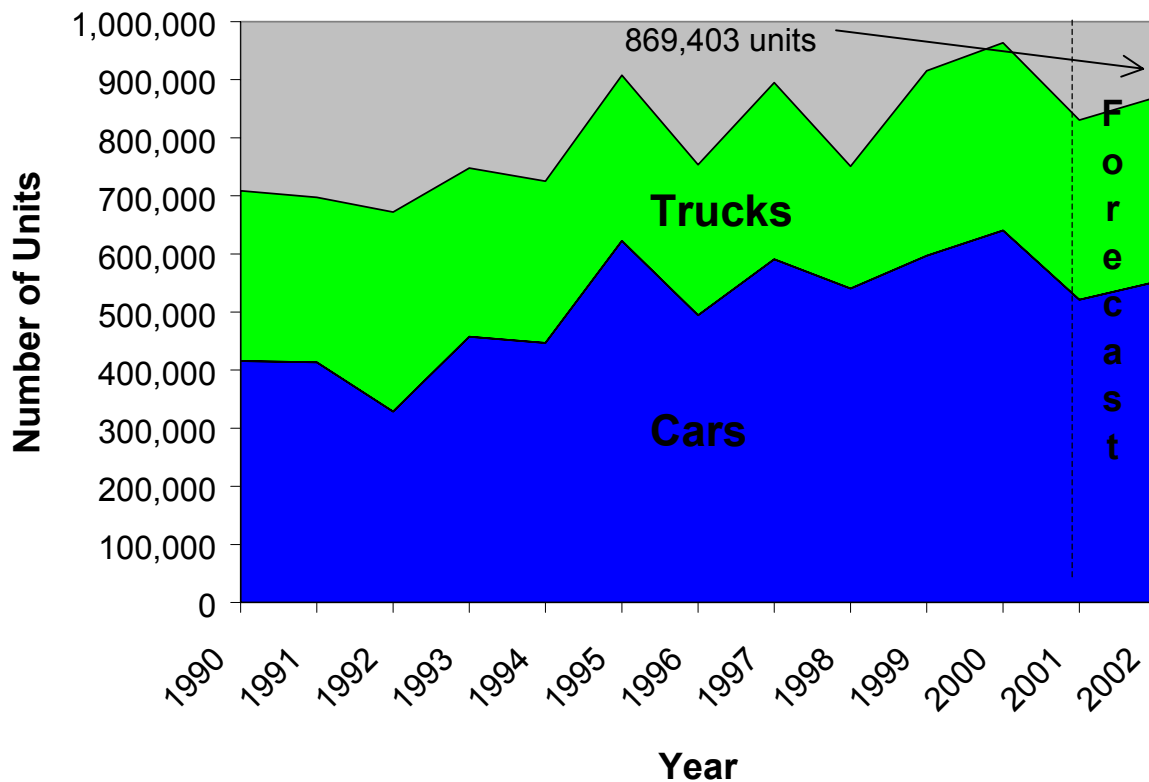
London, Ontario

London Operation – Diesel locomotives and light armoured vehicles (LAVs)

Vehicle Assembly Production

Vehicle assembly data given in Figure 2 reflect the production in Car and Truck Assembly Centres in Oshawa, Ontario and Ste. Thérèse, Quebec. Annual vehicle production has increased 17% over the 1990 through 2001 period. Production levels are a function of many factors including market conditions, work stoppages, downtime for reinvestment, and model changeover.

Figure 2: Vehicle Assembly Production



Energy Consumption and CO₂ Generation Normalized to Vehicles Produced

In 2001, automotive assembly operations accounted for 69% of GMCL's energy consumption. How these operations perform on a consumption per unit basis is an essential indicator of our overall energy consumption and CO₂ generation performance. The energy consumption per vehicle dropped by 34% for car assembly operations and by 25% for truck assembly, for the period 1990 through 2001. The CO₂ production per vehicle dropped by 29% for car assembly operations and by 16% for truck assembly, for the period 1990 through 2001. Detailed information is given in Table 2.

Figure 3 shows the kilograms of CO₂ produced per vehicle for assembly operations and the equation of a linear trend line (year 1 = 1990). The fitted line slope indicates a

consistent performance of over 2.4% per year reduction from baseline of CO₂ intensity per vehicle.

Figure 3: CO₂ Generation at Assembly Plants Normalized to Production

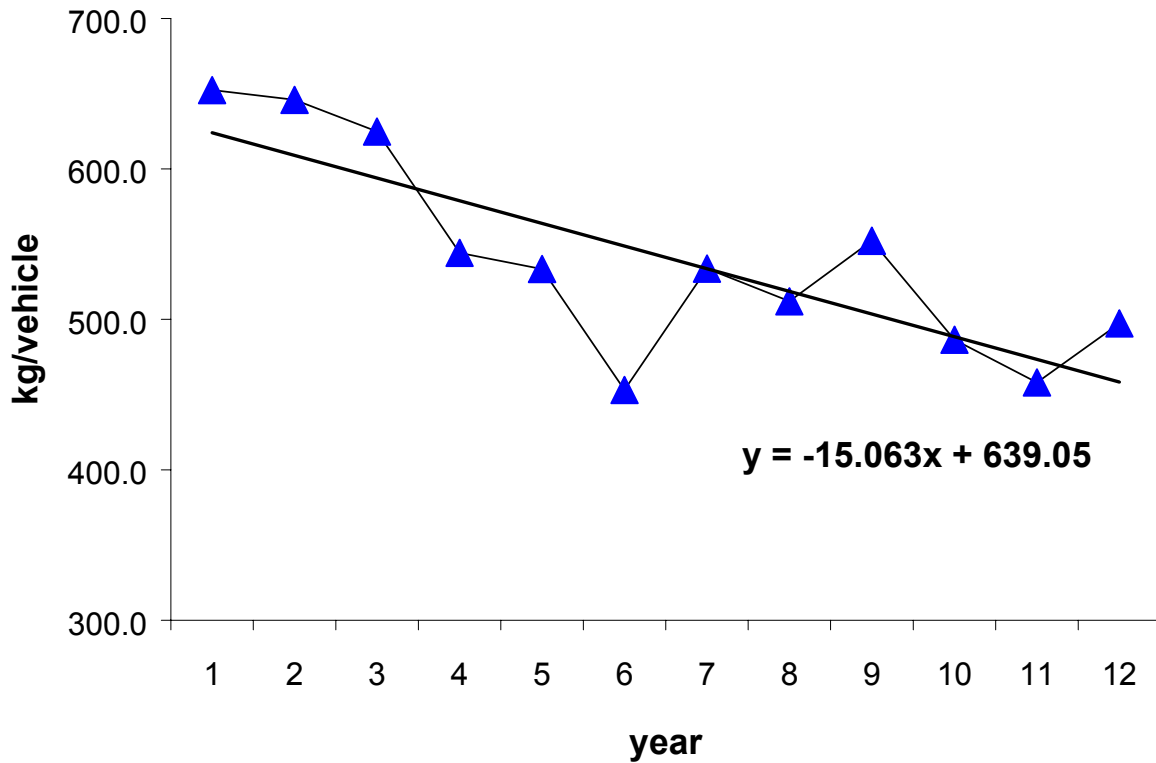


Table 2: Energy and CO₂ Intensity per Vehicle Produced - Automotive Assembly

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Vehicles (thousands)	709	697	672	748	725	908	753	895	751	915	963	830
Energy Consumption (GWh)	2,427	2,312	2,240	2,344	2,306	2,425	2,254	2,471	2,109	2,284	2,354	1975
Normalized Energy Consumption (MWh/vehicle)	3.43	3.31	3.33	3.13	3.18	2.67	2.99	2.76	2.81	2.49	2.44	2.38
CO ₂ Emissions (kilotonnes)	462	450	420	407	387	411	402	458	415	445	441	413

Normalized CO ₂ Emissions (kg/vehicle)	652	646	625	544	533	453	534	512	552	484	458	497
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Practices and Performance

Voluntary Approaches to Environmental Protection

GMCL believes that greenhouse gas reductions can be achieved by encouraging a gradual shift in behavioural patterns and economic activities to less greenhouse gas emitting pursuits. This can be done most efficiently and with the lowest cost to the Canadian economy and society first by pursuing voluntary approaches and second by broad-based market driven measures. Command and control measures should be undertaken only where there is overwhelming evidence that they are required and where voluntary approaches and economic instruments have been attempted but have failed to yield the necessary reductions in greenhouse gas emissions. We strongly support the voluntary approach and believe it must be the cornerstone of Canada's response to the climate change issue. We view the Voluntary Challenge and Registry Inc. (VCR) as a key element in Canada's response to the international climate change challenge. GMCL has also been an active participant in the Champions in Action activity.

GM Environmental Management System/ISO 14000

GM has recognized the significant value of a structured environment management system (EMS). GM is integrating its, multiple, independently applied management systems into a common system that is applicable globally.

GM has defined its global EMS model for its facilities around the International Organization of Standardization (ISO) standard 14001, an environmental management system comprised of seventeen elements which require an organization to develop policies and procedures to manage its processes, products, and services that interact with the environment. These elements provide a common framework and specification for GM units to understand how their activities interact with the environment and to improve management of these activities in an ongoing cycle. This corporate EMS will enable GM to move more efficiently in implementing the GM Environmental Principles.

The management of energy is a part of this EMS and elements of this process have been the framework for our GM Canada energy management operations since the early 1990's. All of GMCL's Ontario manufacturing sites had their environmental management programs third-party certified to be in conformance with the ISO14001 Standard for Environmental Management Systems by December 2001. The facilities continue to improve their EMS and maintain their certification with regular third-party surveillance audits.

General Motors of Canada Limited Environmental Policy

As a responsible corporate citizen, General Motors of Canada (GMCL) is dedicated to protecting human health, natural resources and the local and global environment, in accordance with the Environmental Principles of General Motors Corporation. This dedication reaches further than compliance with the law to encompass the integration of sound environmental practices into our business decisions. This policy is based on the integration of risk-based, cost effective management practices into site activities with the aim of continually improving environmental performance.

GMCL is committed to assess the environmental impacts of its activities, products or services as a basis for its environmental management programs and to reduce wherever practicable these impacts through the establishment of appropriate objectives and targets.

In particular, GMCL will strive to achieve the following objectives through continued execution of our Environmental Management System:

1. Comply with all applicable environmental laws and regulations, and other requirements.
2. Assign management responsibility for the environment in all areas of our facilities and ensure that all employees are aware of their individual responsibilities for acting in accordance with this policy, while providing effective information and training to encourage individuals to contribute effectively.
3. Practice effective prevention of pollution by seeking practicable ways to reduce energy and water consumption, and reducing discharges to air, water and land.
4. Maintain communications with our local community, legislators, regulators and other organizations with an interest in our environmental performance.

In accordance with our Environmental Management System (EMS) requirements, we will regularly review environmental performance and our facilities' objectives and targets to assess progress toward continual improvement. This policy statement will be periodically reviewed to ensure its continuing suitability, be available to the public and communicated to all GMCL employees.



Michael A. Grimaldi
President
General Motors of Canada Ltd.

Energy Use in Our Facilities

Energy use in our manufacturing, testing and office facilities is a function of a number of factors: the capacity utilization of each facility; the age and efficiency of the facility and equipment, weather conditions, etc. GMCL facilities throughout Canada primarily utilize the following forms of energy: natural gas, coal, fuel oil and electricity.

CO₂ is the only greenhouse gas generated in significant quantities by our stationary sources and emissions are shown in Figure 1. CH₄ and N₂O emissions are not significant. This report covers energy consumption and GHG emissions from GMCL manufacturing facilities located throughout Ontario and Québec, excluding GMCL's joint venture, CAMI Automotive, in Ingersoll, Ontario.

Monitoring GMCL's energy usage is not a new activity. GMCL has set energy reduction targets for our operations since 1974. Each Canadian facility has an energy co-ordinator assigned to review the facility's energy usage and conservation planning. These Canadian co-ordinators meet to review progress and share best practices at an annual Energy Efficiency Conference. The conference lasts for two days and the minutes from the conference are compiled and kept on file for reference by employees with energy management responsibility. The "Manager of Energy Services and Supply" oversees GMCL's energy usage and programs.

GMCL is a participating member of the Canadian Industry Program for Energy Conservation, CIPEC, and we work closely with our industrial sector in promoting energy conservation. We have hosted energy conferences at our sites to exchange technical information and to share successful energy reduction projects.

Facilities Energy Input by Fuel and Source

The total energy input into facilities by source is broken down in Figure 4. Previous GMCL VCR Updates submitted contain detailed information on all interim years. Table 3 shows the absolute values of these fuel source numbers. GMCL has achieved a 41% reduction in energy consumption from 1990 to 2001.

Figure 4: Facilities Energy Input by Fuel Source

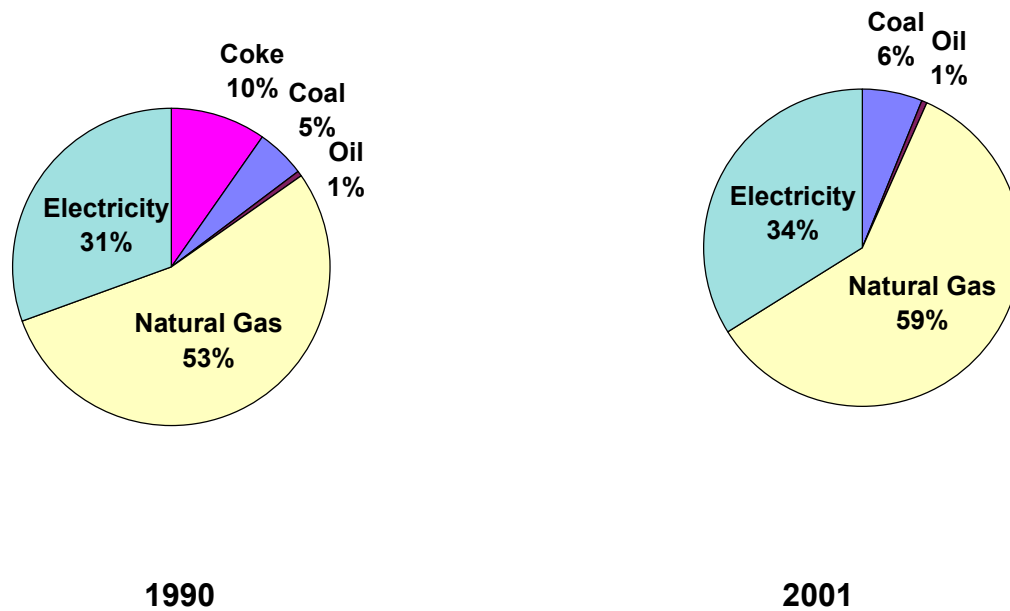


Table 3: Facilities Energy Input by Fuel Source (MWh)

	1990	2001
Natural Gas	2,620,466	1,704,120
Electricity	1,484,233	969,457
Coal	241,174	172,131
Oil	33,873	19,249
Coke	469,445	0
Total	4,849,192	2,864,958

GHG Contribution by Energy Source

The total CO₂ generated by facilities by fuel source is broken down in Figure 5. Table 4 shows the absolute values of these CO₂ numbers. Totals for CO₂ generation for interim years are shown in Figure 1. GMCL has achieved a 37% reduction in CO₂ generated from 1990 to 2001. The CO₂ generation over the period takes into account changes in the mix in source generation of electrical power of supplied electricity from Ontario Power Generation.

Figure 5: Facilities CO₂ Generation by Fuel Source

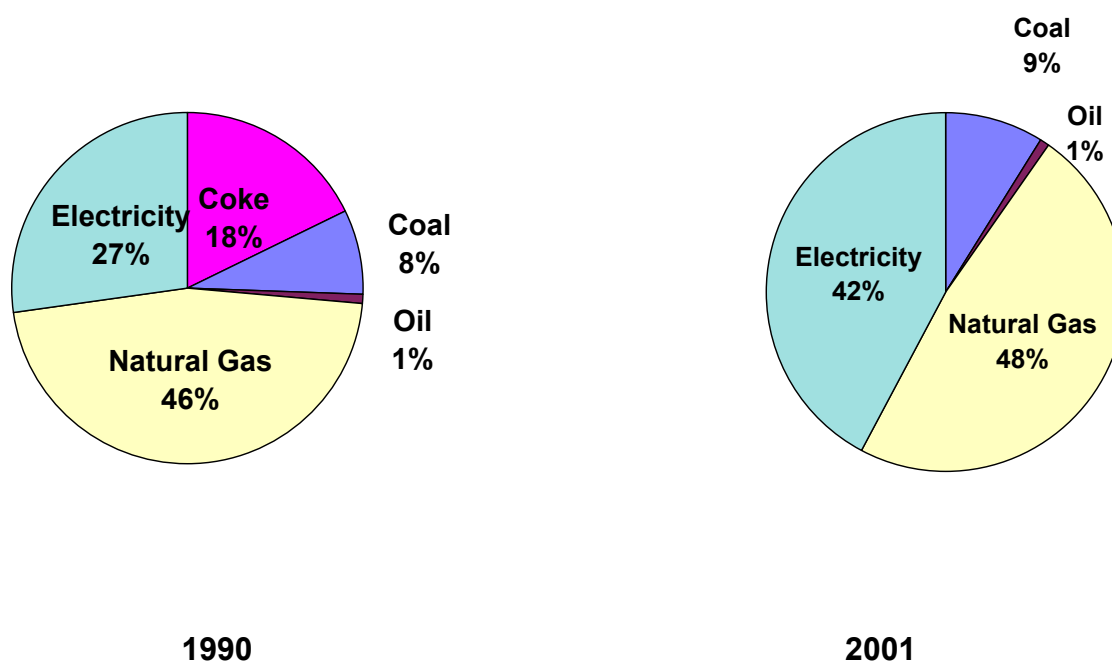


Table 4: Facilities CO₂ Generation Fuel Source (tonnes)

	1990	2001
Natural Gas	466,411	303,313
Electricity	274,445	265,833
Coal	79,507	56,745
Oil	9,384	5,333
Coke	178,010	0
Total	1,007,758	631,225

Key Activities / Projects

Previous GMCL Update Reports contained detailed information on energy saving projects for the eleven year period 1990-2000. This report contains a selection of GMCL's energy savings projects for 2001 in Table 5. The energy savings are from GMCL manufacturing facilities located throughout Ontario and Québec, including GMCL's joint venture, CAMI Automotive, in Ingersoll, Ontario. Electrical energy savings projects shown in this report have included the CAMI operations, because the GMCL Energy Management process accounts for all activities of this nature.

The chart shows energy saved for each project and the total yearly savings. The kWh savings are associated with an efficiency improvement and the introduction of operational controls. ie: computer controlled equipment operations.

Site utility managers and energy coordinators continue to identify numerous other energy savings projects through opportunities in heat recovery, HVAC, and process improvements.

GMCL has also participated from July of 1998 to December 2000 in a joint program with Ontario Power Generation (OPG), and in subsequent years with Enbridge, to underwrite the cost of an energy conservation specialist. The energy conservation specialist conducts surveys of our facilities on a full time basis to assist in identifying opportunities for further energy reductions.

Table 5: Energy Efficiency Projects for 2001

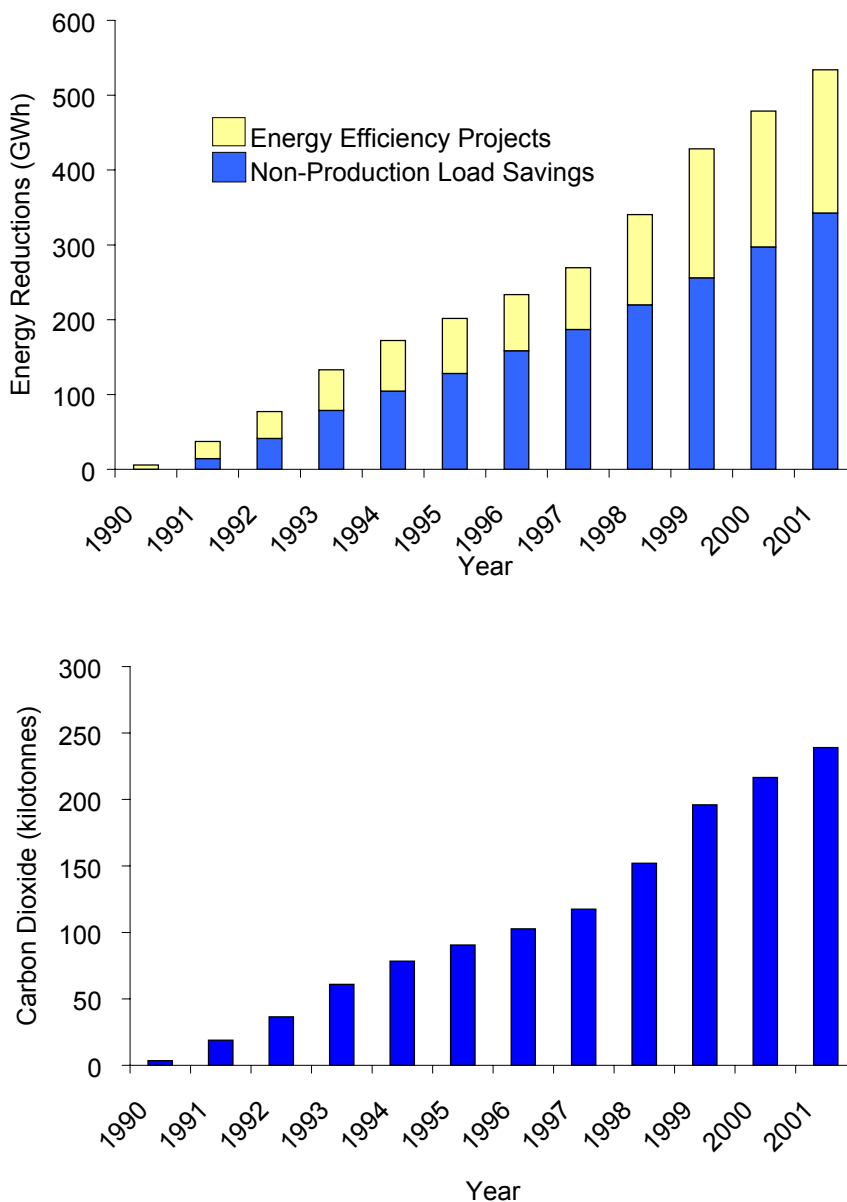
Plant/Project	Energy Saved	Unit/Type	Annual Savings \$
St. Catharines Components Installation of engineered nozzles on air system	301,507	kWh Elec.	\$18,000
St. Catharines Components Implement Sufficiency Plan in Bldg. 3	904,751	kWh Elec.	\$ 54,466
St. Catharines Components Reduce Compressed Air Usage on Bar Machines	398,671	kWh Elec.	\$ 24,000
Windsor Transmission Electric Vibrators	2,900	mcf Comp.Air	\$17,200
Windsor Transmission Dynamometer Lab Oil Coolers	66,300	m ³ Water	\$37,100
Windsor Transmission Auto Off Programming of 3 Types of Equipment	8,048,141	KWh Elec.	\$ 287,200
Windsor Transmission HVAC Seasonal Changeover Set Point Reduction	325,000	m ³ Natural Gas	\$ 65,000
Windsor Transmission Recalibration of HVAC Steam Valves	805,550	m ³ Natural Gas	\$160,500
Windsor Transmission Compressed Air Leak Repair	540,150	Mcf Comp.Air	\$119,000
Oshawa Car Assembly Plant New Powerhouse Condensate Receiver	507,806	KWh Elec.	\$ 20,000
Oshawa Car Assembly Plant Incandescent Light Replacement	9,606	KWh Elec.	\$ 9,610
Oshawa Car Assembly Plant Powerhouse Dearator Vent Reduction	1,104,054	KWh Elec.	\$ 24,000
Oshawa Car Assembly Plant Shutdown several pumps and recirc systems at night.	2,250,865	KWh Elec.	\$ 42, 506
Oshawa Car Assembly Plant Powerhouse Multiport Vent Reduction	6,087,528	KWh Elec.	\$ 139,000

Oshawa Car Assembly Plant Shutdown & Temp Reduce for Steam Heat	2,760,429	KWh Elec.	\$125,000
Oshawa Car Assembly Plant Replace Leaking Airline	52,560	Mcf Comp.Air	\$ 22,600
Totals	<u>Electricity</u> 22,373,358 kWh <u>Water</u> 66,300 cubic meters <u>Comp.Air</u> 595,610 mcf <u>Natural Gas</u> 1,130,550 cubic meters		\$ 1,165,182

Electrical Power Consumption and CO₂ Savings

In addition to the projects given in Table 5, on-going conservation measures in all facilities have reduced the load demand of electricity. Figure 6 shows the savings achieved in the reduction of electrical power consumption due to projects carried out in the plants and energy efficiency initiatives during the period. Figure 6 also shows the corresponding CO₂ emissions avoided for the energy savings achieved. GMCL's electrical energy reduction projects and energy efficiency initiatives over the years have significantly reduced CO₂ emissions.

Figure 6: Cumulative Energy Savings and Cumulative CO₂ Generation Avoided From Non-Production Load Reduction and Energy Efficiency Projects



Target Setting and Projections

Targets

In 1997, GM established aggressive goals for facility resource conservation and pollution prevention with a management objective to work towards a 20% reduction in energy usage with a baseline year of 1995, by the year 2002. This goal has been adjusted to a 25% reduction in energy usage with a baseline year of 1995, by the year 2005.

Energy efficiency is a key element of GM's energy strategy, which includes five distinct areas: rates, conversion, control, conservation and operations. Activities are being targetted to reduce energy usage at each plant, focusing particularly on paint processes. Significant progress is also being made in the design of energy efficient manufacturing and facility systems.

Process for Target Review and Update

Reviews at GMCL track the energy consumption of the sources utilized on a monthly basis. Annual reviews of progress towards and beyond the goals are carried out regularly for corporate and applicable regulatory reporting requirements. The GMCL Board of Directors reviews the progress towards environmental and energy targets on a regular basis. The submittal of the annual VCR report is one tool used in this review process.

Verification

The calculations for this report were done internally and are verifiable against energy invoicing from suppliers. The calculations of greenhouse gas emissions are carried out using publicly available emission factors and are also verifiable. In addition, the on-site external utility specialist is a third party who has regular access to the energy data to make recommendations for potential conservation initiatives.

Offsets

In addition to significant direct reductions in GHG emissions from our manufacturing facilities, GMCL has undertaken initiatives to target opportunities for offset projects. More than 38,000 trees and shrubs have been planted at the McLaughlin Bay Wildlife Reserve in Oshawa, Ontario since 1990. In addition, more than 9,000 trees were planted in 1999 at the Glendale facility in St. Catharines, Ontario. In the final phase of this project, an additional 800 trees were planted at the Glendale site in 2000.

Energy Consumption and GHG Projections.

This report offers a projection for 2005 energy consumption using a logarithmic trendline for the period 2002 to 2005. Energy consumption and fuel source mix for 2002 is projected using year to date actual data. The CO₂ projections for 2002 and 2005 assume the same emission factors as used for 2001 and the 2002 projected fuel source mix. These projections are shown in Tables 6 and 7.

Table 6: Energy Consumption and GHG Emission Projection

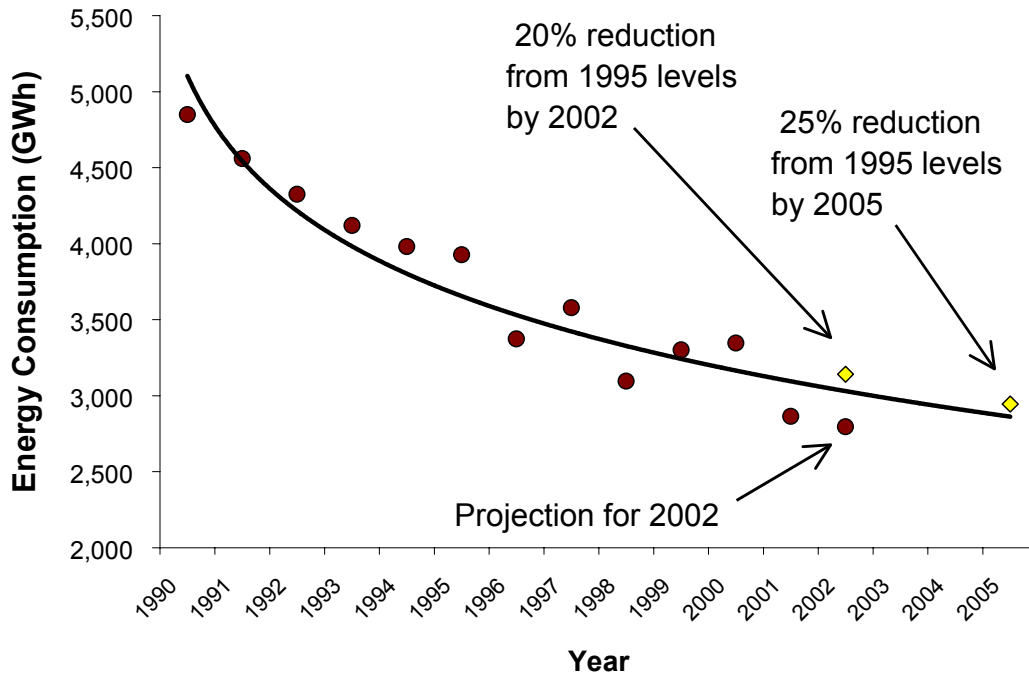
	1990	1995	2001	2002	2005
Energy Consumption (GWh)	4,849	3,927	2,865		
Projection (GWh)				2,800	2,800
Energy Consumption Target (GWh)				3,140	2,950
CO ₂ Emissions (kilotonnes)	1,008	661	631		
Projection (kilotonnes)				631	630

Table 7: CO₂ Emission Projections by Fuel Source (kilotonnes)

	2001	2002	2005
Natural Gas	303	289	288
Electricity	266	270	270
Coal	57	71	71
Oil	5	0.7	0.7
Coke	0	0	
Total Projection	631	631	630

Figure 7 shows GMCL's goals of reducing energy consumption by 20% by 2002 and 25% by 2005 based on a 1995 baseline. The energy use projection for 2002 of 2,800 GWh is shown in the figure. This projection yields a 29% reduction compared to the 1995 base year, while this seems to indicate that GMCL has already met the 2005 target consideration should be given to the fact that 2001 was a low production year as illustrated in Figure 2. A logarithmic trendline has been fit to the data to show the general downward trend. Using this method of projection and considering anticipated increases in production volumes, GMCL will need to maintain its commitment to energy consumption reductions in order to meet the 2005 target of 2,950 GWh.

Figure 7: Energy Consumption at GMCL Facilities



Methodology

Fuel Use and Conversion Factors

Since GMCL facilities do not directly measure CO₂ emissions, emission factors of CO₂ for each form of energy are used. These are given in Table 8 for all reporting years. As respective sources are modifying their emission factors to more accurately account for their operations and GMCL conducts similar activities, previously reported levels may be modified up or down to reflect the new information.

Table 8: Conversion Factors for Fuels Used - All Reporting Years

Fuel	Fuel unit	Fuel unit to energy (fuel unit per MWh)	Energy to GHG (MWh per tonne CO ₂)	Conversion Factor Source
Oil	U.S. gal	41.9	0.277	GMCL Analysis, 1995
Coke	tons	7.82	0.379	Environmental Science & Engineering (Henry & Heinke, 1989)
Coal	tons	8.08	0.330	GMCL Analysis, 1998 & 1999
Natural Gas	cf	0.30	0.178	TransCanada Test Data, 1998
Electricity (Quebec)	MWh	1	0.014	Quebec Hydro 1998 Environmental Performance Review Report

For indirect emissions from electricity, CO₂ generation is calculated based on emission factors for electricity production by the public utilities in Ontario and Quebec. Emission factors provided by Ontario Power Generation (OPG) take into account their emissions reduction and trading practices. OPG's emissions have been capped at 1990 emission levels and so they use emission reduction credits derived from various greenhouse gas reduction projects in North America to achieve the target. The emission rate varies depending on the mix of green power, fossil fuel and nuclear energy used. The 2001 OPG Emission Factor was obtained from their "Towards Sustainable Development 2001 Progress Report", Appendix B. Table 9 gives the emission factors for electricity usage in Ontario used from 1990 to 2001.

Table 9: Emission Factors Provided by OPG to Convert MWh to tonne CO₂

1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
0.198	0.207	0.200	0.143	0.105	0.112	0.136	0.174	0.245	0.245	0.190	0.304

A detailed methodology was provided in GMCL's update report dated October 2000 giving an example template of how energy consumption is reported within GM Canada manufacturing facilities. The methodology in that report identifies the major sources, direct and indirect emissions, emission factors and fuel types. That update report also gives references for the conversion factors used.

In 1997, manufacturing operations in Oshawa and Windsor were sold to other companies that continue to operate them on an ongoing basis. Energy consumption data for these facilities have been removed for all years and this adjusted baseline has been reflected in previous GMCL Update Reports. This year's GMCL Update Report reflects the sale of Delphi Operations in Oshawa, which took place in 1999, and the operations continue to operate under different management. Consistent with previous experiences from the sale of manufacturing operations, energy consumption data for the Oshawa Delphi facilities have been removed for all years.

Since 1990 GMCL has realized efficiencies through the rationalization of production, while producing more vehicles today than in 1990, there are fewer plants in operation, which inherently lends to additional energy efficiencies. These plant closures remain in the GMCL baseline and contribute to the overall greenhouse gas reductions achieved.

Education, Training and Awareness

Our Corporate Response to Climate Change

As a corporation, GM's position indicates our recognition of the need to determine how to operate in ways that promote economic growth and comprehend the needs of the environment and society, without compromising those needs in the future. GM's position is as follows:

Whether emissions from human activity will cause climate change and what the impact will be is still uncertain. GM believes there is enough cause for concern to take moderate cost actions to reduce global greenhouse gas emissions and the risk from potential change. Development of new, cost-effective technologies is the most effective long-term response to address the global climate issue.

GM agrees that the potential consequences of global climate change require responsible actions. The key to acting responsibly is technology development, and GM is committing substantial technical and financial resources to technology development. GM is also taking actions at its facilities and with our suppliers to reduce GHG emissions.

GMCL has undertaken targeted activities in Canada to assist in determining the appropriate response to climate change concerns. The Federal Government launched its National Implementation Strategy consultation in 1998. GMCL, in conjunction with the other auto companies in Canada, took an active role. GMCL representatives sat on the Credit for Early Action table, and sub-groups of both the Industry Table and the Transportation Table. Additionally, the auto industry pooled its resources in order to provide comprehensive input to the national process and other auto company representatives sat on the Public Education and Outreach Table, the Industry Table, and the Transportation Table. The activities of the other tables were reviewed at regular industry meetings. As the table process is now complete, GMCL will continue to work with government and industry stakeholders on an ongoing basis to assist in determining the appropriate response to climate change concerns.

In addition to our involvement in the consultation process, GMCL has participated in many other ways. For example:

- GMCL has participated in the annual Canadian Energy Research Institute's conference, addressing the issues of climate change. In 1998, GMCL's Director of Engineering addressed the CERI conference on the subject of changing vehicle technologies and how these advancements may assist in addressing climate change.
- In April 1999, the auto industry held a Technology Forum in Windsor. Federal and Provincial government officials were invited to the Forum to discuss climate change issues related to the auto industry's products and manufacturing processes. A follow-up meeting was held in June in Ottawa, to allow for further discussion with government officials.
- GMCL, in conjunction with other auto manufacturers in Canada, have undertaken outreach activities with government officials on climate change issues. In connection with the Vancouver Joint Ministers Meeting in March 2000, the auto industry held an Advanced Vehicle Technology display. The display gave the Ministers an opportunity to review firsthand the potential contribution to GHG reductions via advanced vehicle technology.

Climate Change and Our Employees

Our employees guide their day-to-day activities with the GM Environmental Principles in mind. GMCL also uses other tools to communicate with employees on environmental issues and on climate change specifically. GM Today is a magazine distributed to all employees and retirees in Canada twice annually. Once a year, an environmental awareness topic is included in the magazine. Each of GMCL's manufacturing facilities has newsletters that are distributed to local personnel. These publications often contain environmental awareness information. These publications have included information on reducing energy usage both at the workplace and at home. GMCL's Intranet website. www.gmcanada.com currently contains over 40 pages of environmental and energy information. This section includes a total of 10 pages describing energy conservation initiatives that have been implemented at our facilities, and techniques that our employees can use to reduce the energy requirement and environmental impact associated with vehicle use. There are several pages specifically referencing the "VCR" and how to access its website to obtain more detailed information.

GM Canada Energy Awareness Communications

GMCL communicates with employees via email messages. Email messages on a variety of subjects are sent to employees. Environmental topics are frequently addressed, including the need to conserve energy in the workplace to reduce costs and reduce environmental impacts. In 2000 and 2001, newsletters on energy awareness were circulated in February, April, May, June, August, October. Practical tips are often cited for reducing energy usage. A sample is given in Figure 8.

In addition to employee communications to save energy at work, GMCL has also communicated an awareness program concerning energy efficiency at home; an example of this is given in Figure 9.

Figure 8: GM Canada Communication to Employees on Energy Conservation



GM Canada Communications

Energy Conservation Message

Helping the environment we live in, is everybody's responsibility, whether at home or at the workplace. Eliminating energy waste to conserve our natural resources is a fundamental element of GM's environmental policy. All of GM manufacturing facilities now have developed their plant specific "Sufficiency Plan", to ensure that our energy conservation efforts are focused on keeping the non-production (Holidays, Weekends and between shifts) energy usage to a minimum.

Please Consider the Following for Your Plants and Offices:

- Turn off all non-essential HVAC equipment.
- Turn off all non-essential lighting.
- Ensure that any computer controlled equipment (HVAC, Lighting....etc.) will not come on automatically as normally scheduled.
- Where applicable, contact your local TSC/EMS coordinator(s) with production/equipment requirements for your area.
- Turn-off fans, air conditioners, computers, monitors, printers, photocopiers, coffee makers.
- Ensure that all doors and windows are closed.
- Shut down production equipment (tools, personal pedestal fans, conveyors, pumps.....etc.).
- Disconnect any air tools and isolate air line branches to air powered equipment.

Please ensure that all the equipment to be shut-off are considered with personnel and equipment safety in mind.

If you would like to use GM Canada Communications to send out a message or if you have any comments or questions please contact Employee Communications by using the "Reply" button on this screen or by calling us.

Figure 9: GM Canada Communication to Employees on Energy Conservation



GM Canada Communications

Waste Reduction Week

Energy Conservation

Did You Know.....

- It takes 20 well-tuned cars to produce the same amount of pollution as one badly tuned car. Cars should be serviced regularly to help reduce air pollution.
- About 20% of the energy used in residences goes for heating water.
- For each degree you lower your thermostat in the winter, you can save about 3 percent on your heating bill.

Energy Conservation Tips:

- Turn down the temperature on your hot water tank.
- In the winter, run your ceiling-fans counter-clockwise to force hot air downward. In the summer, run them clockwise to circulate cooled air.
- Cook with the microwave, toaster oven and electric skillet – all use much less energy than their traditional, full-size counterparts. For example, microwaves cook in one-quarter of the time and use 30-70% the electricity of an oven.
- Refrigerators and freezers work best when they are full. Use extra items to fill them even if they don't need to be kept cold.
- Defrosting frozen foods in the refrigerator helps the refrigerator stay cool.
- If you have a TV that uses a remote to turn it on, part of the TV is actually on all the time. To turn this type of TV off completely, plug it into a socket that is controlled by a light switch, and to use that light switch when you turn off the set.
- Energy-saver bulbs (compact-fluorescent) give as much light as conventional bulbs, but use less energy. Even though they have a higher initial cost, they are longer lasting and can cut the cost of lighting by 50%!

Resources:

Waste Reduction Week in Canada, Volunteer and School Activity Handbook, www.wrwcanda.com
Region of Durham "2001 Blue Box Recycling Collection Schedules", www.region.durham.on.ca
Gov. Gary Locke, State of Washington Energy Home Page, www.governor.wa.gov/energy/energy.htm

If you have any comments or questions please contact Employee Communications by using the "Reply" button on this screen or by calling us.

Climate Change and Our External Contacts

The CERES Principles

In February 1994, GM became the first mainstream “Fortune 50” company to endorse a set of environmental principles as developed by the Coalition of Environmental Responsible Economies (CERES). CERES is composed of national environmental groups and socially responsible investors. By endorsing the CERES Principles, GM publicly affirmed not only our commitment to the environment but also the accountability for corporate performance. CERES endorsed GM’s Environmental Principles as consistent with the goals of the CERES Principles.

We now annually issue a Corporate Environmental Report (including specific information relating to the activities of GMCL) that follows the CERES report protocol. Our investment in issuing an annual report facilitates internal evaluation of environmental performance, increases employee awareness of GM’s environmental issues, and promotes open discussion with the public on environmental performance.

GM’s quest for continuous improvement has encompassed more than three decades of environmental policy. Throughout GM, our employees continue to use their talents to better understand how our business and our products affect the environment. We’re working hard to identify the environmental challenges and develop solutions.

As a leader of the Canadian automotive manufacturing industry and as a responsible corporate citizen, GMCL is dedicated to protecting human health, natural resources and the global environment.

Suppliers and Dealers

GMCL encourages our external business partners to undertake responsible environmental management.

GM recognizes that our suppliers are critical to our reputation for environmental performance and quality. Each supplier’s creativity and product and process knowledge are important in helping GM achieve its environmental goals. In Canada, GMCL organizes meetings with the Supplier Council and on an annual basis, the assembled group is informed about the issue of climate change and the need for GM’s supplier organizations to reduce energy consumption and track GHG emissions. The supplier community has been informed about the Voluntary Challenge and Registry and encouraged to participate and establish baselines for their individual operations.

Our Supplier Development team assists our Suppliers in identifying waste of many types. This is accomplished by conducting a waste identification audit that includes a section that specifically targets energy waste. Such items include air leaks, inappropriate use of compressed air, lack of operational controls or use of inefficient

energy sources. The results of these audits are reviewed with the Supplier and suggestion are made to assist them in reducing such waste.

GMCL's dealers and retailers are also a critical part of GM's overall footprint. Our dealers are encouraged to put in place environmental management programs. GMCL makes the dealers aware of provincial and federal environmental regulations with which they must comply via a waste management guide. To further reduce waste, GMCL has a parts refurbishment program with its dealers. GMCL also regularly undertakes presentations and other communications to dealers on issues of interest, including energy and environmental issues, to assist in educating and informing the dealer body.

Our Public Education on Climate Change

GM undertakes a number of activities that endeavour to educate the public about climate change.

In May of 2001, GMCL was approached by a local principal of a high school situated near a scenic wetland area. The vision was to develop a School of Environmental Studies and an appropriate curriculum through partnerships with GM, Friends of the Second Marsh and Earthforce. The results of this collaboration were two innovative courses, "Watershed Monitoring and Management" (Gr. 11) and "Industry and the Environment: (Gr. 12). Both courses received Ontario Ministry of Education approval in January of 2002 and will be the only courses of their kind offered in Ontario. GMCL collaborated with the school on the implementation of the grade 11 course which is now being taught. The second course, Industry and the Environment, will teach grade 12 students the importance of achieving balance between economic growth and environmental protection including topics such as energy conservation and climate change.

GMCL's corporate website contains valuable information about climate change and our effort to reduce environmental impacts to help inform the public. The website also offers advice to the public about how they can minimize their impact on the environment by maintaining their vehicles properly and conserving fuel.

All vehicle owner's manuals contain information for the public on the need to maintain their vehicles properly and ensure that all emission control technology is functioning as it was designed. Manuals also offer information to the public about the need to complement vehicle technology with appropriate fuels to ensure that emissions performance is optimal.

Additionally, GMCL actively participates in the production of the annual Fuel Consumption Guide in conjunction with the Federal Government. This reference ensures that consumers have the necessary information to help choose the most fuel-efficient vehicles that meet their personal and functional needs.