

GENERAL MOTORS



SUSTAINABILITY

GENERAL MOTORS



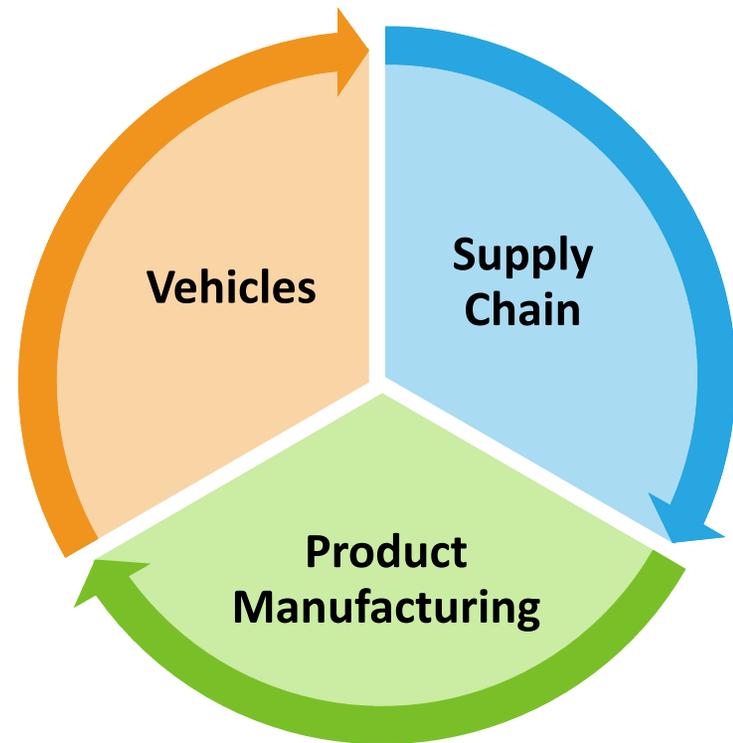
Irene Bashore and Jim Ecklund

Environmental

Environmental Commitment

*We're continually assessing our **environmental impact** and taking steps to **reduce it***

GM has a commitment to the environment and sustainability that applies to every part of our business – from our **supply chain**, to **product manufacturing**, to the **vehicles** we put on the road.





We strive to be the automotive industry's waste reduction leader.



Reduce



Reuse



Recycle



Worldwide Waste Reduction

We recycle more waste than any other automaker

90%

**MANUFACTURING
WASTE RECYCLED**



total waste reduction
from 2000-2010



total waste reduced
from 2010-2012

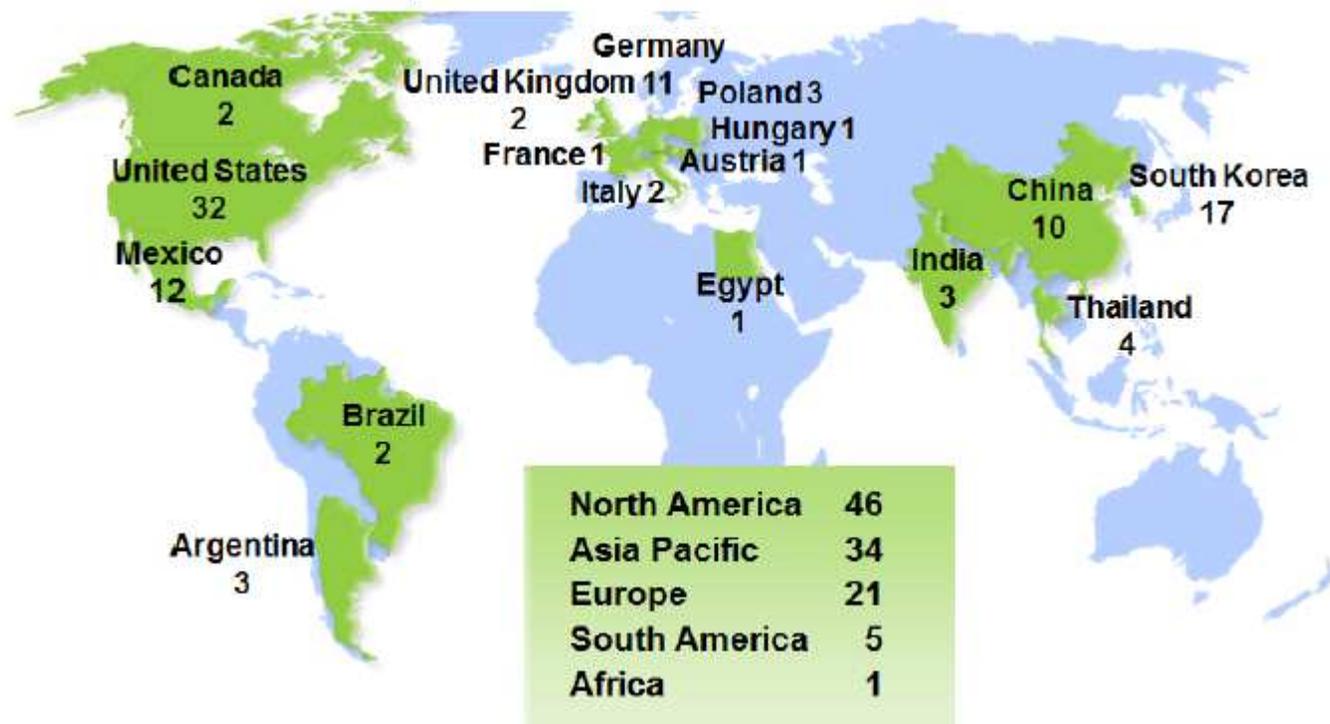


of non-recycled waste
reduced since 2000



107 Landfill-Free Facilities

No other manufacturer has as many facilities contributing zero waste to landfill



83 MANUFACTURING OPERATIONS

24 NON-MANUFACTURING OPERATIONS





We strive to reduce emissions and petroleum dependence by being more energy efficient.



**Reduce
Use**



**Renewable
Energy**



**Reduce
Emissions**



Energy Use Reduction at Global Facilities

28%

FROM 2005 – 2010

3.34 M

METRIC TONS
GREENHOUSE GAS
EMISSIONS AVOIDED



7%

FROM 2010 – 2012





**CO₂
Emissions
Reduction**

28%

FROM 2005 – 2010

5.3%

FROM 2010 – 2012

60% SINCE 1990



Solar Power – United States

GM is the #1 solar user in the automotive sector and ranks in the top 20 of all commercial users of solar energy in the U.S.



2013 EPA ENERGY STAR® Partner of the Year- Sustained Excellence



EPA's highest level of recognition for corporate energy management

63 Plants Met EPA Challenge for Industry

- **More** than any other company
- Avoided **\$162** million in energy costs



Equal to emissions from **244,000** homes



EPA ENERGY STAR– Lansing Delta Township



LEED Gold standard for energy efficiency and greenhouse gas emission reductions

Rainwater collected from roof used to flush toilets



75 acres set aside to preserve plants and wildlife

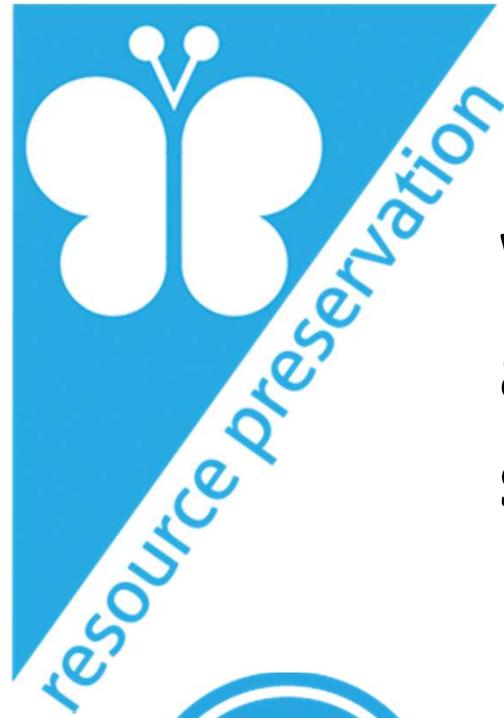


Non-production energy use minimized by hourly monitoring

Safe lighting levels meet recommended best practices

First auto manufacturing facility in world to achieve LEED gold certification





**We preserve natural resources
and enhance habitats
surrounding our facilities.**



**Reduce
Water Use**



**Habitat
Enhancement**



**Watershed
Education**



Water Reduction at Global Facilities

32%

FROM 2005-2010



4%

 FROM 2010-2012

Habitat Enhancement

25 sites certified by:



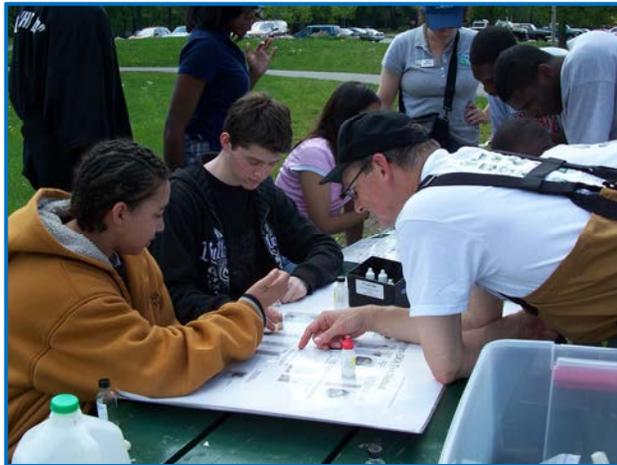
2,635 acres
dedicated



Watershed Education

GM GREEN: Global Rivers Environmental Education Network

- 8,500 students per year matched with GM volunteers
- Supported GREEN since 1989
- Educated over 100,000 students
- In 41 U.S. communities





We're building fuel-efficient vehicles that fit our customers' needs and lifestyles.



**Research &
Development**



**Fuel
Economy**



**Energy
Diversity**



GM CleanTech Patent Leader

**#1
INNOVATOR**

in last 7 Patent Board
quarterly automotive &
transportation industry
scorecards



Ranked second for
most U.S. clean-energy
patents granted since
2002





Fuel Efficiency

Improvement since 1970s

180%
FOR CARS



93%
FOR TRUCKS

Energy Diversity

World's **first** mass-produced vehicle with extended-range capability



Chevrolet Volt



Fuel Cell



GM operates the **world's largest** hydrogen fuel cell vehicle fleet



Hybrid

Biofuels

GM is the **global leader** in FlexFuel vehicles, offering **more than any other automaker**



>8 MILLION VEHICLES

21 MODELS

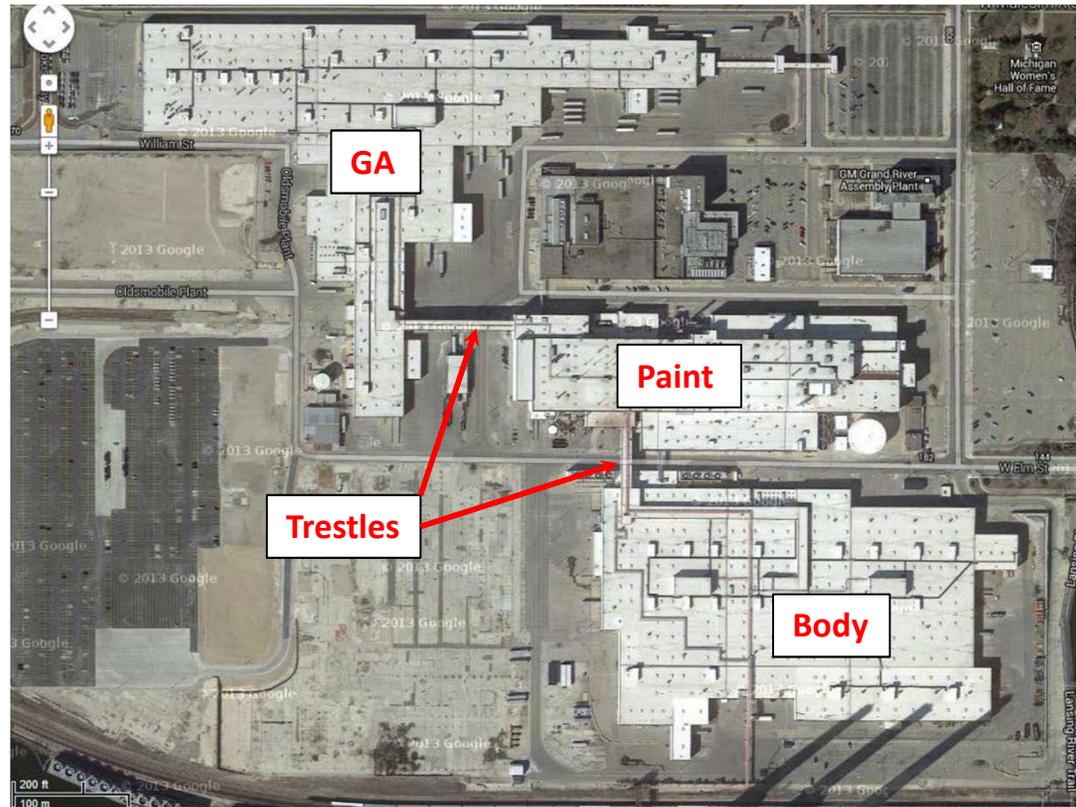


GM environmental

GM Lansing Grand River



LGR Trestle Project



LGR Trestle Project

**Empty Carriers
Returning to Paint**



Car bodies from Paint to GA



LGR Trestle Project

- Objective: Air Balance Between Buildings
 - Paint Booth & Building Air Balance Difficult to Maintain
- Critical to Paint Process - Contaminant Free Air
 - Positively Pressurized Paint Building
 - Negatively Pressurized Body and General Assembly (GA)
- Highly Conditioned Air used in Paint
 - Constant Temperature & Humidity for Consistent Painting
 - 1st - Air Temperature must be Brought Down to 45° F (or Raised in Winter)
 - 2nd - Condense out the Humidity
 - 3rd - Reheat air back to 80° F



LGR Trestle Project

- 1st Study - Stop Airflow to Paint
 - Fans with Pressure Differential Sensors Installed
 - Used Existing Body & GA Exhaust Fans in an Attempt to Control
- Ultimately Continued to have Air “Wasted” from Paint
- 2nd Study - Decision to Install “Air Lock” Doors
 - One Wide Door Between Body & Paint
 - Two Doors Between Paint & GA
 - A Wall to Close off a Utility Trestle



LGR Trestle Project

- Air Lock Door



Only One Door Open at a Time



LGR Trestle Project

- Body to Paint Doors



Before



After



LGR Trestle Project

- Paint to GA Doors



Before



After



LGR Trestle Project

- Utility Trestle Wall Needed to be Enclosed



Before



After





LGR Trestle Project

- Fan Energy Savings - 3,671,779 kWh/Year
 - Supply & Exhaust Fans
- Air Conditioning Savings - 2,640,374 kWh/Year
- **Total Energy Savings - 6,312,153 kWh/Year**

- **Total \$ Savings - \$504,972 per year**

- Project Cost - \$355,138
- Lansing BW&L Incentive - \$177,569



LGR Trestle Project

- > 6,000,000 kWh yearly projected savings in electricity.
- Equivalent to 4,223 Metric Tons of CO2 emissions savings.
- Additional energy savings from natural gas and steam reductions (TBD).
- Improved Paint Quality from reduced contaminant intrusion.
- Partial funding through Lansing Board of Water and Light's "Hometown Energy Savers" incentive award, owing its origination to Michigan PA 295.

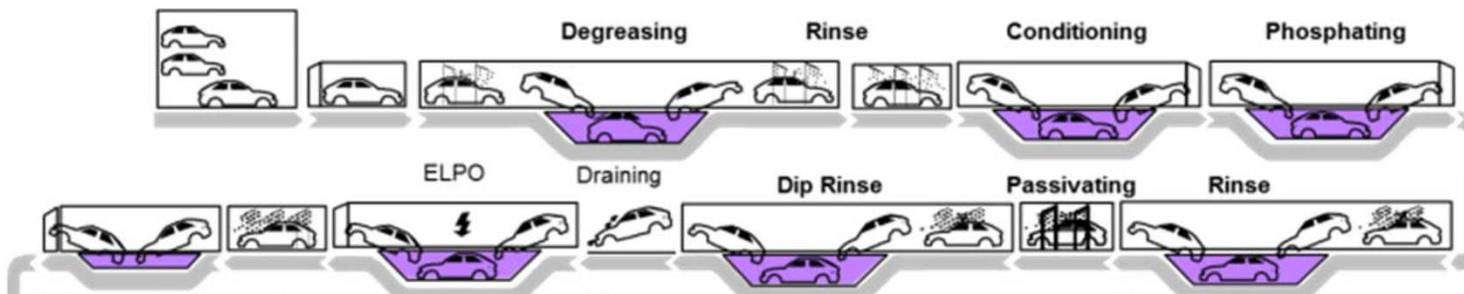


Lansing Delta Township



LDT Water Savings Projects

- Phosphate – Chemically “Etches” Metal Car Body to Receive Paint
- ELPO – Electro Coat Paint Operation to Apply Primer



LDT Water Savings Project #1

- Control of Phosphate Stage 7B RO Make up Water



LDT Water Savings Project #1

- Phosphate Stage 7B sprays the body with filtered water.
- After rinse, the filtered water is collected before being sprayed onto the bodies again.
- The water was controlled by a manual valve (always left partially open) to drain and making up with virgin RO water.
- **An automated RO make up valve now controls the holding tank level thereby reducing the use of RO water.**
- Additionally water cascading of Stages 7B to 7A to 5.
- Modification saves the Paint Shop 26,766 gallons per day.

- Water saved = 6,557,570 gal/year

- Cost Savings = \$59,478 /year



LDT Water Savings Project #2

- ELPO Pental Wash RO Water Savings
 - Pental (Carrier – Carries Car Body Through the System)



LDT Water Savings Project #2

- Overflow rinse water from Stage 6 Elpo flowed to drain.
- The Pental cleaner, at the end of the process, uses virgin RO water.
- **A side stream was piped from the Stage 6 spray header down to the Pental washer as a final rinse, thereby using the water twice.**
- Modification saves the Paint Shop 4.5 gpm of RO water.

- Water Savings = 1,587,600 gal/year

- Cost Savings = \$14,300 year



Project GREEN



20 Years and Counting in Lansing! (1993 to Present)

20 Schools

366 Classes

> 9,250 Students



Project GREEN



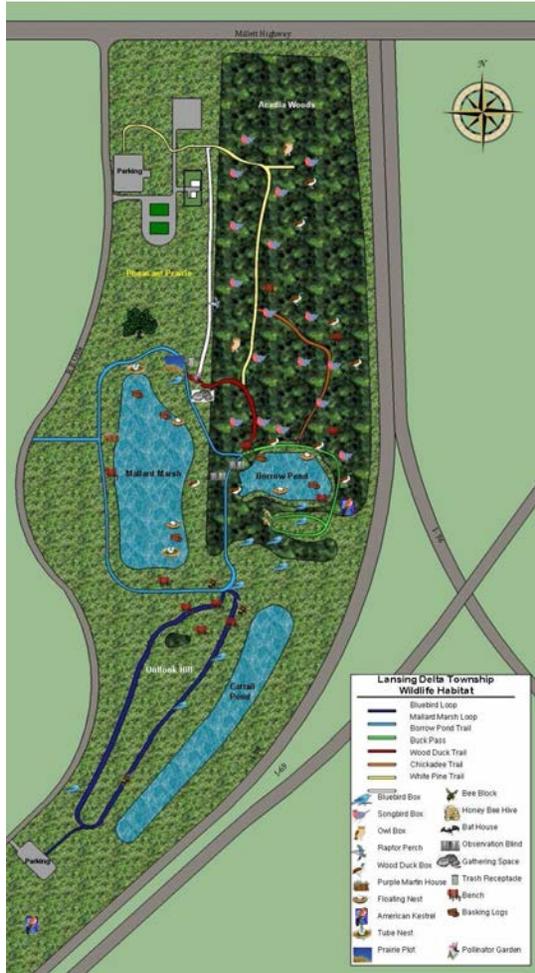
Children's Water Festival @ MSU



Arbor Day @ Potter Park Zoo



LDT Wildlife Habitat



GM Flint Assembly



Flint River GREEN



Flint River Clean Up



Benthic Monitoring



Earth Day Activities



Genesee County HHW Collection



EPA Energy Star Challenge

- Exchange Steam Water Heaters for Electric
- Lighting Fixture Upgrades
- Heating and Cooling Optimization Project



Local Recycling



GENERAL MOTORS

