



# Integrating Distributed Generation into Energy Efficiency Programs

2016 Better Buildings  
Summit

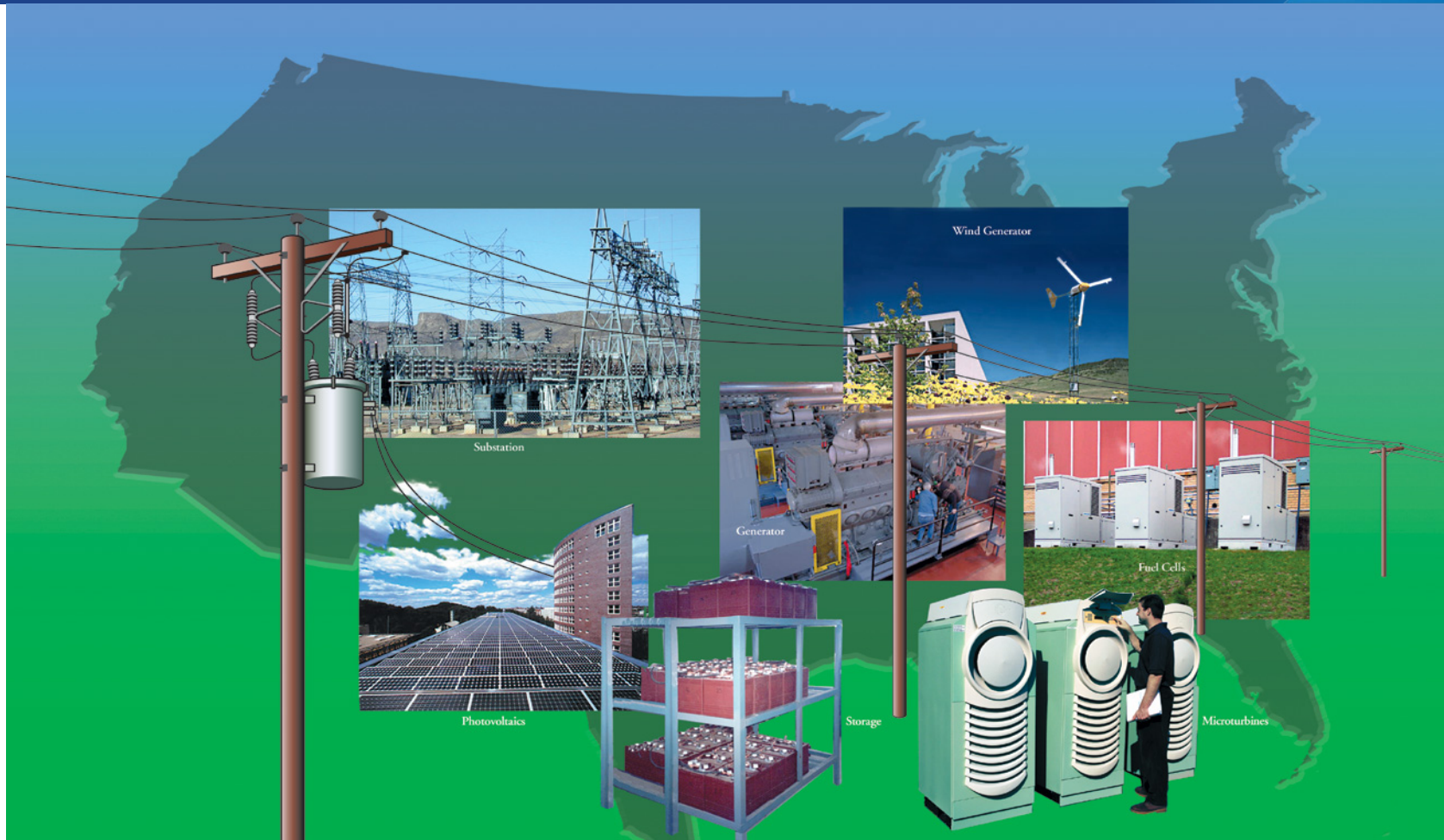


**Better  
Buildings®**  
U.S. DEPARTMENT OF ENERGY

# What is Distributed Generation?

Robert Bruce Lung

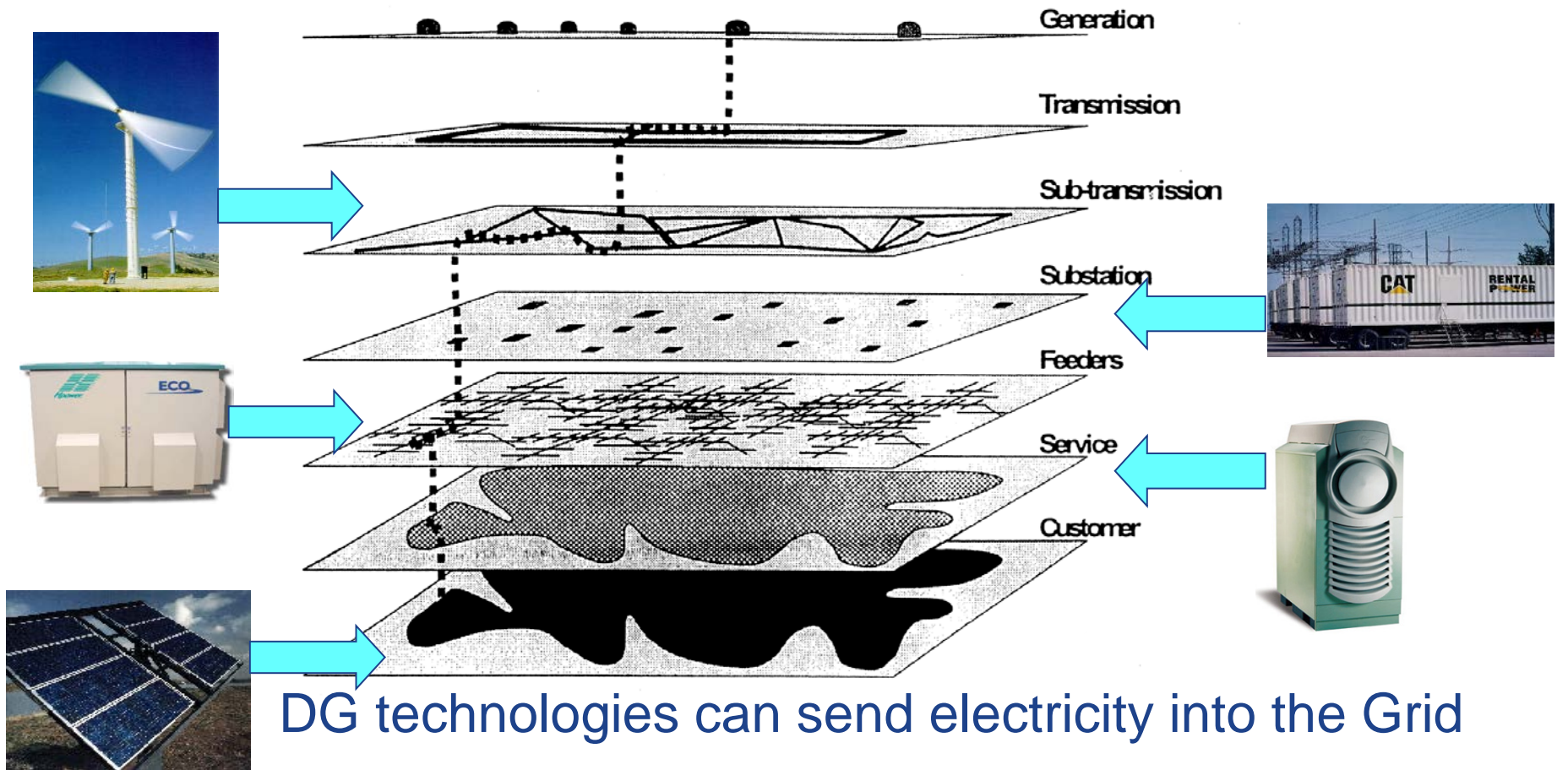
# The Technologies are Well Known



Graphics courtesy of National Renewable Energy Laboratory



# Some Details are less Understood: Interconnection



# The Benefits are Significant

## End User Benefits

- Clean energy
- Lower cost electricity
- Reduced price volatility
- Greater reliability and power quality
- Energy and load management
- Combined Heat and Power

## Utility/Supplier Benefits

- Fewer electric line losses
- Reduced T&D congestion
- Better grid asset utilization
- Better grid reliability
- Ancillary services, e.g., voltage support and stability, VARs, contingency reserves, and black start capability

**Bottom Line: Greater flexibility and energy security**

# ENERGY FROM WASTE

HOW GM IS HARVESTING ENERGY FROM WASTE

Gary J. Londo  
Energy Leader/Senior Energy Engineer  
Global Engineering

May 11, 2016



GENERAL MOTORS

# AGENDA

GM SUSTAINABILITY

MANAGING WASTE

LANDFILL GAS

WASTE TO ENERGY

KEEPING IT PERSONAL

# INTRODUCTION



“Our customer focus underscores why sustainability is and will continue to be a core strategy for GM. People care about more than the cars. They care how we build them, and how we engage with the world around us. This knowledge, and the discipline that flows from it, is transforming our approach to product design, manufacturing, safety, quality, the environment, customer care and a host of other areas at a remarkable pace.”

– GM CEO Mary Barra



# ENVIRONMENTAL COMMITMENTS



## Environment: Our Commitment

We're committed to continuous improvement as we reduce the environmental impact of our vehicles and facilities. Our culture of environmental responsibility makes us think creatively, consistently innovate, and be leaner and more efficient.

### Waste Reduction

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

### Energy Efficiency

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

### Resource Preservation

We help preserve natural resources, and enhance habitats surrounding our facilities.

### Greener Vehicles

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

# 2020 SUSTAINABILITY GOAL PROGRESS



## VOC Emissions from Paint Shops

- Achieved 10% vs 10% Reduction goal (kg/veh)



## Renewable Energy

106 MW vs 125 MW goal by 2020



## CO<sub>2</sub> Footprint

- 11% vs 20% Reduction (CO<sub>2</sub>e tons/veh) by 2020



## Energy Use

- 11% vs 20% Reduction (MWH/veh) by 2020



## Water Use

- 11% vs 15% Reduction (m<sup>3</sup>/veh) by 2020



## Biodiversity

- All sites WHC certified programs (where feasible)
- 46 certified programs



## Total Waste

- 23% vs 10% Reduction (kg/veh)
- New target 40% reduction



## Landfill-Free

- 131 sites vs 150 sites goal by 2020
- New aspirational target: all manufacturing facilities LFF



## Community Outreach

- All manufacturing sites
- Explore new global coordinated effort



2010 Baseline

### Legend:

- 2020 Goal Met or Exceeded
- Glide Path Status (RYG)

# ENVIRONMENTAL COMMITMENTS: MICHIGAN



## Environment: Our Commitment

We're committed to continuous improvement as we reduce the environmental impact of our vehicles and facilities. Our culture of environmental responsibility makes us think creatively, consistently innovate, and be leaner and more efficient.

### Waste Reduction

8 manufacturing &  
11 non-  
manufacturing  
facilities landfill-free

### Energy Efficiency

Approximately 26  
MW from renewable  
sources

### Resource Preservation

7 manufacturing & 5  
non-manufacturing  
facilities WHC  
certified  
All sites engaged in  
GM GREEN

### Greener Vehicles

40MPG vehicles – 2  
of 9 current models  
Chevrolet Sonic  
(Lake Orion),  
Chevrolet Volt  
(Detroit-Hamtramck)

# GM AND TRASH

At GM, we follow the US EPA's guidelines to manage waste.

## Waste Management Hierarchy

### Levels of the EPA's solid waste management hierarchy

1. Source Reduction and Reuse
2. Recycling/Composting
3. Combustion with Energy Recovery
4. Landfilling and Incineration without Energy Recovery

US Environmental Protection Agency, Waste website:

<http://www2.epa.gov/recycle>

<http://www.epa.gov/wastes/nonhaz/municipal/hierarchy.htm>



# LANDFILL-FREE

AVOIDING + REDUCING + REUSING + RECYCLING = LANDFILL-FREE

GM has 131 landfill-FREE sites





# USING OTHER PEOPLE'S WASTE FOR POWER

*GM is consuming gas produced from landfills to power its plants in three locations*

## Landfill gas to electricity

GM Assembly - Fort Wayne, IN (6.4 MW electricity)

GM Assembly – Lake Orion, MI (8 MW electricity)

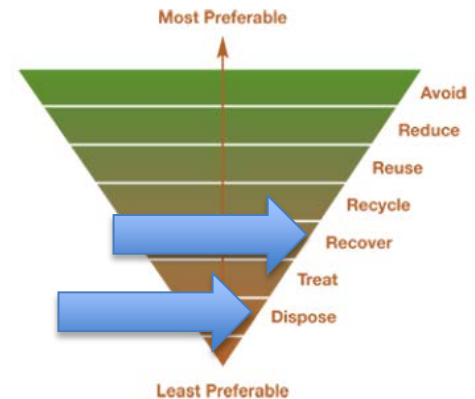
## Boiler Fuel

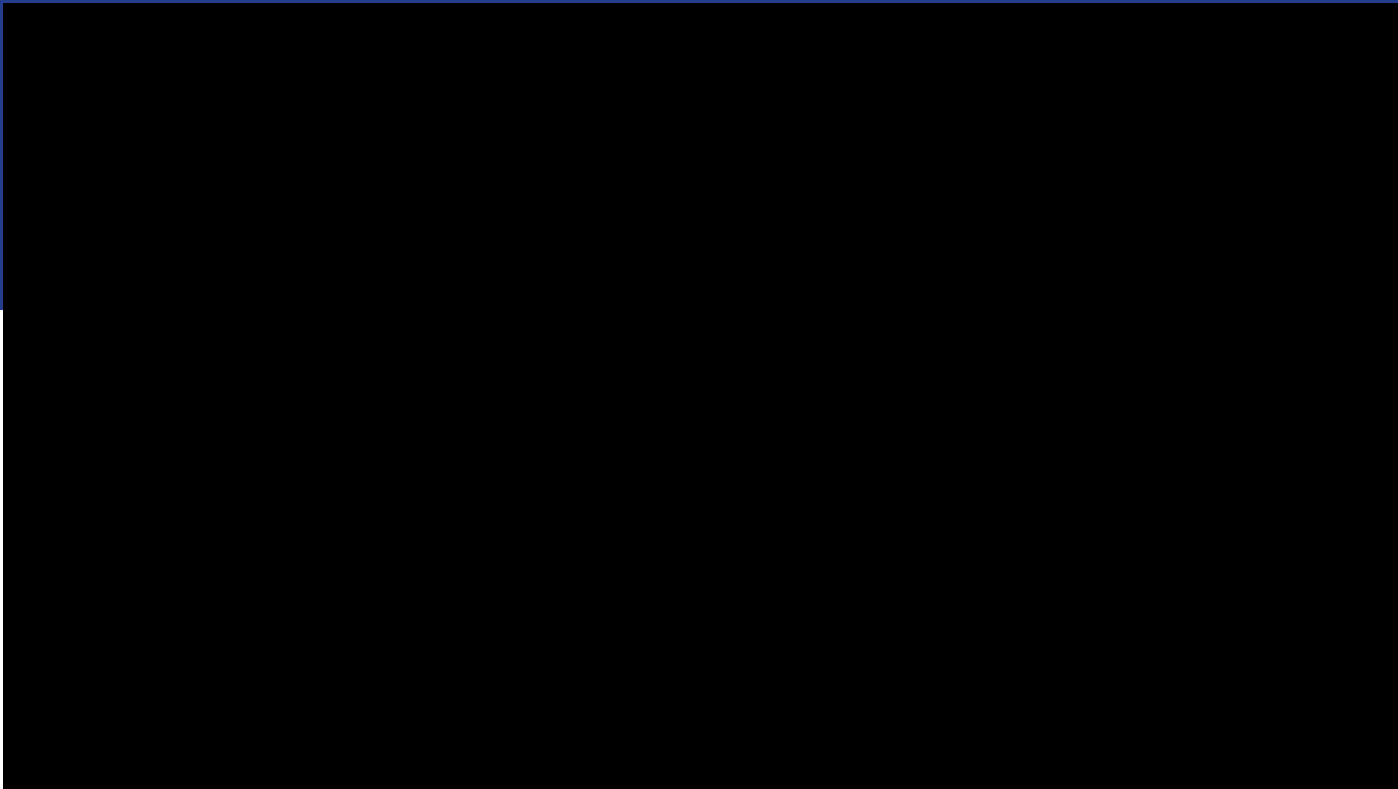
GM Engine/Transmission- Toledo, OH (10.14 MWe - seasonal)

*GM is also consuming steam produced from waste in Detroit*

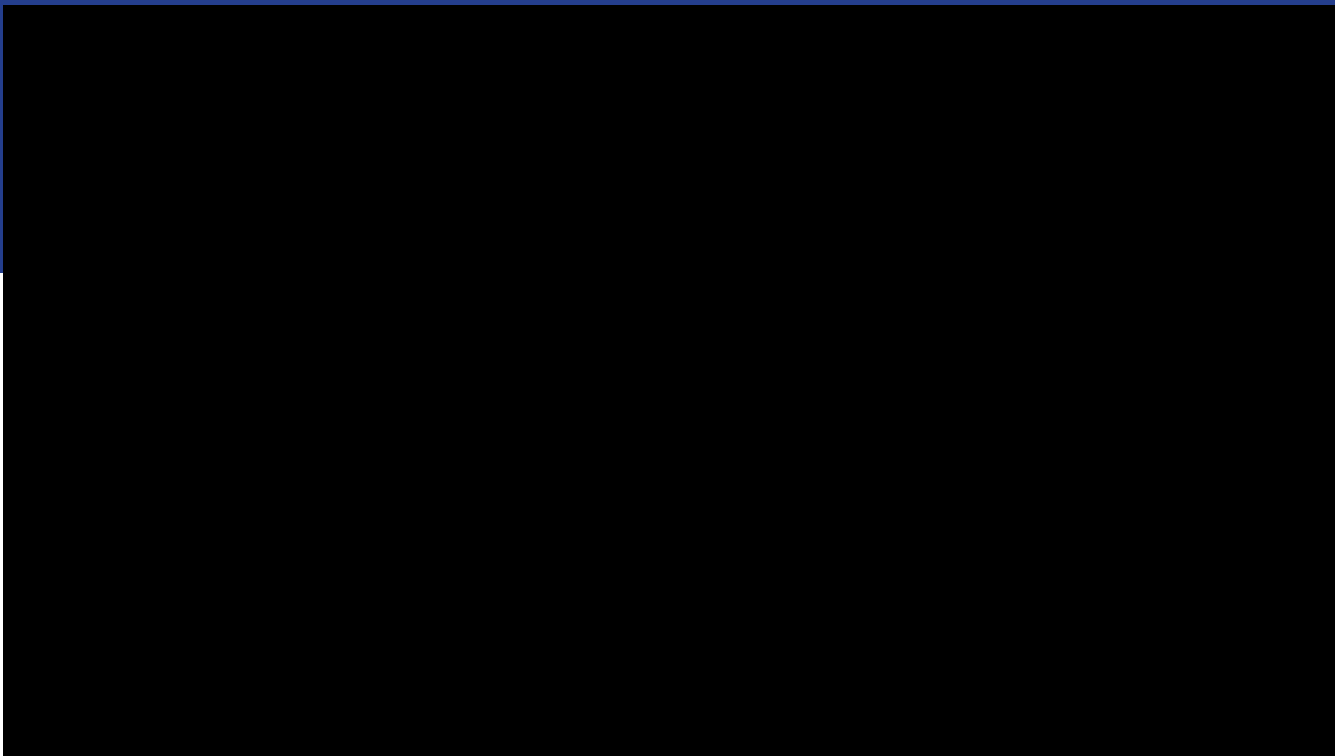
## Waste-to-energy (steam)

GM Assembly – Hamtramck, MI (15.8 MWe equivalent)





GENERAL MOTORS



GENERAL MOTORS





GENERAL MOTORS

GMVM Fort Wayne

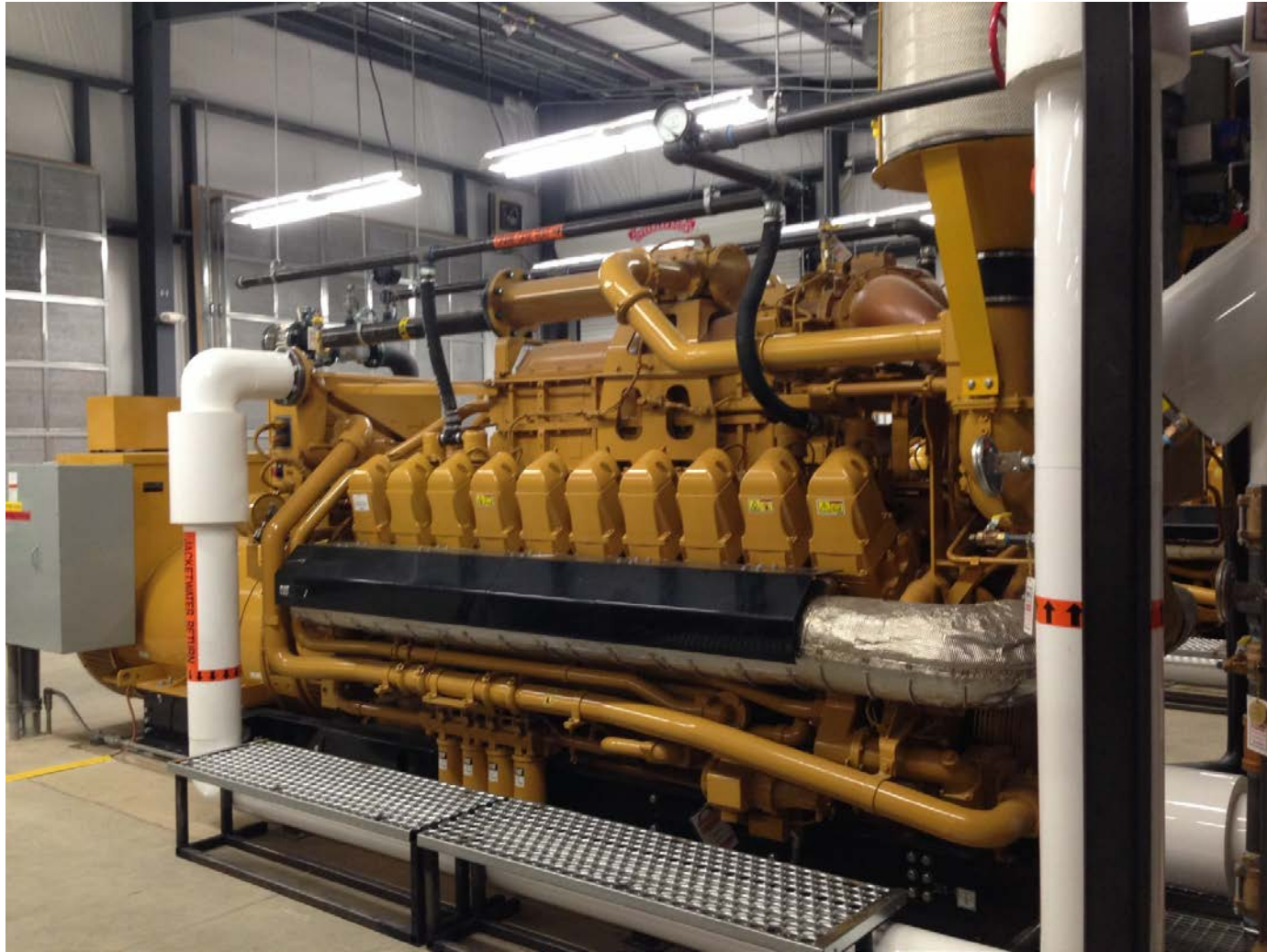






GENERAL MOTORS

GMV Fort Wayne



GENERAL MOTORS

GMVM Fort Wayne



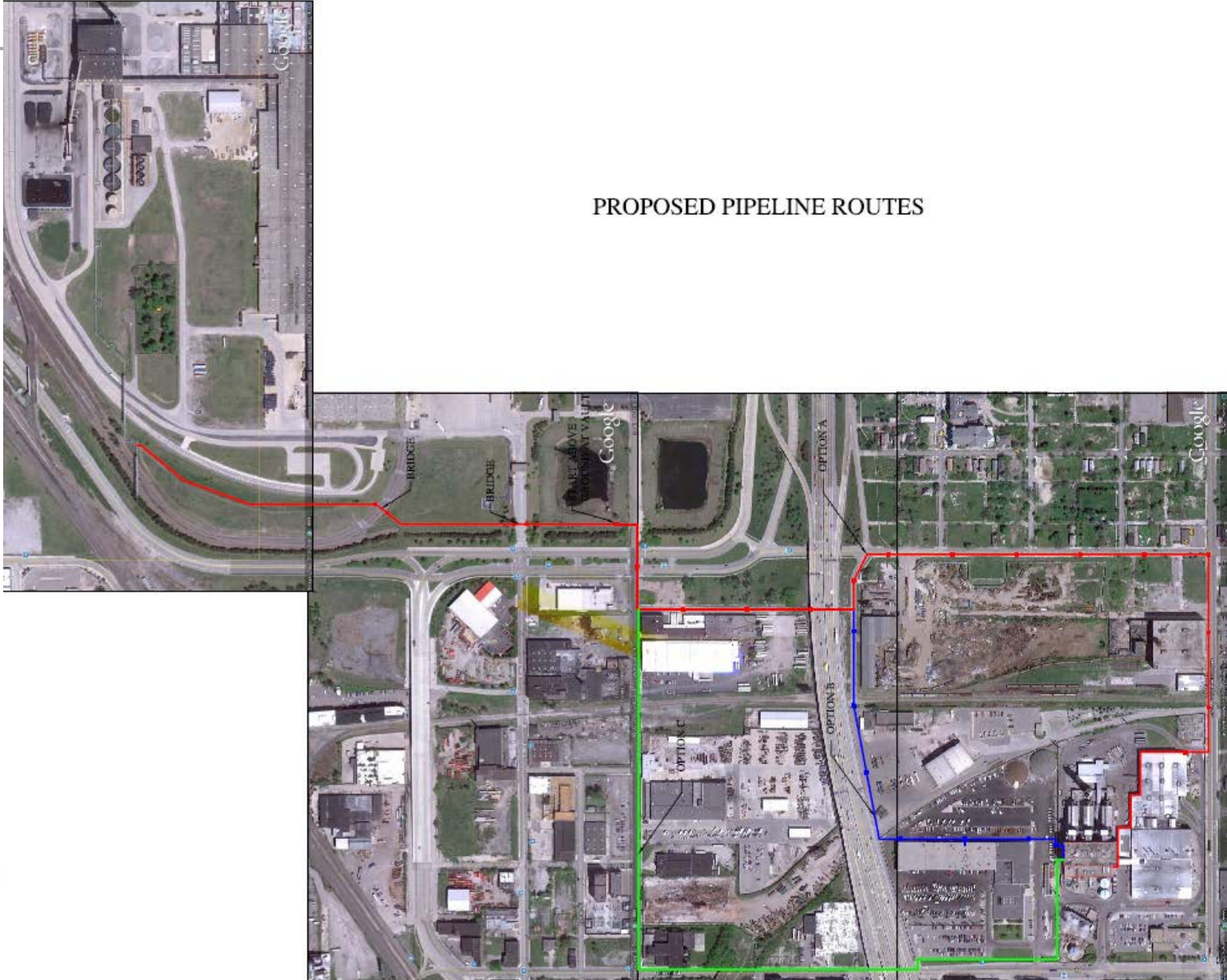




# SUSTAINABLE & RENEWABLE



# PIPELINE



PROPOSED PIPELINE ROUTES



# INDUSTRY TRENDS

## Quadrennial Technology Review

by R. Neal Elliott, Associate Director for Research

Recently, the Department of Energy (DOE) and the White House Office of Science and Technology released the second [Quadrennial Technology Review](#), or QTR. The 489 page tome bears resemblance to many other government reports that are too often relegated to the TL;DR file--too long; didn't read. That would be unfortunate for those of us who care about the future of energy efficiency technologies.

The report contains a wealth of numbers about energy use and the technologies that can affect the future of energy efficiency in the US economy, and it presents four trends:

- **Convergence.** All sectors of the economy are becoming increasingly interdependent.
- **Diversification.** Energy sectors are shifting to diversified, distributed resources--a trend that ACEEE has been seeing in state and local energy planning.
- **Confluence.** Computing power and simulation are ushering in a new era of "systems by design," much the same as the concept of intelligent efficiency that ACEEE has been advancing.
- **Efficiency everywhere.** Energy efficiency is a critical element in achieving national energy security, cost, and environmental goals--a theme that is at the core of our Energy Efficiency as a Resource Conference that took place last week in Little Rock...

To continue reading this blog post, visit: <http://aceee.org/blog/2015/09/4-energy-efficiency-trends-look-new>

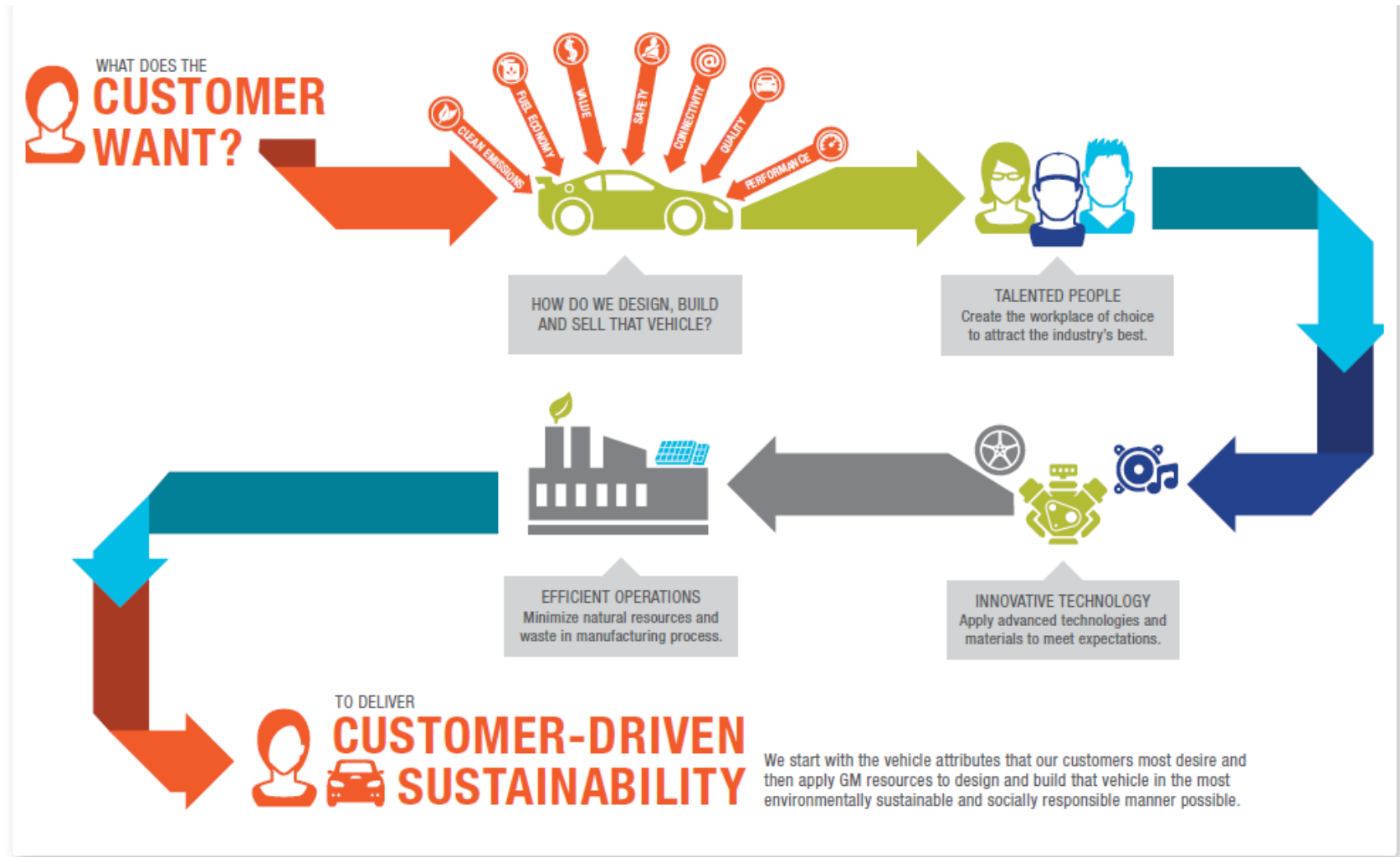
*About ACEEE: The American Council for an Energy-Efficient Economy acts as a catalyst to advance energy efficiency policies, programs, technologies, investments, and behaviors. For information about ACEEE and its programs, publications, and*

GM is part of a national trend in energy use, as recognized by the US Department of Energy and the White House.

Trending toward more interdependence, diversification, intelligent design, and efficiency, the "US Energy Economy" is changing dramatically.

Although GM invests in renewable technology to meet our company goals and commitments, the investment saves GM a lot of money. The investments are good business.

# GM CUSTOMER-DRIVEN SUSTAINABILITY FOCUS



# INCREASED CONSUMER WILLINGNESS

“I would be more likely to purchase products or services from a company with a good reputation for environmental responsibility.”

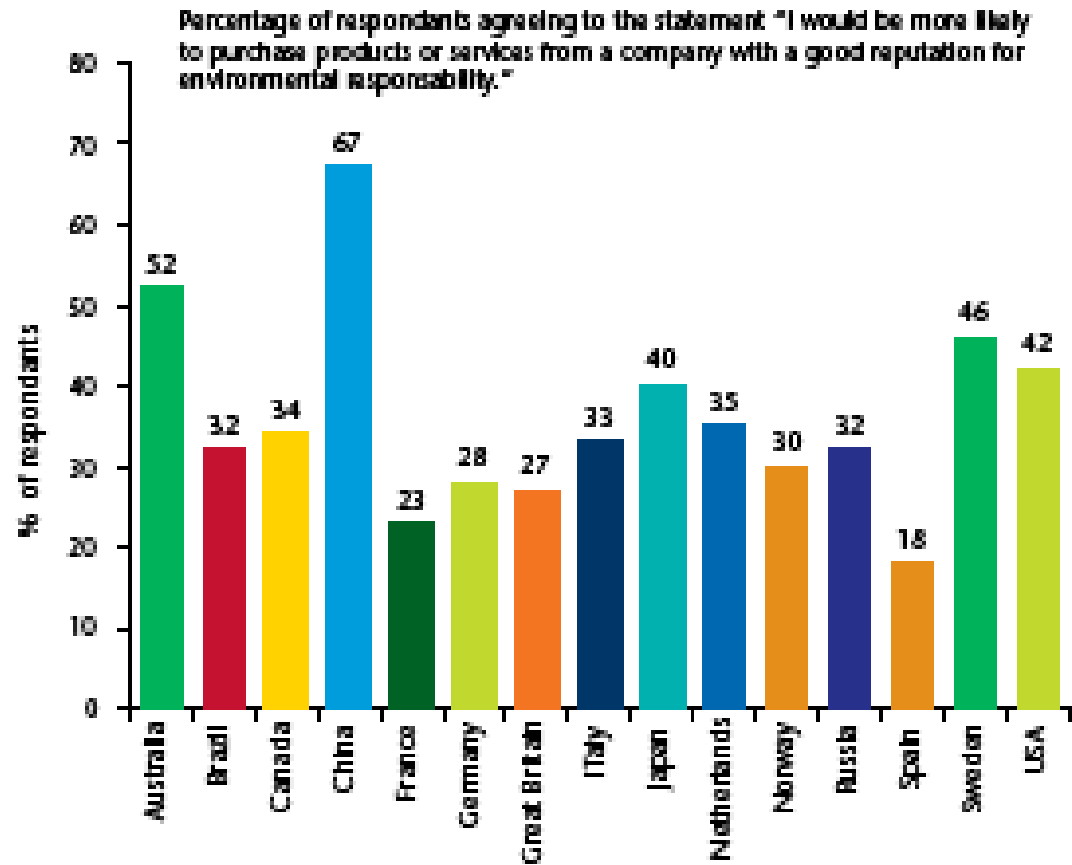


Figure 12: Consumers globally report greater propensity to buy from companies with a reputation for environmental responsibility  
Source: Tandberg, 2007:iv

## KEEPING IT PERSONAL



You cannot get through a single day without having an impact on the world around you. What you do makes a difference, and you have to decide what kind of difference you want to make."  
—*Jane Goodall*

# QUESTIONS / ANSWERS



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