Integrating Distributed Generation into Energy Efficiency Programs

2016 Better Buildings Summit
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

DG technologies can send electricity into the Grid

Graphics courtesy of National Renewable Energy Laboratory
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
“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
**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.

<table>
<thead>
<tr>
<th>Waste Reduction</th>
<th>Energy Efficiency</th>
<th>Resource Preservation</th>
<th>Greener Vehicles</th>
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<td>We strive to be the automotive industry’s waste reduction leader.</td>
<td>We strive to reduce emissions &amp; petroleum dependence by being more energy efficient.</td>
<td>We help preserve natural resources, and enhance habitats surrounding our facilities.</td>
<td>We’re building fuel-efficient vehicles that fit our customers’ needs and lifestyles.</td>
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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

CO₂ Footprint
• 11% vs 20% Reduction (CO₂e tons/veh) by 2020

Energy Use
• 11% vs 20% Reduction (MWH/veh) by 2020

Water Use
• 11% vs 15% Reduction (m³/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

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

2010 Baseline
ENVIRONMENTAL COMMITMENTS: MICHIGAN

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<td>8 manufacturing &amp; 11 non-manufacturing facilities landfill-free</td>
<td>Approximately 26 MW from renewable sources</td>
<td>7 manufacturing &amp; 5 non-manufacturing facilities WHC certified All sites engaged in GM GREEN</td>
<td>40MPG vehicles – 2 of 9 current models Chevrolet Sonic (Lake Orion), Chevrolet Volt (Detroit-Hamtramck)</td>
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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)
Fort Wayne Assembly/Lake Orion Assembly
US EPA LANDFILL METHANE OUTREACH PROGRAM
We Are Not The Only Ones

Figure 14: LFG Utilization
Source: http://www.epa.gov/lmop/

Nationwide Summary
621 OPERATIONAL Projects
(1,978 MW and 311 mmscfd)
~450 CANDIDATE Landfills
(850 MW or 470 mmscfd, 36 MMTCO2e/yr Potential)

OPERATIONAL PROJECTS
CANDIDATE LANDFILLS*

*Landfill is accepting waste or has been closed 5 years or less, has at least
1 mm tons of waste, and does not have an operational, under-construction, or
planned project; can also be designated based on actual interest by the site.

These data are from LMOP's database as of July 16, 2013.
** LMOP does not have any information on candidate landfills in this state.
SUSTAINABLE & RENEWABLE

GM Detroit-Hamtramck Plant
Purchases Renewable Energy from DRP

Safe, reliable MSW disposal

General Motors

- Processes waste into steam & electricity
- Sells renewable energy to GM
- Manages, monitors & maintains a clean energy supply to GM
PIPELINE

PROPOSED PIPELINE ROUTES
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

WHAT DOES THE CUSTOMER WANT?

HOW DO WE DESIGN, BUILD AND SELL THAT VEHICLE?

TALENTED PEOPLE
Create the workplace of choice to attract the industry’s best.

EFFICIENT OPERATIONS
Minimize natural resources and waste in manufacturing process.

INNOVATIVE TECHNOLOGY
Apply advanced technologies and materials to meet expectations.

TO DELIVER CUSTOMER-DRIVEN SUSTAINABILITY

We start with the vehicle attributes that our customers most desire and then apply GM resources to design and build that vehicle in the most environmentally sustainable and socially responsible manner possible.
INCREASED CONSUMER WILLINGNESS

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

Figure 1.2: Consumers globally report greater propensity to buy from companies with a reputation for environmental responsibility
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
NEED TO ADD COREY’S SLIDES HERE, BUT THEY ARE ONLY AVAILABLE VIA PDF, THEREFORE YOU NEED TO PDF THIS PPT THEN ADD COREY’S SLIDES. TALK TO SAMANTHA STAFFORD TO GET COREY’S PDF SLIDES.