Accelerating Maryland's Future

Chris Rice, Clean Cities Coordinator

March 1, 2013
Maryland CNG Showcase
MDOT Headquarters
Hanover, Maryland

ACCELERATING MARYLAND'S CLEAN CITIES TRANSPORTATION FUTURE

Maryland Energy ADMINISTRATION
Powering Maryland's Future

Presentation Outline

1. About MEA
2. Petroleum
3. Alternative Fuels
4. Programs

“Accelerating Maryland’s Future”

About MEA

MEA's mission is to assist Maryland citizens and businesses save money through smart investments in energy efficiency, renewable energy and conservation. MEA fuels the creation of green jobs by providing funds and resources to expand the use and availability of clean, safe energy in Maryland.

“Accelerating Maryland’s Future”

Maryland's Key Energy Goals

EMPOWER: **Reduce electricity consumption 15% by 2015**

RPS: **Obtain 20% of electricity from renewables by 2022**

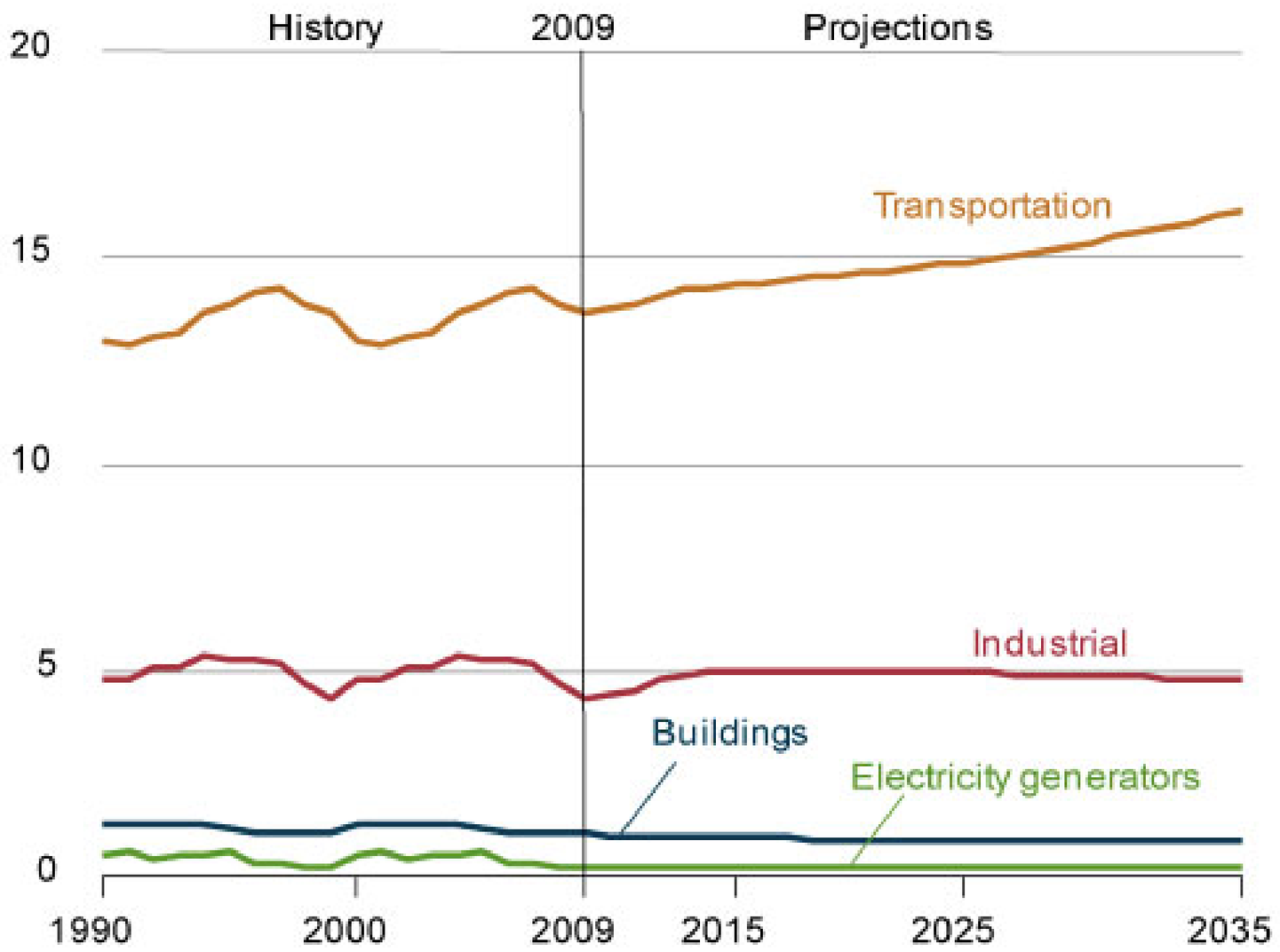
CLIMATE: **Reduce greenhouse gas emissions 25% by 2020**

JOBS: **Create 100,000 new green jobs by 2015**

ACCELERATING MARYLAND'S CLEAN CITIES TRANSPORTATION FUTURE

"Accelerating Maryland's Future"

Petroleum



US Liquid fuels consumption by sector, 1990-2035 (million barrels per day)

Source: Annual Energy Outlook 2011. Energy Information Administration.

"Accelerating Maryland's Future"

Petroleum

Rising Petroleum Prices

U.S. Owns 2-3% of world oil reserves
U.S. Uses 25% of worlds oil

Volatility of Petroleum Market

2013 highest fuel costs on record in U.S.
Significant production domestically, but 50% imports

Survey Finds 62% of Fleet Managers Plan to Purchase More Fuel-Efficient Vehicles in 2013

70% of respondents think fuel cost may go up in 2013

Source: Green Fleet Magazine Dec. 2012

Petroleum

Reducing Petroleum Consumption

- Petroleum = most consumed energy source in U.S.
- About half of petroleum used is imported

U.S. spends

- $1 million per minute on petroleum
- $Nearly one billion per day on petroleum imports
- $5.7 billion per week on petroleum imports
- $297 billion per year on petroleum imports

Electric Drive Vehicles

- Hybrid Electric Vehicles (HEVs)
- Plug-In Hybrid Electric Vehicles (PHEVs)
- All-Electric Vehicles (EVs)

ACCELERATING MARYLAND'S CLEAN CITIES TRANSPORTATION FUTURE

"Accelerating Maryland's Future"

Electric Vehicle Availability in Maryland

Passenger Vehicles

Chevy Volt – December 2010
Nissan Leaf – August 2011
Ford eFocus – 2012
Ford PHEV Escape – 2012 / 2013
Mitsubishi iMev – 2012
Toyota PHEV Prius – 2012
Toyota eRAV4 – 2012 / 2013
Coda
Others

Light to Medium Duty Trucks

Smith Electric Truck – 2011 / 2012
Bright Electric – 2011 / 2012
Navistar eStar - 2011
Ford Transit Connect - 2012
Others




Nearly every major manufacturer and several “new” entrants are expected to have product on the road by 2015.

ACCELERATING MARYLAND'S CLEAN CITIES TRANSPORTATION FUTURE

“Accelerating Maryland’s Future”

Sample views of Level 2 Charging Stations

Level 1 : 120 volt, 20 amp 1.2 – 1.5 kW /hour draw

Level 2: 240 volt, 3.3 kW / hour draw

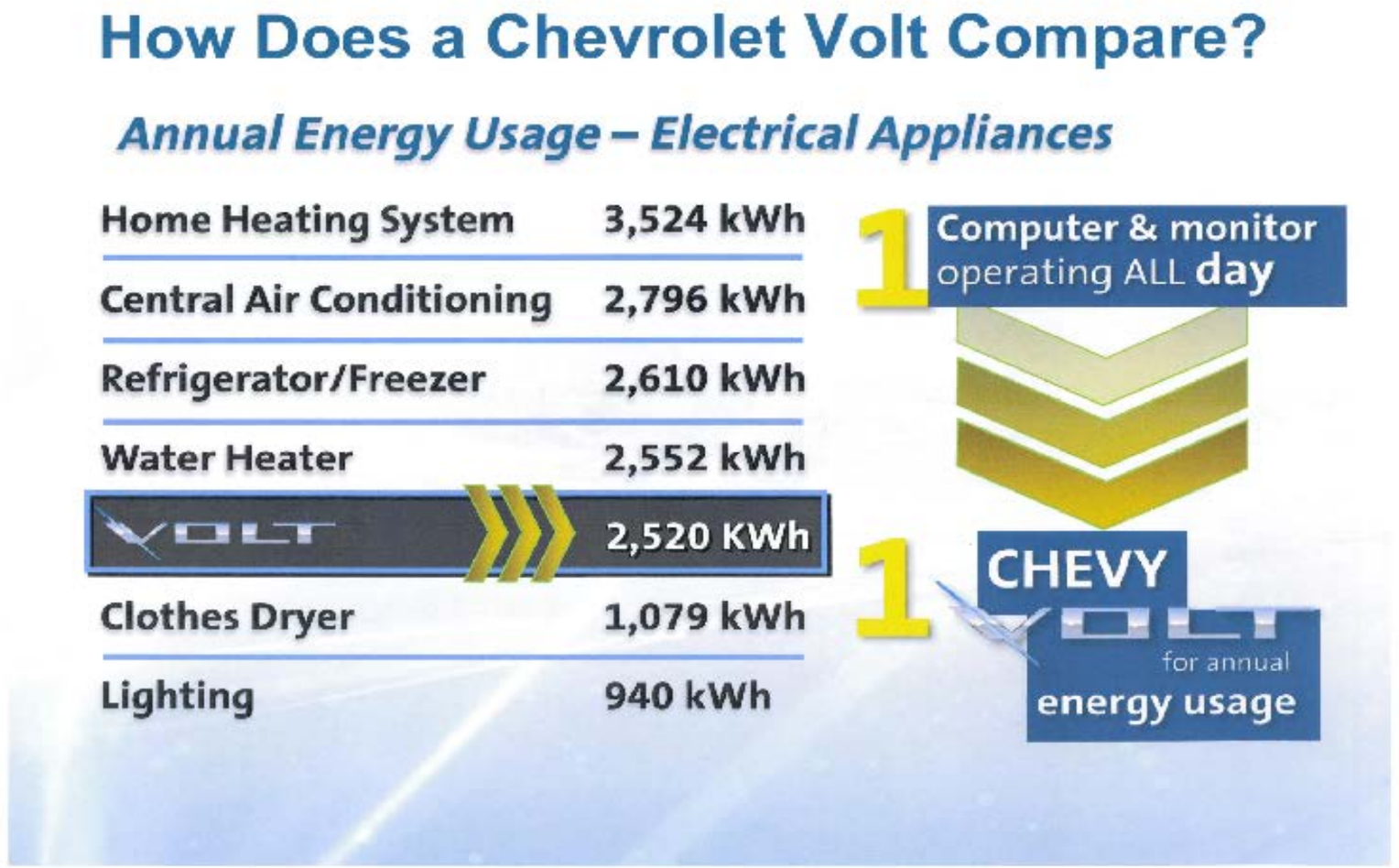
Level 2 : 240 volt, 6.6 – 7 kW / hour draw

(Future Level 2 may be as much as 19 kW draw)

ACCELERATING MARYLAND'S CLEAN CITIES TRANSPORTATION FUTURE

"Accelerating Maryland's Future"

GM's Comparison of Volt Energy Use



From presentation by
Kristin B. Zimmerman, Ph.D.
General Motors
Research & Development
Volt Infrastructure Team

Baltimore County EV Roundtable
June 2010

Ethanol

About

- Renewable fuel produced from plant materials (biomass)
- Same chemical compound in alcoholic beverages (C_2H_5OH)
- Comes from starchy feedstocks (corn, sugar cane, sugar beets) and cellulosic feedstocks (yard waste, grasses, poplars)
- Blended at low levels into 80% of gasoline sold in the United States
- Increasingly available as E85 for use in flex fuel vehicles
- High-octane fuel

Intermediate Blends

- E20, E30, E50, etc.
- Only for FFVs

Blender Pumps

- Mix E10 with E85 to create intermediate blends
- Provide flexibility for future changes in regulations
- Allow for choice, based on prices and performance

Public Health and Environment

- Corn ethanol reduces GHGs by 19% to 52%
- Cellulosic ethanol reduces GHGs by 75%
- Reduces emissions of NO_x, CO, benzene, 1,3-butadiene (higher formaldehyde and acetaldehyde emissions)

ACCELERATING MARYLAND'S CLEAN CITIES TRANSPORTATION FUTURE

"Accelerating Maryland's Future"

Propane

About

- Three-carbon alkane gas C_3H_8
- Also known as liquefied petroleum gas (LPG)
- Colorless, odorless liquid (when stored under pressure)
- High octane rating
- Nontoxic
- By-product of natural gas processing and crude oil refining
- Accounts for 2% of energy used in the U.S.
- Less than 2% of propane used in U.S. used in transportation

Propane as a Transportation Fuel

- World's third most common engine fuel
- Considered an alternative fuel under the Energy Policy Act of 1992
- Mix of propane (at least 90%), butane, butylene
- Stored in on-board tank at 125-150 psi
- 25% less energy than gasoline

Public Health and Environment

- Converted vehicles:
  - Significant reductions in particulate matter (PM) and carbon monoxide (CO) emissions
  - Lifecycle greenhouse gas emissions reduced 21-24%

ACCELERATING MARYLAND'S CLEAN CITIES TRANSPORTATION FUTURE

"Accelerating Maryland's Future"

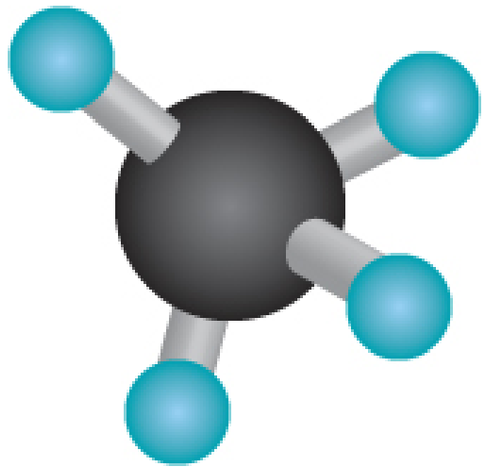
Natural Gas (CNG-LNG)

About

- Hydrocarbons, mostly One-carbon gas CH_4
- Also known as Compressed Natural Gas (CNG) and Liquefied Natural Gas (LNG)
- High octane rating
- Nontoxic
- Extracted from oil and gas wells
- Colorless and Odorless
- Less than 1% of natural gas consumed in U.S. is used in transportation

Natural Gas as a Transportation Fuel

- 14.8 million vehicles world wide
- Considered an alternative fuel under the Energy Policy Act of 1992
- CNG stored in on-board tank at 3,600 psi
- LNG stored in on-board tank and cooled to -260° F



Public Health and Environment

- Converted vehicles:
  - Significant reductions in particulate matter (PM) and carbon monoxide (CO) emissions
  - Lifecycle greenhouse gas emissions reduced 20-30%

ACCELERATING MARYLAND'S CLEAN CITIES TRANSPORTATION FUTURE

"Accelerating Maryland's Future"

Natural Gas (CNG-LNG)

Compressed Natural Gas

- Stored in onboard tanks under high pressure
- Fuel economy similar to gasoline
- 1 GGE = 5.7 lb CNG

Liquefied Natural Gas

- Kept at cold temperatures
- Stored in double-wall, vacuum-insulated pressure vessels
- Heavy-duty vehicles
- 1 GGE = 1.5 gal LNG

Programs & Infrastructure

HOV Lane Use

The HOV Lane Use statute authorizes the use of a high occupancy vehicle (HOV) lane by certain EV's.

Electric Vehicle Tax Credit- *1,314 Jan. 2013*

Make	Model	Vehicles
Chevy	Volt	567
Nissan	Leaf	170
Tesla		43
Toyota	Prius	492
Other	Other	42

4,069,809

Lifetime GGE Displaced

Existing Laws, Incentives & Infrastructure

Electric Vehicle Charging Station Tax Credit

Allows a State income tax credit of 20% up to $400.

Allowable Tax Credits Per Year		
2011	**2012**	**2013**
1,000	1,250	1,500
29	13	1

Electric Vehicle Pilot Program

- Establishes a pilot program for charging EV's.
- Program goal: modify behavior so that recharging occurs during off peak hours.

Existing Laws, Incentives & Infrastructure

Electric Vehicle Infrastructure Council

The Council developed an action plan to facilitate the successful integration of electric vehicles within Maryland's transportation sector.

Electric Vehicle Infrastructure Program

- Created in 2010 to aid the installation of EVSE's. Two grants issued totaling $594,000.
- Eighty one (81) stations were installed.

Existing Laws, Incentives & Infrastructure

- $5.9 Million ARRA Grant
- 143 Heavy Duty Hybrids
- 123 Hybrid Electric
- 20 Hydraulic Hybrids
- 143 Deployed
- 3,600,000 Miles on the Road
- Over 94,000 Gallons Saved
- 20%-30% Fuel Economy Increase
- Create 60 Green Collar Jobs

Maryland Energy ADMINISTRATION
Powering Maryland's Future

gna GLADSTEIN, NEANDROSS & ASSOCIATES

U.S. DEPARTMENT OF ENERGY

RECOVERY.GOV

Nestlé Waters NORTH AMERICA

ups

ARAMARK

Clean Cities
U.S. Department of Energy

DAIMLER

Sysco

ACCELERATING MARYLAND'S CLEAN CITIES TRANSPORTATION FUTURE

"Accelerating Maryland's Future"

Existing Laws, Incentives & Infrastructure

Maryland Electric Truck (MET) Voucher Program

Budget	$500,000
Voucher Amount	$15,000-$20,000
Eligible Vehicles	Class 3 and above
Eligible Fleets	Registered Maryland Motor Carriers

- Announced 10/12/11, **in Governor's Speech**
- Opened 1/31/12
- Partners: MEA, MCC, MDOT, MDE and MMTA
- Received 14 applications totaling $280,000
- Over 20,000 gallons will be saved annually with current commitments

Idle Reduction Technology Grant Program

- Opened 10/12/11, in **Governor's Speech**
- Partners: MEA, MCC, MDE & MMTA
- Received 58 applications totaling $219,594
- Over 108,000 gallons will be saved annually with current installations
- New Funding in 2013: $142,000

Budget	**$225,000**
Grant Amount	50% up to $4,000
Eligible Vehicles	Class 6 and above
Eligible Fleets	Registered Maryland Motor Carriers

Natural Gas Vehicle Voucher Program

- Opened 12/13/12
- Partners: MEA, MCC, MDOT, MDE & MMTA
- Incentives based on Gross Vehicle Weight (GVW)
- Accepting applications through 5/8/13

Budget	$400,000
Grant Amount	60% up to $3,000-$20,000
Eligible Vehicles	All Classes
Eligible Fleets	Registered Maryland Motor Carriers

ACCELERATING MARYLAND'S CLEAN CITIES TRANSPORTATION FUTURE

"Accelerating Maryland's Future"

Current Projects

- **University of Maryland- Propane Project**
- **John Hopkins University- CNG Project**
- **Maryland Smart Energy Communities**

Chris Rice
Clean Cities Coordinator

crice@energy.state.md.us
http://energy.state.md.us
Phone: (410) 260 - 7655