The Case for Fuel-Saving Technology
Jobs, Lots of Jobs, More Energy
Security, and Cleaner Air

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United Auto Workers
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United Nations Association, Lansing MI
Complete Industry Collapse PREVENTED

Which option looks best!

FAIL!
U.S. Vehicle Sales:
Will They Ever Recover?
(Model year: October to October)
Percent of Vehicles Sold in U.S. That Are Assembled in U.S.

0.0% 10.0% 20.0% 30.0% 40.0% 50.0% 60.0% 70.0% 80.0% 90.0% 100.0%

Graphic Representation of U.S. Motor Vehicle Sector Employment
Economic Trends for U.S. Auto Sector

• Cyclical Downturn or New Reality?
  – New vehicles as a percent of consumer spending
    • 2002 – 2007: 3.0%
    • 2008 – 2011: 1.8%
  – This shift resulted in over $600 billion in lost sales since 2008 when compared to previous pattern

• Critical Challenges in Auto Sector Economy
  – Will trade situation deteriorate?
  – Can worker pay ever recover?
Sales and Consumers

• U.S. consumers are hurt by weak employment growth
  – After 2001 and 2009 recessions, employment recovery weak: “Jobless Recovery”
• U.S. consumers hurt by wages that have lagged inflation for 30 years

The main threat to auto sales is the lack of job and income growth
CAFE Does Not Kill Sales

• Under no circumstance is the buyer worse off
  – Gas savings overwhelm price increase
• Is it the price of the vehicle or the cost of driving?
• Actual consumer experience does not involve a net-present-value calculation
  – Does involve higher monthly payments
  – Gas savings exceed incremental payment beginning month #1?
Economic Growth Matters Most

CAFE Standards vs. Sales

Miles per Gallon

Unit Sales Millions


Car Std Truck Std Total Sales mm

<table>
<thead>
<tr>
<th>Year</th>
<th>Car Std</th>
<th>Truck Std</th>
<th>Total Sales mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>1978</td>
<td>20</td>
<td>18</td>
<td>38</td>
</tr>
<tr>
<td>1980</td>
<td>22</td>
<td>20</td>
<td>42</td>
</tr>
<tr>
<td>1990</td>
<td>24</td>
<td>22</td>
<td>46</td>
</tr>
<tr>
<td>2000</td>
<td>26</td>
<td>24</td>
<td>50</td>
</tr>
<tr>
<td>2010</td>
<td>28</td>
<td>26</td>
<td>54</td>
</tr>
</tbody>
</table>

Legend:
- Blue: Car Std
- Red: Truck Std
- Green: Total Sales mm
Major Shift in Energy Policy: President Obama Establishes Conditions for Future Success

New efficiency standard 54.5 miles per gallon in 2025

Consumers shift to more efficient vehicles

Green cars create more jobs

Plants everywhere retool for more efficient vehicles

A Green-Based Revival of U.S. Auto Industry?
Good Governance

• Fuel economy rules the result of rough agreement between regulators and companies
  – Preferable because deeply technical and highly confidential business information required
• Presidential memo required consultation of all stakeholders
• Company and EPA/DOT technical staffs the critical participants
How the Standards are Structured: Car Curve
What CAFE Achieves

• Motor Vehicle Sector – LDVs + MHD – contributing more to GHG reductions and oil security than any sector, by far
• Auto Industry on a path to reduce per-vehicle emissions over 80% by 2040.

UAW President Bob King: Auto industry deserves recognition for leadership on issues critical to our nation
Sales Shift to More Efficient Vehicle Classes

Market Share by Vehicle Class

- Small Car: 15.2% (2000), 18.3% (2011)
- Middle Car: 23.1% (2000), 19.9% (2011)
- Large Car: 3.6% (2000), 1.9% (2011)
- Luxury Car: 8.7% (2000), 7.8% (2011)
- Cross Utility: 24.6% (2000)
- Sport Utility: 17.2% (2000), 7.8% (2011)
- Van: 10.3% (2000), 5.8% (2011)
- Pickup: 18.3% (2000), 14% (2011)

Legend:
- Blue: 2000
- Green: 2011
Consumers Shift to More MPG

Dearborn, Mich., June 21, 2011 – More than 40 percent of consumers view fuel economy as “extremely important” when considering a new vehicle purchase today, a new study finds.

What’s more, one third of consumers say fuel economy will have the “greatest impact” on their next vehicle purchase, and younger buyers place an even higher priority on miles per gallon.

The Maritz Research survey results also track with Ford’s 2011 research and sales trends. Consumer perceptions of Ford delivering “good gas mileage” grew 57 percent from late 2008 to the end of the first quarter of 2011, according to Ford’s latest brand health study.

“Customers are telling us clean and green vehicles matter most because they are good for people’s wallets and good for our planet,” said Mark Fields, Ford president of The Americas. “We hear what they are saying, and that is why Ford is absolutely committed to giving our customers vehicles with top fuel efficiency.”
Auburn Hills: Michigan-based BorgWarner a Leader in Fuel Efficient Products

Michigan-based Borg Warner is a leader in supplying fuel efficiency-boosting products to OEMs, including turbochargers and parts for high-efficiency transmissions, among others. In November 2011, Borg Warner announced over $2.5 billion in net new business expected through 2014, a nine percent gain over the previous three-year cycle, and heavily focused on fuel efficient product applications. BorgWarner has five facilities and over 900 employees in Michigan.

Source: BorgWarner, Nov. 8, 2011

Dearborn: Ford Boosts Engineering Staff for Fuel-Saving Technologies R&D

Ford Motor Company announced in March 2012 that it is investing in revamping a major section of its Advanced Engineering Center in Dearborn in order to house a fuel-efficiency engineering team that has doubled to 1,000 employees in the past five years. Working on a range of fuel-saving technologies, including hybrid engines, electrified vehicles, and Ford’s EcoBoost engine range, the added engineering staff are essential in helping Ford meet consumer demands for more fuel efficient vehicles and give the company a competitive advantage in the high-stakes world of fuel efficient vehicles.

Source: USA Today, March 29, 2012
Standards + Incentives = More Jobs

- Demand for fuel-saving technology assured by changing customer taste and long-term regulatory certainty
- The UAW believes this is an opportunity to increase domestic employment

Policies that assist in capital formation help create domestic employment
Ford gets a $5.6 Billion Loan from the Federal Government

- Ford approved for **13 projects in 3 states that create or retain 38,000 jobs**
- Money can only be used to retool factories for fuel-efficient production and the associated engineering
- Low-interest loan with generous pay-back terms
- Van Dyke, Rawsonville, Cleveland, Wayne, Louisville, and many more retooled with this money.
Driving Growth: Incentives Matter

• 2010 study by UAW, NRDC and Center for American Progress estimates that continued incentives could result in up to 150,000 additional auto industry jobs in 2020 @ 40 mpg fleet average

• Premised on *net incremental content* and projections about domestic production share

Near term: advanced conventional technologies provide most fuel savings and most jobs
Why Hybrids Create Lots of Jobs
Someone Must Engineer and Produce all the Additional Components!!
Real Companies, Real Jobs

Figure 3: Example U.S. Suppliers of Fuel-Efficient Vehicle Components

- **ENGINE DIRECT INJECTION**
  - Suppliers manufacturing this component: Bosch, Continental, Siemens

- **EXHAUST GAS RECIRCULATION**
  - Suppliers manufacturing this component: GM Components Holdings, Keihin, Metaldyne

- **START/STOP COMPONENTS AND SYSTEMS**
  - Suppliers manufacturing this component: Denso, Bosch, Johnson Controls, Inc.

- **TURBOCHARGERS**
  - Suppliers manufacturing this component: Honeywell, BorgWarner, ABB

- **ADVANCED ENGINE VALVE CONTROLS**
  - Suppliers manufacturing this component: GM Components Holdings, Aisin, BorgWarner

- **ELECTRONIC CONTROLLERS**
  - Suppliers manufacturing this component: Arens Controls, Denso, Keihin

- **HIGH STRENGTH STEEL**
  - Suppliers manufacturing this component: AK Steel, Severstal, ArcelorMittal

- **CAPACITORS**
  - Suppliers manufacturing this component: Hemlock Semiconductors, KEMET, Maxwell Technologies

- **BATTERY SYSTEMS**
  - Suppliers manufacturing this component: A123 Systems, Johnson Controls, Inc., GM Subsystems Manufacturing

- **ELECTRIC POWER STEERING**
  - Suppliers manufacturing this component: JTEKT, Nexteer, NTN

- **FUEL-EFFICIENT TIRES**
  - Suppliers manufacturing this component: Michelin, Goodyear, Continental Tires

- **ADVANCED TRANSMISSIONS**
  - Suppliers manufacturing this component: Ford, Chrysler, ZF

- **ELECTRIC-DRIVE WIRING SYSTEMS**
  - Suppliers manufacturing this component: Lear, Yazaki, Sumitomo Electric
<table>
<thead>
<tr>
<th>Product Category</th>
<th>Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced Gasoline Internal Combustion</td>
<td>Engine assembly, camless valve actuation, cylinder deactivation, exhaust</td>
</tr>
<tr>
<td>Engines and Components</td>
<td>treatment, gasoline direct injection, turbochargers, variable valve</td>
</tr>
<tr>
<td></td>
<td>lift, variable valve timing</td>
</tr>
<tr>
<td>Alternative fuel systems</td>
<td>Fuel cells, propane and natural gas propulsion components</td>
</tr>
<tr>
<td>Batteries</td>
<td>Materials, separators, cells, and packs for traction and start-stop</td>
</tr>
<tr>
<td></td>
<td>system batteries</td>
</tr>
<tr>
<td>Diesel Engine Vehicles</td>
<td>Engines, turbochargers, injectors, electronic fuel pumps, and after-treatment systems</td>
</tr>
<tr>
<td>Electronics</td>
<td>Electronic braking, electronic compressors, electronic control modules,</td>
</tr>
<tr>
<td></td>
<td>electronic controls/controllers, capacitors, charging systems, electronic</td>
</tr>
<tr>
<td></td>
<td>motors, electric power steering, high efficiency alternators, inverters,</td>
</tr>
<tr>
<td></td>
<td>power splitters, sensors, start/stop systems, starter/generator, wiring</td>
</tr>
<tr>
<td></td>
<td>systems, including specialized wiring harnesses</td>
</tr>
<tr>
<td>Hybrids</td>
<td>Hybrid-specific powertrain components, fuel tanks, low energy lighting,</td>
</tr>
<tr>
<td></td>
<td>vehicle assembly</td>
</tr>
<tr>
<td>Infrastructure</td>
<td>Battery-swapping stations, home charging stations, public charging</td>
</tr>
<tr>
<td></td>
<td>stations, battery materials recycling</td>
</tr>
<tr>
<td>Materials</td>
<td>Aluminum, carbon fiber, high strength steel, lithium mining, magnesium,</td>
</tr>
<tr>
<td></td>
<td>rare earth metals mining</td>
</tr>
<tr>
<td>Non Powertrain</td>
<td>Aerodynamic improvements, cooling systems, exhaust gas recirculation</td>
</tr>
<tr>
<td></td>
<td>systems, electric water pumps, emissions control enabling clean diesels,</td>
</tr>
<tr>
<td></td>
<td>gasoline direction injection</td>
</tr>
<tr>
<td>Plug-in Electric Vehicles</td>
<td>Battery cooling systems, vehicle assembly, vehicle conversion, specialty</td>
</tr>
<tr>
<td></td>
<td>(3-wheel and low-speed electric) vehicle assembly</td>
</tr>
<tr>
<td>Transmission</td>
<td>Six or more speed transmission, automated manual transmission, continuously</td>
</tr>
<tr>
<td></td>
<td>variable transmissions, dual clutch transmission</td>
</tr>
<tr>
<td>Truck (Class 4+) and bus hybrid components</td>
<td>Hybrid truck and bus component and vehicle assembly</td>
</tr>
<tr>
<td>and assembly</td>
<td></td>
</tr>
</tbody>
</table>
UAW, NRDC and NWF Study on Production Locations
Strategic Approach to the Future: Capture Early Investment in U.S.

• Recovery Act Battery and Electric Drive Component Grant Program invests $2.0 billion in U.S. *production*

• U.S. will go from 2% of world’s advanced battery capacity in 2008 to 40% by 2016
  – Similar progress on other electric-drive components

• Governor Granholm deserves a lot of credit for understanding the long-term importance to Michigan

• U.S. finally gets smart and does what other nations have been doing – supports its auto industry and pushes new technology
United States Invests in Electric Drive Technology
Beginning of Plug-in Hybrid Market in U.S.

Chevy Volt made in Detroit
UAW and GM Partner to Make It Work in the U.S.

GM Brownstown Battery Assembly Plant

2009 - 2010 Highlights
Ford Michigan Truck Re-Invents Itself

- Switched from Big SUV – one shift, sales dying to small car, sales growing, two shifts, possibly three
- Now set up as Ford’s first electrified vehicle plant
- Adding B-Max Energi electric CUV as we speak!
Nexteer in Saginaw

- Electric Power Steering
- Technology Leadership
- Over 4,000 good jobs in Saginaw Michigan

http://www.drivinggrowth.org/driving-growth-in-michigan-nexteer/
Big Savings on Fuel = Big Boost to Consumer Spending

### Gearing Up
Smart Standards Create Good Jobs Building Cleaner Cars

#### Table 4. Sector Specific Employment Impacts

<table>
<thead>
<tr>
<th>Sector</th>
<th>2017</th>
<th>2020</th>
<th>2025</th>
<th>2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>320</td>
<td>1,400</td>
<td>5,500</td>
<td>8,200</td>
</tr>
<tr>
<td>Oil and Gas Production</td>
<td>14</td>
<td>-200</td>
<td>-1,300</td>
<td>-2,500</td>
</tr>
<tr>
<td>Mining</td>
<td>80</td>
<td>290</td>
<td>1,100</td>
<td>1,200</td>
</tr>
<tr>
<td>Transportation and Public Utilities</td>
<td>420</td>
<td>2,000</td>
<td>8,800</td>
<td>15,000</td>
</tr>
<tr>
<td>Construction</td>
<td>160</td>
<td>700</td>
<td>3,000</td>
<td>4,900</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>1,800</td>
<td>7,100</td>
<td>27,000</td>
<td>35,000</td>
</tr>
<tr>
<td>Oil Refining</td>
<td>-1</td>
<td>-24</td>
<td>-120</td>
<td>-190</td>
</tr>
<tr>
<td>Iron and Steel Products</td>
<td>160</td>
<td>610</td>
<td>2,300</td>
<td>2,500</td>
</tr>
<tr>
<td>Light-Duty (LD) Vehicle Manufacturing</td>
<td>420</td>
<td>1,500</td>
<td>5,300</td>
<td>5,100</td>
</tr>
<tr>
<td>LD Vehicle Parts Manufacturing</td>
<td>4,200</td>
<td>14,000</td>
<td>49,000</td>
<td>45,000</td>
</tr>
<tr>
<td>Wholesale and Retail Trade</td>
<td>1,100</td>
<td>2,800</td>
<td>8,400</td>
<td>16,000</td>
</tr>
<tr>
<td>Vehicle Sales and Services</td>
<td>620</td>
<td>7,000</td>
<td>35,000</td>
<td>68,000</td>
</tr>
<tr>
<td>Business and Personal Services</td>
<td>4,900</td>
<td>30,000</td>
<td>140,000</td>
<td>310,000</td>
</tr>
<tr>
<td>Government</td>
<td>1,900</td>
<td>8,500</td>
<td>39,000</td>
<td>63,000</td>
</tr>
<tr>
<td><strong>Total Jobs Impacts</strong></td>
<td><strong>16,000</strong></td>
<td><strong>76,000</strong></td>
<td><strong>320,000</strong></td>
<td><strong>570,000</strong></td>
</tr>
</tbody>
</table>

Note: Numbers may not appear to add up due to rounding.
Winning on Jobs, Emissions and Oil Security

• We can be successful if we:
  – Accelerate the introduction of fuel-saving technologies
  – Build capacity for domestic production
  – Preserve and expand U.S. employment as these technologies gain market acceptance

• U.S. industrial might can make a difference!
  – 1940: Walter Reuther proposed 500 planes a day
  – Today: 5,000 hybrids and clean diesels a day?
  – Tomorrow: very light weight E-100 plug-ins?

Challenge: Can auto industry progress be repeated in elsewhere? Clean Fuels and Renewable Energy?