ELECTRIC VEHICLES

Reducing Foreign Oil Dependence, Enhancing U.S. Competitiveness and Decreasing Pollution

PHOTO: GENERAL MOTORS CORP.

National policies that promote vehicle electrification are critical to reducing America's dependence on foreign oil, reinvigorating U.S. manufacturing and minimizing environmental impacts while enhancing the nation's competitiveness in the global clean energy economy. If the United States committed to deploying 10 million charging stations and making 25 percent of new vehicles electric by 2020, it would yield benefits that could help strengthen economic, national and environmental security far into the 21st century.

HEAVY RELIANCE ON OIL

In the United States, 94 percent of cars, trucks, ships and planes depend on oil. In 2009, this country imported 11.7 million barrels of crude oil and refined petroleum products per day.[1] At $100 a barrel, this amounts to sending foreign countries—some of them hostile to U.S. interests—more than $1.1 billion to meet our daily energy needs.[2] To ensure stability in the world oil markets, American troops are deployed on oil-security missions, costing U.S. taxpayers $67 billion to $83 billion a year, according to the Rand Corp.[3]

The United States also faces increased competition for oil from developing nations. According to the U.S. Energy Information Administration, developing nations will account for 85 percent of new energy demand through 2035.[4] To avoid the crippling economic and security effects of dependence on a commodity that

is increasingly scarce and more expensive, America's vehicle fleet must become more efficient and able to use alternative sources of fuel, such as electricity.

ECONOMIC OPPORTUNITY

Manufacturing and Investment

Manufacturing is one of the largest U.S. economic sectors, providing more than 11.6 million direct jobs.[5] Vehicle manufacturing accounts for almost 700,000 jobs, and recent growth in this industry is contributing to the nation's economic recovery.[6] Manufacturers are making new investments in electric vehicles (EVs) to meet consumer demand; General Motors Corp. announced that it will double production of the Chevy Volt in 2011. Underscoring the demand for electric vehicles, the first production line of the Nissan Leaf sold out six months before the vehicle went on sale. Ford Motor Co. offers an electric commercial van, the Transit Connect, and will begin selling its all-electric Focus by the end of 2011. Demand for EVs has resulted in new battery and component manufacturing facilities across the United States. The Department of Energy estimates that the United States will have the capacity to produce 40 percent of the world's advanced vehicle batteries by 2015, and other experts predict that battery manufacturing could grow to $100 billion a year by 2030.[7]

Investments in charging infrastructure offer significant economic opportunities as well. The U.S. market for supply and installation of residential charging points alone is expected to reach almost $1 billion by 2020.[8] Investments made in the American Recovery and Reinvestment Act are deploying infrastructure in urban areas to collect information on how charging stations are used and will help ensure that EVs can be charged effectively and conveniently.

Though the United States has made critical initial investments in EVs and charging infrastructure, it will face intense competition for production and installation of these technologies. Overseas, China hopes to produce 500,000 EVs annually beginning in 2011 and is investing $15 billion in EV research, purchase incentives and charging stations.[9] South Korea has also launched its Battery 2020 Project, which aims to invest $12 billion in battery technologies to become the world leader in rechargeable battery production in 10 years.

Efficiency and Consumer Savings

Vehicles fueled by electricity are far more efficient than conventional vehicles, sometimes achieving efficiency equivalents of 100 mpg.[10] When these vehicles run on batteries alone, the cost of driving is significantly lower than with conventional vehicles. Fuel costs for EVs are typically 2 to 3 cents a mile, whereas owners of conventional vehicles with average fuel efficiency pay more than 13 cents a mile when gasoline prices are $3 a gallon. At these prices, an EV owner will save up to $10,000 over the vehicle's lifetime, compared with a conventional vehicle.[11]

PHOTO: FELIX KRAMER/FLICKR

> *"Electric vehicle technology is real and ready for deployment, and we are embracing the transformation. … Wide-scale adoption of electric vehicles will also drive clean energy innovation, strengthen energy security and deliver economic value."*
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> **—Jeff Immelt,** General Electric's chief executive and chairman

NATIONAL SECURITY AND ENVIRONMENT BENEFITS

Security

As noted previously, the United States spends billions of dollars a year on oil-security missions, requiring mobilization and deployment of a significant number of military personnel. Recent political instability in the Middle East has disrupted oil markets. A 2010 report by CNA's Military Advisory Board confirmed that "[o]ur dependence on foreign oil reduces our international influence, places our troops in dangerous global regions, funds nations and individuals who wish us harm and weakens our economy."[12] The Department of Defense has aggressively sought to reduce its dependence on foreign oil, which accounts for more than 80 percent of the U.S. government's total energy consumption. The Navy, for example, aims to reduce its petroleum use in the commercial fleet by 50 percent by 2015. If the United States reduces its dependence on oil imports, the Department of Defense can meet its national security obligations at a far lower cost.

Emission Reductions

EVs emit far fewer greenhouse gases than conventional vehicles. Although power plants use various types of fuel to generate electricity, even plug-in hybrid EVs powered by older coal plants emit approximately 25 percent fewer greenhouse gases compared with conventional vehicles. Plug-in hybrids charged with electricity from zero emission power plants can achieve a 66 percent reduction in emissions.[13] With transportation accounting for more than 31 percent of annual greenhouse gas emissions in the United States, broad adoption of EVs will dramatically lower emissions from this sector.[14]

A PATH FORWARD: POLICY SPURS INVESTMENT AND DEPLOYMENT

To fully realize the benefits from large-scale adoption of EVs, national policies are needed to help stimulate demand and ensure that EVs do not encounter technical or logistical obstacles. Some of these policies include:

- Adoption of a national goal for deployment of EVs and infrastructure, including 10 million charging stations by 2020, and invest in programs to deploy new charging infrastructure in communities around the nation. Financial incentives provided to localities that develop innovative plans to accelerate deployment of EVs and charging stations will help address consumer "range anxiety"—the fear of becoming stranded too far from a charge. Continued provision of effective purchase incentives that can be realized immediately by consumers to spur sales and help manufacturers achieve economies of scale.
- A higher cap on EV purchase incentives.
- More research and development investments in vehicle technologies, especially rapid charging devices and long-lasting batteries.

> *"The best ways to reduce oil intensity are to bring to bear a diversity of fuels in the transportation sector, and this is best achieved by the electrification of transportation."*
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> **—Retired Air Force Gen. Charles F. Wald,** member, Energy Security Leadership Council, and former deputy commander, U.S. European Command

1 U.S. Energy Information Administration. Nov. 29, 2010. "How Dependent Are We on Foreign Oil?" www.eia.doe.gov/energy_in_brief/foreign_oil_dependence.cfm.

2 In February 2011, average world oil prices passed $100 a barrel. Energy Information Administration http://eia.gov/dnav/pet/pet_pri_wco_k_w.htm.

3 Rand Corp. 2009. *Imported Oil and U.S. National Security*. Page 98. www.rand.org/pubs/monographs/2009/RAND_MG838.pdf.

4 Energy Information Administration. July 2010. "International Energy Outlook 2010." www.eia.doe.gov/oiaf/ieo/pdf/0484%282010%29.pdf.

5 The Bureau of Labor Statistics reported that January 2011 manufacturing employment stood at 11.6 million of the 153 million individuals in the national workforce. www.bls.gov/news.release/pdf/empsit.pdf.

6 Vehicle manufacturing accounted for 20,000 of the 49,000 manufacturing jobs added in January 2011. www.bls.gov/news.release/pdf/empsit.pdf.

7 Department of Energy. July 2010. *The Recovery Act: Transforming America's Transportation Sector, Batteries and Electric Vehicles*. P. 8. www.whitehouse.gov/files/documents/Battery-and-Electric-Vehicle-Report-FINAL.pdf.

8 Bloomberg New Energy Finance. Feb. 24, 2011. *Advanced Transportation, Energy Smart Technologies*. P. 1.

9 International Energy Administration, 2009. *Technology Roadmap: Electric and plug-in hybrid electric vehicles*. P. 18. www.iea.org/Papers/2009/EV_PHEV_Roadmap.pdf.

10 The Environmental Protection Agency has given the Nissan Leaf an equivalent fuel-economy rating of 99 mpg of gasoline when it is running only on electricity. The Chevy Volt's equivalent rating is 93 mpg. www.fueleconomy.gov.

11 Model year 2009 vehicles had an average fuel economy of 22.5 mpg. Driving 10,000 miles per vehicle annually for 10 years, fuel costs for an EV would total $3,000, compared to $13,000 for a conventional vehicle. www.epa.gov/otaq/fetrends.htm.

12 CNA Analysis & Solutions. May 2009. *Powering America's Defense: Energy and the Risks to National Security*. P. i. www.cna.org/sites/default/files/Powering%20Americas%20Defense.pdf.

13 Electric Power Research Institute, Natural Resources Defense Council and Charles Clark Group. 2007. *Environmental Assessment of Plug-In Hybrid Electric Vehicles Vol. I: Nationwide Greenhouse Gas Emissions*. P. 7. http://my.epri.com/portal/server.pt?open=512&objID=243&PageID=223132&cached=true&mode=2.

14 The Environmental Protection Agency's 2011 Draft U.S. Greenhouse Gas Inventory Report estimates that the transportation sector accounted for 31 percent of greenhouse gas emissions in 2009. www.epa.gov/climatechange/emissions/downloads11/US-GHG-Inventory-2011-Executive-Summary.pdf.

Contact: Joe Dooley | Senior Associate, Clean Energy Program | Pew Environment Group
202-540-6309 | jdooley@pewtrusts.org

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