



Environmental Law & Policy Center
Protecting the Midwest's Environment and Natural Heritage

Plug-In Hybrids: Smart Strategies for Reducing Pollution Why Location and Charging Time Matter

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Northern Illinois Is A Very Good Place For Plug-In Hybrid Vehicles

- Chicago Metro Area – 9+ million people. **3rd largest U.S. auto market.**
- Illinois is an **early adopter** – In top ten states for hybrid vehicle registrations.
- **Low-GHG power supply at night** means PHEVs can achieve net positive environmental benefits.
- **Low-Cost power generation at night**, higher-priced gasoline benefits PHEV economics.
- Ford, Chrysler and Mitsubishi have **manufacturing plants** in Illinois.



Daimler Smart for Two



Ford Focus Electric



Mitsubishi iMiev

Location Matters: Net Environmental Pollution



Major studies have highlighted the importance of the power generation mix for overall PHEV emissions impacts:

- National Academies of Science (includes life-cycle emissions from manufacturing)
- Minnesota Pollution Control Agency
- Electric Power Research Institute/Natural Resources Defense Council

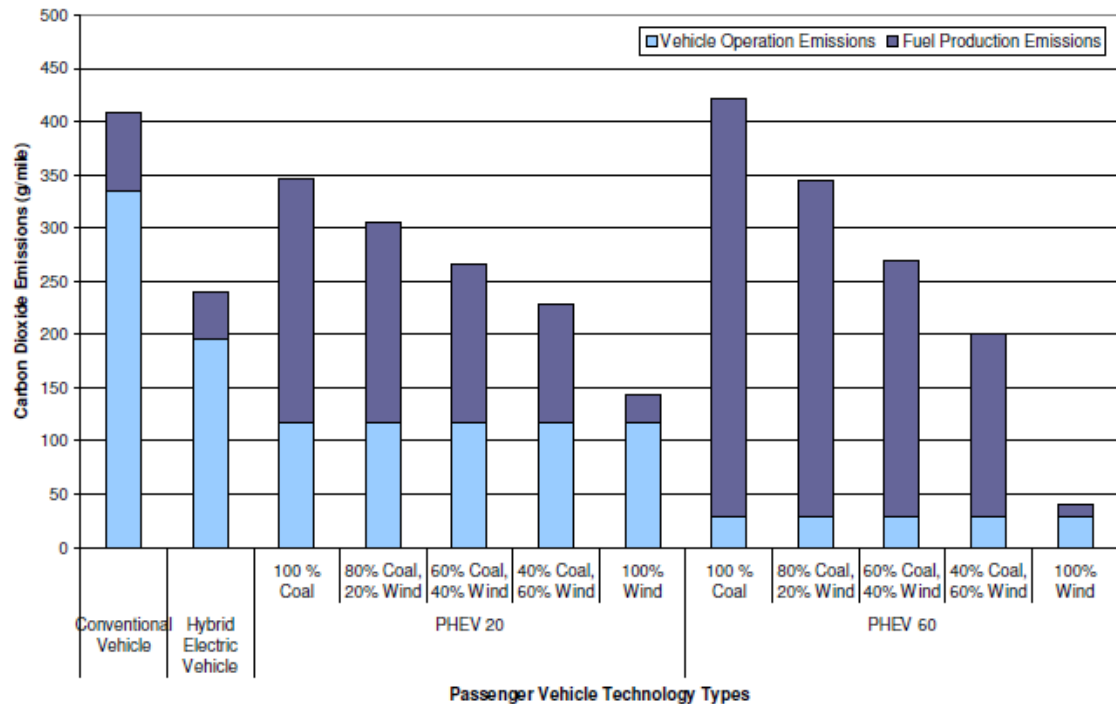


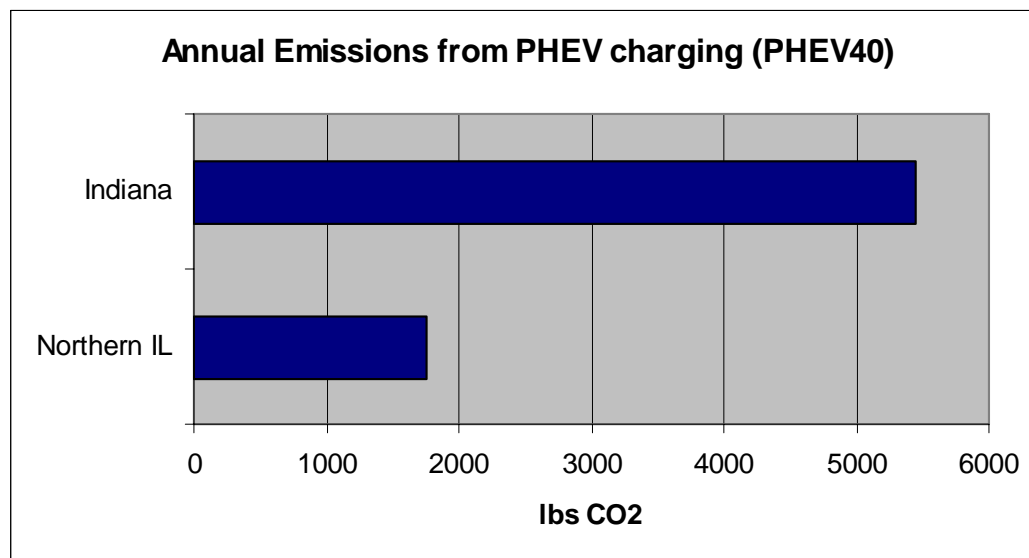
Figure 3: Carbon dioxide emissions (grams/mile) vehicle-to-vehicle comparison.

Minnesota Pollution Control Agency. "Air Emissions Impacts of Plug-In Hybrid Vehicles in Minnesota's Passenger Fleet," March 2007.

Location Matters for GHG: Compare Northern Illinois v. Indiana



- Northern Illinois' power mix: 62% Nuclear, 32% Coal, 4% Gas, 2% Renewables (and growing to about 20% by 2020)
- Indiana's power mix: 94% Coal, 5% Gas, 1% Nuclear
- **Northern Illinois' power mix generates 710 lbs CO₂ per MWh, compared to Indiana's power mix at 2200 lbs CO₂ per MWh.**
- South Dakota's power mix is ~50% hydro power, but the automobile market is very small.



Time Of Charging Matters: GHG Pollution and Power Prices



- **Encourage Charging PHEVs at Night When Low/No-GHG, Low Marginal Cost Nuclear Power and Wind Power Resources Are Abundant** in Northern Illinois and are at the margin many hours to meet new PHEV power demand.
- **Discourage Charging PHEVs at Peak Demand Daytime Hours when High-Polluting Coal Plants are at the margin** and power market prices are highest.
- ***However, Encourage Use of Solar Power at PHEV Charging Facilities to Enable No-GHG, Low-Cost Charges.***

Smart Strategies for PHEV Integration and Acceleration

- Location Matters: Choose markets where the electricity is largely generated from low/no GHG power resources – wind power, solar power, nuclear power, hydro power.
- Location Matters: Choose large automobile markets where policy advocacy can make a major difference.
- Time of Charging Matters: Create rate incentives for PHEV charging at night when nuclear and wind power are generating low-cost, low-GHG power. *ELPC is building a coalition to support a new discounted rate tariff for PHEV charging at night.*
- Time of Charging Matters: Require public charging stations to build/install solar/wind power or buy RECs to offset generation during daytime use.



Photo by Envision Solar – Dell Solar Grove

Plug-in Hybrids – Energy Cost Savings Opportunities



Annual Vehicle Energy Costs

	<i>PHEV Savings</i>	<i>PHEV40 (10¢ /Kwh)</i>	<i>HEV</i>	<i>Conventional Vehicle</i>
\$2.00/ Gallon	\$514	\$462.10	\$633.20	\$975.60
\$3.00/ Gallon	\$894	\$569.30	\$949.80	\$1,463.40
\$4.00/ Gallon	\$1275	\$676.50	\$1,266.40	\$1,951.20

- **Night-time discounted PHEV charging rate (4¢/kWh) would result in savings of an additional \$150 - \$175 per year.**
- **If the Chevy Volt prices at \$40,000 (pre-\$7,500 federal tax credit), payback period is 7 years to get to the price of a Toyota Prius (with \$4/gallon gas).**
- **Economics will change as battery costs decline and/or V2G technology creates value for the electric grid.**

Chicago Is Preparing for PHEVs



- City of Chicago's Electric Vehicle Coalition is providing a forum for collaborative work: charging station installation and interconnection, public charging locations and ownership models, on-site renewable energy, permitting, etc.
- Illinois' capital program includes \$10M for electric car infrastructure.
- Local companies I-Go and Carbon Day are developing business models for EV car-sharing and solar powered charging stations.
- The U.S. Department of Energy recently awarded the City of Chicago Department of Environment \$15M for clean transportation initiatives.
- ComEd will deploy up to 32 public charging stations in the Chicago area and is considering interconnection issues.

Questions & Comments

- Please type your questions into the chat box at the lower left side of the webinar screen.



Photo by Envision Solar – NREL Solar Tree