

PHEV Market Potential Study

Objectives:

- To assess the market potential and identify the market niche(s) for PHEVs
- Identify markets and geographic area where PHEVs would provide environmental benefits
- Assess fleet functions and identify potential fleet markets for PHEVs within Minnesota and nationally
- Identify vehicle use segments that are most likely to buy PHEVs
- Assess potential customer acceptance
- Recommend markets for PHEV within MN that have best potential
- Identify incentives for these MN markets that would buy down extra cost of PHEVs enough to influence purchase.

Background:

A 2001 EPRI study found that 30-35% of consumers surveyed would choose a PHEV even if it were priced up to 25% higher than a \$19,000 conventional powered car. What's more, over 65% of respondents preferred plugging a vehicle at home to going to the gas station. But intentions are not reliable enough on which to build a market plan. This study would review relevant market studies on vehicles, with particular attention to factors that differentiate markets for fuel efficient or/and hybrid vehicles. It would identify market segments, include markets for fleet vehicles, in Minnesota that would most likely be interested in purchasing PHEVs and make recommendations on policy that could influence purchase decisions for these markets.

Variations:

The Market Potential Study would be modified as needed to provide specific market research for the type of vehicle that would be developed in a Minnesota PHEV conversion demonstration project. (See Demonstration Project worksheets)

Budget:

PHEVs: Potential Impact on MN's Electric Capacity and Grid

Objectives:

- To determine if Minnesota utilities have adequate, spare generation capacity to accommodate PHEVs.
- To identify the seasons, times of day and weather conditions that would be optimal for the additional PHEV load and conversely to identify those times and days when the system is most likely to be constrained
- To recommend pricing structure or other strategies for encouraging plug-in of PHEVs at appropriate times and discourage it during peak.
- To assess impact at different market penetration rates of PHEVs on grid.

Background: Many PHEV supporters are suggesting that PHEVs would be plugged in for recharging overnight when there is excess electric capacity. But others suggest that commuters driving PHEVs would need to plug-in during the day to recharge their battery before their drive home. This study would assess the impact of PHEVs on Minnesota utilities' capacity and identify the parameters of operation that could supply power for PHEVs without impacting other users. It will also recommend strategies to encourage plug in when the system has excess capacity and discourage it during peaks.

Cost:

PHEV Ford Plant Environmental Assessment and Abatement Plan

Objective:

- Conduct a full environmental assessment of the Ford Plant site
- Develop an abatement plan as needed.

Background:

The Ford plant has a number of environmental problems that need to be identified, assessed and strategies for abatement must be developed. Ford will conduct an environmental assessment but they do not have to make this assessment public. The sub-committee thinks that the site requires a full environmental review. The Minnesota Department of Employment and Economic Development has a funding program that will partially fund such a study. The sub-committee would like to request that the legislature provide the additional funds needed.

Cost:

Green Manufacturing Feasibility and Market Assessment Study

Objective:

- To develop a green manufacturing or assembly business at the Ford Plant
- Identify growth areas within green technologies
- Determine which of the growth technologies have assembly processes that would require skills of UAW workers and provides a good fit for both that City St Paul and the Mississippi river corridor.
- Develop market plan to influence a business start-up or expansion at the site

Background:

- This study would assess trends in “green” technologies to identify growing technical industries. It would look at the manufacturing and assembly processes for these technologies to identify ones that could employ workers with the skill sets of current Ford employees. It would identify the types of “green” technologies that could expand in the Minnesota market and their likelihood to open a plant in Minnesota, given the proper incentives.

Cost:

Feasibility and Cost Study for a Ford Plant Retrofit

Objective:

- To determine feasibility and cost of retrofitting and/or retooling Ford Plant for new assembly or manufacturing use.

Background:

This study could begin as a generic study to estimate the gross costs involved in retrofitting the Ford plant for re-use as an assembly or manufacturing plant compared to the cost if the plant was torn down and rebuilt. Once a subset of industries are identified in the above mentioned Feasibility and Market Assessment study, a more detailed assessment of the costs could be undertaken for a particular type of industry or even a specific application.

Cost:

Business Development Incentives for ReUse of Ford Plant

Objective:

- To determine adequate incentives and develop incentive package to influence an new assembly or manufacturing operation at the Ford Plant site

Background:

This study would examine the types of incentives such as industrial development bonds, revenue bonds or a new “green” bond, and the amount that would be needed to attract businesses identified in the above studies to the plant.

Cost: ?

Ford Ranger Electric to Series Hybrid PHEV Conversion and Demonstration Project (or Ford S10)

Objective(s)

- Practical vehicle for utility fleet operations
- Demonstrate and document PHEV utility, operating economics
- Relationship to Ford plant
- Potential for data on series system PHEVs that could be compared to some of the parallel systems that other states are retrofitting

Strategic Decisions

- Utility vehicle vs. Passenger Car -- sacrifices best operating economics and electric range in favor of utility function / cargo capacity
- Identification of design driving cycle (drives vehicle power unit specification, battery capacity requirements)
- Range extended or full HEV
 - ✚ Smaller power plant will improve operating economics and emissions, result in range limitation on design drive cycle.
 - ✚ Larger power plant will provide increased utility and range at the cost of operating economics and emissions.
- Not in production vehicle – could limit replicability, availability of spare parts

Other questions

- Availability of technical documentation necessary to support reconfiguration
- Availability of technical support (cooperation) from Ford to support reconfiguration
- Engine / fuel selection (diesel or spark ignition, ULSD, bio diesel blend, straight biodiesel, unleaded gasoline, E85)
- Emissions waiver

Pro's

- Reasonable compromise for utility vehicle
- Tie-in to Ford plant.
- Room for locating retro-fitted power plant

Con's

- Relatively inefficient vehicle will require larger battery for same range, battery is one of strongest drivers on PHEV economics
- Achieving full truck functionality (e.g. towing capacity) will require a large power unit, alternatively compromise to the Electric Ranger capacity
- This is a complex and sophisticated system. Reverse engineering will be difficult / problematical without engineering documentation and /or preferably some support from Ford engineering

Collateral Studies

- Market study - to assess the market potential for both fleets and passenger vehicles that use Ranger sized vehicles for short start-and-stop trips, both in Minnesota and in U.S.
- Production study – to identify the vehicle parts, find suppliers and determine costs; evaluate licensing agreements, assess the feasibility and costs to produce a PHEV Ranger at various levels of production.
- Feasibility and cost study for Ford Plant retrofit – What would it take and how much would it cost to retrofit the Ford Plant to produce PHEV Rangers
- Business Development Incentives – examine types and amounts of incentives needed to retrofit Ford plant for production
- Consumer/Fleet Procurement Incentives – develop an incentive plan that will influence the procurement of PHEV Ranger

e-ride NEV to Series Hybrid PHEV Conversion and Demonstration

Objective(s)

- Practical vehicle for extended NEV operations, on-site utility operations
- Demonstrate and document extended utility, operating economics
- Relationship to local industry, EV development

Strategic Decisions

- Utility vehicle vs. Passenger Car -- sacrifices full passenger car functionality in favor of utility function, low cost
- Identification of design driving cycle (drives vehicle power unit specification, battery capacity requirements)
- Range extended or full HEV
 - ✚ Smaller power plant will improve operating economics and emissions, result in range limitation on design drive cycle.
 - ✚ Larger power plant will provide increased utility and range at the cost of operating economics and emissions.
- Production vehicle –replicable, spare parts and tech support available

Other questions

- Overall market size, potential impact of successful project
- Engine / fuel selection (diesel or spark ignition, ULSD, bio diesel blend, straight biodiesel, unleaded gasoline, E85)
- Emissions waiver

Pro's

- Reasonable compromise for small utility vehicle
- Tie-in to e-Ride, support for Minnesota small business
- Expanded functionality (range, capacity)
- Potential for greatly extended battery life (reduced SOC variation), improved battery economics

Con's

- Limited market size (compared to commuter vehicles), limited impact from successful product

Collateral Studies

- Market study - to assess the market potential for NEVs that have the added reliability of a hybrid engine as a backup for emergency situations. In addition to current markets, are there other functions/markets that NEVs could serve to provide environmental benefits, and if so, what are the regulatory barriers?
- Production study – to determine costs of production and assess feasibility
- Regulations – Assess federal and state (all states) regulations and identify regulatory barriers to expanding NEV hybrids into markets that would realize environmental benefits.
- Consumer/Fleet Procurement Incentives – develop an incentive plan that will influence the procurement of NEV with emergency backup engine.

Demonstration and Monitoring of a PHEV at the MN Department of Transportation and Staff Training in PHEV Maintenance

Objective:

To provide the MnDOT fleet staff with experience in operating and maintaining, a PHEV so that they can develop the infrastructure and knowledge for incorporating PHEVs into their fleet and act as advisors to other State agencies when PHEVs become commercially available to be integrated into the state's fleets.

Background:

PHEVs are a somewhat difference technology than normal fleet vehicles because of their need to be plugged in for battery recharging. In addition, to get optimal performance and minimize use of gasoline with a PHEV, they must have a suitable function that maximizes the use of its motors and be driven differently than a normal fleet vehicle. This project will provide MnDOT with both experience and training in PHEV operation and maintenance so that MnDOT will be better prepared to integrate PHEVs into the fleet when they become commercially available. It will also provide MnDOT with knowledge and experience so they can advise other State fleet managers on best use and operation of PHEVs.

Budget: \$70,000 for 1 demonstration PHEV and training.

PHEV and NEV Demonstration at Local Government Level

Objective:

This project will demonstrate and promote the use of PHEVs and all-electric vehicles for public service functions at the local government level in the state.

Background:

Advanced vehicle demonstrations are generally conducted and publicized in the Metro area. This project intends to move the demonstration technology into Greater Minnesota communities that are willing to participate by providing a hybrid vehicle for retrofit. This project would provide funding for a local government entity to retrofit its own hybrid vehicle as a PHEV and participate in the monitoring and testing protocols that the state's PHEV Task Force sets up. It would also provide funding for a local government to procure and deploy a neighborhood electric vehicle (preferably the E-Ride electric trucks which are currently manufactured in Princeton, Minnesota) for demonstration and testing purposes, such as use at a park or maintenance work around the community such as watering the floral gardens, mowing the parks and other maintenance needs.

FUNDING REQUEST: \$40,000