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PREDICTING THE IMPACT OF PLUG-IN HYBRID CARS

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In the coming years, more and more Ontarians will start plugging in their cars as well as filling them up. And with good reason. The plug-in hybrid electric vehicles (PHEVs) just starting to hit the market can run more than 30 km on their battery charge before switching over to gasoline. That saves consumers money, cuts air pollution, and reduces greenhouse gas emissions.

But what impact will this have on Ontario's electricity grid? Several WISE researchers set out to answer that question. They developed long-term forecasting models of peak and base electricity demand under different scenarios.

The chemical engineers considered different potential levels of PHEV penetration and charging scenarios. They took weather, demographics and economic variables into account. Finally, they compared linear and non-linear regression models to arrive at the most accurate forecasts.

Their predictions? Under the highest-demand scenarios - where PHEVs account for 50 per cent of Ontario's cars by 2030 and more than 50 per cent of charging occurs during peak hours - the province will need more generating power by 2027 to meet the demand. Similarly, demand will outstrip supply by 2029 if 30 per cent of Ontario's cars are PHEVs but 100 per cent charging takes place during peak hours.

Since it takes many years to increase the capacity of existing power plants or build new ones, this gives the Ontario Power Authority (OPA) the information it needs to start planning now for a PHEV future.

Currently, the WISE researchers are developing planning and optimization models to make the OPA's task easier. Taking into account a host of variables - from retrofit costs to hour-by-hour electricity loads - these models will allow OPA to find the most cost-efficient way of meeting increased demand in the years to come.

Partners: CANMET Energy Technology Centre, Natural Resources Canada