DYNAMIC MODEL OF A PLUG IN HYBRID ELECTRIC VEHICLE

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Outline

- Why PHEV
- REVS: Renewable Energy Vehicle Simulator
- Dynamic Model
- Some Results
It is estimated vehicle exhaust is responsible for 20% of greenhouse gases.

1000 times!

32 times!

Solution ???
Renewable Energy

- Gasoline (no biofuels)
- BEV
- PHEV (1/3 gasoline)
- PHEV (1/3 biofuel; 1.65 FF ratio)
- FCV (electrolysis H₂)
- Renewable H₂

GHG (g/km)
MB Winter Load

- Winter
- Winter + FCV
- Winter + BEV
- Winter + PHEV

Daytime vs. Nighttime

Vehicles in Manitoba:
- cars: 662,200
- Driving mileage per day: 50

New MW power

Generating Capacity

GHG/Emissions?

Manitoba Grid Infrastructure Winter
1. Model emerging Plug in Hybrid Electric Vehicle (PHEV) to optimize their performance and maximize the effective use of renewable energy resources.

2. Design and develop better mobility solutions and technologies for the transportation industry.

3. Operate on various biofuels, conventional gasoline and diesel, and renewable and non-renewable electricity.

4. Analyse any PHEV components vehicle configuration, alternative fuels, and control strategies.

5. Determine the optimal combination of fossil fuels, renewable biofuels and renewable grid electricity use.

6. Able to model the fundamental aspects of the PHEV components, process control, heat transfer, chemical reactions, thermodynamics and fluid properties.
Dynamic Model
Dynamic Model
Results

- **Time (sec)**: 0, 5, 10, 15, 20, 25, 30, 35
- **Speed (kph)**: 1, 5, 10, 15, 20, 25, 30, 35

Graphs showing the comparison between required speed and the performance of PHEV and Baseline models.
Results

High Battery Capacity

Low Battery Capacity
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