

# EV - Battery Pack Design & Performance for a Canadian Winter

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Electric  
Mobility  
Canada

Mobilité  
électrique  
Canada

# Canada and Plug In Vehicles

- Canada - a Great Place for Plug In Vehicles
  - National Electrical Production
    - Excess Capacity
    - Clean, Low GHG Emissions
    - Low Cost
  - Canada – A Winter Climate (4 to 6 Months)
    - Cold
    - Road Conditions (Snow, Slush, Road Salt)
    - Long Distances with Changing Conditions

# Driving an EV in the Winter

- Vehicle Energy Usage
- Changing Road Conditions
- Changing Temperature
- Range and Charging Anxiety



# Batteries in Cold

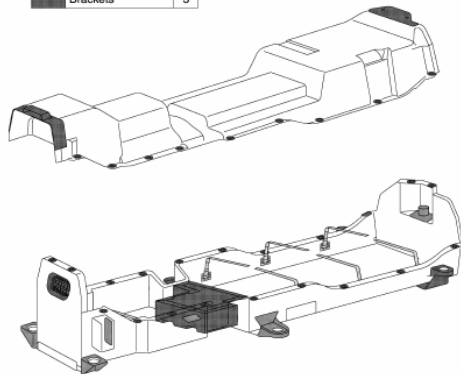
- Power Declines
- Energy Declines
- Amp Hour Capacity May Decline
- Life and Abuse Tolerance Unknown



# Pack Design

- Designs: Open, Enclosed, Sealed
- Thermal Management
- Salt and Insect/Rodent Intrusion
- State of Charge and Distance to Empty Algorithms

Battery hold downs	1
Battery tray	2
Brackets	3



# Pack Design

- Loss of Voltage Isolation by Salt Intrusion
- Condensate
- Mechanical Performance of Materials in Vibration/Cold



# Canada and Plug In Vehicles

- Vehicle Winter Energy Usage Can Change Dramatically on a Daily Basis (Efficient Winter Vehicle?)
- Battery Pack Design for Cold Climate is Evolving
- Need for Ever-present Plugs, Charging, Cabin Heating and Battery Warming
- Need for Development of Distance to Empty Algorithms Coupled with GPS

Canada – Great Electrical Resources

Designing EVs for the Cold Climate is in Progress