

EnerMotion's Auxiliary Power Management Incorporating Sustainable Energy Resources

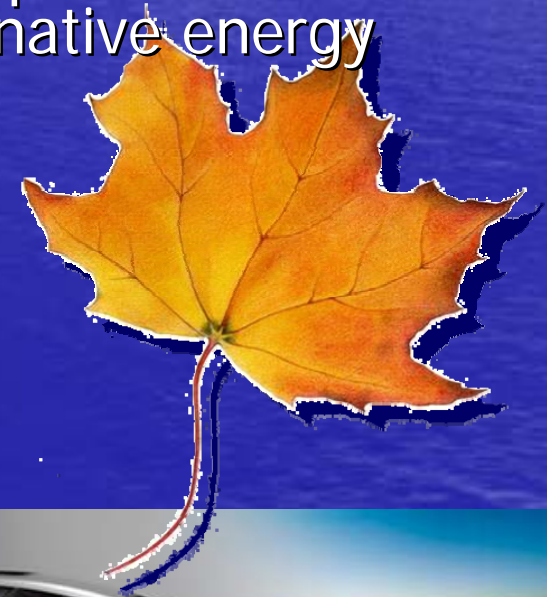
Steve Lapp, Director Technology
Jack MacDonnell, CEO



EnerMotion Inc.

"Centre of Excellence"

- Founded in 2007
- Federally Incorporated April 2008
- Key Directors
 - A consortium of engineers, scientists, technicians, academics, media and business professionals with 125 years of experience in alternative energy
- Privately funded
- R&D lab Bolton



1890 | 1900 | 1910 | 1920



1980 | 1990 | 2000 | 2010

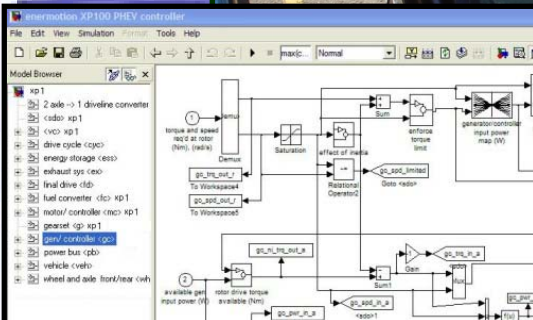
Photovoltaics on the Vehicle

- We have 5 years of road experience with high efficiency mono crystalline roof mounted Photovoltaics
- No mobile application problems
- Second generation being implemented in 2, 5 and 14kWh PV-PHEV apps



First Generation Hybrid Electric Range Extension (HERE) Prototype

- Battery 2kWh VRLA
- Solar Array 1.6m²
- Cells 19.5% Efficiency
- Peak Power 270W
- Array extends beyond Roof Line
- Small Aero drag Penalty
- Best Results 2.78 L/100km (100mpg)
- Simple First Generation Controller with Manual Override
- DC/DC Converter To Boost Voltage to Vehicle Bus @ 330 VDC
- 110 V Charging



Modeled Results – HERE™ System

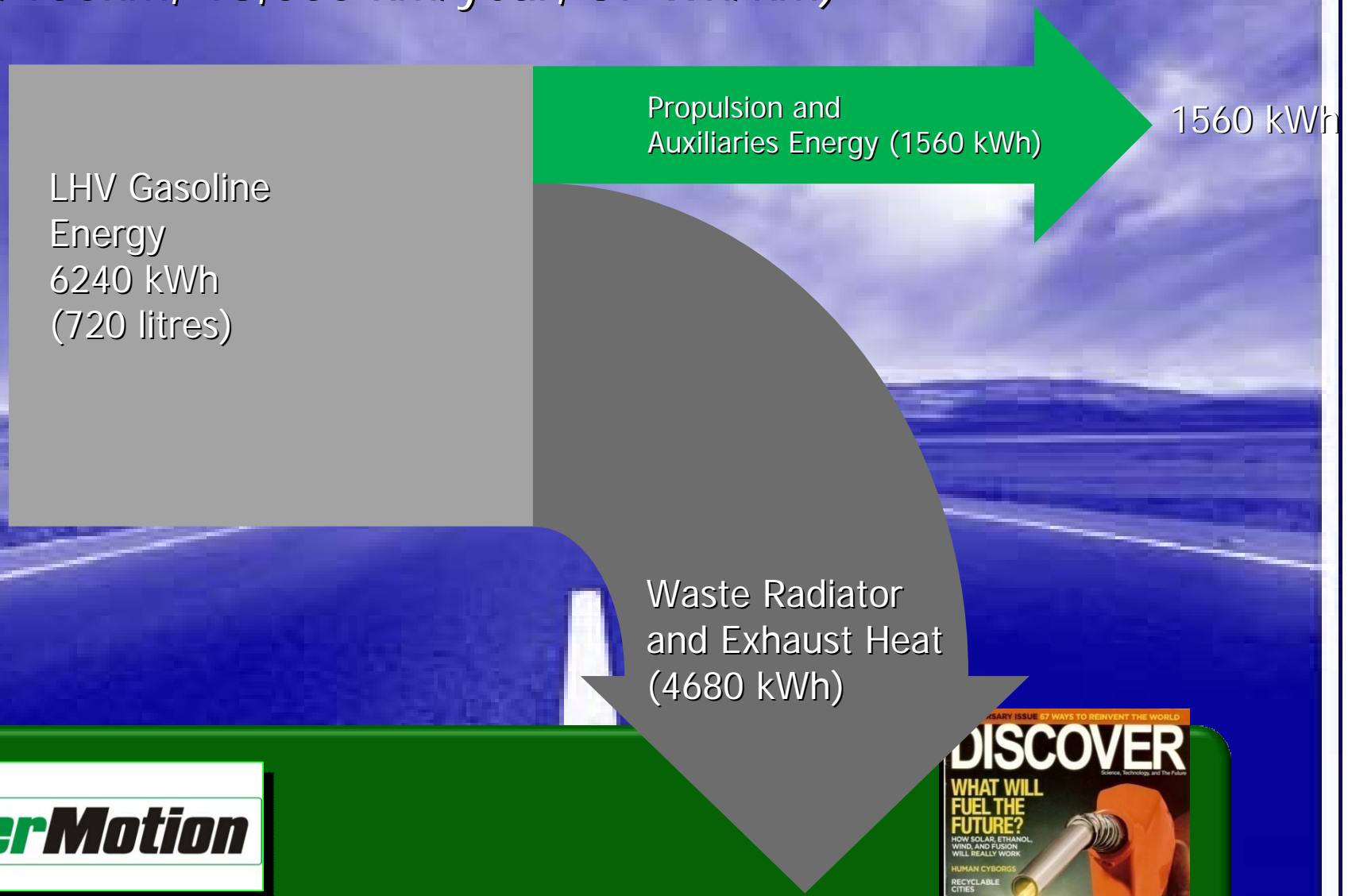
| | 2010 Full Hybrid | Full Hybrid with HERE System (2 m ² PV @ 17%) | Full Hybrid PHEV with HERE System (2 m ² PV @ 20%) |
|--|------------------|--|---|
| Total Heating Value of Gasoline Energy - kWh | 6240 | 5000 | 3120 |
| Total Shaft Energy Delivered from Engine - kWh | 1560 | 1248 | 780 |
| Total solar insolation on vehicle roof | n/a | 2618 | 2618 |
| Energy from PV - kWh | n/a | 440 | 510 |
| Energy From PV after losses - kWh | n/a | 310 | 360 |
| PHEV Electricity from Grid - kWh | n/a | n/a | 420 |
| Wh/km | 87 | 87 | 87 |
| l/100 km | 4 | 3.2 | 2 |
| Annual litres of gasoline | 720 | 576 | 360 |
| gm C02/km | 94 | 75 | 47 |

Assumptions

- 4 l/100 km base hybrid series/parallel architecture vehicle
- Toronto solar insolation data (MATLAB w/Meteorological yr data)
- 17% present, 22% near term solar conversion efficiency
- 18,000 km per year vehicle travel
- 25% ICE average ICE engine efficiency (par/series hybrid)
- 87 Wh/km electrical energy usage equivalent (1560 kWh/year)



Energy Flow – Stock 2010 Model Year Hybrid (4 l/100km, 18,000 km/year, 87 Wh/km)



HERE Assist Hybrid

3.2 l/100 km, (2 m² 17% eff. PV)

Solar Conversion
Loss (2160 kWh)

Insolation on
PV (2600
kWh)

PV Battery, Electronics
(130) kWh

PV Energy (310 kWh)

Propulsion and Aux.
Energy (1250 kWh)

1560 kWh

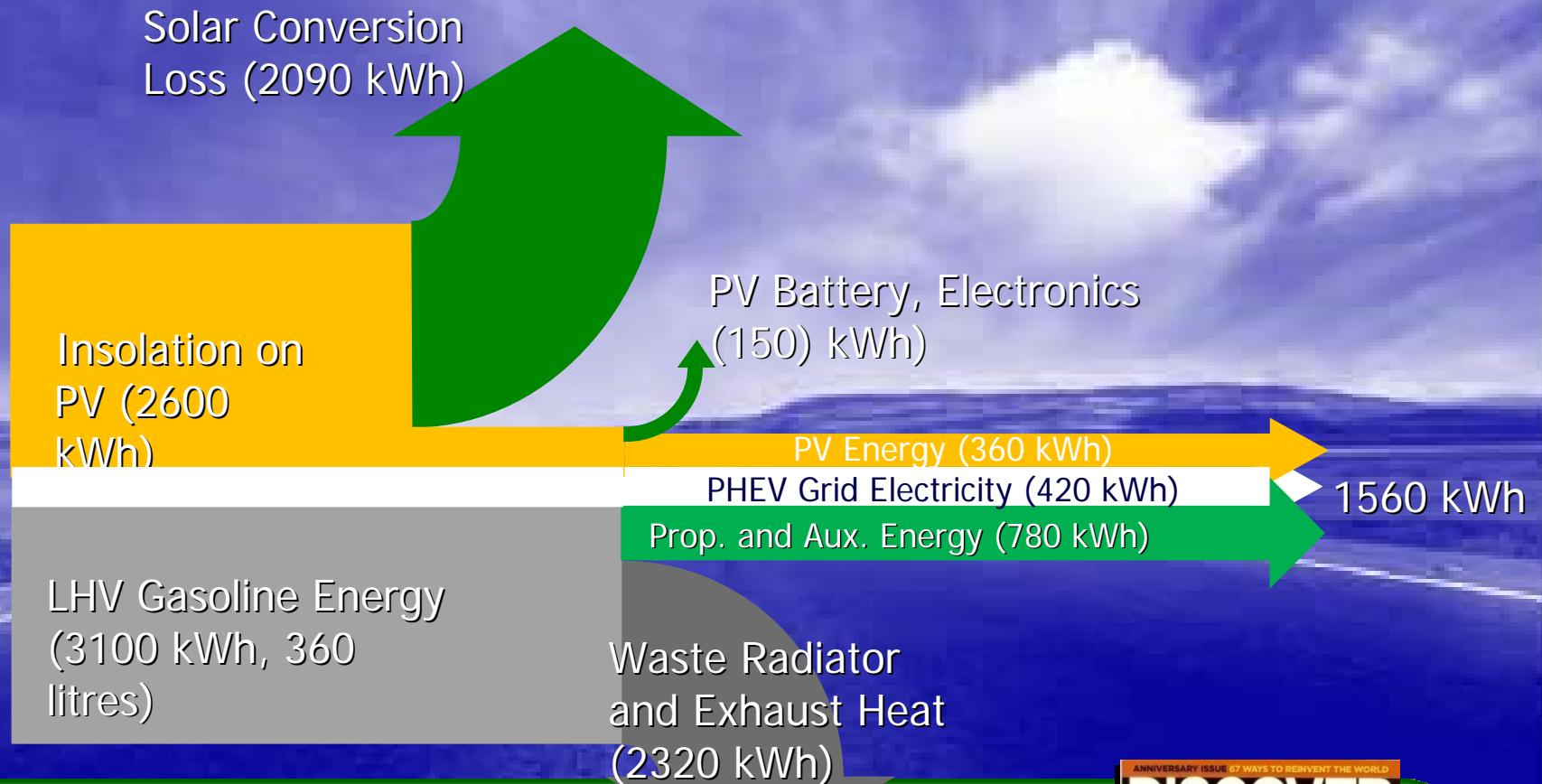
LHV Gasoline
Energy
5000 kWh
(580 litres)

Waste Radiator
and Exhaust Heat
(3750 kWh)



HERE System - PHEV & PV Hybrid

2.0 l/100 km, (Improved efficiency PV to 20%, Grid supplies PHEV charge)



Second Generation Plug-in HERE System Prototype

- Plug-in Capability
- Conformal Roof Array
- Very Low Drag Penalty
- Array Efficiency 15.5 %
- Array Area 1.35 m²
- Peak Power 185 W
- Lower Cost and Simplified Installation
- Improved Appearance and Market Acceptance
- Energy Storage System (ESS) NiMH & Li-ION
- Second Generation EnerMotion Controller
- 2nd GEN EnerMotion Converter



The logo for EnerMotion, featuring a green lightning bolt icon followed by the text 'EnerMotion' in a bold, black, sans-serif font.

Photovoltaics Looking Forward

- HERE Options being explored:
 - Emissions
 - Comfort
 - Battery cost (displacement/hybridisation of ESS capacity)
 - Luxury options
 - Solar thermal management of engine and interior

OEM Cell Cost Reduction



Summary

Fuel Efficiency and Alternative Propulsion

- HERE System reduces GHG emissions of hybrid vehicles
- The 100mpg passenger vehicle is achievable
- Optimisation of energy end use is key
- Smart ESS management is critical
- Blend technology for cost optimisation

– *Application of EnerMotion's HERE technology to passenger vehicles results in 50% Improvements to fuel consumption and emissions*



Thank you.

Steve Lapp and Jack MacDonnell
EnerMotion Inc.

jmacdonnell@enermotion.ca

slapp@enermotion.ca

O: (905) 857-5808

www.enermotion.ca

