

LiTHIUM BALANCE



LiTHIUM BALANCE A/S

Ivan Loncarevic, CTO-development



Li-Balance development dept.



LITHIUM BALANCE

Battery Management System - BMS



Computerized BMS system for big industrial Li-Ion batteries, range: 24V- 560V/up to 500 Amps

Functions:

- **charge/discharge/temp. control**
- **self-balancing of each separate cell**
- **data-log of all important functions such as:**
 - **state of charge (SOC)**
 - **state of health (SOH)**
 - **efficient cell-balancing**
 - **battery history & diagnostic – data-log function**
 - **Can-bus communication**
 - **TÜV Certification**
 - **24 month warranty**

BMS



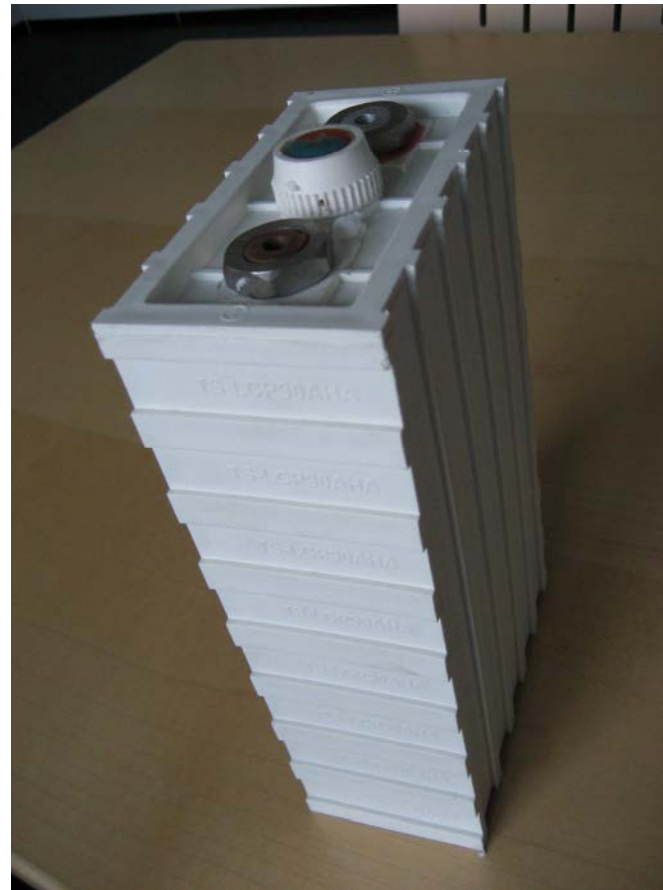
LITHIUM BALANCE

Advantages of Lithium System



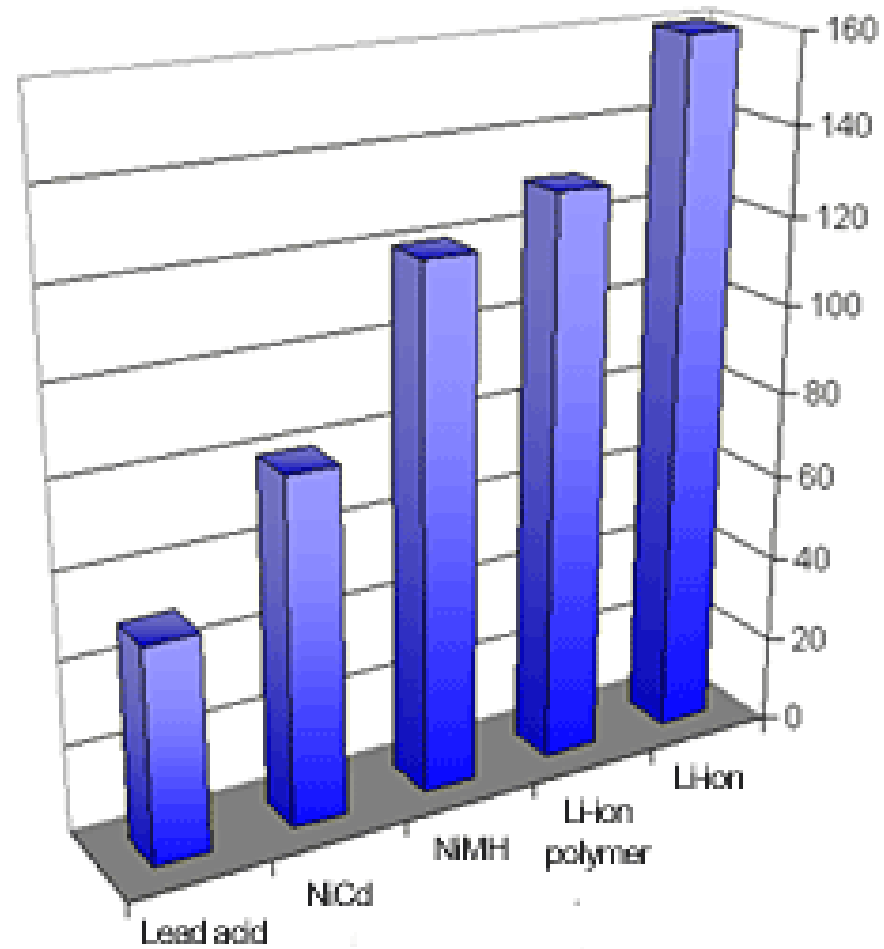
- **62% reduction of weight**
- **8-10 times higher energy density w/l**
- **58% reduction of size**
- **700% higher longevity**
- **Environmentally friendly**

Li-Ion cell 3,2V 90Ah, weight: 3,4 kg



LiTHIUM BALANCE

Li-Ion battery energy density



Advantages



- **EV, Pb-acid:** 59 g CO₂/km
- **EV, Li-Ion:** 45 g CO₂/km
- **EV, methanol:** 51 g CO₂/km

- * **Lupo 3L** 81 g CO₂/km.
- * **Citroen C5** 190 g CO₂/km)

Consequences of automotive emissions



- 4.000 directly related deaths in Denmark
- 7 billion dkr in direct cost
- Growing CO2 emissions



Market potential



- **Pollution free ev-applications**
- **scooters/motorcycles**
- **cars**
- **busses**
- **trucks**

LiBal strategy & BMS models



- **Development of pure electric vehicles with fuel cell generator/methanol range extender together with our partners to achieve range of 450 km per charge**
- **24V-72V/400Amps models for scooters, small cars, UPS and other applications**
- **Scalable BMS models operating from 72V-560V/800Amps for large vehicles, yachts and "plug-in-hybrids"**

Goals



- **10% of world market, estimated 7,2 billion \$**
- **Strategic alliances with existing European producers of electric automotive applications**
- **Strategy: awareness , creation of demand, volume**
- **Development of original electric-automotive concepts together with our partners - application producers**
- **Renewable energy charger stations**

Fiat-developed&certified



Fiat

Batteries: Li-Ion 278/400Ah

Speed: 130 km/h

Range: 300 km per charge



LiTHIUM BALANCE

Fiat-developed&certified

batterypack 42KW



LiTHIUM BALANCE

Fiat-developed&certified

motor,motorcontroler, BMS, GPS



LITHIUM BALANCE

Ready for production

equiped with LiBal system



E-Max

4KW hub brushless motor
Li-Ion48V/ 90Ah, 72V/60Ah
Speed: 45 km/h, 90 km/h
Range 180 km/charge



LITHIUM BALANCE

Ready for production

equiped with LiBal system



EVT

1,5KW hub brushmotor

Li-Ion48V/ 90Ah

Speed: 45 km/h

Range 160 km/charge

LITHIUM BALANCE

Ready for production

equiped with LiBal system



EVT Transporter

2x 1500 W hub brush motors

Batteries: Li-Ion48V/ 90Ah

Speed: 30 or 45 km/h

Range 140 km/charge



LiTHIUM BALANCE

Ready for production

equiped with LiBal system



Energizer Motorcycle

4 KW hub brushless motor

Batteries: Li-Ion60V/ 90Ah

Speed: 92 km/h

Range 160 km/charge



ItalCar – prototype with Li-Ion

equiped with LiBal system



T3

Batteries: Li-Ion 48V 400Ah

Speed: 45 km/h

Range: 250 km per charge (400Ah)



LiTHIUM BALANCE

Development

developing project



-
- **Technical solution -Scalable BMS – System overview**
 - One Battery Master Control Unit
 - A number of Local Monitoring Units – each unit can monitor 3-8 battery cells
 - One Switching Functional Block
 - By adjusting the number of Local Monitoring Units and through configuration of the Switching Functional Block, the battery management system can be configured for use with battery packs in the range from 15V to 400V, 800 amps.
 - The scalable battery management system is also flexible in numerous other ways, diesel,/gasoline or fuell-cell range extender can be controled or monitored.

Development

fuell-cell range extender

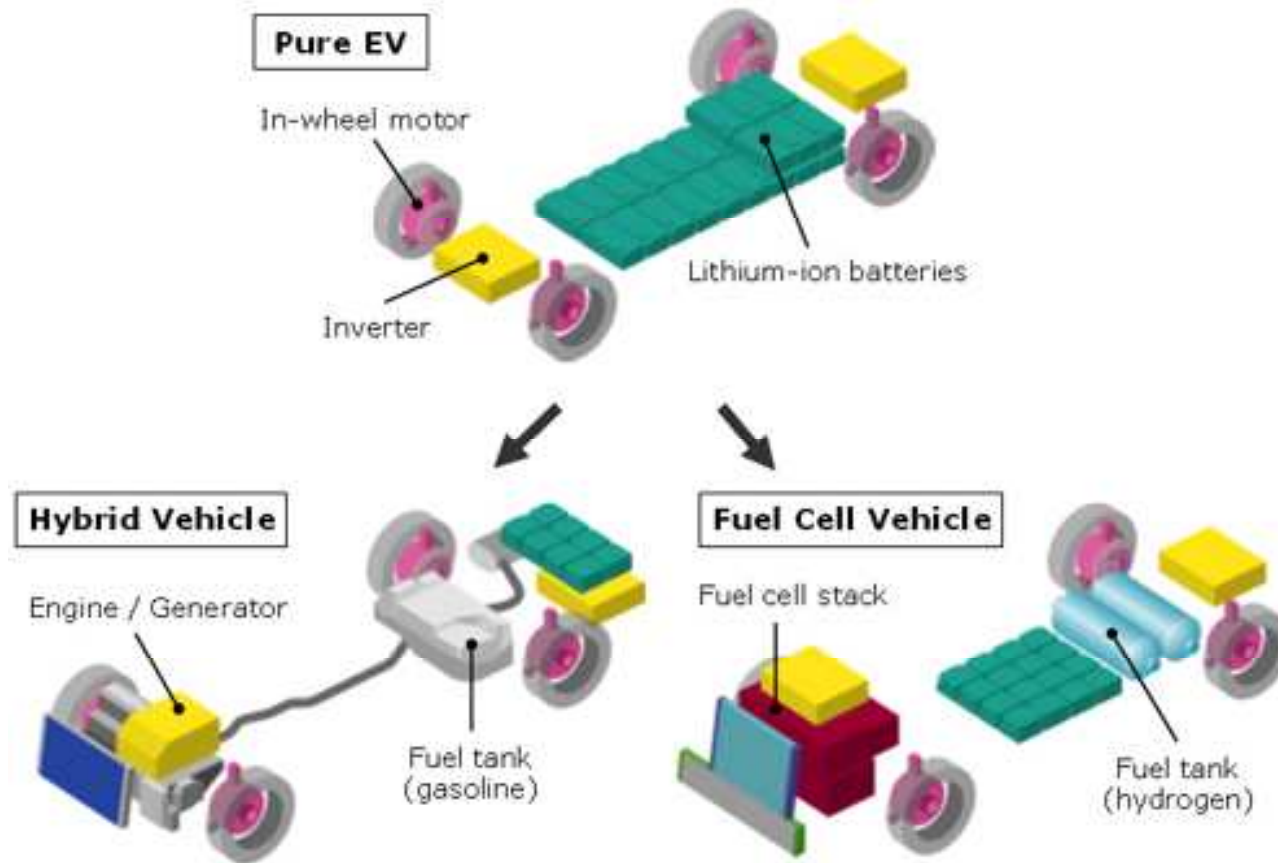


Methanol high-temp PEM fuell-cell



- Possible range 600 km/charge
- Methanol driven
- 6-12KW per unit
- No cooling system, no sound, no polution
- Can be delivered as highly integrated unit in a box that can be plugged-in in the car as option
- Production price for 10.000 units estimated 800 euro/KW
- In China methanol is produced in 150 big factories from coal

Electric system simple, effective & inexpensive



Li-Ion – fuel cell system

