



# **MiEV** - the product

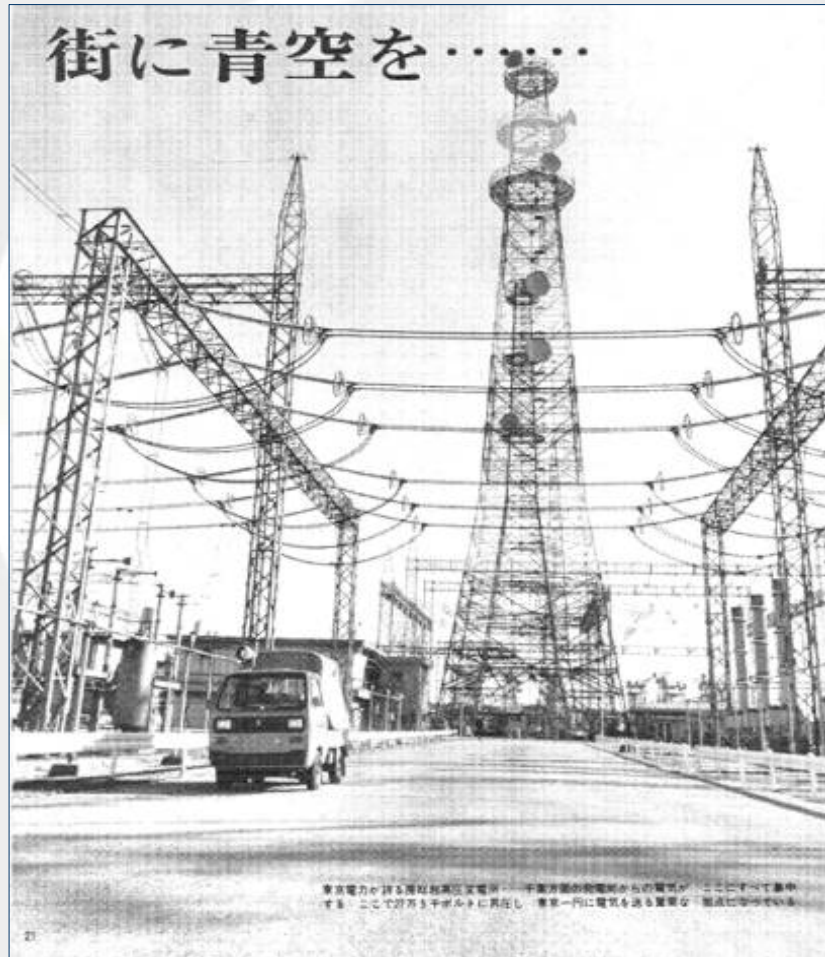


March 2009

# Mitsubishi electrical vehicle history



- ❶ First Mitsubishi Electrical vehicle was built in 1971
- ❷ We provided 150 EV's to power companies and the government



**MINICAB EV**

*Mitsubishi Group's PR magazine; issued in 1972*



**MINICA VAN EV**



# Mitsubishi electrical vehicle history



1970

1980

1990

2000

2005

2010

Response to oil dependency

Response to Global warming

Response to Air Pollution



Minica EV



Mini Cab EV



Libero EV  
(Lancer Estate)



Delica EV



Minica Econo EV



FTO EV



Colt EV



ECLIPSE EV



Preparation for mass production

Lead-acid Battery

Lithium-ion Battery

# Environmental strategy Mitsubishi



## 1. Diversification of energy resources (Energy Security)

CNG vehicle

Readiness for bio-fuel  
(Ethanol FFV)

Green plastic



FCV



i MiEV

PHEV

Improved diesel performance

High-efficient transmission

Catalyst technologies

Restricted use of hazardous substances

Weight reduction

low-emission vehicles



Variable valve engine

Variable displacement engine

## 3. Reduce Pollution

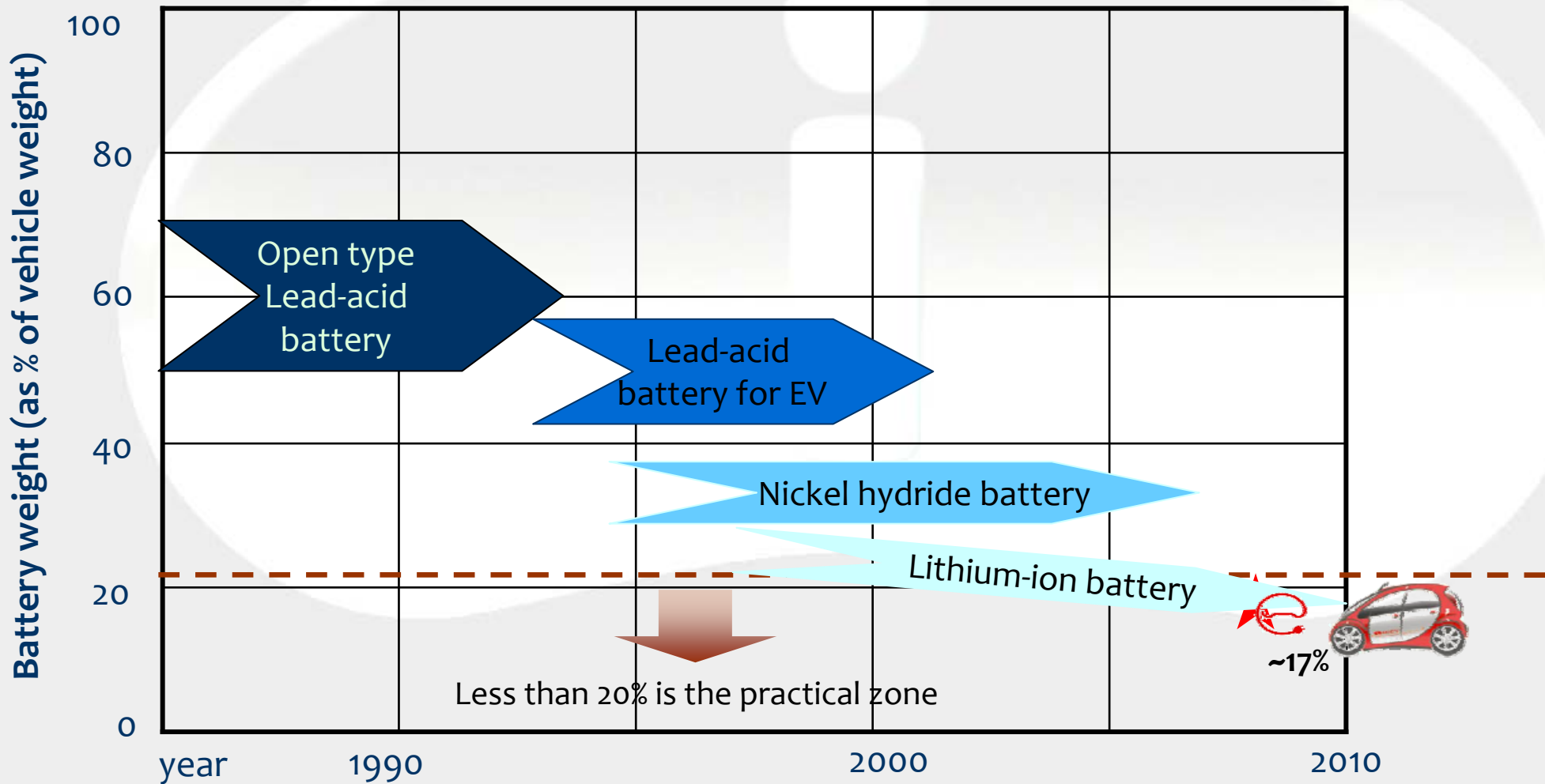
## 2. Reduce Global Warming



# Battery development



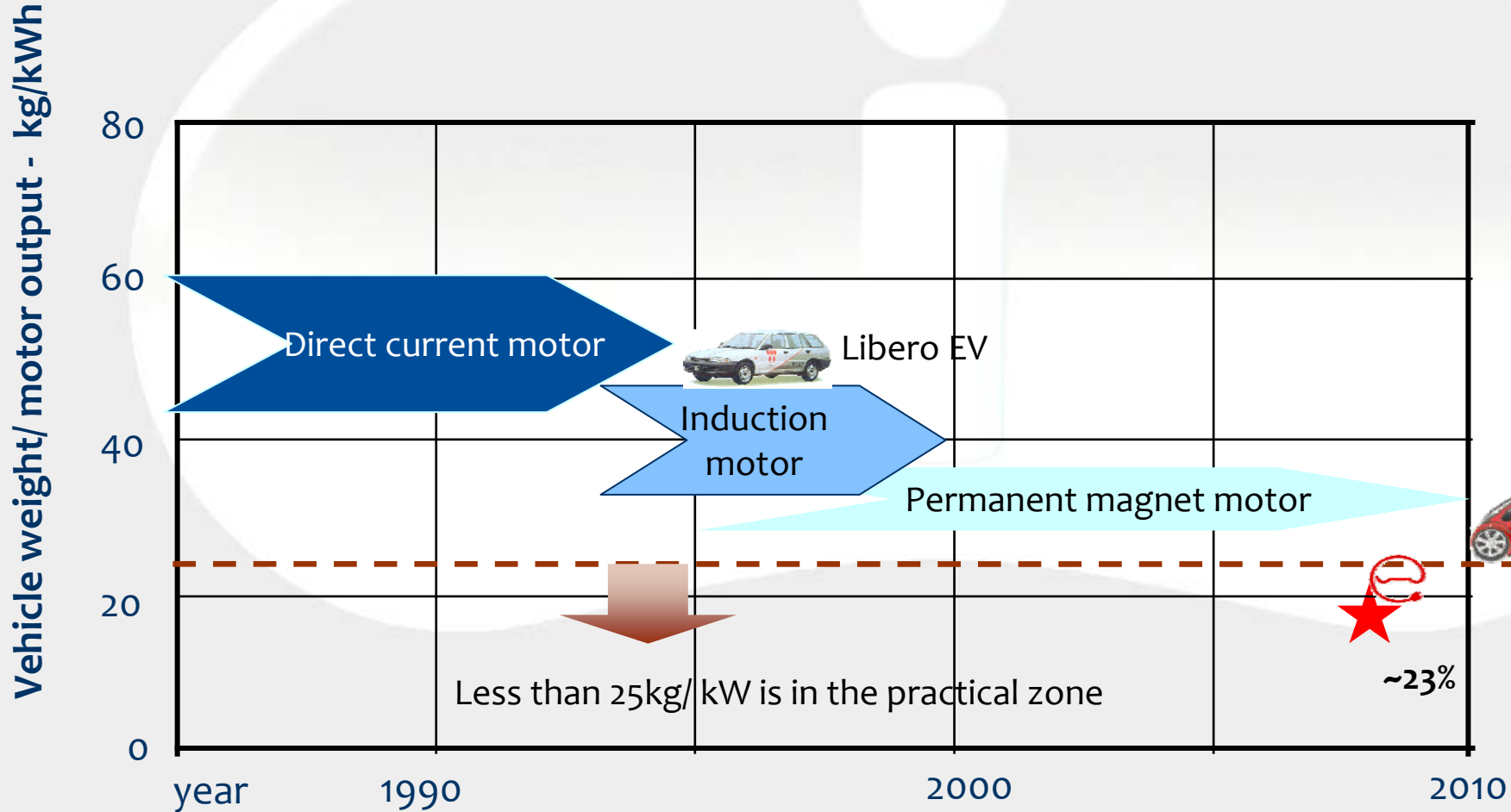
**i** Battery weight as a percent of vehicle weight when calibrated for a driving range of 200km\*



# Engine development



## Power to weight ratio



# Energy efficiency



Well to wheel

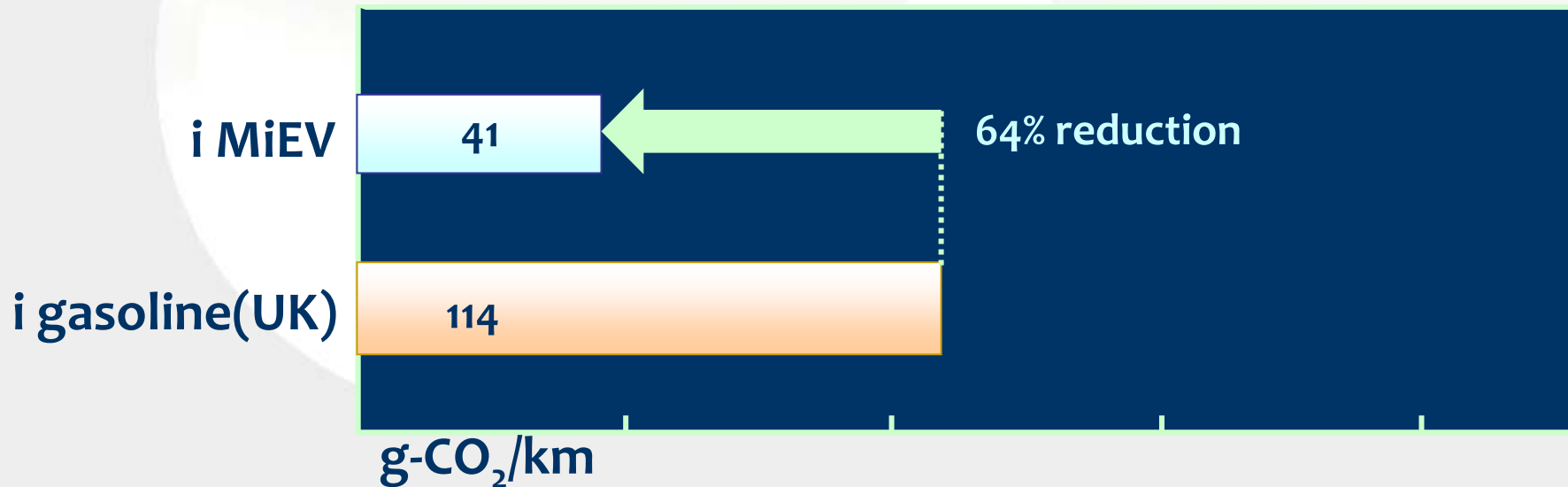
	Well to tank	Tank to wheel						Overall
EV	42.9%*	Charger 90%	Batt. 92%	Inverter 96%	Motor 91%	Mechanical 92%	66,5%	28.5%*
HEV (Gasoline)	82.2%	30.2%						24.8%
Diesel	88.6%	17.8%						15.8%
Gasoline	82.2%	15.1%						12.4%



# CO<sub>2</sub> emission

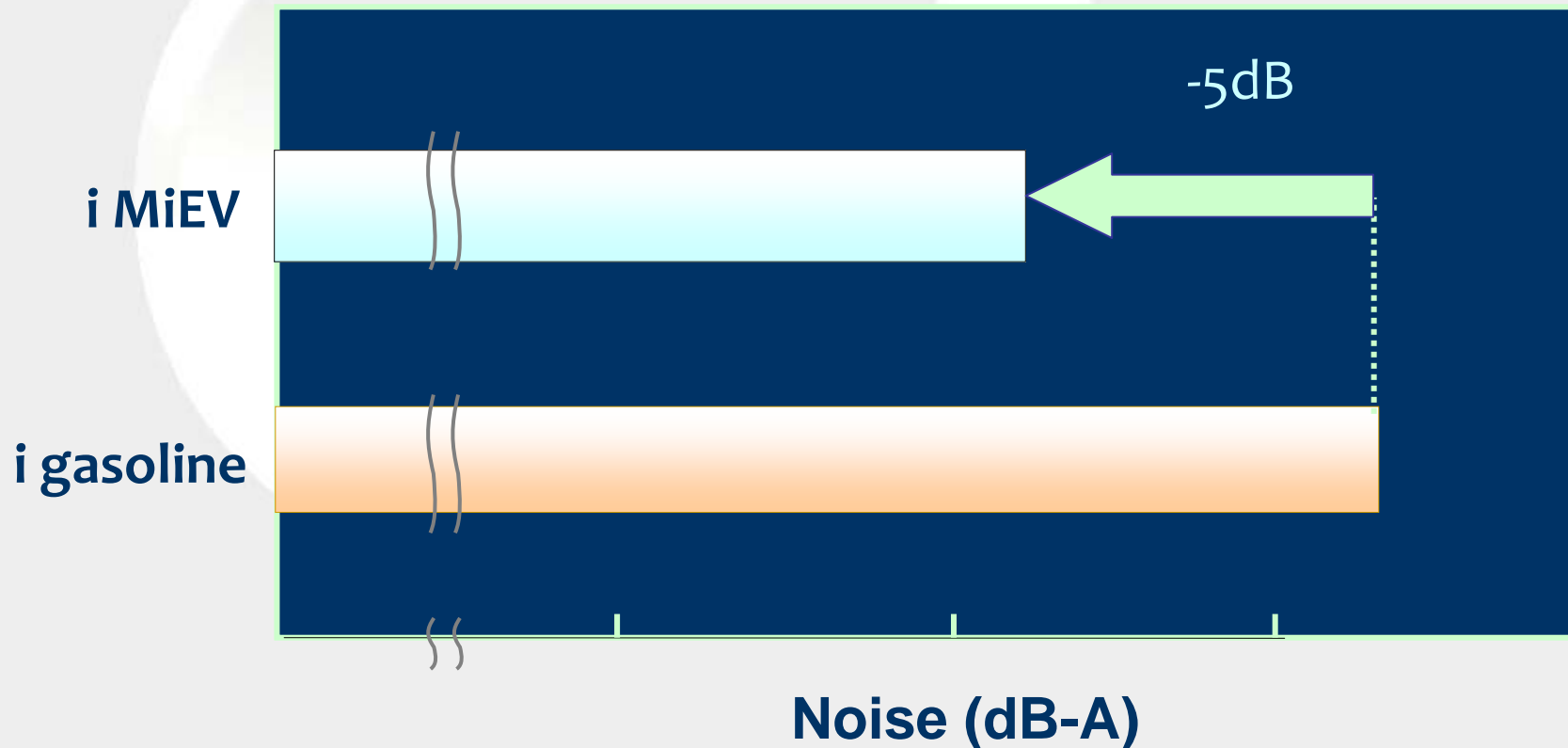
- ❶ CO<sub>2</sub> value of electrical vehicles is officially 0 g/km in Europe
- ❷ Electricity production does however create CO<sub>2</sub>
- ❸ Given Japanese energy mix, net CO<sub>2</sub> reduction is 64%\*
- ❹ Driving 10.000 km per year > 0,73 ton CO<sub>2</sub> reduction

Well to wheel emission ( Japanese 10-15 mode)



# Noise level – outside vehicle

- Noise level decrease with 5 dB
  - When fully accelerating from 50 km/h
  - A 100% increase of sound volume equals (=) 3dB increase
  - EV can contribute to lower the sound pollution in big cities in Europe

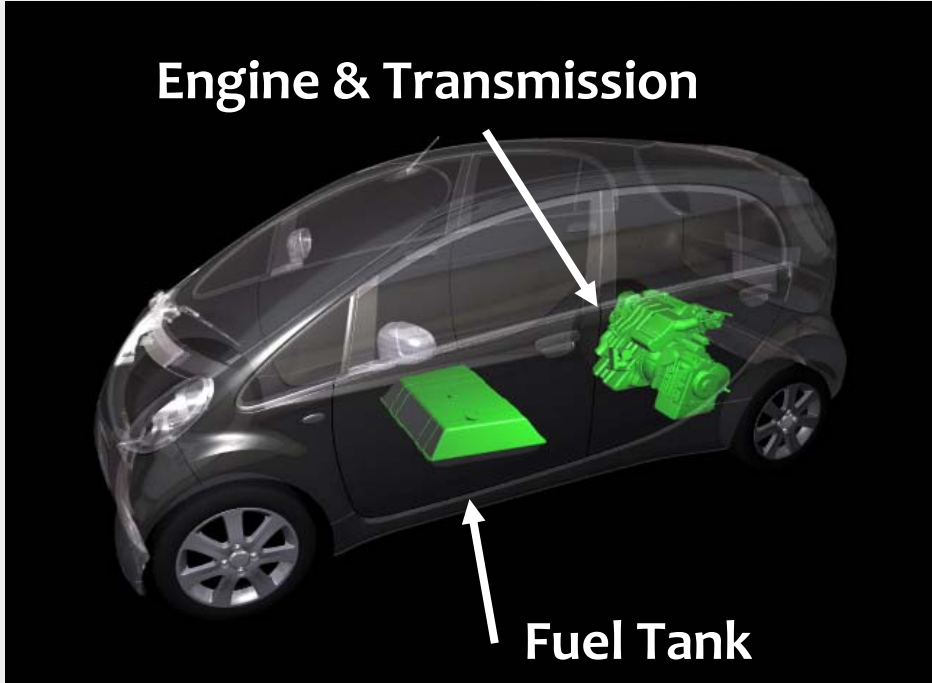


# MiEV Packaging



All EV components can be installed under the floor

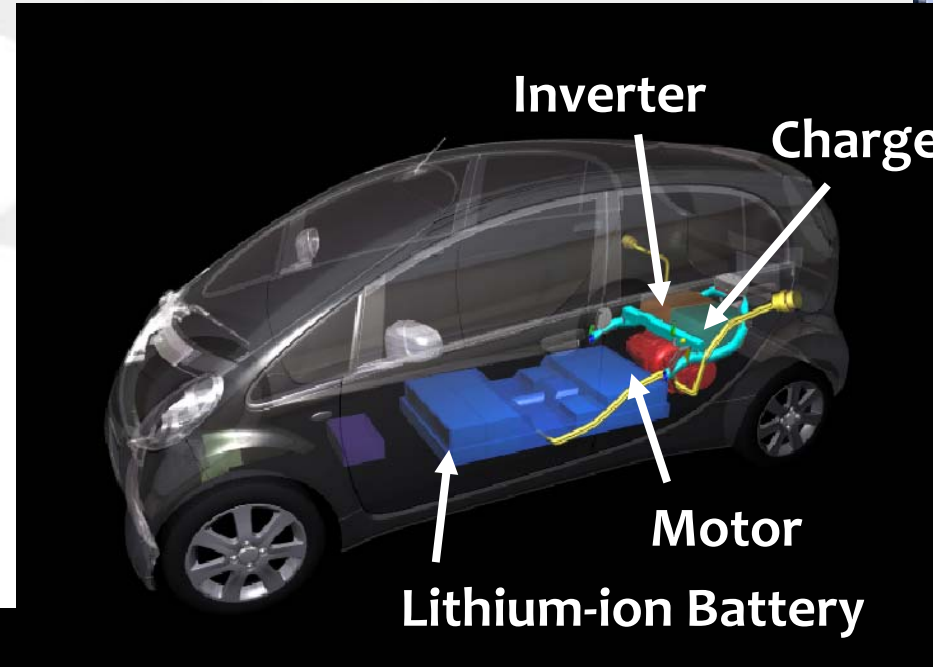
## Engine & Transmission



Fuel Tank

## Inverter

## Charger



Motor

Lithium-ion Battery



- Four adults can be seated
- Cargo space is same as Gasoline i

# Lithium-ion Battery

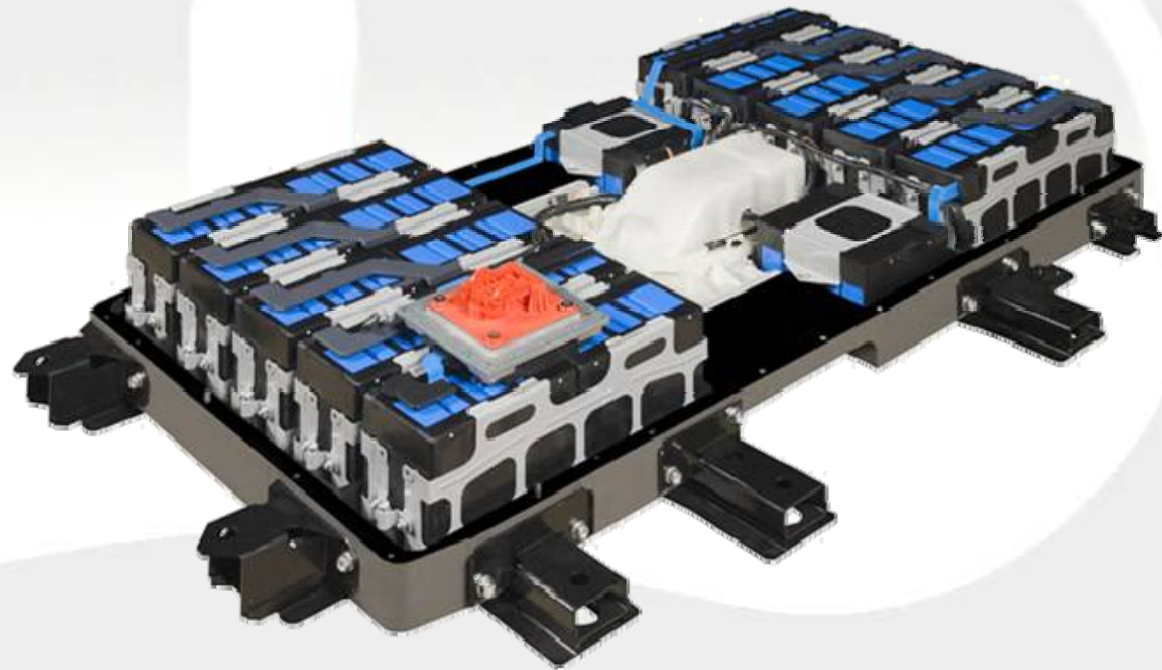
- ❶ Battery module of 16KWh can be placed under the floor panel without further modification



88 x Cell



22 Modules

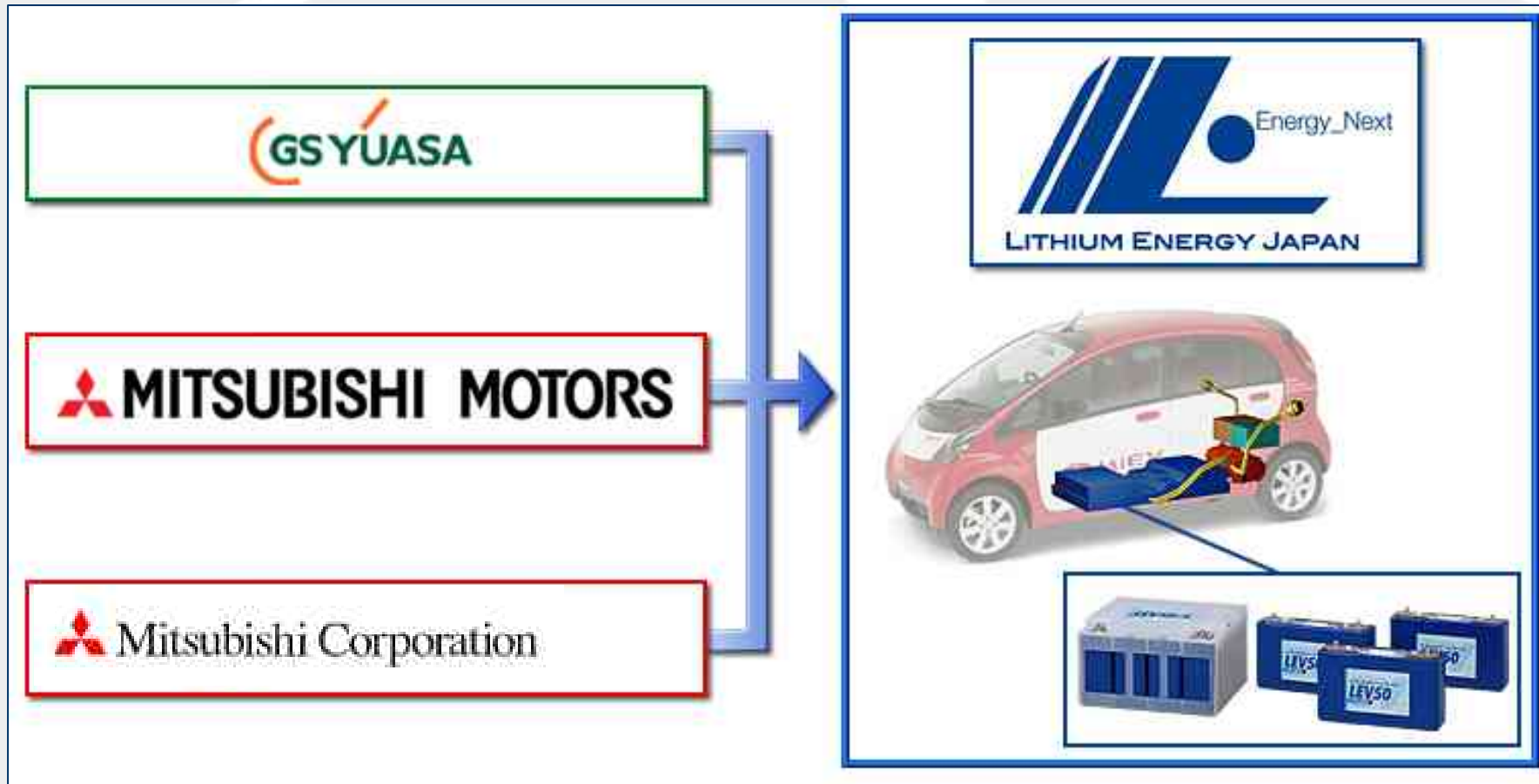


1 x Battery Package



# Battery origin

- GS Yuasa, Mitsubishi Corporation, and Mitsubishi Motors Corporation established a Battery Manufacturing Company (Lithium Energy Japan) in December 2007.



# Motor



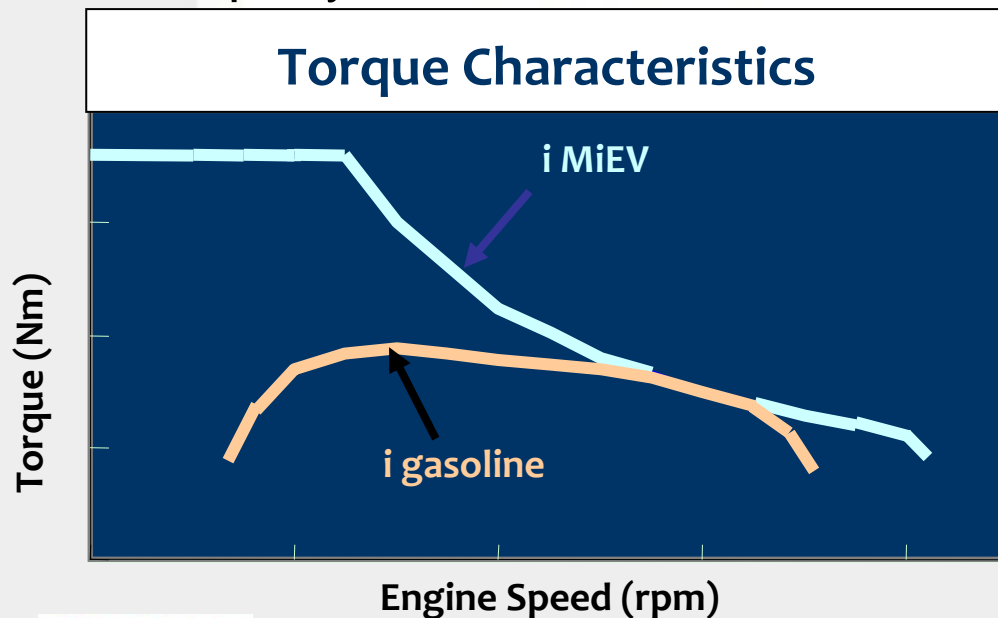
## **i** Small and quiet engine



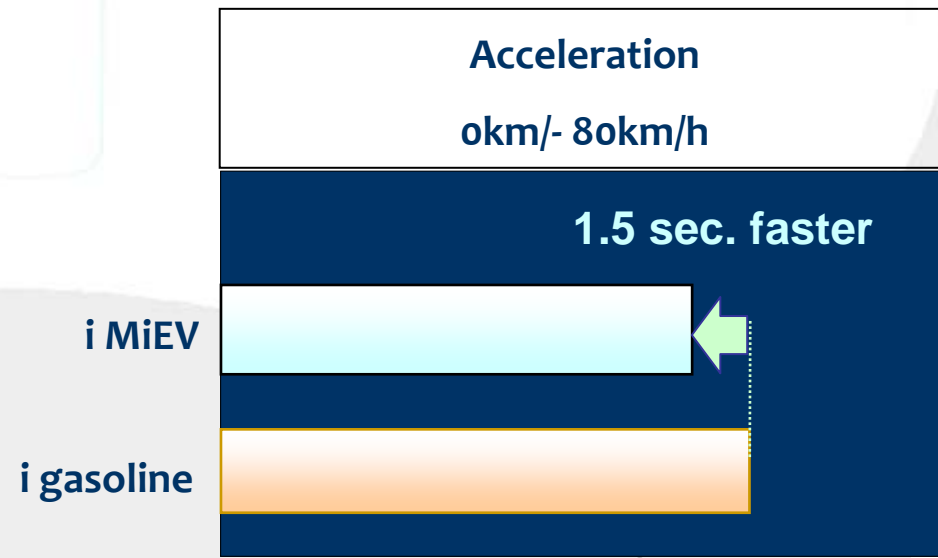
## **i** More torque

Data/ type	i MiEV	Gasoline
Max.Output	47kW	47kW
Max.Torque	180Nm	94Nm
Max.Speed	8500rpm	7500rpm
Type	Permanent magnet synchronous	Turbo-charged

## **i** Sporty character



## **i** Quicker acceleration

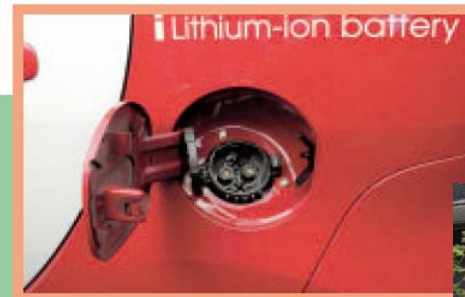


# Charging

- ❶ Two ways of charging – quick and normal
- ❷ Normal charging at any regular plug in Europe
- ❸ Quick charging developed by Tokyo Electric Power Company (TEPCO) and Subaru, Nissan and Mitsubishi.
  - under development for Europe
    - Many manufacturers
    - Many electrical companies

Charging time	Power supply	Charging time
Quick charger	Three-phase 200V, 50kW	Approx. 30 min. (80%)
Household charger	230V (15A)	6+ hours(Full)

Normal socket



Quick charger socket



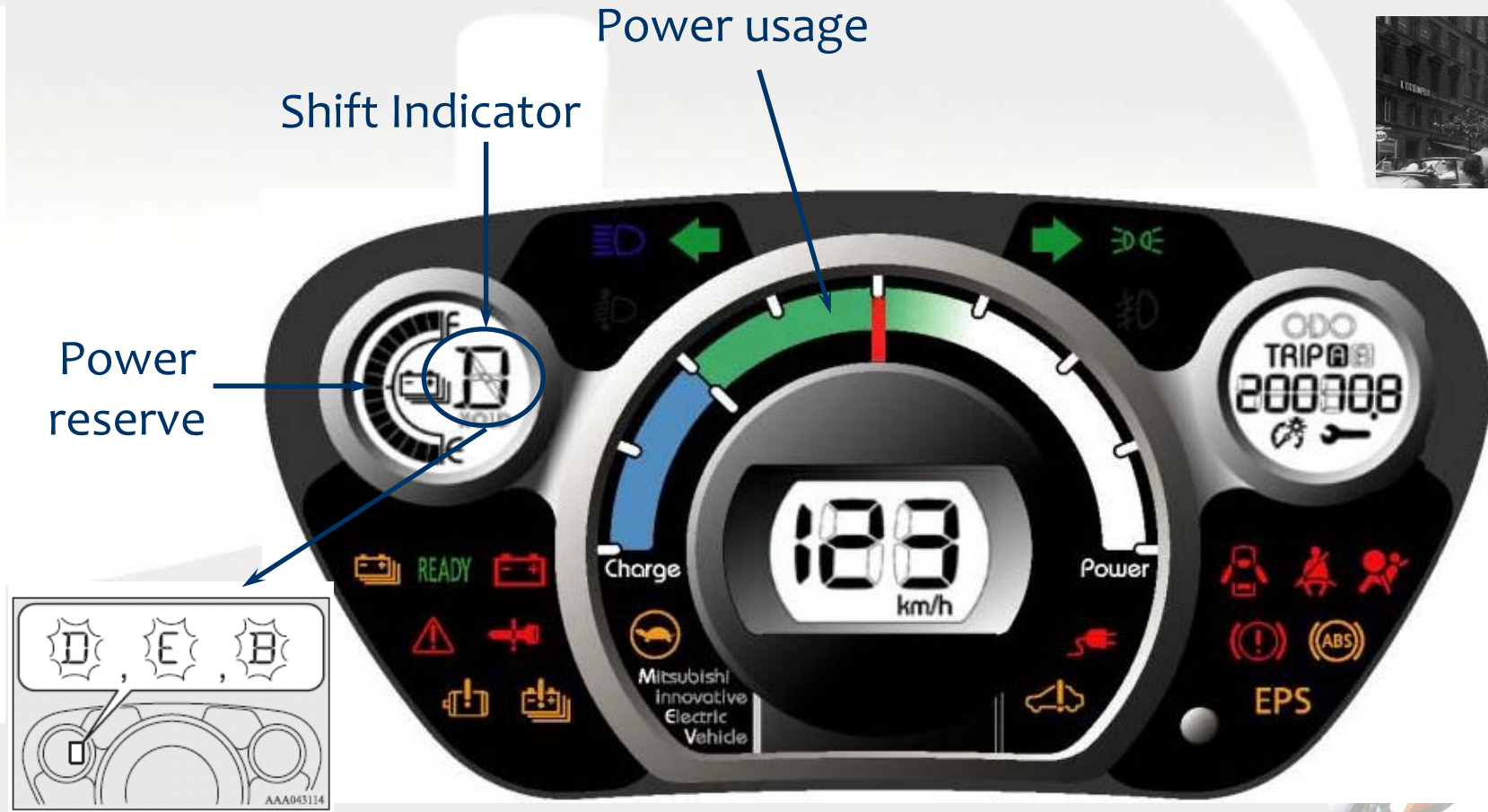
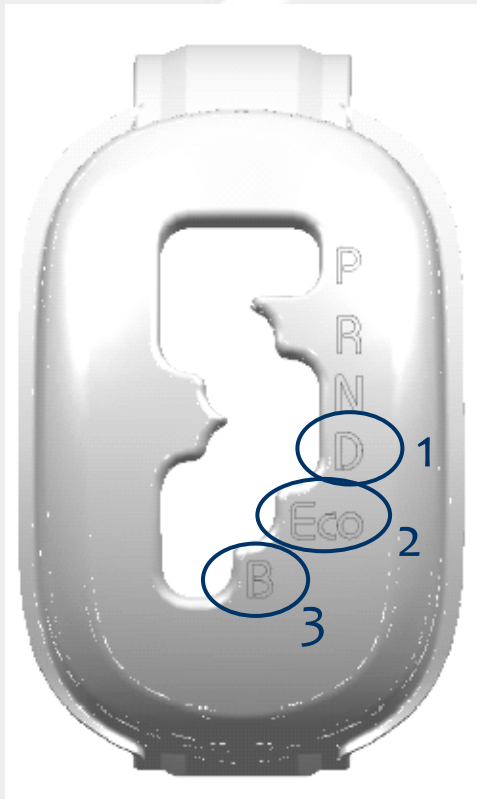
TEPCO Quick charger



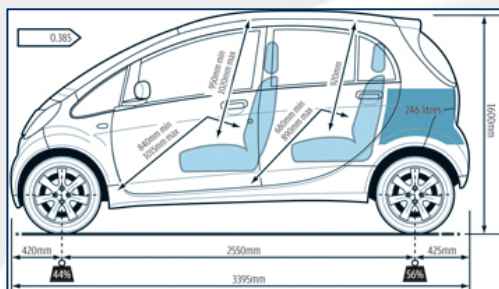
# Instrument panel & controls

## 3 positions for gear lever

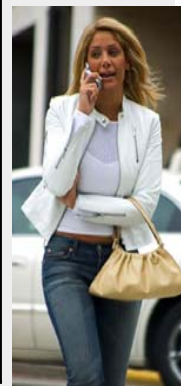
1. Drive – car functions as normal
2. Eco mode – limits power output >> limits consumption. Light regenerative braking
3. Brake – Strong regenerative braking – used for downhill driving



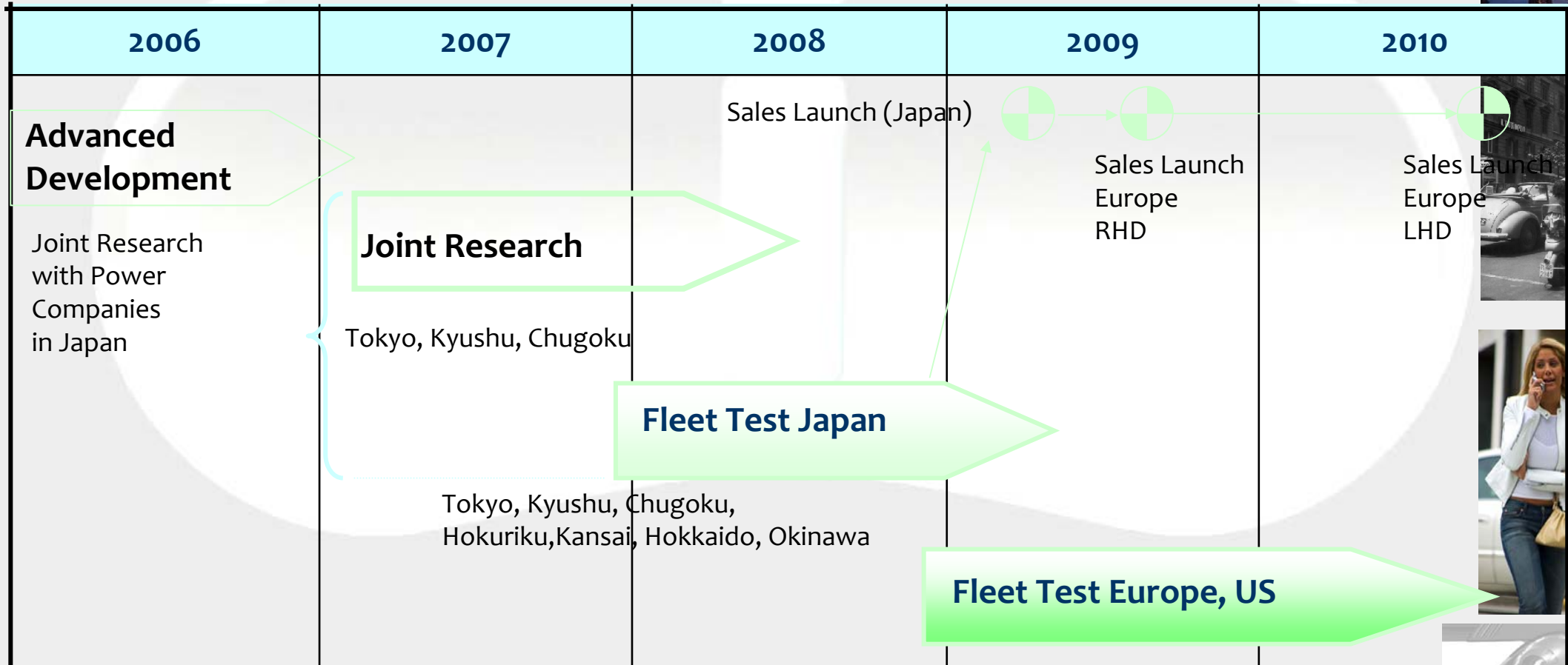
# Specifications



<b>Overall Length x Width x Height</b>		3395 x 1475 x 1600 mm
<b>Curb Weight</b>		1080 kg
<b>Seating Capacity</b>		4
<b>Max. Speed</b>		130 km/h
<b>Range (European cycle)</b>		144 km
<b>Motor</b>	<b>Type</b>	Permanent magnet synchronous
	<b>Max. Output</b>	47 kW
	<b>Max. Torque</b>	180 NM
<b>Drive System</b>		Rear wheel drive
<b>Battery</b>	<b>Type</b>	Lithium-ion
	<b>Total Voltage</b>	330 V
	<b>Total Energy</b>	16 kWh



# Road map of development

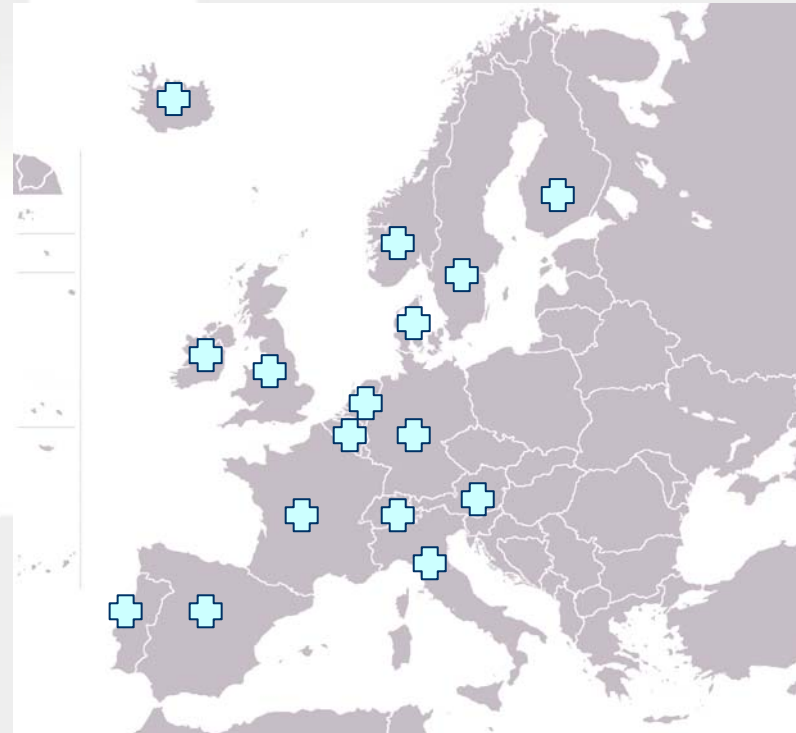


# European fleet test

- i** 11 vehicles
- i** Used for fleet test in several countries throughout Europe
- i** Several vehicles for a few months per country
- i** Preparation for launch I MiEV
- i** Proto types
- i** Objectives
  - Promote Electrical vehicles
  - Test drives for
    - Governmental parties
    - Business customers
    - Consumers
  - European conditions
    - Driving style
    - Weather
    - Road
    - Reliability



x11



# Collaboration with Utilities in USA



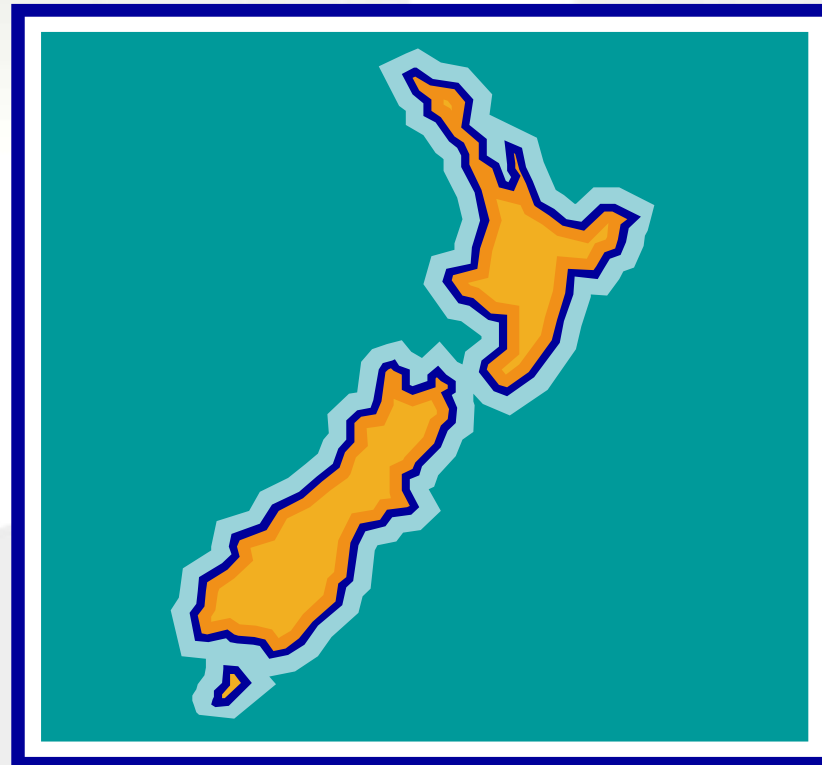
■ Mitsubishi Motors Corporation to provide i MiEV Electric Vehicles to “Southern California Edison” and “Pacific Gas and Electric Company” for Joint Testing and Evaluation



# Collaboration with Meridian Energy in New Zealand



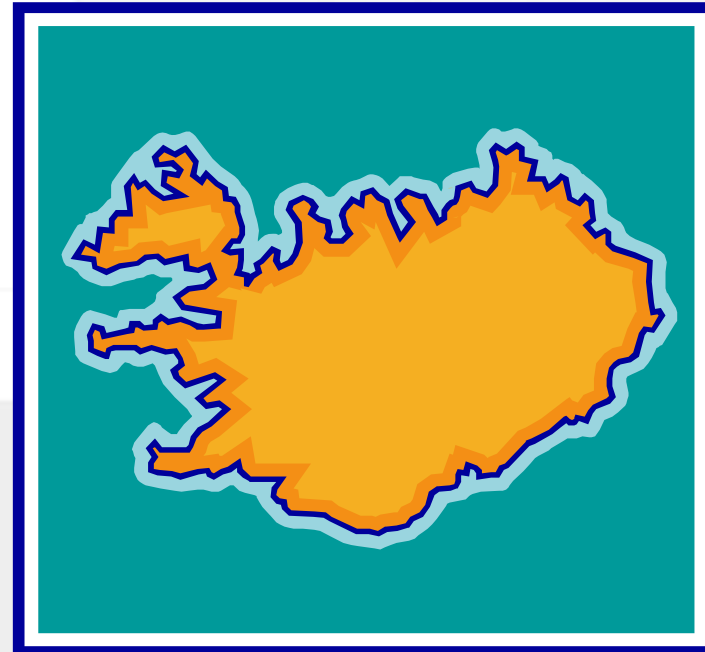
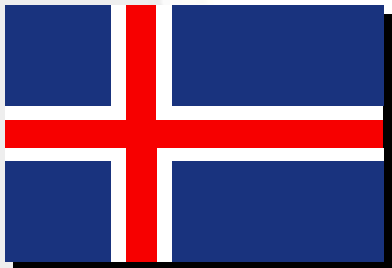
■ Agreed with Meridian Energy Limited, which is the largest power company in New Zealand, to promote and demonstrate pure electric vehicle named as i MiEV on September 16th .



# Collaboration with Iceland



■ Agreed with Iceland, which is mainly utilized for geothermal energy in the country, to promote and demonstrate pure electric vehicle named as i MiEV on September 19th 2008.



***END***

