



ARB ZEV Technology Symposium

September 2009

History of Mitsubishi Motors Electric Vehicles

- ❑ The first Mitsubishi Motors Corporation (MMC) EV was built in 1971.
- ❑ MMC provided power companies and the government with approximately 150 EVs.



MINI CAB EV



MINICA VAN EV

in the Mitsubishi Group's PR magazine issued in 1972

History of Mitsubishi Motors Electric Vehicles



- ❑ Long History: EV R&D from the late 1960's
- ❑ PHEV (40 mile ZEV range Li-ion w/ CNG engine) tested by ARB mid-1990's
- ❑ New Era: Announcement of MiEV Project in October 2006

1970 1980 1990 2000 2010

Air Pollution

Energy Security



EXPO PHEV



MiEV



MINICA EV

MINI CAB EV

LIBERO EV

DELICA EV



MINICA ECONO EV



FTO EV

ECLIPSE EV



LANCER EVOLUTION MIEV (in-wheel motor) Future Technology

Lead Battery

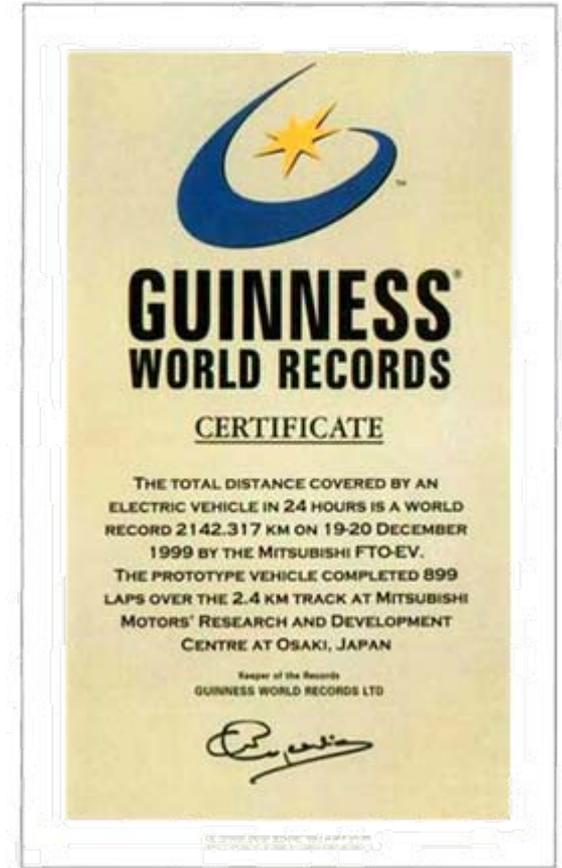
Lithium-ion Battery

Achieved a World Record for EV Distance



Total distance 2,142km in 24 Hrs

**[Repeat of Drive for 50 min @130km/h
and Quick charge for 20 min]**



**Guinness World Records
Certificate**

On 19-20 Dec.,1999



Overall Length x Width x Height		3395 x 1475 x 1600 mm (134" X 58" X 63")
Curb Weight		1080 kg (2376 lbs.)
Seating Capacity		4
Max. Speed		130 km/h (81 mph)
Cruising Distance with a Single Charge (10 · 15 mode)		160 km (100 miles)
Motor	Type	Permanent magnet synchronous
	Max. Output	47 kW (63 hp)
	Max. Torque	180 N · m (133 ft-lbs.)
Drive System		Rear wheel drive
Battery	Type	Lithium-ion
	Total Voltage	330 V
	Total Energy	16 kWh

Three-way Charging System

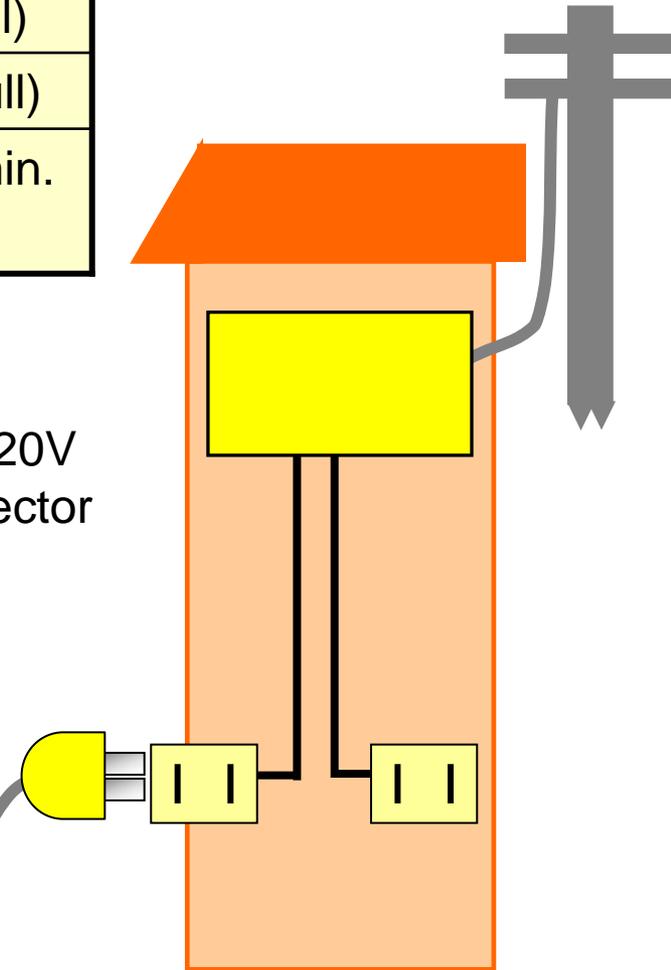
	Power supply	Charging time
Household charger	220V (15A)	6 hours (Full)
	110V (15A)	12 hours (Full)
Quick charger	Three-phase 200V, 50kW	Approx. 30 min. (80%)

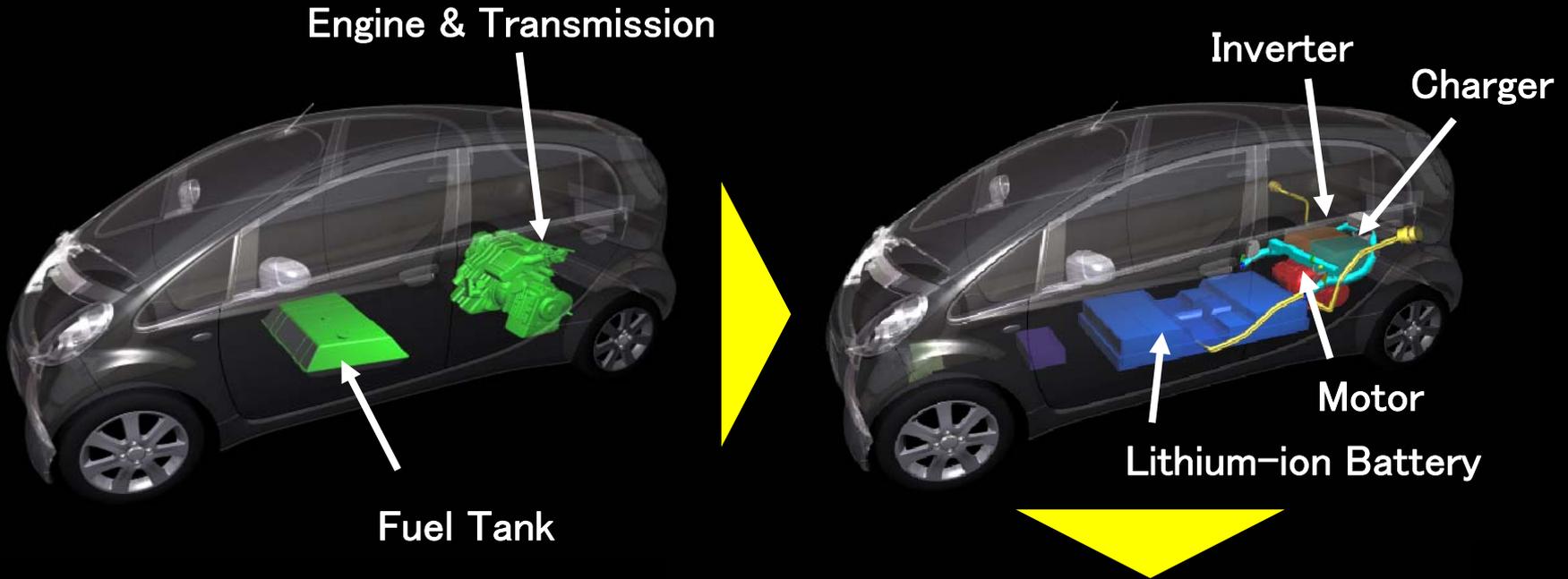


Quickcharger Connector

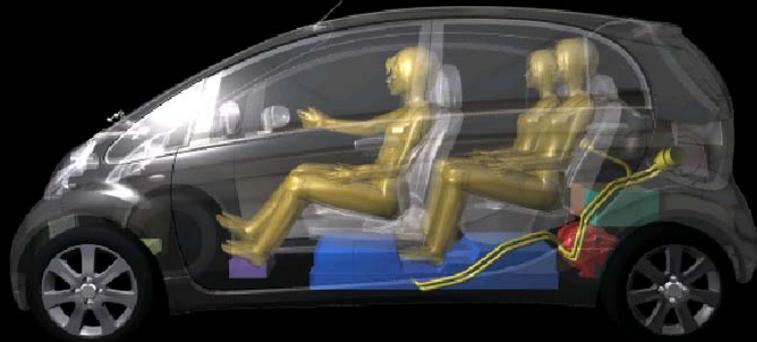


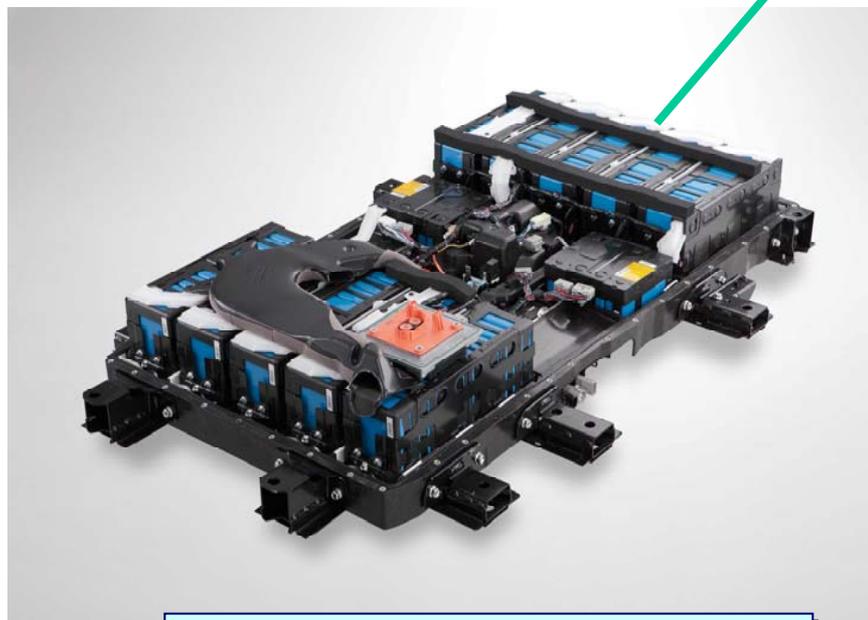
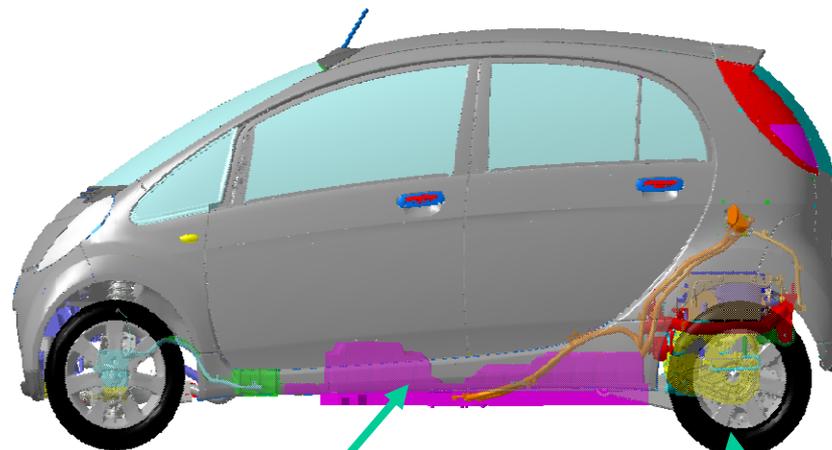
110/220V Connector





- Seating for Four Adults
- No Change in Cargo space





Lithium-ion Battery



Compact, Highly Efficient Motor

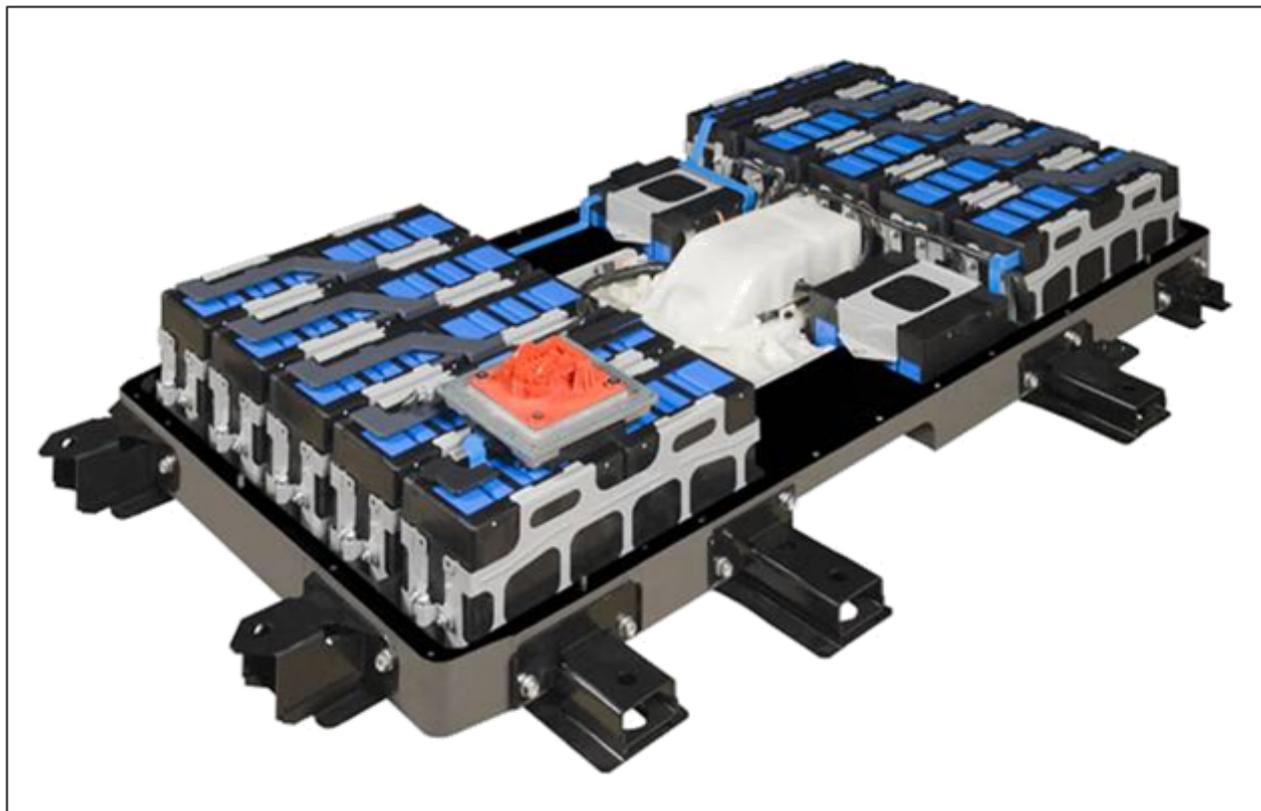
High capacity battery module (max.16kWh) installed under the floor panel without modification. Batteries can be oriented vertically or horizontally.



Cell



Module



Battery Package

Establishment of Battery Manufacturing Company

December 2007, GS Yuasa, Mitsubishi Corporation, and Mitsubishi Motors Corporation established a Battery Manufacturing Company “LITHIUM ENERGY JAPAN”.



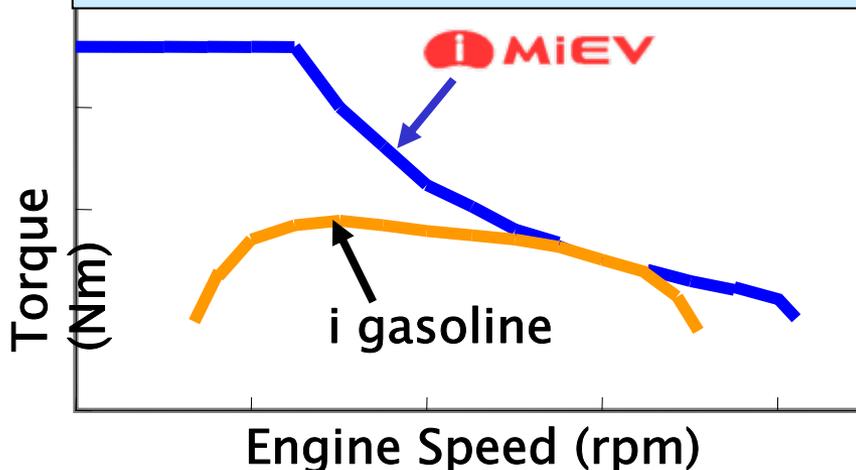
Small, high-efficiency motor technologies

Sportier and quieter driving than the i 's turbo-charged engine (660cc)

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



Torque Characteristics

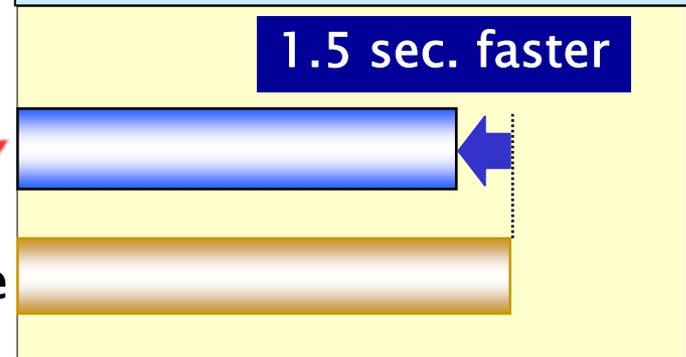


Acceleration

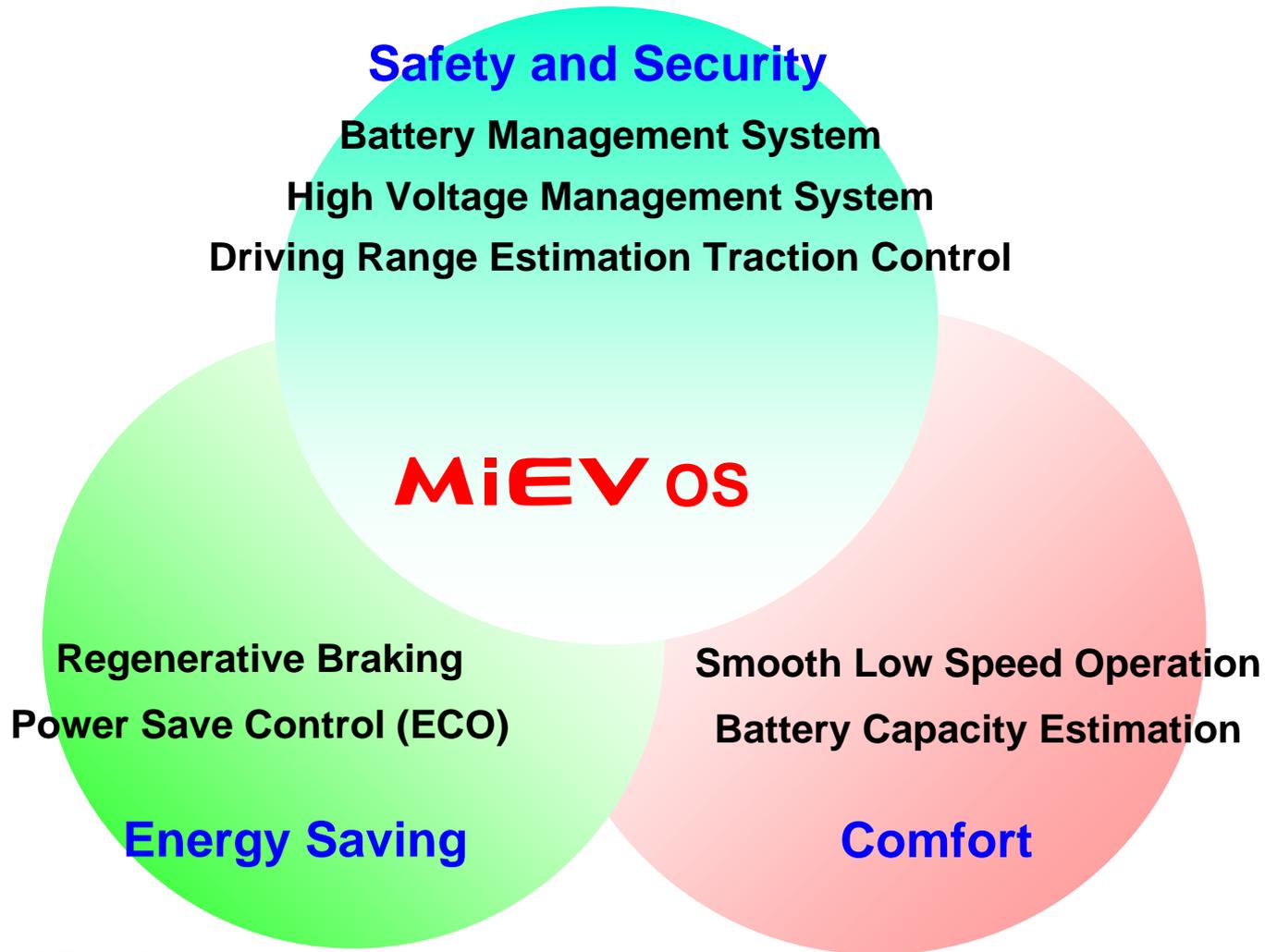
(0km/h → 80km/h)

1.5 sec. faster

i MIEV
i gasoline



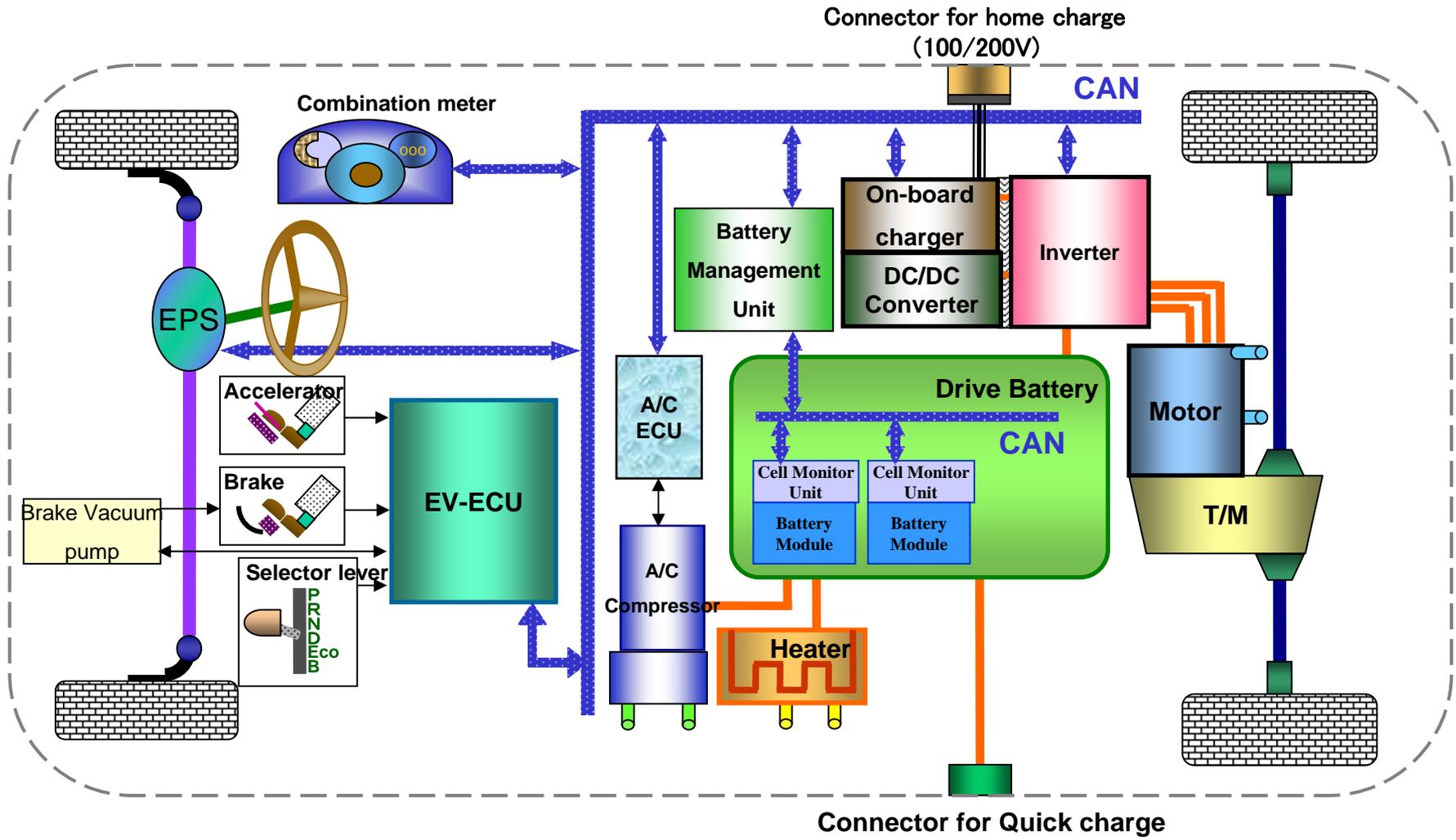
Time

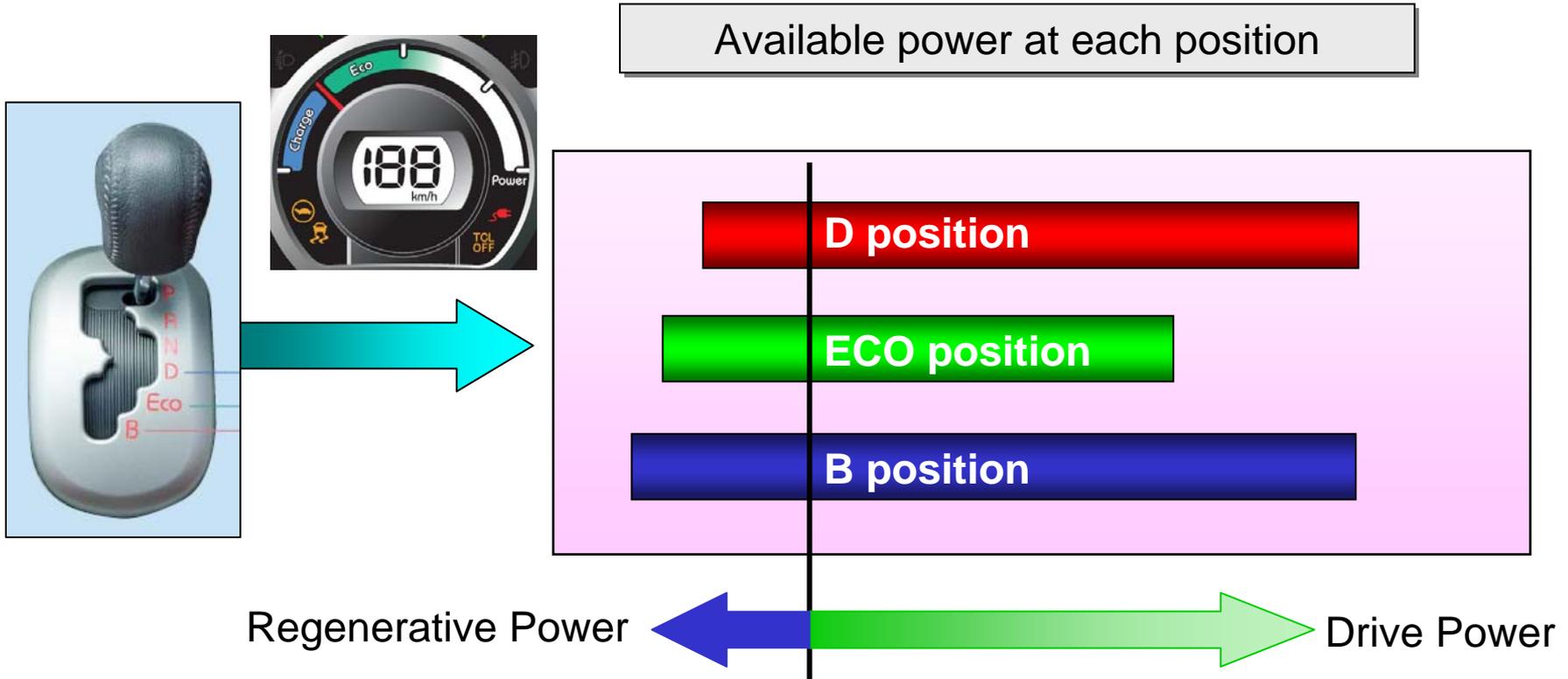


MiEV

Mitsubishi innovative Electric Vehicle – generic term for Mitsubishi Motors proprietary electric vehicle technologies

MiEV System Schema





Same Quality Standards as all Mitsubishi Motors' Vehicles



Roadmap of **iMiEV** development



Chugoku



Hokuriku



Hokkaido



Kyushu



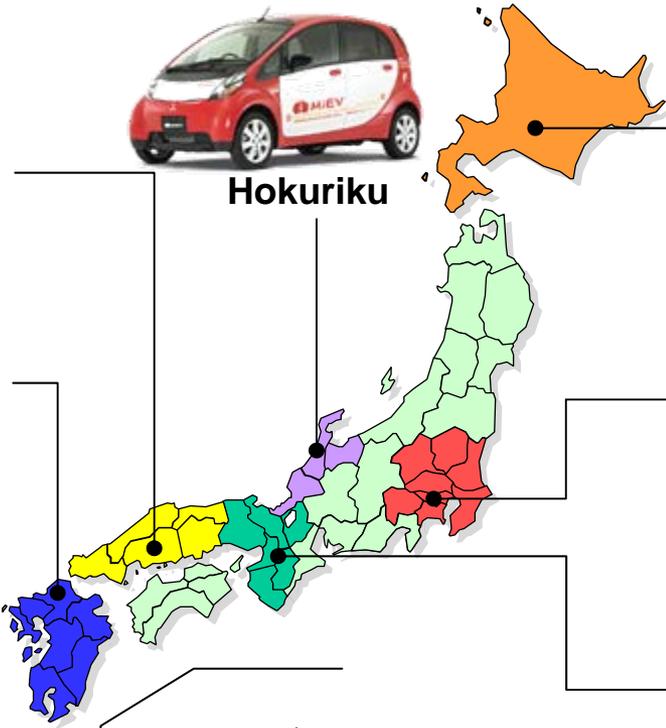
Tokyo



Okinawa



Kansai



2006	
Advanced Development	
Joint Research with Power Companies in Japan	Jo
	Tok Chu

Tokyo, Kyushu, Chugoku, Hokuriku, Kansai, Hokkaido, Okinawa

Fleet Test

United States, Canada, Europe, New Zealand, Australia



Production debut on June 5th, 2009

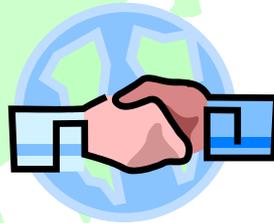


	2009FY	2010FY	2011FY
Japan	<p>2009FY Sales Plan : 1,400 vehicles</p> 		
	<p>July, 2009</p> 		
Overseas	<p>2009 Autumn</p> 		
			

Cooperation with other automaker

■ MOU was concluded with PSA Peugeot Citroen company on March 2, 2009.

■ MMC will develop electric cars for Europe based on  and produce and supply them to PSA Peugeot Citroen.



Why Quickcharge?

- Allows lighter, lower cost battery pack – battery pack sized for daily commute (40 mile typical) use.

- Provides infrastructure solution for inner city multi-family residences



Design Goal – Success!

**5 minute charge for 40km (25 miles) driving range
10 minute charge for 60km (37 miles) driving range**

JARI QuickCharger Use Summary

- **Prototype Testing started in 2005**
- **More than four years of real world use charging 9-16kWh battery EVs from three different Automakers.**
- **Mass Production started in Spring 2009.**



Convenience Store installation -- Quickcharger with Solar Array.



Current Quickcharger Locations



Map of Quickcharger locations in Japan

- TEPCO offices
- Public or commercial facilities
- Soon available



- 71 chargers are in service.
- 1,000 chargers will be installed by 2012.
- Prototype (Test Programs) installations underway in the US (Vacaville) and Vancouver, BC.



- Expand to housing companies,
- Shopping centers, Postal services
- Convenience stores.



**Tostem Co. Housing
Research Center,
Itochu Urban
Development**



**AEON
Shopping
Center**



Japan Post Group



Lawson, Convenience store



Secom Home Security

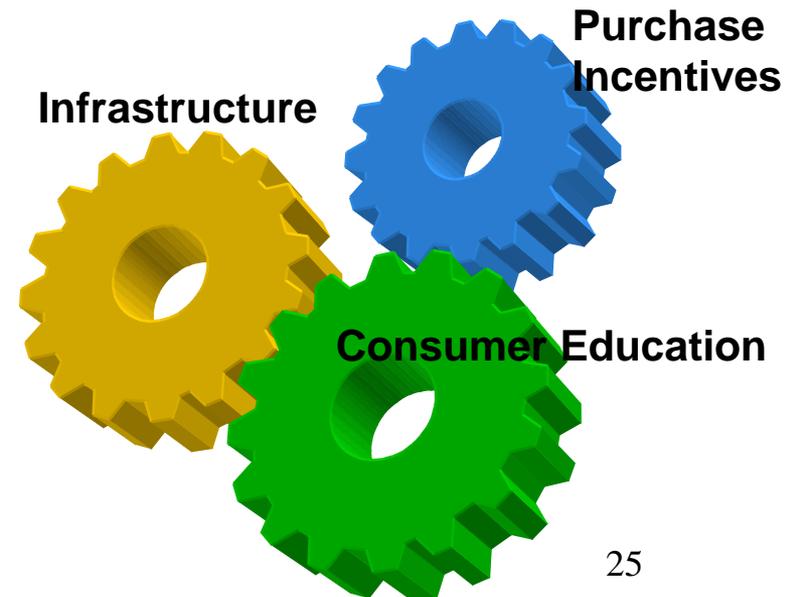
Market Actions to Support EV Introduction

For Initial Introduction, the important actions are **Consumer Education** and **Purchase Incentives**.

1. New Type of Vehicle – purchased and operated in a new way.
How to show benefits to general vehicle user?
2. Creative Purchase Incentives/User Perks
 - HOV access?
 - Free Tolls/Parking
 - Free Charging
 - **Others? – Eliminate Registration Fees/Sales Tax/Fuel Tax**

For Long Term Success, the most important action is **Infrastructure**

1. Easy, low cost and efficient Home Charging installation process.
2. Public Quickcharging Infrastructure

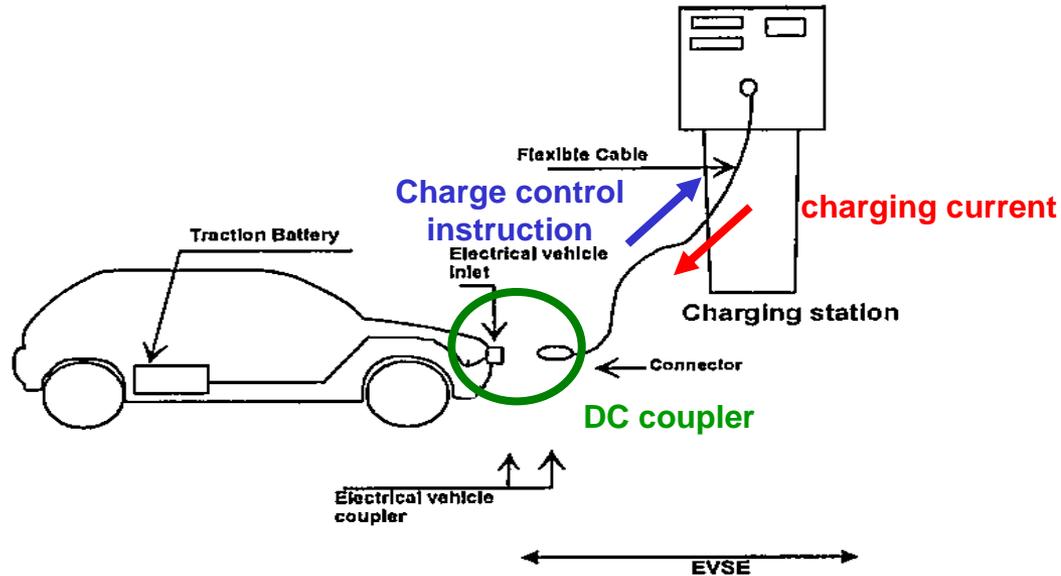


Mitsubishi Motors is leading the way toward wide-spread electric vehicle use.

- **The launch  *MiEV* in the Japanese Market - COMPLETE**
- **Evaluating the launch of the *i MiEV* in the global market**
- **Expansion of the EV and EV components business globally.**

JARI Vehicle & Charger Concept

1.) Master/Slave Design: Vehicle ECU controls the Charger.



- The Universal DC Charger allows for a variety of charging protocols and supports diverse battery and vehicle design requirements.
- Vehicle controls the charger output voltage and current via CANbus communication.

2.) Maximum Power: Up to 100kW (500V/200A) - Suitable for EVs and PHEVs

3.) Grid Power Requirement:

Typical -- 208V/3-phase, 240V/3-phase, 480V/3-phase, etc.