1st EVS Meeting

EV Market and Safety Regulation in Japan

April 24, 2012

MLIT / JASIC

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EVs (electric vehicles) is a general term that refers to HEV, PHEV or BEV.
* HEV: Hybrid electric vehicle
* PHEV: Plug-in hybrid electric vehicle
* BEV: Battery electric vehicle

Introduction of Safety Regulation for EVs in Japan

Japan has established EV related standards in early 90s (JEVS)

* Nov. 2007 — Requirements for protection of occupants against high voltage in normal use and post crash (Attachments 110 and 111) were introduced in Japan.

- *Dec. 2010* — *ECE-R100 (01 series of amendments), to which the requirements on protection of occupants against high voltage in normal use were added, entered into force.*

- *Jun. 2011* — *ECE-R12 (04 series of amendments), EE-R94 (02 series of amendments), and UN R95 (03 series of amendments), to which the requirements on protection of occupants against high voltage after collision were added, entered into force*.

* Jun. 2011 — Japanese regulation were harmonized with the UN ECE Regulations.

EVs Market

History of the Main HEV/PHEV on the Market

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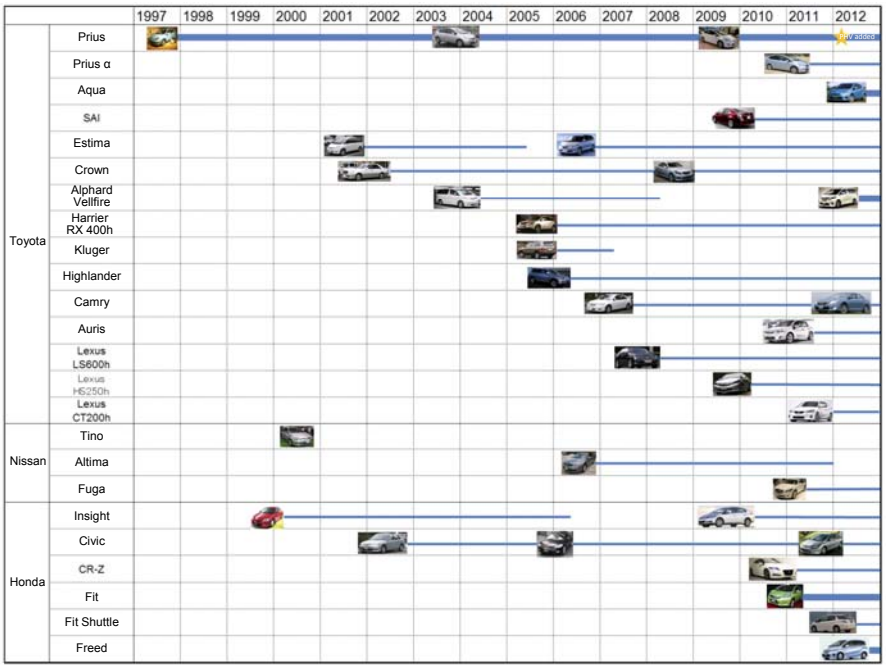

EVs Market

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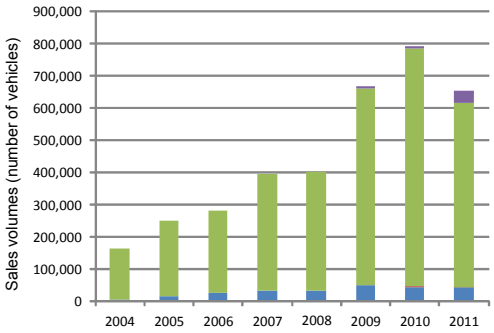
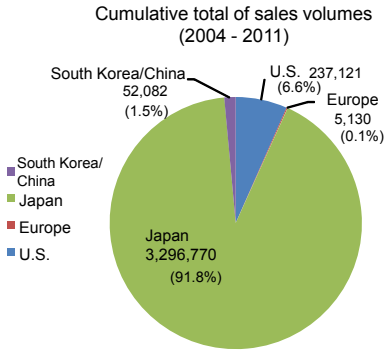
Changes in Sales Volumes of HEV/PHEV

(Data collected for each region of OEM headquarters)





Unit: number of vehicles

OEM region	2004	2005	2006	2007	2008	2009	2010	2011	Total
U.S.	2,993	14,813	22,569	32,255	32,062	49,681	42,582	40,166	237,121
Europe	0	0	0	0	0	0	2,426	2,704	5,130
Japan	157,602	233,250	257,177	360,570	368,211	610,551	738,337	571,072	3,296,770
South Korea/China	0	0	0	0	0	6,279	6,603	39,200	52,082

Source of figures: MarkLines/hybridcars.com

EVs Market

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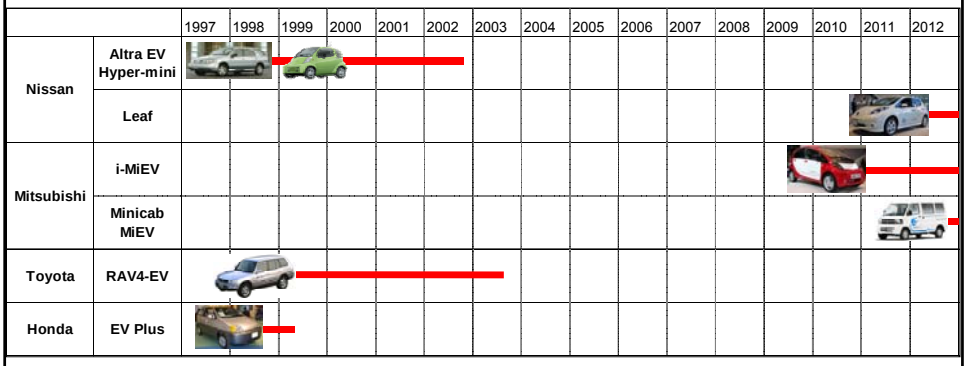
History of the Main BEV on the Market



EVs Market

Changes in Sales Volumes of BEV

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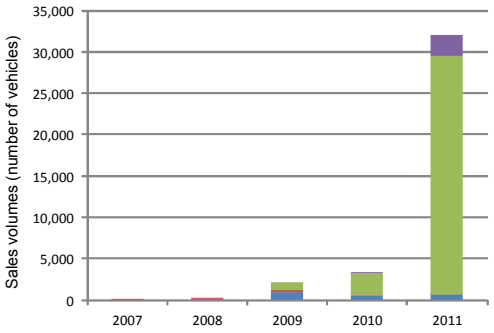
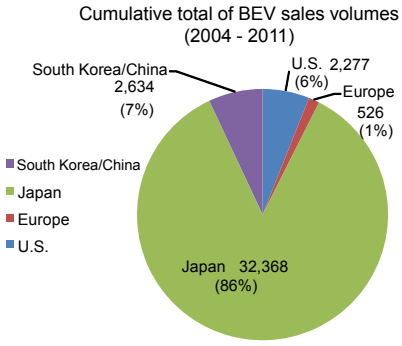
(Data collected for each region of OEM)





Unit: number of vehicles

OEM region	2007	2008	2009	2010	2011	Total
U.S.	0	127	973	527	650	2,277
Europe	68	108	184	103	63	526
Japan	0	0	986	2,599	28,783	32,368
South Korea/China	0	0	0	63	2,571	2,634

Source of figures: MarkLines/Tesla Motors (U.S.) site

EVs Market

Introduction to the Main EVs

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		Mitsubishi Motors i-MiEV	Nissan LEAF	Toyota Prius Plug-in Hybrid	
					
Seating capacity		4	5	EV range *	26.4km
Dimension (L×W×H)		3,395×1,475×1,610 mm	4,445×1,770×1,550 mm	Max speed at EV	100km/h
Maximum speed		130km/h	140km/h<	Energy Consumption at EV*	114Wh/km
Cruising distance		160km	200km	Fuel Consumption for HEV*	31.6km/h
Motor		47kW	80kW	Fuel Consumption for PHV*	61.0km/h
Battery		Li-ion 16kWh	Li-ion 24kWh	Battery/ kWh at one charge	Li-ion/ 3.02kWh
Charging time	normal	1Φ100V:14h 200V:7h	1Φ200V:8h	Charging time	Almost 90min. (1Φ200V)
	Quick	DC500V:0.5h(80%)	DC500V:0.5h(80%)		

*driving test mode
JC08 mode

EVs Market -conclusion-

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* Japanese manufactures sold many EVs in the world.
* The cumulative total of EV sales reached 3.33 million in about 40 countries, which accounts for more than 90% of the global EV sales.
* No serious safety problem specific to EVs has been reported.
* In establishing the new GTR, Japan is willing to contribute based on the experience and knowledge.

Concept of Safety Regulation in Japan

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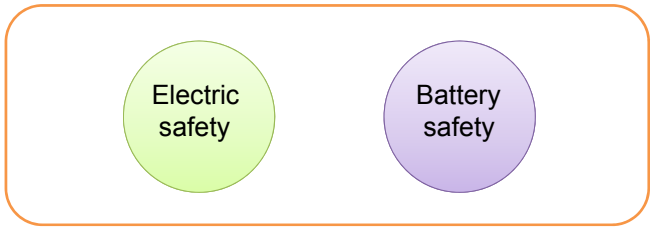
- How to Ensure EV Safety



* Electric safety: Protection of occupants against electrical shock
* Battery safety: Prevention of battery-induced fires, prevention of damage to the human body caused by electrolyte scatter, prevention of accumulation of hydrogen gas

Concept of Safety Regulation in Japan

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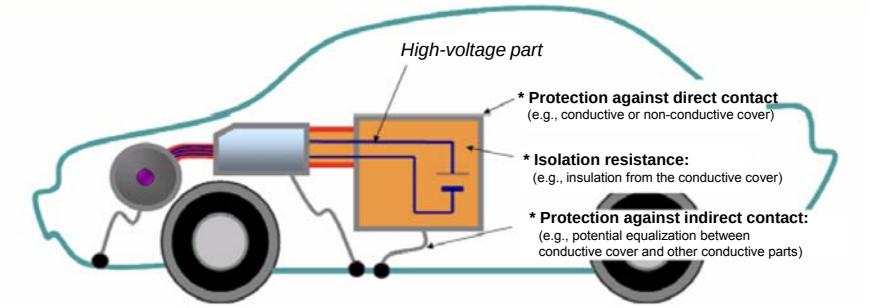
Protection against electrical shock

* Protection against direct contact: Occupants are prevented from coming in direct contact with high-voltage parts.
* Isolation resistance: High-voltage parts are insulated from the other conductive parts.
* Protection against indirect contact: Occupants are protected against electrical shock even when leakages occur from high-voltage parts to other conductive parts.



Concept of Safety Regulation in Japan

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* Attachment 110
Protection of occupants against high voltage in normal use
- Regarding protection against electrical shock in normal use of EVs, etc., this regulation specifies requirements on:
  * Protection against electrical shock from the powertrain's high voltage
  * Protection from devices connected to the external power
  * Protection against overcurrent of traction batteries
  * Ventilation in the case of containing traction batteries that produce hydrogen gas
  * Indication of the vehicle's operational readiness status

* Attachment 111
Protection of occupants against high voltage after collision
- Regarding protection against electrical shock after collision of EVs, etc., this regulation specifies requirements on:
  * Protection against electrical shock from the powertrain's high voltage
  * Electrolyte leakage from traction batteries
  * Fixation of traction batteries
- For heavy trucks and buses to which the above requirements are not applicable, it specifies requirements on:
  * Installation positions of traction batteries and electrical circuits
  * Strength of traction battery attachment

Japan's Position at EVS

- **EVS should prioritize its activities considering the defined timeline by the end of 2014.**
  - technical regulations of vehicle, its equipment and parts
    (based on the definition from 98 Agreement)
  - applicable vehicle category of vehicles (category 1 & 2)
- **EVS should also exchange the information and views for the item other than above, such as EVs' infrastructure.**