

**2nd. Asia Automobile Institute Summit**

**25-26 November 2013, Bali**

# **Electrically Propelled Vehicles**

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**FC-EV Research Div.**

**Japan Automobile Research Institute**



# Today's Agenda

- 1. Prospect for the International Standardization of EV related items : JARI (20 min)**
- 2. The situation for domestic standardization on EV related subject in each countries (10-20 min. each)**
- 3. Discussion and further action (45 min)**
  - The situation for EV in each counties
  - Itemization for the topics for this session to discuss
  - Issues on introducing international standards into domestic standards
  - Further actions.
- 4. Wrap-up and next steps (5 min)**

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## **Prospect for the International Standardization of EV related items**

**Hidenori Tomioka**

**FC-EV Research Div.**

**Japan Automobile Research Institute**



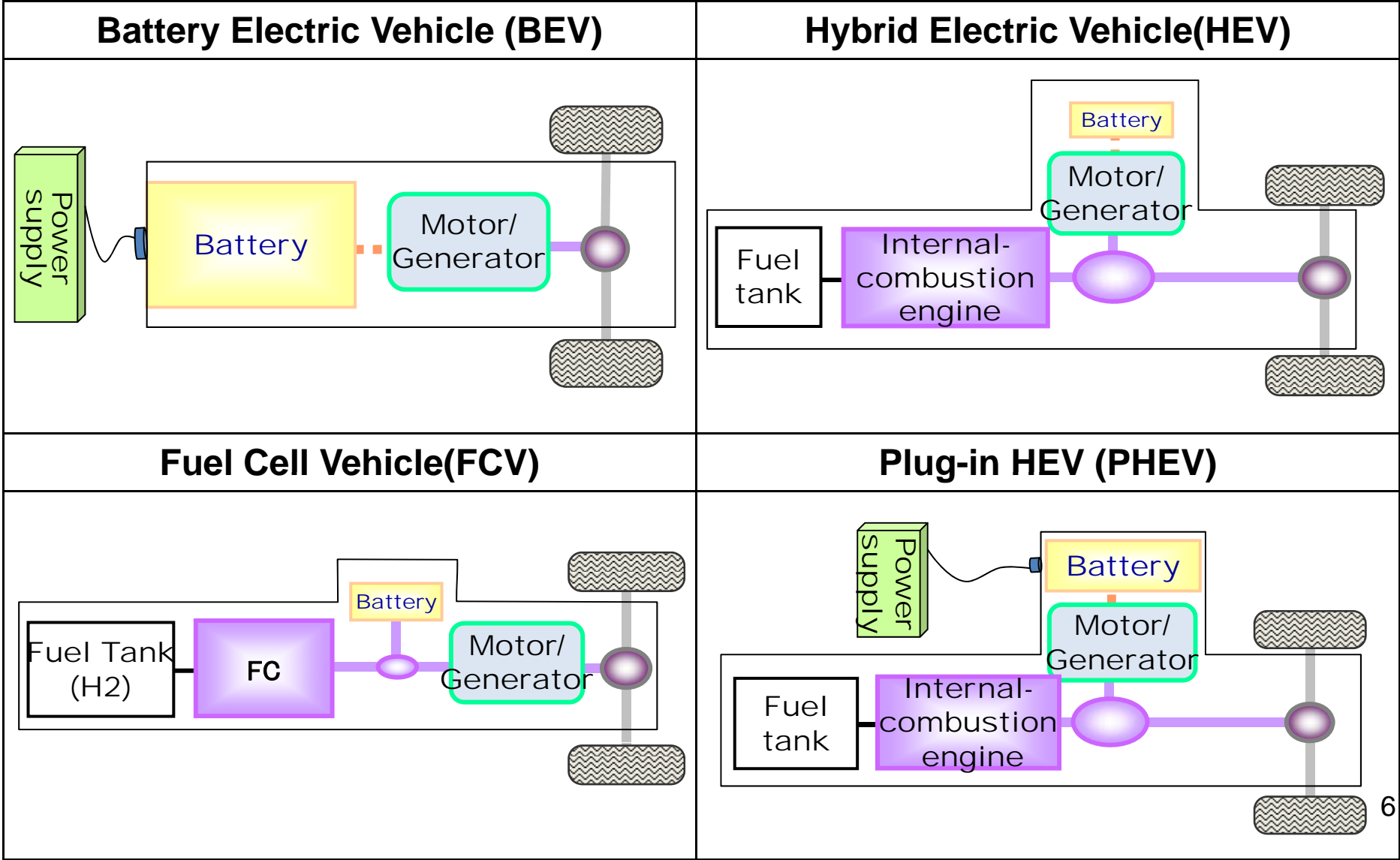
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- 1. Prospect for the market and the popularization of EVs**
- 2. International standardization activities in the EV sector**
- 3. Standardization information exchange on EV applications among AAIS members**

# Contents

## 1. Prospect for the market and the popularization of EVs

# Basic structures of electrically propelled vehicles' family



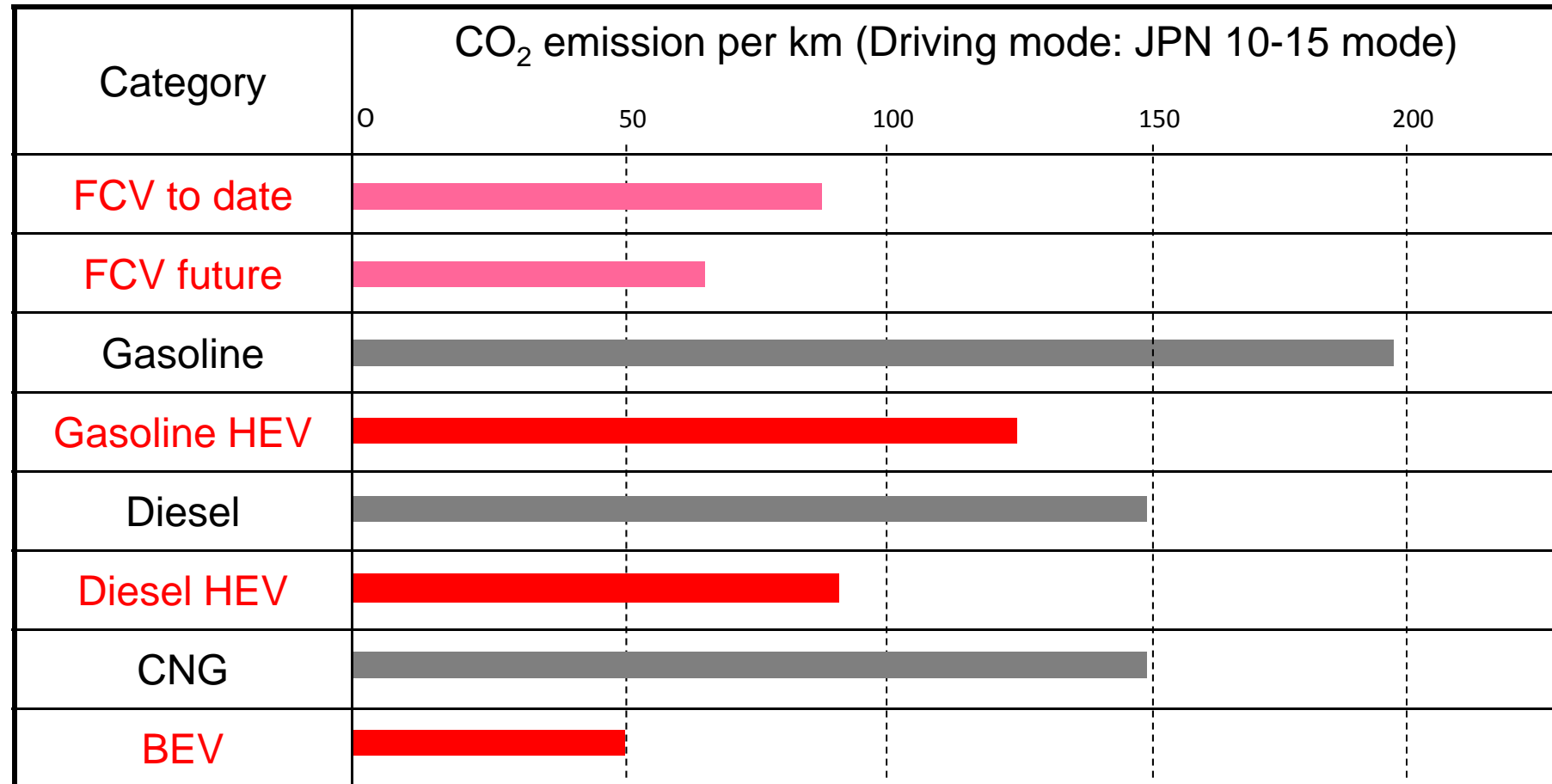
# CO<sub>2</sub>-reduction utilizing electrically propelled vehicles

(Well to Wheel CO<sub>2</sub> emission)



Source: JHFC

Unit: g-CO<sub>2</sub>/km

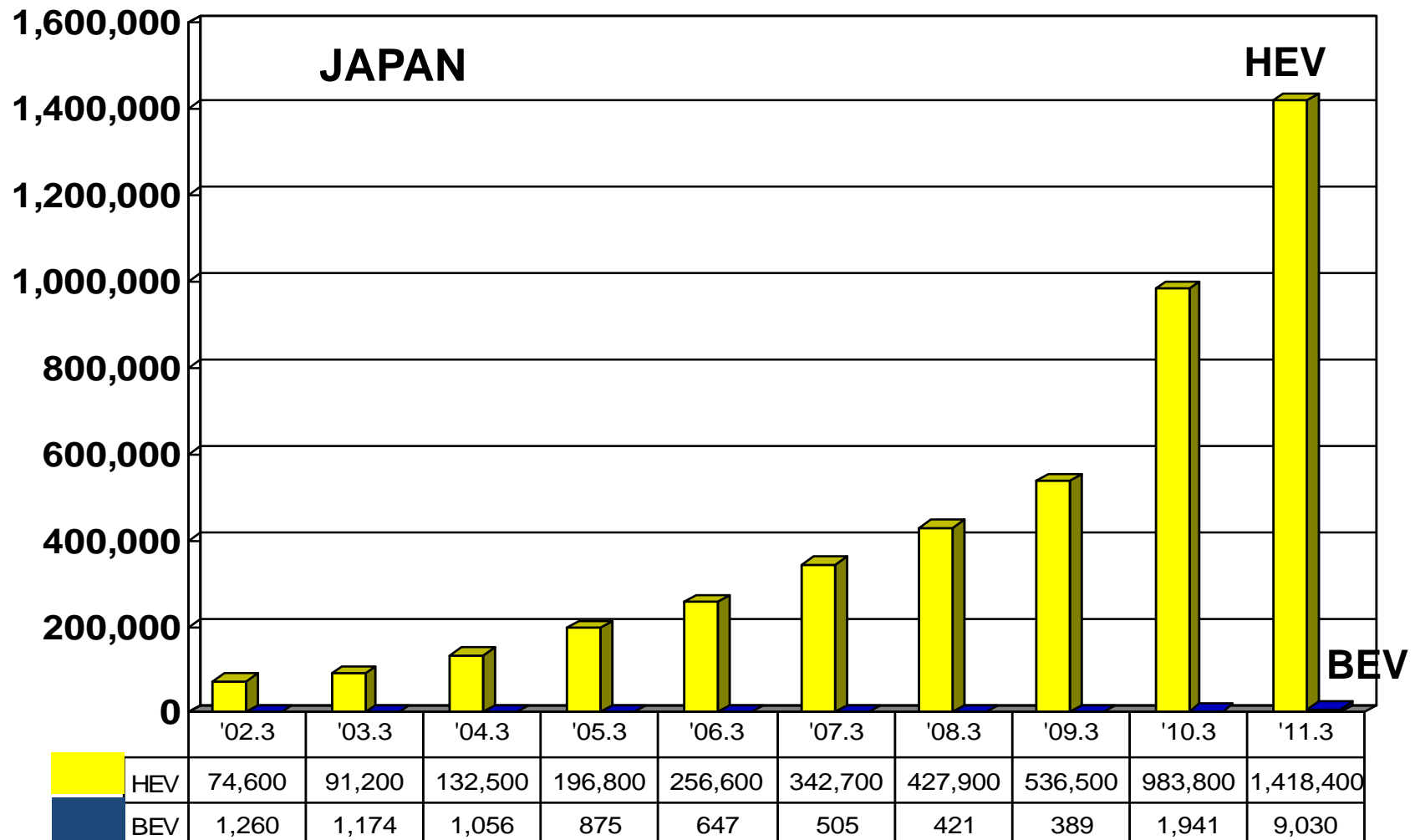


FCV現状:「水素ステーション」「FCV」データはJHFC実証結果トップ値、その他データは文献トップ値により算出  
 FCV将来:FCVの将来FCシステム効率60%と文献トップ値により算出      電力構成 :日本の平均電源構成

**Broad use of EV is effective for CO<sub>2</sub>-reduction**

# The number of BEV·HEV in operation in Japan

Development of international standardization for EV and batteries is urgent to match the rapid spread of Electric Vehicles.

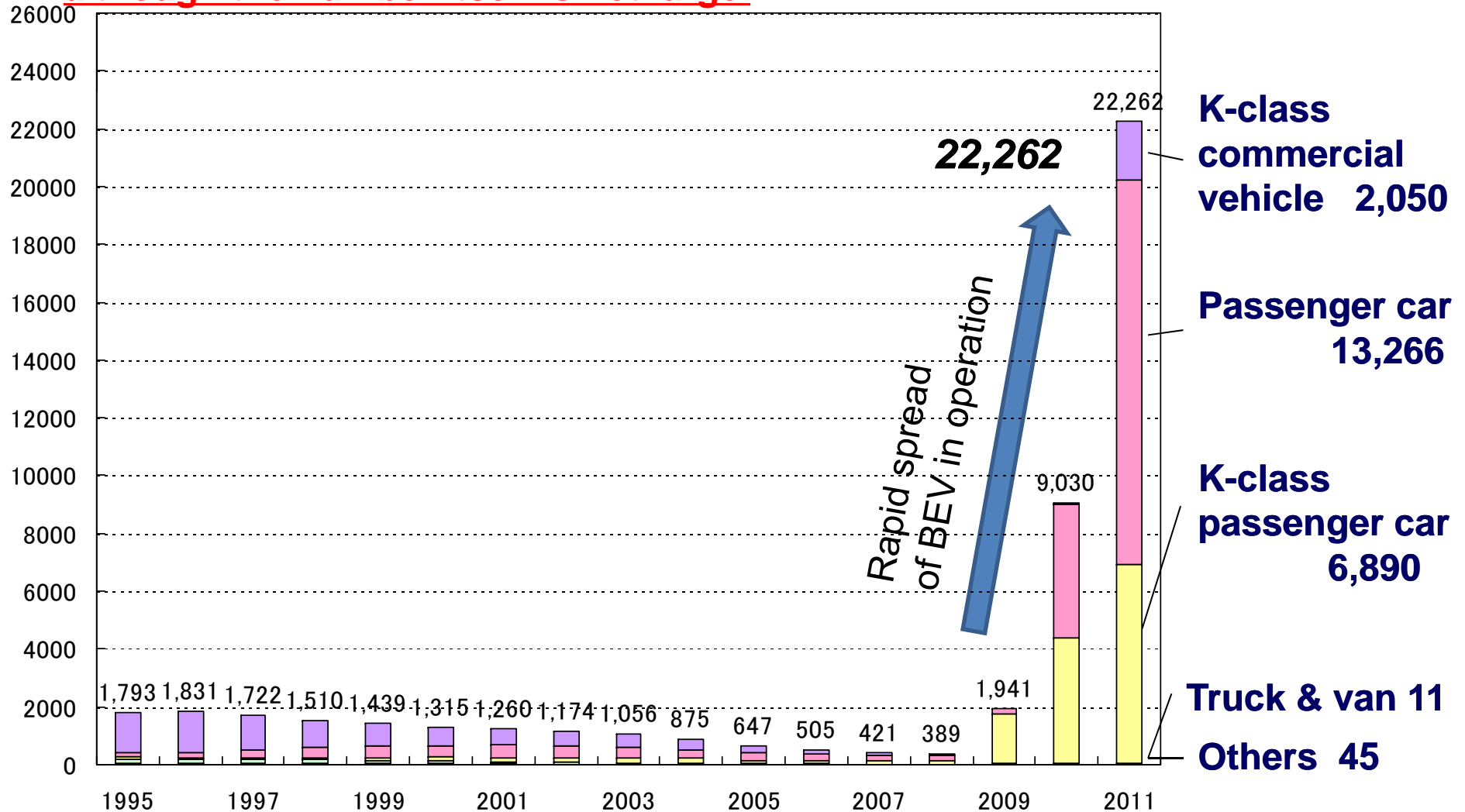




# The number of BEV in operation in Japan



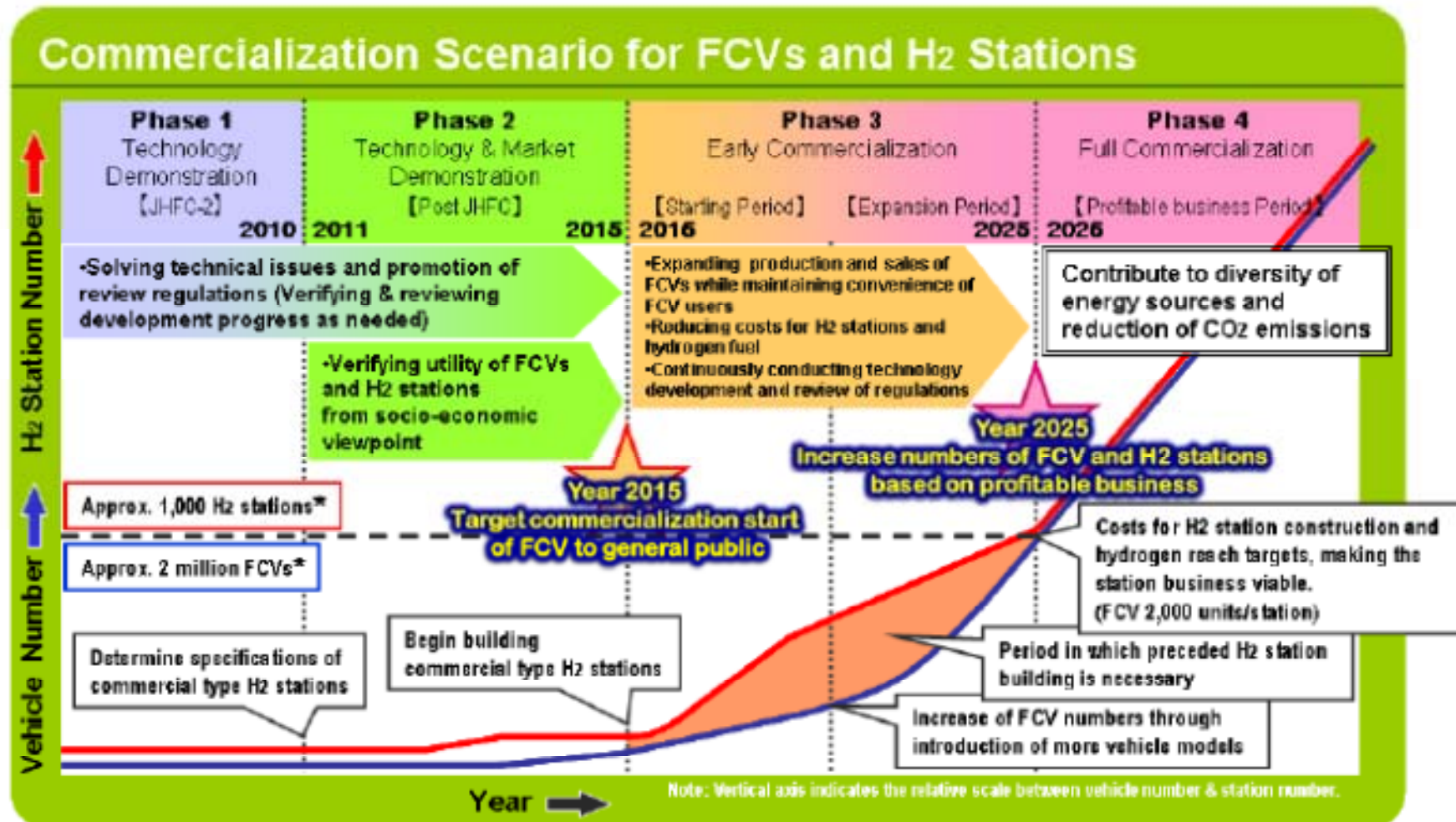
Number of BEV operation has been increased rapidly in these years although the number itself is not large.



**"K-class" is the Japanese classification for vehicles which are less than 3.4m long and with an engine displacement of 660cc or less.**

# Commercialization Scenario for FCVs and H<sub>2</sub> Stations

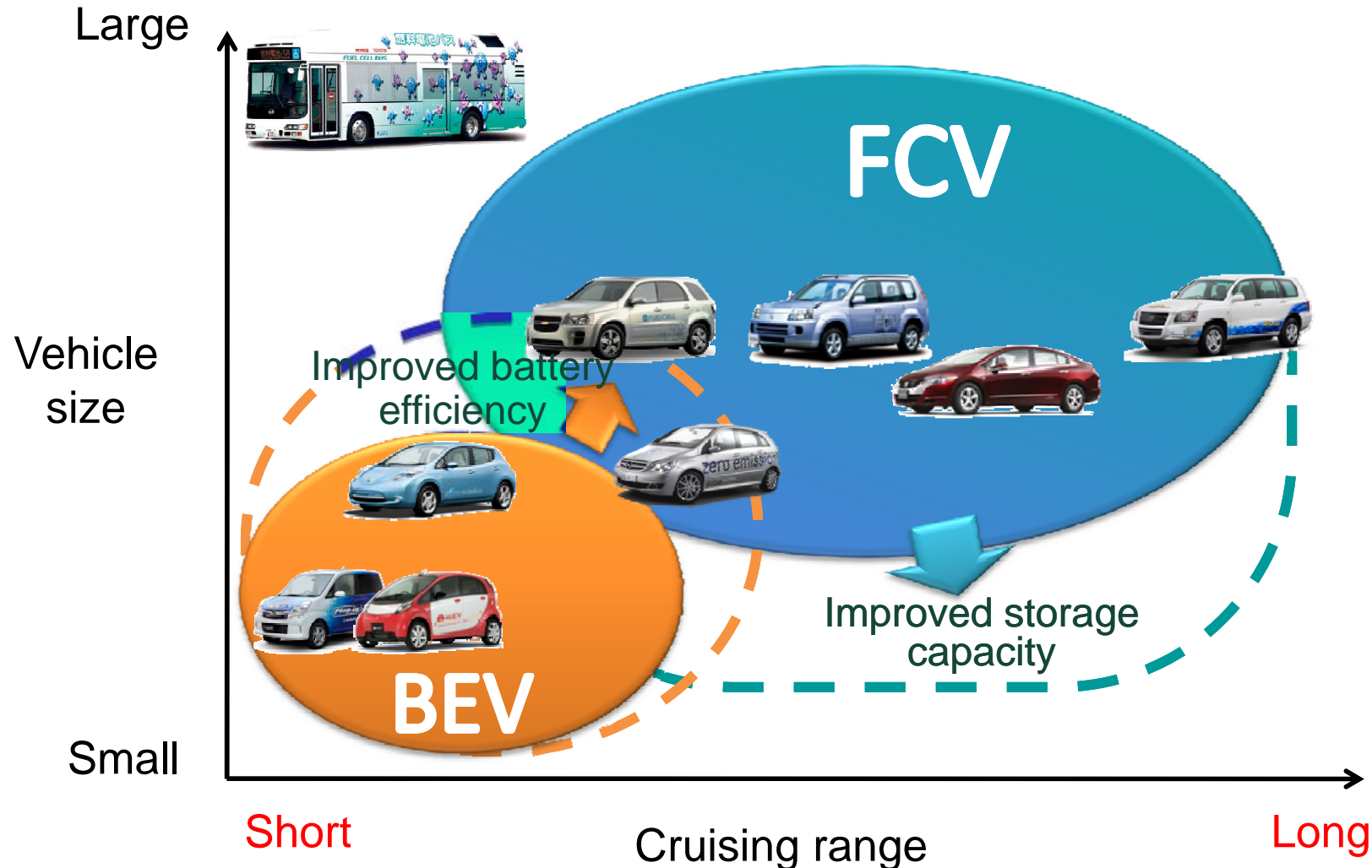
2010



^ Precondition: Benefit for FCV users (price/convenience etc.) are secured, and FCVs are widely and smoothly deployed

# Segmentation of FCV and BEV

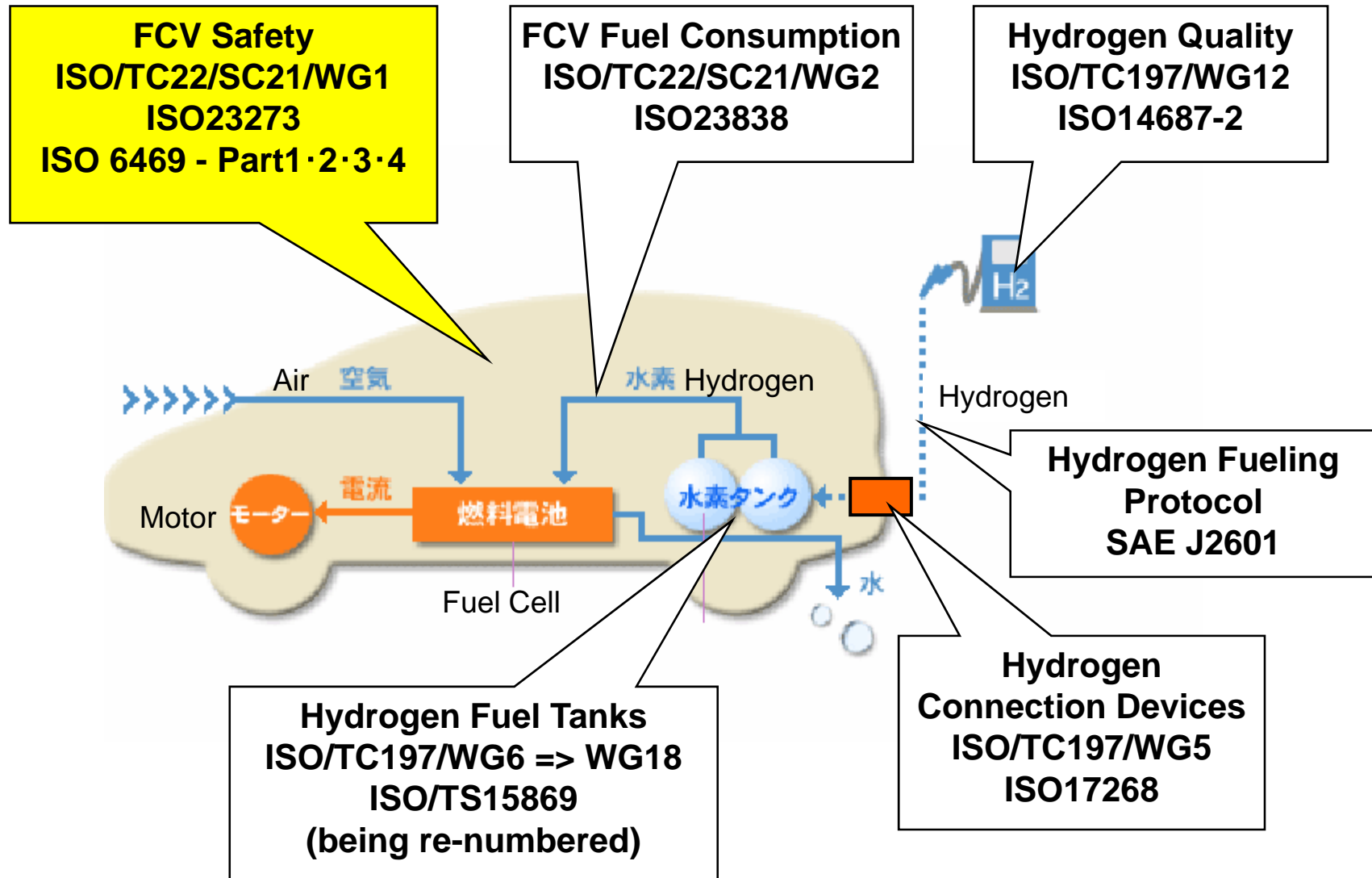
- FCV can replace existing internal combustion engine vehicle in aspects of vehicle size and Cruising range.
- For small and short-distance applications, BEV and FCV can coexist to spread more widely.



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## 2. International standardization activities in the EV sector

# Schematics of Standardization for FCV



# EV Safety: ISO6469-Part1 · 2 · 3 · 4 ISO23273



FCV safety standards are changing the system.

-- ISO6469 Electrically propelled road vehicles - Safety specifications (Revision)

Part 1: On-board rechargeable energy storage system - RESS

Part 2: Vehicle operational safety means and protection

Part 3: Protection of persons against electric shock

Part 4: Post crash electrical safety requirements

"Electrically propelled road vehicles" includes BEV, HEV and FCV.

ISO23273: Fuel cell road vehicles -- Safety specifications --  
Protection against hydrogen hazards for vehicles fuelled with  
compressed hydrogen

# Standards and regulations of traction Li-ion batteries



	Standard	Regulation
Performance test	<div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; border-radius: 10px; padding: 5px; background-color: #FFD1E8;">ISO 12405-1</div> <div style="border: 1px solid black; border-radius: 10px; padding: 5px; background-color: #E0F7FA;">IEC 62660-1</div> </div> <div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; border-radius: 10px; padding: 5px; background-color: #FFD1E8;">ISO 12405-2</div> <div style="border: 1px solid black; border-radius: 10px; padding: 5px; background-color: #E0F7FA;">IEC 62660-2</div> </div>	
Reliability test		
Abuse test		
Safety requirement	<div style="border: 1px solid black; border-radius: 10px; padding: 5px; background-color: #FFD1E8; margin-bottom: 5px;">ISO 12405-3</div> <div style="border: 1px solid black; border-radius: 10px; padding: 5px; background-color: #E0F7FA;">IEC 62660-3</div>	<div style="border: 1px solid black; border-radius: 10px; padding: 5px; background-color: #FFD1E8; text-align: center;">ECE regulation</div>
Dimension	<div style="border: 1px solid black; border-radius: 10px; padding: 5px; background-color: #E0F7FA; text-align: center;">IEC/ISO PAS 16898</div>	

: For battery system or pack  
 : For cell

# The basic stance on the standardization of traction Li-ion batteries



- **Start with the standardization for the test procedures, then make the standards those include the pass/fail criteria.**
- **Input the appropriate contents in consideration of current and future battery technology.**
- **Promote the harmonization between relevant standards and regulations.**



# Structure of International Standard with regard to Charging System 1



		System	Interface
Conductive Charging	General	IEC 61851-1 C.Bleijs (FR) <b>General Requirements</b>	IEC 62196-1 G.Nieminski (US) <b>General Requirements</b>
		Vehicle	
	ISO PAS T.Miki (JP) <b>Electric Vehicle</b>		
	AC Charging	IEC 61851-22 C.Bleijs (FR) <b>AC Charge Station</b>	<b>IEC 62196-2</b> T.Miki (JP) <b>AC Charge Interface</b>
	DC Charging	<b>IEC 61851-23</b> S.Roy (JP) <b>DC Charge Station</b>	<b>IEC 62196-3</b> T.Rose (US) <b>DC Charge Coupler</b>
		<b>IEC 61851-24</b> S.Roy (JP) <b>DC Charge Protocol</b>	
Inductive Charging	General	IEC 61980-1 E.Stolz (CH) <b>General Requirements</b>	

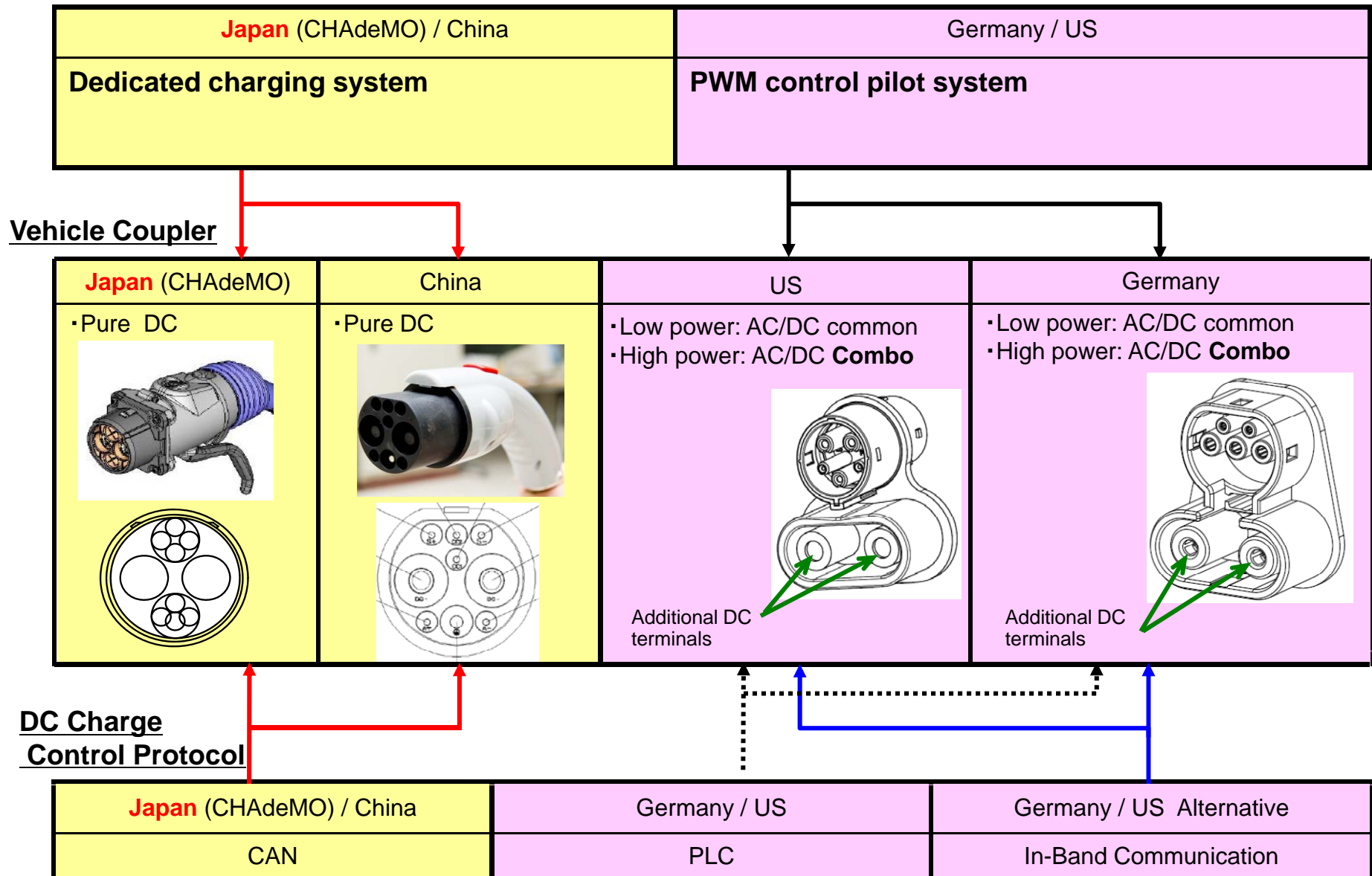
# Structure of International Standard with regard to Charging System 2



	System
<p style="text-align: center;"><b>Vehicle to Grid Communication Interface (V2G CI)</b> C.Bleijs (FR) C.Saalfeld (DE)</p>	<p>ISO 15118-1 <b>General information and use-case definition</b></p>
	<p>ISO 15118-2 <b>Technical protocol description and Open Systems Interconnections (OSI) layer requirements</b></p>
	<p>ISO 15118-3 <b>Physical and data link layer requirements</b></p>

# DC charging system/ interface standardization

## DC charging system



# Aspect of standardization for this field



- IEC has not reached the single specification for both AC and DC couplers.



- There are many stakeholders in this field, unlike other technical fields.
  - Interests among the automotive industry, electric power suppliers.
  - Differences in the power situation in national and regional areas

**To reach consensus**



**It is essential to build a relationship of mutual trust among stakeholders**

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## **3. Standardization information exchange on EV applications among AAI members**

## ◆ Background

At the #2 summit, we're anticipating these outputs:

- ✓ Sharing the current status and issues related standardization of "Safety and performance of EV and battery" and "Charging" among attending countries.
- ✓ Agreeing to set the summits after #3 to be the regular area of exchange of information to solve the facing issues.

## ◆ Concerns

- ✓ How to introduce those international standards into local codes and standards.
- ✓ Needs to built up the common interpretation of those languages in international standards.

## ◆ Outcome

We're expecting these fruits among the AAIS members:

- ✓ Harmonization of testing protocol in the future
- ✓ Enhancement of "Asian Voices" at the international standardization in this EV field

-- Contact Persons?

-- The next topic(s) at the #3 AAIS?



# Thank you for your attention.

**If you have any comments and questions,  
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