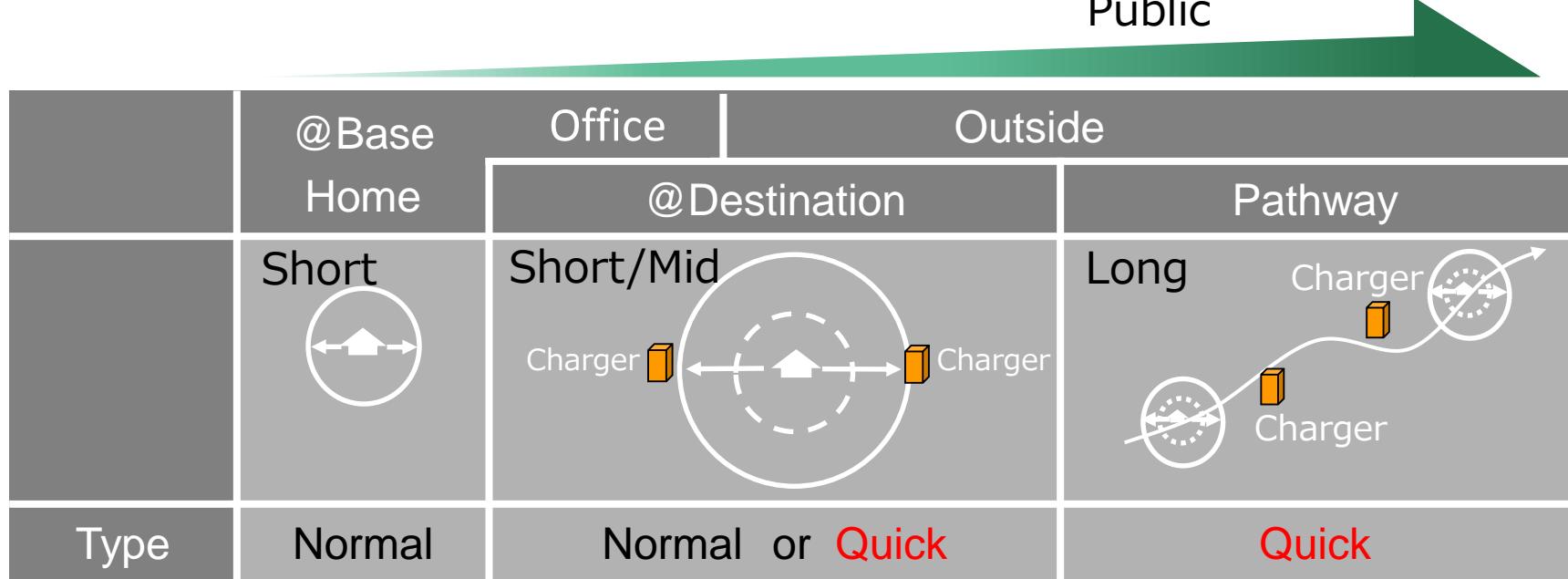


Super High Power Charging

China-Japan Joint Research Project

November 30th, 2018
CHAdemo Association
Secretary General
Makoto YOSHIDA

Charging



The diagram illustrates the range of EV charging scenarios across different locations:

	@Base Home	Office	Outside	Pathway
Range	Short (circle with double arrow)	Short/Mid (circle with dashed center line and double arrows)	@Destination (circle with dashed center line and double arrows)	Long (line with multiple chargers and arrows)
Type	Normal	Normal or Quick	Quick	Quick

Base Charge



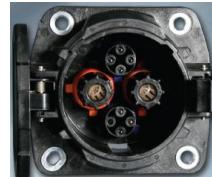
AC 100-200V



DC 500V (20kW-150kW+)

Charging Standards



	CHAdeMO	GB/T	US-COMBO CCS1	EUR-COMBO CCS2	Tesla
Connector					
Inlet					
 	✓	✓	✓	✓	
					
 	✓			✓	
 	✓	✓	✓	✓	
 		✓			
Protocol	CAN		PLC		CAN
Max Spec Power	400kW 1000x400	185kW 750x250	200kW 600x400	350kW 900x400	?
Max Market Power	150kW	50kW	50kW	350kW ?	120kW
First	2009	2013	2014	2013	2012

CHAdeMO Association Started @Mar 2010



CHAdeMO Association

411 members



42 countries

bp



PORSCHE



dyson

RICOH

Panasonic

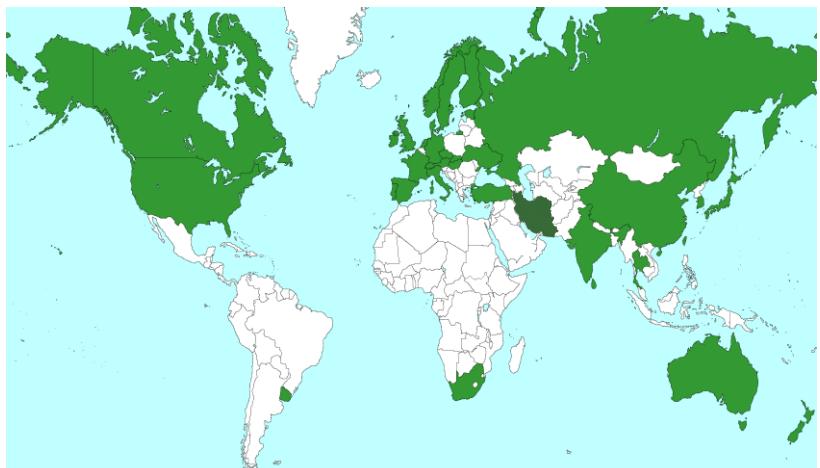
HITACHI
Inspire the Next

Kubota

e-on

TÜV SÜD

TÜVRheinland

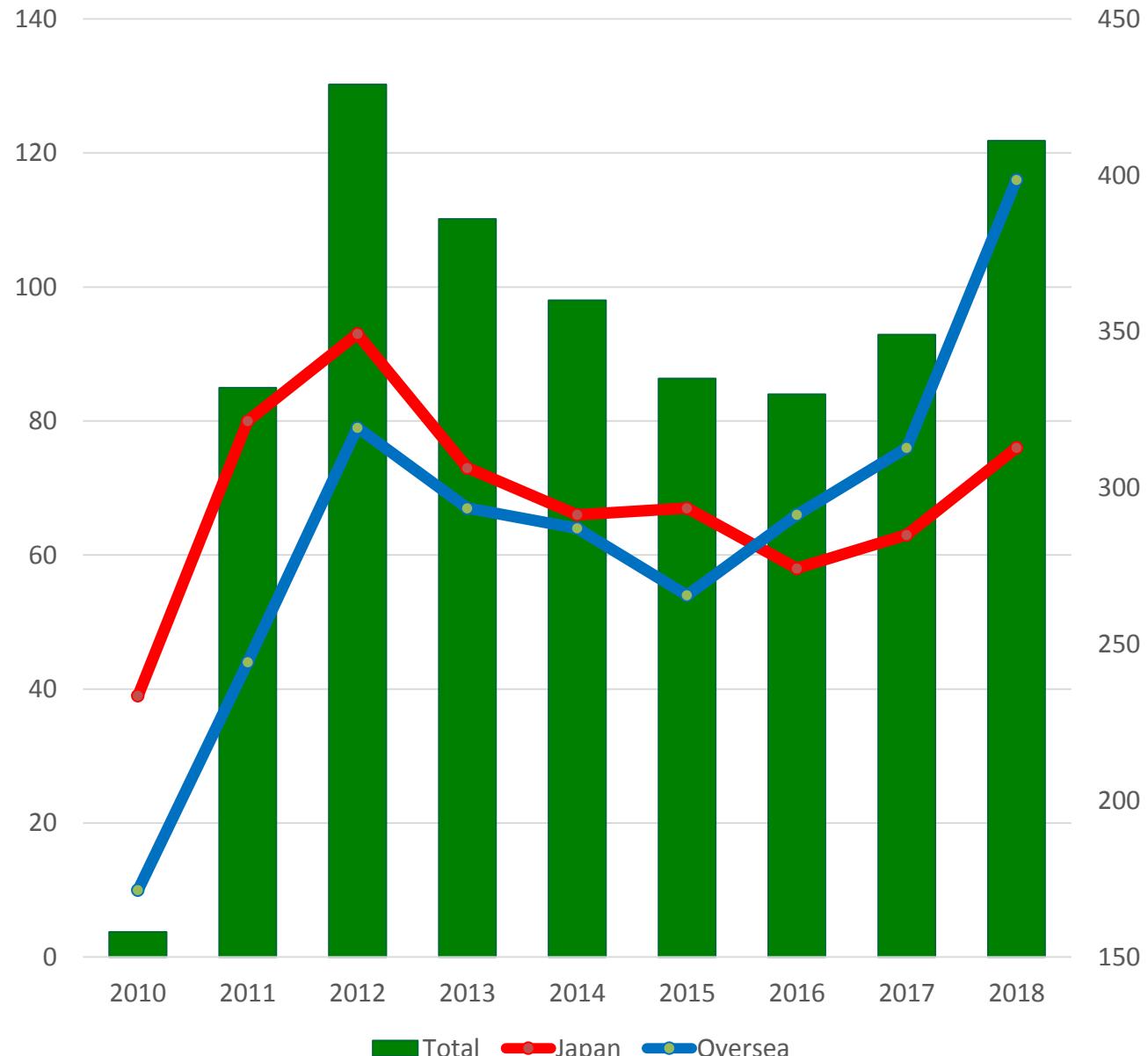


Consortium

- Manufacture
 - Charger
 - EV
 - Parts
 - Cable/Guns
- Power Generation
- Communication / IT
- Construction
- Certification Agency
- University / Laboratory
- Local Authority

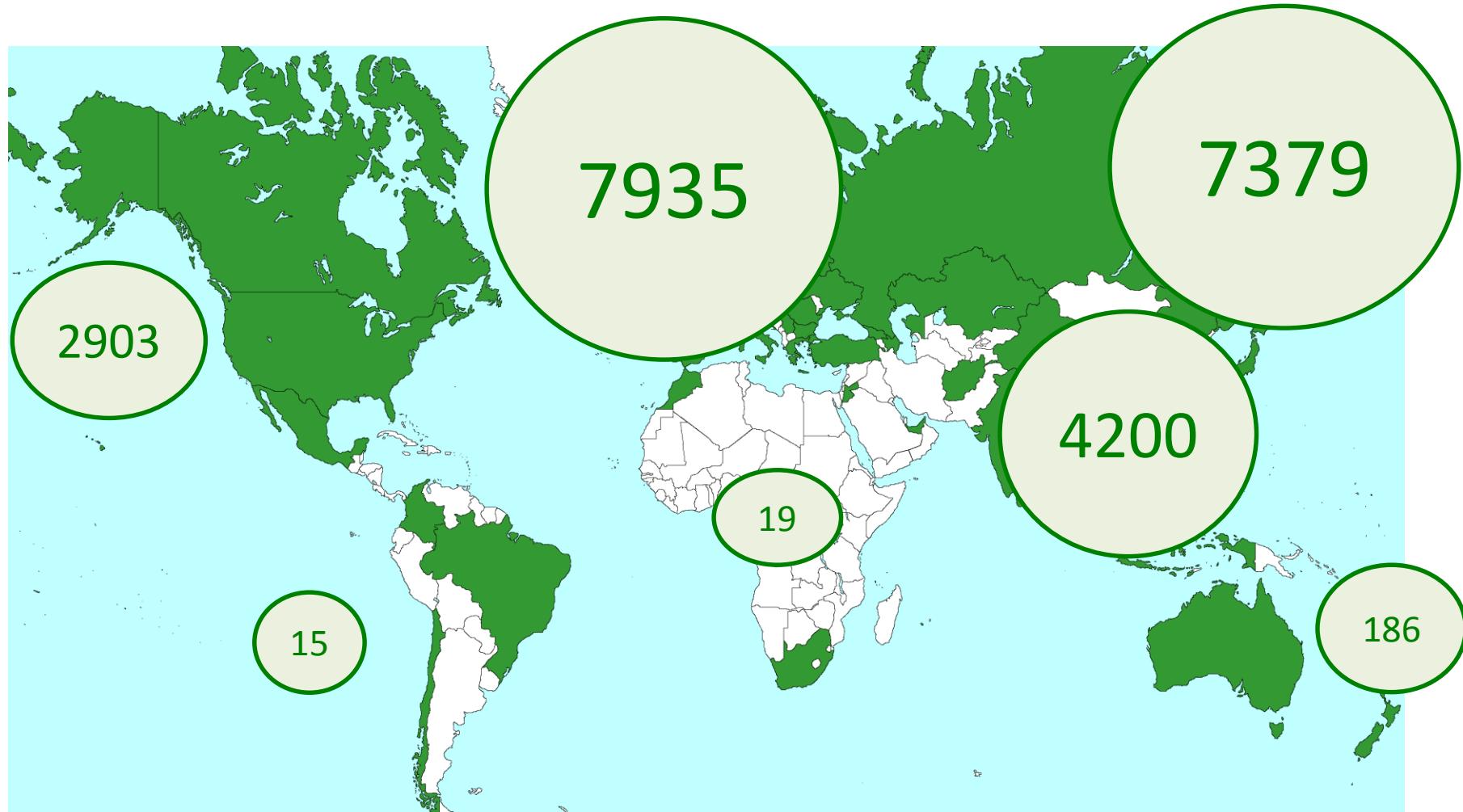


CHAdeMO members



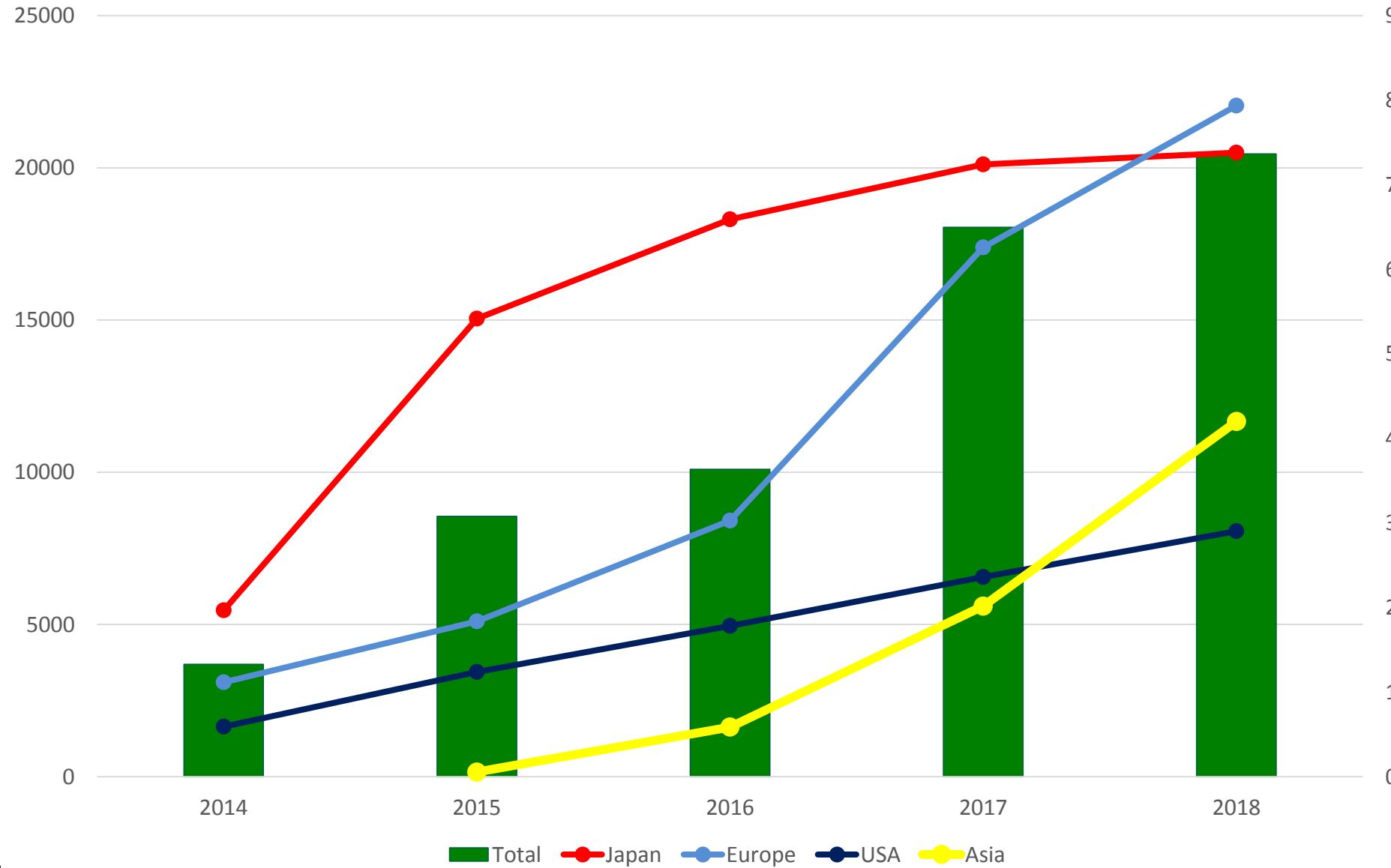
CHAdeMO Here and There

as of Sept 2018



CHAdeMO Here and There

as of Sept 2018

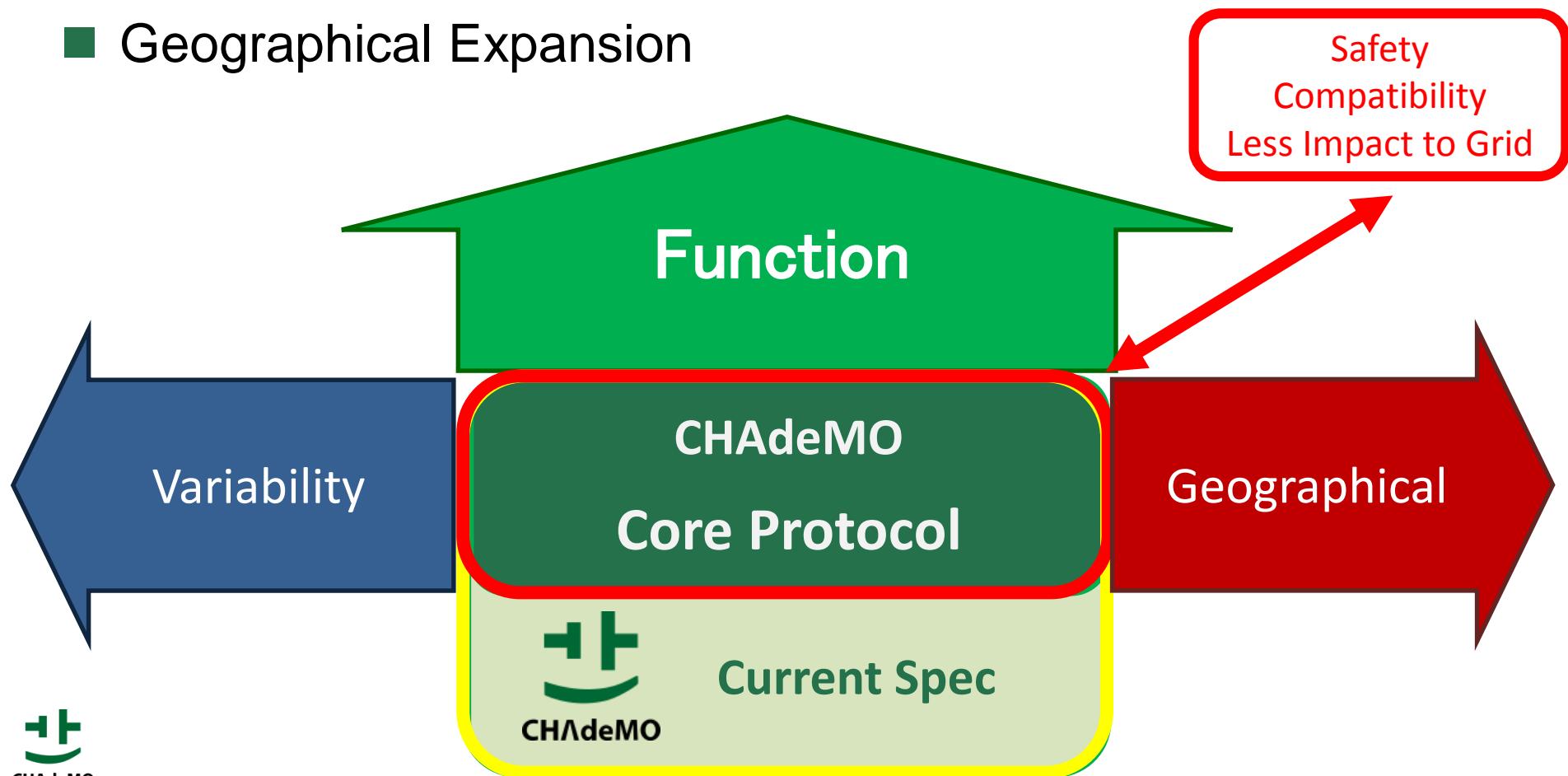


CHAdeMO's Innovation



Basic Function with Core Protocol +

- Functional Expansion
- Variability Expansion
- Geographical Expansion



“Glocal” with Open Platform Strategy



Target

- Designed, Made, Certified, Sold, Charged **Locally**
- CHAdeMO Similarity Makes Export Easy (**Global**)

Proposal

- Localize the Certification Scheme
- Empowerment to Local Organization
- Open All the Intellectual Property
- With Local Companies to **Minimize Cost**
- Local Unique Standard with **CHAdeMO Core Protocol**
- **CHAdeMO Local Office** (Tokyo + Europe, Thai, India, UK)
- Technical Support (Global Help Desk, Lecture, Education..)



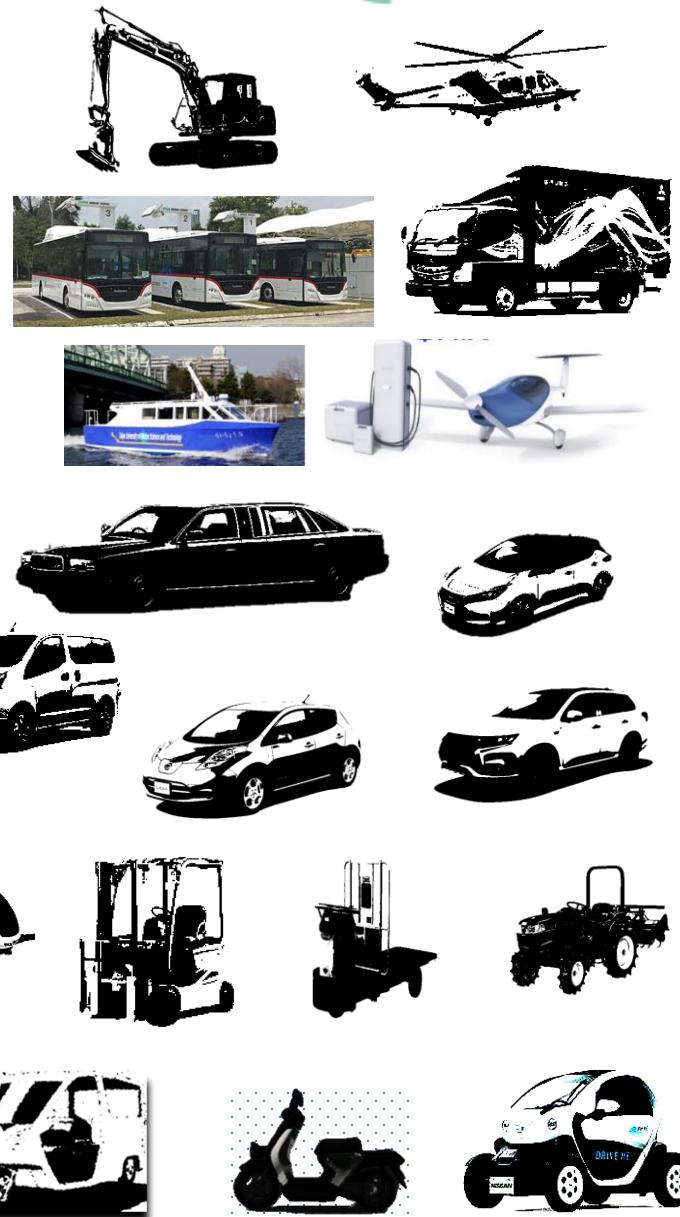
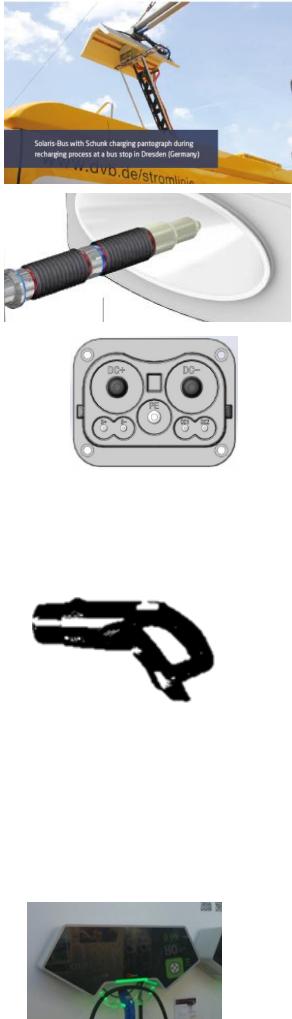
Charger; Its Variety



Big



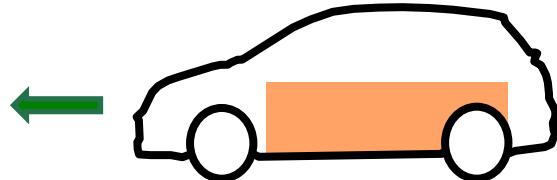
Small



As Battery on EV Grows



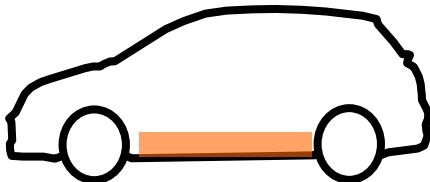
V2X Function



Various Power Charge



Batt Cap Up



Battery as Energy Source

- to Shift the Peak
- to Join Smart Grid
- to Prepare Blackout
- to Collaborate with PV
- to use in Leisure/Work

High Power

- 50->100->400kW+
- Power Share Charger

Add on Charge

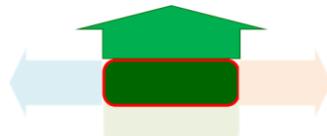
- During...

Cost Conscious

- 10-20kW

IoT Guide

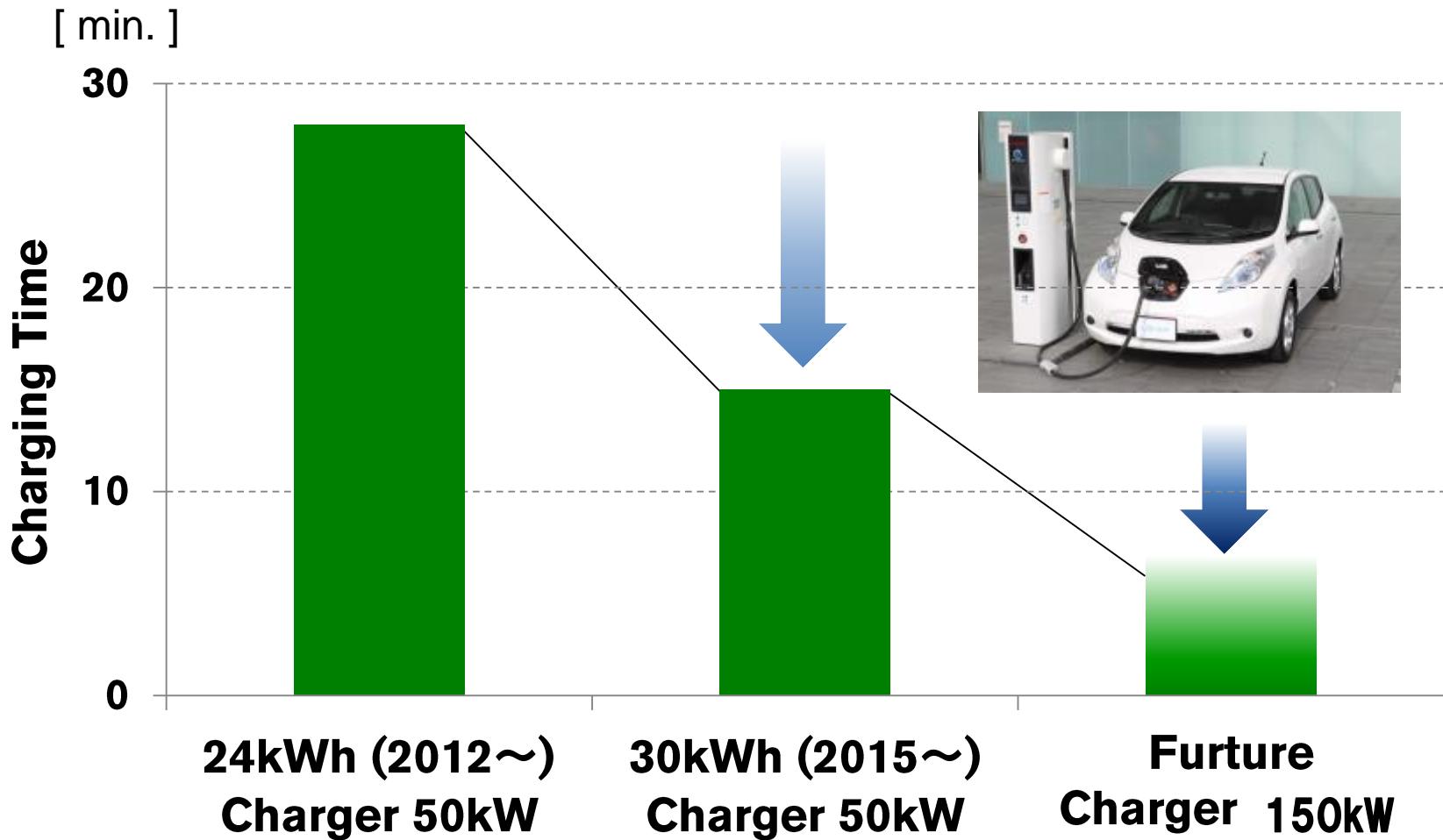
- Load Levelize



Shorten the Charging Duration



Charging Duration to Drive 100km



* Charging started from 30% charged. Performance depends on individual difference and environmental condition.

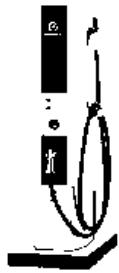
Source: Nissan

High Power Road Map -Now-



Auto Charge

Power Share



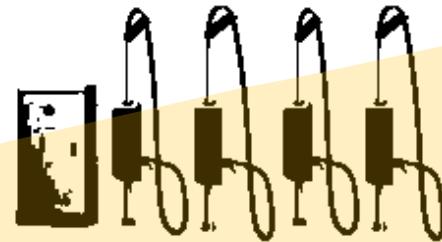
50kW



**100/150-200kW
(Cont/Peak)**



**150-200kW
(Cont)**



**350-400kW
Spec 2.0**



**350-400A
x 1kV**

125Ax500V

**350Ax500V
(400Ax500V)**



Liquid Cooling

Dynamic Control

2016

2018

2020

Task of High-Power



- Battery Acceptance
- Impact to the Power Grid
- Electrical Safety
 - Heat Resistance for High Current,
 - Electrical Shock for High Voltage
 - Heavier Cable and Connector with Heavy Connectivity
- High Cost
- Multi-Arm; Power Share
 - Dynamic Current Control
 - For No Waiting Vehicle Line

Battery	Charger		
	50kW	150kW	350kW
25kWh	30 min	×	×
50kWh	1 hour	20 min	×
150kWh	3 hours	1 hour	30 min

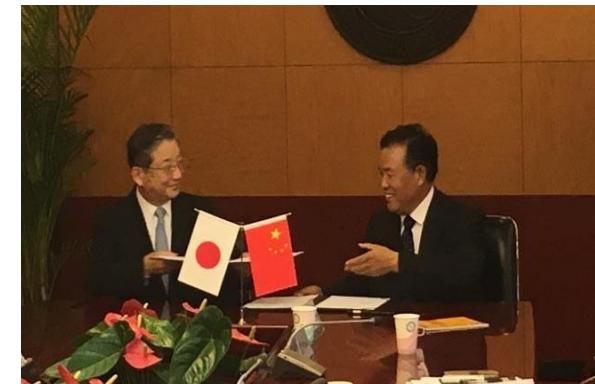


China and Japan Agreement



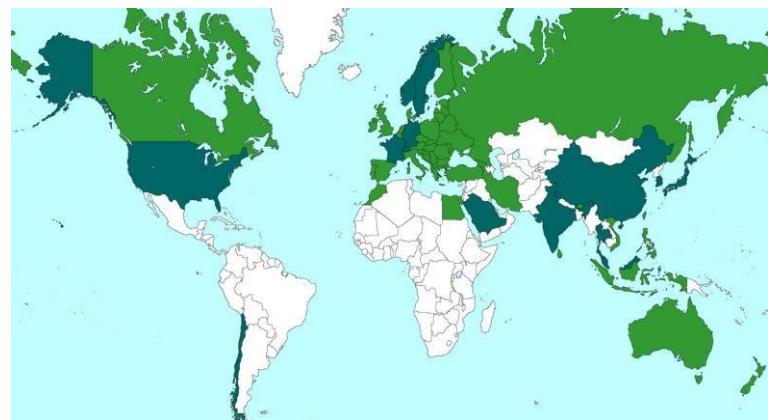
Develop New Standard

- Agreement to develop common new standard on 28th of August 2018
- China Electricity Council and CHAdeMO Association Agreed to Establish the new future Standard for 2020



Expansion to the 3rd Countries

- Agreement to expand common standard to the 3rd Countries on 26th October 2018 under the supervision of each Government



To Establish Future Standard



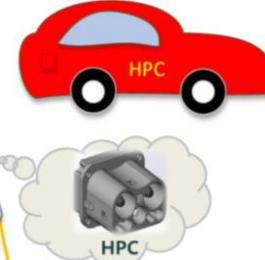
- Scope; Safety, Durability, Compatibility, Expandability(V2X)
- Backward Compatibility Assured
- Use CAN system as Primary Communication
- Joint Technical Group and Demonstration
- Targeting Standardization by 2020
- Agreement Signed between CEC and CHAdeMO



new chargers with GB/T 2015 vehicles

Backward Compatibility

- ✓ easy to use, strong security ;
- ! need to install two sets of different charging coupler;



new chargers with GB/T 2015 vehicles

Backward Compatibility

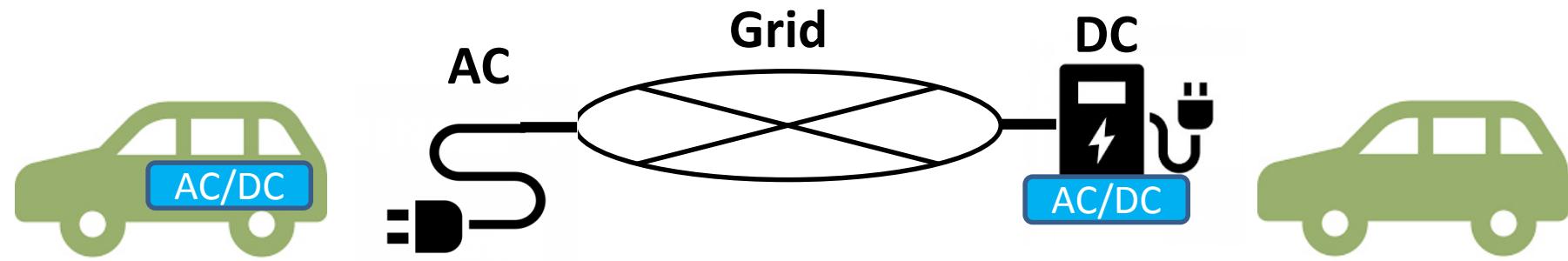
- ✓ conform with IEC standards ;
- ! increase costs ;



Why CAN is better?

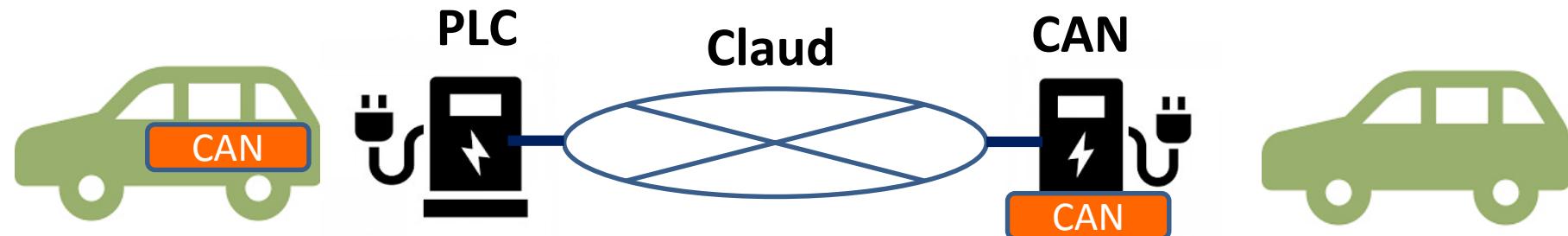


1 : 1



1 : 100

100 : 1

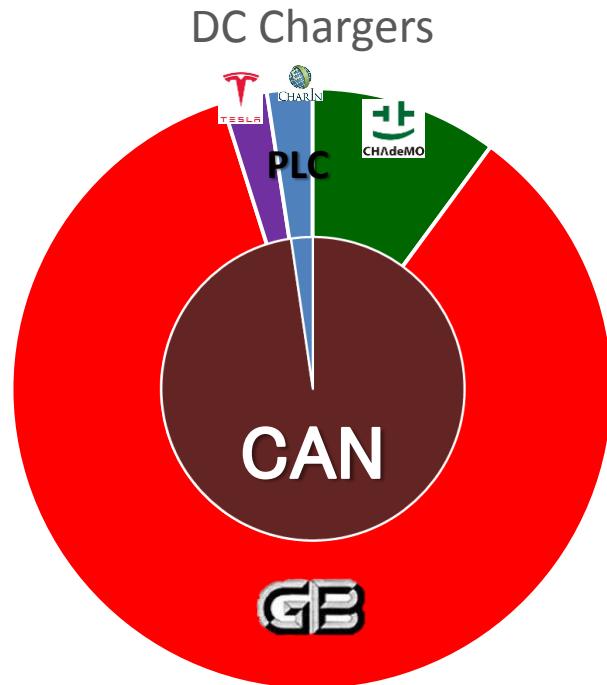


1 : 100

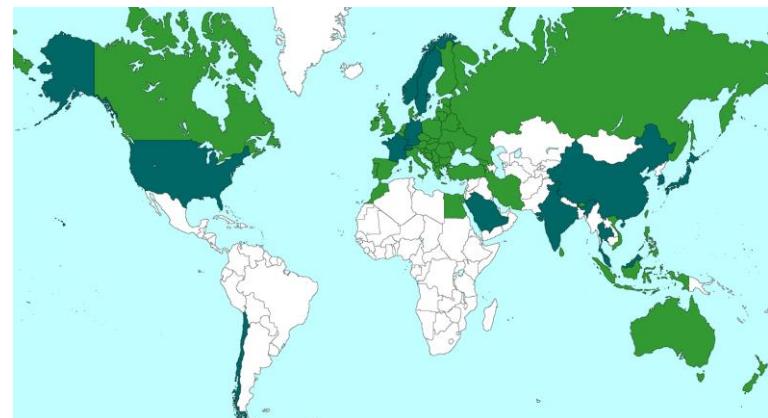
Merit of Common Project



- Better Quality, Safety, Compatible Standard
- Market Expansion with A Unique Standard
- Mass Manufacturing leads Cost Down
- Current Asset Utilization by Backward Compatibility
- No Business Obligation Each Other (Independency)



GBT dominate by number



CHAdeMO Covers Geographically

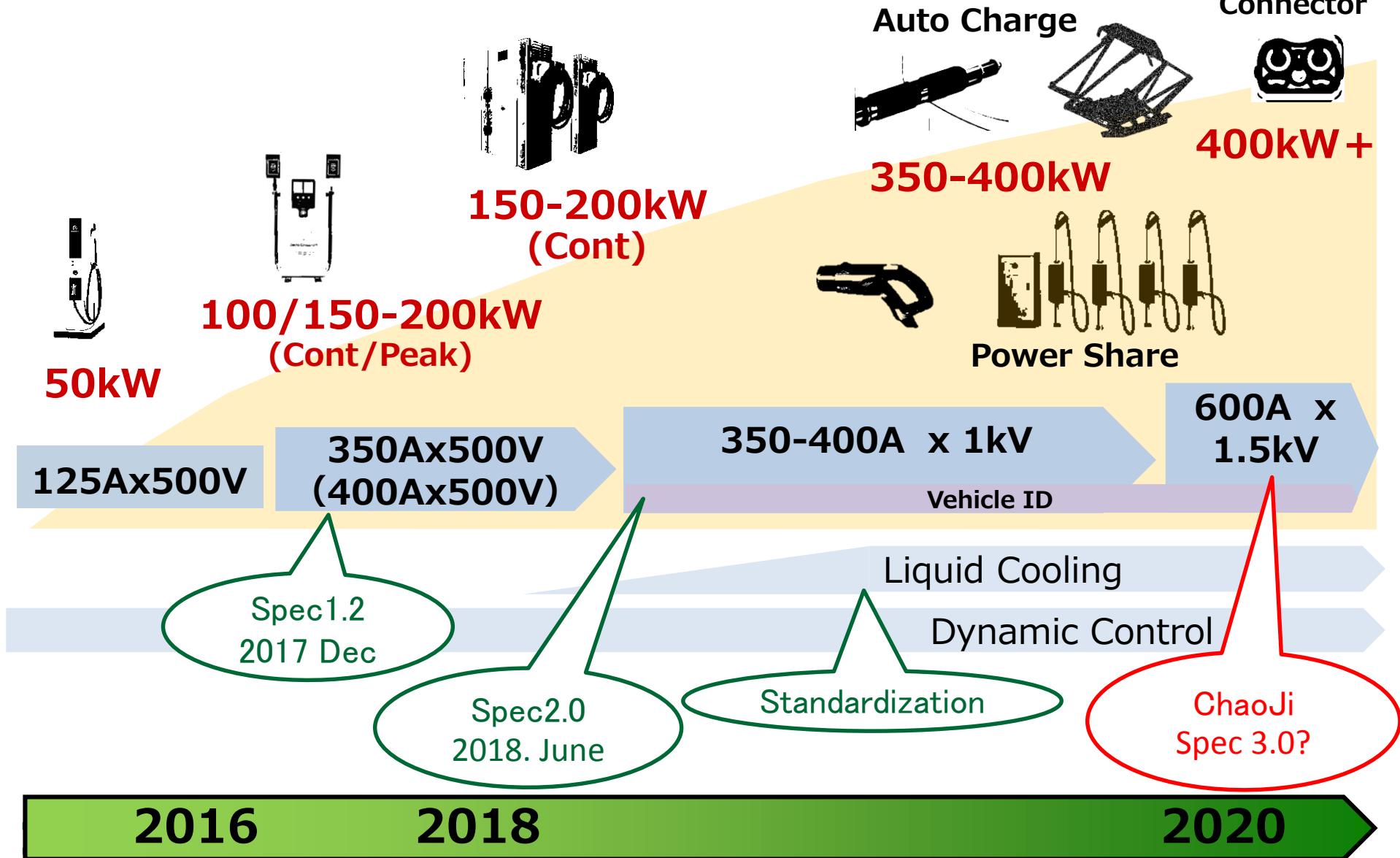
Candidates for the NEXT



* According to the latest standards, including drafts

Spec.	ChaoJi	GB/T	CHAdeMO	CCS	Tesla
Max. power	1500V x 600A = 900kW	950V x 250A = 237.5kW	1000V x 400A = 400kW	1000V x 400A = 400kW	410V x 330A = 135kW
Number of control pilots	2	0	3 (2+1)	1	1
Communication	CAN (SAE J1939)	CAN (SAE J1939)	CAN (ISO 11898)	PLC (ISO 15118)	CAN (SAE J2411)
12V power supply to EV	No	Optional (A+/-)	Yes (d1)	No	No
V2L/H/G/V	Unknown	Under development	Yes	Under development	No
Coupler lock	Inlet	Connector	Connector	Inlet	Inlet
Availability	PRC	PRC, India	Global	EU, US, South Korea, Australia	Global (Type 2 for EU)
Related standards	IEC 61851-23-1, 23-2(planned)	IEC 61851-23-1	IEC 61851-23-1, 23-2, IEEE 2030.1	IEC 61851-23-1, SAE J1772	None
Notes	Liquid-cooled cable under development	Liquid-cooled cable not available	Liquid-cooled cable under development	Liquid-cooled cable under development	Liquid-cooled cable discontinued

High Power Road Map -Future-



2016

2018

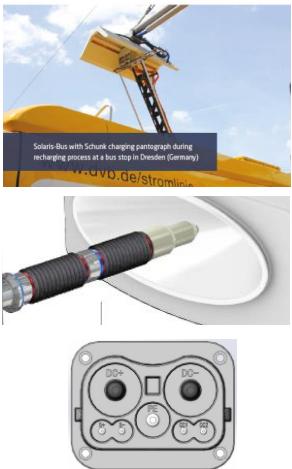
2020

Charger; Its Variety

- High/Big
 - 350kW, 500kW+
 - Battery 100kWh+
 - Charge @Dedicated Place
 - Auto Charge, New Plug

- Moderate
 - 100-150kW
 - Battery 50kWh+
 - Charge along Road
 - Maintenance/Update

- Low/Small
 - 3-20kW
 - Battery 2-10kWh
 - Charge @Home, Base
 - Low Cost (efficiency)
 - Wireless Charging



Team Open to Everybody



- Welcome To Develop New Standard
- With Backward Compatibility (Asset works)
- Team Policy

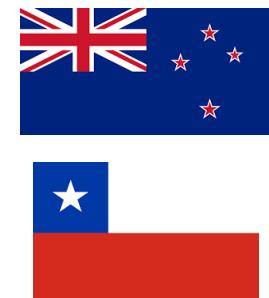
Respect Each Other

No Elimination

More Installation, More Sales, More Deploy

Clear Decision Making Process

Ambition Required





Thank you for your attention

