EV infrastructure and standardization in China

State Grid Corporation of China

Otc.2013

1 Overview of EV infrastructure construction

2 Standardization of EV infrastructure in China

3 Comparison of EV infrastructure Standards

国家电网公司
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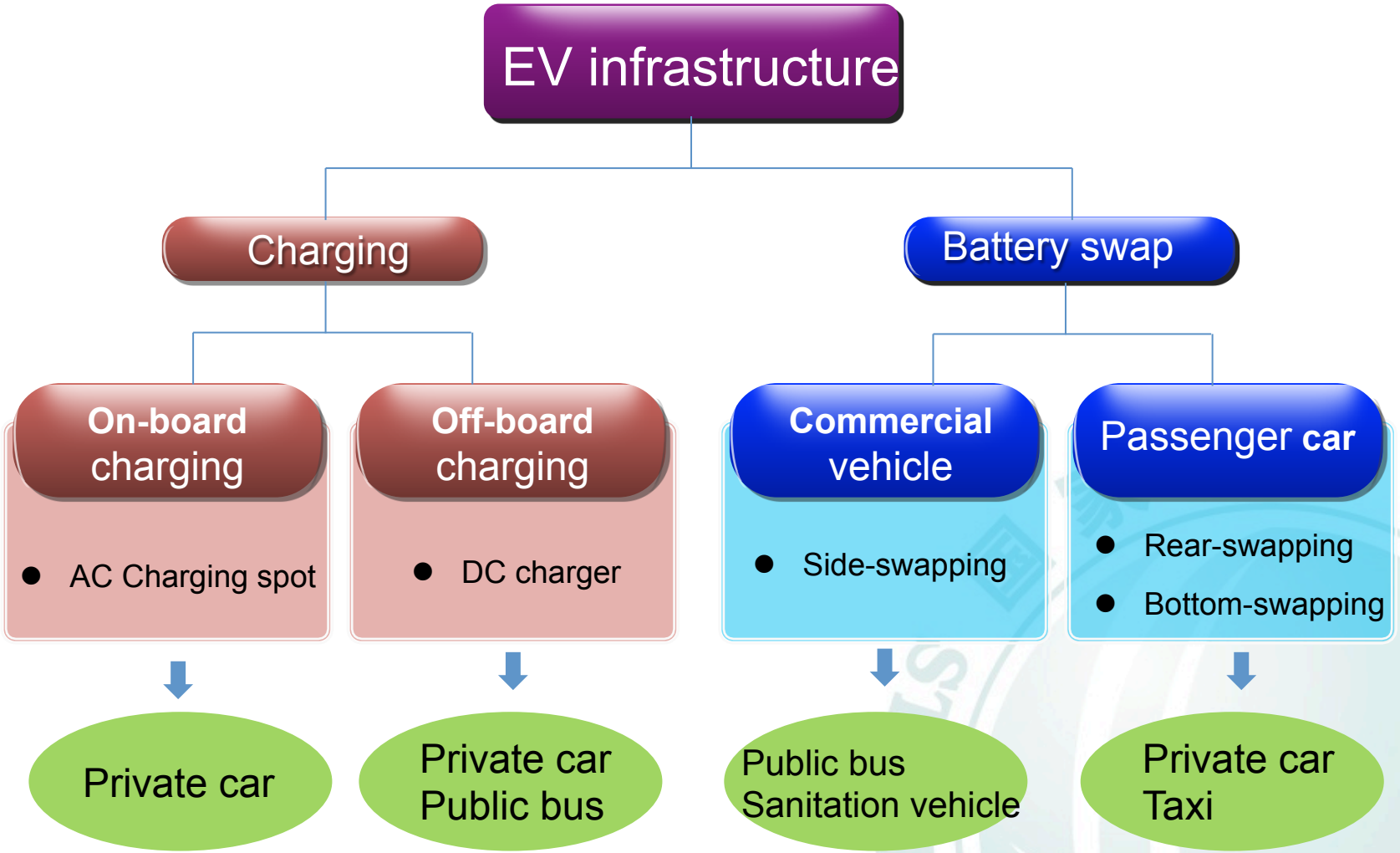
Overview-types of infrastructure



Overview-AC charging spot

【AC Charging Spot】

Item	Spec.
Coupler	GB
UI	LCD / LED / VFD Keyboard
Billing	RFID / IC card
Power	AC 220V (380V) 50Hz ± 1Hz
Output-U	single-phase ,220V ± 10%
Output-I	≤ 32A
IP	IP55
Communication interface	RS485 / 2G / 3G
Installation	Pillar/Wallbox

Overview-DC charger

【DC Charger】

Item	Spec.
Coupler	GB
UI	LCD / LED / VFD Keyboard
Billing	RFID / IC card
Power	AC 380V ± 10%,50Hz -60Hz
Output	DC 200-500V, 0-100A DC 300-700V, 0-250(600)A
Efficiency (50%-100% load)	≥92%
IP	IP55

Overview-battery swap station

【Battery swap station】

Side-swapping: applicable to commercial electric vehicles such as buses and sanitation trucks which have battery packs installed in both sides of the vehicle body.

Rear-swapping: applicable to electric passenger vehicles such as private cars and taxis, with battery packs installed in the trunk of the vehicle body.

Bottom-swapping: applicable to electric passenger vehicles such as private cars and taxis, with battery packs installed in the chasiss of the vehicle body.

Overview-main supplier

Up to Jun.2013, **SGCC** has built 383 charging stations/battery swap stations and 15,333 AC charging spots.

Overview-main supplier

中国南方电网
CHINA SOUTHERN POWER GRID

Up to the end of 2012, **CSG** has built 18 charging stations/battery swap stations and 3,229 AC charging spots.

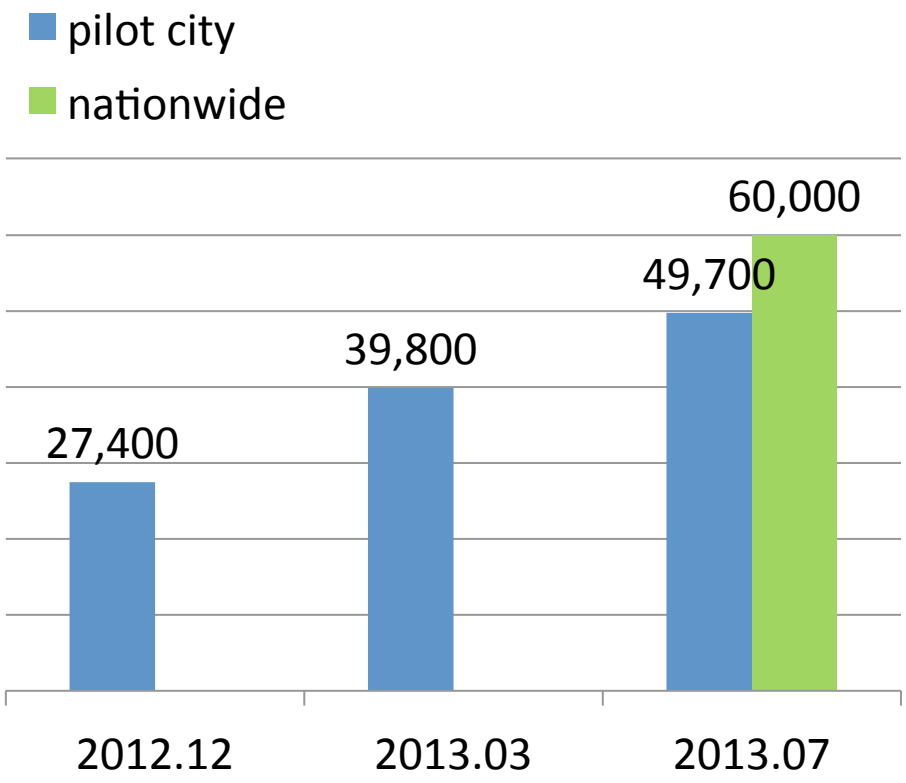
Overview-main supplier

Potevio 中国普天

Up to the end of 2012, **Potevio** has built 74 charging stations.

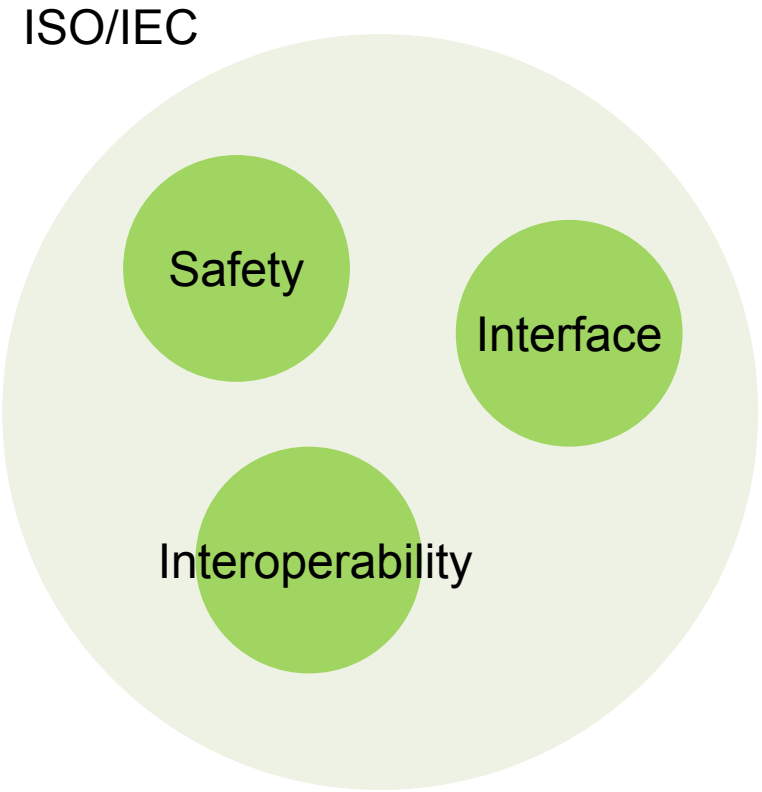
Overview-summary of NEV

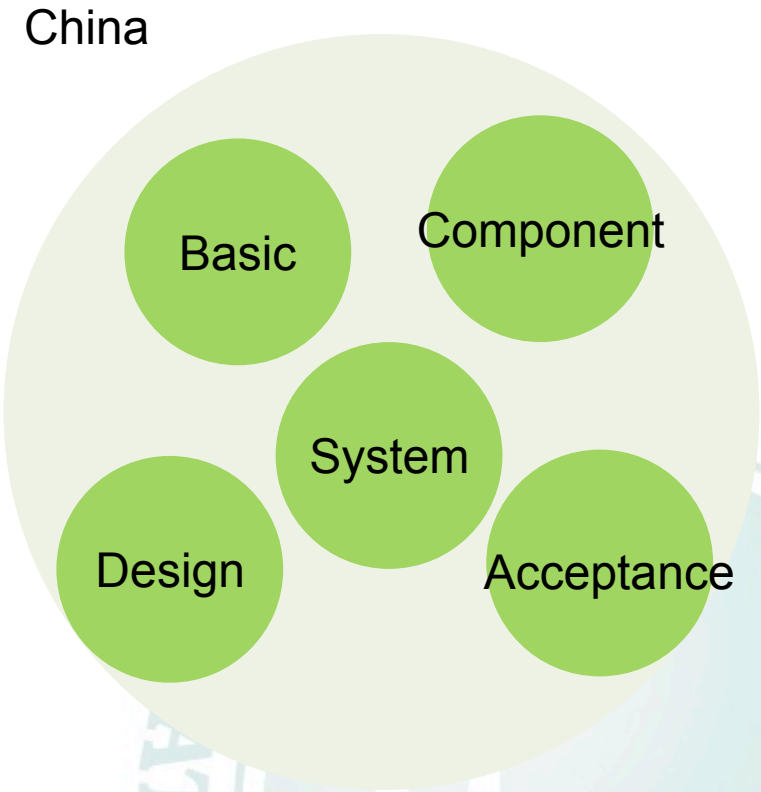
Application of new energy vehicles in China



Standardization

Comparison of the standard structure between ISO/IEC and China





Standardization

Corresponding of the standard

	ISO/IEC		China
System	IEC 61851	⟷	GB/T 18487-2001 GB/T 27930-2011
Interface	IEC 62196	⟷	GB/T 20234-2011
Communication	ISO 15118	⟷	GB/T 27930-2011 Q/GDW 397-2009 Q/GDW 398-2009 Q/GDW 399-2009
Battery swap	IEC 62840	⟷	GB/T 29317 Q/GDW 486-2010 Q/GDW 487-2010 Q/GDW 488-2010 Q/GDW 685-2011 Q/GDW 686-2011

Standardization

National Standards

No	Publish No	Name
1	GB/T 20234.1-2011	*Connection set of conductive charging for electric vehicles-Part 1:General requirements*
2	GB/T 20234.2-2011	*Connection set of conductive charging for electric vehicles-Part2:AC Charging coupler*
3	GB/T 20234.3-2011	*Connection set of conductive charging for electric vehicles-Part3:DC charging coupler*
4	GB/T 27930-2011	*Communication protocols between off-board conductive charger and battery management system for electric vehicle*
5	GB/T 28569-2012	*Electric energy metering for electric vehicle AC charging spot*
6	GB/T 29317-2012	*Terminology of electric vehicle charging/battery swap infrastructure*
7	GB/T 29318-2012	*Electric energy metering for electric vehicle off-board charger*

(18 Industry Standards and 37 Enterprise Standards are published or being prepared.)

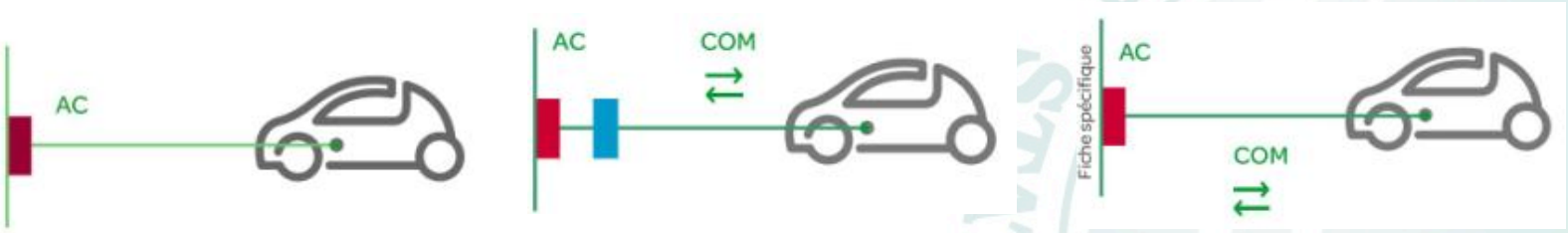
Maintenance of *GB18487.1 Electric vehicle conductive charging system Part1: General requirement* (*kick-off meeting 2013.09.02*)

Milestone: 2013.12 1st WD, 2014.03 2nd WD, 2014.05 CD, 2014.09 FDIS

AC charging coupler

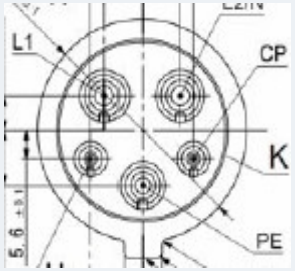
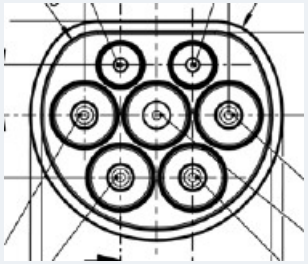
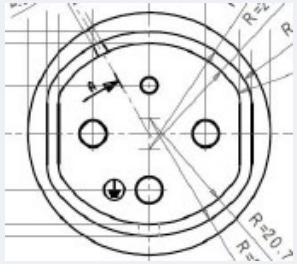
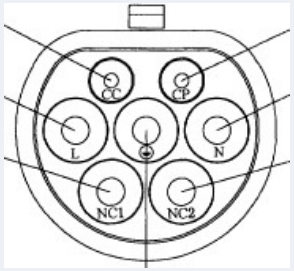
- **Mode 1** connection: normal socket-outlet charging
- **Mode 2** connection : normal socket-outlet with in cable control box
- **Mode 3** connection : dedicated AC charging spot

China: Mode 2 and Mode 3 connection with single-phase(32A) power supply are recommended, three-phase is under consideration.



Mode 1 Mode 2 Mode 3

Comparison-AC charging coupler

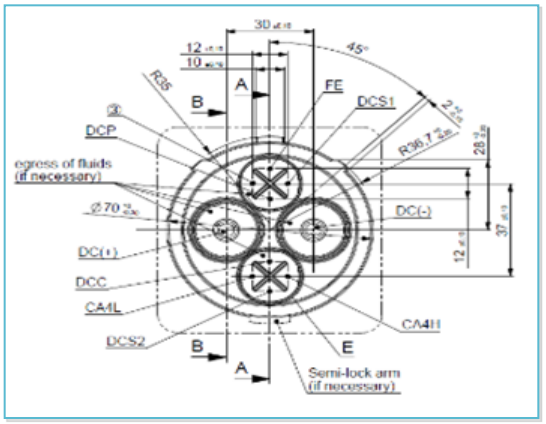
	IEC 62196-2:2010			GB 20234.2-2011
	Type1-U.S	Type 2-Germany	Type 3-Italy	China
Phase	Single phase	Single/Three phase	Single phase	Single phase (Three phase reserved)
Current	32A(80A U.S)	70A/63A	16A,32A/32A	16A,32A
Voltage	250V	480V	250V,250V/500V	250V/400V
Pin & interlock	5-pin, mechanical lock	7-pin, electronic lock	4-pin, 5-pin	7-pin, mechanical lock (optional electronic lock)
Control pilot pin	Two short pins	One short pin, one long pin		Two short pins
Male & female pin		Plug: male Vehicle connector: female		Plug: male Vehicle connector: male
Dimensions				

Comparison-DC charging coupler

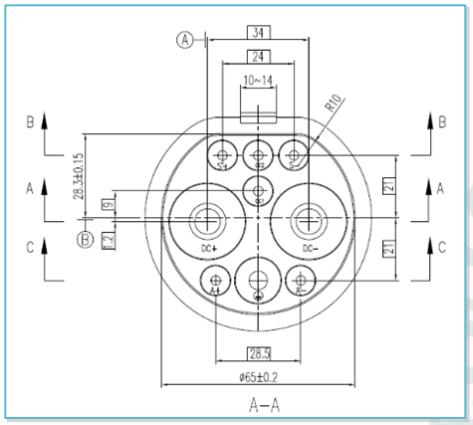
Japan proposal → CHAdeMO

China proposal → GB/T 20234 Connection set for conductive charging of electric vehicles

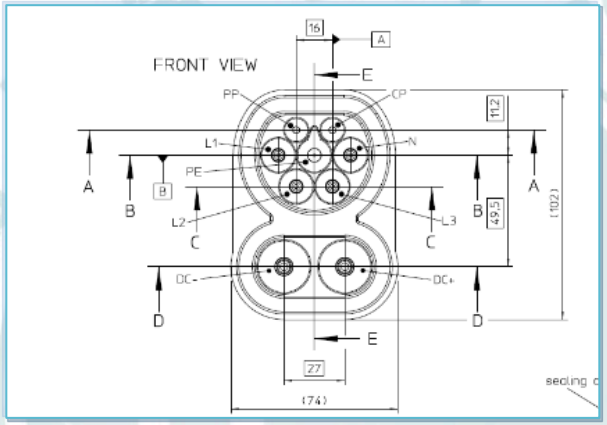
Germany proposal → AC & DC Combo coupler



Japan



China



Europe/US

Comparison-Communication interconnection

- **Communication Protocol**

	International:	China:
Physical layer	PLC	CAN BUS
Link/Network layer	IP Based	CAN

- **PWM pilot control**

	International:	China:
EVSE side	Voltage detection	Current detection

Thank you for your attention!