

In the framework of
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In association with
CII
Confederation of Indian Industry

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Electric Vehicle Infrastructure Standards

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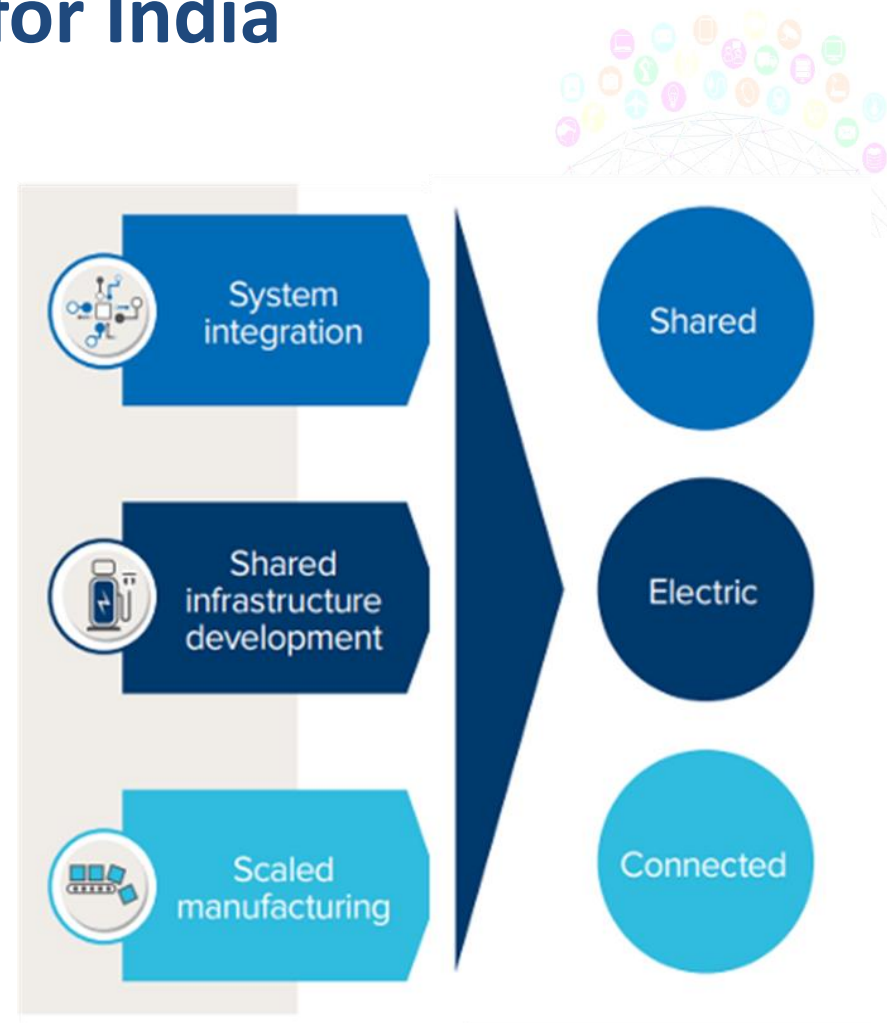
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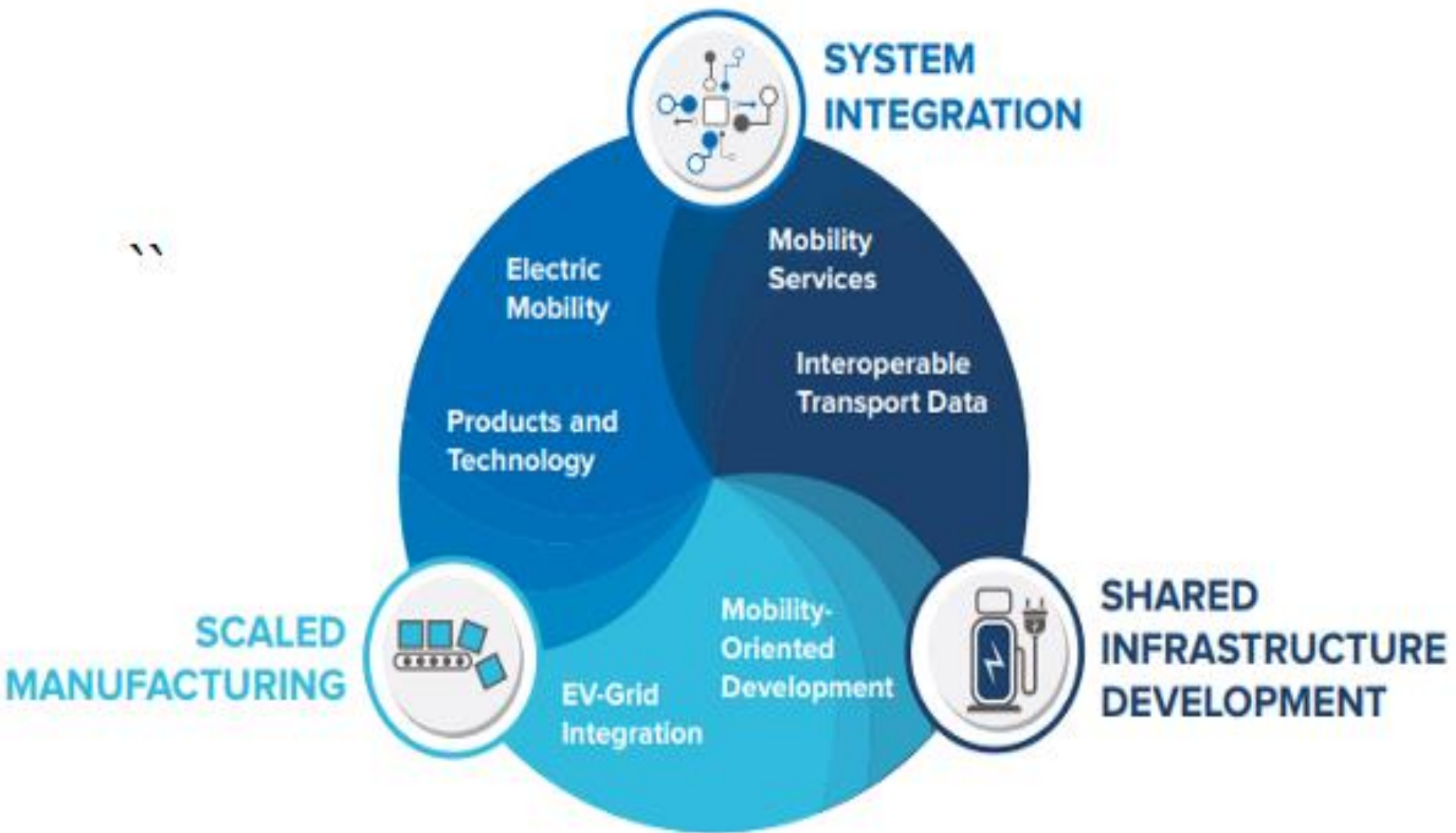
Transformative Mobility for India

The Niti Aayog is the nodal agency.

Aim: Improve air quality in India's high pollution cities, bring zero emission mobility to India, introduce manufacturing of global size and scale and reduce oil import dependence.

Method: Making India's passenger mobility shared, electric and connected can cut its energy demand by 64% and carbon emission by 37%.





Inflection point



Auto industry ~7% GDP & growing.

Low per capita car ownership ~ 20 vehicles/ thousand citizens.

EV may become equivalent in price to an IC engine vehicle in 5 years. Batteries account for nearly 40 to 50% of the cost of EV and the expected drop battery prices in future would drive e-mobility.

The initial trust will involve government has an aggregator of demand and the use of EV in public transportation.

2-wheeler sales ~18 million/ year & 20% passenger travel

Bus Fleets used by large urban population.

30% EV penetration, in 2030



30% Scenario	No. of EV in 2030 (mn)	No. of charging points in 2030 (mn)	Equipment cost in billion INR
Cars	26	2.6	1300
2 wheelers	106	5.3	88
Buses	2.83	0.7	2450

Assumptions

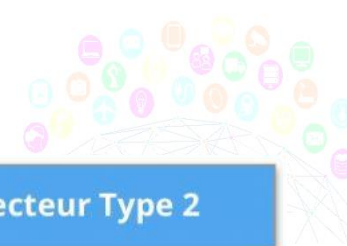
1 low cost DC charging point per 10 electric cars & 1 AC charging point for 20 two- wheelers

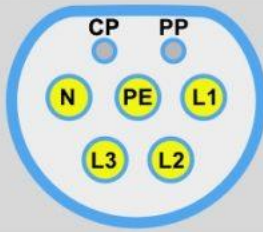
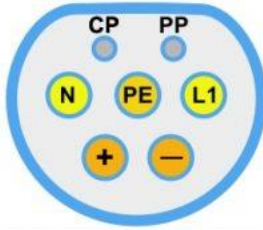
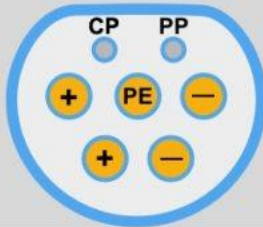
100% government owned buses will be electric and 50% private buses to be electric by 2030

Description of type 2:

Proposed by Mennekes in 2009, certified by the German Association of Automotive Industry (VDA), recommended by the European Automobile Manufacturers' Association (ACEA) in 2011.

Can go up to 43kW in AC 3-phase (as used in Europe) or 52kW in DC (CharIN has validated it recently)



Configurations AC et DC du connecteur Type 2		
	AC Mono ou Triphasé	Max : 500V AC 3 x 63A ou 1 x 80A
	AC Mono ou Triphasé DC-Low	Max : 500V AC/DC 3 x 63A ou 1 x 70A DC ou 1 x 80A AC
	DC-Mid	Max : 500V DC 1 x 140A

EV Supply Equipment: AC Level 2 Charging



Charge plug not powered until plugged into and commanded by vehicle. Supply equipment signals presence of AC input power. Vehicle detects plug via proximity circuit (prevents drive away while connected)

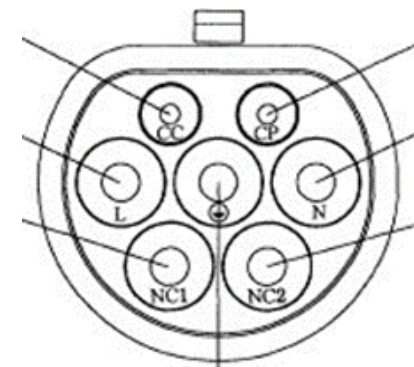
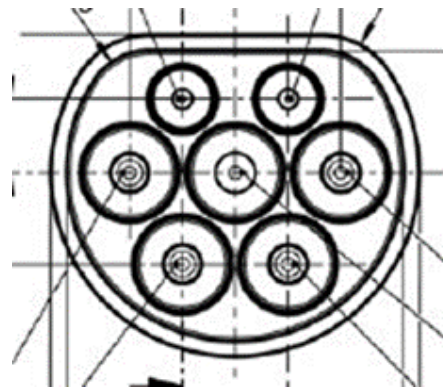
Control Pilot functions

- **Begin:** Supply equipment detects EV; Supply equipment indicates to EV readiness to supply energy; EV ventilation requirements are determined
- Supply equipment current capacity provided to EV; EV commands energy flow; EV and supply equipment continuously monitor continuity of safety ground; Charge continues as determined by EV

AC connector : Germany & China



	IEC 62196-2:2010 Type 2- Germany	GB 20234.2-2011 China
Phase	Single/Three phase	Single phase (Three phase reserved)
Current	70A/63A	16A,32A
Voltage	480V	250V/400V
Pin & interlock	7-pin, electronic lock	7-pin, mechanical lock (optional electronic lock)
Control pilot pin	One short pin, one long pin	Two short pins



DC Fast Charging of EV

- **Big curb-side Charging Device** provides DC to EV – from 12 kW to 350 kW. It fast charges the battery (15 min to 1 hour) by shifting the AC-DC conversion to outside the vehicle.
- DC charger components:
 - Common to all DC chargers (95% cost):
 - Grid input side metering; Power Converter;
Communication interface with Grid (Load management;
Payment Gateway)
 - Specific to different Standards (5% of cost):
 - Communication interface; Cable/ Connector

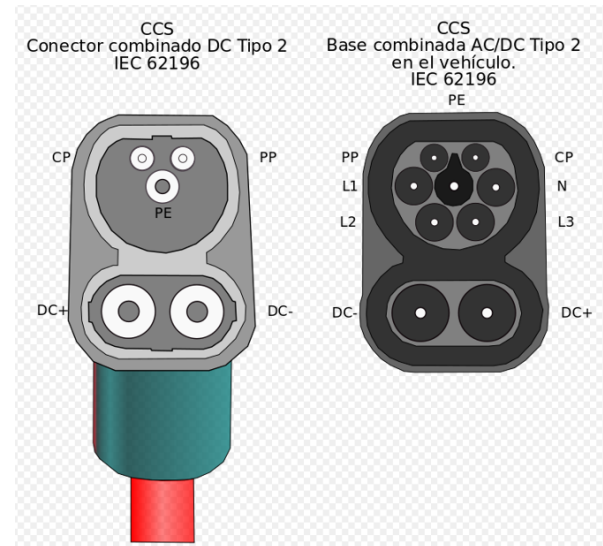


ChAdeMo & CCS-2

CHAdEMO "CHARge de Move"/ "move using charge" deliver up to 62.5 kW by 500 V, 125 A DC via a special electrical connector. Included in IEC 62196 as type 4.

CHAdEMO can charge low-range (120 km, or 75 mi) electric cars in less than half an hour.

Combined Charging System adds DC charging to type 2 connectors for DC charging up to 350 kW.

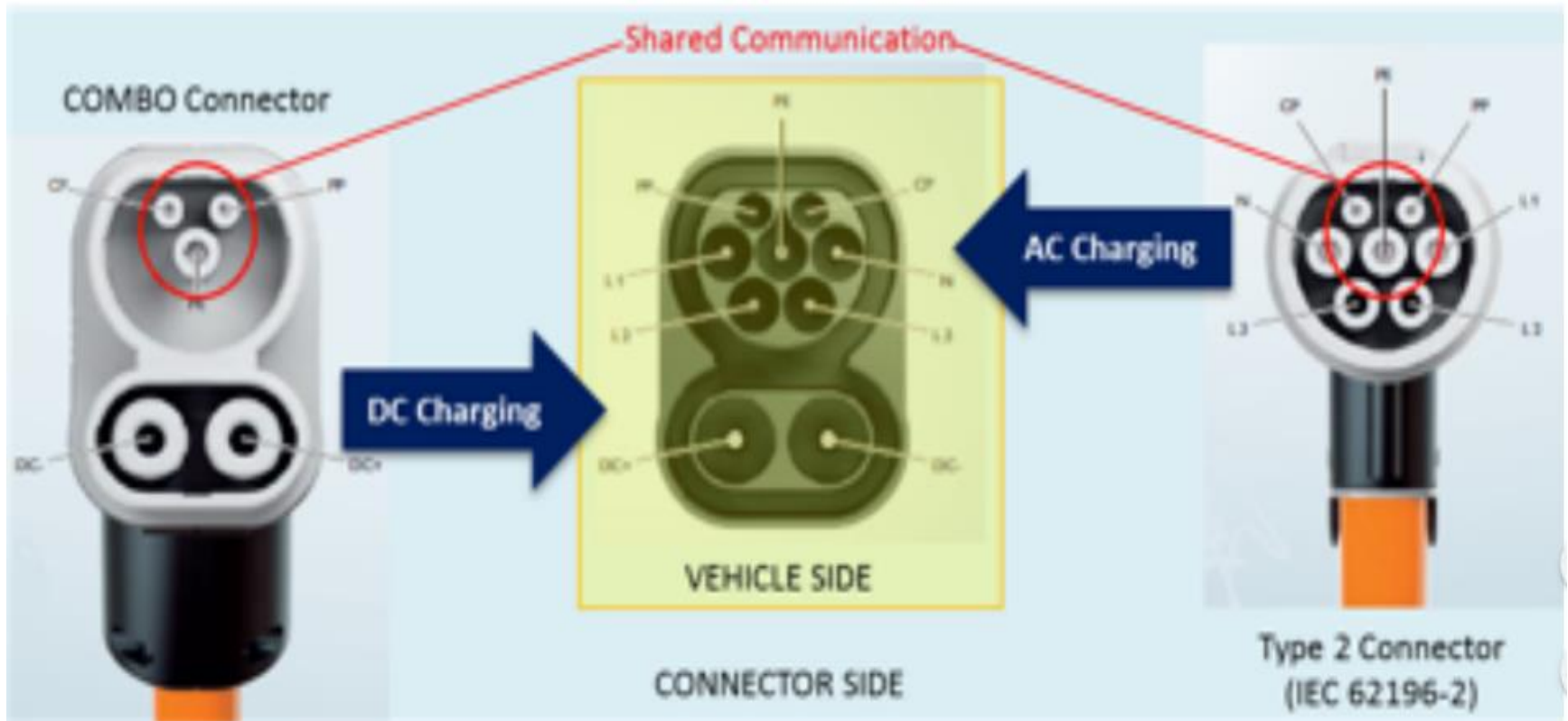


ChAdeMo is CAN based protocol

- Two Power pins
- Seven control/ communication pins
- Two communication pins usually CANbus
- Two pins for EV relay control
- One reference Ground for vehicle isolation monitor
- One proximity or mating detection pin
- One “ready to charge” pin.

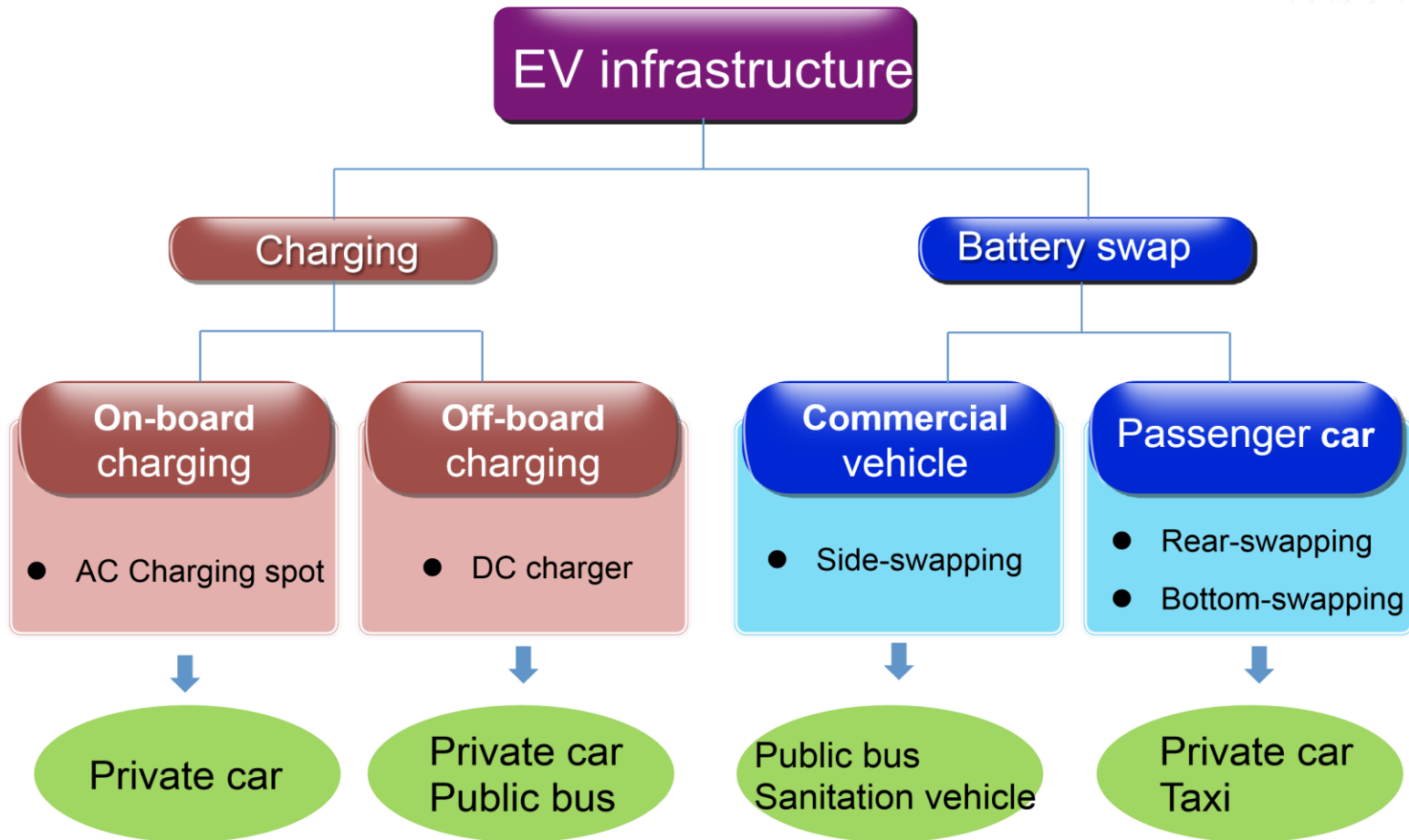


Combined Charging System (European)



China - 2013

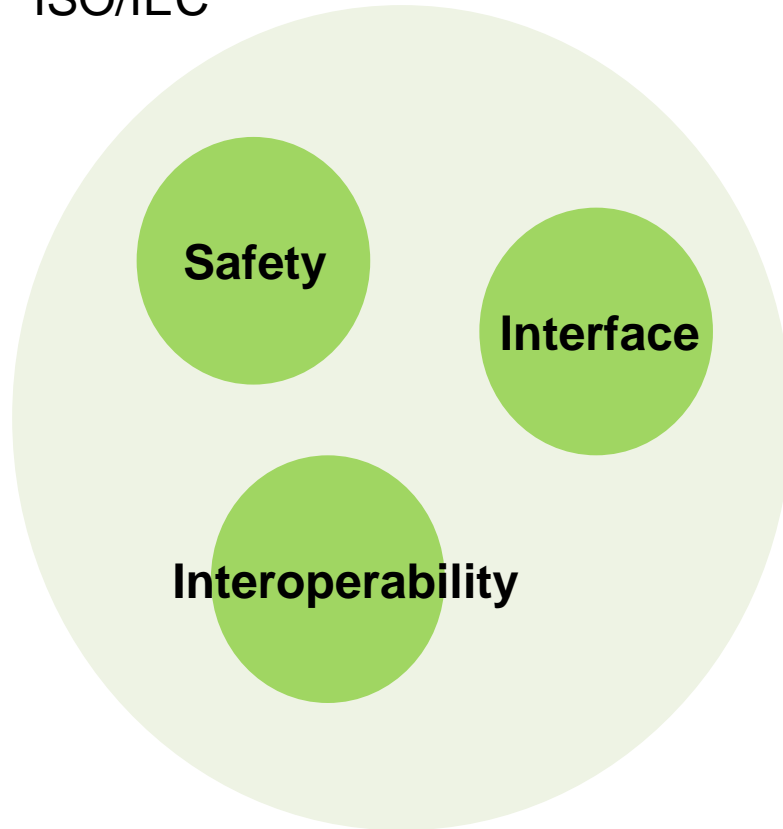
types of infrastructure



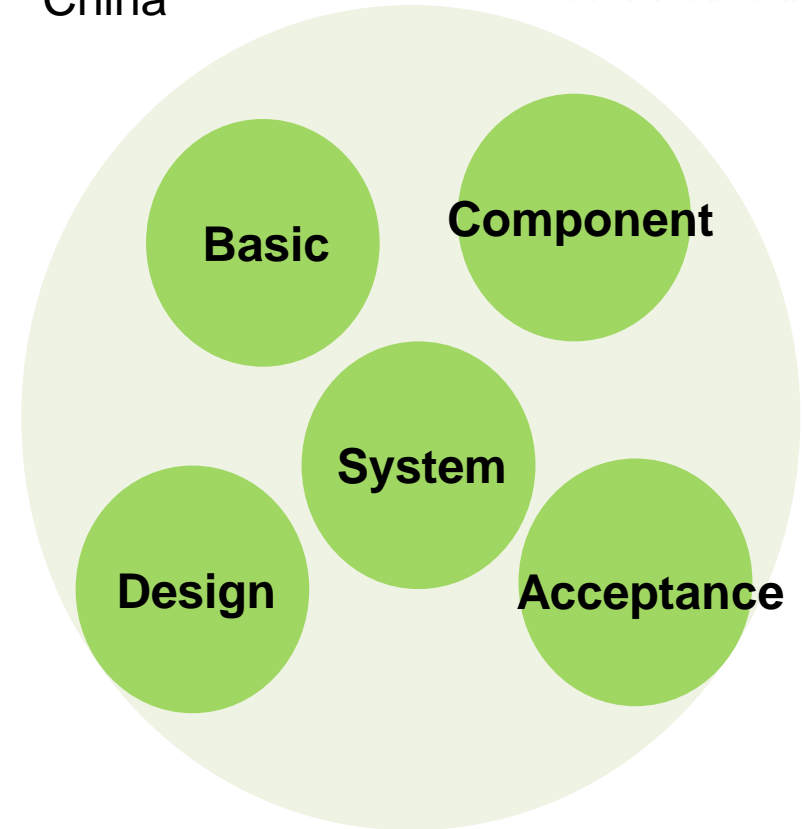
Europe & China, priorities



ISO/IEC



China



Indian EV Infrastructure Requirements



- Three categories
 - Low Voltage (Small Vehicles – 2W, 3W, 4W)
 - Medium Voltage (Cars, SUV, intra-city trucks- 4W)
 - High Voltage (Buses, Trucks – 6W or more)