evs 30
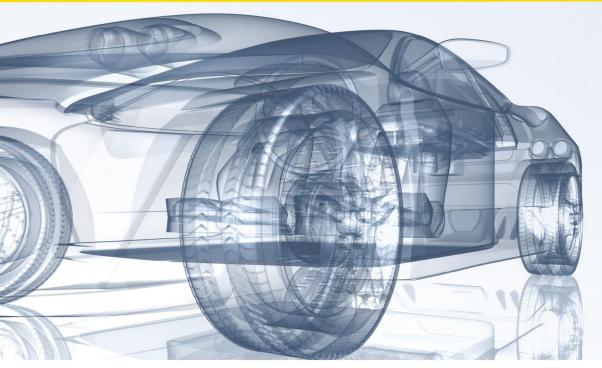
The 30th International Electric Vehicle Symposium & Exhibition

October 9–11, 2017
Messe Stuttgart, Germany

www.evs30.org

V2X protocol: benefits and world-wide applications

Stuttgart, 11 October 2017

Agenda

- CHAdeMO and V2X
  - What's CHAdeMO?
  - V2X protocol and products

- V2X
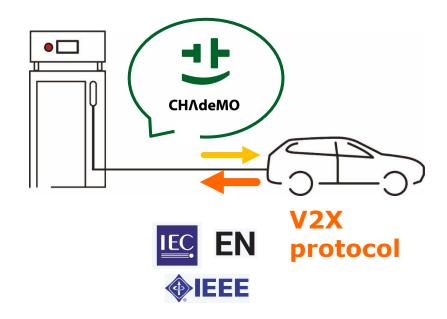 - Smart charging vs. V2X
  - Demo projects

- Summary

What is CHAdeMO?

360   36

members   countries

CHAdeMO

V2X
protocol

IEC EN IEEE

And many more..
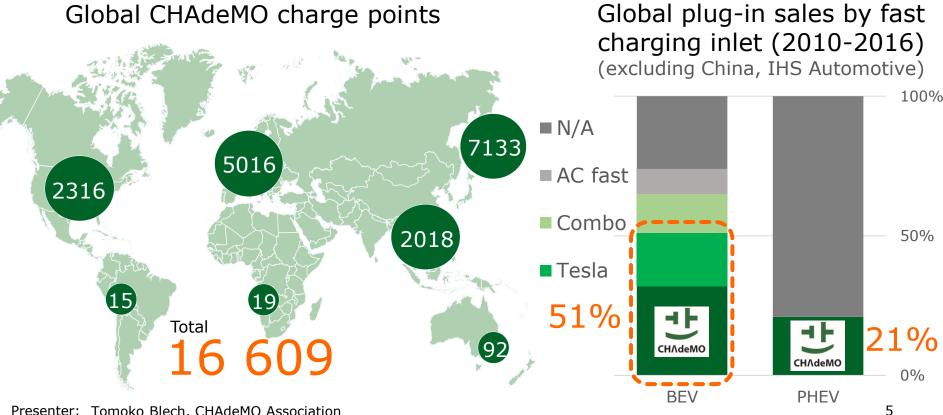
Leading DC fast charging standard...

Global CHAdeMO charge points

2316

5016

7133

2018

15

19

92

Total
16 609

Global plug-in sales by fast charging inlet (2010-2016)
(excluding China, IHS Automotive)

100%

- N/A
- AC fast
- Combo
- Tesla

50%

51%

21%

CHAdeMO

CHAdeMO

0%

BEV

PHEV

Presenter: Tomoko Blech, CHAdeMO Association

5

…and THE ONLY enabler of V2X

Information access

Heating

Kettle（700-1000W)

Electric blankets
（50W-90W)

Phone charging
(15W/phone)

Portable PC
(50W-150W)

Recovery support

LED floodlight (70W)
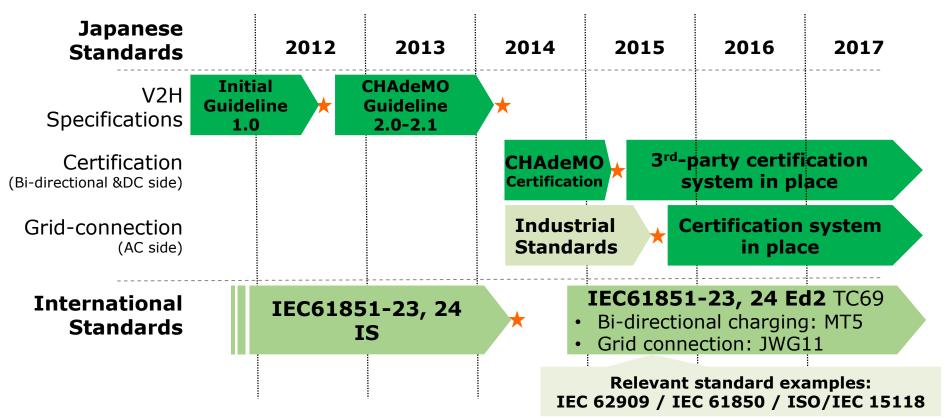
LED electric signs (200W)

Standardised with certification

evs/30

Japanese Standards	2012	2013	2014	2015	2016	2017

V2H Specifications
Initial Guideline 1.0 ★ CHAdeMO Guideline 2.0-2.1 ★

Certification (Bi-directional &DC side)
CHAdeMO Certification ★ 3rd-party certification system in place

Grid-connection (AC side)
Industrial Standards ★ Certification system in place

International Standards
IEC61851-23, 24 IS ★

IEC61851-23, 24 Ed2 TC69
- Bi-directional charging: MT5
- Grid connection: JWG11

Relevant standard examples:
IEC 62909 / IEC 61850 / ISO/IEC 15118

With a number of products in the market

V2V
(Vehicle)

V2L
(Load)

V2H
(OFF Grid)

V2G/B/H
(Grid connectable)

DR: EVs parked at home

Home parking rate & distance driven

Daytime home parking rate [%] (6am-6pm)

Average 80% n=32%

Average 70% n=14%

Ave: 53%

Ave: 1,314km

Distance driven [km/month]

Source: Nissan GDC, n=11,192, California, USA, August 2014

Presenter: Tomoko Blech, CHAdeMO Association

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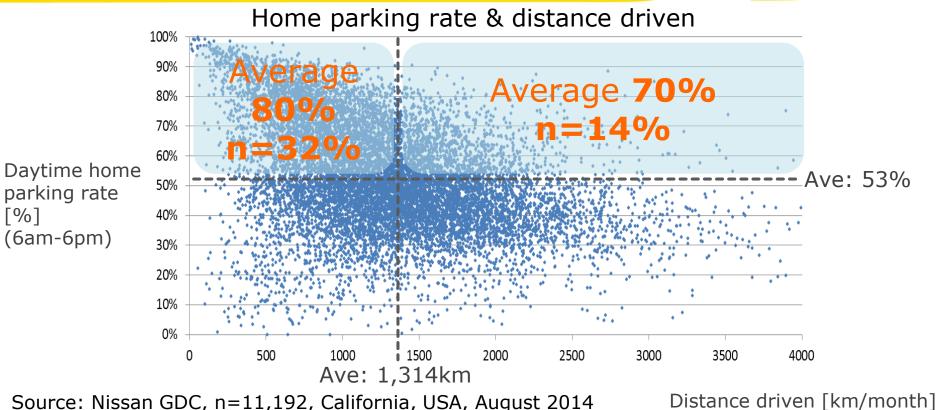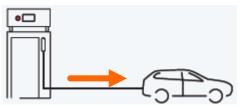
Smart charge vs. V2X

Smart charging

V2X

Assumptions:

Battery capacity	24-40 kWh
EU ave distance driven	14,000 km/year
Energy consumption	0.12 kWh/km

Assumptions:

Battery capacity	24-40 kWh
Fully dischargeable	
Buffer driving/protection	50%

Ave daily capacity available:
 (14,000km/365 days) x 0.12 = **4.6 kWh**

Ave daily capacity available:
24-40kWh x 0.5 = **12-20 kWh**

- V2X allows for **at least x2.6-4.3** of battery capacity
- **This ratio can only increase** as battery size increases
- CHAdeMO PCS can provide **higher power** vs. on-board AC chargers

V2X projects

Locations of V2X demonstration projects

>40 projects
o 20+ Europe
o 10 US/Canada
o 10 Asia-Pacific

A large variety of stakeholders
o Industrial and business
o Utilities, national grid operators
o R&D institutions and universities
o Municipalities, regional departments
o …
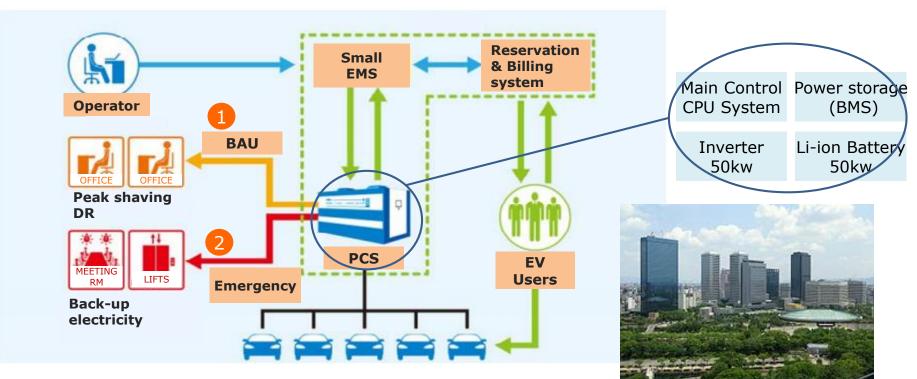
V2B/G for office buildings

Osaka Business Park (V2B/G) Japan

V2H/G: RES integration and VPP

JUMP Smart Maui Project USA

o Phase I: 2013 – 2016

  o 200 EVs, 9 DC chargers

  o EV energy control center

o Phase II: 2015 – 2017

  o 500 EVs, 13 DC chargers

  o V2G/H

    o EV charge/discharge to power Home/Business

    o Grid services using **V2G** systems and DR **(80EVs)**

Grid-integrated EVs: demo projects to commercial applications

Demo projects

Parker Project (2016-2018) **Denmark**
- 4 PCS + EVs
  - ➔➔ Grid-balancing services with an EV fleet

GridMotion project (2017-2019) **France**
- 15 PCS + EVs in B2B fleet
  - ➔➔ Grid balancing services through short charging & discharging cycles, while serving "real-life" mobility needs

Commercial activities

Nissan Europe Denmark
- 30 PCS+EVs
  - ➔➔ Frequency regulation
- Currently generating 1300€/EV/year

OVO UK
- V2G smart charge/discharge service (Jan2018)
- 4.2kW PCS with estimated average first year revenue £590/EV

DriveElectric UK
- V2G smart charge/discharge service (summer/autumn 2018)
- 6kW PCS with expected initial revenue £300-£800/EV/year

V2G emerging learnings and next steps

Learning	Measures taken / next steps
o No need for high power cable	o Smaller cable to lower cost
o Some sort of vehicle ID is needed	o Vehicle ID details in discussion for authentication and forecasting
o Need to be seamlessly integrated into the cross-sectoral ecosystem beyond PCS	o Active participation in IEC and other standardisation platforms in the making of international rules

Summary

o CHAdeMO is the first and the only international protocol to enable V2X for production EVs

o Having engaged in a variety of demo and commercial projects, CHAdeMO leads the innovation in the V2X domain

o CHAdeMO protocol evolves and optimises functionality with the lessons learned

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