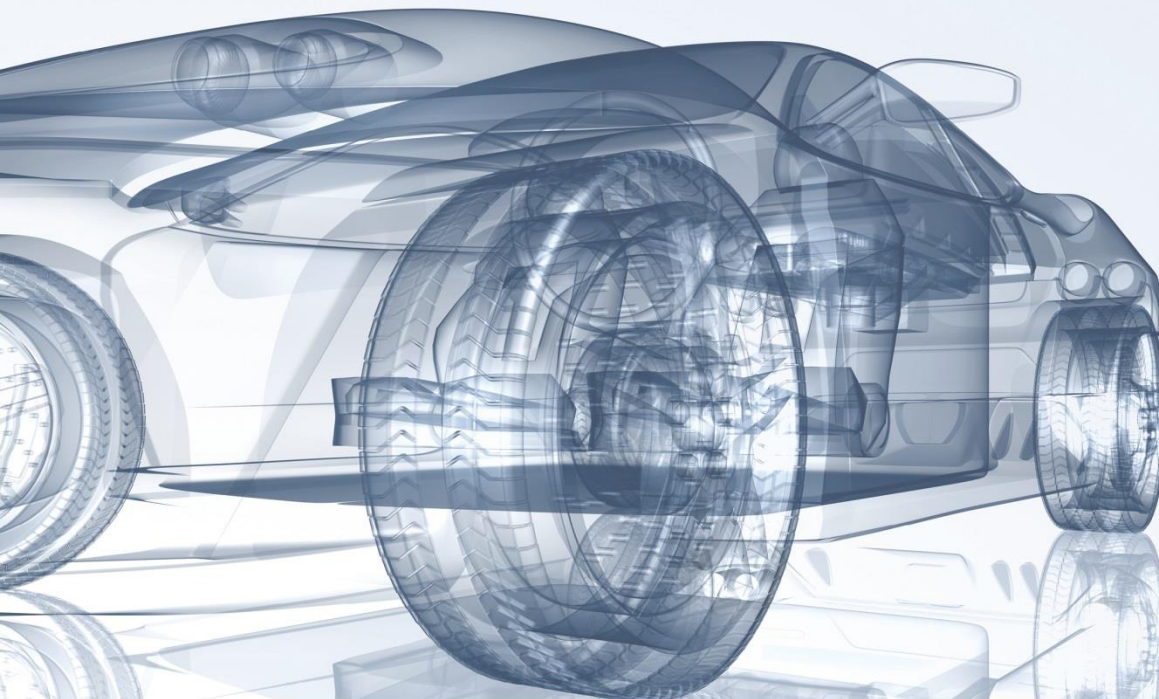


# evs 30



The 30th International  
Electric Vehicle  
Symposium & Exhibition

**October 9–11, 2017**  
Messe Stuttgart, Germany

[www.evs30.org](http://www.evs30.org)

Sponsored by

DAIMLER



**BOSCH**  
Invented for life

GRUPE RENAULT

MAHLE

EnBW



swarco



**CHAdeMO**

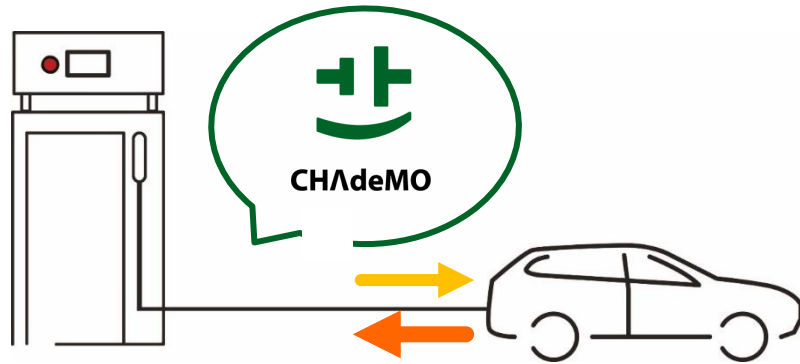
# V2X protocol: benefits and world-wide applications

Stuttgart, 11 October 2017

- CHAdeMO and V2X
  - What's CHAdeMO?
  - V2X protocol and products
- V2X
  - Smart charging vs. V2X
  - Demo projects
- Summary



# What is CHAdeMO?



V2X  
protocol

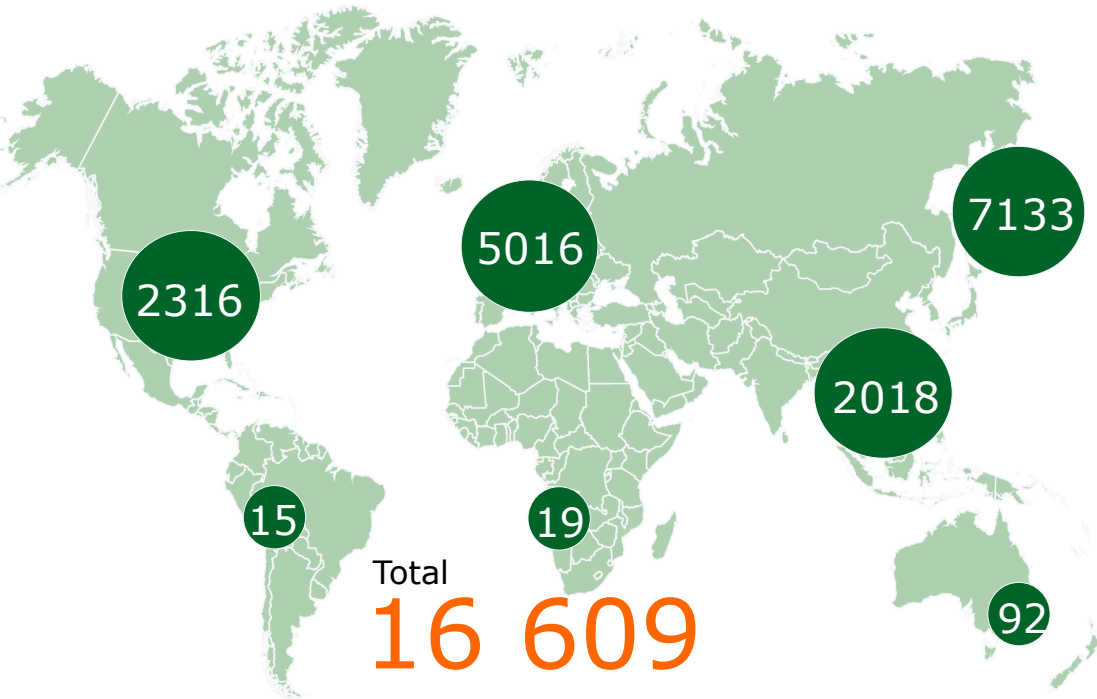
360 36  
members countries



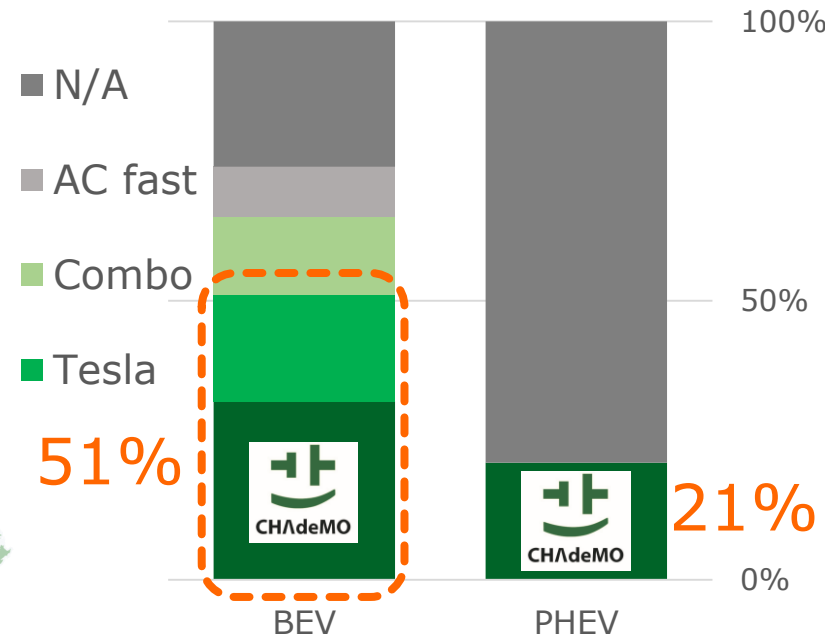
And many more..

# Leading DC fast charging standard...

## Global CHAdeMO charge points



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



# ...and THE ONLY enabler of V2X



## Heating

Kettle (700-1000W)



Electric blankets (50W-90W)

## Information access



Phone charging (15W/phone)



Portable PC (50W-150W)

## Recovery support



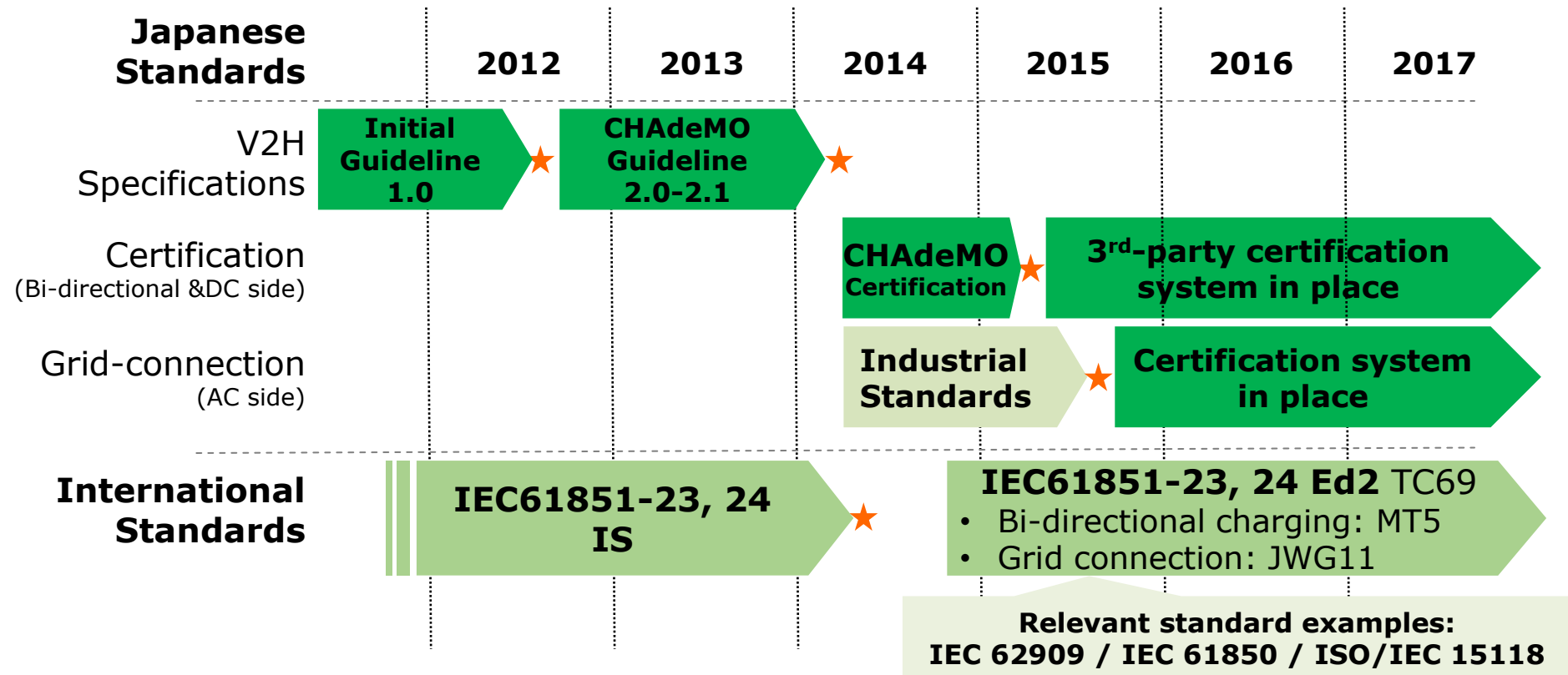
LED floodlight (70W)



LED electric signs (200W)

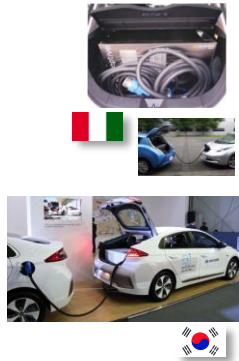


# Standardised with certification



# With a number of products in the market

## V2V (Vehicle)



## V2L (Load)



## V2H (OFF Grid)

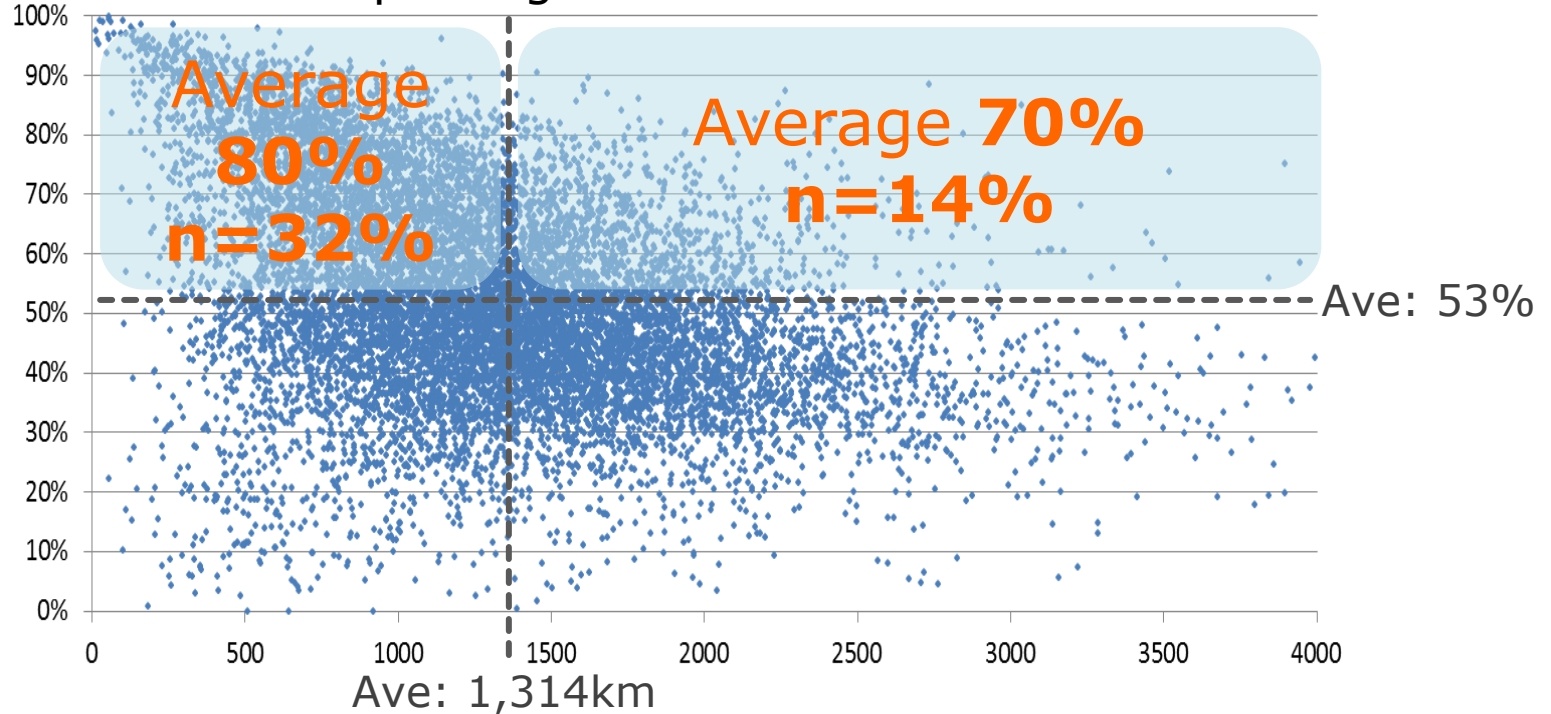


## V2G/B/H (Grid connectable)



# DR: EVs parked at home

## Home parking rate & distance driven

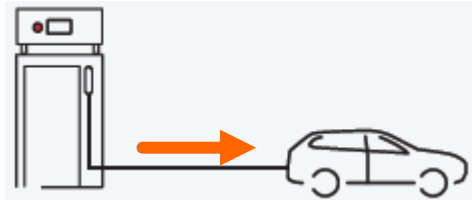


Source: Nissan GDC, n=11,192, California, USA, August 2014

Distance driven [km/month]

# Smart charge vs. V2X

## Smart charging



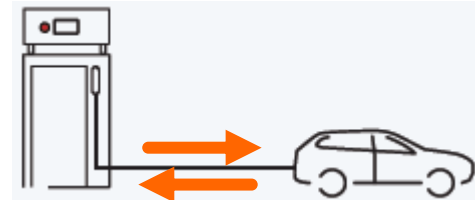
### Assumptions:

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

### Ave daily capacity available:

$(14,000\text{km}/365 \text{ days}) \times 0.12 = \mathbf{4.6 \text{ kWh}}$

## V2X



### Assumptions:

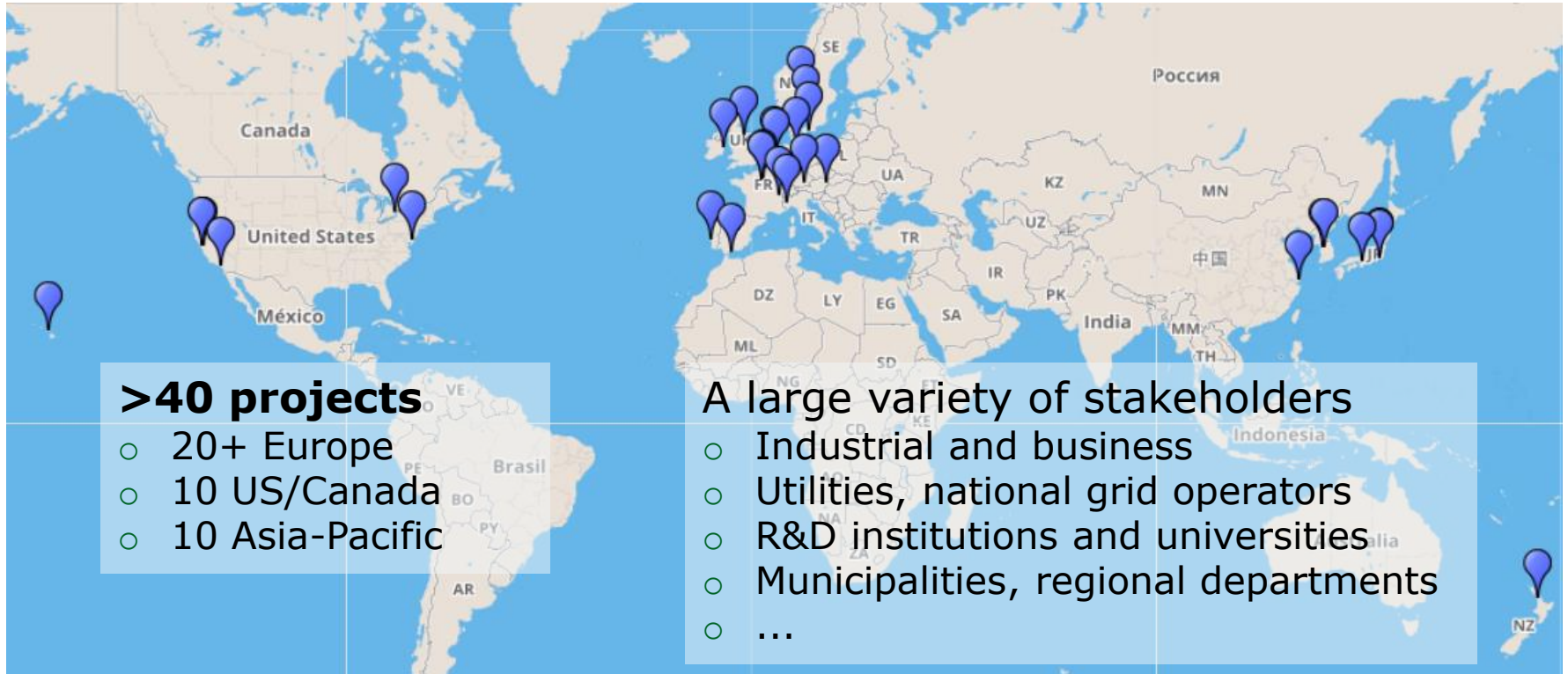
Battery capacity	24-40 kWh
Fully dischargeable	
Buffer driving/protection	50%

### Ave daily capacity available:

$24\text{-}40\text{kWh} \times 0.5 = \mathbf{12\text{-}20 \text{ kWh}}$

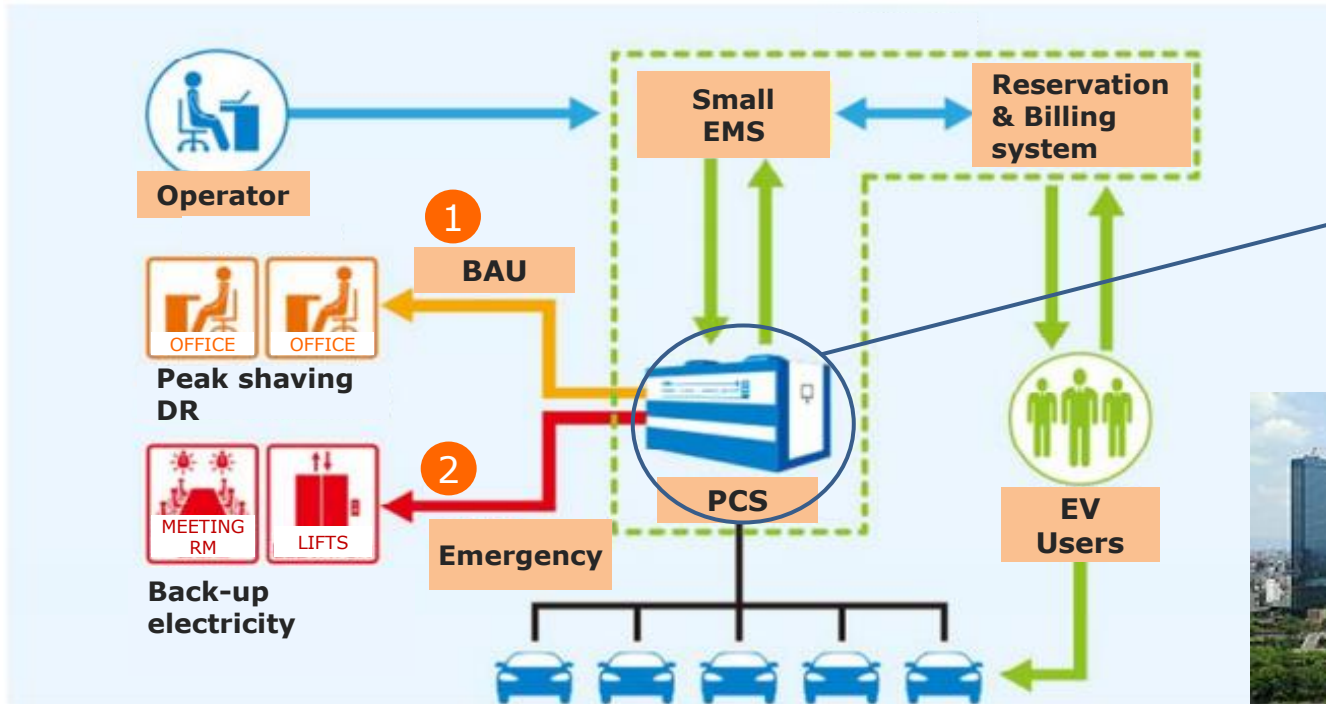
- V2X allows for **at least x2.6-4.3** of battery capacity
- **This ratio can only increase** as battery size increases
- CHAdeMO PCS can provide **higher power** vs. on-board AC chargers

## Locations of V2X demonstration projects



# V2B/G for office buildings

## Osaka Business Park (V2B/G) Japan



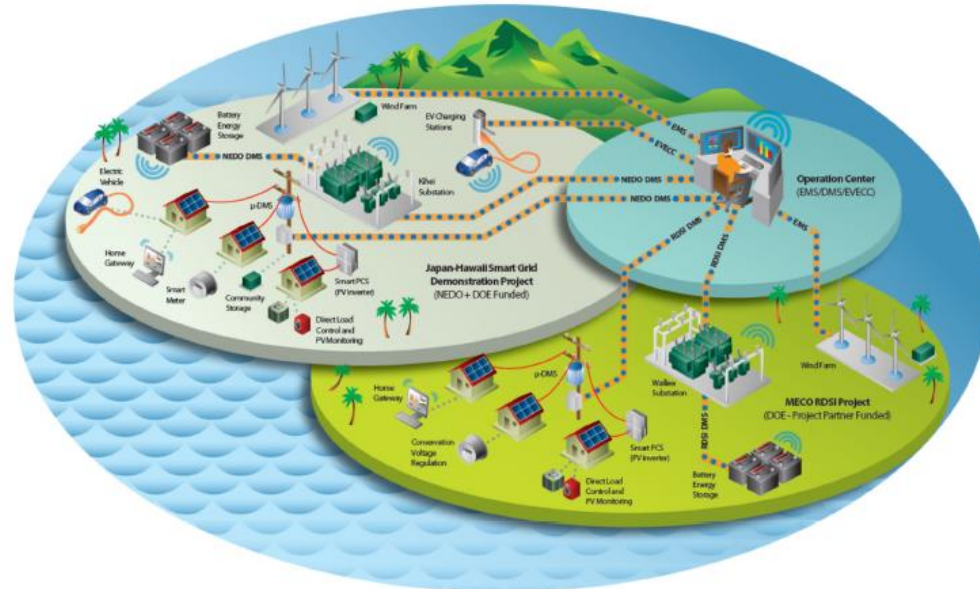
Main Control CPU System	Power storage (BMS)
Inverter 50kw	Li-ion Battery 50kw



# V2H/G: RES integration and VPP

## JUMP Smart Maui Project USA

- Phase I: 2013 – 2016
  - 200 EVs, 9 DC chargers
  - EV energy control center
- Phase II: 2015 – 2017
  - 500 EVs, 13 DC chargers
  - V2G/H
    - EV charge/discharge to power Home/Business
    - 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

## Learning

- No need for high power cable
- Some sort of vehicle ID is needed
- Need to be seamlessly integrated into the cross-sectoral ecosystem beyond PCS

## Measures taken / next steps

- Smaller cable to lower cost
- Vehicle ID details in discussion for authentication and forecasting
- Active participation in IEC and other standardisation platforms in the making of international rules

# Summary

- CHAdeMO is the first and the only international protocol to enable V2X for production EVs
- Having engaged in a variety of demo and commercial projects, CHAdeMO leads the innovation in the V2X domain
- CHAdeMO protocol evolves and optimises functionality with the lessons learned



[info@chademo.eu](mailto:info@chademo.eu)