



CHAdeMO



DC V2X systems: advantages and evolution

Lyon, 20 May 2019

Tomoko BLECH

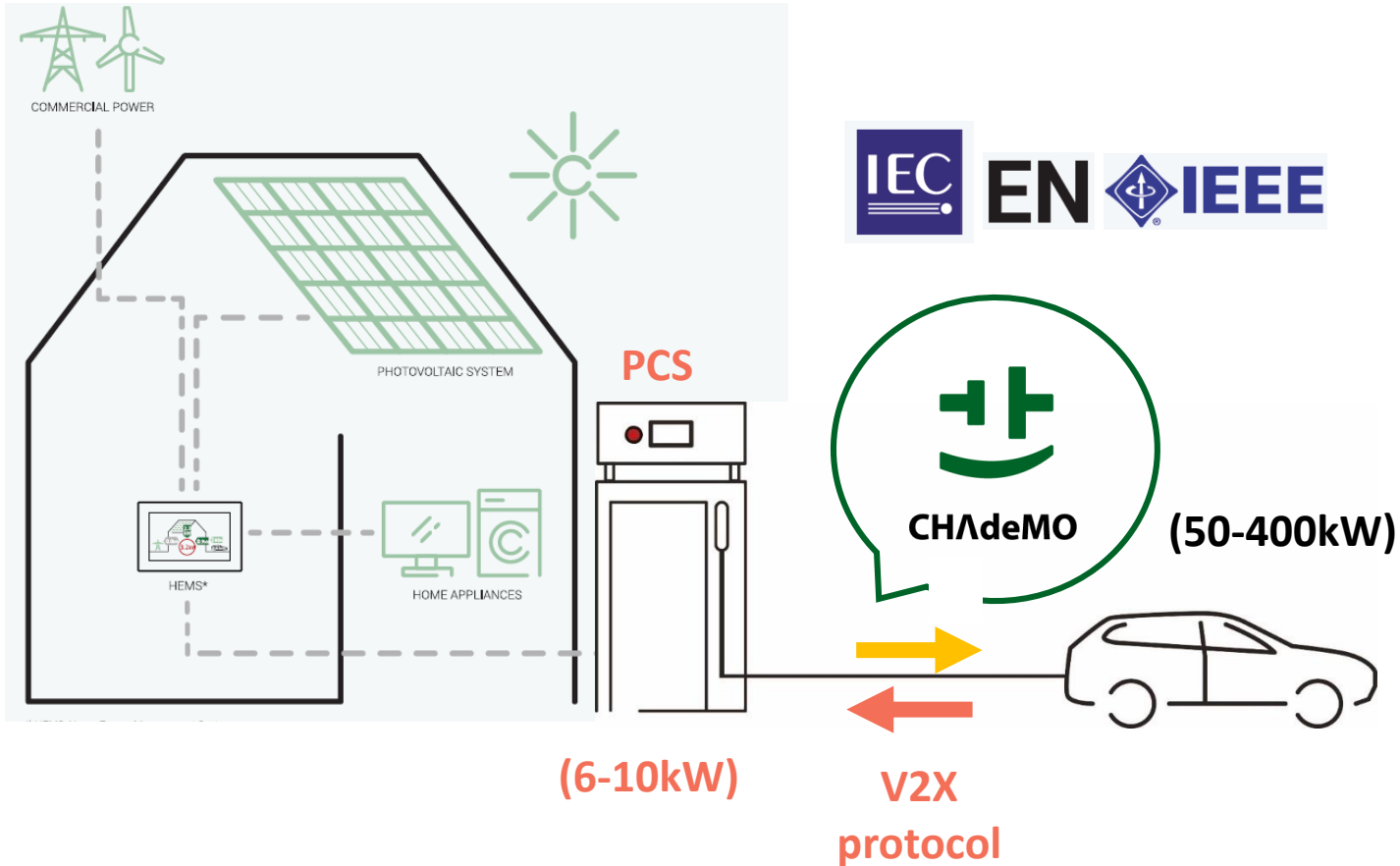
Agenda



- CHAdeMO basics and V2X
- International standardisation
- AC/DC system comparison
- Product R&D trend
 - Category
 - Trends
- Summary



CHAdeMO and CHAdeMO Association



CHAdeMO
Association



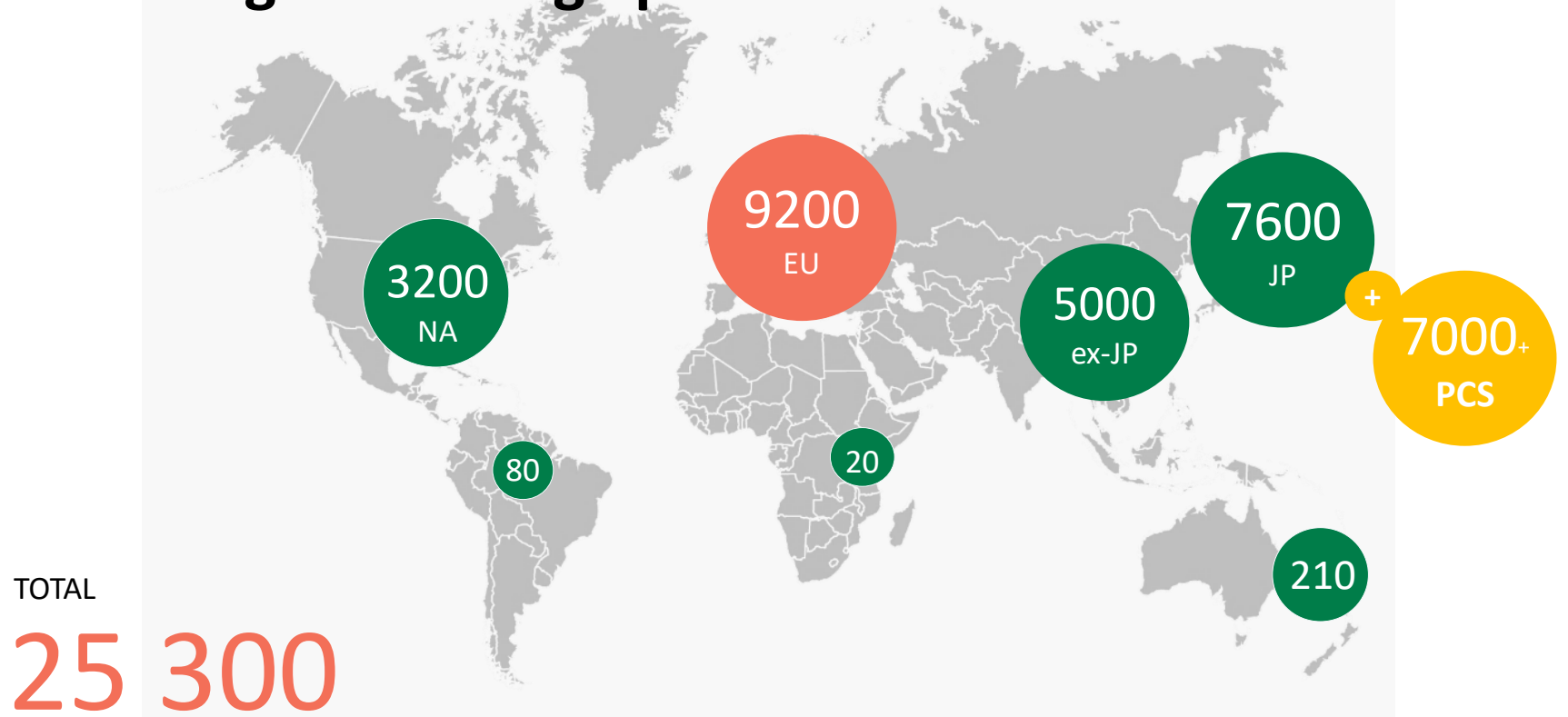
Association members



Our members:
430
 entities
 from
41
 countries

And many, many more..

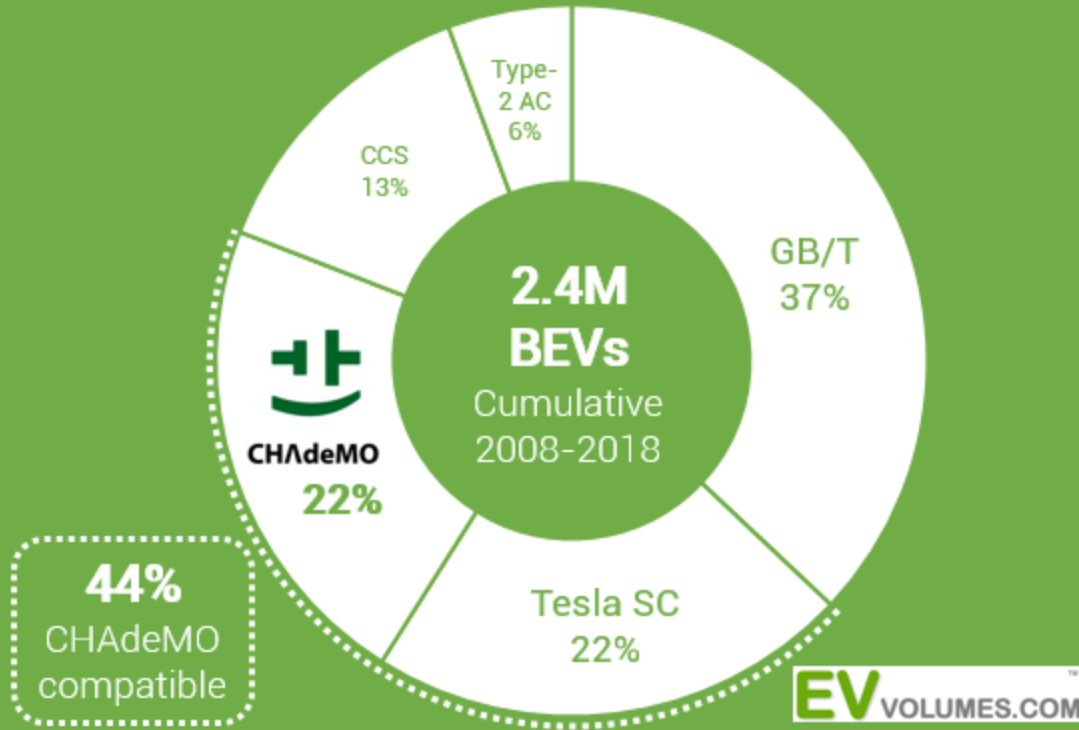
CHAdEMO global charge points



Note: as of April 2019; not exhaustive; not including V2H systems

Source: ChargeMap, EAFO, Zap-Map, NOBIL, Girève, GoingElectric, ChargeHub

GLOBAL FAST-CHARGEABLE BEV INLET SHARE



Source: EV-volumes.com; BEVs only, excluding non fast-chargeable BEVs (33%)

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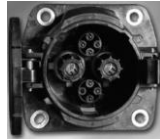
International standards and smart charging requirements



GB/T
(PRC)



CHAdeMO
(Japan)



CCS Combo1
(US)



CCS Combo2
(DE)

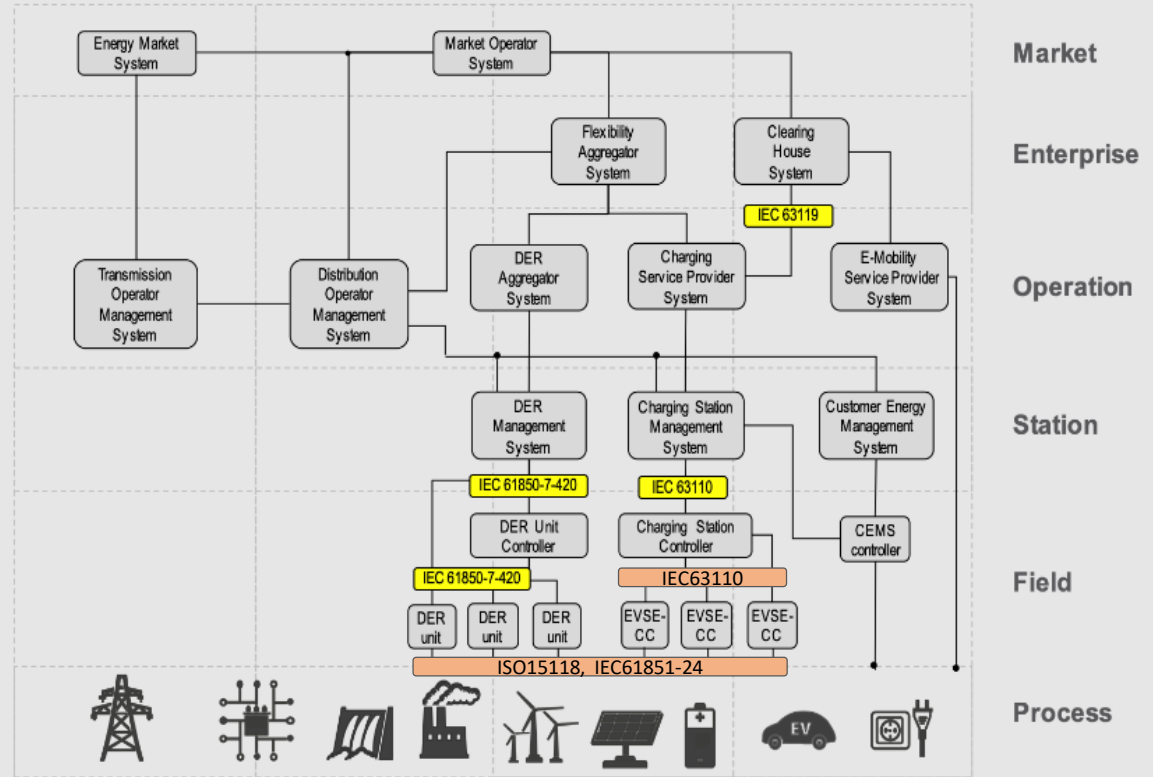


AC/DC Mono-directional	IEC 61851 (2014) ✓	IEC61851 (2014) ✓	ISO 15118 Ed1 (2014) ✓	ISO 15118 Ed1 (2014) ✓
DC bi-directional	Merging with CHAdeMO (2021)	CHAdeMO V2X (2014); IEC 62909-2 (2019) ✓	CCS (EU+US) + ISO/IEC 15118-20 (to be published in 2019)	
AC bi-directional	N/A (DC only)	N/A (DC only)	Bidirectional OBC (on-board charger) + ISO/IEC 15118-20 + IEC61851 Ed4 (to be started)	

V2X and energy market

SGAM information layer

Revision 2018-11-09



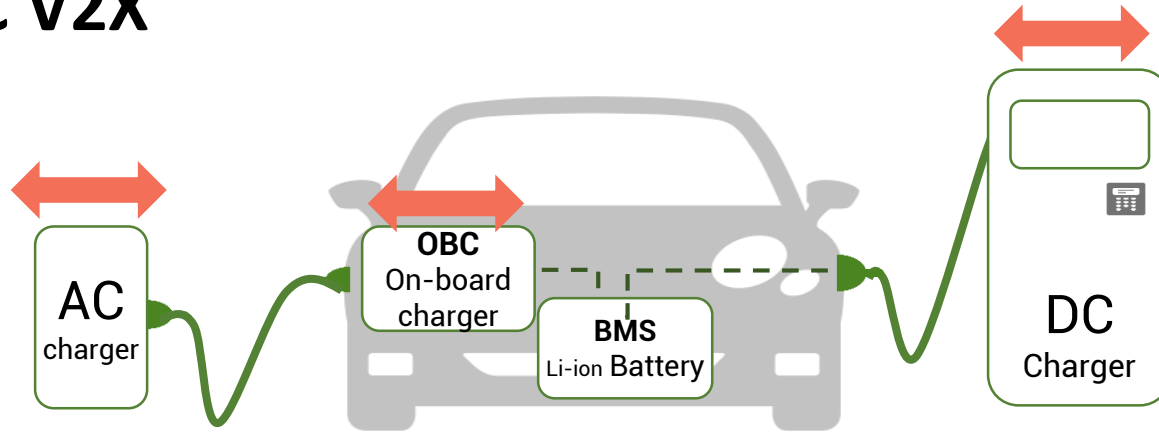


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AC / DC V2X



AC V2X

- Low power, slower charge
- Simple, easy, economic charger*
- More expensive (and heavier) EV*
- V2G in all locations when parked, but a challenge for DSOs
- More difficult to meet all grid requirements

DC V2X

- Faster with higher power
- Complicated, bigger, pricy charger*
- Less expensive (and lighter) EV*
- Greater scalability and service options → financial returns*
- Greater electrical safety, grid requirements easier to meet
- Direct solar, less loss

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V2X products in the market

V2V (Vehicle)



V2L (Load)



V2H (Home-off Grid)

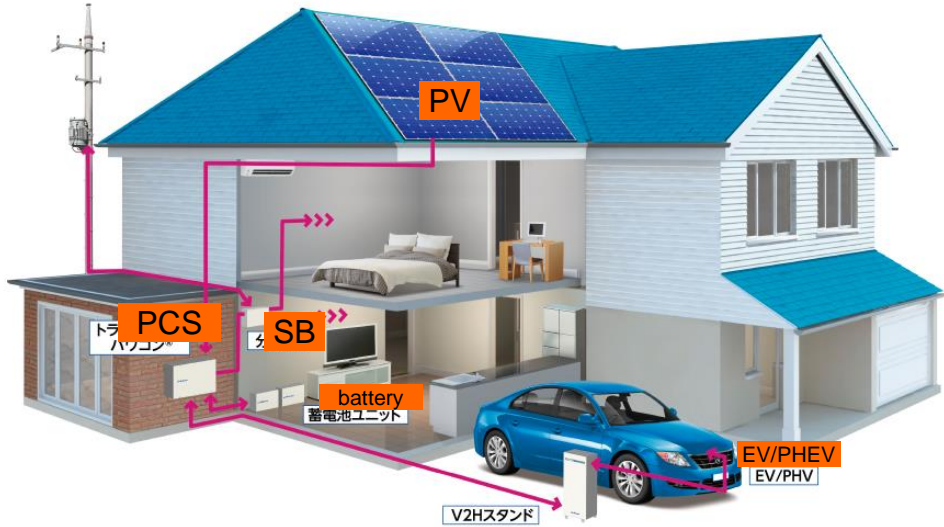


V2G/B/H (Grid)



V2X Market trend 1: high-end multi-source systems

Multi-source system for homes



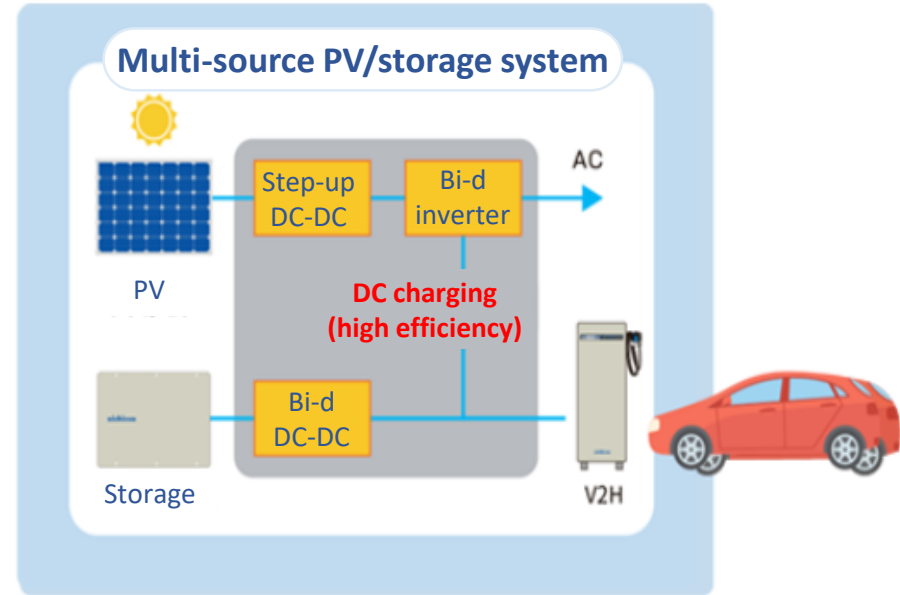
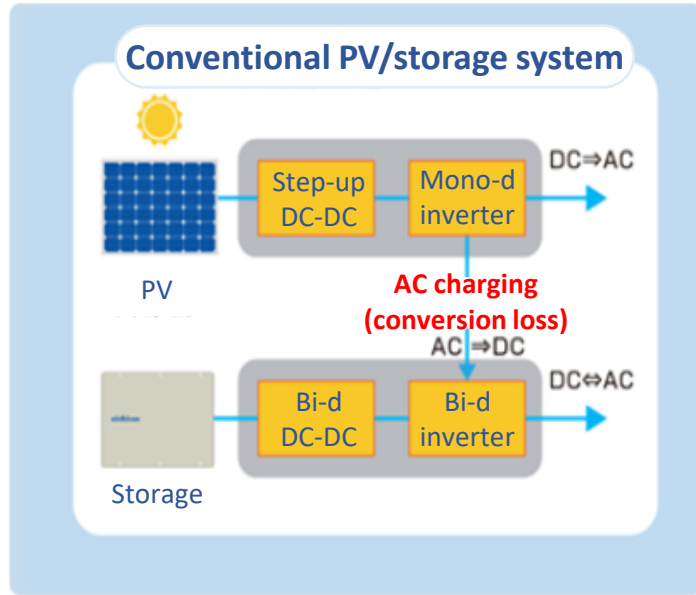
Source: Nichicon

Large-scale multi-source system



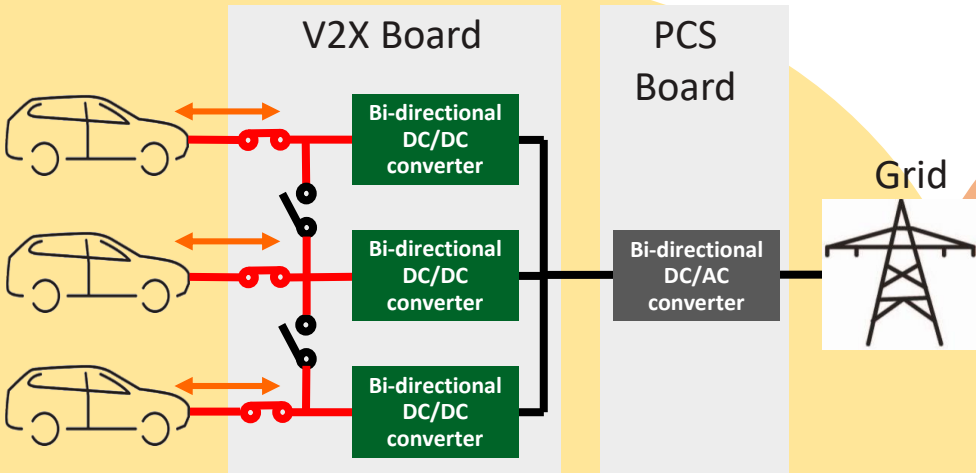
Source: TU Delft and Last Mile Solutions, PRE Power Developers

How it works: avoiding conversion (and taxation) losses



Source: Nichicon

Development in progress: fast-charge on V2X system

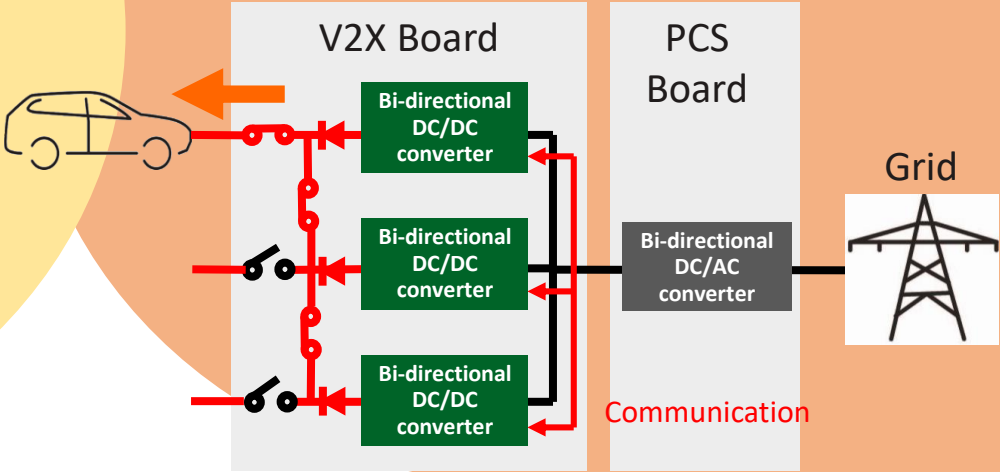


V2X mode:

- Charge / discharge
- Safety and convenience of equipment usage

Fast-charger mode

- Parallelisation DC/DC converters
- Communication between each converter
- Ensure fast-charge



V2X Market trend 2: more affordable and compact PCS



eNovates /the New Motion
Wall-mountable V2G (10kW)



OVO/Indra
V2G for home(6kW)



Wallbox
DC V2G (7.4kW)

Photo courtesy of
Narcis Vidal, Enel X

Grid-integrated EVs: demo to commercial applications

 JUMPSmartMaui
USA

 LA Air Force Base
USA

 UCSD
USA

 PowerStream
Canada

 Yokohama Smart
City Project
Japan

 Nikola Project /
Parker Project
Denmark

 Nuve Project
Denmark

 Amsterdam Smart City
Netherlands

 NewMotion V2G Project
Netherlands

 GrowSmarter
Spain



 Nissan HQ Project
France

 GridMotion
France

 Genoa Pilot
Italy

 Suvilahti Pilot
Finland

 Nissan-Enel Project
UK

 DriveElectric
UK

 OVO
UK

 Redispatch V2G
Germany

 SEEV4-City
UK

 Norway
 Netherlands
 Belgium
 Germany

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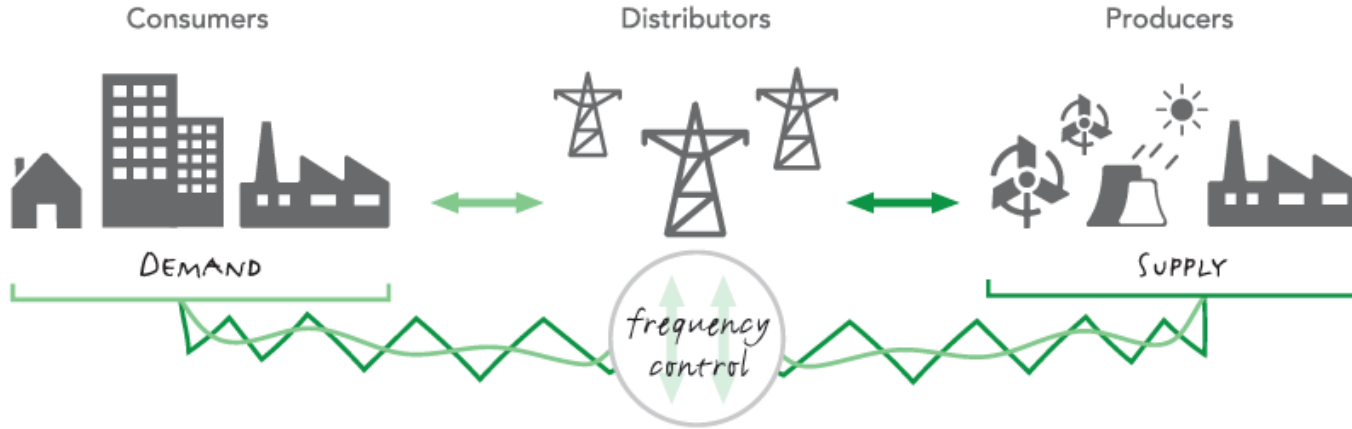


- CHAdeMO is the only enabler of V2X with production EVs/PCS readily available
- More V2X product options are increasingly becoming available both high-end and affordable models
- To reduce the price and accelerate V2X adoption, more AC/DC V2X products are awaited, although some standardisation work remains



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V2X: what it does



MAKE MONEY

by providing capacity and sending energy back and forth to regulate the Grid

SAVE COSTS by using stored energy from EV batteries to reduce building energy peak consumption