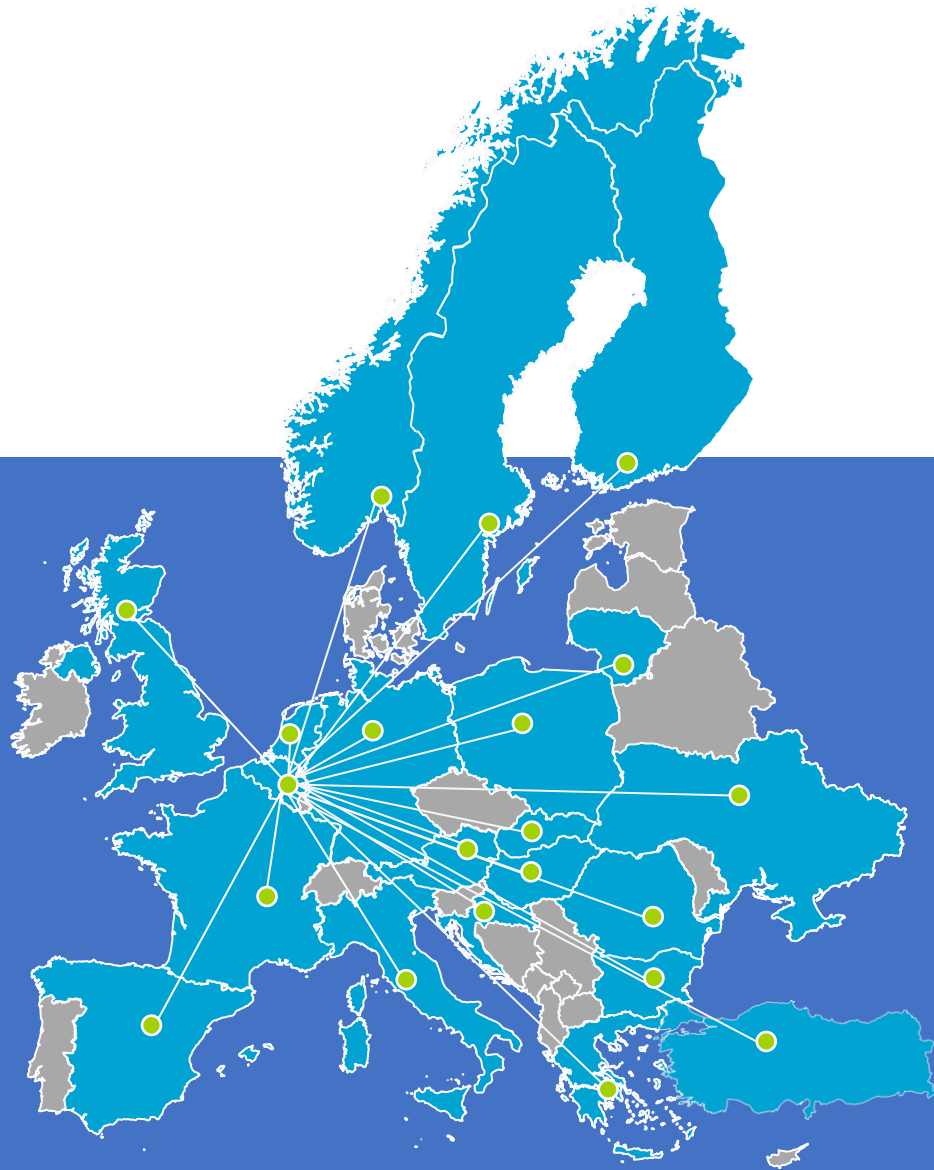


## SUPPORTING V2X'S UPTAKE:

**What should be the key  
priorities?**





# AVERE

The European Association for Electromobility

Representing the e-mobility value chain:  
OEMs, CPOs, EV users, Public Institutions, etc.

**65+** members present in 26 states

- **e-Drivers**
- **e-Chargers**
- **e-Vehicles**

**Started 1978**, from academic perspective  
to a drivable & convenient EV reality

## Content:

1. Why V2X?
2. Current state-of-play of V2X
3. EU Pilot projects: lessons learned & scalability
4. Key considerations
5. Customers and operators (CPO) perspective
6. EV OEM and EVSE OEM perspective
7. Future considerations beyond standardization
8. Recommendations for gaps & regulations



# Why V2X?



Sustainable power generation + stationary battery energy storage + electrifying everything (esp. transport) are the 3 pillars of a sustainable energy future.



Cooperation between Utilities, Industry players, Operators and DSO/TSOs is key to integrate the 4 pillars.



Electricity demand in our economy will grow 3x. Technologies can provide flexibility and better anticipate between demand and supply.



We need a clear roadmap to enable the electricity growth. We need processes, - business models and operations improvements too.



V2X is key to solve local and unplanned grid issues (on top of constraint based tech and supply driven technologies)



V2X unlocks a flexible, free floating fleet of mobile batteries, with enough spare capacity not always required for traveling.



V2X unlocks a flexible, free floating fleet of mobile batteries, with enough spare capacity not always required for traveling.

# Current state-of-play of V2X

01	<b>Market situation</b>	<ul style="list-style-type: none"><li>• V2G is a solution to allow the use of “available” batteries on wheels which are parked 95% of time to support stationary batteries.</li><li>• State-of-art V2G solutions still in pilot/living lab plots. Conditions to scale are yet to be matured.</li></ul>
02	<b>Business models to appear</b>	<ul style="list-style-type: none"><li>• V2G at project stage but might reach a turning point, first proof of concepts with commercial triggers close to launch.</li><li>• Customers are going to want to be compensated for providing value.</li><li>• V2G supports the uptake of electric trucks as truck operators will be able to generate new incomes through power transfer.</li><li>• Costs and complexity of V2G interoperability needs to get down for viability.</li></ul>
03	<b>Support from plug &amp; charge standard</b>	<ul style="list-style-type: none"><li>• ISO 15118-20 supports V2G functions and will accelerate development of new market mechanisms to enable bidirectional power transfer. Focus on open standards is key to ensure that EVs and EVSEs (chargepoints) can be paired to enable V2X services.</li></ul>
04	<b>Unlock unused battery capacity</b>	<ul style="list-style-type: none"><li>• EV battery capacity for energy management will grow heavily in the next couple of years. This will be the peak battery capacity for the European electricity system.</li><li>• V2X can unlock unused mobile battery capacity from EVs up to 50% of the regular capacity:<ul style="list-style-type: none"><li>◦ Average EV battery: 50-70 kWh</li><li>◦ Actual used battery capacity for traveling per day: &lt; 20 kWh</li><li>◦ Actual unused capacity while free floating between home, office and public area: 30-50 kWh</li></ul></li></ul>
05	<b>Several use cases</b>	<p>Only V2G directly supports the grid. V2H/2L concepts indirectly do.</p> <ul style="list-style-type: none"><li>• V2Home: standalone; integrated with Home energy management system (EMS)</li><li>• V2Load: standalone; customer features</li><li>• V2Grid: various use cases</li></ul>



# EU Pilot projects

## FLOW

- FLOW tests, validates and enhances user-centric V2X smart charging solutions and their orchestrated integration into energy grids that deliver flexibility assets to favour additional penetration of renewables and alleviate energy grid challenges.  
\* ongoing Horizon Europe project



Flexible energy systems Leveraging the Optimal  
integration of EVs deployment Wave

## SCALE - Smart Charging Alignment for Europe

- SCALE is a three-year project (2022-2025) co-funded by the new Horizon Europe Programme with a budget of around 10 million EUR. It aims to advance smart charging infrastructure and facilitate the mass deployment of electric vehicles.  
\* ongoing Horizon Europe project

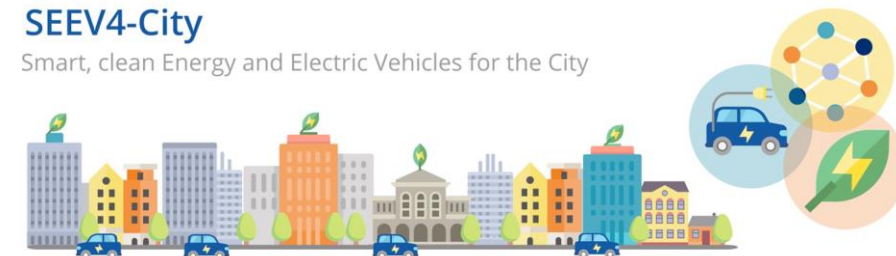


## SEEV4-City

- Smart, Clean and Electric Vehicle for the City (SEEV4-City) took place between 2018 and 2021.  
Its main objective was to demonstrate smart electric mobility solutions, that integrate renewable-energy sources and encourage take-up in cities.

### SEEV4-City

Smart, clean Energy and Electric Vehicles for the City



# Key considerations



# Customer and Operator perspectives

## Customers

- Need clear **incentives** to consider V2G as convenient 'money in-the-pocket'
- Should have the **ability to opt in- and opt out** at any time
- Should have a **freedom of travel**. V2X, V2G remains optional
- Should have sufficient **means to control and configure**, i.e. safety thresholds
- Should get **compensated** for their willingness to support the grid', i.e.
  - *Standby fee (actual period a DSO can rely upon an asset)*
  - *Time based fee (period that the EV can't be used for key purpose)*
  - *kWh based fee (compensation for feed-in power, extracted from the battery)*

## Charge Points Operators (CPO)

- **Can't be forced to deploy V2G all times.** Even with customer/MSP consent there could be reasons not to activate V2G at a particular moment
- Should have the **ability to opt in- and opt out** at any time (per asset/charge point or pool based, per grid connection point)
- Should have a **freedom of distribution**: A CPO ensures controllability, taking into account customer preferences, actual power demand, distribution and balance between demand and supply
- Should have sufficient **means to control and configure**, i.e. safety thresholds
- Direct **controllability of charge points by DSO/TSO should be avoided** since it would impact user experience and CPO controllability
- Should be **compensated** for missed charging sessions, lower charging tariffs and reduced charged kWhs

### We need business models to meet customer willingness to participate in V2G:

- Between TSO/DSO and CPO (availability of network)
- Between TSO/DSO and customer (remuneration)
- Between CPO and/or MSP and customer (compensation/adjusted charging tariffs)



# EV OEMs and EVSE OEMs perspectives

## EV OEMs

- Need to be incentivized to offer **Hardware capable EVs with V2X ready functionalities**
- Need to work on cost reduction first to support full BEV uptake. Costly V2G solutions 'on top of that' don't help the market.
- Need to support V2X providers with **User Interface** (in-vehicle, app) to activate and deactivate V2G functions
- To work together with V2X providers on **control platforms** to configure customer, and DSO/CPO/MSP preferences and safety thresholds (in-vehicle, app)
- **Should comply to uniform and open standards** to enable V2X functions(i.e. **ISO 15118-20**)

## EVSE OEMs

- Need to offer a **control platform to configure preferences and safety thresholds or should enable a CPO to do so** via Chargepoint Management Systems (based on OCPP)
- Should **comply to uniform and open standards** to enable V2X functions(i.e. **ISO 15118-20 Bidirectional Power Transfer**)

### 2G/V2X parity should be clearly determined:

- V2X architecture: what (safety) components are located in EV, EVSE, or metering point
- EV and EVSE (chargepoint) parity: which EV and EVSE types can execute V2X together (type approval)

# Future considerations beyond standardization

Beyond standardization and technology developments, it is essential to address the following:

- **Double taxation:**

In Europe, energy is taxed according to its flows – we need to ensure consumers are not disincentivised from using V2X by ensuring energy is taxed only once

- **Cybersecurity**

While V2X offers incredible opportunities to reimagine our energy management systems, we need to guarantee cybersecurity thresholds so that malicious entities can't break into these energy systems.

- **Grid codes**

EV (battery-on-wheels) should be treated equally in Network codes/grid codes and a dialogue should be initiated between e-mobility players and DSO / TSO / Energy regulators



# Recommendations

- **V2X requires standardisation at DSO/TSO** to enable large scale markets
- **V2X requires revisions on standards for battery durability** (GTR22) and **OEM battery warranty provisions**. V2G results in additional battery aging. Defined durability/State-of-Health should therefore be based on i.e. battery cycles instead of vehicle mileage.
- **V2X ready Hardware pairing and architecture demarcation:** V2X requires parity between EV and EVSEs and a clear demarcation of components and functions (i.e. backup switch, isolation, etc). To be facilitated via type testing, type approval or other relevant mechanism.
- **V2X requires business models** between various market actors to compensate ChargePoint Operators and customers for their willingness to support the grid with V2X services
- **V2X requires open standards to be followed by EV OEM, EVSE OEM and Chargepoint Operators** for seamless, harmonized communication between:
  - EV and EVSE (ISO 15118-20)
  - EVSE and CPO platform (OCPP 2.0.1 or higher, IEC 63110 in near future)
  - Open source API or User Interface (proprietary MSP, OEM or CPO interface to extract customer preferences)
- **V2X requires revisions on standards for battery durability** (GTR22) and **OEM battery warranty provisions**. V2G results in additional battery aging. Defined durability/State-of-Health should therefore be based on i.e. battery cycles instead of vehicle mileage.





The European Association  
for Electromobility

# Thank you!

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