Lessons Learnt

A cross-case analysis of six, real-time Smart Charging and V2X Operational Pilots in the North Sea Region

EVS32 20-05-2019

Robert van den Hoed

Jorden van der Hoogt

Interreg North Sea Region
SEEV4-City
European Regional Development Fund

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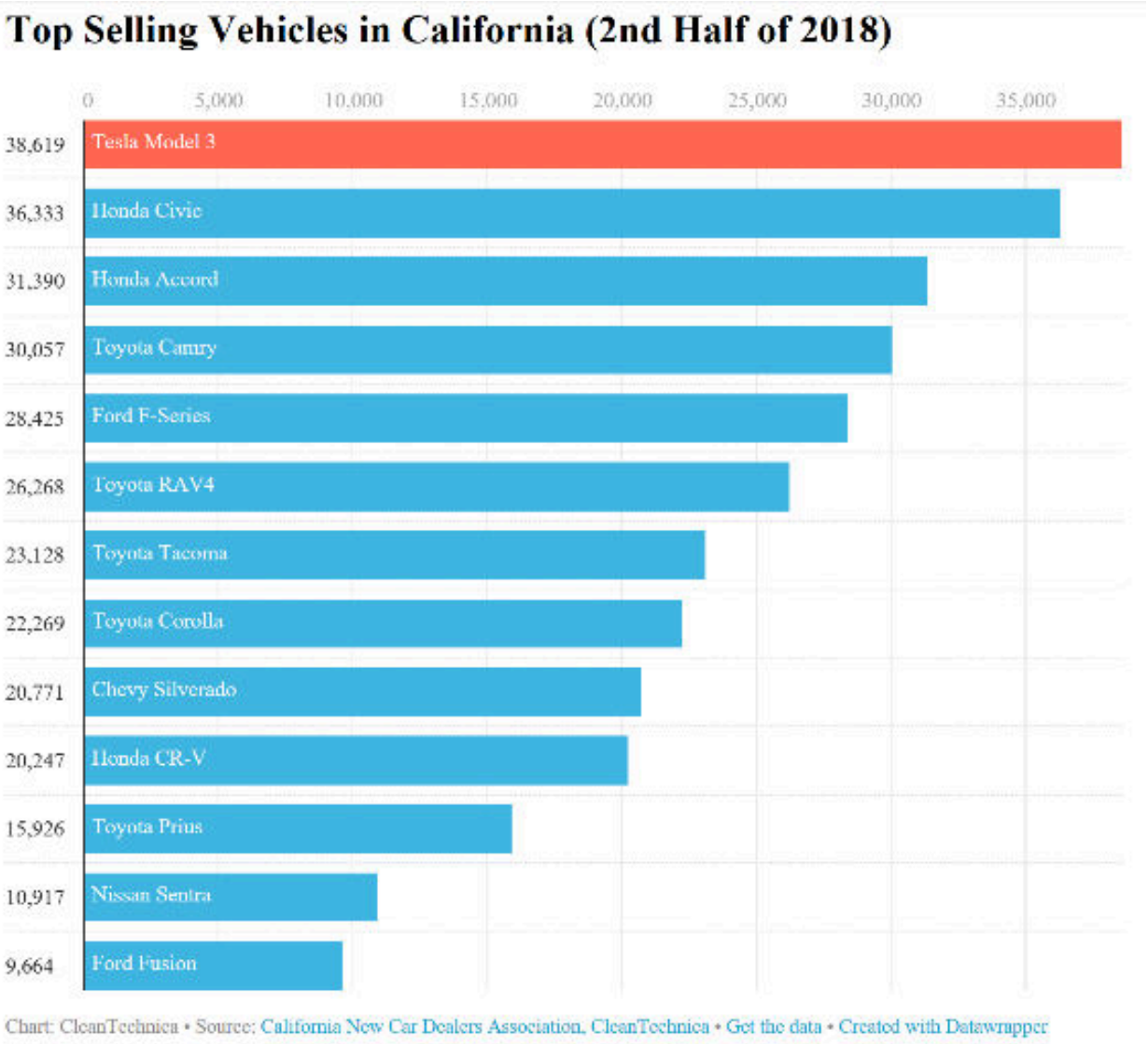
cenex nederland

Northumbria University NEWCASTLE

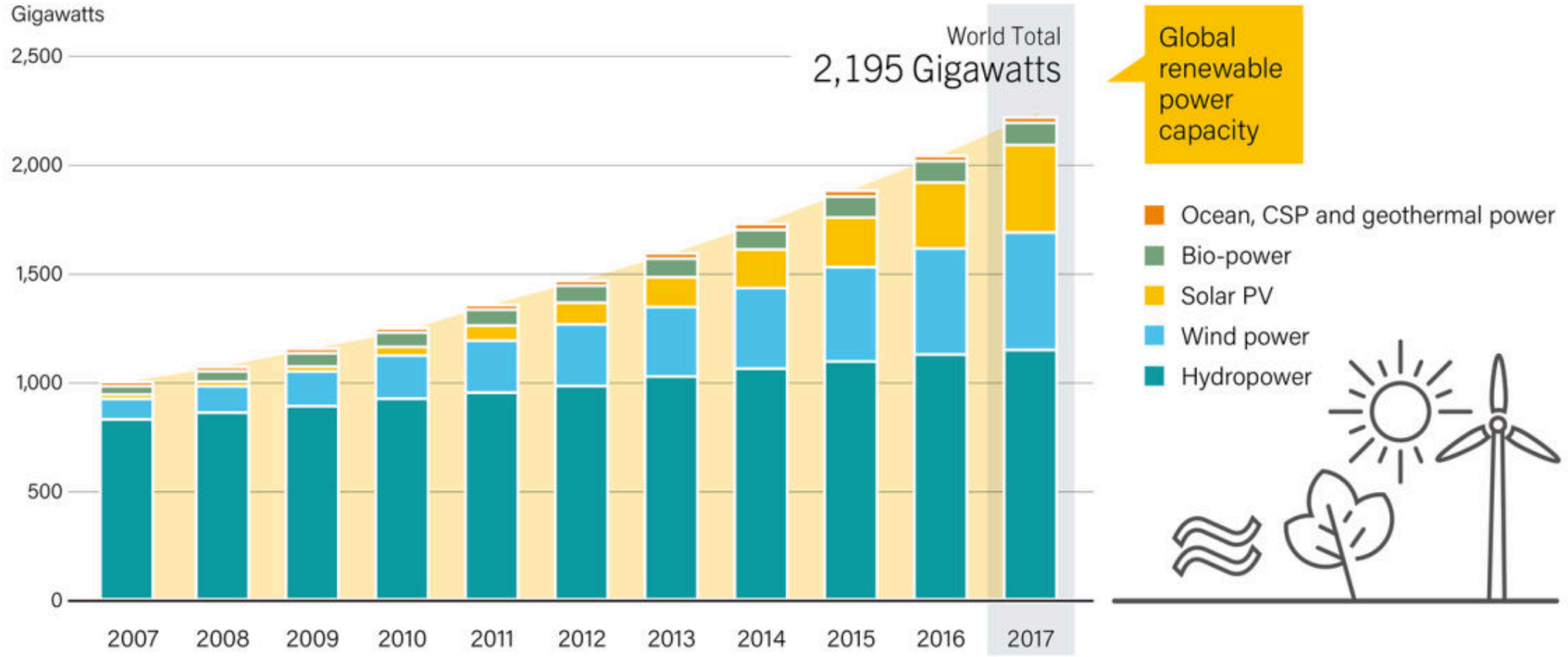
1 Electric mobility is growing fast



https://cleantechnica.com/2019/02/23/tesla-model-3-was-top-selling-car-in-california-in-2nd-half-of-2018-cleantechnica-report/
https://cleantechnica.com/2019/03/01/what-does-28750-to-35000-tesla-model-3-mean-for-the-us-auto-market/

2 Renewable energy growing fast

FIGURE 5. Global Renewable Power Capacity, 2007-2017



REN21 RENEWABLES 2018 GLOBAL STATUS REPORT

3 Demand-side mgt & storage are key

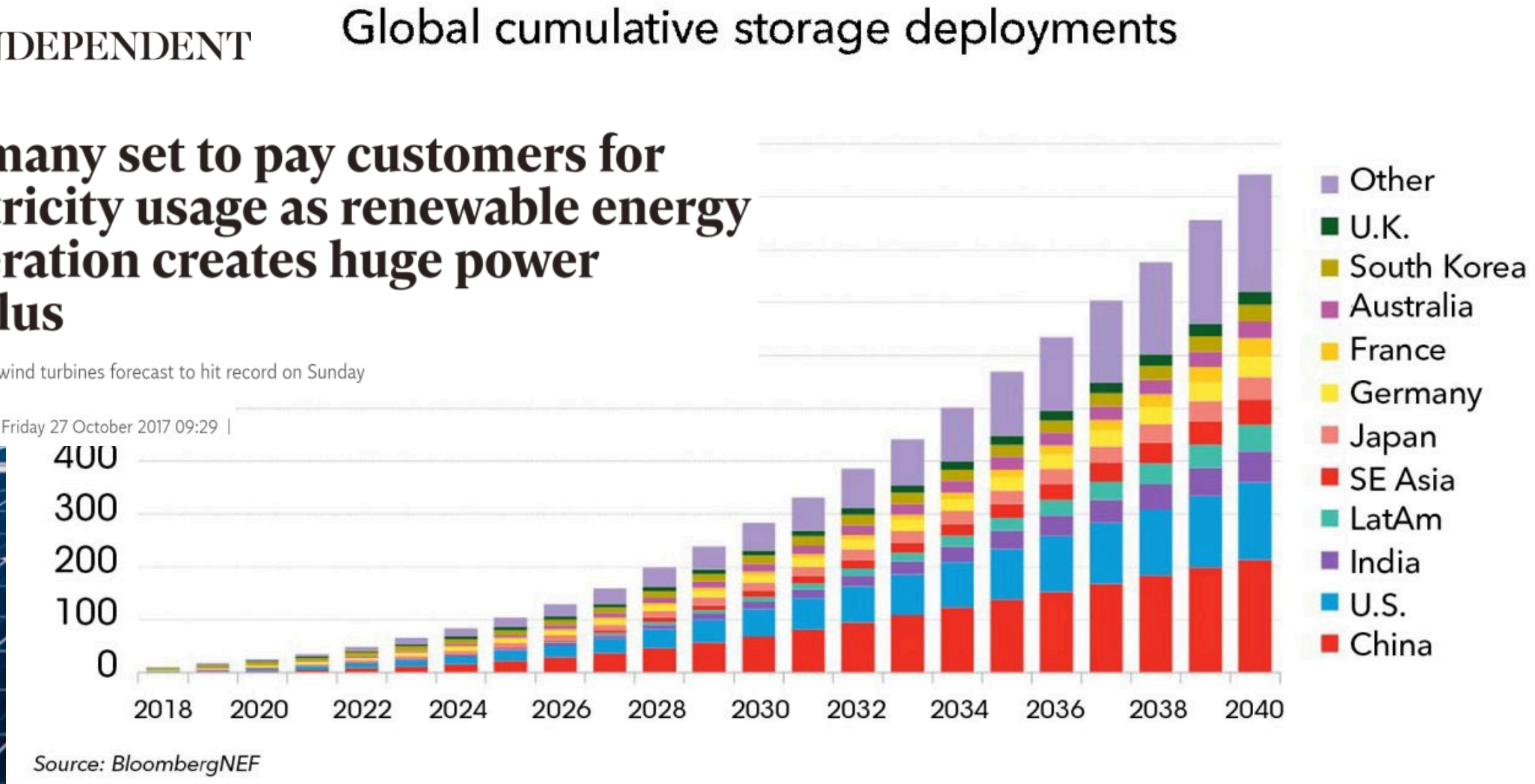
INDEPENDENT

Environment

Germany set to pay customers for electricity usage as renewable energy generation creates huge power surplus

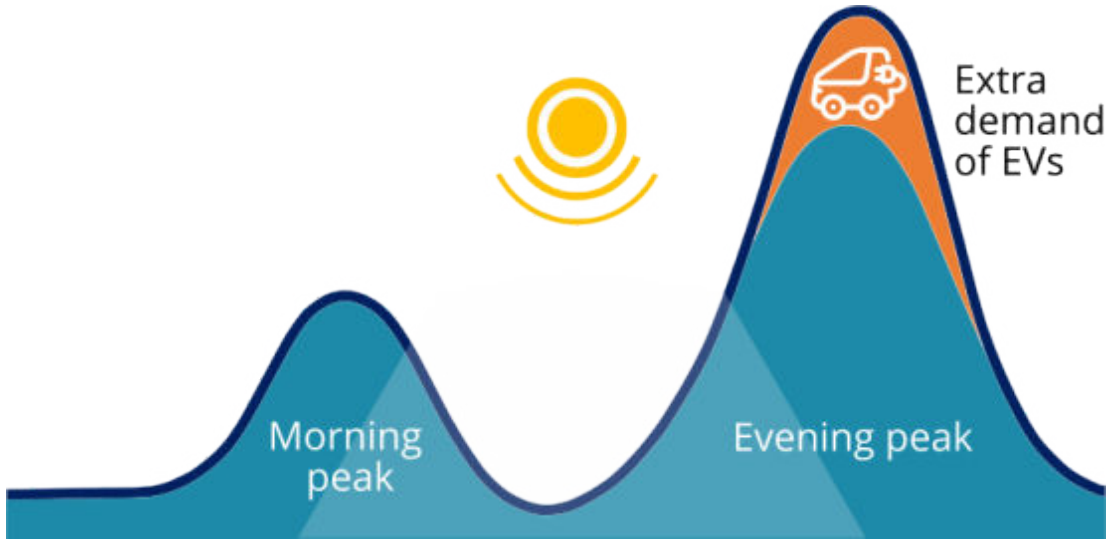
Output from wind turbines forecast to hit record on Sunday

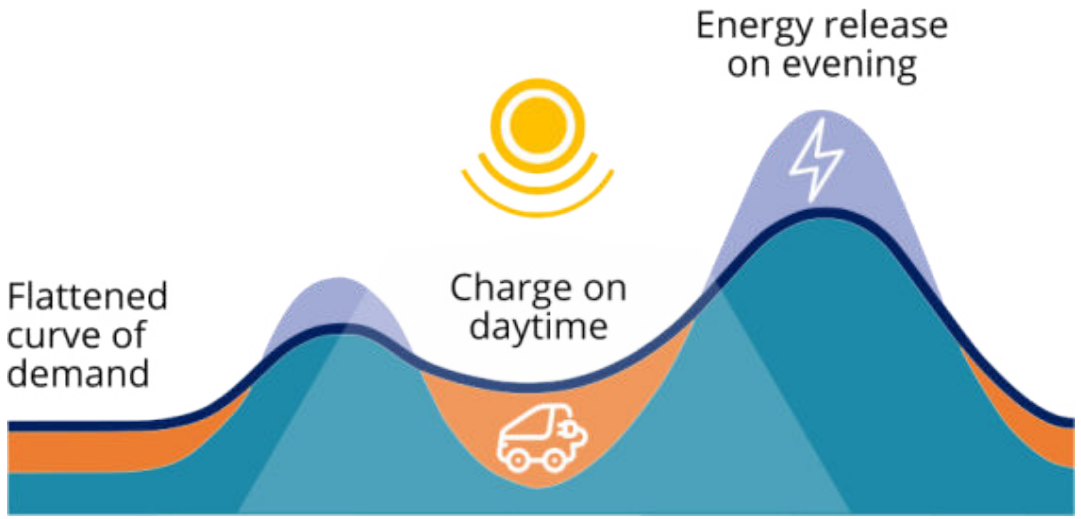
Jesper Starn | Friday 27 October 2017 09:29 |



Vehicle To Infrastructure (V2X):

Utilizing battery electric vehicles for energy services





Without V2X

With V2X

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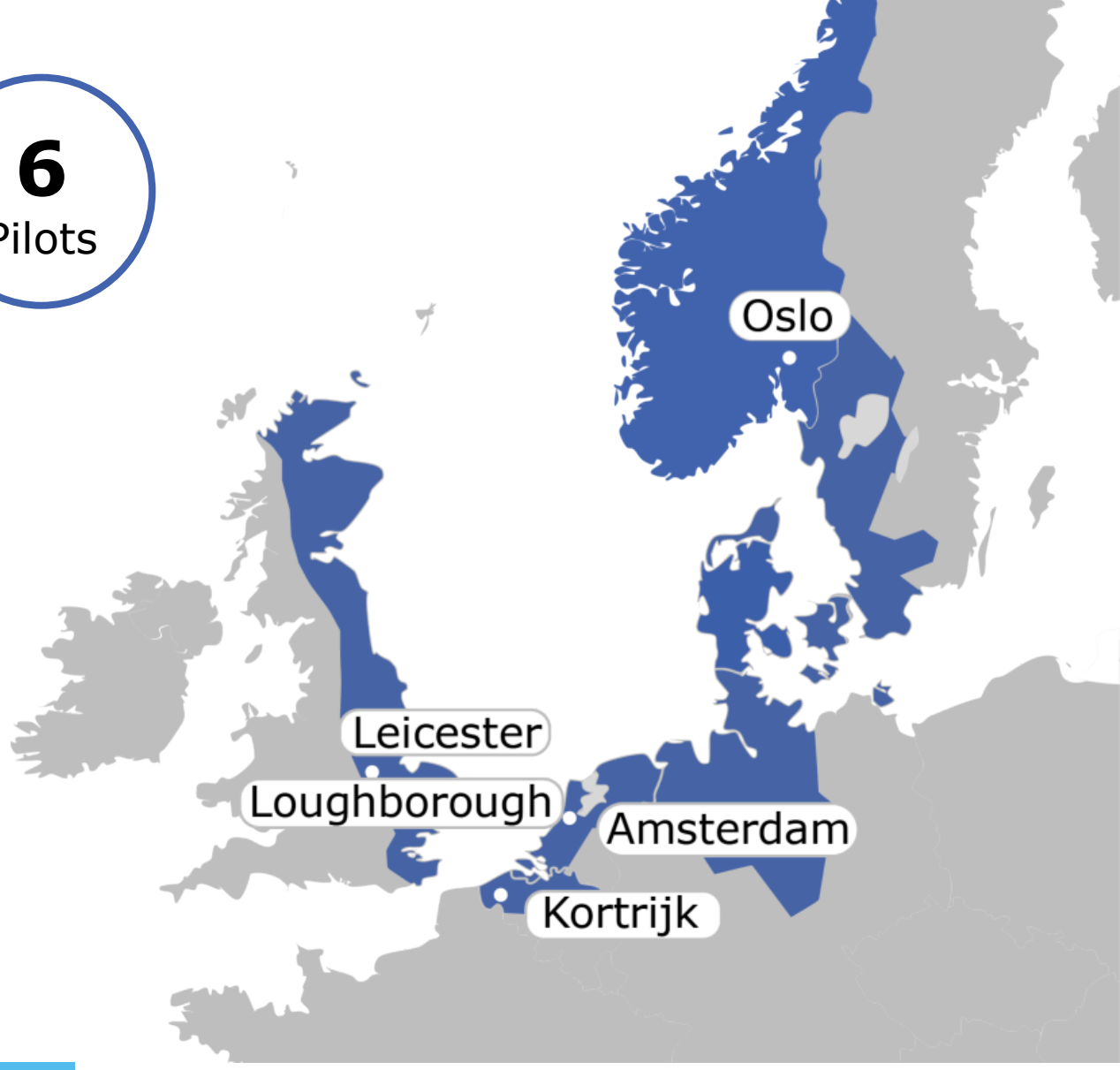
6
Pilots

Sep 2016
–
Oct 2019

5 mln
budget

11
partners



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AMSTERDAM ArenA

City of Amsterdam

AVERE

Leicester City Council

Key Performance Indicators

Reduce CO_2 emissions

Project objective: 130 – 210 tons yearly

Increase energy autonomy

Project objective: increase varies up to 30%

Analyse avoided grid investments

Project objective: calculation by extrapolation of OP results

Vehicle to Home

Vehicle to Business

Vehicle to Neighbourhood

Vehicle to City

Scale

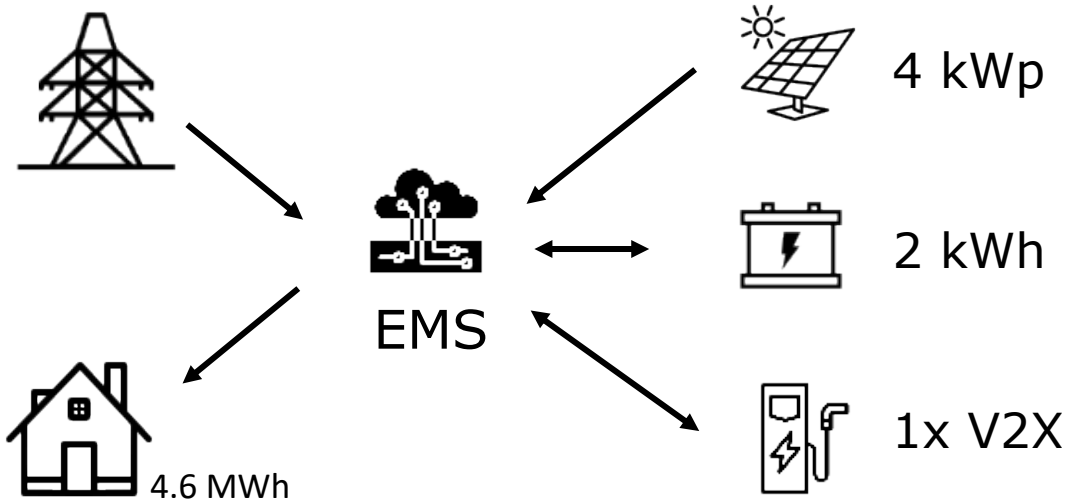
- **Loughborough** (UK)
  Cenex employee home owner
- **Kortrijk** (BE)
  The City Depot of Kortrijk
- **Leicester** (UK)
  Leicester City Hall
- **Amsterdam** (NL)
  Johan Cruijff Arena
- **Oslo** (NO)
  Vulkan Real Estate
- **Amsterdam** (NL)
  Flexpower Amsterdam

Loughborough (UK)

Cenex employee home owner

Pilot characteristics

- A single household
- Vehicle used is a 24 kWh Nissan Leaf
- Equipment inherited from the EFES project
- Currently being moved to Notthingham



Key findings

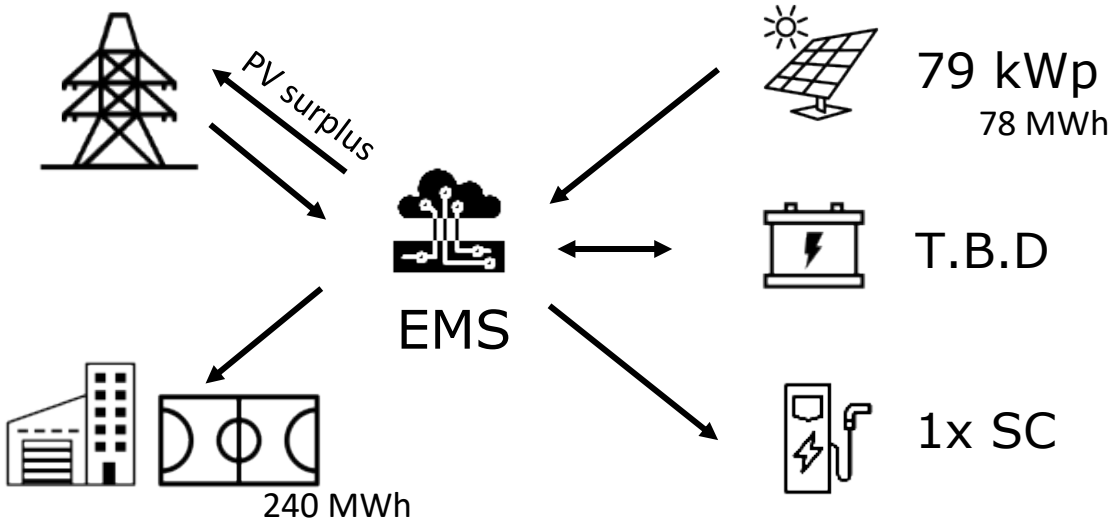
Behind the meter

Commissioning

Almost 1 year

Kortrijk (BE)

The City Depot of Kortrijk



Pilot characteristics

- One Nissan E-NV200 that follows the same delivery route every day
- Self developed, python based EMS system to integrate all hardware.
- Belpex (power exchange) for using flexible energy tariffs

Key findings

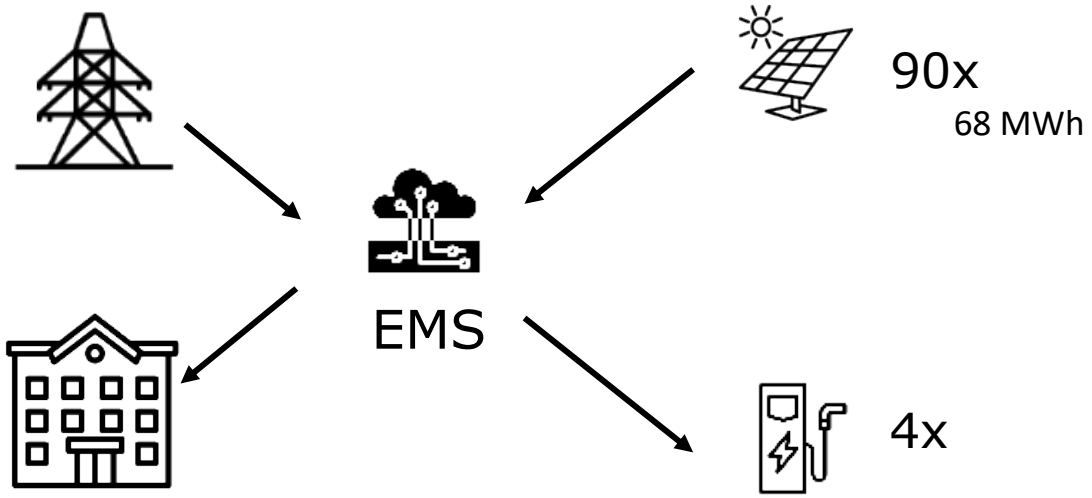
Behind the meter

Flexible tariffs

No second-life VW Battery

Leicester (UK)

Leicester City Hall



Pilot characteristics

- Delayed due to possible conflicts with a new city emergency response plan
- Smart energy system currently being procured.
- A tender is being organised for suppliers

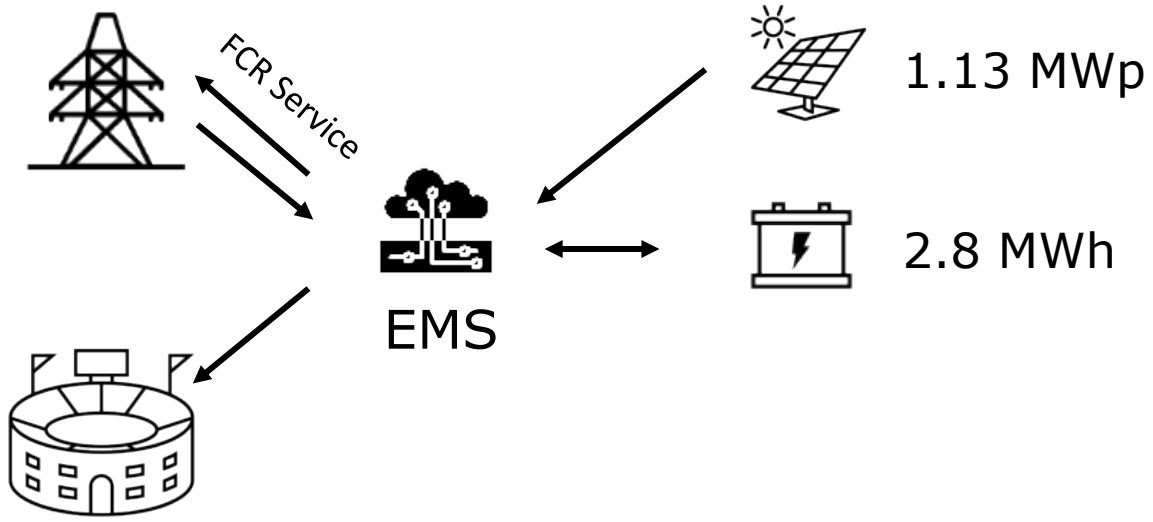
Key findings

External technical support

Dedicated EMS

Amsterdam (NL)

Johan Cruijff Arena



Pilot characteristics

- 140 Nissan Leaf Battery packs
- Frequency Response and Reserve services
- 3x V2X chargers installed soon
- 14x regular chargers installed soon

Key findings

80k
9 years RoI

New and old batteries

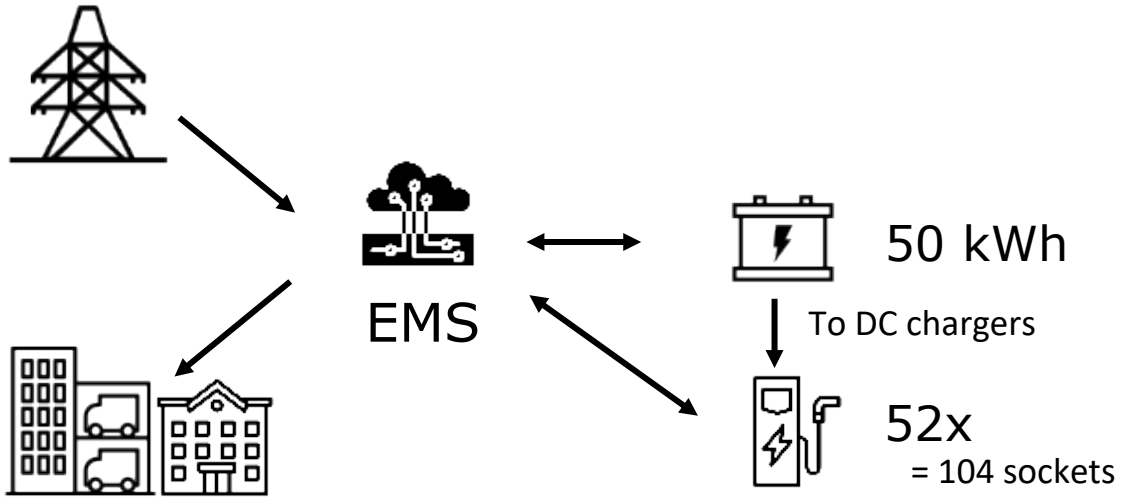
Free during events when V2X

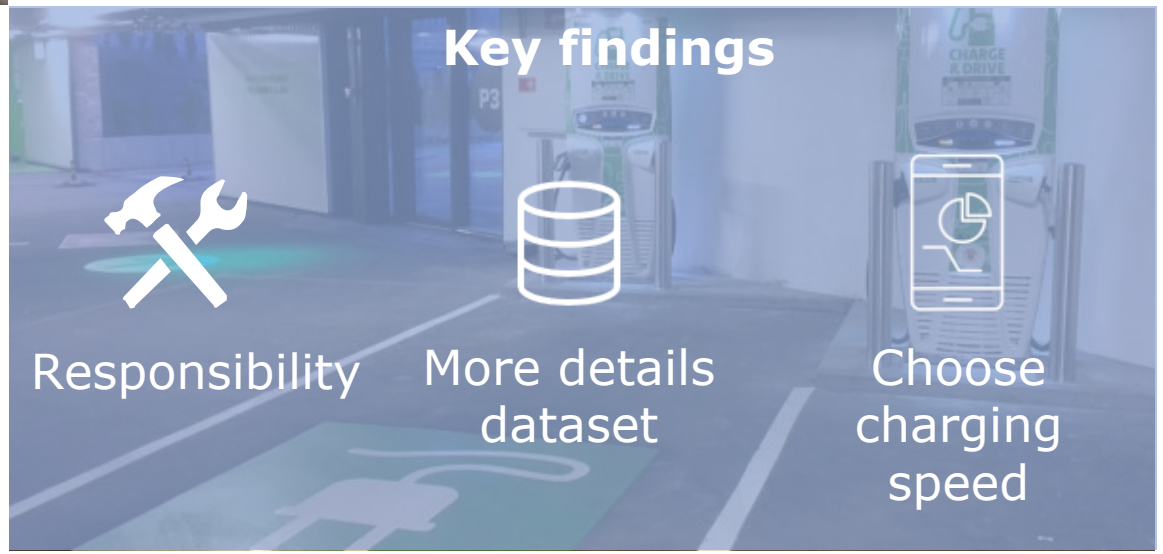
Oslo (NO)

Vulkan Real Estate

Pilot characteristics

- 50x (100 sockets) AC semi-fast charging with SC capability (22 kW)
- All 50 AC chargers are V2X ready
- 2x (4 sockets) DC fast charging (50 kW)
- Battery supports the DC fast-chargers



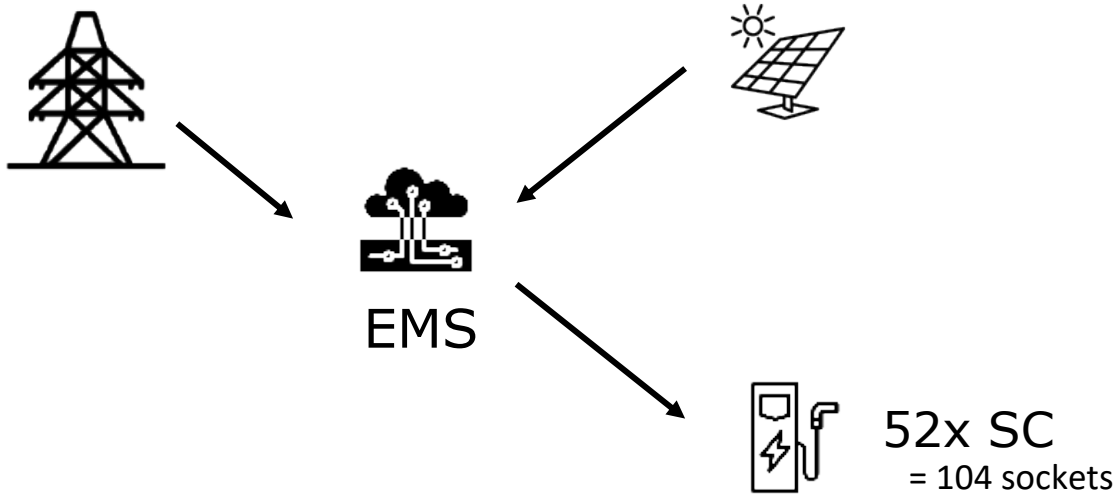


Amsterdam (NL)

Flexpower Amsterdam

Pilot characteristics

- Six Static Smart Charging profiles
- Towards 4000 charging points in 2025
- Flexpower 2 recently started (456 charging stations = 912 sockets), with supply and demand matching of RE generation

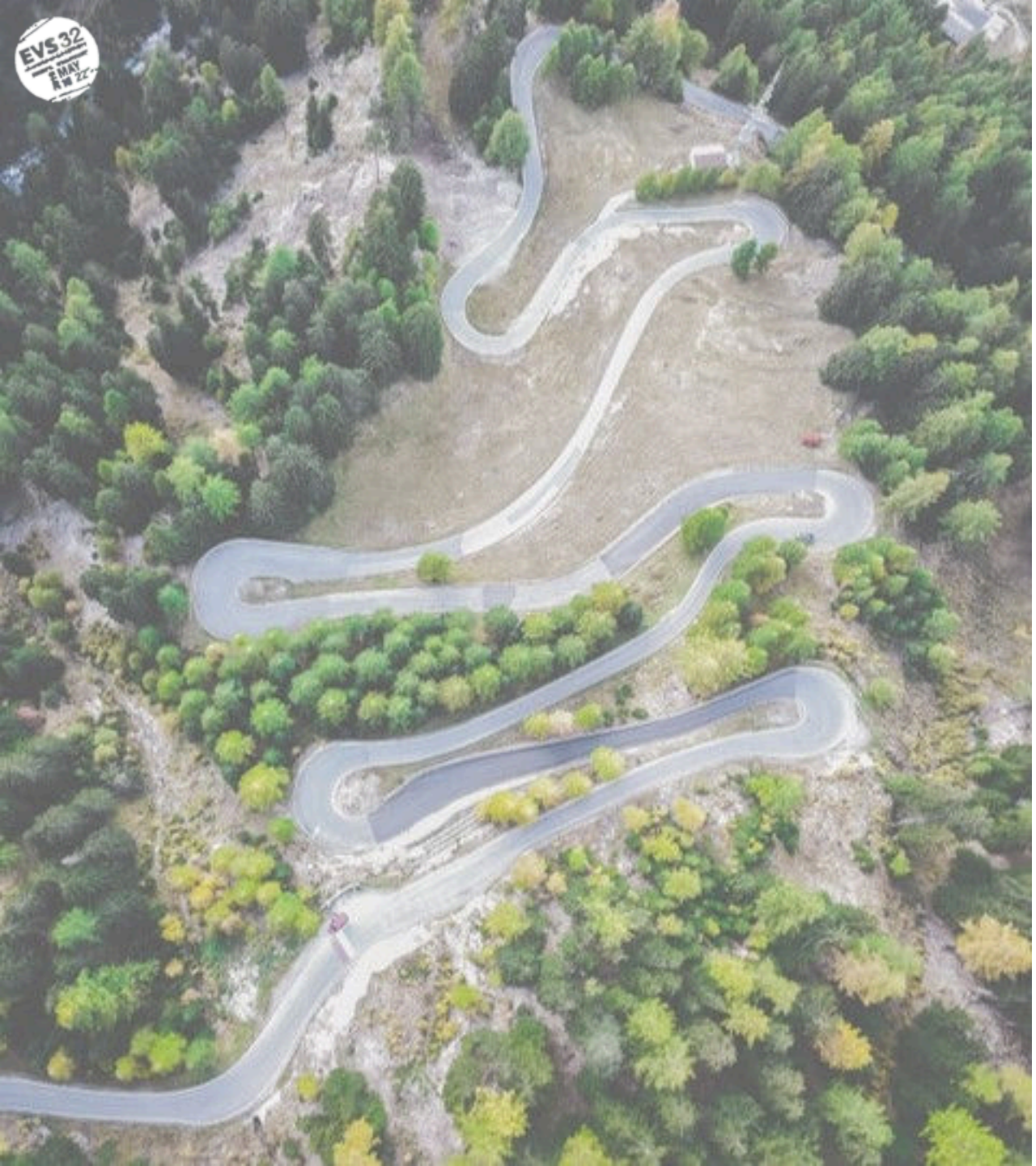


Key findings

Data security in place

Higher connection costs SC

2x Faster outside peak times



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Lessons Learnt

from six operational pilots
with different scales

1. **Technology: the V2X market is not fully mature**
2. **Configuration: tailor-made projects**
3. **Procurement: knowing the market is key**
4. **Business models: V2X requires customised BM**

1

Technology: the V2X market is not fully mature

Technology in development

Procurement and installation may change

Expensive

V2X units are currently very expensive

Car compatibility

Not all EVs support bi-directional charging

OEM warranties

Manufacturers are reserved on providing warranties

2

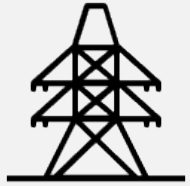
Configuration: tailor-made projects

Merge different data collection systems

Pre-existing installations such as PV

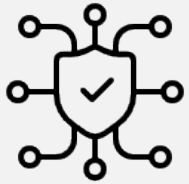
Technical issues

Communication and compatibility



DNO requirement

Installation and operation behind the meter



Data security and privacy

Be mindful with the access to collected data

3

Procurement: knowing the market is key

Total system suppliers

Consortia for installation and operation

Procurement time planning

Components may have long lead-times

Investment in human capital

Invest in knowledge training

Know what suppliers offer

Product specifications and terms of supplier

Business models: V2X requires customised BM

Tariffs and type of consumer

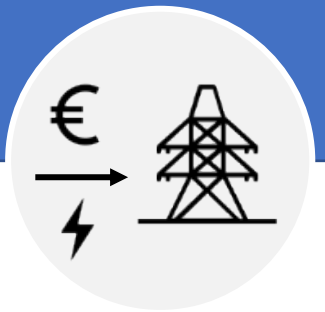
Different regions and project purposes

Avoided grid investments

Location and network specific

Smart charging currently a better business case

Less expensive units and wider applicability



V2G may become more rewarding

If Feed-in-Tariffs are altered in the future

Key takeaways

PRIORITIES

price and the availability of bi-directional charging units are key barriers

PROCUREMENT

compatibility of the technology in general is poor

PERSPECTIVE

Smart Charging currently favourable, but V2X still holds potential

Thank you for your attention

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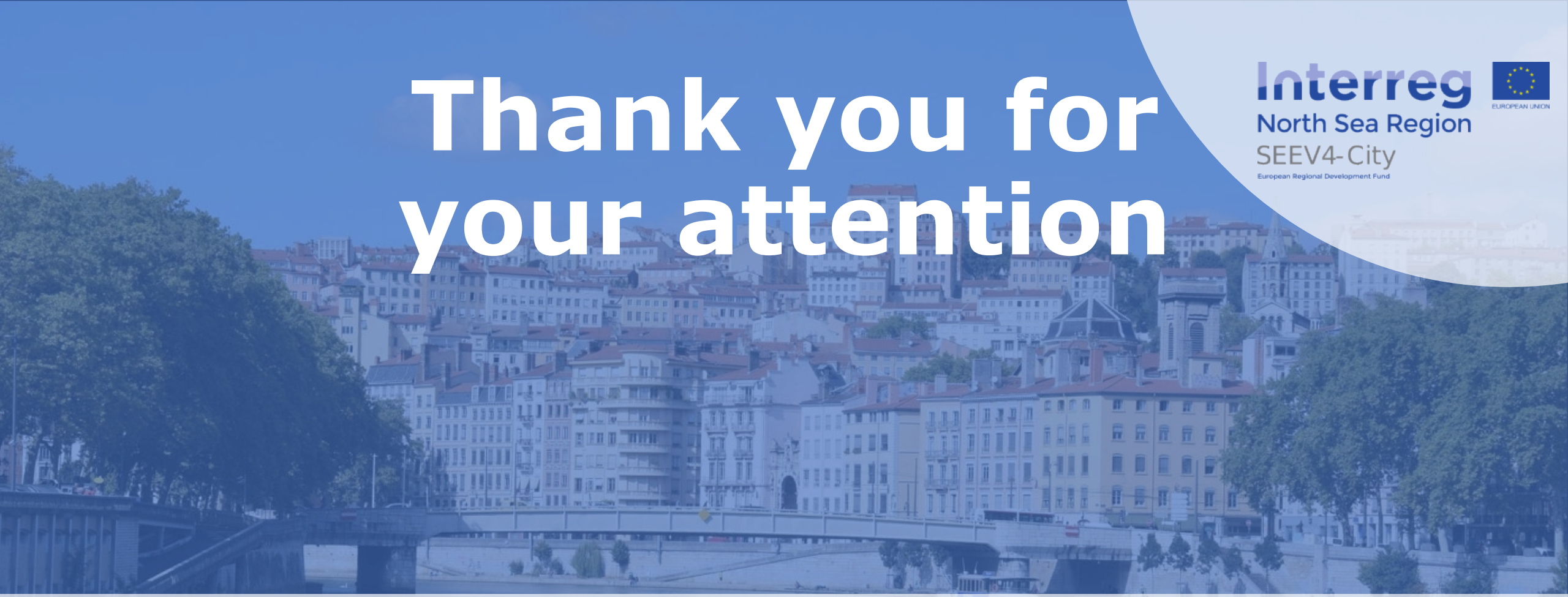

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