



INTERNATIONAL ELECTRIC VEHICLE SYMPOSIUM & EXHIBITION



The value of vehicle-to-grid on the distribution grid level

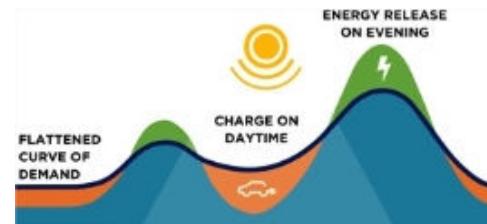
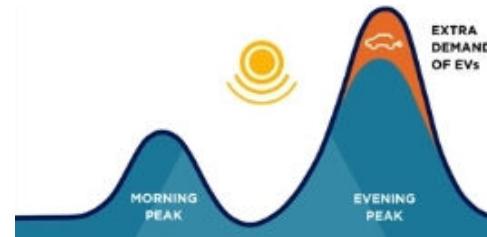
EVS32 - 2019
Lyon, France





Agenda

- About EVConsult: A brief introduction
- The world of V2G
- The value of V2G on the distribution grid level
- Vision on the future of V2G



About EVConsult

**Accelerating the transition towards
zero-emission mobility**



About EVConsult

Unique global expertise in the field of e-mobility

- Over 10 years of experience
- Completed over 300 e-mobility projects
- Largest independent EV Office
- Multidisciplinary backgrounds
(e.g. technical, commercial, economic, legal)
- Partners across the world
- International experience with e-mobility strategy, project management and innovation
- Vehicle-to-grid (V2G) specialists



About EVConsult

Government



Global
Green Growth
Institute



Transport
for London



Ministry of Energy
משרד האנרגיה



Ministerie van Economische Zaken

Energy & Utility



SINGAPORE
POWER



enpuls



UK
Power
Networks
Delivering your electricity



conEdison



VATTENFALL

Automotive & Operators



Volkswagen



anwb



MITSUBISHI
MOTORS

Qbuzz



postnl



JAGUAR

LAND
ROVER

Ahold



Active globally



Founded the European e-mobility
consulting group (EEMCG)



About EVConsult

A selection of our V2G projects

Global review of V2G projects

UK Power Network & Innovate UK



City-zen V2G, Amsterdam

NewMotion, Alliander, Enervalis



FCR Netherlands

NewMotion, TenneT, Mitsubishi, Nuvve



V2G for large fleets & shared vehicles

Province of Groningen and Drenthe



provincie
Drenthe



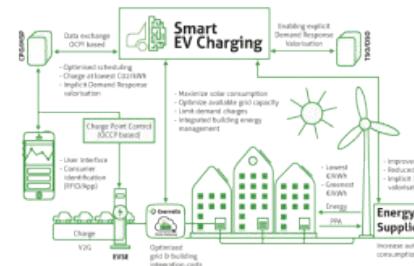
First AC V2G charge point

Municipality of Utrecht

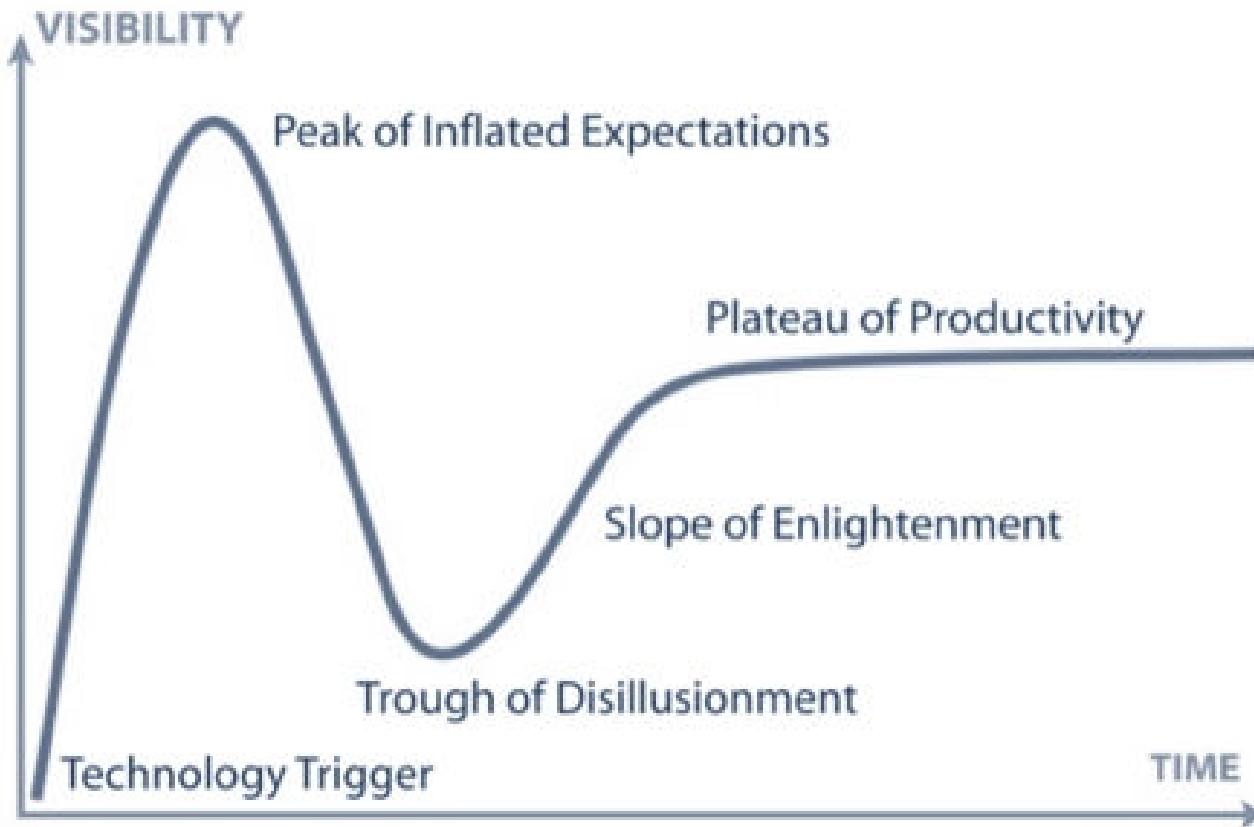


FCR mix of V1G & V2G

EVConsult, Elia, NewMotion, Enervalis



My personal V2G hype cycle



Global review of V2G projects



Innovate UK
UK Power Networks
Delivering your electricity

everoze EVCONSULT



Global review of V2G projects



LESSONS

FOR NETWORK OPERATORS



1. ADAPT INTERCONNECTION STANDARDS & PROCESSES



2. CLARIFY THE VALUE OF DSO SERVICES



3. DESIGN SERVICE SPECIFICATIONS WITH V2G IN MIND



FOR INDUSTRY



4. MATURE THE HARDWARE



5. TARGET SERVICES WHERE V2G ADDS VALUE



6. SEGMENT USER BEHAVIOUR



Value of V2G

Research Project:

What is the value of vehicle-to-grid (V2G) to distribution system congestion management for the DSO?

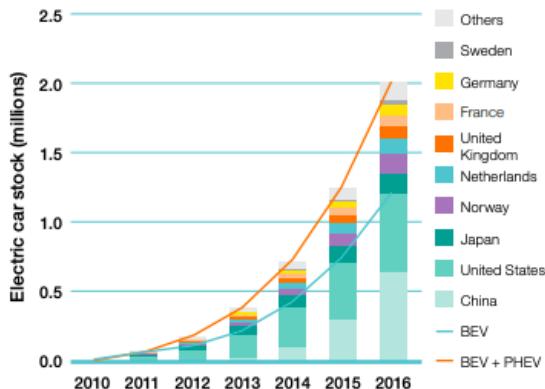
In collaboration with:



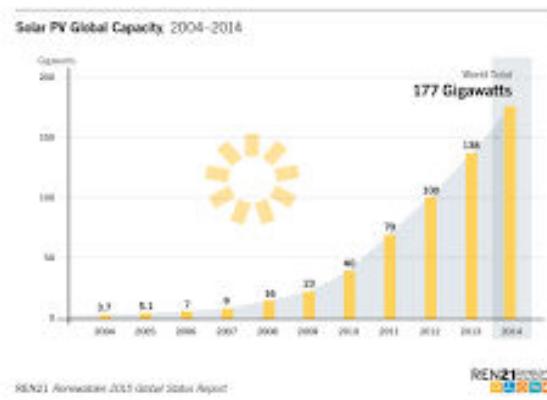
Value of V2G

Transition to sustainable energy system

1. EVs



2. Solar



3. Heat pumps, electric cooking, etc.



> Will cause significant extra load AND congestion on grid



Value for DSO

An alternative to grid reinforcements

Scenario 1:

Smart charging + grid upgrades



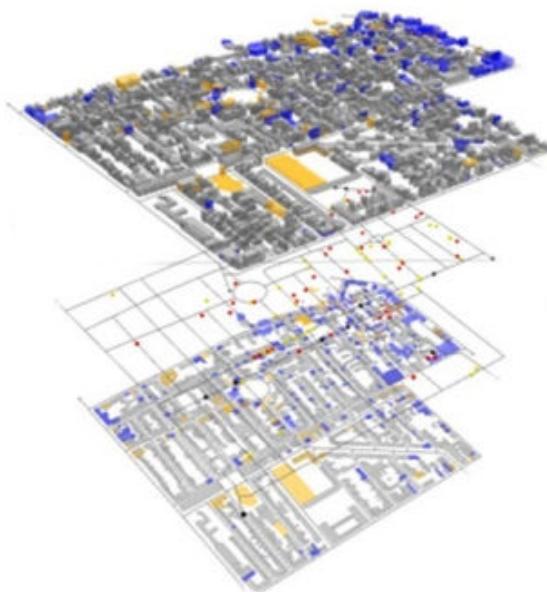
Scenario 2:

Vehicle-to-grid (V2G)



Methodology

Sparkcity model, an Agent-Based Model (ABM)



Why ABM?

- Ability to model accurate driving behaviour
- Heterogeneity of agents
- Time and location specific

'upload' a city and play
simulate the real-life behaviour
of the people living there



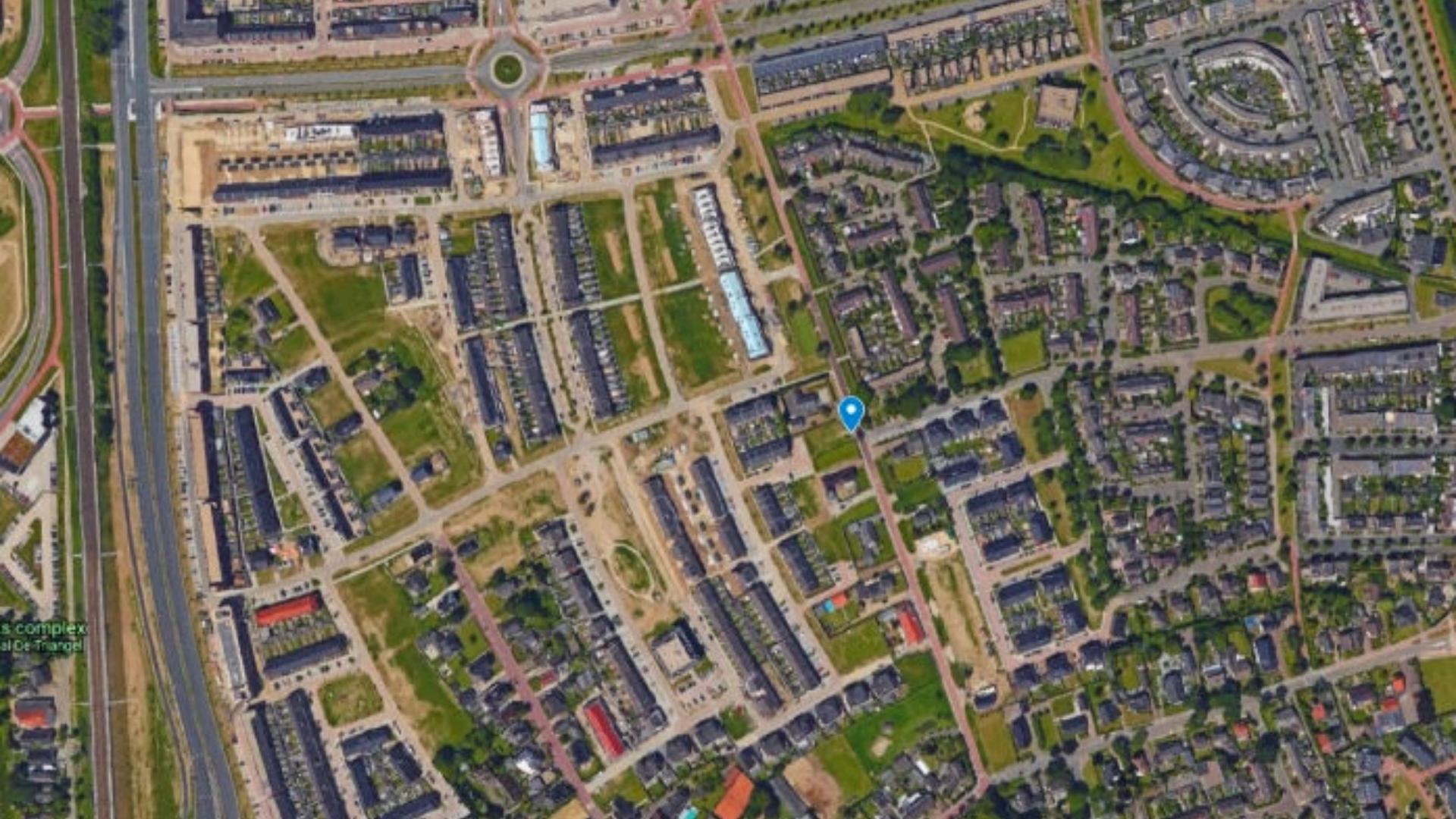
Case study



Nijmegen Noord (Lent) - 2030

- ± 3.000 households
- 30% of households have solar PV
- 35% of cars is an EV
- 1 out of 3 chargers is V2G
- Grid is already constrained
- Flexibility market is piloted



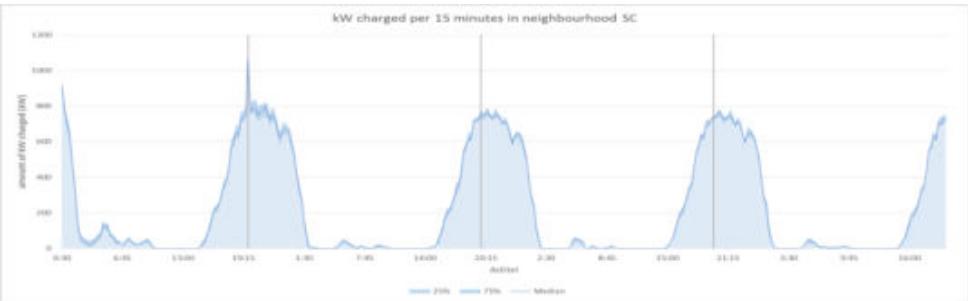
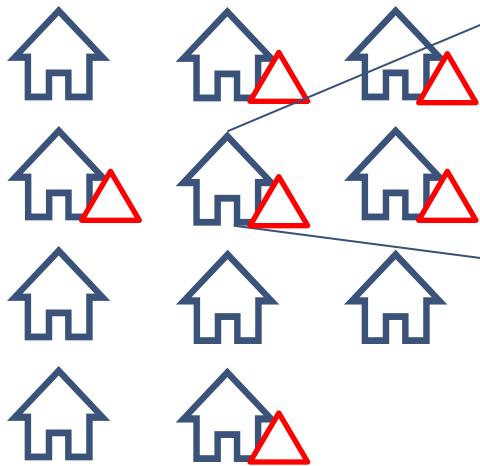


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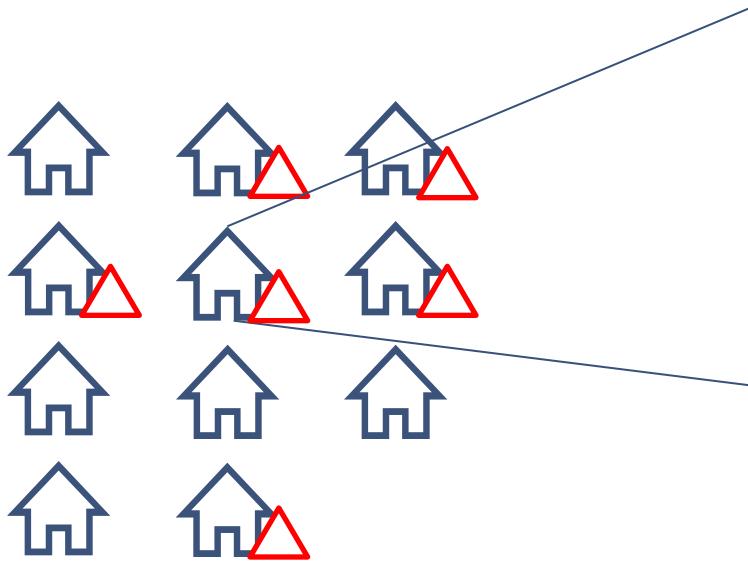
Results

Electrical load in transformers in smart charging scenario



Results

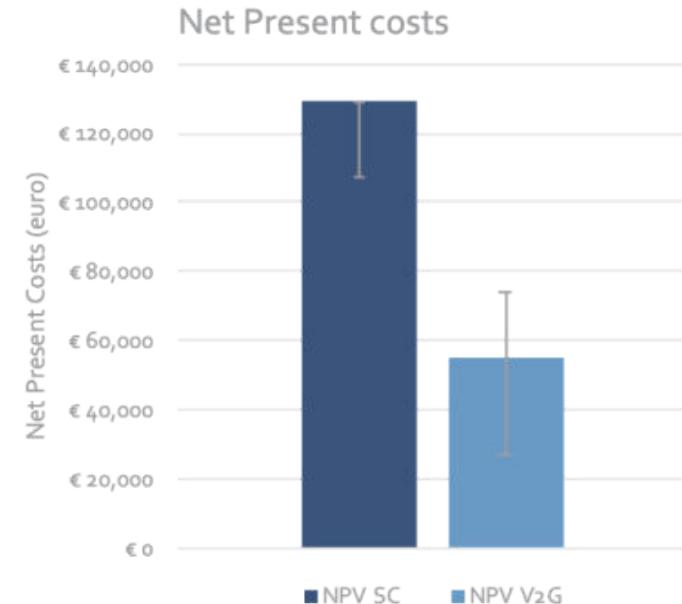
Electrical load in transformers with V2G charging



Value of V2G for local grid

Cost benefit analysis of different alternatives

- 10 year timeline
- CAPEX Transformer €50.000
- CAPEX V2G per V2G charger €500
- Reimbursement per kWh for battery usage €0,04
- Interest rate 3.1%

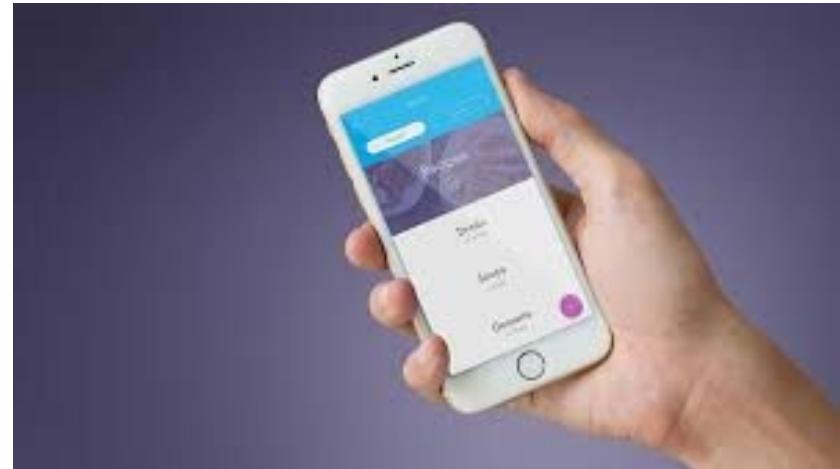


Conclusions

- V2G is able to lower overload in majority of local grid transformer stations
- V2G charging can be a cost effective solution for congestion management



Vision on the future of V2G



Vision on the future of V2G

2017-2018



2019-2020



Vision on the future of V2G

2017-2018



2019-2020



Amsterdam V2X



v2g-hub.com

Mapping the world of V2X

Home EVMonitor V2G projects Updates **CONTACT**

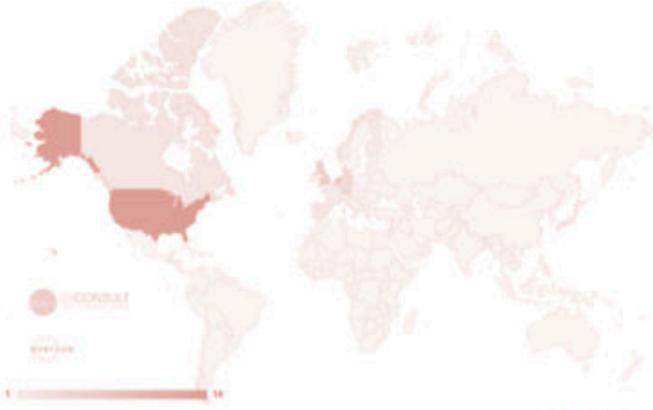
Innovate UK

UK Power Networks
Delivering your electricity

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World map of international V2G projects



Project counter

V2G Global Activity Index:

50

V2G projects

ADD YOUR PROJECT

Overview of international projects

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Sustainable Energy Technology
Delft University of Technology



Find me on LinkedIn, Twitter

What I work on:

EV strategy: Roadmaps - Business plans - Fleet transition plans

Innovation: Charging hubs - Smart Charging - V2B / V2H / V2G

- World-first Global Review of Vehicle-to-Grid projects
- Smart Charging Strategy & Roadmap for DNO UK Power Networks
- Market sizing for Vehicle-to-Building services in the UK
- Fast charging rollout business case for supermarket chain in France
- Fleet transition plan for City of Amsterdam
- World-first online EdX course on electric mobility
(>70,000 learners worldwide)





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