

SEEV4-City Smart, clean Energy and Electric Vehicles 4 the City

State of the Art &
the Point of Departure



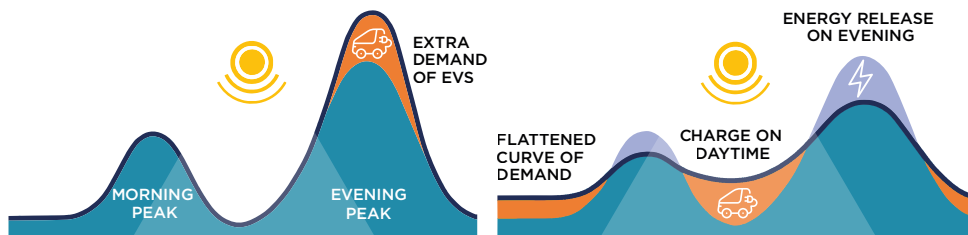
SEEV4-City is an innovative project funded by the EU Interreg North Sea Region Programme. Its main objective is to demonstrate smart electric mobility solutions, integrating renewable-energy sources and encouraging take-up in cities.



Project background and reasoning:

Charging **electric vehicles** in the evening creates a peak demand when renewable electricity production is lower. As a result:

- Electric vehicles do not charge with electricity from renewable-energy sources
- Expensive grid reinforcement is required to limit peak demand.



Information and Communication

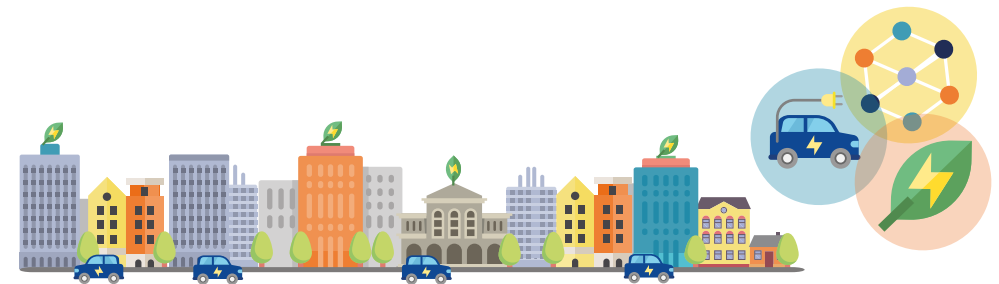
Technologies can help to structure and maximize the synergies between electric vehicles and local renewable-energy sources, thereby optimizing the electricity grid.

A smarter electricity grid for people, planet & profit

The electricity grid is used as energy buffer, on a daily and a seasonal scale. Large amounts of local energy and EVs cause grid-stress. SEEV4-City aims to provide sustainable solutions.

7 SEEV4-City Operational Pilots demonstrate:

- 1 Reduction of CO₂ emission
- 2 Increased energy autonomy
- 3 Optimized grid performance



The **SEEV4-City "State of the Art"** report is a "Living Document", meant as reference for local authorities, energy suppliers, shared mobility operators, transport planning practitioners and energy management professionals who want to deploy smart electric mobility solutions and optimize electricity networks. Contact us to access more detailed information.

Three levels of detail are distinguished:

- For **specialists**, the reference document (about 200 pages)
- For **generalists** and other stakeholders the summary report (about 35 pages)
- For **managers** this brochure.

Actual trends on Electric Vehicles & Renewable Energies in the North Sea region and outstanding SEEV4City cities, regions & countries achievements:



United Kingdom cities are to become the Ultra-Low Emission Vehicle capitals

Various cities realize their Ultra Low Emission Vehicle (ULEV) plan to maximize renewable uptake and clean city mobility of EVs by 2020. Plug-in cars grow from 3,500 (2013) to almost 95,000 March 2017.



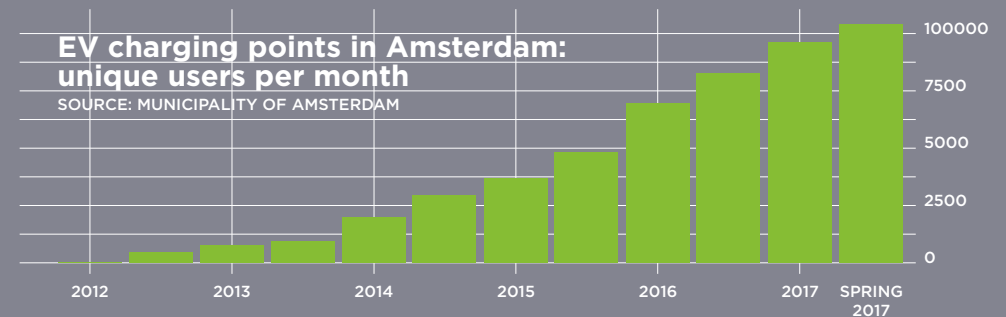
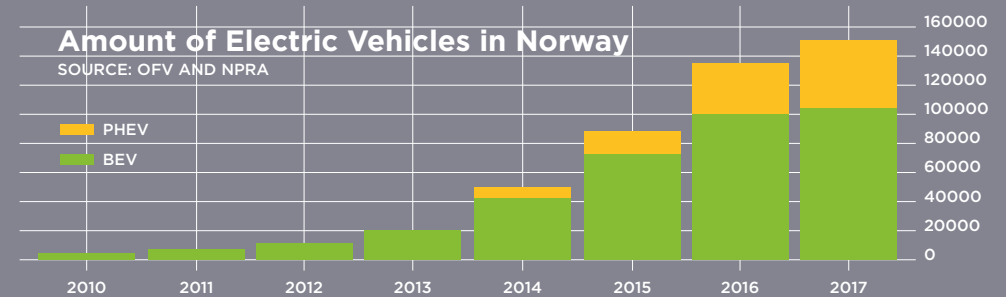
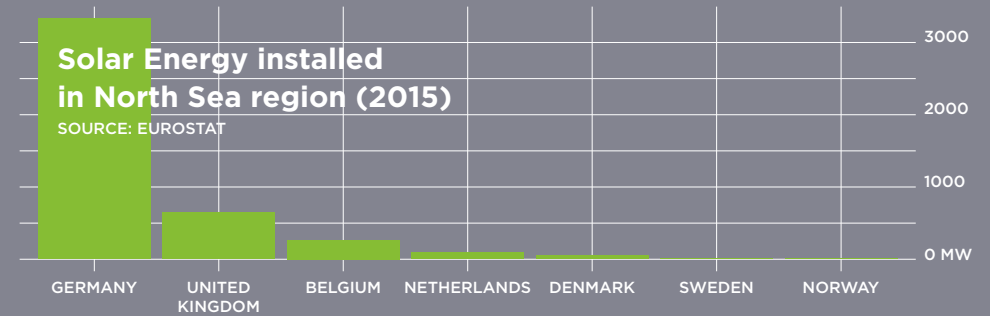
Germany leads the way in solar energy

Thanks to incentives to photovoltaic production, Germany has multiplied its installed solar panels by a factor ten in less than a decade.



Amsterdam expands EV charging network

The city's investment program has resulted in a strong increase of the EV charging infrastructure for both the city as on metropolitan-regional scale. In 2016, Amsterdam won the AVERE E-Visionary Award for best charging infrastructure development.



Electric Vehicles and renewable energies are increasing rapidly in Europe.

These developments can threaten the stability of the grid. To alleviate this stress, now, more cost effective business models are being developed. This is cheaper than reinforcing the grid.

The legacy of SEEV4-City:

- New business models
- Innovative 'Vehicle4Energy services'
- Intelligence for a new energy and mobility regime in the planning
- Built upon information, retrieved from 'Big Data'

Multiple Business models

New business models for EV charging will offer services to different partners in the energy trading system focusing on shifting the demand for electric vehicles charging.

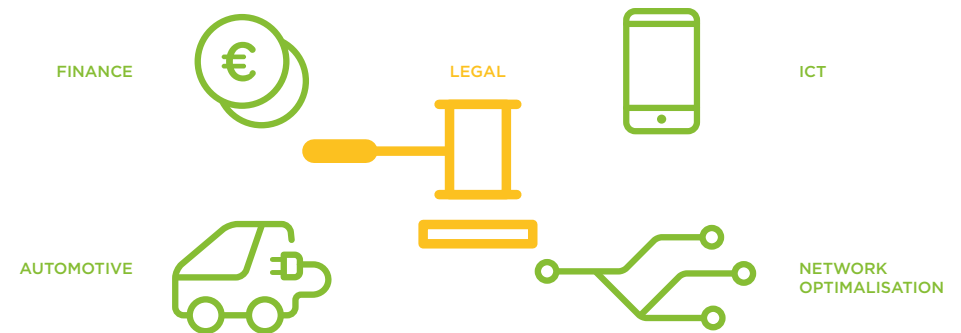
'Vehicle4Energy services'

Optimizing the intersections between mobility needs and local energy availability optimizes zero-emission city transport. During the project different 'Vehicle4Energy services' are modelled and experimented.

Integrated Energy and Mobility Planning

Local authorities developing Sustainable Urban Mobility Plans (SUMP) are integrating electro-mobility in their transport networks. SEEV4-City Operational Pilots will develop solutions for integrating local renewable energy in Sustainable Urban Mobility Energy Plans (SUMEP).

Areas of innovation



Big Data, the information challenge:

The SEEV4-City partners have a good overview of – and broad experience with – energy forecasting systems, modelling, monitoring and decision making tools.

→ Forecasting, monitoring and modelling

SEEV4-City partners have an overview and experience with energy forecasting systems, monitoring, modelling and decision making tools and are developing energy management systems applied at the Operational Pilots.

→ SEEV4-City Energy Management System

Data analysis will demonstrate the feasibility of several business schemes, and determine the features of an integrated SEEV4-City energy management system. The SEEV4-City Operational Pilots energy systems are developed transnationally and implemented locally.

SEEV4-City is piloting seven demonstration projects across the North Sea Region focusing on different aspects of the integration between electric vehicles and renewable energies:

- Vehicle 2 Household or at building scale (Loughborough and Leicester)
- Vehicle 2 Street and Neighborhood scale (Amsterdam, Oslo, Hamburg)
- Vehicle 2 Businesses (Amsterdam Arena and Kortrijk)



Integrating Energy Management System components into SEEV4-City Operational Pilots



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