SEEV4-City
Start – Results - Outlook

Robert van den Hoed
Professor Energy & Innovation, Amsterdam University of Applied Sciences

Hugo Niesing
Director, Resourcefully, Amsterdam
Origin of the SEEV4-City project
THE SOLAR & ELECTRICAL MOBILITY REVOLUTION CONFERENCE
AMSTERDAM 30 & 31 MARCH 2015
1st Roadmap for smart city development enhanced by Electric Vehicles and Solar energy, towards 2020 – 2025

- **1st operational Vehicle** in EU
  - Tests GRID Varying costs hourly
  - 1st ICT steered urban energy neighbourhood

- **Energy Car 2 society more present**
  - Flexible EV charging & RES EU directive
  - EV + PV Cost & benefits reach parity

- **Battery prices 50% compared 2013**
  - EV transport and clean energy taxes merged
  - PV & EV industries integrate

- **Smart ICT steered energy cheapest option**
  - GRID Energy source & use distance
  - GRID and Electricity Varying costs hourly

- **All EV includes PV**
  - Smart ICT booming industry
  - European Demonstration 'Lighthouse' projects from pilots operational in 100 European cities.

- **Large scale roll-out for integrated V2X in other European cities, ESCO - services.**
  - No more funding required

**Phase:** 1st Pilots V2G - ICT cost effective - Energy & Transport Company alliances - Lighthouse Demo- large scale realisation

- **2015**
- **2016**
- **2017**
- **2018**
- **2019**
- **2020**
- **2025**
Origin of the SEEV4-City project: principal idea

**Without SC or V2G**
- Morning peak
- Evening peak
- Extra demand of EVs

**With SC or V2G**
- Flattened curve of demand
- Charge on daytime
- Energy release on evening
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
Solar installation growth 2015 -2020

Netherlands in total

Amsterdam Neighbourhood

Installed Capacity

* Voorlopige cijfers.
Amsterdam climate objectives and Roadmap

250 MW sun PV in 2022!

Oostelijk Havengebied = 7 MW sun PV in 2022
Solar installation growth 2015 - 2020

Potential in the Neighbourhood
Solar installation growth 2015 -2020

Present in the Neighbourhood mid 2019
Solar development in city

• In 2015 1 % of potential used - now 7 % of the potential

• Slow process, now fast acceleration last year increase 60% of total installed

• This trend continues:

  2020-2025 : Energy and EV integration,
  SEEV4-City provides necessary examples, knowledge & lessons
Electric Mobility towards the Tipping Point
From 1.2mln EVs (2015) to 6+mln (2020)

Electric Car Global Stock, Top 5 Countries and Rest of World, 2014-2018

Million cars

Rest of World
United Kingdom
Japan
Norway
United States
China

5.1 million electric cars and 260 million electric two-wheelers were on the road in 2018.

Source: OECD/IEA.
Electric becoming main stream in leading countries
60% share in Norway & Model3 best sold car in NL (2019)
Major driver for EVs
Battery prices decreasing 80% in 10 years
Electric Vehicles
iPad & Battery on wheels

https://steinbuch.wordpress.com/2015/09/05/i-pad-op-wielen/
3 Vehicle2grid

![Diagram of Vehicle2grid concept]

- Earn money from the energy supplier
- 2 days of household electricity
V2G is in development

THE COSTS of V2G hardware still expensive, related costs for instalment adds to costs trend shows cost decline

TECHNOLOGY IN DEVELOPMENT Limited availability & long procurement times

CAR COMPATIBILITY Not all EVs support bi-directional charging

V2G INITIATIVES & PROJECTS 10 in 2015 to over 50 in 2019

DATA SYSTEMS & COMMUNICATION to be aligned, multiple assets are involved in the city energy system

V2G SYSTEM COMPATIBILITY Different hardware solutions, multiple interfaces

GRID IMPACT Given the peaking rise in both solar energy and massive EV-charging this will be the challenge
SEEV4City Quick overview

- Smart clean Energy and Electric Vehicles 4 the City
  - EU-Interreg NSR
  - Priority 4: Promoting green transport and mobility
  - Duration: Sep 2016 – October 2019
  - Budget: € 5 Million
  - Consortium: 10 partners, 6 pilots
  - Coordinated by Amsterdam University of Applied Sciences
Project objectives

Objective SEEV4-City:

• Demonstrate the **technical** and **business feasibility** of Renewable Energy Systems based on (i) renewables, (ii) (battery) electric vehicles and (iii) V2G / smart charging functionality.

• Through (i) a multitude of operational pilots (demonstration) and (ii) applied research.

Key performance indicators:

1. CO₂-emissions
2. Energy autonomy
3. (Avoided) Grid investments
Six Operational Pilots

All SEEV4-City operational pilots are aimed at optimizing the combination of electro mobility and renewable energies!

The pilots vary from:

- A single household with solar energy, storage and an electric vehicle.
- Buildings with multiple electric vehicles and larger renewables.
- A large ‘power-parking’ or a soccer stadium acting as ‘energy hub’.
- Large scale smart charging in public charging solutions in the city.
Thank you for your attention!