



An European urban transition project towards more sustainable cities through innovative solutions, in the fields of mobility, energy and digital.

Smart City

Global project

Coordination: Cartif
European grant: 18 M€
30 partners, 6 countries
Period: Dec.2016 – Sept 2022
Demonstrators: Nantes, Hamburg, Helsinki

@mySMARTLife_EU
<https://mysmartlife.eu/>

Hamburg demonstrator site

Coordination: Borough of Hamburg-Bergedorf
European grant: 5,25 M€
14 partners

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Energy

Involved Partners:

University of Applied Science
Hamburg
Verkehrsbetriebe Hamburg Holstein
GmbH

ACTION OVERVIEW

A Concept for Green Integrated Energy for E-Buses

This action has been supervised by the University of Applied Science Hamburg (HAW) in collaboration with Verkehrsbetriebe Hamburg-Holstein GmbH (VHH). A full report (D 3.8), written in English in November 2019, is available at <https://mysmartlife.eu/publications-media/public-deliverables/>.

► OBJECTIVES

- › Creating a concept for charging the VHH e-buses with wind power from the Curlack wind farm
- › Direct use of locally produced wind power
- › Checking the legal and technical feasibility of the concept

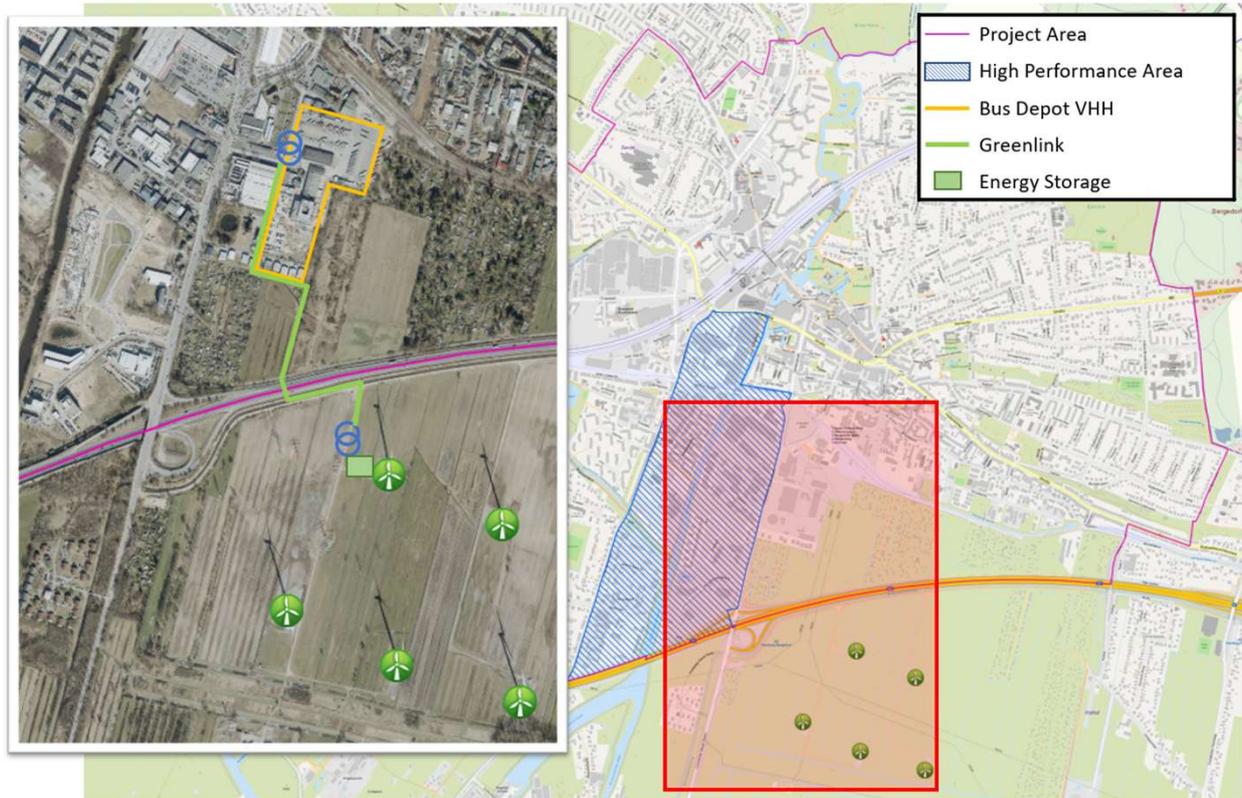
► IMPLEMENTATION

CHALLENGE

The energy transition leads to increased use of CO₂-neutral, renewable energies (RE) such as wind energy. In some cases, more electricity from renewable energies is offered than the grid load requires. In such situations, wind turbines and PV plants are shut down. For a stable power supply provided by fluctuating RE generation, power grid expansion and smart grids are needed. One option is to regulate the system at the grid connection point. Electricity could be delivered to a consumer or storage via a direct line.

The transport sector should become more sustainable, and alternative drives such as electric motors in combination with renewable energy are a sustainable solution. Operators of electric charging stations must prove the origin of the electricity. They can conclude a certified green electricity supply contract in accordance with § 79 EEG.

A direct link between the local wind farm and the VHH bus depot (Greenlink) would make it possible to load the new e-busses with green energy.



PROGRESS AND LESSONS LEARNT

In order to check the feasibility of the developed concept, a legal and technical examination was carried out.

- › From a legal point of view, the implementation of the two business models with a Greenlink is only possible after additional checks. For the self-supply model, the question of the direct spatial connection and the possible saving of certain electricity cost components would have to be examined. The direct supply model can only be comprehensively assessed after examining the existing electricity supply contracts and direct supply conditions.
- › The current conditions would in principle allow a connection between the VHH depot and the wind farm. However, there would be a heavy load on the operating resources due to increased switching occurrences and this would jeopardise VHH's security of supply. Therefore, from a safety point of view, the construction of the Greenlink cannot take place as things stand at present.
- › The economic analysis shows that savings can only be achieved with the self-supply model according to the current development of electricity prices. With the legally probable direct supply model, savings would only result if the electricity price would rise. An amortisation of the investment costs related to the Greenlink would only occur within 10 years with electricity costs above 10.9-11 ct/kWh. This could change in the following years if electricity prices and wind power production fluctuate.

For these reasons, it is not possible to implement the Greenlink between the bus depot and the wind farms.

In this case, a physical path already exists between the two locations through the existing electricity grid. It can be assumed that the charging infrastructure is supplied with wind power. Since the wind power is routed through the public electricity grid, it is not possible to be 100% certain what proportion of the wind power will arrive at VHH. Although VHH does not obtain its electricity through Greenlink, it has signed a green electricity contract. So, the depot is generally supplied with green electricity.