Allensbach: Blueprint for „Energiewende“

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Project Name	Allensbach: Blueprint for „Energiewende“
Sector Application	Residential community

Short Description of the project

Location

Allensbach, a municipality on Lake Constance with just over 7000 inhabitants, in the south of Germany.

Purpose

Maximize the energy efficiency and initiate the energy transformation process (100% renewable energy) in Allensbach.
In this model community we show future energy scenarios, development paths and pricing within a future simplified regulation.

The future of highly volatile renewable energy systems relies on flexible consumer behavior, cost-effective storage and high levels of decentralization to limit grid expansion and electricity cost.
Sector coupling of electricity, heat and cooling will play a major role here – where heat pumps become extremely important.
Easy Smart Grid has developed an approach to control and coordinate all electrical devices (including the heat pumps) decentrally, activating even the smallest flexibilities through the minimization of transaction costs, achieving a more cost-effective energy transition.
Devices react to renewable energy availability and allow a higher integration of these energy sources.

Environmental relevance

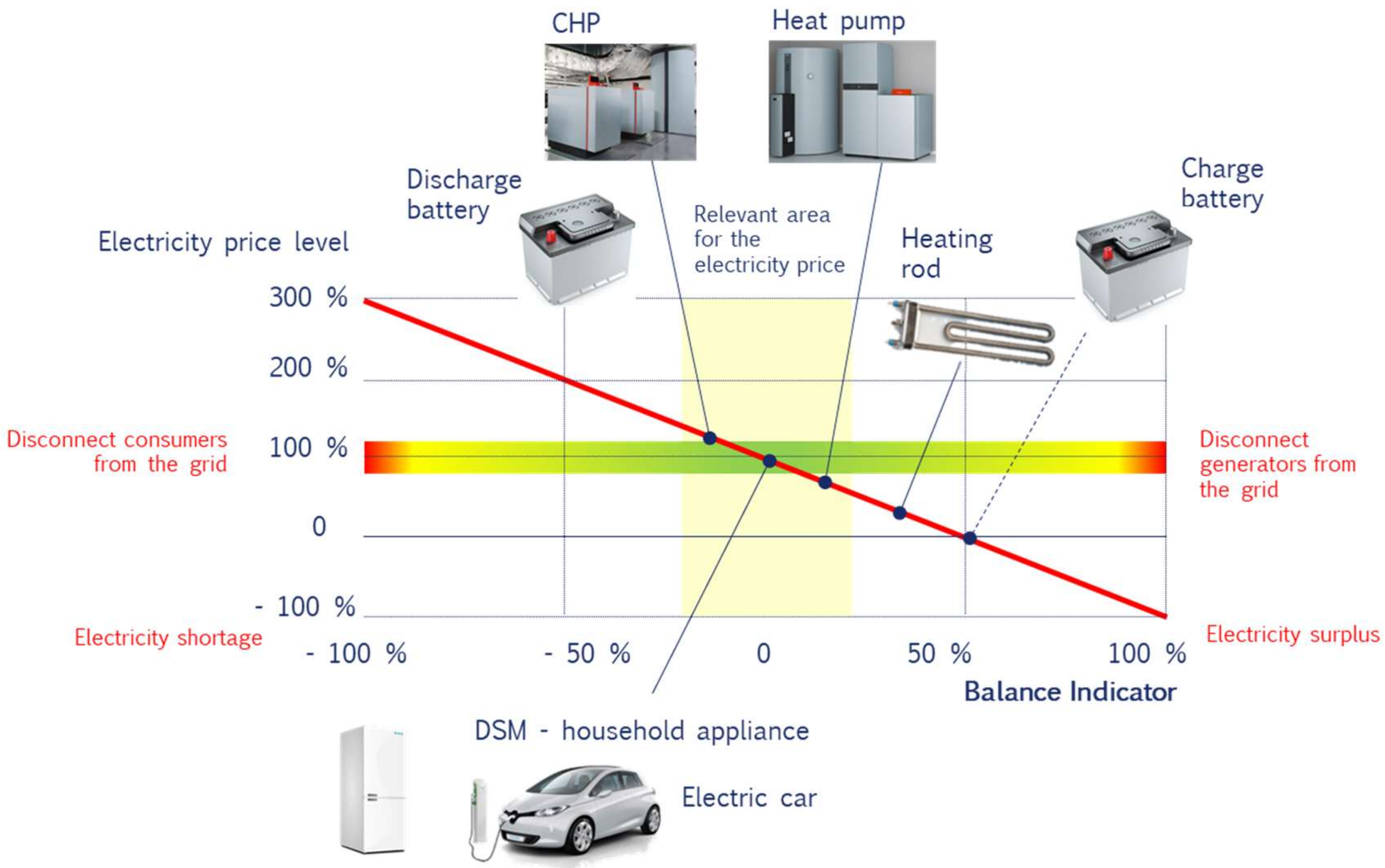
Significant increase in the amount of renewable energy and corresponding CO_2 emissions reduction

Funded by

BWPLUS Programme, Ministry of Environment, Climate and Energy of Baden-Württemberg (Germany)

Technology details

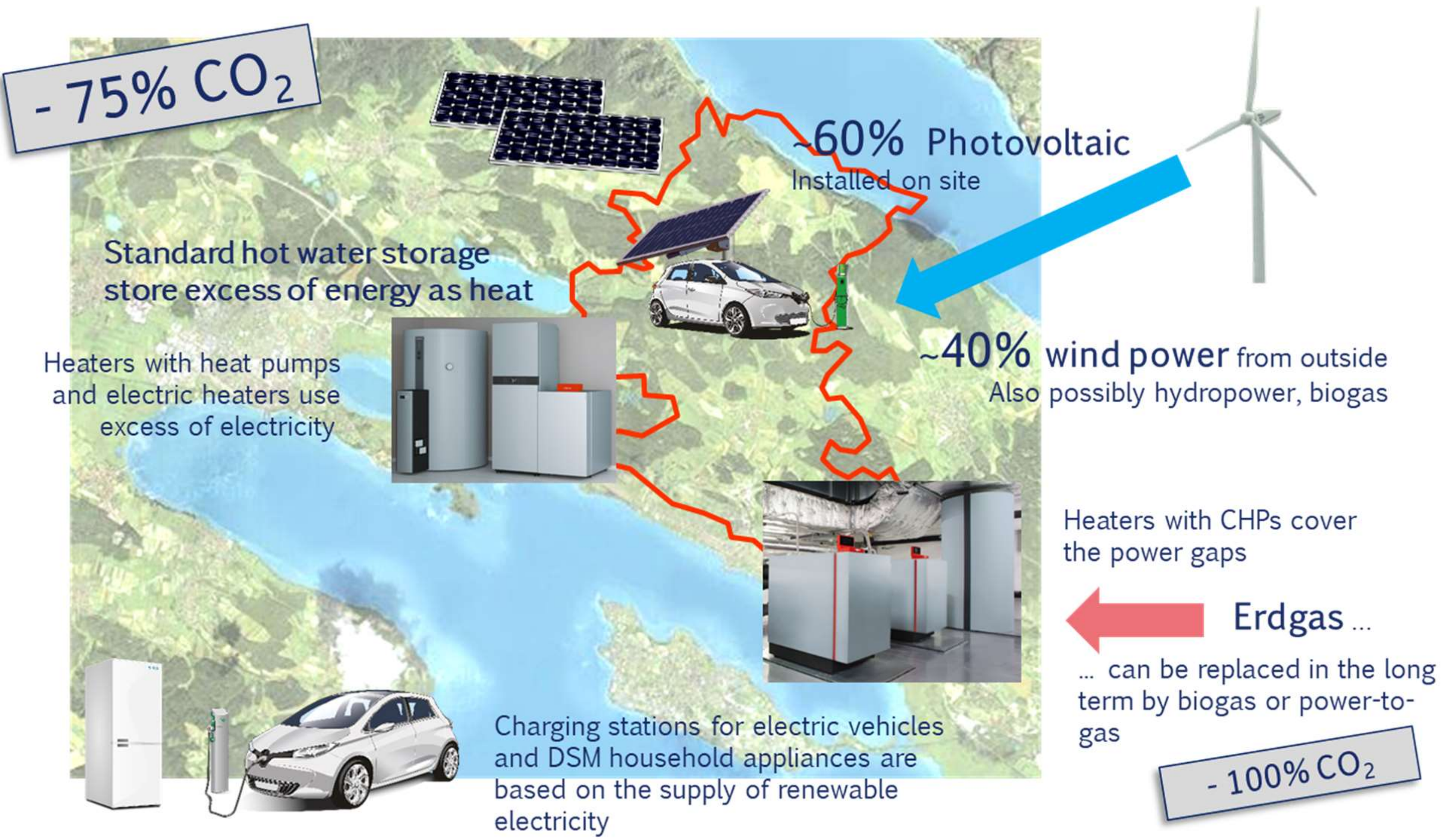
Balance Indicator
Price signals for producers and consumers



Easy Smart Grid technology allows to integrate and reward flexible energy consumption/generation into the electric grid ensuring system stability and data security. Individual flexible resources receive direct incentives to change their consumption patterns, by a balance indicator derived from physical network variables such as frequency or the terminal voltage. The system reacts immediately to information on variations in the grid.

The decentralized control intelligence is distributed to each individual device. To manage this system decentrally, the use of a market mechanism is necessary: the balance indicator is interpreted by the controllers as a "price signal". This signal informs all actuators on the actual price level, and each device reacts according to its particular situation. When the sun shines and the wind blows, higher electricity supply causes a lower price level, loads turn on and compensate this effect.

Technical Details - Results



As a result of the heating/cooling and electricity sector coupling, around 80% of the solar and wind energy can be coupled into the local power grid. With a mix of 60% locally generated PV and 40% external wind power, the power grid needs only little expansion.

Electricity gaps are covered by micro CHP. Surpluses are consumed by heat pumps. In winter, these systems are coupled via the electricity grid as virtual gas heat pumps. The cogeneration plants are operated in a transitional phase with natural gas, which can be replaced later by regenerative gas. The gas consumption can be minimized by using micro load management to such an extent that even in the natural gas scenario, with the inclusion of electromobility, 75% CO_2 can be reduced.

Multiplication potential

hpcy heat pump city of the year

How the heat pump plays a major role in this project?

The heating sector can be used perfectly to store energy, compensating deviations of renewable power generation from electricity demand. Heat pumps use electricity surpluses if the demand cannot be covered by sun or wind. The heat or cold generated in each case can be stored cost-effectively in appropriately dimensioned buffer tanks according to demand. Compared to other technologies, such as batteries or power-to-gas, storage costs are very low and availability is virtually everywhere. 40%-50%

Why is it a best practice example?

This project demonstrates how energy transition, using the existing technologies and available equipment, is possible today. Costs are distributed among all actors, optimizing the use of the existing grid without major network construction.

What would it need to be replicated?

- Energy price is one of the most important factors to make available existing flexibilities in the electricity market. Regulations should have a new role allowing practices to support dynamic energy prices. This project proposes the necessary changes to regulations.

- Electrical devices must have the controllers with the integrated Easy Smart Grid technology. We invite companies interested in our technology to contact us.

Easy Smart Grid GmbH

ehpa european heat pump association