

Waste Challenge Title

Sustainable Self-Sufficient Communities based on Renewable Energy

Introduction

Global heating is one of the most urgent challenges we currently face as a society. Greenhouse gases such as CO₂ and Methane are the main drivers of climate change. Over 73 % of the world's global greenhouse gas emissions stem from the energy sector. Within this, transportation and buildings are responsible for over 32 %. The creation of more sustainable communities based on renewable energy provide an enormous opportunity to tackle global greenhouse gas emissions and therefore the phenomenon of global heating.

Problem Definition:

In contrast to nuclear or coal-fired power plants, the energy generated by renewable energies such as wind power or photovoltaics (solar) is not constant over time. Photovoltaic systems, for example, can only generate electricity during daylight hours. This can not only put the stability of the power grid at risk, but also means that these renewable energy technologies require additional infrastructure to provide a reliable power supply throughout the day. Some technical solutions already exist to counteract this phenomenon. Vertical photovoltaic systems, for example, can make electricity generation much more homogeneous throughout the day and even throughout the year compared to conventional photovoltaic systems. As solar panels produce the greatest amount of electricity when the sun is directly perpendicular to the panel, vertically installed panels are particularly effective in the mornings, evenings and in winter. Conventionally installed panels have a significantly stronger peak production in summer and in the middle of the day. Energy storage systems can also be used to temporarily store excess production.

What is the waste challenge?

Your challenge is to develop a concept for a smart community featuring energy self-sufficiency and suitable storage and distribution systems for renewable electricity.

- ➔ *How can innovative renewable energy concepts, such as solar facades be leveraged as enablers of self-sufficient sustainable communities?*
- ➔ *What could a smart network within a self-sufficient community look like? How can we enable a stable storage and distribution solution for electric energy?*
- ➔ *What regulatory and societal challenges could one face during the realization of smart self-sustainable cities?*

Who is behind this challenge?

ENVELON offers an innovative system for solar active façades under the umbrella of the multinational Grenzebach Group. Since its founding, a team of experienced experts from various fields of automation as well as the glass and solar industries have been working together on a common vision: to provide Germany, Europe, and the world with technology that will make it possible to generate sustainable energy directly on buildings over the long term. In this context, we blend tradition and innovation to deliver products and services of the highest quality and performance – we deliberately produce our façade panels in Hamlar, in the Donau-Ries region of Bavaria. As a family business with strong

convictions, we are therefore bringing the solar industry back to Germany and offering a flexible system “Made in Germany” – combined with an experienced and highly skilled network of international partners.

Topic domain of challenge: Cities, Energy or Consumption

1. *Energy*
2. *Cities*

Desired Impact of Challenge:

The aim of the challenge is to generate innovative concepts for smart self-sufficient cities which can be used as inspiration for various projects in the field of renewable energies and urban planning.

Skills needed/recommended

Any background from engineering to sociology is suitable for this project. We are looking for a diverse team with both technical and non-technical backgrounds

Relevant considerations for the challenge / theme:

The challenge should focus on available renewable technologies, in particular photovoltaic energy.

Relevant links:

[ENVELON | Solar-active façades from Germany](#)

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Background on the Energy supply and demand: <https://energy-charts.info/>

Background for building integrated PV (German only): [Allianz-BIPV-Info-Broschüre-final.pdf](#)