

Waste Challenge Title

Innovative Solar Energy Concepts for a Stable Electricity Grid

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. Feed-in tariffs motivate operators of photovoltaic systems to produce as much electricity as possible, regardless of the grid load. Large photovoltaic power plants are therefore typically built to face southwards in order to optimize the total energy yield throughout the day. Especially in summer, this leads to an overproduction around noon and a very low share of solar electricity in the morning and evening as well as in winter.

Solar façades differ from such photovoltaic power plants, as the solar panels are arranged vertically, maximizing their output during times when the sun is low on the horizon. This occurs in winter as well as mornings and evenings. While the overall power output is thus lower compared to a conventional photovoltaic power plant, the energy is produced more evenly throughout the day and year. This reduces the stress on the electricity grid and facilitates the direct use of energy within a building. However, current incentives for renewable energies such as feed-in tariffs do not promote this highly sustainable way of photovoltaic energy production.

What is the waste challenge?

Your challenge is to develop a policy paper to promote photovoltaic power plants and solar façades optimized for homogeneous energy production and a more stable grid.

- ➔ *What incentives could be used to promote solar façades?*
- ➔ *How do typical load profiles in a building/city/country compare to the output of a conventional photovoltaic power plant and a vertical photovoltaic system, such as a façade?*
- ➔ *What would be the ideal mix of conventional photovoltaic power plants and vertical photovoltaic systems, such as façades?*

Who is behind this challenge?

ENVELON offers an innovative system for solar active façades under the umbrella of the multinational Grenzbach 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 a policy paper and provide guidance on the use of vertical photovoltaics for more sustainable renewable energy.

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 create a strong summary of the current situation, provide recommendations for a better future utilization of solar facades, and finally propose a policy paper to promote vertical and other photovoltaic systems optimized for a stable grid and energy supply.

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](#)