

POWERTY

Renewable energies for vulnerable groups

STUDY VISIT N° 5

Wind panel, microhouses 100% RES and
Rehabilitation and Recreation Complex with PV solar
Opolskie Voivodeship (Poland) – 18 of June 2021



1. INTRODUCTION

The [3rd Interregional Thematic Seminar](#) of the POWERTY project was held online, therefore the study visit was in the form of a [video](#). The premiere took place during the 2nd day of the seminar 18th of June 2021. Study visit is a part of each seminar that each partner organizes in turn.

The objective of the study visit was to show innovative technological solutions (including for example, Microhouse and wind panel), say a few words about the best practices identified so far and show one of the most modern facilities using renewable energy sources in our region (Kamień Śląski).

2. DESCRIPTION AND LOCATION

The study visit shows the most modern facility that uses renewable energy on a massive scale and places and people who are responsible for creating good practices identified in the POWERTY project such as wind panel and modular houses.

Wind panel is the winning project of the [Warm up your business](#) competition, organized by our stakeholder - Science and Technology Park in Opole. This project is located in Science and Technology Park in Opole- ul. Technologiczna 2, 45-839 Opole. When the wind panel is available for sale on the market, its price will be comparable to that of photovoltaic panels. The wind panel is a device that produces electricity. It will be a great way to get electricity in household on cloudy days. The wind panels will be part of the house fencing and their work does not generate any noise.





Photos : <https://pnt.opole.pl/index.php/pl/>

Modular Houses or Microhouses it is also one of the best practice identified by AOT but importantly, invented by one of its employees, professor at the University of Applied Sciences in Nysa and architect Mr. Bugusław Szuba. It had been implemented (thanks to the involvement of Polish teams for the POWERTY project) by one of the AOT members, the Municipality of Gogolin. The main goal of the creation of microhouses is to provide people (including the energy poor) with housing that will fully use renewable energy. The one to be built in Kamionek will be home to older people who are independent. Thanks to the fact that the buildings will be in the immediate vicinity of the nursing home, residents will also have access to medical care and canteens. These flats will be cheap to maintain, therefore their residents will be able to afford them. In Poland, the maintenance of social buildings and nursing homes consume huge costs in municipal budgets. The applied solution will relieve the budgets of communes from the fixed costs of living. This project is located in the retirement home « St. Barbara » in Kamionek, UL. POLNA 24, 47-325 KAMIEŃ ŚLĄSKI.



Scientific and Research Institute - Father Sebastian Kneipp, Rehabilitation and Recreation Complex Sebastianum Silesiacum located in Kamień Śląski, Ul. Parkowa 1B, 47-325 Kamień Śląski. It is a modern rehabilitation and leisure facility. The specificity of the Center is based on the use of the healing properties of Oligocene waters for hydrotherapy according to the methods of Father Sebastian Kneipp from Bavaria.



3. TECHNICAL DATA

Wind panel (PW) consist on:



- A highly scalable system of wind turbines.
- The missing link between the common type of RES installations (photovoltaics) and technological constraints in the transmission and storage of energy from renewable sources through energy networks.
- Design assumptions that meet many market needs.
- A business model focused on user experience at the highest level.
- A fence-like structure in which the rails are turbine-generator sets, thanks to which the system has a huge work surface.
- Energy production in almost any wind direction.
- Turbine sets designed to efficiently generate electricity from low wind speeds (from 1 to 6 m/s), which are most common throughout Europe.
- A system that produces energy for at least 75% of the time a year, even 24 hours a day, thanks to which it has a higher auto energy consumption rate than photovoltaic (a small amount of energy "stored" in the network).
- 150 W of installed power in one running meter of the installation.
- Off-grid surplus energy storage system in the chemical warehouse inside each turbine - also in hybrid mode with photovoltaics (storage of daily overproduction), which significantly increases the level of auto consumption of PV + PW installations.
- A system in which the weaknesses of photovoltaics are its strengths, making it an ideal companion product for PV.

- A product designed for cooperation with commonly available inverters on the market, making it easy to extend the existing PV installation with a wind panel.
- Highly scalable structure, consisting of easy-to-connect modules. This allows the installation to be built in a short time and with low labor input.
- The installation and service process partially automated with the use of drones.
- The installation easily blends in with any surroundings, both urban and non-urbanized.
- The product is safe for humans, animals and birds.
- A product that works silently (no louder than wind noise).
- Turbines without flashing effect (working turbines look like a stationary object) - a system resistant to unfavorable weather conditions and a vengeful neighbor.
- Quick return on investment, approx. 4 years. Return of investment (ROI) compared to photovoltaics: 2 times higher.
- Product life up to 50 years.
- Product price comparable to PV (similar cost of "installed power") thanks to innovative methods of component production and the use of cheap raw materials.
- A product that can be installed almost anywhere: as a free-standing structure on a private plot or its fence, construction in the crown of a flat-roof building, fencing of a photovoltaic farm, industrial zone, airport, parking lot, viaduct, bridge, opencast mine, installations along the highway, expressway, railway line
- Turbines generating energy also from vortices generated by moving vehicles
- Low entry barrier and savings for the investor who, instead of building a traditional fence, can build a fence with a wind farm in one, for which a banking institution can grant him a loan.

Modular houses or Microhouses consist on:



- **Passive use of solar energy** - the construction of walls that allows for the acquisition of heat and its transport to the heat accumulator located in the underground
- **Hybrid photovoltaic installation** (off and on grid) on the plot or integrated with the building, supplying household appliances. The 4KWp installation power with high thermal insulation values of the facility allows to obtain the standard of a zero-energy house.
- **High efficiency of keeping heat in the building space**. Heat transfer coefficient U_c (max) for external walls $U < 0.2 \text{ W / m}^2\text{K}$ for a flat roof $U < 0.15 \text{ W / m}^2\text{K}$
- **Passive solutions for heating, cooling and heat recovery Ventilation** of the module space during the summer will take place in a natural way by opening or closing external windows. In the autumn and winter period introducing fresh air into the interior of the house with simultaneous heat recovery from the used air in the ceiling channels through a stone heat accumulator.

Scientific and Research Institute - Father Sebastian Kneipp, Rehabilitation and Recreation Complex Sebastianium Silesiacum consists on:



- Modernization of the Medium Voltage / Low Voltage transformer station.
- Construction of a PV installation with 500 kWp.
- Installations of a container industrial energy storage with a capacity of 670 kWh and a charging and discharging power of 300 kW.

- Vertical wind turbine installations with a capacity of 2.8 kW Polish production.
- Measurement of energy flow.
- At the connection of the transformer station and the PV installation to control the energy storage.
- Installation of publicly available fast charging stations of Polish production for 100 kW and 22 kW electric vehicles.
- Electric bicycle charging point installations.
- 3 battery, low-speed electric vehicles of Polish production for internal transport.
- More than 5 electric bikes

4. CONCLUSIONS

The solutions presented in the video are universal, which can be transferred as good practices in other countries.

The **Wind panel** was created with the aim of creating the next generation of onshore wind turbines beyond the current wind energy generation technologies. A wind panel is a system of turbines that efficiently generates electricity from Europe's prevailing low-speed winds in almost any place - both in urban and non-urban areas - without adversely affecting human health, the landscape and the natural environment. Thanks to its **versatile application**, the product is expected to contribute to the **decentralization of the energy network**, accelerating the electrification of road transport **and reducing smog** in cities.

Modular Houses/Microhouse is the name of the method to combat energy poverty that we want to **expand among the municipalities of our association**. The idea is that the owner of a large house gets a proposal to exchange it for a passive house - Microhouse (a house consisting of functional modules) offered by a developer, organization, local government or other entity acting for the benefit of sensitive people. This solution has already interested one of the municipalities, the **Gogolin Municipality**, which wants to locate **buildings near the nursing home** so that seniors who are still independent can live in comfortable conditions and additionally can use the services of the Nursing Home depending on their needs. These houses are widely used depending on the investor's needs.

Scientific and Research Institute- Science and Technology Park in Opole creates a possibility of searching and implementing new and technological solutions. It also creates favorable conditions for the economic and scientific development of the Opole region by supporting existing as well as emerging initiatives. The sole shareholder of the company is the **city of Opole**. Park is a **cooperative** place of cooperation of scientific and business activity. The aim is to act on the development of the Opole region by providing favorable conditions for business development with a special focus on high technologies, developing

the knowledge-based economy, creating effective links between science and technology, promoting innovative entrepreneurship in an open environment of partnership between science, business and local authorities.

5. ANNEX

The video about study visit is published on youtube:

- English version with English subtitles: https://youtu.be/QWWPN41W_Uw
- Polish version with English subtitles: <https://youtu.be/bvtTlgaQJz0>