Energy independence at settlement level

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TELEPÜLÉSFEJLESZTÉSI SZÖVETSÉG

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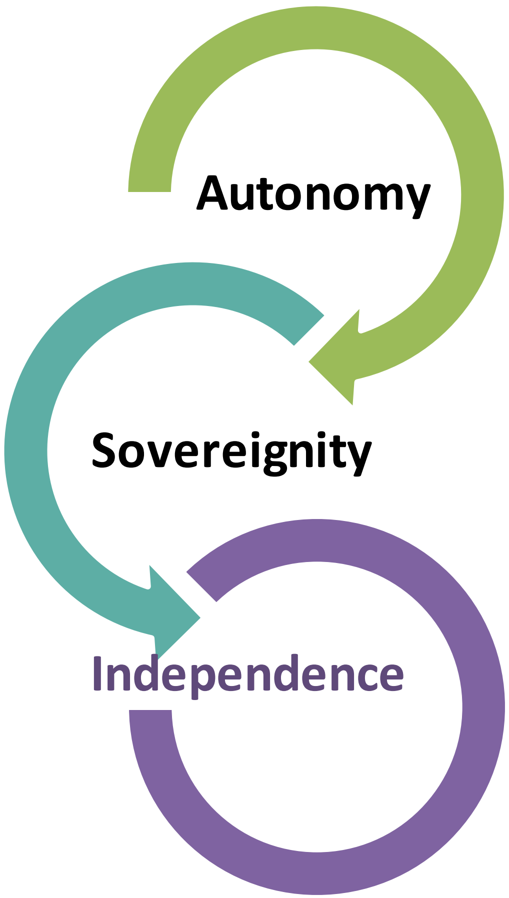
Autonomy - sovereignity - independence



opportunity for self-determination

ability for self-determination

result → **resilience**

Energy independece

How energy independence helps settlement resilience?

Threat	Direct effect / risk:	resilience ability:	Indirect effect / risk:	resilience ability:
War	Attack and damage to national / regional energy infrastructure elements	Independent, **off-grid** energy infrastructure elements: **physical independence**	Increase in the price of energy carriers (oil, gas, electricity)	Municipal energy production capacity: **physical independence**
Climate change	Less predictable energy consumption		Higher volatility in the price of energy carriers (oil, gas, electricity)	Predictable, low-cost energy contracts: **economic independence**

Energy related consequences of the war in Ukraine

- As a result of the war conflict taking place next door, the previous energy supply chains were interrupted, and the **energy costs**, which were previously equalized and predictable, **multiplied**, not only in Hungary, but in the whole of Europe.
- Country **governments compensated household consumers** in different ways and to a different extent, more specifically the groups of residential consumers **who were most affected by the increased utility costs**
- **Municipalities and cities only did receive** partial **compensation**, so most municipalities had to reduce their services to mitigate their losses. E.g. **temporary closing of** city institutions (**museums, libraries, sports facilities**) for the winter months.

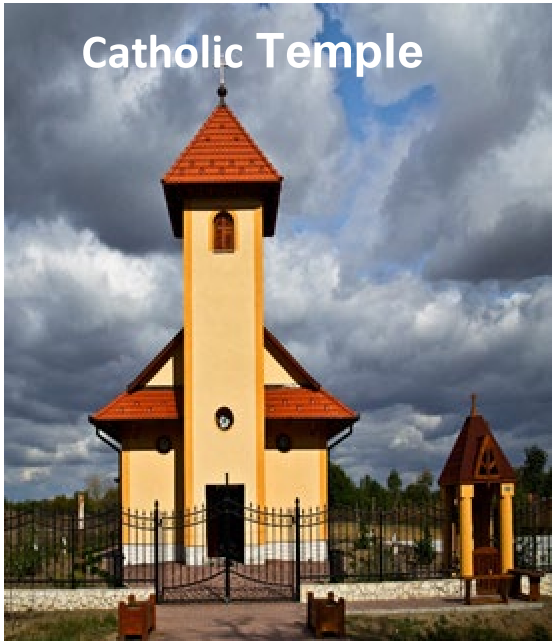
The Újszilvás model of **settlement level energy sovereignty**

Újszilvás village - a pioneer of energy independence

Újszilvás is located in the Pest county region

Újszilvás was founded in 1950.

It got its name from its abundant plum trees.

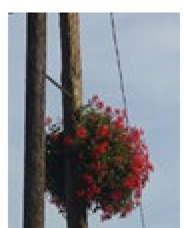


Population of the village approximately 2,800 people, 460 of them are of out-of-town residents

Welcome to Újszilvás!


ISTEN HOZTA ÚJSZILVÁSON!
WELCOME TO ÚJSZILVÁS!



Újszilvás: *the „eco-village" (self-definition)*

- Introduction of the first **innovative waste management** in the region (3+1 fractional selective collection, every household received a compost bin)
- **Eco-conscious education** in kindergarten and school-Organic farming
- **Utilization of green energies**
- **Strategic energy independence**

Implementation of a forward-looking, multi-decade **strategy**

- **1. The country's first solar power plant**
- **2. Direct solar panels in public institutions**
- **3. Geothermal - heat pump heating**
- **4. Self-sustaining swimming pool**
- 5. Eco-centic education
- 6. Self-produced food
- **7. Intelligent street lighting powered by solar energy - in progress**
- *8. Creation of an energy community - in progress*
- *9. Reservoir water supply implemented with a windmill – future plan*

Dr. Csaba Petrányi

Since 2002, he has been mayor for 21 years, and notary for 7 years before that.

1. The Újszilvás solar power plant - 2011

1. The Újszilvás solar power plant - 2011

- The solar power plant, consisting of **1,632 panels on 68 rotating systems**, was the largest built in Hungary up to that point.
- It works with solar tracking technology, its **peak power is 400 kWp** (kilowatt peak). Its **annual electricity production exceeds 630,000 kWh.**
- Its performance is 30% higher than similar-sized, non-solar-tracking power plants.
- **Its total costs** are almost HUF 620 million (**EUR 1.63 million**), of which the amount of non-refundable support provided by the Hungarian state and the European Union is about HUF 432 million. (1.14 million EUR) The investment will reduce CO emissions by **450 tons per year**

1. The Újszilvás solar power plant - 2011

- At the time of its construction, it was capable of almost half of the performance of all solar power generating investments realized in Hungary the previous year.
- When it was built, **the power plant was able to cover the entire electricity needs of local government institutions in Újszilvás.**
- The generated electricity is sold to the grid service provider, which covers the energy costs of the municipality operated buildings (school, kindergarten, nursery, sports center, home for the elderly, library) and the minucipality can also use the income for social purposes.
- This also covers the repayment of the loan for the swimming pool built in the meantime in 10 years.

*Based on the operating experience of the past decade, **the mayor recommends the traditional, non-sun tracking system**, because the higher efficiency does not compensate for the higher maintenance requirements and failure rate of the rotating mechanisms. Nevertheless, no significant reduction in capacity has been experienced in the performance of the photovoltaic elements of the system in the last more than 13 years.*

2. Solar panels and solar collectors installed directly on municipal buidings

- They cover 60% of the institutions' electricity consumption.





3. Utilization of geothermal energy

2007 - 2010

- Today, **90 percent of the heating and hot water supply** of municipality institutions is provided with the help of the thermal well.
- The thermal well brings up **thermal water of 33° Celsius** from a depth of 440 meters. Its maximum yield is 375 l/min.
- The **heating circuit** runs along the route of the mayor's office -> village hall / community center / library -> kindergarten -> primary school - > sports hall -> waterworks on an insulated line. At the end it cools down to 16 degrees.

3. Utilization of geothermal energy

2007 - 2010

- With heat pump – using about -**1/5 - 1/6 of the electrical energy** by cooling the extracted water temperature of 25-29 °C by 10-15 °C makes 40-50 °C hot water, suitable for heating on the heat exchanger.
- After cooling, chemical neutralization and disinfection, **it becomes drinking water**. They only need to pump back the amount of water that the municipal water network cannot consume, if the drinking water demand lower than the heating water demand.
- The system design was prioritized that **as little water as possible had to be pumped back**, since its energy demand, or potential operational difficulties reduce energy efficiency.

4. Self-sustaining swimming pool

2015 - 2021

- **Own drilled well for water supply and thermal water** heating of the swimming pool.
- By 2023, a total of **4 x 50 kW solar panels provide the energy supply** for the thermal well, the heat pump, heat exchangers and electrical auxiliary equipment. (With the fourth solar block in 2023, the swimming pool **could also operate in island mode, independent of the grid**.
- The swimming pool with an area of 3,000 m2 is **not only self-sufficient energetically, but also economically**, thanks to the low operating costs, since it is able to cover the personnel costs of the operation with the income generated by guests from the surrounding settlements.

4. Self-sustaining swimming pool

2015 - 2021

- The swimming pool is **accredited by the Hungarian Water Polo Association** and is also suitable for water polo matches, which is an additional source of income.

- They had to have a 5-year budget surplus to get started financing their own part. In addition, the municipality took out a loan of 160 million forints, and then practically the government added another 100 million, plus an agreement with the Hungarian Water Polo Association also added about 600 million forints.

- The development total costs were one billion HUF plus VAT, which is currently worth 3-4 billion HUF **(about 10 million EUR)** two years after the completion of the project.

5. Eco-centric education

- Both the kindergarten and the school in Újszilvás **have eco-certification.**
- Children begin to **learn about** the application of nature-based solutions in practice from an early age, and in kindergarten they learn what a **solar cell is and what geothermal energy** is,
- and then they specialize in this further, to even more detailed knowledge in elementary school, where, for example, **they have their own little gardeny** which they take care of.

6. Self-produced food and fruit juice

- The **450-serving municipal kitchen** is supplied with **self-produced greenhouse food, locally** produced agricultural raw materials, by their own workers.
- 100% **fruit juice processing plant**, which is supplied with raw material from its own 6-7 hectare orchard with intensive irrigation technology.
- they produce sweet peppers, potatoes, and onions as **traditional raw materials for the** kitchen, and they provide healthy raw materials for healthy meals for the population, **children, and also for the elderly**, as there are two homes for the elderly in the settlement.

7. Intelligent street lighting powered by solar energy

- 26 electric candelabra. From 2023, one of the streets will be equipped with **intelligent LED public lighting,** where the poles can always measure and react to the given light conditions with independent sensors. (For example, if it's a moonlit night, it doesn't illuminate the street as much, using less energy.) They would like to extend this to the entire settlement

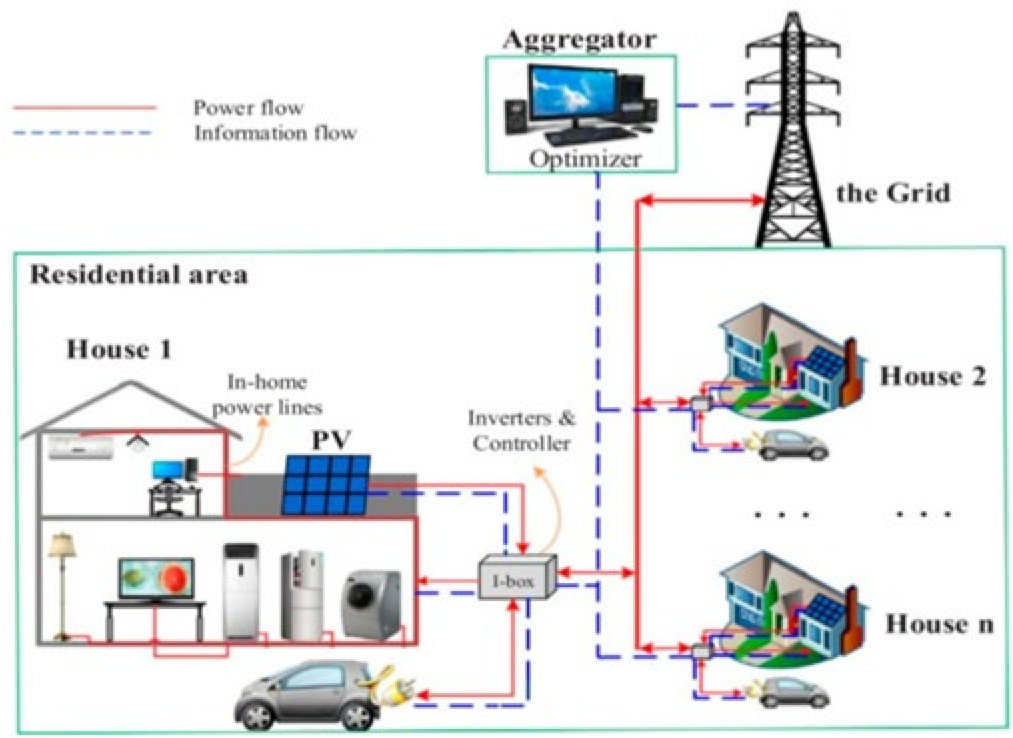
Future plans:

- **Solar powered parking lots for electric vehicle charging**
- Establishment **of combined production and storage capacities**, where the solar panel group can also generate electricity for batteries for institutions. This energy could be used to illuminate buildings during the day, and in the evening, for example, to illuminate a parking lot or public areas.
- In addition, they want to install **smart benches** around the sports center and cultural center, where young people like to hang around more often.

8. In progress: Energy Community

- The energy community, with the participation of the municipality, **creates a virtual network of municipality power plants and power consumers**, **energy trader, and grid provider** in which the municipality can cover its own consumption and its **production/storage capacity.**

- This way, it is possible **to use and store own energy produced locally**, and the excess production can be passed on to the electricity supplier itself, so that the latter pays the producer for it



Energy community - advantages

- The energy produced is produced and utilized locally
- The existence of the community spares the already overloaded network
- Improved efficiency protects the environment
- Network development costs due to hectic production can be minimized
- In addition to their own use, members can carry out private trade, which allows locals to charge their electric cars or even electric buses for local transport
- They can also use electric vehicles for regulatory purposes on the community's virtual network, as mobile energy storage
- **Creates system balance**

Thank You for your attention!

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