



## SUSTAINABLE ENERGY MANAGEMENT IN SZENTES

In a broad mean, sustainable development includes sustainable economic, ecological, social development and their harmony. A key element of sustainable development is energy management which can provide the necessary power to the use of local resources in long run and without burdening the environment.

Szentés is located in the south-eastern part of the Great Plain on the riverside of Tisza, Körös and Kurca. Szentés is the third largest settlement in Csongrád County according to its population of 29,000. It is also the sixth most significant among Hungarian towns with the outskirt as big as 353km<sup>2</sup>.

### Early industrial developments

The town's first public artesian well - third in the country – was opened in 1886 in the main square of Szentés. The depth of the well was 314m which ensured water supply in the amount of 354,240 liters per day and at 22.7°C through a decorative three-level fountain made by the French Duranne company. Besides being consumed for drinking, in 1896 water from the well was used for filling a nearby swimming pool located in the town's park. By 1928 more than 80 deep wells were in use in the town's catchment area for various applications. According to the reports, advantages of surface gases were taken for farm lighting such as for operating combustion engines in mills.

Industry of Szentés was established in the 18th and 19th century by a mechanical engineer Ferenc Zsoldos and his son. Their talent, entrepreneurial spirit and hard work allowed the companies (brick and tile, scythe stones, cement and stove factories, lumberyard, sawmill, mill, slaughterhouse bakery), become outstanding among the nationally listed significant industrial companies.

The family business, formed into a share company in 1918, represented the cross-section of the whole economic life in the town through its industrial and commercial sectors operating them in five sites that were powered with the company's own electricity and water supply from 1923.

The conscious use of renewable energy in the past is dated back to the 1950s. The first thermal water well was drilled in 1958 in the area of the County Hospital as deep as 1736m and was used for heating the hospital buildings as well as discharge water, the leachate was employed for heating greenhouses over the area behind the hospital. Thermal heating was proved to be more economical solution for heating in comparison to coal-fired boilers. Benefits of thermal water resulted the installation of a the thermal heating system in the town in 1978 after the oil crisis.

### Today

The most important form of thermal water usage is the agricultural and communal heating. In addition to the use of geothermal energy projects, Szentés has started the modernization of public lighting and development in the utilization of solar energy.

As part of the improvement, Szentés council has intentions to make plans of solution for generating electricity from geothermal energy. The project, in which two wells are needed to be drilled, is outlined and the appropriate technology will be selected by the analysis of efficiency and economy. In addition, the Investment Concept of Szentés embraces the aim to implement a small power plant for



producing renewable energy in the eastern zone of the Industrial Park of Szentes within the period 2014-2020.

### Exploitation of thermal water

With its 33 thermal wells in the area, Szentes is the largest field with geothermal exploratory activities in Hungary and the most dense geothermic one in all Europe. The depth of wells ranges between 1,500m and 2,500m, their soft water is rich in bicarbonate. The temperature of each well is above 60°C including 12 wells which provide water at 90-99 °C. Thermal water brought to the surface is used in several stages (cascade system) and sector. At 70-75 °C it is employed for heating the buildings of the local hospital then forwarded to fill up the pools of the public thermal bath between 40°C and 28 °C followed by underfloor heating at 15-20 °C. The 70 °C hot water provides heating the air in horticulture greenhouses, next heating the vegetation at 30-35 °C then heating soil between 15°C and 20 °C before releasing it into a cooling pond. The establishment of thermal wells in the area started in 1963 and lasted mainly until the mid 1980s, however, the 33th well was drilled in 2013. The urban thermal transmission pipe is 7 km long and shaped in a circular system to allow any locations be provided with water by any of the wells making water intake and consumption on optimal level. The system is reliable even in the case of a wreck havoc.

The agricultural utilization of thermal water in horticulture and in animal husbandry is significant. The cost of heating 1 m<sup>2</sup> greenhouse with fossil energy costs HUF 3500 per year while using thermal energy is five times cheaper, approx HUF 700 per year. In other words, HUF74.5 value gas was needed for heating to produce 1 kilogram tomato in 2010 compared with thermal water was HUF10.

Thermal water is used by a wide range from large plants to family farms. Árpád Agricultural Company benefits 550 GJ thermal energy per year by exploiting around 2-3 million m<sup>3</sup> of 78-97 °C water from its 14 wells. (18.3 million m<sup>3</sup> of gas or 14,775 t of petroleum). This energy is used for heating 60 hectare greenhouses of horticulture and floriculture, livestock farms, industrial and social buildings. It is among the plans of Árpád Agricultural Company to create 2 hectare modern gardening surface every year.

In addition, producing vegetable plants and ornamentals are taking place in greenhouses run by family businesses. As a result of integration, a co-operative of greenhouse gardeners was founded on 20 acres of private land giving work for 163 families dealing with vegetable sprouting based on using thermal water. An outstanding example of secondary use of thermal water heating (temperature 40-45 °C) is Daniel Bako's paprika producing farm which won The Most Sustainable Enterprise award at the Congress of Young Farmers organized by the European Parliament.

Besides horticultural practice, the thermal energy is used in pig farms as well as for egg hatching and poultry farming.

The development of urban thermal heating system began in 1987, the water supply was ensured by the thermal wells of Szentes I and Szentes II. In the beginning water was produced through an exchanger and later it was switched to the direct heating system that has been supplying 1,400 homes and public buildings equivalent of 1,500 houses with thermal heat where the all heated air volume is 408,150 m<sup>3</sup>, resource energy consumption is 89,896 GJ, energy produced from thermal water is 87,607 GJ, energy produced from gas is GJ 2289. Total amount of heat sold is 70,140 GJ. Costs of average home heating in Szentes area is HUF106 868 per year that is 60% less than the national average (HUF177,210 per year). The special thermal heat exchangers pass energy to the circulating heating water system. Thus, in addition to a significant reduction in the operational costs of previous heating system, the environmental impact of the boiler plants have been reduced.

In 1968 thermal water was drilled in the area of Szentes hospital then it was certified as mineral water with medical benefits of alkali bicarbonate and fluoride. It has been used in the Turkish-style bath for treatments of arthritis, musculoskeletal and chronic gynecological diseases. The spa can



accommodate 350 people in its five indoor pool and in an outdoor pool. The building has a number of medical appliances such as effervescent bath, underwater hydro massage jet, weight bath, galvanic mud pack besides traditional and hydro medical gym.

The town pool was previously supplied with hot water from a well in the surrounding area, however, since the development in 2002, the pool has also gained hot water from the urban heating system for secondary use. Furthermore, in 2013 gas energy was replaced by thermal water that is pumped back to the center of the town's heating system.

The energy modernization in eight public buildings such as the town's nursery, two kindergartens, 3 secondary schools, the Music School and the Family Support Center has taken place with the assistance of the Norwegian Fund. In contrast to the former gas and oil energy consumption of 12000 GJ, the current consumption is 6,500 GJ as a result of building isolation, window and door replacement. Between 2003 and 2012, 1348 homes, of which 159 owned by the town council underwent a complete energy based renovation. Continuing the Panel I-II. energy development program, the intention of the Town Council is to upgrade the remaining homes.

As Szentes is in the region of high number in sunshine hours throughout the year (2000-2050 hours per year), a solar (photovoltaic) system can completely take over the electricity consumption in six institutions run by the local government decreasing the costs by 35% . The financial sources are ensured mainly by grant applications but the local government contributes to the costs from the town's budget. Szentes Services Ltd plans to build a 2x50 kw/h of solar thermal systems to supply the existing thermal wells; through this way 110,000 kW of electricity per year can be induced .

Artificial lighting in public areas in the town is the duty of the local government. Instead of the outdated, low luminous and mercury vapor lamps, modern and energy efficient (LED, DML) lights are planned to be installed from 2014. The complete replacement requires 4787 light bulbs saving the 32-35% of the earlier consumption (500,000 kWh) thus leaving HUF 33 million in the town's budget for other purposes.

In the local transportation, the use of renewable energy means the bicycle traffic all over the town. Joining to the European Mobility Week, Szentes takes part in the Car Free Day event series that aims to popularize alternative transport possibilities. Thanks to the development and rehabilitation projects, 24 mile bike path and bike storages were built in the past 20 years designed in order to promote environmentally friendly transport.

"Purchase and protect the products of Szentes" Broadly speaking, sustainable energy management is linked to a sustainable economy. The local economy can be supported mainly by purchasing and distributing local products. To get a clear view on the transaction habits among local businesses and consumers, the town's government had a survey done in 2009. It pointed out that consumers often were not aware of the local products and services. However, due to the intensive and constructive public relations and marketing activities, HUF 150-250 million were spent - and this way kept in the local market.

### Summary

The town has history of sustainable power management, even from the days when it was not named this way. Szentes has extremely high potentials for renewable energies: an extensive area of the geothermal field is located under the surface of the town, the number of sun shining hours is outstanding and the most in the country.

The people of the town are consciously and constantly looking for solutions of the global challenges effecting energy efficiency to replace the decreasing fossil energy sources into renewable ones.



Energy efficiency and the use of green energy has an important role in the town's Investment Concept for the 2014-2020 European design period.

Marking the renewable energy zones in the Industrial Park development program indicates the consciousness in comprehending the relationship between economic development and environmental management. The biomass power plant is planned not only for the environmentally friendly use of waste generated in the region, but also provides attractive energy to businesses running here.

In the following periods, energy efficiency can be improved with the secondary extraction of heat content in thermal water the heat content such as extraction and utilization of the salt content bringing not only economic but also environmental results.

In addition to the economic and environmental sustainability, the third pillar of sustainable development is the idea of social sustainability meaning improvements in the quality of people's life that is beyond the material well-being. The town has done significant acts for the residents feel good. Being a cooperative partner with the local civil organizations, the local government develops and operates community sites (Youth Community Place, Community Civic Square, Youth House) supporting the youngsters and children in their sport activities (swimming, skating) and in the cultural and recreation programs. Special attention is paid to disadvantaged children ensuring access to cultural, educational and useful leisure activities. In the Social Renewal Operational Programme an equal opportunity program has been implemented for disadvantaged children in order to catch up resulting integrated education in the town. Public institutions become positive about disabled people ensuring equal access to services for vulnerable groups in the town.

Due to the developments, the town's energetically modernized public institutions and community buildings are able to serve the local community both economically and environmentally in a sustainable way in long term.

As the result of supporting sustainable development efforts, in 2011 Szentes won the Hungarian and European awards of biodiversity, namely the Green Capital of Europe. In 2013, Szentes received the silver medal of the Hungarian Landscape award as well as achieved the second place in the competition of The World's Most Livable Town.

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