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SUSTAINABLE ENERGY ACTION PLAN FOR SZEKSZÁRD CITY

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VISNOVA
CLEAN ENERGY FROM RURAL REGIONS

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Imprint

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Executive Summary

Creating the right conditions for sustainable energy management, decreasing the dependence on energy import are increasingly important tasks for the decision-makers of municipalities. Energy use is a major item in local governments' budgets. The efficient and environmentally friendly use of locally available energy sources is fundamental not just in terms of decreasing costs, but it is also a means to create more liveable environments and to improve the living conditions of local residents.

The goal of this Sustainable Energy Action Plan is to provide guidelines for the city's energy projects, thereby assisting the work of the decision-makers. The plan provides an overview of Szekszárd's energy consumption and carbon-dioxide emissions, then gives suggestions for improving energy efficiency and utilizing renewable energy sources in the field of sustainable energy management. The actions suggested in this document show intervention possibilities through which the city of Szekszárd can decrease its energy use and greenhouse gas emission, focusing on areas under the control of the local government.

In the course of preparing this urban Sustainable Energy Action Plan, we analysed relevant national, regional and local strategic plans, and the municipality's energy management objectives are in line with the goals set forth in the planning documents. The city's energy management aims advance the fulfilment of Hungary's international commitments.

Szekszárd's strategic goals include decreasing energy consumption – nominally – through improving energy efficiency, increasing the ratio of renewable energy sources and decreasing the ratio of fossil energy sources in the city's energy consumption, creating a diversified renewable energy mix, developing and stimulating the economy overall through diminishing energy costs as well as through attracting investors to the city who manufacture and operate energy efficient or renewable energy operated technologies, and shaping attitudes in order to enhance the social diffusion of sustainable energy management. The above goals reflect all three components of the definition of sustainability: environmental, economic, social sustainability.

The final energy use of Szekszárd (city with county rights) was 503,865 MWh, the related greenhouse gas emission was 111,600 tCO_2eq. Residential buildings accounted for a substantial portion (45%) of the gross final energy use; industrial and service facilities were the largest consumers of electricity (with a total share of 67%).

The greenhouse gas emissions related to the city's energy use come mainly from the residential sector (39%). The suggestions articulated in the Sustainable Energy Action Plan include the following intervention areas: local government operational structures, energy efficiency modernisation of municipal buildings, solar energy developments of family homes, energy efficiency and photovoltaic developments of businesses, sustainable transport solutions, modernisation of public lighting, purchasing energy from the free market, and attitude-shaping pertaining to sustainable energy management. Implementing the proposed actions would lead to energy savings and renewable energy production of almost 85,350 MWh per year, and a reduction of 22,280 tCO_2eq per year in greenhouse gas emissions. This amounts to a 20% decrease compared to the baseline year of 2011.

1. Introduction

The local government of Szekszárd has been participating in the EU's VIS NOVA project between 2011 and 2014, which was conducted in several regions in the framework of the CENTRAL EUROPE programme. The following regions joined the initiative: Dübener Heide and Schwäbisch-Hall (Germany), Tullnerfeld-West (Austria), Małopolska (Poland) and the South Transdanubian Region (Hungary). The partners cooperating in the project prepare studies together through an exchange of experiences and with outside expert help, and they develop innovative solutions based on those studies, which they later adjust to the specific features of each partner region. As a result of the studies, pilot projects with small-scale investments are created and presented in each partner region. The objective of the participants is to serve as a reference for other countries, and to motivate the actors of other European regions to pursue environmentally conscious energy use. The main target groups of the project are small and medium sized enterprises, scientific and advocacy bodies, and local residents. As part of the VIS NOVA project, the local government of Szekszárd city with county rights modernised the hot water supply used for heating and domestic hot water use of the Sports and Leusire Center with the use of renewable energy sources. The implementation period is 42 months. The budget of the local government of Szekszárd is 285,400 EUR, 85% of which is financed by the EU, 10% is automatically financed through domestic co-financing, and 5% from the city's own resources.

The local government of Szekszárd city with county rights commissioned the ENERGIAKLUB Climate Policy Institute and Applied Communications in the framework of the VIS NOVA project to prepare this action plan. Experts from other organizations contributed to certain sections: the South Transdanubian Regional Development Agency (Related regional, micro-regional and local strategies) and the Department of Transport Technology and Economics of the Budapest University of Technology and Economics (Energy consumption and carbon-dioxide emission related to transport, and proposed measures). The action plan was developed using the methodology of the Covenant of Mayors[1], therefore if the local government decides to join the Covenant, this document can be submitted without modification.

Founded by the European Commission in 2008, the Covenant of Mayors is a mainstream European movement involving local and regional authorities, voluntarily committing to increasing energy efficiency and use of renewable energy sources on their territories. By their commitment, Covenant signatories aim to meet and exceed the European Union's 20% CO_2 reduction objective by 2020. Being the only movement of its kind mobilising local and regional actors around the fulfilment of EU objectives, the Covenant of Mayors has been portrayed by European institutions as an exceptional model of multi-level

[1] http://www.covenantofmayors.eu/index_en.html

governance. The initiative currently has 24 members in Hungary,[2] and several further local governments are in the preparation phase of joining the Covenant.

In order to translate their political commitment into concrete measures and projects, Covenant signatories notably undertake to prepare a Baseline Emission Inventory and submit, within the year following their signature, a Sustainable Energy Action Plan outlining the key actions they plan to undertake.

It is important to highlight that the possession of the action plan will give the local government significantly better chances on EU tenders for the 2014-2020 programming period, and through financing options from EU sources it can implement useful projects that are demonstrative towards the city's residents as well.

The action plan includes an analysis of the city's energy consumption and carbon-dioxide emission, an overview of related strategic documents, and a list of measures that can reduce energy use and greenhouse gas emissions.

[2] Bogács, Budaörs, Budapest, Budapest District 4 (Újpest), Budapest District 18 (Pestszentlőrinc-Pestszentimre), Bükkaranyos, Bükkszentkereszt, Eger, Felsőnyék, Felsőtárkány, Hajdúszoboszló, Hatvan, Hernádnémeti, Martfű, Nagykanizsa, Nyékládháza, Ózd, Paks, Pécs, Sárospatak, Szerencs, Tab, Tiszaújváros, Tokaj

2. An analysis of the current situation

2.1 Related strategies

In Hungary several strategic documents handle energy issues both at local and at national level. In the following chapter we discuss those of them which play an important role while developing local strategies and Sustainable Energy Action Plans.

Documents of national scope

The parliament defined the directives of national energy policy for the period 2008-2020 in the decree of 40/2008. (IV.17.). Thus, the primary long-term objectives of the country are the security of energy supply, competitiveness and sustainability. To achieve these objectives, the reduction of energy consumption, the expansion of the share of renewable energy and energy from waste, the gradual introduction of natural and environmental friendly technologies is required. The decree orders the development of environmental consciousness and the increase of energy efficiency - the latter especially in the building, transport and energy conversion sectors. The achievement of the objectives should be promoted by the state aid policy tools and the EU funds available for Hungary.

In the fall of 2011, the Hungarian government approved the document titled **National Energy Strategy 2030** that includes energy policy measures proposed to be implemented by 2030 and an outlook until 2050. The National Ministry for Development gave forth the document for public debate. It states that its main energy policy goal is ending the energy dependency. To achieve these goals the following instruments shall be used: developing energy efficiency and energy saving, increasing the use of renewable energy sources, replacing fuel by electricity in transport using electricity generated by the nuclear power plant, and upgrading the regional energy infrastructure. In terms of Hungary's potential for the use of renewable energy sources, the strategy relies on the theoretical potential (2600–2700 PJ/year) calculated by the Renewable Energy Subcommittee of the Hungarian Academy of Sciences (MTA), and states that there are no well-founded and professionally accepted calculations on the technically achievable and economically feasible potentials; expert estimations vary greatly (between 100 and 1300 PJ/year). The energy strategy is aimed at a 20% share of renewable energies by 2030 in primary energy use. Within renewable energy sources, priority is given to biogas and biomass power cogeneration plants, and to geothermal energy used primarily (but not exclusively) for heating. The document forecasts an increase in the use of solar and wind energy as well. According to the document, expansion of the use of Hungary's solar energy potential for electricity production can be expected after 2020 owing to a price drop in the photovoltaic technology field.

Annex I of the Directive 2009/28/EC of the European Parliament and of the Council on the promotion of the use of energy from renewable sources set the target share of energy

from renewable energy sources at 13% in Hungary's gross energy use of 2020. The Directive requested each Member State to submit its **National Renewable Energy Action Plan** (NREAP) detailing the measures necessary for achieving the targets by June 30, 2010. The Hungarian government approved Hungary's National Renewable Energy Action Plan 6 months late, on December 22, 2010. The document included an undertaking that the share of renewable energy sources will be 14.65%, higher than the target set by the EU.

The Hungarian NREAP – in accordance with the provisions of the European Commission – includes the measures planned to achieve the 2020 target share of renewable energy as well as the growth rate, detailed for each technology. The document presents three different scenarios as follows: BAU energy use, reference scenario, and a scenario based on the supplementary energy efficiency measures. Based on these scenarios, Hungary's gross energy end use will reach a value of 823–923 PJ/year by 2020. The national accumulated target for the use of renewable energy sources for 2020 was set at 120.56 PJ/year based on the realistically achievable maximum shares per each renewable energy source type. If the scenario based on the supplemental energy efficiency measures is realized, this value would mean a renewable energy share of 14.65% in the gross energy end-use.

The submission deadline for the **National Energy Efficiency Action Plan** (NEEAP) was June 2007 for all Member States, but Hungary submitted a 15-page "draft" to the European Commission. Infringement proceedings were initiated for Hungary, along with 11 other Member States for failure to prepare the action plan. Hungary sent its NEEAP to the Commission in February 2008, approved with Government Decree 2019/2008 (II. 23.). During its revision in 2008, the European Commission found several discrepancies in the action plan, the relevant ministry therefore prepared a new, modified action plan, approved by the government with Government Decree 1076/2010 (III. 31.). The revised NEEAP was then submitted to the European Commission.

The action plan's target is savings of 57.4 PJ in Hungary's energy end-use by 2016. Measures listed include programmes providing residential, public institutional and corporate investment subsidies for the improvement of the energy efficiency of buildings, programmes aimed at purchasing more efficient household and office equipment primarily through subsidies for investments, as well as legislative tasks and attitude-shaping measures.

The creators of the NEEAP expect national programmes aimed at the renovation of residential buildings to bring the greatest energy savings (18 PJ), and improving the efficiency of transport to bring the least savings (4.6 PJ). The document specifies that the government and local government sector shall develop and implement energy efficiency guidelines for public procurement processes, decrease energy use through the ROPs, and define requirements for office equipment, among other tasks. Industry players, large consumers are required to employ an energy expert and prepare a compulsory energy consumption report. Additionally, the creators of the NEEAP expect further savings from making the district heating supply systems more efficient. In the area of making transport

more efficient, the document specifies two measures: the expansion of road tax payable by heavy duty vehicles, and the creation of Park & Ride systems.

The country's agricultural and rural development strategy is rather closely related to the region's energy strategy (and energy strategy in general). One of the objectives of the **National Rural Development Strategy** for 2012–2020 is that rural regions attempt to generate, produce the highest possible share of energy satisfying their own energy needs, with regard to sustainability requirements. The document highlights that the sustainable energy management of rural areas is based on a significant decrease in absolute energy demand (energy saving).

The strategy's goals include the construction of decentralized, small-capacity biomass power plants – or biogas power plants for stock farming plants – and compost furnaces (providing organic matter for the soil) that use local raw materials and satisfy local needs. Another one of its goals is the use of primarily forestry firewood and wood chips, pellets, straw and wooden bricks, agricultural byproducts, secondary raw materials, communal organic waste and biomass produced on uncultivated land and on roadsides and embankments. The strategy encourages the production and purchase of household-sized, energy-efficient, cheap chopping-grinding-compacting machines for combustible waste and byproducts. It also recognizes the importance of establishing energy plantations for woody plants (with regard to social aspects as well, for satisfying the region's solid fuel demand, with timber and wood chips from forests and plantations, including other alternative energy sources, up to the limit of the remaining need, within the framework of land management). The document proposes that energy plantations should be created on lands less suitable for agricultural use, respecting environmental and nature preservation aspects.

The goal of the strategy is to increase wooded areas, especially through the reforestation of weak agricultural areas; and to enhance the pace of forestation to achieve a 27% forestation of the country in the long run. Another goal is to increase the yearly rate of forest planting to 15,000 hectares, primarily using indigenous species and species that fit the specific forest landscape. Increasing green areas and improving their quality are also objectives of this strategy, as well as the rejuvenation and improvement of municipal green areas.

Increasing forest areas and rational use of wood are central elements of the **National Forest Programme** for the 2006–2015 period: "energy production through the construction and exploitation of energy plantations, through the use of wood unsuitable for industrial utilization and waste unfit for reuse in a way that the manufacturing of products, the public provision of firewood and the internationally required energy production are well-balanced".

The regional energy strategy is slightly affected directly by the national and regional development and planning concepts and programmes, but indirectly their influence is much more significant (at least in theory). In accordance with Act XXI of 1996 on regional development and regional planning, the government prepares the **National Regional**

Development Concept (NRDC) and submits it to the Parliament. The document was approved with Decree 97/2005 of the Hungarian Parliament.

The goal of the Concept is the establishment of a harmonized and sustainable social-economic-environmental spatial structure and regional system that is organized in regions based on local attributes with their own identity, which is integrated into the European space, and in which there are no significant regional inequalities in terms of public services and life conditions that determine the fundamental chances for the society. Therefore it sets the following five main objectives to be achieved by 2020:

- Regional competitiveness
- Regional catching up
- Sustainable regional development and heritage protection
- Regional integration into Europe
- Decentralization and regionalism

In order to achieve the above objectives, the Concept defines further mid-run objectives to be fulfilled by 2013. We will present the major statements related to energy and regional issues. The Concept writes the following pertaining to the Balaton region, which is one of the integrated development regions with national importance:

- active landscape protection of the region, protection of cultural heritage and sustainable development of the back areas based on their attributes;
- encouraging the environment-friendly technology and energy-efficient operations of the region's businesses;
- encouraging the launch and settlement of enterprises with high knowledge content and low raw material and transport demand.

For the similarly prominent Danube bank region the Concept lays down the establishment of utilization based on sustainability, along with the harmonization of agriculture, fishery, forest and game management, eco-tourism and infrastructure development, and it sets the goal of improving flood control and water supply management systems in accordance with ecological goals.

Another major objective of the Concept is the integrated and innovative regional development of the thermal water treasure (energy utilization, medicine industry, tourism, agriculture etc.), encouraging the creation of industrial, service and research networks and vertical relations serving the complex utilization of the thermal wealth. Furthermore, it advises increasing the share of renewable energy sources, primarily for the local, micro-regional supply, with asserting economic and environmental criteria, in compliance with the strategy of sustainable development.

The Concept's section on the development of regions specifically deals with the development goals of the South Transdanubian region as follows: "The aim of the South Transdanubian region is development considering cultural, environmental and nature preservation values, based on education, science and research centers, which integrates

the lagging regions and is based on a balanced municipal structure. The region is successful in turning its current backlog in development into benefits by utilizing its preserved natural and cultural wealth, architectural heritage and thermal water treasure in a sustainable way and provides high-quality, well-balanced life conditions."

In addition to the National Regional Development Concept, the Parliament approved a National Development Policy Concept (NDPC) as well, but its energy management aspects are only tangential, in relation to environment protection and sustainable development, which are the main topics of the document.

The Hungarian Government approved the **Investing in the Future: National Research, Development and Innovation Strategy** on June 13, 2013. The basic aim of the RDI strategy is that Hungary increases the R&D investments from 1.2% up to 1.8% of the GDP by the end of the decade and to provide an economic environment, where the R&D oriented and innovating companies and public firms can develop equally, in line with social expectations. The strategy treats the provision of "Safe, clean and efficient energy" as a social priority and assumes government programmes launched from the top, regulations of submarkets (eg. alternative energy), organization and institution-building, and the classic race amplifier regulatory actions of the defined priorities, such as energy production.

Numerous country-level strategic documents are being prepared, which are directly or indirectly related to the field of energy and climate change.

Under the supervision of the Ministry of National Development, the **National Climate Change Strategy** has been prepared by the National Centre for Adaptation of the Hungarian Institute of Geology and Geophysics. The public discussion about the document was finished November 30th, 2013. The National Climate Change Strategy adopted in 2008, summarizing the fight against climate change, creating a coherent climate protection and development policy, needed to be reviewed due to the accelerating natural changes and the changing economic environment. The draft of the strategy includes the National Decarbonisation Roadmap for the 2050 period defining the objectives, priorities and directions of the actions for greenhouse gas emission reduction. The document also contains the effects of climate change in Hungary, natural and socio-economic consequences as well, and the National Adaptation Strategy assessing climate vulnerability of ecosystems and sectors. Conceptual framework for adaptation and preparation affects climate security and risks related to water management, rural development, health, energy, tourism and other sectors, and contains the possible courses of action. The "Partnership for the climate" awareness-raising plan is part of the document. The plan aims to integrate the climate awareness and sustainability aspects into the planning, decision-making and implementation at all levels of society.

In order to meet the requirements of the 27/2012 EU directive, the Ministry of National Development entrusted the ÉMI Construction Quality Control Innovation Nonprofit Ltd. to elaborate the **National Building Energy Strategy**. Content of the strategy is the renovation of existing buildings, as well as the design and implementation of requirements of new energy-saving building system. The document is still under elaboration, the exact content is not known yet.

The government decree about adopting the National Energy Strategy envisages the preparation of Action Plans related to the following topics: Power Plant Development, Mineral Resources of Inventory Management and Recovery, Awareness Raising, Energy Research and Development Industry and District Heating Development.

The aim of the **Energy and Climate Awareness Raising Action Plan** is to identify those government actions which contribute to fight lack of information about climate change and energy consumption and promote consumer awareness. To improve energy efficiency and energy savings, the Action Plan appoints the increase of the residential use of renewable energy sources and the reduction of the emissions related to transport as a primary instrument. Local governments are listed under the target groups of the Action Plan.

The purpose of the **District Heating Development Action Plan** is to create a modern, green and climate-friendly district heating system, and the efficient development of the district heating sector. The action plan includes targets such as creating a stable regulatory and financial background, raising the technical quality of district heating systems and the share of renewable energy, moreover increasing the social acceptance. The concept of the document was presented in October 2012.

The purpose of the **Power Plant Development Action Plan** is to draw a roadmap of capacity development for the nuclear energy-carbon-green scenario of the National Energy Strategy that complies with EU requirements, moreover the monitoring of capacity development. The action plan has not been disclosed yet.

Social discussion took place in February 2013 about the Mineral Resources Exploitation and Inventory Management Action Plan. The overall objective of the action plan is to improve the economic and social position of mining and energy industries in regard to the current and anticipated technical, environmental and economic trends. The document assesses our country's valuable mineral assets in terms of energy, potential and national economic importance. The potential survey covers coals, hydrocarbons, rare earth metals, fissionable materials, geothermal energy and underground gas storage capacity. The action plan states that the increasing utilization of the country's coal and lignite stocks, unconventional hydrocarbon reserves and geothermal potential can significantly increase the security of supply and can reduce the import dependency in long term. Among the conceived measures the use of coals in electricity generation on the current level or the possible increase, research and development of CCS-related technologies, enhancing the exploration and extraction of domestic hydrocarbon resources, development of an appropriate legal framework, examining the possibilities for mining of fissile materials, implementation of 2020 target related to geothermal energy with the appropriate incentives, and strategy-making related to the extraction of rare earth metals are listed.

The **Energy Industry Development and Research-Development-Innovation Action Plan** identifies the specific areas of energy, where the national characteristics and skills could be capitalized in the international scene as well. The plan also maps the partners who may be included in the cooperation. The document is currently under elaboration. Among the proposed R & D focus areas both fossil fuel based, nuclear and renewable energy generation related developments are listed, including: renewable-based district

heating, community heating, CCS and fusion power technology research and developments, landfill gas and sewage sludge utilization.

Another nationally important development document is the **New Széchenyi Plan** (ÚSzT), presented by the government on July 28, 2010 for debate. The development policy programme defines the country's potentials that the national and EU sources will focus on in the next decade. The ÚSzT focuses on the dynamic expansion of employment, the creation of financial stability, provision of the conditions for economic growth, and development of Hungary's competitiveness. The ten-year strategy defines the following potentials and the related programmes: health industry, green economic development, business development, transport development, science-innovation and employment. Of these seven points, green economic development and housing include statements pertaining to the topic of energy.

In relation to green economic development, the document emphasizes energy efficiency and energy saving, enhanced use of renewable energy sources, and prioritizing Hungary's own resources. The document recognizes that measures related to energy efficiency are of central importance for achieving the objectives set in the field of climate change and energy policy with the least cost (primarily in the area of buildings and transport). The document mentions the EU's 20% target and stresses that short-, medium- and long-term plans shall be developed to be able to ensure achieving these goals.

The debate document of the ÚSzT considers improving the energy efficiency of consumption goods, buildings, transport and local governments, developing energy efficiency services, encouraging the energy efficiency investments of small and medium enterprises and raising awareness on energy to be the most important areas for intervention. Based on the priorities stated in the document, the ÚSzT regards energy management mainly as an industry with job potential.

Additional to national documents, strategies affecting the city should be investigated on regional, county, district / sub-regional level. In the Nomenclature of Territorial Units for Statistics used by the European Union, NUTS 2 level means the South-Transdanubian (NUTS23) and NUTS 3 level means Tolna County (NUTS233). In the micro-regional level system, the Local Administrative Units (LAU) can be used for the delineation.

Based on the geographical location of Szekszárd the analysis of the following documents is crucial: South Transdanubian planning documents – in particular the South Transdanubian Regional Energy Strategy –, Tolna County Development Concept and the Area Development Programme of Szekszárd.

Regional strategies

In the previous programming period, the South Transdanubian Region had a strategic development programme in the following six areas: business services, rehabilitation of brown fields, rural development, transport development, tourism development,

development of human and public services. Relevant findings in terms of energy are included in the environment development programme, which lists the following main goals:

- the sustainable use of the natural resources, focusing on the conservation of the resources;
- developing a healthy urban environment that includes the reduction of the built environment load and infrastructure development (eg. drainage, increasing green space), and
- the environmental industry – eco-harmonic energy management, which aims to attract the wider use of renewable energy and secondary raw materials, supplying the growing energy demand with regional resources. The programme prefers complex, local, small-scale projects, and formulates the development of the related technologies, and the strengthening of related enterprises in the region.

The development directions of **the South Transdanubia Operational Programme** (DDOP) 2007-2013 were determined by the development strategies. The operational programme engrosses the protection of natural and built environment, construction of competitive economy based on local features and reduction of social disparities as alignment of the region. The document does not emphasize the reduction of the region's energy consumption, the development of energy efficiency and the use of renewable energy sources. By the time of the compilation of the Sustainable Energy Action Plan of Szekszárd, the regional operational programmes were closed, while the **Area and Town Development Operational Programme** (TOP) was under development. The content of TOP priorities should be considered after the finalization, which may provide a source of funding to implement certain actions.

Given that the DDOP has not prioritized the topics of energy efficiency and renewable energy sources, the South Transdanubian Regional Development Agency elaborated the **South Transdanubian Regional Energy Strategy** in cooperation with Energiaklub and the South Transdanubian Regional Innovation Agency in the autumn of 2012. The document was updated in February 2014. The strategy aims to support South Transdanubian political decision-makers in order to achieve higher levels of energy efficiency, energy security and sustainable energy management. The document presents the energy consumption characteristics and main data about the energy potential of the region, then lists needed measures in relation to improving energy efficiency, as well as judicious utilization of fossil and renewable energy sources. Some of the findings are applicable to a single local government, but the strategy emphasizes the synergies which can only be validated by using regional planning methods. Several resources can be found beyond the territorial capacity of municipalities, districts, counties, administrative boundaries, so their use requires regional collaboration. The strategy also recommends to take into account the fact that joint investments result in shorter recovery times due to sharing the related costs. The effective implementation of the energy strategy requires the coordination of the three South Transdanubian county development plans, moreover the integration of local strategies and action plans – the present Szekszárd MJV action plan as well – into the regional level document.

The implementation of the proposed measures in the regional strategy would contribute to reaching the goals of the city of Szekszárd: improvement of energy security and energy efficiency, better quality of the urban environment and quality of life of the population as well as development of the local economy.

The regional strategy analyzes the characteristics and potential of South-Transdanubia in a detailed SWOT analysis. The document analyzes different aspects such as natural resources, economic, infrastructural and regulatory background, organizational issues, education, transport, and social aspects. In the field of renewable energy sources, the strategy suggests the use of biomass, geothermal and solar energy. Among others, the following possibilities are listed:

- utilization of the hydropower potential of the Danube, Drava and smaller streams, taking into account the aspects of nature conservation;
- the use of solar energy to produce electricity and heat in both the private and public sectors;
- a higher degree of the exploitation of the geothermal potential by the operation of closed wells and the design of cascade systems (eg. thermal baths);
- utilization of unused agricultural territory to raise energy crops;
- energy production from agricultural and municipal waste, which also reduces the cost of waste management;
- horticultural improvements (geothermal energy - greenhouses);
- developments of livestock breeding and the establishment of biogas plants;
- a shift to renewable energy sources in district heating systems (biomass, geothermal);
- the improvement of education related to energy;
- adhesion to the Covenant of Mayors initiative, the mainstream European movement, providing platform for the exchange of experiences;
- the availability of unskilled labor - eg. waste wood, biomass harvesting.

Following the assessment of the situation and review of the opportunities, the strategy proposes the following targets:

- The gross final energy consumption should be decreased by 10% by 2020 (compared to the baseline year of 2011), thus:
    - The average monthly gas consumption per household will be reduced to 58.5 m^3/month,
    - The electricity consumption per household will be reduced to 150 kWh/month;
- The renewable energy share in the gross final energy consumption should reach the national commitment of 14,65% in 2020
- The regional produced goods (products and services) in Purchasing Power Standards (GDP-PPS) will be increased by minimum 5% by 2020;

- More than 30 local authorities from the region should sign the Covenant of Mayors by 2020;
- The amount of fuels (particularly firewood) provided for poor and extremely poor households should be increased by 20% compared to the current level;
- By 2020, all district heating systems and houses connected to them will be modernized in the region;
- The share of renewable energy in district heating power generation will reach 100%;
- The share of public buildings having an energy certificate should reach 80% by 2020.

To reach the regional goals, it is important that local authorities adapt the previously listed targets while elaborating local action plans or energy strategies. This can also be recommended in the case of Szekszárd.

County level development strategies

In accordance with the amendment of Act XXI of 1996 on regional development and regional planning in December 2011, regional development tasks became the responsibility of county governments that elaborate regional development policies and programmes, furthermore assist in the development of territorial planning during the European Union's 2014-2020 programming period. The county development programmes set the targets of the county related to regional and rural development for 7-10 year periods. The design also gives a framework for the use of funds during the European Union's 2014-2020 programming period.

The **Area Development Concept of Tolna County** aims at improving the quality of life via job creation and rural development. Related to energy, the document lays emphasis on the vocational training and higher education associated with the construction of Paks Nuclear Power Plant, and the involvement of the county's organizations into the implementation of the project.

The concept identifies three overarching objectives that cover economic development, social renewal and rural development topics. The general goals have been divided into seven strategic objectives. The following objectives have a link to the city of Szekszárd:

Dissemination related to natural resources, built environment, landscape and natural values, improvement of the potential of sustainable utilization and thematic linking of these values

An energy R&D center with Paks and Tamási as headquarters is planned within the document. The purpose of the research center is to capitalize the engineering expertise in the implementation of energy projects and the expansion of Paks Nuclear Power Plant, while supporting the use of local renewable energy sources

in Tamási. The concept does not describe the role of Szekszárd in R&D and education.

Development of marketable, traditional industrial sectors

The concept describes the favorable influence of the new units of Paks Nuclear Power Plant on the housing market. The implementation needs numerous engineers and skilled workers, whose accommodation requires special investments. This may also result labour extraction in case of Szekszárd.

The document envisages the recommencement of the coal and rock mining in Nagymányok and Váralja areas with respect to environmental sustainability. The region has a significant amount of minerals and the exploration is economically justifiable because of the increase in energy prices. The mining activities and supporting services significantly improve the employment in the region. Since Nagymányok area is 30 km away from Szekszárd, the developments may give an opportunity for experts and service providers to take part in the activities.

Improve the quality of rural life and promote the retention of population in the rural area

The document highlights that the better use of geothermal, solar and wind energy, as well as biomass and biogas energy sources, can make rural living attractive, and boost local economic activity. The strategy also mentions the option of wind energy utilization. This potential is negligible regarding the whole region, but in the north-eastern part of Tolna county the installation of wind turbines could be relevant.

In addition to the above, the concept identifies the following areas related to energy:

- Use of thermal waters in health tourism, energy and agriculture, giving a major role to the energy-intensive sectors in the county;
- The further utilization of locally available energy sources, which reduce both energy dependence and GHG emissions (at national level), and make housing in rural areas cheaper;
- Describes the possibility of complex utilization of geothermal energy in every town of Tolna County as this is built on existing medical tourism services and infrastructure.

In conclusion, we can say that the concept of the county visualizes the energy targets indirectly by sustainable use of natural resources, enhancement of self-sufficiency of local communities and economic development goals. Interventions in relation to energy mainly refer to sustainable exploitation of fossil and renewable energy sources. The proposed measures do not emphasize the role of Szekszárd, which underlines the need of an action plan for the city itself.

Micro-regional strategies

Regarding regional planning, the role of micro-regions directly above municipalities has been replaced by districts in 2013, after the reconstruction of the district system. The

following municipalities belong to the district of Szekszárd: Alsónána, Alsónyék, Báta, Bátaszék, Decs, Harc, Kistormás, Kölesd, Medina, Őcsény, Pörböly, Sárpilis, Sióagárd, Szálka, Szedres, Szekszárd, Várdomb. However, the district had no development concept at the time of the elaboration of the action plan, so we analyzed the micro-region development plan of Szekszárd. 26 municipalities are located in the area of the micro region. Szekszárd plays an important role in the micro region as a consequence of its economic importance and magnitude.

The **Szekszárd Micro Region Development Programme 2014-2020** analysis the status-quo of the micro-region and describes development packages. Out of the 16 packages the "Urban energy efficiency increase" is the one that includes the most information related to energy development measures. The "Integrated and environmentally conscious renewal of urban environment", the "Small-scale urban environmental protection infrastructure development", the "Introduction of environmental friendly transport systems and sustainable community mobility, and reduction of carbon dioxide emissions" and the “Improvement of employment at county, regional and local level by increasing alternative employment” packages show connection to the Sustainable Energy Action Plan of Szekszárd.

Related to increasing energy efficiency in settlements, the concept states that the transition to low-carbon economy should also appear in public buildings and the housing sector. In addition to improving energy efficiency and reducing overhead costs, the improved use of regional and local energy potential based on a complex development programme is targeted. To reduce heating and cooling needs, thermal insulation is recommended. The use of renewable energy sources to cover both heat and electricity demand – mainly by installing PV and solar thermal systems should be implemented as well.

The package related to public transport targets the reduction of CO_2 emissions by shortening the interurban routes and developing bicycle pathways. The energy and emission aspects of the proposed measures in other packages do not affect the city of Szekszárd. The development programme includes a list of projects which describes nine topics.

Local strategies

Szekszárd joined the “Climate Friendly Towns” Association in 2009. One year later the local authority accepted the **Municipal Climate Strategy**. The strategy examines the possibilities for the reduction of CO_2 emissions in the public, residential and transport sectors, and makes recommendations for climate change adaptation options. It lays down the organizational structure of Szekszárd Climate Association, the special areas for the individual working groups and recommends the establishment of a Local Government Climate Fund, with an annual budget of at least 4 million HUF.

Among the priorities of the **Szekszárd MJV Economic Programme** (2010-2014) the modernization of educational institutions (replacement of the heating and lighting systems) with renewable energy sources in order to reduce energy consumption is listed. According to the document, the city's major goal is to increase the share of cycling within transport methods. The first step towards this could be the involvement of the the town center, then the development of the conditions for recreational cycling.

In 2001, Szekszárd MJV elaborated its **Environmental Programme**; the first revision took place in 2010. The study deals with the detailed analysis of the environmental elements (earth, water, air, nature), as well as the analysis of the transport and energy supply. The document notes that the traffic situation and the related impacts (noise, congestion, traffic jams), according to the household survey did not improve between 2001 and 2010. Continuous improvements were made in the field of municipal energy management, but focusing rather on current problems than the implementation of planned developments. The document makes a number of general and specific suggestions to reduce energy consumption; a large part of the implementation is in progress.

2.2 Energy consumption analysis

The city's Baseline Emission Inventory is part of the Sustainable Energy Action Plan that should be submitted to the Covenant of Mayors. The inventory includes energy consumption data for the 2011 baseline year for the following sectors: local government institutions, residential buildings, public lighting, industry, service sector and transport.

Sectoral data on electricity and natural gas consumption are based on data provided by the Central Statistical Office (KSH). Energy consumption data (electricity, gas, district heating, fuel) of the local government's buildings and vehicles were provided by the local government.

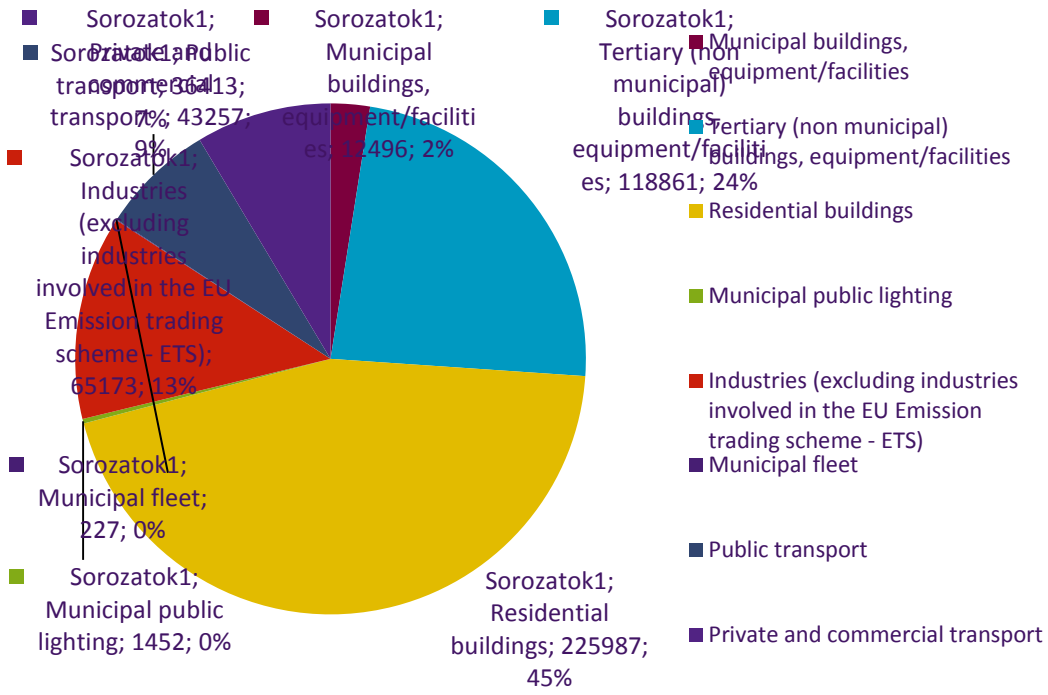
No exact data are available pertaining to the residential firewood and coal use, therefore these figures had to be estimated using two data sources. The KSH provided us with data on the distribution of households according to heating fuels. The average amount of coal and firewood used was also determined based on KSH data, specifically from the Household Budget Survey. For the calculation we used the average values (coal: 3200 kg/year/household, firewood: 5560 kg/year/household) derived from the data of the national representative survey conducted among almost 6500 households.

Data were collected for other renewable energy sources as well: the local government provided data on the renewable energy projects of local government institutions, and relevant data were collected from the records of the National Development Agency (NFÜ).

However, these data sources did not contain relevant renewable energy investments completed prior to 2011 for Szekszárd, therefore these calculations do not include any renewable energy sources other than firewood.

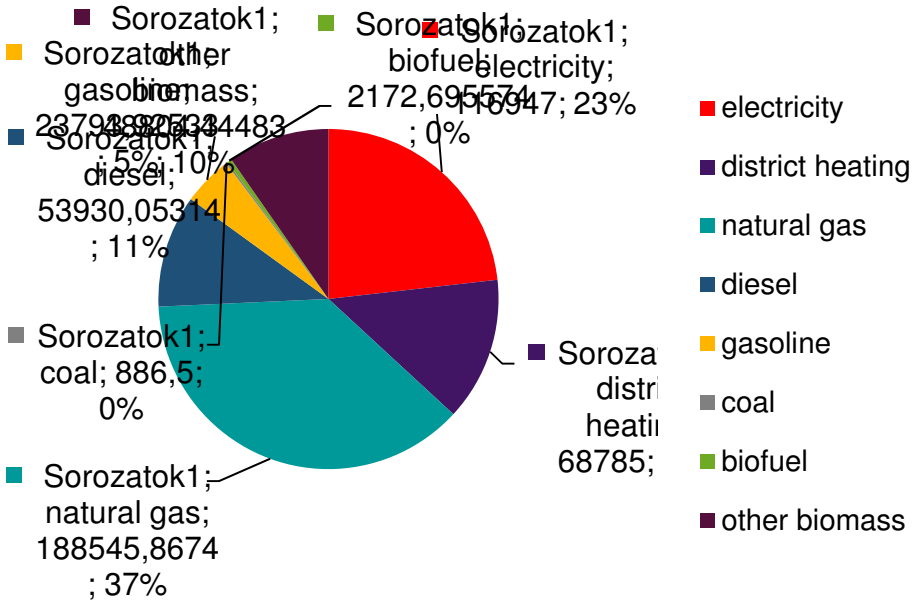
The local government provided data on the fuel consumption of its own vehicles. Fuel consumption figures pertaining to public and private transport were calculated by experts of the Department of Transport Technology and Economics of the Budapest University of Technology and Economics based on surveys and assessments provided by the local government.

The total energy consumption of Szekszárd was 503,865 MWh in 2001. 84% of this was used by buildings and facilities. Almost half of the total energy consumption was related to residential buildings.



1. Figure: Final energy consumption by sector in 2011

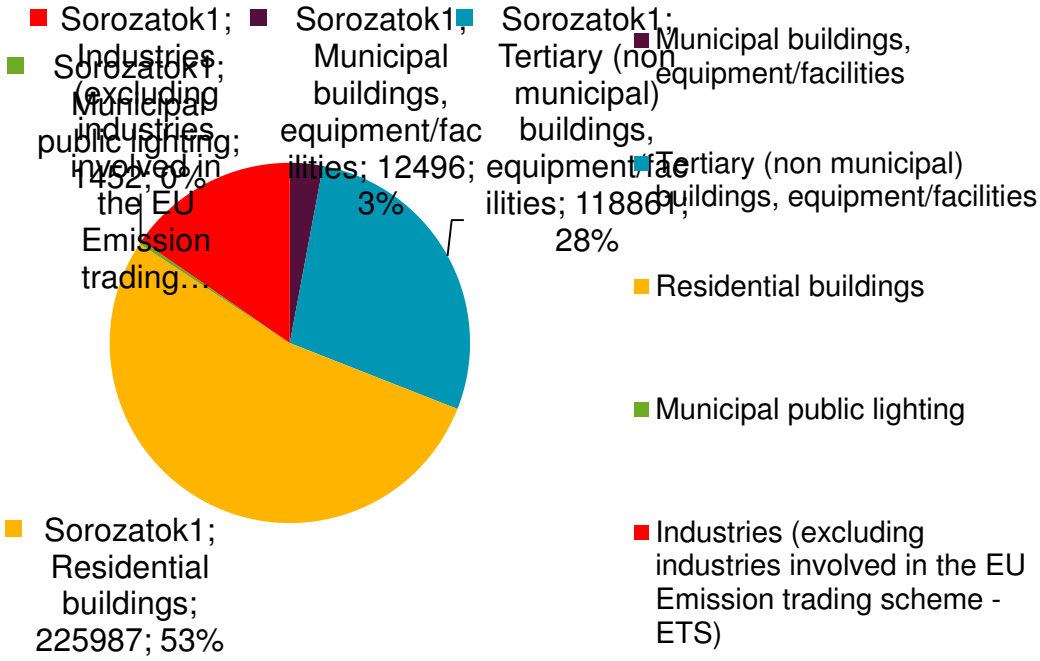
In the distribution according to energy sources, natural gas, electricity and district heating amounted for the highest percentages in energy consumption.



2. Figure: Final energy consumption by source in 2011

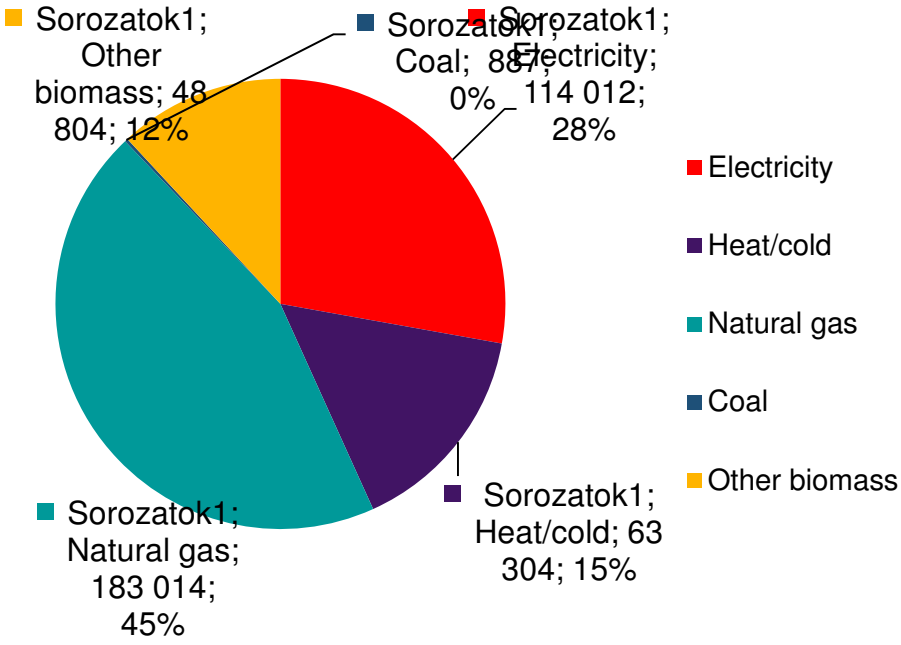
Buildings, facilities

According to the results, the city's residential buildings, public buildings, facilities of the industrial and service sectors, and the public lighting network used almost 424,000 MWh energy altogether in 2011. The largest portion of this was the energy consumption of residential buildings (54%). The commercial and service buildings also consumed a significant portion (28%). Public lighting is responsible for a small fraction, 0,5% of the total energy consumption of the facilities.



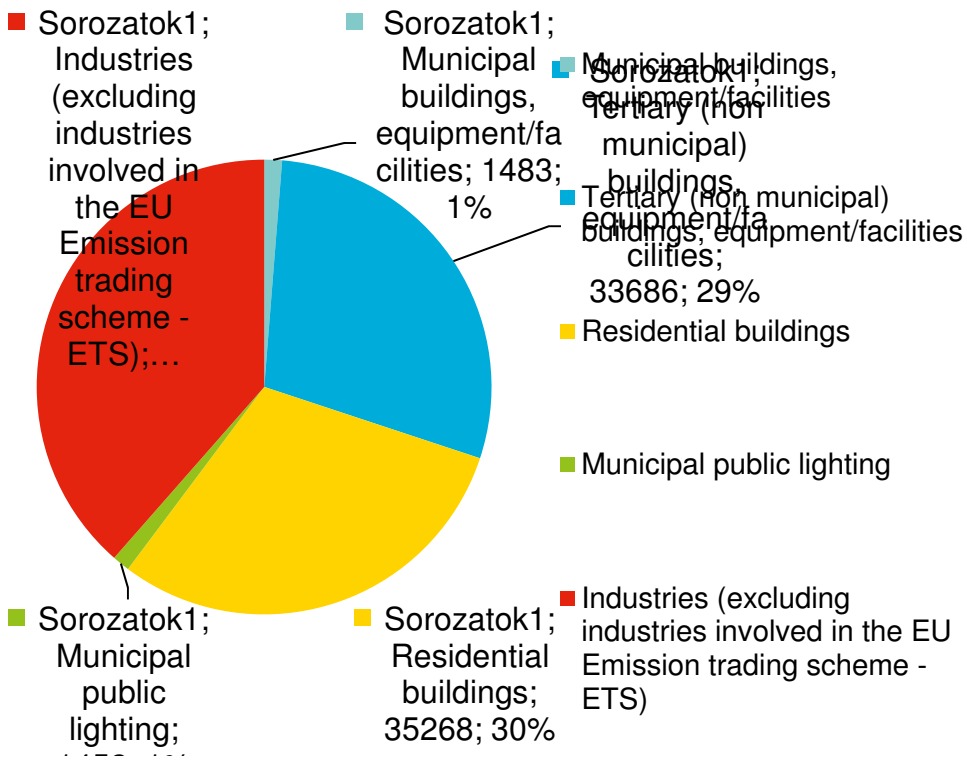
3. Figure: Energy consumption of buildings, equipments/facilities by sector

As the below figure shows, electricity use is less than one third of the final energy consumption. Natural gas is dominant among the energy sources utilized (45%). Firewood use amounts to approx. 12% according to the above detailed calculation methodology.



4. Figure: Energy consumption of buildings, equipments/facilities by source

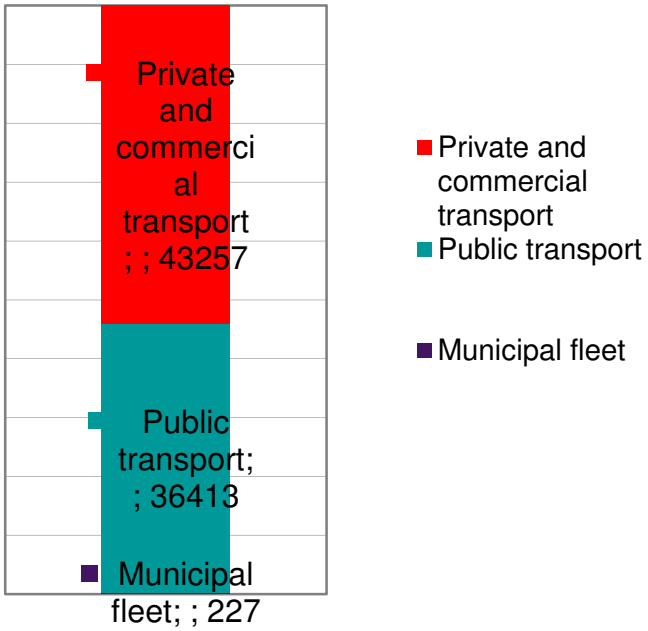
If we study the use of electricity only per sectors, the highest consumers are industrial facilities (with 39%). Residential buildings and buildings of the commercial and service sectors amounted to almost equal portions in electricity consumption (30% and 29%, respectively). The amount of electricity used for public lighting is only 1% of the city's electricity consumption.



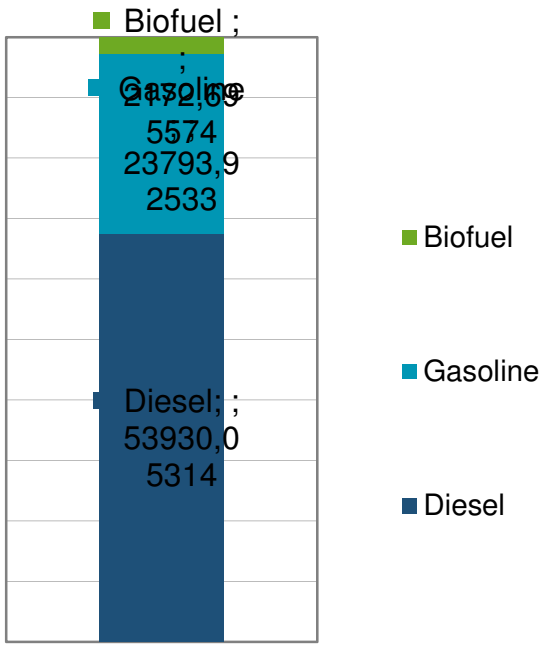
5. Figure: Electricity consumption of buildings, equipments/facilities by sector

Transport

The majority of energy consumption for transportation comes from personal and freight traffic. In terms of fuel types, diesel is the most used fuel, primarily because of freight and bus traffic.



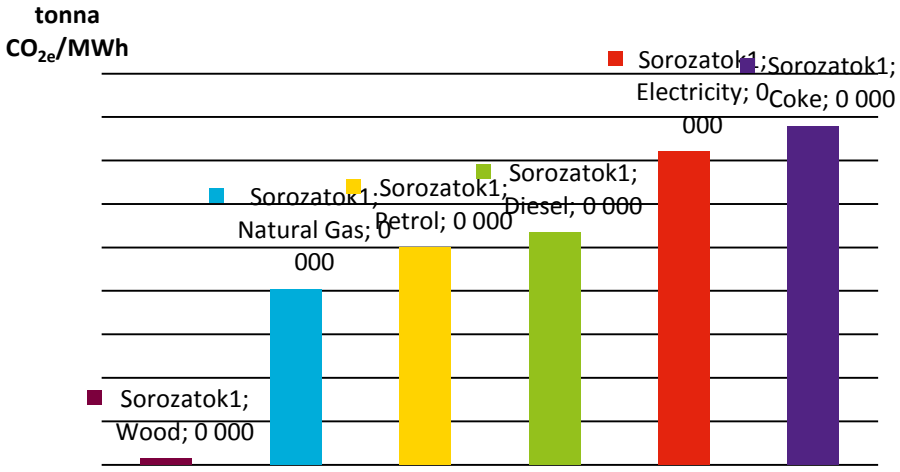
6. Figure: Transportation energy consumption by sector



7. Figure: Transportation energy consumption by fuel type

2.3 An analysis of the emission of pollutants: greenhouse gas emissions produced through energy consumption per sectors

Putting the carbon-dioxide emissions arising from energy consumption into numbers was performed with the calculator developed by ICLEI – Local Governments for Sustainability. The calculator was intended to facilitate the compilation of the Baseline Emission Inventory to be submitted to the Covenant of Mayors, and uses the emission factors set in the SEAP methodology. The factors were reviewed by a relevant expert of the Hungarian Meteorological Service (OMSZ), whose suggestion prompted us to modify the emission factors of firewood and electricity to values more indicative of domestic conditions (firewood: 0.007 tCO_2e/MWh, electricity: 0.36 tCO_2e/MWh).



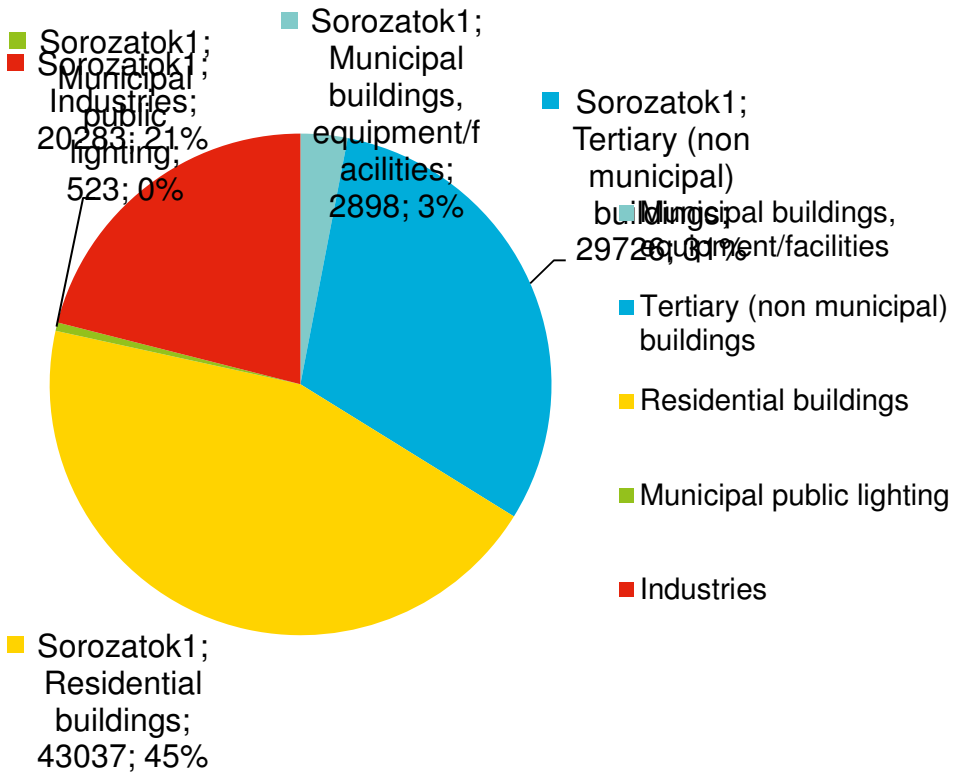
8. Figure: Fuels emission factors

In 2011, the pollutant emissions of buildings, facilities and transport amounted to a total of 111,600 tons altogether.

Buildings, facilities

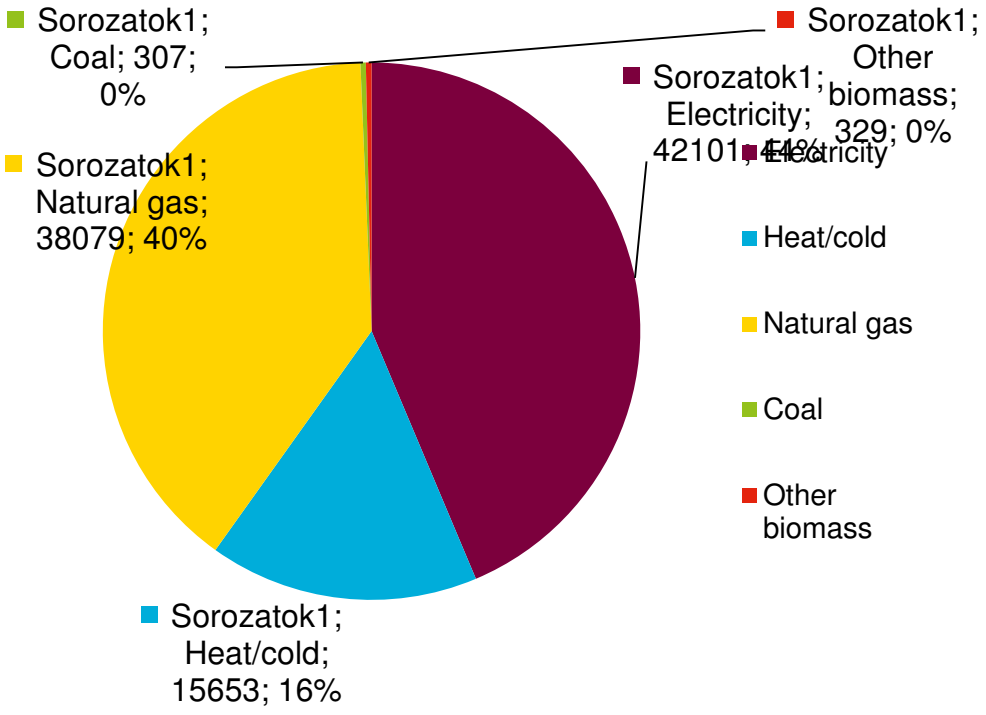
The total carbon-dioxide emissions of buildings and facilities (including public lighting) in Szekszárd amounted to 96,500 tons in the baseline year of 2011.

The distribution among sectors shows a similar picture to the final energy use, however, as shown in the below figure, the portion of residential buildings is smaller than it is in energy consumption. The difference comes from the use of firewood because the emission factor of firewood is quite low (see figure above). Due to the amount of carbon-dioxide a tree absorbs (globally) the amount of (extra) emissions is very low. (Of course, there is still the local pollutant emission from burning biomass.)



9. Figure: CO_2 emission of buildings, equipments/facilities by sector

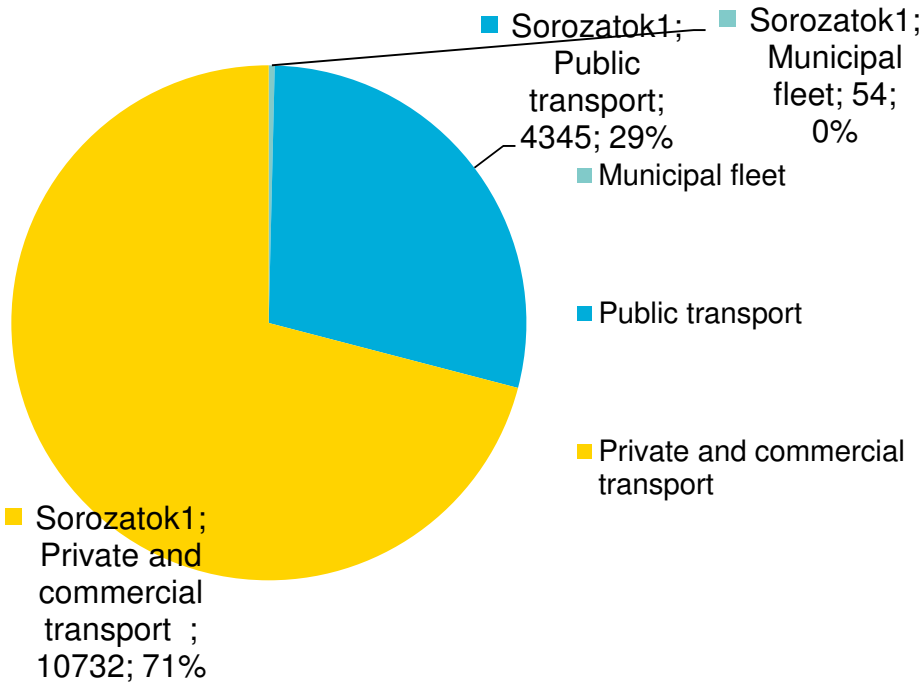
The most carbon-dioxide emission from buildings comes from the use of electricity and natural gas.



10. Figure: CO_2 emission of buildings, equipments/facilities by source

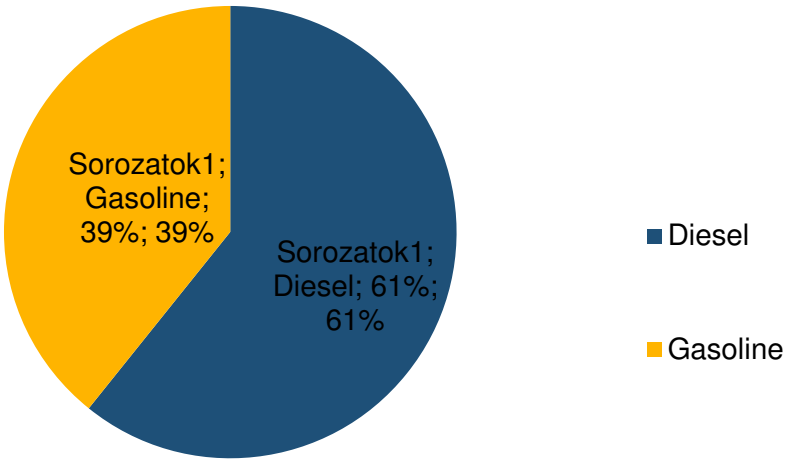
Transport

Personal and freight vehicles account for almost three thirds of the emissions.



11. Figure: Transportation CO_2 emission by sector

61% of the emissions comes from burning diesel fuel.



12. Figure: Transportation CO_2 emission by fuel type

3. Energy projects completed since 2011

Since the baseline year of 2011, the local government has conducted several renewable energy projects.

In the framework of the full energy management modernisation of the buildings of the Mérey Street Welfare Home and Kindergarten, a photovoltaic system of a total output of 30 kW and 20 solar thermal collectors were installed with subsidies from the Environment and Energy Operational Programme (KEOP). The modernisation was completed in these buildings in September 2013. The project cost was HUF 187 million, of which the awarded subsidies amounted to HUF 159 million.

The modernisation of Babits Mihály Cultural Center was completed in the framework of Agóra Program with subsidies from the Social Infrastructure Operational Programme (TIOP). Within this project, the heat pump heating system of the House of Arts was completed in 2013.

The heating and hot water producing system of the Szekszárd City Sports Centre was modernised in the framework of the VIS NOVA project. Within the project, the Sports Centre received heating assistance with geothermal energy from the area of the new Szekszárd Spa that was inaugurated in May 2013. The hot water (temperature: 32°C), pumped from 350 meters deep, is utilized by two heat pumps operating at 800 kW each. Insulated pipelines were also laid between the heat centre and the heat pumps as part of the project. The cost of the project was EUR 110,039, the subsidies awarded amounted to EUR 95,000. The local government gained support for the construction of the pipeline for geothermal heating in the VIS NOVA project. 80 square meters of solar thermal collectors were installed on the southern side of the Sports Centre in 2012, therefore the hot water supply of the facility is provided by solar energy for most of the year. Another positive effect of the solar thermal collectors is that they provide shade for the gyms on the southern side, so their heat production in the summer dropped significantly. During summer months the amount of heat produced by the solar thermal collector system is enough to partially satisfy the spa's water heating demand, thus the system can operate at maximum capacity all year round. The secondary side also underwent modernisation in the framework of the project: heat emitters were replaced with modern panel radiators with larger surfaces and thermostatic valves. The whole hydraulic system was also regulated simultaneously. A building integration system was installed as part of the project, which enables the optimization of the production, use and control of heat energy. Due to the optimized operation the energy costs of the facilities have been reduced significantly.[3]

[3] http://www.vgfszaklap.hu/lapszamok/2013/december/mintaerteku-futesrendszer-felujitas-szekszardon
http://www.vis-nova.eu/pdf/visnova_newsletter_englisch_oktober2013.pdf

A solar thermal collector project was completed in 2013 in the Tolna County Remand Prison as well. The institution gained non-refundable subsidies of over HUF 16 million on a KEOP tender, which was used to optimize the penal institution's own hot water supply by installing a solar thermal collector system.[4]

In addition to local government projects, numerous enterprises with sites in Szekszárd have installed renewable energy systems since 2011. Based on the NFÜ's database, solar panels amounting to an output of 125.38 kW were installed in Szekszárd's industrial and service sectors with subsidies from the Environment and Energy Operational Programme (KEOP).

The renewable energy projects implemented in Szekszárd since 2011 produce approx. 1688 MWh of energy per year, which is equal to the reduction of greenhouse gas emissions by **283 tCO_2eq/year**.[5]

[4] http://www.teol.hu/tolna/kozelet/korszerubb-lett-a-szekszardi-borton-518502

[5] When calculating the energy production and carbon-dioxide emission savings, we took the extra electricity use arising from the operation of heat pump systems into account.

4. Proposed measures

4.1 Local government operational structures

4.1.1 The establishment of an energy management system

The goal of establishing an energy management system is to make the energy consumption of specific institutions easy to monitor, compare and evaluate. The regularly collected data facilitates the planning and preparation of energy management tender proposals and the performance of audits. The energy management expert of the Authority does not even see the energy bills of the institutions because those are sent by the energy providers to the Authority's finance department, which then transfers the money.

Deadlines / periods (start and end) to be set for proposed measures, scheduling – steps, estimated length

Appointing a responsible person

A person should be appointed to be responsible for energy management, who shall coordinate and perform tasks pertaining to the local government's energy management, and collects data regularly (biannually / annually) from the institutions. In Szekszárd this can be the energy management expert.

Start: 1st June 2014

End: 30th September 2014

Data collection

Installing an electronic energy monitoring system is a good solution. The system can monitor (and even regulate) the energy consumption and temperature of different institutions (school, hospital, etc.) remotely, from the offices of the local government.

But collecting energy consumption data can begin before such a system is installed, these data can be requested from the institutions via a simple electronic worksheet. This can even be done by simply creating a joint Google account. In 2013 the financial directorate asked the operators of public institutions to read the utility meters of the institutions regularly (monthly), and provide the data to the directorate. This, however, does not work in practice because the institutions usually do not have an employee suitable for reading the meters and collecting the data. In order to make the meter reading and data collection go more smoothly, the local government should organize a training for public institution employees where they can learn about the methods to apply and receive information for interpreting the values read from the meters.

Key data about energy management projects implemented in the institutions (subject and cost of the project) should also be collected in a shared database.

Start: 1st October 2014

End: 1st January 2020

Information

Information flow should be made two-directional: the local government can inform the institutions about their energy use regularly, in easily interpretable ways (with charts, short textual explanations). By creating specific data (e.g. kWh/m^2), the local government can call the institutions to compete – the institution with the lowest specific consumption wins.

Start: 1st October 2015

End: 1st January 2020

Department, person responsible for implementation and coordination

Local government of Szekszárd city with county rights: Urban Development and Operations Department

Planned costs

As Szekszárd already has an energy management expert in its workforce, the implementation of this measure would not require extra expenses (unless extra software, electronic system, smart metering are created – more in-depth analysis would be required to estimate the costs for such)

Expected energy savings (MWh/year)

This measure does not yield direct energy savings. Establishing an energy management system, appointing a responsible person and conscious planning are necessary prerequisites for sustainable energy management.

4.1.2 Green (public) procurement

State and local governments are the largest consumers on the purchase market in Europe today, current data show that the purchases of the public sector in the EU amount to about EUR 2 billion, which roughly equals 19% of the EU's GDP. It is clear therefore that whatever behaviour the state and local governments express in relation to purchases and public procurements, it will have significant impact on the market. If the completed public procurement procedures result in ordering environmentally friendly products and services, purchasers can set an example to consumers and influence the market, and the industry

may be motivated to create “green” technologies and develop eco-friendly products that satisfy the public purchasers’ demands.[6]

In addition to shaping the market, by practicing green public procurement state and local governments utilize energy efficiently, reduce their carbon-dioxide and other pollutant emissions, and help preserve natural resources. Green public procurement also often saves money for the institution! It is especially true for energy efficient public procurements that are best applied in the following areas:

- transport
- public lighting
- construction projects
- certain goods purchases.

Green procurement may include for example:

- purchasing products that belong to the best energy efficiency class for products that possess an energy label (refrigerators, light bulbs, dishwashers, air conditioners, vehicles, tyres)
- exceeding the effective national criteria when renovating buildings
- purchasing recycled paper instead of whitened paper, etc.

In accordance with European Union directives, Act CVIII of 2011 on public procurement offers the option of putting forth environmental, sustainability preferences in public procurement procedures. Item 20 of Section (1) of Article 182 of the Act allows the government to regulate through a decree the exact conditions and the scope of committed parties of green public procurements.

Green public procurement rejects the approach that purchasers should take the cheapest offer. Green requirements have outstanding significance among the selection criteria. Next to the one-time purchase price, the lifecycle cost approach helps determining real mid-term and long-term expenses. Green requirements can appear in several parts of the call for proposals. They can be part of the eligibility criteria, the technical specifications or the terms and conditions, or they can be incorporated into the evaluation criteria. Thus, instead of the cheapest offer, the economically and environmentally best or “altogether most beneficial” offer is accepted.

[6] Definition: Green procurement is a process whereby purchasers seek to procure goods, services and works with a reduced environmental impact throughout their life cycle when compared with goods, services and works with the same primary function that would otherwise be procured. In green public procurement, purchasers consider certain environmental, sustainability or energy efficiency requirements, or requires the application of certain eco-friendly solutions in certain phases of the procurement procedure.

Green public procurements should be introduced gradually with expert assistance. This can be facilitated by creating a green public procurement policy. The policy helps the institutions to determine the requirements for experts, to establish organizational and formal frameworks, and equally importantly, to create commitment.

4.2 Modernisation of local government buildings

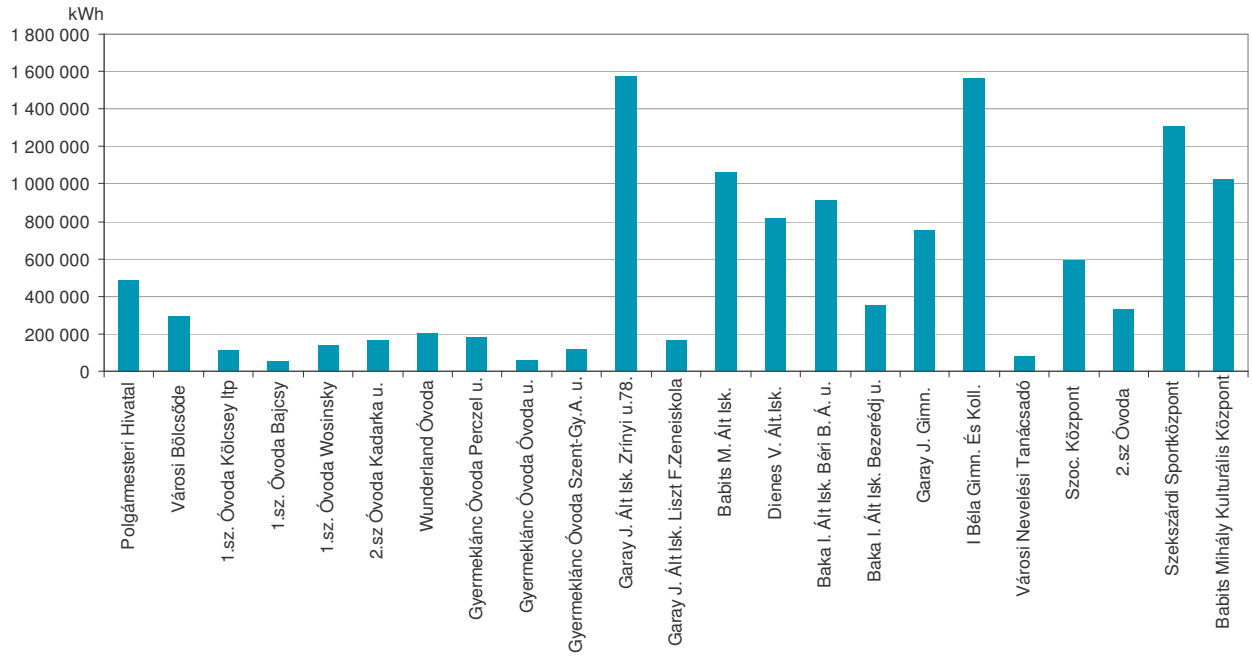
We converted the consumption data provided by the local government into kWh for all the institutions in order to be able to summarize them. According to these data, almost 90% of the energy use of local government institutions is the consumption of natural gas and district heating, so the consumption of these buildings is primarily related to the use oif heat (heating, hot water).

Energy management assessments and renovations should be started in institutions that consume outstandingly high amounts of energy as these buildings are generally the most likely to yield the highest energy savings.

The following chart shows that the energy consumption of the following buildings was outstandingly high in 2011:

- Garay J. Elementary School (Zrínyi Street)[7]
- I. Béla High School and Dormitory
- Babits M. Elementary School
- Dienes V. Elementary School
- Baka I. Elementary School (Béri B. Street)
- Sports Centre
- Cultural Centre

[7] This institution is owned by Szekszárdi Vagyonkezelő Kft. (Szekszárd Asset Management Ltd.), which is owned solely by the local government. This can lead to difficulties in utilizing certain public resources via tenders.

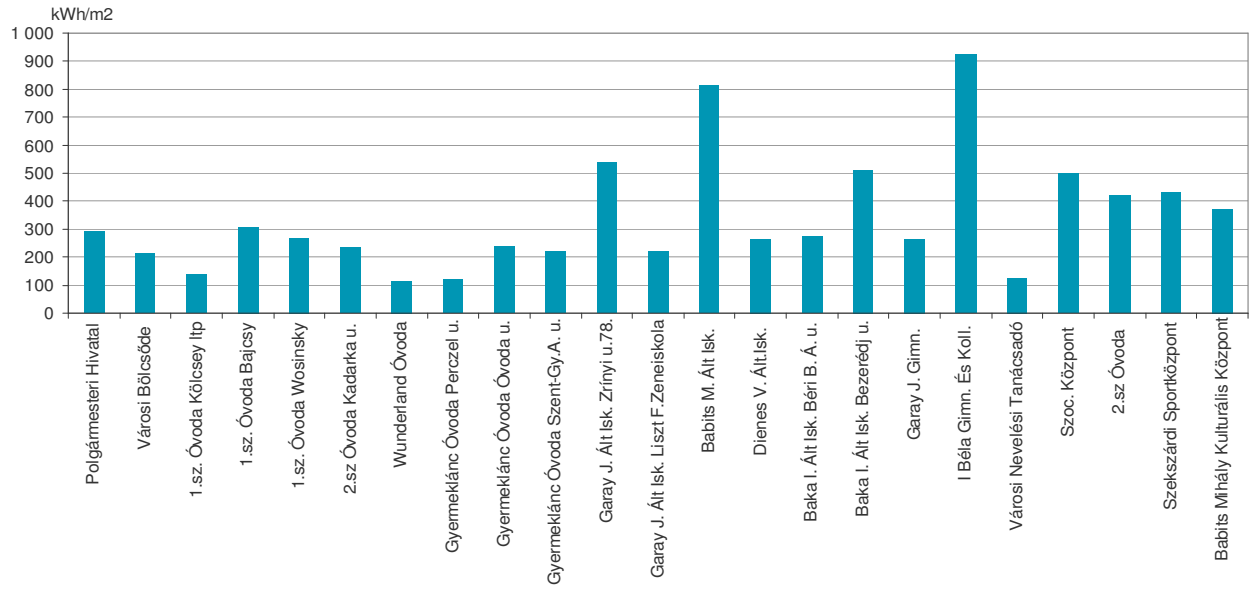


13. Figure: Government buildings' final energy consumption (2011)

Electricity consumption is outstandingly high in I. Béla High School and Dormitory, in the Sports Centre and in the Cultural Centre.

If we convert the annual energy consumption into a per square metre value, the institutions with the highest consumption are the following:

- Garay J. Elementary School (Zrínyi Street)
- Babits M. Elementary School
- Baka I. Elementary School (Bezerédj Street)
- I. Béla High School and Dormitory
- Social Centre
- Kindergarten No. 2
- Sports Centre
- Cultural Centre



14. Figure: Government buildings' final energy consumption per m2 (2011)

It should be added, however, that the energy consumption of institutions depends on several factors, such as the opening hours, the number of persons using the building, the character of the institution, etc. Comparison of the buildings are therefore has its limits. Each building should be viewed separately – the charts were made only as an illustration.

According to model calculations,[8] in their original state, without modernisation the various educational and office-like buildings built more than 25-30 years ago will classify as F or G on the scale from I to A+ used for energy certifications. This means an average energy consumption of 200-350 kWh/m^2/year in theory.[9]

The theoretical, calculated consumption obviously differs (possibly significantly) from real consumption as rooms are not always heated to 20°C, and the average external temperature determined in the calculation methodology[10] may also differ from the actual temperatures, etc.

[8] Cost optimization of buildings' energy performance requirements in Hungary, Energiaklub, 2012

[9] This is the amount of primary energy sources to be burnt to heat 1 m^2 area of the institutions to 20°C under the given weather conditions, to produce hot water and operate various building engineering systems (lighting, air conditioning, etc.).

[10] Ministerial decree 7/2006, government decree 176/2008

4.2.1 Energy efficiency modernisation

Building structure

According to data collected by the municipality, out of the 23 institutions only 3 have external thermal insulation, and 2 more with partial thermal insulation. The situation of windows is somewhat more positive, 6 of the 23 institutions replaced its windows in the past 10 years, and 11 replaced part of its windows.

As a result of the modernisation of the building structure (external thermal insulation, replacing windows), school and office-like buildings can reach energy efficiency classifications of C-D according to model calculations, so their energy needs decrease by 30-40%. The return of investment period of the projects is usually 10-15 years, which falls well within the lifetime of the installed materials (approx. 30 years). Thus local governments only profit from the completed projects through diminished energy costs for the remaining 15-20 years.

For buildings without thermal insulation and old windows it is absolutely profitable to investigate the possibility of such projects, especially for institutions with outstandingly high consumption.

Building engineering

According to data provided by the local government, the heating systems of institutions are typically 15-20, or even 30 years old, so options for heating modernisation should be investigated.

For institutions, modernising the full building engineering system – replacing the furnace with a condensing furnace and creating controls, replacing the heat emitters, renovating the hot water system, insulating the pipelines, modernising and controlling the lighting system, replacing lamps, installing a heat recovering air conditioning system – results in significant further energy savings. According to the model calculations, with these interventions in addition to structural renovations the buildings can reach A-A+ energy efficiency categories.

13 of the institutions in Szekszárd have district heating, which limits modernisation, but replacing radiators and controlling temperatures can be achieved here as well.

According to the city's financial program, the lighting systems of the institutions are 30-40 years old; the lamps are in poor condition and cannot be repaired, and they do not meet today's standard requirements. Modernisation is urgent because the National Public Health and Medical Officer Service (ÁNTSZ) performed audits and disapproved the low level of lighting in areas that fall short from the standards.

Summary

When preparing the SEAP, we calculated with facade and ceiling insulation, window replacement and building engineering modernisation for all buildings where no such renovation has been done according to local government data.

To what extent should the energy efficiency of walls, floors and ceilings be improved? Energy management and profitability calculations confirm that using stricter requirements than the current Hungarian regulations (Ministerial decree 7/2006) yield better results. Considering both initial investment costs and annual energy costs, renovating with stricter requirements is a “cheaper” solution for building users. Since the project is for a 25-30 year time period, once we start modernising we should endeavour to exceed the required values for new constructions.

The objective of the European Union (Directive 2010/31) is also minimizing the number of buildings that were poorly renovated. In accordance with this, the Hungarian government approved a decree (1246/2013) that sets forth stricter building engineering requirements for public buildings starting from January 2015, and for other buildings starting from 2018. State energy efficiency calls for proposals will include the new, stricter requirements for any building type from 2015 on.

A few examples of new requirements (for more information see Government decree 1246/2013):

walls: U=0,24 W/m^{2}K

ceiling: U=0,17 W/m^{2}K

windows: U=1,15 W/m^{2}K

Therefore these technical parameters should be considered when planning the project and requesting quotes.

Expected energy savings (MWh/year)

For our calculations, we took into account the tender application calculations (Szemünk Fénye, TIOP) prepared for the modernisation of local government buildings. According to this, if all the institutions of local government are renovated by 2020, institutions in Szekszárd can save up to 7400 MWh. According to the proposal for the Szemünk Fénye tender, the lighting modernisation of the 17 local government institutions would amount to approx. 414 MWh from this total.

Expected decrease in carbon-dioxide emissions (tons/year)

If all local government institutions underwent energy efficiency renovations by 2020, the city’s greenhouse gas emission would decrease by approx. 2000 tons.

Deadlines / periods (start and end) to be set for proposed measures, scheduling – steps, estimated length

1. Selection of buildings

As mentioned above, energy management assessments should begin at institutions that consume outstandingly high amounts of energy because the total energy savings would be highest for such buildings. However, different situations may also arise: aged, dysfunctional equipment (heating system, windows), the level of comfort (people feeling cold) are sufficient to require intervention, these could also be considered in terms of the selection.

Start: 1st June 2014

End: 31st December 2015

2. Energy management assessment (audit, certification)

Before the projects are implemented, unique technical calculations are needed. An energy audit shows, based on specific expert calculations, which the most urgently improved areas are, what works can yield the highest energy savings or return on investment in the specific building.

Start: 1st June 2014

End: 31st December 2017

3. Planning and realisation of the projects determined during the energy management assessment

Start: 1st September 2014

End: 31st December 2019

4. Follow-up of the impact of the projects determined during the energy management assessment

The impact of completed projects can be measured if the person responsible for energy management regularly monitors the energy consumption. It is advisable to provide information on the achieved results to the municipality's decision makers and representatives. This can boost further projects.

Start: 1st June 2015

End: 31st December 2021

5. Dissemination of results

The achieved results should be disseminated to the wider public for shaping attitudes, encouraging investments and sharing know-how. The local and county media are suitable for this, as well as the local government's website, the website or Facebook page of the Hungarian National Association of Local Authorities (TÖOSZ) or even the Energiaklub.

Start: 1st June 2015

End: 31st December 2021

Department, person responsible for implementation and coordination

Planning, preparation, monitoring of projects: Urban Development and Operations Department and Tender and Public Procurement Department of the local government of Szekszárd city with county rights

Information, dissemination of results: Mayor's Cabinet

Planned costs

The price of an audit or certification depends on the size of the building, the scope of available technical data, the certifying company, etc. Our estimate shows that the cost of an assessment would be approx. HUF 3-5 million altogether for the institutions that need renovating.

We estimate the total costs of the energy efficiency projects at HUF 1.3 billion. The energy efficiency modernisation of institutions usually yields a return on the investment within 8 to 15 years. More specific costs and returns can be calculated when the energy assessments are performed.

Available financial resources

Regional and Municipal Development Operational Programme (TOP) (not open for applications yet)

4.2.2 Solar thermal collector projects for local government institutions

Introduction

Solar thermal collector systems should be installed on buildings that need hot water all year round. For educational institutions, such a project is only feasible if the building is not vacant during the summer, because persistent high temperatures in idle periods are harmful to the collectors. Although the right orientation and tilt angle are important factors when installing thermal collectors, aesthetical considerations should also be considered. The efficiency of the system does not drop significantly with slight deviations from the ideal

orientation and tilt angle, therefore it is not sensible to install the collectors on a scaffolding frame that deviates significantly from the plane of the roof. Erecting solar thermal collectors on a frame also creates great wind-load. The optimal tilt angle of solar thermal collectors depends on the function of the collector system. For solar thermal collector systems that produce hot water for consistent use all year, the optimal tilt angle is 40-45°. If the solar thermal collector system is primarily aimed at heating assistance during the winter half-year, the optimal tilt angle is 55-60° because of the lower position of the sun. For hotels, swimming pools and similar facilities operating in the summer half-year, the solar thermal collectors should be angled lower, at a tilt angle of 25-30°. Optimal orientation is mostly necessary if the solar thermal collector system is mainly used for heating in the winter half-year. To facilitate easy control, solar thermal collectors used within the same system should be installed with identical tilt angles and orientation, in equal sized fields.[11]

Based on the above considerations, the dormitory building of I. Béla High School would be a good site to install solar thermal collectors because there is demand for hot water all year round. The 26 solar thermal collectors can be installed on top of the flat roof of the dormitory building, therefore suitable orientation and tilt angle can be achieved using scaffolding. Solar thermal collectors could be installed to satisfy the hot water needs of the kitchen operating at Garay János Elementary School as well, a total of 28 thermal collectors can be installed there.

The local government applied for subsidies in the TIOP program for the renovation of the Homeless Shelter, the Family Daycare and the Kadarka Street Old Folks' Home, and for the purchase of solar thermal collectors. The three buildings could altogether host 28 2 m^2 solar thermal collectors.

Department, person, organization, enterprise responsible for implementation and coordination

Planning, preparation, monitoring of projects: Urban Development and Operations Department and Tender and Public Procurement Department of the local government of Szekszárd city with county rights.

Deadlines / periods (start and end) to be set for proposed measures, scheduling – steps, estimated length

Already submitted TIOP projects will be realized upon evaluation with the deadlines set in the call for applications.

Realization of the projects can begin directly after the action plan is approved, but in case of budgetary restraints it may be sensible to wait for TOP calls for tenders, and apply for subsidies for the projects. Thus for solar thermal collector projects, scheduling depends

[11] Further information: http://naplopo.hu/tudastar/szakcikkeink-hasznos-irasaink/228-a-napkollektorok-elhelyezese

partially on the availability of subsidies. Preparation of the projects, planning of the systems should be started before the calls for tenders are announced so that the local government can apply for these subsidies with good chances even if the application period is short.

Start: 1st September 2014

End: 31st December 2020

Planned costs, return on investment

The realization of solar thermal collector systems for 1 m^2 of solar thermal collector surface typically costs HUF 150 to 250 thousand. This is a gross system price including all necessary materials and construction. Smaller systems are more expensive per square meter, larger ones are cheaper.[12] For estimating the costs displayed in the Sustainable Energy Action Plan we calculated with a gross price of HUF 200,000/m^2, which brings the total cost of these projects to HUF 34.44 million.

Available financial resources – full amount, the total of resources from the local government and other sources

Regional and Municipal Development Operational Programme (TOP) (not open for applications yet)

Expected renewable energy production (MWh/year)

A one square meter solar thermal collector within an average system can produce approximately 550 to 650 kWh in a year in Hungary under average conditions.[13] The geographical conditions of Szekszárd are beneficial for utilizing solar energy, therefore the expected renewable energy production can be estimated to be at least 600 kWh/m^2/year. The estimated energy production of the planned systems is 103.3 MWh/year.

Expected decrease in carbon-dioxide emissions (tons/year)

The hot water supply and heating are provided by natural gas furnaces and the district heating network in the institutions mentioned, therefore the emission factors of natural gas (0.202) and district heating (0.228) must be used for calculating the potential decrease in carbon-dioxide emissions. The decrease of greenhouse gas emissions owing to the projects can be estimated at approx. 21.7 tCO_2eq/year.

[12] http://www.naplopo.hu/miert-napenergia/gazdasagossag-megteruelesi-ido
[13] http://www.naplopo.hu/miert-napenergia/gazdasagossag-megteruelesi-ido

4.2.3 Solar panel projects for local government institutions

Owing to the well-developed electricity network, solar panel systems feeding into the grid can be installed on the whole territory of the city. When selecting the installation sites, the orientation and inclination of the roof must be taken into account. Under Hungarian weather conditions and climate, the ideal placement requires a southern orientation and an angle of 30 to 40 degrees. The performance of solar systems is still relatively good with an orientation between southeast and southwest and at an angle of 20 to 50 degrees, so solar panels can be installed profitably under these conditions as well. Shading is also an important factor: even a 10% partial shade can lead to a performance drop of 30 to 50%. The state and static stability of the roof are also influencing factors for installation. If the roof requires renovation during the lifetime of the solar panels, this work should be performed before installation. The statics of flat roofs are often not suitable for the installation of solar panels, the wind-load for such installations must be considered in the planning stage.

The local government plans several solar panel projects on the properties it maintains. Information pertaining to the planned measures is provided below.

Introduction

The local government's plans include installing solar panel systems on public institutions of Szekszárd that have high electricity consumption. According to plans, solar panels should be installed by 2020 on I. Béla High School, Garay J. Elementary School, Baka I. Elementary School (Béri B. Á. Street) and Babits M. Elementary School. These solar panel systems could partially satisfy the institutions' own energy demand, and could feed into the grid and this decrease energy costs. Most of these buildings have flat roofs, thus much more solar panels can be installed on them as on buildings with saddle roofs, our calculations suggest a total of 1116 solar panel modules. Later other public institutions could be equipped with solar panels.

Department, person, organization, enterprise responsible for implementation and coordination

Planning, preparation, monitoring of projects: Urban Development and Operations Department and Tender and Public Procurement Department of the local government of Szekszárd city with county rights

Deadlines / periods (start and end) to be set for proposed measures, scheduling – steps, estimated length

Realization of the projects can begin directly after the action plan is approved, but in case of budgetary restraints it may be sensible to wait for TOP calls for tenders, and apply for subsidies for the projects. Thus for solar panel projects, scheduling depends partially on the availability of subsidies. Preparation of the projects, planning of the systems, studying

the conditions for dealing with grid licensees should be started before the calls for tenders are announced so that the local government can apply for these subsidies with good chances even if the application period is short. We advise that these projects should be performed within the next 1-1.5 years for the listed four institutions.

Start: 1st September 2014

End: 1st March 2016

Planned costs, return on investment

The expected costs naturally also depend on the time of the completion for these projects. The three planned projects include the installation of solar panels with a total output of 279 kW_p, which at current solar panel prices means an investment cost of approx. HUF 195.3 million.

Available financial resources – full amount, the total of resources from the local government and other sources

To finance energy management modernisation of public institutions, including solar panel installations, the local government can apply for calls for tenders to the Regional and Municipal Development Operational Programme (TOP).[14]

Expected renewable energy production (MWh/year)

With the geographical conditions of Szekszárd in mind, 1 kW of solar panels can produce 1150 kWh per year.[15] The project implemented on four sites is estimated to produce 321 MWh/year of renewable energy with the solar panels.

Expected decrease in carbon-dioxide emissions (tons/year)

Installing solar panel systems decreases the amount of electricity purchased from the grid. For estimating the expected decrease in carbon-dioxide emissions, we must use the emission factor of the Hungarian electricity mix (0.36 tCO_2eq/MWh). The three projects can decrease carbon-dioxide emissions by 115.5 tCO_2eq/year altogether.

[14] The first calls for applications of the operative programmes will be announced in 2014.

[15] http://re.jrc.ec.europa.eu/pvgis/apps4/pvest.php#

4.3 Modernisation of residential buildings

The energy consumption and carbon-dioxide emission figures reflect that the highest consumers and biggest emitters in the city are residential buildings, i.e. households. This sector has therefore the largest potential for savings.

4.3.1 Energy efficiency modernisation of residential buildings

Introduction

The local government can facilitate the modernisation of residential buildings with various instruments.

It can encourage residential projects through advisory services and providing news on calls for tenders. The simplest way to do this is regularly reporting on national, regional or even international tenders in the local media. A more advanced method is opening a local advisory service office where one or more experts could give proposals to people on the suggested renovations. The city's environmental protection program also plans for the creation of an Energy Saving Information Service (Energiatakarékossági Információs Szolgálat) in cooperation with NGOs.

Installation subsidies can have the largest impact, which can be non-refundable or refundable (loans) as well. A good solution would be for the local government to create a fund that gives refundable subsidies (with favourable interests) to households for certain parts of a project, to be repaid within a fixed term in fixed instalments. Part of this fund would be recreated in the following years through the payment of the instalments. Organizing and creating such a fund would require a large degree of cooperation and great efforts on the local government's part, therefore it seems more feasible to do it on a regional level (e.g. in cooperation with the South Transdanubian Regional Development Agency). The first step should be the preparation of a financial plan and submitting the proposal to the city's decision-makers.

Expected energy savings (MWh/year)

According to our calculations, if one fifth of the households implemented energy efficiency modernisation projects in their homes by 2020, the city's energy consumption would drop by over 15 thousand MWh.

These savings could be further increased by replacing out-of-date household appliances: if 20% of the households replaced their old (over 15-20 years old) refrigerators with a modern one, the city's electricity consumption would decrease by approx. 1862 MWh.

Expected decrease in carbon-dioxide emissions (tons/year)

The energy efficient modernisation of residential buildings by 2020 would decrease the municipality's greenhouse gas emissions by 2400 tons, and replacing household appliances would further decrease them by 670 tons.

Deadlines / periods (start and end) to be set for proposed measures, scheduling – steps, estimated length

1. Providing information on tenders

Start: 1st September 2014

End: 31st December 2020

2. Establishing an advisory services office

Start: 1st April 2015

End: 31st December 2020

3. Launching a local / regional / micro-regional renovation fund

Start: 1st January 2016

End: 31st December 2020

Department, person responsible for implementation and coordination

Coordination and advisory services can be performed by the Urban Planning and Operations Department, tasks pertaining to the revolving fund can be done by the Financial Department of Szekszárd city with county rights.

The completion of the projects is the responsibility of people living in the buildings, the local government can only encourage energy efficiency modernisation among the residents.

Planned costs

Providing information on tenders does not require additional costs from the local government.

The costs of personal advisory services depend on the opening hours, i.e. the number of advisors necessary. In the beginning, 1 advisor can perform this task – depending on his/her other duties, it can be the energy management expert – over a half day or one day a week.

The additional, non-refundable local government subsidies to complete state resources, with a subsidy intensity of 25%, would require approx. HUF 1.8 by 2020.

For a local / regional / micro-regional fund, some of the resources could probably be collected from banks, savings co-operatives, international loan programmes. This there may not be a need for direct local government resources.

Available financial resources

Advisory services: EU programmes (Horizon2020) and programmes of other European countries (e.g. Norwegian tenders), domestic tenders (e.g. Zöld Forrás – Green Source programme of the Ministry of Rural Development), etc.

Renovation fund: EU subsidy programmes combined with loans (e.g. ELENA, MLEI), European Energy Efficiency Fund, or programmes of the European Investment Bank.

4.3.2 Solar thermal collector projects for residential buildings

Introduction

It is expected that the utilization of renewable energy sources will increase in residential buildings as well. Solar thermal collectors that can satisfy the hot water demand and maybe to assist heating are relatively easily installable, economical solutions to decrease the fuel demand of buildings, primarily of family homes.

1-1.5 square metres of solar thermal collectors per person can produce most of the hot water necessary. This equals savings of 60-70% annually on average, which is almost 100% in the summer half-year, and 30-40% in the winter half-year.[16] The Sustainable Energy Action Plan sets the objective of installing solar thermal collector systems of a surface area of 4 m^2 onto 20% of family houses in Szekszárd by 2020.

Department, person, organization, enterprise responsible for implementation and coordination

As these projects are implemented within the population, the primary responsible persons are the owners of the family homes that are renovated or refurbished. The local government can encourage such projects by setting up an information office or point where it informs residents about the effects of such measures, the potential savings, the costs and return periods of projects. The office can provide information constantly to the residents on available tender resources, it can assist them (even free of charge) in applying to those, and it can recommend trustworthy, preferably local experts and enterprises to partake in the execution.

[16] http://www.naplopo.hu/miert-napenergia/alkalmazasi-terueletek/napkollektoros-rendszerek/melegviz-keszites

Deadlines / periods (start and end) to be set for proposed measures, scheduling – steps, estimated length

As the realization of solar thermal collector projects for family homes falls beyond the local government's authority, it is not sensible to assign a strict schedule to this measure.

Start: 1st September 2014

End: 31st December 2020

Planned costs

A solar thermal collector system with a surface area of 4 m^2 can be installed for approx. gross HUF 600,000-1,000,000 including all components and installation. The SEAP worksheet does not contain these costs because these projects will not be implemented from the local government's budget. Completing the necessary projects costs HUF 1064 million altogether.

Available financial resources – full amount, the total of resources from the local government and other sources

The public could apply for non-refundable state subsidies for solar thermal collector installations in the National Energy Conservation Programme until 2008, and in the Green Investment Scheme (ZBR) from 2009. The last ZBR announcement available for households was in 2013. Similarly to previous years, it is expected that residents will be able to apply for project subsidies for the installation of household solar thermal collector systems.

A good solution would be for the local government to create a fund that gives refundable subsidies (with favourable interests) to households installing solar thermal collector systems for certain parts of a project, to be repaid within a fixed term in fixed instalments. Part of this fund would be recreated in the following years through the payment of the instalments. Organizing and creating such a fund would require a large degree of cooperation and great efforts on the local government's part, therefore it seems more feasible to do it on a regional level (e.g. in cooperation with the South Transdanubian Regional Development Agency).

Expected renewable energy production (MWh/year)

With the conditions of Szekszárd in mind, with ideal orientation and installation, the energy production attainable with the solar thermal collectors is 600 kWh/m^2/year. If solar thermal collector systems of 4 m^2 surface area each are installed on 20% of family homes, the expected renewable energy production will be 2553.6 MWh/year.

Expected decrease in carbon-dioxide emissions (tons/year)

In terms of the expected decrease in carbon-dioxide emissions, we assumed that the heat produced by solar thermal collector systems installed by households will replace the use of natural gas. In this case the decrease in carbon-dioxide emissions can be estimated at 515.8 tCO_2eq/year.

4.3.3 Solar panel projects for residential buildings

Introduction

Owing to the price drop in solar panel modules, solar panel systems feeding electricity back to the grid have begin to spread among the residential sector. In the Sustainable Energy Action Plan we calculated with 20% of family houses installing solar panel systems by 2020, each family house holding a 3 kW system.

The spread of solar panel systems feeding electricity back to the grid is encouraged by the so-called “sell-buy” accounting where the electricity provider charges according to the balance of solar energy produced and fed into the grid and solar energy purchased from the grid, deducting the former from the latter in the bill. The legislation[17] offers monthly, semi-annual or annual balance accounting periods.[18]

Department, person, organization, enterprise responsible for implementation and coordination

As these projects are implemented within the population, the primary responsible persons are the owners of the family homes that are renovated or refurbished. The local government can encourage such projects by setting up an information office or point where it informs residents about the effects of such measures, the potential savings, the costs and return periods of projects. The office can provide information constantly to the residents on available tender resources, it can assist them (even free of charge) in applying to those, and it can recommend trustworthy, preferably local experts and enterprises to partake in the execution.

Deadlines / periods (start and end) to be set for proposed measures, scheduling – steps, estimated length

[17] Government Decree No 273/2007 (X. 19.) on the implementation of certain provisions of Act LXXXVI of 2007 on Electricity.

[18] Section (5) of Article 5: If the household power plant injects electricity into the public utility system at the given connection point, the electricity trader or the provider of universal services being in a legal relationship with the operator of the household power plant as a user shall apply monthly, semi-annual or annual balance accounting, as agreed on by the parties, in respect of the total electricity injected into the network and the total purchased electricity per metering period.

As the realization of solar thermal collector projects for family homes falls beyond the local government's authority, it is not sensible to assign a strict schedule to this measure.

Start: 1st September 2014

End: 31st December 2020

Planned costs, return on investment

A solar panel system with an output of 3 kW can be installed for approx. gross HUF 1,960,000 including all components and installation. The SEAP worksheet does not contain these costs because these projects will not be implemented from the local government's budget. Completing the necessary projects costs HUF 2085 million altogether.

Available financial resources – full amount, the total of resources from the local government and other sources

The public could apply for non-refundable state subsidies for solar panel installations in the National Energy Conservation Programme until 2008, and in the Green Investment Scheme (ZBR) from 2009. The last ZBR announcement available for households was in 2013. Similarly to previous years, it is expected that residents will be able to apply for project subsidies for the installation of household solar thermal collector systems.

A good solution would be for the local government to create a fund that gives refundable subsidies (with favourable interests) to households installing solar thermal collector systems for certain parts of a project, to be repaid within a fixed term in fixed instalments. Part of this fund would be recreated in the following years through the payment of the instalments. Organizing and creating such a fund would require a large degree of cooperation and great efforts on the local government's part, therefore it seems more feasible to do it on a regional level (e.g. in cooperation with the South Transdanubian Regional Development Agency).

Expected renewable energy production (MWh/year)

With the geographical conditions of Szekszárd in mind, 1 kW of solar panels can produce 1150 kWh per year.[19] If 3 kW solar panel systems are installed on 20% of family homes by 2020, the total renewable energy production would amount to 3671 MWh/year.

Expected decrease in carbon-dioxide emissions (tons/year)

Installing solar panel systems decreases the amount of electricity purchased from the grid. For estimating the expected decrease in carbon-dioxide emissions, we must use the

[19] http://re.jrc.ec.europa.eu/pvgis/apps4/pvest.php#

emission factor of the Hungarian electricity mix (0.36 tCO_2eq/MWh). The planned projects can decrease carbon-dioxide emissions by 1321 tCO_2eq/year altogether.

4.4 Company (industrial and service sector) buildings

4.4.1 Energy efficiency projects for companies

Introduction

A 20% energy reduction goal can be set for 2020 in the service sector. The local government can play a similar role in encouraging the pursuit of this goal as pertaining to residential buildings: it can help complete such projects primarily through providing advisory services and information. In the past years several enterprises implemented energy modernisation projects from tender resources in Szekszárd. Subsidy programmes financed from EU structural and cohesion funds will be available for enterprises in the 2014-2020 programme period as well, probably also for energy efficiency modernisation projects.

Deadlines / periods (start and end) to be set for proposed measures, scheduling – steps, estimated length

1. Providing information on tenders

Start: 1st June 2014

End: 31st December 2020

2. Establishing an advisory services office

Start: 1st April 2015

End: 31st December 2020

Department, person responsible for implementation and coordination

The local government can encourage modernisation through the advisory services office and information campaigns, but implementing the projects is the companies' responsibility.

Expected energy savings (MWh/year)

If industrial and service companies achieved an energy decrease of 20% by 2020 the city's energy consumption would drop by over 34 thousand MWh.

Expected decrease in carbon-dioxide emissions (tons/year)

Energy efficient renovation of the buildings of the service sector by 2020 would decrease the municipality's greenhouse gas emission by approx. 4700 tons.

Planned costs

Providing information on tenders does not require additional costs from the local government.

The costs of personal advisory services depend on the opening hours, i.e. the number of advisors necessary.

Available financial resources

Advisory services: EU programmes (Horizon2020) and programmes of other European countries (e.g. Norwegian tenders), domestic tenders (e.g. Zöld Forrás – Green Source programme of the Ministry of Rural Development), etc.

4.4.2 Renewable energy projects for companies

Introduction

The share of the industrial and service sectors of Szekszárd's electricity consumption in the baseline year of 2011 was 68%. This high ratio shows how important it would be for companies to implement renewable energy projects producing electricity. The Sustainable Energy Action Plan sets the goal of satisfying 10% of the industrial and service sectors' electricity consumption by solar panels, which would be achievable by installing approx. 7 MW of solar panels.

Department, person, organization, enterprise responsible for implementation and coordination

Similarly to the renewable energy projects for residential buildings, the local government is not directly responsible for the implementation of these projects. It can, however, encourage companies to complete such projects through advisory services, attitude-shaping programmes or even by introducing regulatory instruments.

Deadlines / periods (start and end) to be set for proposed measures, scheduling – steps, estimated length

As the realization of solar panel projects for companies falls beyond the local government's authority, it is not sensible to assign a strict schedule to this measure.

Start: 1st September 2014

End: 31st December 2020

Planned costs

Similarly to household projects, the costs of installing the solar panel systems for companies do not burden the local government budget, therefore these costs are not included in the SEAP worksheet. Installing the solar panel system of approx. 7 MW of output would have an initial cost of approx. gross HUF 4.5 billion, but it depends largely on the size of systems to be installed, as the per kW installation costs are lower for bigger systems. The estimated cost of HUF 4.5 billion is calculated for small, 3 kW systems, in reality we can expect the installation of systems with higher outputs by companies.

Available financial resources – full amount, the total of resources from the local government and other sources

Between 2007 and 2013 local governments, enterprises and non-profit organizations could apply for subsidies for installing systems using solar energy in the framework of the Environment and Energy Operational Programme (KEOP), which drew from the EU's structural funds. In the 2014-2020 period the Environment and Energy Efficiency Operative Programme (KEHOP) and the Economic Development and Innovation Operative Programme (GINOP) will probably available for companies to apply for subsidies for the implementation of energy efficiency projects.

Expected renewable energy production (MWh/year)

The goal set in the Sustainable Energy Action Plan is to satisfy 10% of the electricity consumption of the industrial and service sectors with solar panels, which would amount to renewable energy production of almost 8000 MWh/year.

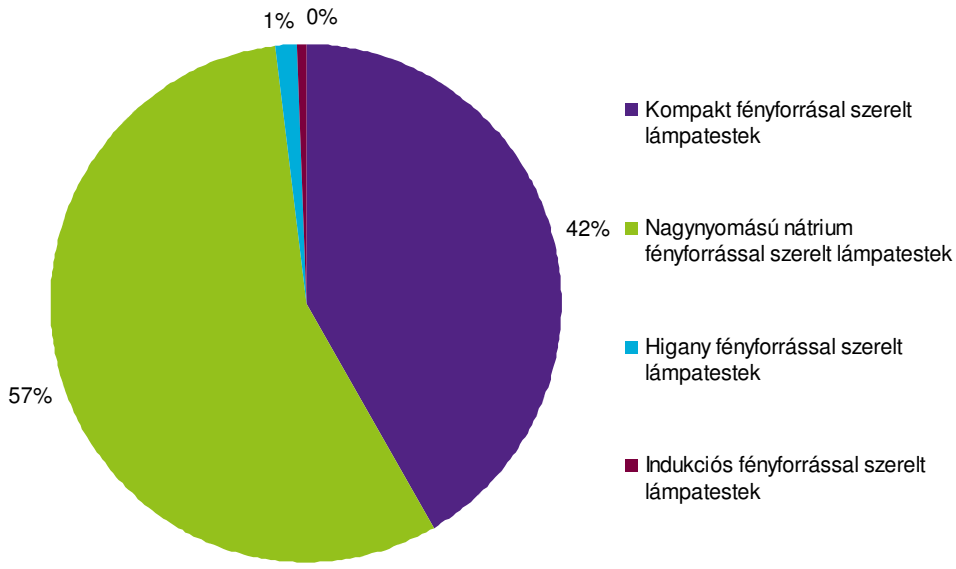
Expected decrease in carbon-dioxide emissions (tons/year)

Installing solar panel systems decreases the amount of electricity purchased from the grid. For estimating the expected decrease in carbon-dioxide emissions, we must use the emission factor of the Hungarian electricity mix (0.36 tCO_2eq/MWh). The planned projects can decrease carbon-dioxide emissions by 2876 $tCO_2eq/year$ altogether.

4.5 Public lighting

Introduction

The lighting fittings currently operating in Szekszárd's public lighting system are mostly high-pressure sodium lamps installed along main traffic routes, in the city centre, in parks and in estate areas. There are mainly compact fluorescent tubes along lower order roads with lower traffic, and mercury-vapour lamps operate only in fringe areas and suburban residential areas. Altogether 4399 lighting fittings are currently in function in the city, the highest portion of which are outdated high-pressure sodium lamps.



15. Figure: The lamp types of public lighting before renewal

In 2013 the city applied for a KEOP tender for the modernisation of public lighting. The main objectives of creating a smart public lighting system are decreasing electricity use and operational costs, and minimising light pollution.

Modernisation will affect 4366 lighting fittings, thus only 1% of the fittings (33 pieces) will remain unchanged in Kadarka Street. These were replaced by induction lights in the framework of a pilot project realized by EON, and are owned by EON. The lighting fittings to be installed are almost all LED lighting fittings, with 35 compact fluorescent tubes.

Expected energy savings (MWh/year)

The modernisation is expected to diminish the electricity consumption of the public lighting system by 30%, which equals 415 MWh.

Expected decrease in carbon-dioxide emissions (tons/year)

The diminished electricity consumption would lead to a decrease of pollutant emissions by approx. 150 tons in the city.

Deadlines / periods (start and end) to be set for proposed measures, scheduling – steps, estimated length

Modernisation is already underway.

Department, person responsible for implementation and coordination

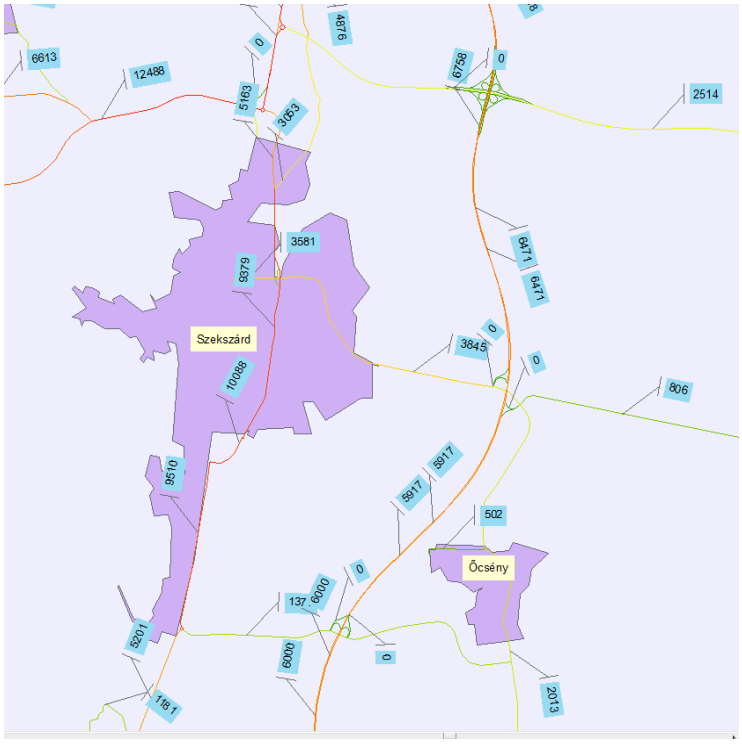
Local government of Szekszárd city with county rights: Tender and Public Procurement Department, Urban Development and Operations Department

Planned costs

The full cost of the project is HUF 640 million.

4.6 Transport

The following figure shows the traffic count data commissioned by the local government.



16. Figure: Traffic data around Szekszárd

Based on these data, the results of expert calculations and models pertaining to current fuel consumption can be summarized in the following table:

Current situation	number	Fuel (Litre)
private cars, gasoline	3411	2,548,247.69
private cars, diesel	1137	896,946.80
freight vehicles	476	815,478.78
buses	107	1,548,004.91
Total		5,808,678.18

17. Figure: Fuel consumption by vehicle type

The measures proposed pertaining to transport are set by the development concept of the transport system of Szekszárd and surroundings.[20] The short and medium term proposals articulated in the studies are summarized in the below table:

	Adottságok, kapcsolódó regionális és országos fejlesztések	**Gyalogos forgalom**	**Kerékpározás**	**Közúti forgalom**	**Parkolás**	**Közforgalmú közlekedés**	**Teherforgalom, áruszállítás**
Jelenlegi állapot	Az M6/M60 autópálya Dunaújváros-Pécs közötti szakaszának átadása, Szekszárdnál három csomóponti kapcsolattal.	Béla király tér – Garay tér sétáló utca. Szent István tér – Luther tér – Bajcsy-Zsilinszky utca gyalogos tengely.	Déli kerékpáros főútvonal-hálózat. Nem kezelt kerékpártárolás.	2x2 sávos észak-déli tengely. Tehermentesítő főútvonal.	Két díjzónás tarifális parkolási övezet.	Kompromisszumos, nem letisztult helyi hálózat. Erőteljes helyi szerepű helyközi hálózat. Nincs tarifaközösség.	
Rövid távú beavat-kozások			A kerékpártárolás fejlesztése **(B+R)** az intermodális csomópont valamint intézmények. Az északi városrészben gerinchálózat fejlesztése. Minőségjavítás, állagmegőrzési feladatok.	Az M6 átadása nyomán átrendeződő forgalom vizsgálata. Csomóponti beavatkozások **(Keselyűsi csomópont rendezése)** Átmenő forgalom „TRANZIT" forgalomtechnikai jelzésekkel való terelése.	Felszíni parkolásnál Időkorlát (1-2 óra) alkalmazása. „3".díjzóna kialakítása a peremen jelentkező parkolási feszültségek oldására. P+R parkoló a vasútállomás környezetében. Piac téri mélygarázs megvalósítása.	Pontszerű beavatkozások, zavarkezelési és hozzáférhetőségi racionalizálások **(Csatári rendezés, Keselyűsi csomópont rendezése) Utastájékoztató rendszerek bővítése.** Kínálatbővítő hálózatfejlesztések, új területek bekapcsolása.	Az átmenő teherforgalom nagy hányada az M6 autópályán keresztül bonyolódik. Teherforgalom korlátozása a tehermentesítő út kivételével: 3,5t, kivéve engedéllyel.
Középtávú (5-10 év) beavatkozások		- A Béla király tér – Garay tér – Szent István tér gyalogos rendszer **„Gemenc Sétány"** felületeinek egységesítése és bővítése. Széchenyi utca felületeinek bővítése. Séd patak – Tinódi utca – Szent László utca **„Babits Sétány"** gyalogos rendszer fejlesztése	A kerékpárút-hálózat fejlesztése az északi városrészben és a városmagban (Széchenyi utca – Béri Balogh Ádám utca, legalább a rendelőig) Meglévő tárolók színvonalának fejlesztése.	Forgalomcsillapítás a belső területeken. Damjanich utca – 56-os főút csomópont mozgási irányainak bővítése. Rákóczi F. utca Damjanich utca – Mátyás király utca közötti szakaszán 2x1 forgalmi sáv.	Rákóczi F. utca Damjanich utca – Mátyás király utca közötti szakaszán a kétoldali parkolás engedélyezése a jelenlegi forgalmi sáv helyén. Széchenyi utca Szent László utca – Garay tér közötti szakaszán felszíni parkolási tilalom. Mobil parkolás bevezetése. Mélygarázsok, parkolóházak építése.	Előnyben részesítés buszzsilipekkel az észak-déli tengely mentén, a közúti kapacitás ellenében. Hálózati kínálatbővítés városi körjárattal a 4 belső pólust érintve (állomás, Damjanich u. – Széchenyi utca – Béla tér – Kórház)	

[20] Prepared by Városkutatás Kft. and Közlekedés Kft. in 2010.

If the above developments are completed, the expert studies suggest that traffic would decrease in the city as follows:

Traffic	Road traffic	Public transportation traffic	Freight traffic, goods delivery
Current situation	4550 private vehicles	107 buses	476 freight vehicles
After short term interventions	4100 private vehicles	110 buses	200 freight vehicles
After medium term interventions	3700 private vehicles	120 buses	200 freight vehicles

Note: According to expert calculations, the decrease in private and freight transport could not be fully compensated through increasing pedestrian and bicycle transport, therefore they calculated with a small increase in public transportation (buses). They assumed the purchase of buses with a Hungarian average fuel consumption; if better, new buses are purchased the consumption of public transportation would be somewhat lower than the value put forth in the below table (by approx. 10%).

Million litres	Road traffic	Public transportation	Freight traffic, goods delivery
Current situation	3.44	1.55	0.81
After short term interventions	3.10	1.59	0.34
After medium term interventions	2.80	1.73	0.34

We used all these data for preparing the Baseline Emission Inventory and the template of the Sustainable Energy Action Plan.

Expected energy savings (MWh/year)

In a medium run, almost 20% of the energy consumption arising from transport, 9580 MWh could be saved with the above actions.

Expected decrease in carbon-dioxide emissions (tons/year)

This would decrease pollutant emissions by 2476 in the city.

Department, person responsible for implementation and coordination:

Local government of Szekszárd city with county rights: Tender and Public Procurement Department, Urban Development and Operations Department

Planned costs:

The transport development concept and the background studies prepared for it did not contain data on the costs of the actions. As these are enormous, unique, complex projects, calculating these costs would be beyond the scope of this document.

4.7 Attitude shaping, information

Informing the public is necessary for various reasons and on various levels: on one hand it is important to inform residents of the goals set by the local government, the planned actions, renovations of institutions, changes. On the other hand they need information and actions, campaigns helping them to become active and committed in order to encourage them to take steps in their own lives and households.

Introduction

1. Publishing series of articles on given subjects, energy tips, reports and articles on interesting initiatives

The cheapest and most flexibly manageable information platforms are themed websites and Facebook. Their obvious disadvantage is that some of the residents, especially elderly people are not users. Local communication channels (county newspapers, local government news sites, etc.) should also be taken advantage of.

The local government does not necessarily have to build these up from scratch: different organisations (including Energiaklub) have created numerous information publications and websites that can be used or linked on the municipality's website.

Start: 1st June 2014

End: 31st December 2020

2. Events

Events with a theme are suitable platforms for bringing expert companies and residents together, as well as other economic actors. According to experience, even events with non-energy subjects welcome organizations that bring diversity to the event's profile and provide useful knowledge to visitors. These events usually attract larger audiences than energy industry days, therefore these should also be taken into account when planning an attitude shaping programme.

Start: 1st June 2014

End: 31st December 2020

3. Education

Programmes, campaigns organized in educational institutions provide long term effects in addition to direct savings: the attitude conveyed to children in their most formative age will show its influence when this generation comes into adulthood. Related NGOs, organizations working in the field of education and environmental education can be involved in the realization of such programmes.

Start: 1st June 2014

End: 31st December 2020

Department, person responsible for implementation and coordination

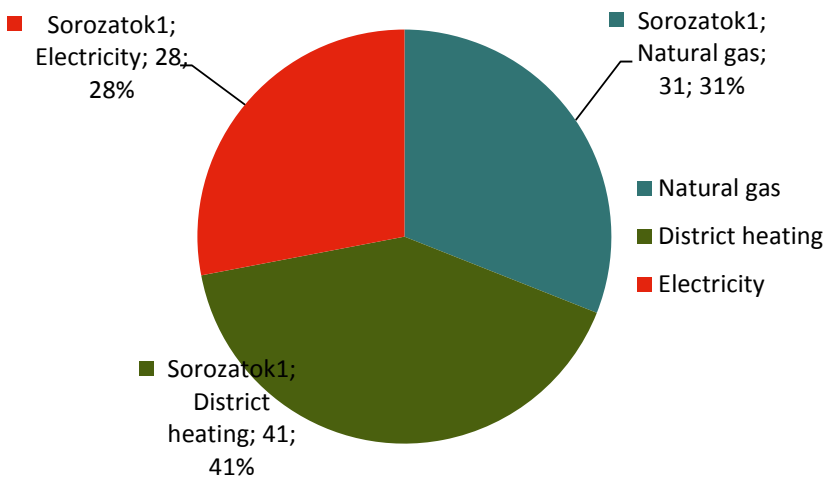
Local government of Szekszárd city with county rights: Human Resources Department

Planned costs

- Educational material for schools, kindergartens (approx. 1000 copies): depending on the material, approx. HUF 300-500 thousand
- Informational publication (printed, 5000 copies): approx. HUF 2 million
- Organizing one event annually: costs depend on the nature of the event and on requirements (etc. sound, etc.).

4.8 Purchasing energy from the free market

The local government has been purchasing electricity from MVM Partner Energy Trading Ltd since 1st January 2014. Compared to the universal service provider average price, this means savings of HUF 5.28/kWh. Similar options should be explored for natural gas because natural gas costs amount for approximately the same portion in the local government's budget as electricity.



18. Figure: Share of energy costs in government's budget

This measure cannot result in energy savings but it would reduce the local government's expenses, and the remaining resources could be used to support energy efficiency programmes or procuring renewable energy sources.

The local government of Szekszárd spent a total of HUF 270 million in 2011 on the energy bills of local government institutions.

5. Monitoring implementation, proposed indicators

Regular evaluation of the progress made towards the 2020 objectives is fundamental for achieving the planned decrease in energy consumption and carbon-dioxide emission. The status of the planned measures, the changes in the energy consumption of different sectors and the related greenhouse gas emission changes should be regularly reviewed and compared with the methodology of the Sustainable Energy Action Plan. The local energy management expert may be responsible for preparing the calculations, analyses pertaining to energy management.

If the leadership of Szekszárd city with county rights decides to join the Covenant of Mayors, the city shall undertake, like other member municipalities, to submit a report every two years on the implementation of the actions after the preparation of the Sustainable Energy Action Plan to facilitate the monitoring of implementation. The Covenant requires member municipalities to submit qualitative reports every two years, and a Monitoring Emission Inventory with quantitative data every four years. Compliance with the foreseen objectives can be measured or estimated with the same methodology, based on the same statistical data as used for the energy consumption and carbon-dioxide inventories (see Sections 2.2 and 2.3), for the given year, respectively (2016, 2018, 2020). Further information pertaining to the preparation and submission of the monitoring report can be found on the Covenant of Mayors website.[21]

[21] http://www.polgarmesterekszovetsege.eu/about/covenant-step-by-step-implementation%20reports_en.html

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