

# Energy

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## Situation Analysis

Energy situation of Somogy County is recommended to analyse with examining three main factors: availability of energy sources (inter alia raw materials); extent of energy exploitation and production; and the way of distributing the energy to the consumers (mainly electricity).

The structure of energy sources in Somogy County is consisted of two different groups: primer energy sources (including renewable sources standing first on the list) and secuder sources (as bio gas, bio mass and bio fuels). As for the primer group, fossil sources that can be economically utilized represent a little ratio within renewable energies.

## Available Energy Sources and Their (Way of) Utilisation

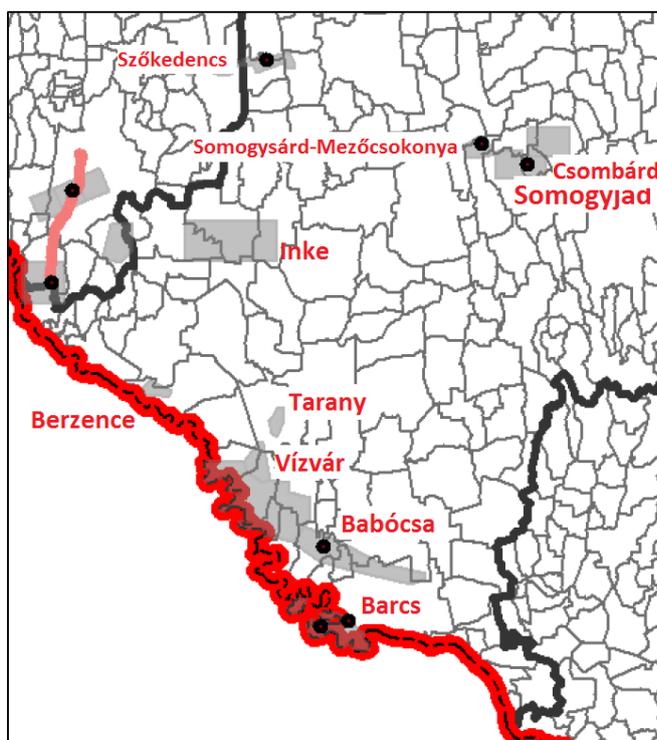


Chart 1. Hydrocarbon fields in Somogy county (2012, TEIR) (fields coloured by grey, exploitation spots by black)

### Hydrocarbon Stocks

In Somogy county, hydrocarbon sources (oil and gas) is being exploited in the surroundings of Babócsa, Barcs, Berzence, Vízvár, Tarany, Csombárd, Mezőcsokonya, Somogyjád, Somogysárd and in the fields located near Inke, Szőkedencs and Törökkoppány-1.

The field of Görgeteg-Babócsa contains gas – methane in particular - and oil in a little volume. Similar fields are found in the cross-border region of the Drava basin as well<sup>1</sup>, and they are being exploited. Governments of Croatia and Hungary mutually wish to expand the hydrocarbon utilisation in the border region in the medium term. The Hungarian Oil Company (MOL) also carries out research activities into new fields in the region.

No coal mines can be found in the county, though turves are being utilised in small quantities in the surroundings of Kiskorpád, Sávolj, Somogysámson and Szőkedencs.

<sup>1</sup> Molnár Mária, 2011: A Pannon-medence szénhidrogén rendszerei és főbb szénhidrogén mezői ([http://kornyezet.elte.hu/cimlap/hu/kornytan/Zarovizsga/Vedes\\_prez/110701/MolnarMaria.pdf](http://kornyezet.elte.hu/cimlap/hu/kornytan/Zarovizsga/Vedes_prez/110701/MolnarMaria.pdf))

It needs to be mentioned, however, that barren measures are potentially able to store CO<sub>2</sub> geologically.<sup>2</sup> There are 76.2 million of tons storage capacity in the county that can be used for CO<sub>2</sub> capture for environment protection purposes in the future.

### **Renewable Energies (water, solar, geothermal, wind power, biomass)**

Somogy county has a great potential especially in biomass as well as geothermal and solar energy. To use water energy, river Drava theoretically offers a great opportunity for energy production though more uncertainties like its nature as a border river flowing across a National Park, or the plan to use the stream for eco-tourism can set a bar against the purpose.

### **Biomass, Bioethanol**

Primer energy sources based on biomass are of the biggest stocks in the county, and there are fields ready to be exploited. The number of existing bio gas plants is also planned to be extended with new establishments, for example by setting up small-scale wood-burning power plants for the regions rich in forests. Conditions for producing biomass-based energy sources is very good even compared to the country level, since forest coverage with a ratio of 34.75% in Somogy county exceeds both the national (20.66%) and regional (26.25) levels on one hand; and the volume of spin-offs from farming and agriculture to be used for energy purposes is also of high account on the other. Areas with great wood and forest coverage exceeding the average (500,000 m<sup>3</sup> of quantity by settlements) are mainly located near Iharosberény, Szentá, Tarány, Lábod, Csokonyavisonta, Barcs; in the surroundings of Marcali and Nagybjajom, and of Szenna and Bőszénfa in the region of Dél-Zselic.

Spin-off based renewable energies coming from agriculture are typically piled up in highly-valued fields performing big outcomes, especially in the regions of Marcali-Balatonszentgyörgy, settlements alongside the Lake Balaton – Siófok, Fonyód and Lengyeltóti in particular – and the small settlements north, northeast to Kaposvár in the regions of Iharosberény-Csurgó. For energy plantation, however, lower-valued agricultural fields are considered more suitable to use, such as the regions of Belső-somogy table-land and Kadarkút-Bőszénfa in the Zselic. Cities of Kaposvár and Barcs are those settlements where views are already outlined to establish biomass power plants. It can be stated that the size of corn fields altogether in Somogy County, which is the material to produce bioethanol of, is making these area the fifth largest in Hungary. (100,803 acre of size; HCSO, 2013). No bioethanol plant can be found in Somogy county yet, since the establishment planned in Marcali is still not set up.

### **Biogas**

As for the commodities needed to the production of biogas, Somogy county has an average potential: according to statistical data, the staff of animals came to 31,000 head of cattle and 133,000 head of pig in 2013, making the county take an average place in this regard in Hungary. The great volume of spin-off coming as a result from the production of sugar beet, however, offers Somogy County a unique potential. Within the sugar refinery centre operating in Kaposvár more bio gas plants deal with using the spin-offs (with the capacity of 47.5 million m<sup>3</sup>/annum bio gas, using 80-100 thousands of tons sugar beet slice). There is one more bio gas plant operating in Várda, and a few more is planned to be set up in

<sup>2</sup> Magyar Bányászati és Földtani Hivatal honlapja, Széndioxid tárolók (<http://www.mbfh.hu/home/html/index.asp?msid=1&sid=0&hkl=755&lng=1>)

Balatonszabadi, Kutas and Nagyatád in the near future. It has to be mentioned, though, that bio gas that performs the most efficient amount of energy can be produced by utilising sewage sludge (320-750 m<sup>3</sup>/thousand kg), therefore sewage sludge produced in sewage works of the county is to be considered as the other important energy source, in addition to the fact that it is a recycling method as well.

### Geothermal Energy

Somogy County abounds in geothermal energy sources (differentiating the sources as one that is near the ground; and the other, the heat energy captured by the deep strata). Geothermal energy production can be efficiently used particularly in the micro-regions of Marcali and Kaposvár, where the amount of heat transferred by the ground heat exceeds 2.5 PJ per annum. This rate is near 2 PJ in the micro regions of Barcs and Nagyatád as well. For the utilisation of geothermal energy karstic or porous strata filled with thermal water in the deep are needed. These kinds of strata can be mainly found in the district of Külső-Somogy in Somogy county (alongside Marcali-Tab region), and areas with smaller extent south, southeast from Kaposvár where temperature of water expected to come to the surface can reach 70-90 Celsius. Areas with porous strata filled with thermal water capable to be used for energy purposes are primarily located to north, northeast from the river Drava, especially in the surroundings of Barcs and Nagyatád (thermal water here with a temperature of more than 50 Celsius is 1000-1200 m deep under the ground). According to the data provided by the VITUKI there are 64 piece of water well in the county, of which 45 are operating and 19 are out of use. Latest information reveals that geothermal energy plant is to be established by the City of Csurgó in Hungary and City of Kapronca in Croatia (studies have been prepared in 2011).

### Solar Energy

The use of solar energy depends on the number of sunny hours to a great extent, which is significantly influenced by the geographical characteristics and the climate. Areas that get the most amount of solar energy (1295 kWh/m<sup>2</sup> per annum) are located south of Marcali-Kaposvár-Tab. More than a half of the territory of the county (areas south, southeast of Barcs – Nagybjom – Tab) experiences more than 2000 sunny hours a year while in the other parts of the region sunny hours almost exceed 1951-2000 hours per annum too. In Hungary, and in Somogy County too, the period between March and October is most probably the most favourable time to utilise solar energy. During this period almost full needs of the population for hot water could be met purely by using solar energy. Based on the temperature changes experienced in the middle years of the last decade, weather-stations providing meteorological data on county level (Baja, Nagykanizsa, Pécs, Siófok) records rising monthly average temperatures at all stations, compared to the averages of many years. These data justify the process of global warming, and proclaim solar energy a role of higher importance in the energy structure of the region. There is now no solar power plant operating in the region. 20 years ago, photovoltaic cells were producing in Kaposvár; at present, some companies are dealing with making solar collectors (e.g. in Siófok and Segesd). Most probably solar energy will be used only in small areas or buildings, albeit the idea of establishing a solar cell park has been already drawn up.

### Water Energy

Water power potential of Hungary to be technically used is appx. 1000 MW (which is certainly more than a used or useable potential just for electricity production), of which river

Drava gets the largest ratio of 7% among the inland waters concerning Somogy county. In the county, including the river section of the Drava along the Hungarian border, there is no water power plant. Considering the runoff data of the rivers flown across the county, only the Drava is the stream on that economically sustainable water power plant could be established (though significant costs of nature protection should be faced with): according to data provided by the South-Transdanubia Water Management Directorate the average runoff of the Drava is 530-570 m<sup>3</sup>/sec, while the second largest stream the Kapos has a 1.74 m<sup>3</sup>/sec performance, and the volume for the third one the Nagykoppány is only 0.59 m<sup>3</sup>/sec. Based on the information above, Kapos river would not be suitable to have a water power plant, but be able to supply small-scale electricity at local level by setting up minor plants on the stream.

### Wind Power

The geographical characteristics of the county do not show favour for using wind power. When you're 10 metre above sea level in the triangle of Balatonszentgyörgy – Pécs – River Danube area, the wind speed is 2 and 3 m/sec, but reaches a 4.5 m/sec value in the south-eastern part of Lake Balaton. These wind speeds are only able to operate windmills or small-scale wind generators. 70 metre high above sea level, however, the speed of the wind towards Szántód-Pécs can exceed the limit to use it for energy purposes. In the surroundings of Kőröshegy and Kaposvár - Toponár the wind speed reaches the value of 4.8-5.0 m/sec. Measuring the speed 100 metre above sea level shows the wind can blow with a 7m/sec speed in the areas of Balatonszentgyörgy-Marcali, Fonyód, and Látvány-Somogybabod, while Somogyvár-Igal can also have 6-7 m/sec wind force.

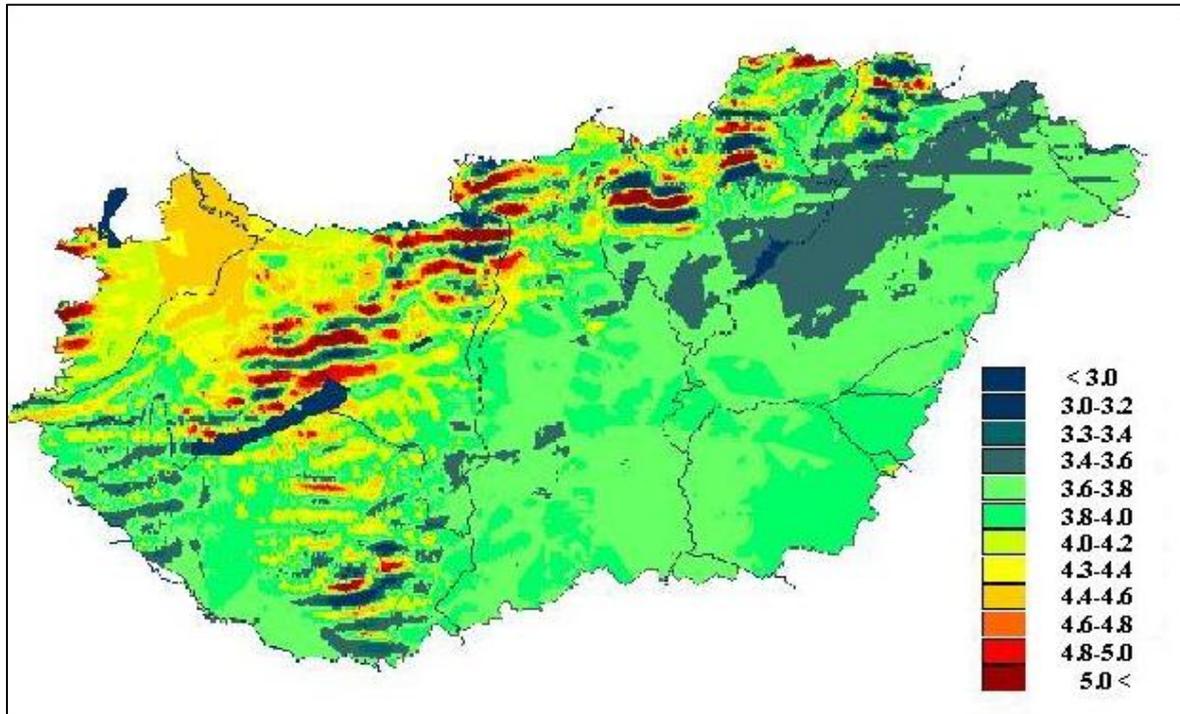


Chart 2. Average wind force 70 metre above sea level (OMSZ)

This speed of wind would prove to be enough to make a wind power plant with medium-scale performance operate. In Somogy county the investment of Wind Power Plant Park of Gölle was the closest to the implementation (permit plan) when the settlement applied to the

Hungarian Energy and Public Utility Regulatory Authority for 48 MW energy production; 25 pieces of wind tower were planned to build. There are efforts to establish wind power plants in the Balaton Kiemelt Üdülőkörzet too: in Szőlősgyörök (25 MW) and in Kánya (22x50kW). However, due to the national law on regional development adopted to the Development Plan of Somogy County as well, the investments are not to be implemented awhile.

## Energy Supply Systems, Infrastructure

### County Level Electricity Network

Since more routes and pipelines of the biggest energy networks are concerning Somogy County, the area is connected to both the domestic and international electricity systems. The national high-voltage power-current of 400kV crosses the county through Hévíz – Toponár – Paks and Toponár – Pécs, and more sections of the 120 kV national electricity transportation route concern the area too. In addition to them, the region is connected to the hydrocarbon network through one national service pipe lying down in the county.



Chart 3. National transportation routes(MVM)

Four levels of electricity systems can be differentiated by functions and management. The basis of the electricity supply systems are the high-voltage networks including wirings with 750 kV, 400 kV, 220 kV and 120 kV, and the power plants connected to them. Wires of 120 kV supply larger industrial sites and cities. Except for these wires which are of regional competence to supply and managed by the South Transdanubian Department of E.ON Hungaria, all the high-voltage power-currents are owned and managed by the MVM.

The present system of high-voltage network meets the criteria set up for the use of electricity. The national high-voltage power-current of 400kV crosses the county through Hévíz – Toponár – Paks and Toponár – Pécs, and more sections of the 120 kV national electricity

transportation route are concern the area too. These are as follows: Kaposvár-Dombóvár, Kaposvár-Almamellék, Kaposvár-Csurgó, Nagykanizsa-Berzence, Barcs-Berzence, Kaposvár-Tab-Balatonszabadi.

The station with 400/120 kV performance as one of the junctions of the domestic electricity supply system operates in Toponár.

Somogy county is supplied with electricity through the national-level wiring of 120 kV. Smaller areas are connected to the system by joining the wire of 35 kV.

There is neither a new high-voltage wire nor new power plant with more than a 50 MW performance is planned to establish in the near future.

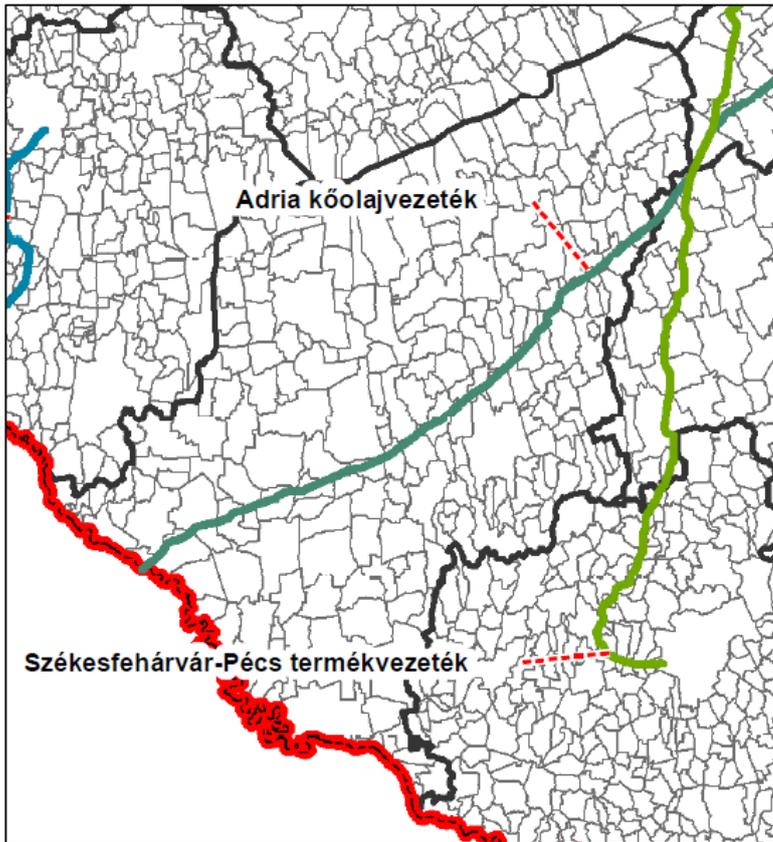


Chart 4. County level oil pipeleine (2012, TEIR)

### Hydrocarbon network

That is the National Structure Plans which defines the transportation routes of domestic and international hydrocarbon pipes. There is one national pipe from all these that goes through Somogy county: that is the Adria oil pipeline with the capacity of 10 million tons. The use of this pipeline could be of high significance to the economic performance of Hungary with its capability to transport the whole amount of oil needed to the country. After many years however, the impact of the war in the former Yugoslavia, still makes barriers to use it regularly, transfer fees are extremely high. This is one of the most significant energy lines both for Somogy County and for Hungary for a long term, but the oil refineries and other establishments to utilise oil are too far the place to use the pipe for its general purpose. (Situation

is similar across the border in Kapronca County.)

Hydrocarbon network is consisted of gas pipelines which connect the settlements of the county to the system. In the next 10 years no new gas or oil pipelines are expected to build, though has to be mentioned that there is a want of two international transport routes with higher capacities, to meet the growing needs for gas and easier transfer. There is no need, however, for building new oil pipeline since Adria pipe is already being in the region.

As for the regional coverage of gas supply, 80% of settlements in Somogy County are connected to the system. Only areas of southern, southeast part of the county (Belső-Somogy) and smaller villages of Zselic hills suffer from shortfall in supply. Has to be noted, however, that some settlements in the neighbouring Baranya County neither are nor covered with full gas supply either.

Regional disparities can be noticed for the rate of connections to the gas system too: while the

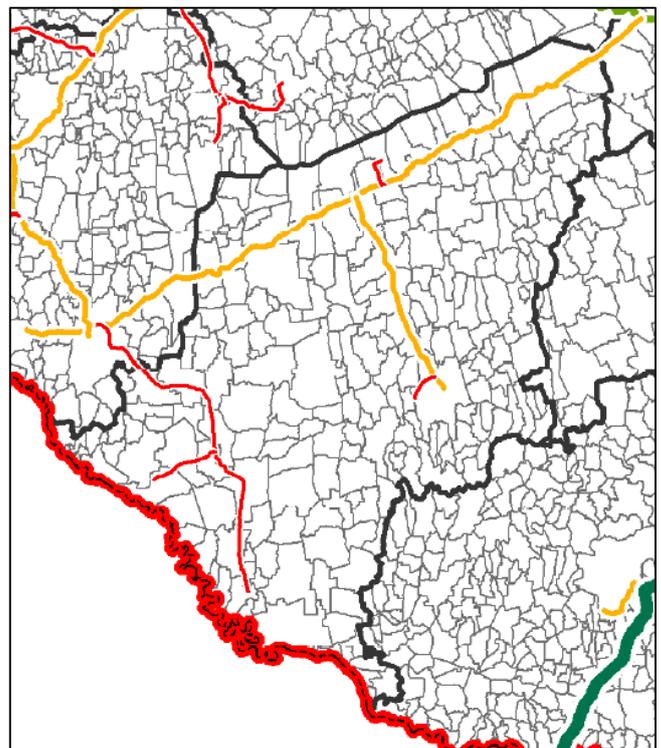


Chart 5. Gas piplines running through the county (2012, TEIR)

rate of households join the net is high (70-90%) in the settlements alongside Lake Balaton (90%), in the surroundings of Kaposvár and Barcs, the rural parts of the county suffer from lower rates (not exceeding 30%).

## Energy Efficiency and Energy Consumption

### Electricity

As for its territorial distribution, per household consumption of electricity is high (2000-2700 kWh) in the inner parts of the county (alongside Nagybjom-Kaposvár) and settlements in the agglomeration of Kaposvár; in the surroundings of Csurgó and the Lake Balaton.

1. table Electricity consumption per household, monthly average (kWh/month) (KSH, 2013)

Territorial unit	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012
Baranya	181,0	192,3	188,5	185,7	188,9	176,3	179,3	179,7	179,3	183,9	179,9
Somogy	145,1	155,5	157,5	163,2	159,7	158,3	155,9	144,3	130,9	134,4	132,5
Tolna	217,2	247,9	227,9	221,4	220,6	212,5	209,8	195,1	186,8	191,5	188,7
Southern Transdanubia	176,0	191,4	186,1	185,4	185,1	177,7	177,4	169,9	162,7	166,9	164,0
National total	175,0	178,8	172,5	184,9	185,3	181,4	186,1	185,9	181,0	178,9	174,7

The monthly average consumption per household has been slowly growing till 2004-2005 followed by a drop of 10-15% since 2008. The reason for that partly can be the spread of a more environmentally conscious way of life and the broader use of energy-efficient technologies. On the other hand, the growing price of electricity and the negative impact of world economy crisis are rather to blame for noticing a reduction in the consumption. In Somogy County the consumption has been reducing by more than the national average.

### Gas

Gas is mainly utilised for heating in Somogy county: the rate of households within the whole housing heated by gas is almost 100% in microregions near Lake Balaton: regions of Balatonföldvár, Fonyód and Siófok. Gas is used for heating in microregions of Kadarkút, Csurgó and Tab the least, not exceeding the rate of 38%. It can be stated that in areas with large forest cover gas utilisation for heating does not exceed the rate of 50%.

The rate of gas consumption per capita is the highest in the surroundings of Siófok and Kaposvár, while lower in the southern, southeast parts of the region, but generally can be stated that northern parts possess a higher ratio than the southern ones.

**2. table Average gas-consumption per household (cubic meter/month) (KSH, 2013)**

Territorial unit	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012
Baranya	80,1	108,2	92,5	125,1	116,0	97,7	99,7	97,5	85,7	71,2	71,0
<b>Somogy</b>	<b>118,1</b>	<b>115,9</b>	<b>89,6</b>	<b>107,4</b>	<b>96,3</b>	<b>77,6</b>	<b>76,9</b>	<b>80,3</b>	<b>77,1</b>	<b>53,0</b>	<b>50,4</b>
Tolna	150,4	152,7	123,2	146,6	132,4	106,7	113,1	117,1	96,4	78,2	75,0
Southern Transdanubia	<b>105,4</b>	<b>117,9</b>	<b>97,7</b>	<b>122,5</b>	<b>110,4</b>	<b>91,4</b>	<b>93,2</b>	<b>94,7</b>	<b>84,5</b>	<b>65,1</b>	<b>63,1</b>
<i>National total</i>	<b>95,2</b>	<b>113,3</b>	<b>102,3</b>	<b>121,4</b>	<b>114,4</b>	<b>97,0</b>	<b>96,0</b>	<b>90,6</b>	<b>89,0</b>	<b>77,9</b>	<b>74,7</b>

Based on the statistical data recorded in the past 10 years, gas consumption per capita has been reducing: it was more than 100 m<sup>3</sup> a month in 2003-2004, and did not exceed the value of 53 m<sup>3</sup> a month in 2011. In the last two years consumption dropped below 80 m<sup>3</sup>/month. Using energy-saving technologies and buildings more frequently probably influence the reduction to a less extent; it is rather due to the growing gas prices and deepening poverty as the impacts of the economy crisis. Compared to the statistics at national level, gas consumption per capita in Somogy county is below the national average by 10-15%, similar to the national tendencies.

## Stakeholder Analysis

### Government Institutions, Authorities

#### Hungarian Office of Mines and Geology – Mining Authority of Pécs

Mining Authorities belongs to the supervision of Hungarian Office of Mines and Geology working as its regional offices. They are dealing with mining affairs in the first instance. Mining Authority of Pécs is responsible for the mining activities of South Transdanubian region, but the office is also involved with the control of oil and gas utilisation by having the right to permit research, exploitation activities and storage of gas.

#### Government Office For Somogy County

Government Bureau is to be partially involved with energy policy by taking part in permitting processes, cooperating with Land Registry Office and Woods and Forests Offices.

#### South Transdanubia Regional Development Agency

In recent years, the Agency acting as the intermediary body of Operational Program of Transdanubia was responsible for implementing regional development programmes financed by EU Funds. In the period of 2007-2013, the organisation helped to implement 904 projects financed by 241.7 billion Ft support. According to the latest information, in the next period of 2014-2020 the responsibility of the Agency will be confined to county level. The experience the organisation gained between 2007-13 is a great asset to be built upon and the use of it for cross-border cooperations is highly recommended.

### Energy Public Service Providers

#### MVM and Mavir

Hungarian electricity supply system is owned and managed by MVM Ltd. The Mavir Ltd. is the responsible organisation for the operation with the aim of securing full and safe supply and economic and efficient energy use.

#### E.ON DÉDÁSZ

E.ON Dél-dunántúli Áramhálózati Zrt.'s main activities have been the transportation of electricity and the secure operation of the requisite distribution networks, transformer substations, and switch gear. The company's main tasks include system operation, network development and maintenance, regional customer relations management, as well as tasks in regard to metering and monitoring consumption.

#### E.ON Dél-dunántúli Gázhálózati Zrt.

E.ON Dél-dunántúli Gázhálózati Zrt.'s primary activity is gas supply. The company went public in 1993 and was privatized in 1996, with a consortium of Ruhrgas and VEW purchasing the majority of its shares. The current majority shareholder of Dél-dunántúli Gázhálózati Zrt. is E.ON Hungária Zrt. The company's main tasks include system operation, network development and maintenance, regional customer relations management, as well as tasks in regard to metering and monitoring consumption.

## MOL (and INA)

MOL Group is pursuing exploitation and running infrastructure for the utilisation in the county (Croatian oil company INA is the member of MOL Group). The company in cooperation with Slovnaft is planning the modernization of Adria oil pipeline. Joint research activities in the border region are also being carried out with INA with the aim of extending the oil and gas production.

## Companies Dealing with Renewable Energies

### Lakics Gépgyártó Kft.<sup>3</sup>

It is very worth mentioning this Limited Co. based in Kaposvár which, in cooperation with the University of Pécs, initiated a joint project of building a small-scale wind power plant of 50kW performance, with the aim of using the establishment for pursuing RTD activities in place.

## SWOT Analysis

Strength	Weakness
<ul style="list-style-type: none"> <li>➔ Great potential in renewable energies including solar and wind power, geothermal energy, biomass and biogas, energy plantation</li> <li>➔ Great amount of corn available to be used for energy plantation</li> <li>➔ Biogas plant operating in Várda and Kaposvár with experience in running the business</li> <li>➔ Modern electricity network and high-voltage system</li> <li>➔ Hydrocarbon stocks available to be exploited</li> <li>➔ Adria oil pipeline crosses the county</li> </ul>	<ul style="list-style-type: none"> <li>➔ Utilisation of water streams for energy production is limited</li> <li>➔ No wind power plant</li> <li>➔ Partial gas coverage</li> <li>➔ No power plant</li> <li>➔ No bioethanol and biomass plant found despite the fact that raw materials are available</li> <li>➔ Institutions and firms operating with low energy-efficiency</li> <li>➔ Lack of capital discourages small-scale investments</li> </ul>

<sup>3</sup> „Közösen fejleszt szélérőművet a Pécsi Tudományegyetem és a Lakics Kft.” Somogy Portál, 2014.02.11. (<http://www.somogy.hu/index.php?cid=14779>)

Opportunity	Threat
<ul style="list-style-type: none"> <li>→ Funds for energy investments for the financial period of 2014-2020 of the EU</li> <li>→ Utilisation of renewable energies on local level to improve energy-efficiency of buildings and households</li> </ul> <p>Water energy:</p> <ul style="list-style-type: none"> <li>→ Cooperation between Hungary and Croatia to utilise water energy of river Drava</li> <li>→ Building small-scale water power plant on river Kapos</li> </ul> <p>Wind power:</p> <ul style="list-style-type: none"> <li>→ Setting up wind turbines particularly in the northern part of the region</li> </ul> <p>Solar power:</p> <ul style="list-style-type: none"> <li>→ Utilisation of solar power on household level</li> </ul> <p>Geothermal energy:</p> <ul style="list-style-type: none"> <li>→ Establishing heat-pump systems</li> </ul> <p>Energy plantation:</p> <ul style="list-style-type: none"> <li>→ Building biomass and bioethanol plants</li> </ul> <p>Non-renewable energy :</p> <ul style="list-style-type: none"> <li>→ Extended utilisation of hydrocarbon fields</li> <li>→ Broadening gas pipeline and electricity network towards Croatia (mitigating the isolation of the cross-border regions)</li> <li>→ Utilisation of Adria oil pipeline of high performance by diversifying national level oil supply</li> <li>→ Intergovernmental cooperations for oil utilisation in the cross-border regions</li> </ul>	<ul style="list-style-type: none"> <li>→ Lack of capital and strict regulation can curb utilisation of renewable energy sources</li> <li>→ Application deficiencies, not enough funds to apply for for energy investments</li> <li>→ No significant development in local economy despite the fact of extended exploitation of gas and oil</li> <li>→ Not enough investors show interest in energy business</li> <li>→ Financial problems of regional municipalities can make barriers to energetic investmens</li> <li>→ No interest in use of renewable energies, because of the lack of capital of companies and households</li> </ul>

## Identification of Key Challenges

There are **great opportunities in using renewable energies in Somogy county**. However, connection to the regions in the other side of the border to put it into practice is very limited since cross-border areas of both countries are partially isolated. It is very true for the energy sector as well.

It is **basically a challenge to use the regional characteristics efficiently, in terms of opportunities being both in renewable energies and agriculture**. Production of biomass, biogas and utilisation of geothermal energies offer the greatest asset for the county to use to achieve development.

**It would be worth utilising wind and solar power. Heating public institutions, buildings even flats by using geothermal energy could contribute to a long term and sustainable**

**operation.** Strong cooperation between Hungary and Croatia is suggested in this field as was experienced for a project in Csurgó before.

**Excellent opportunities lieing in energy plantation and production of biomass and bio fuels especially needs to be emphasised.** Agricultural spin-offs produced for energy purposes would set a good direction to the county to move toward.

**Energy-efficient reconstructions are necessary in public institutions and buildings, but justified even for flats and houses.** A community program on how to be more environmentally conscious and achieve energy savings is also highly recommended to carry out.

To reveal how energies can be utilised in the region elaboration of a study is suggested on the stocks of biomass, on the way and place of setting up power plants, and opportunities how to use geothermal energy on local level. Alternative energies can also contribute to agricultural activities as well.

There is a **general need expressed, that cross-border cooperation is necessary between the Hungarian and Croatian border regions**, even for implementing energy projects. Mainly small-scale investments can be initiated and implemented jointly, since larger infrastructural developments is not of regional competence and require huge financial support.

1. **Renewable energies should be utilized in greater scale.**
2. **Agricultural spin-offs produced for energy purposes would set a good direction to the county to move toward.**
3. **Energy-efficient reconstructions are necessary in public institutions and buildings, but justified even for flats and houses.**
4. **The challenge to use the regional characteristics efficiently, in terms of opportunities being both in renewable energies and agriculture.**
5. **There is a need to create local, cross-border cooperations in the field of renewable energies.**

## Cross-sectoral Linkages

### Agriculture

The sectors of energy and agriculture make huge synergies in Somogy. Plenty of possibilities are open for further utilization. One of them is the biofuel production.

The local agriculture are able to support economically the local biogas plants and this can be true to future biomass and bioethanol plants as well.

### Environment Protection, Natural Values

The use of renewable energy would contribute to limiting the load on environment, even though energy production emitting significant CO<sub>2</sub> does not exist in the county.

Since the region does not have energy producers who contribute to environment pollution to a great extent, this is one of the parts of the country where nature is the most preserved with the biggest biodiversity. However, the involvement of the water power of the river Drava in energy production might cause a real environmental damage.

### Regional Development

Improvement of energy performance of public institutions, buildings, households and companies and small-scale energy production on local level would grow the competitiveness of the region and contribute to the efficient use of funding sources.

### List of Publications Used:

KSH Statisztikai tájékoztató – Somogy megye, 2013/4 (KSH, 2014)

Somogy Megye Területfejlesztési Konceptiója (Somogy Megyei Önkormányzat, 2014)

Somogy Megye Területrendezési Terve (Somogy Megyei Közgyűlés 15/2004. (XII. 27.) önkormányzati rendelete)

Join Cross-border Enterprise Development Strategy for Somogy and Virovitica-Podravina Counties 2013-2020 (SOVISEC Project, 2012)

TEIR Országos Területfejlesztési és Területrendezési Információs Rendszer adatbázisa ([www.teir.hu](http://www.teir.hu))