

# GREECO

## Territorial Potentials for a Greener Economy

Applied Research 2013/1/20

(Draft) Final Report | Version 22/11/2013

Case Study

Vol 4.6. Southern Transdanubia (Dél-Dunántúl)



This report presents the draft final results of an Applied Research Project conducted within the framework of the ESPON 2013 Programme, partly financed by the European Regional Development Fund. The partnership behind the ESPON Programme consists of the EU Commission and the Member States of the EU27, plus Iceland, Liechtenstein, Norway and Switzerland. Each partner is represented in the ESPON Monitoring Committee.

This report does not necessarily reflect the opinion of the members of the Monitoring Committee.

Information on the ESPON Programme and projects can be found on

[www.espon.eu](http://www.espon.eu)

The web site provides the possibility to download and examine the most recent documents produced by finalised and ongoing ESPON projects.

This basic report exists only in an electronic version.

© ESPON & Regional Environmental Center - REC, 2013.

Printing, reproduction or quotation is authorised provided the source is acknowledged and a copy is forwarded to the ESPON Coordination Unit in Luxembourg.

## List of authors

### **Regional Environmental Center - REC (Hungary)**

Ellen Maria-Baltzar

## Table of Content

<b>1. EXECUTIVE SUMMARY .....</b>	<b>¡ERROR! MARCADOR NO DEFINIDO.</b>
<b>2. GENERAL DESCRIPTION OF THE REGION .....</b>	<b>6</b>
2.1. GEOGRAPHY .....	6
2.2. STATE OF INFRASTRUCTURE.....	7
2.3. DEMOGRAPHICS .....	8
2.4. ADMINISTRATIVE STRUCTURE .....	9
2.5. GOVERNANCE.....	9
<b>3. REGIONAL ECONOMY .....</b>	<b>10</b>
3.1. OVERALL ECONOMY OF THE REGION .....	10
3.1.1. GPD and value added.....	11
3.1.2. Employment .....	14
3.1.3. Foreign Direct Investments .....	14
3.2. IMPORTANCE OF DIFFERENT ECONOMIC SECTORS IN THE REGION .....	14
3.2.1. Building and construction.....	15
3.2.2. Transport.....	16
3.2.3. Bioeconomy .....	16
3.2.4. Industry .....	16
3.2.5. Energy.....	17
3.2.6. Green research and eco-innovation .....	17
3.2.7. Water and Waste .....	17
3.2.8. Tourism .....	18
3.3. SELECTION OF KEY GREEN ECONOMIC SECTORS.....	19
<b>4. SECTORS OF THE GREEN ECONOMY .....</b>	<b>19</b>
4.1. BIOECONOMY .....	19
4.1.1. Performance of the sector .....	19
4.1.2. Drivers, barriers and enabling conditions .....	25
4.1.3.1. Identification and description of external .....	25
4.1.3.2. Policies as an internal driver .....	25
4.1.3.3. Institutions as an internal driver .....	29
4.1.3.4. Financing as an internal driver .....	29
4.1.3.5. Others drivers.....	30
4.1.3.6. Description of problems and barriers encountered within sectors .....	30
4.1.3. Spatial dimensions of the development of the bio-economy sector .....	31
4.1.4. Links with other sectors .....	32
4.1.5. Potential for development of the sector .....	32
4.2. ENERGY .....	33
4.2.1 Performance of the sector .....	33
4.2.3 Key milestones.....	40
4.2.4 Drivers, barriers and enabling conditions .....	40
4.2.4.1 Identification and description of external drivers.....	40
4.2.4.2. Policies as an internal driver .....	41
4.2.4.3. Institutions as an internal driver .....	47
4.2.4.4. Financing as an internal driver .....	48
4.2.4.5. Others drivers.....	50
4.2.4.6. Description of problems and barriers encountered within the energy sector.....	50
4.2.5. Spatial dimensions of the development of the sector .....	52
4.2.5. Links with other sectors .....	52
4.2.5. Potential for green economy development of the energy sector .....	52
4.3. GREEN INNOVATION AND RESEARCH .....	54
4.3.1. Performance of the sector .....	54
4.3.2. Key Milestones.....	61
4.3.3. Drivers, barriers and enabling conditions .....	61

4.2.3.1.	<i>Identification and description of external drivers</i> .....	61
4.2.3.2.	<i>Policies as an internal driver</i> .....	62
4.2.3.3.	<i>Institutions as an internal driver</i> .....	64
4.2.3.4.	<i>Financing as an internal driver</i> .....	66
4.2.3.5.	<i>Others drivers</i> .....	67
4.2.3.6.	<i>Description of problems and barriers encountered within sectors</i> .....	67
4.3.4.	<i>Spatial dimensions of the development of the sector</i> .....	68
4.3.5.	<i>Links with other sectors</i> .....	69
4.3.6.	<i>Potential for development of the sector</i> .....	69
<b>5.</b>	<b>HORIZONTAL DRIVERS, ENABLERS AND BARRIERS</b> .....	<b>70</b>
<b>6.</b>	<b>ASSESSMENT OF THE REGIONS' POTENTIAL TO DEVELOP GREEN ECONOMY IN THE FUTURE</b> .....	<b>72</b>
<b>7.</b>	<b>TRANSFERABILITY</b> .....	<b>73</b>
<b>8.</b>	<b>CONCLUSIONS AND KEY MEASURES</b> .....	<b>73</b>
<b>9.</b>	<b>REFERENCES</b> .....	<b>76</b>

## Figures

Figure 1, Hungary and South Transdanubia .....	6
Figure 2, GDP per capita in EU-27 .....	11
Figure 3: Gross Value Added of the South Transdanubia region GDP per capita in EU-27 .....	12
Figure 4: Investments per capita as percentage of national average .....	13
Figure 4: GVA of the green economy sectors in South Transdanubia 2009 .....	14
Figure 4: The sectoral structure of the gross added value by regions in Hungary .....	15
Figure 7: GVA in agriculture, forestry and fishing 2010 .....	19
Figure 8: GVA in Agriculture, forestry and fisheries 2000-2010 .....	20
Figure 9: Land area by land use category in South Transdanubia .....	21
Figure 10: Energy consumption by agriculture, EU-27, 2010 .....	22
Figure 11: Area under organic farming, share of total utilised agricultural area. ....	23
Figure 12: Hungary's primary Energy use .....	34
Figure 13: Electricity generation in Hungary .....	35
Figure 14: Electricity consumption per household in South Transdanubia, 2011 .....	35
Figure 15: Geothermal conductivity .....	37
Figure 16: Incoming solar energy .....	38
Figure 17: Key innovation indicators relative to the EU27 .....	54
Figure 18: Governments environmental and energy R&D appropriations and outlays .....	55
Figure 19: Governments environmental and energy R&D appropriations and outlays .....	57
Figure 20: Share of Employment in eco-innovation related activities (% of total workforce) in 2008 .....	57
Figure 21: Regional Innovation Scoreboard .....	58
Figure 22: Regional breakdown of the regional R&D expenditure .....	59
Figure 23: Public R&D Expenditure 2011 .....	60
Figure 24: Innovation performance indicators for South Transdanubia and change relative to the EU-27 average .....	60
Figure 25: Subsidies according to regions .....	66

## Tables

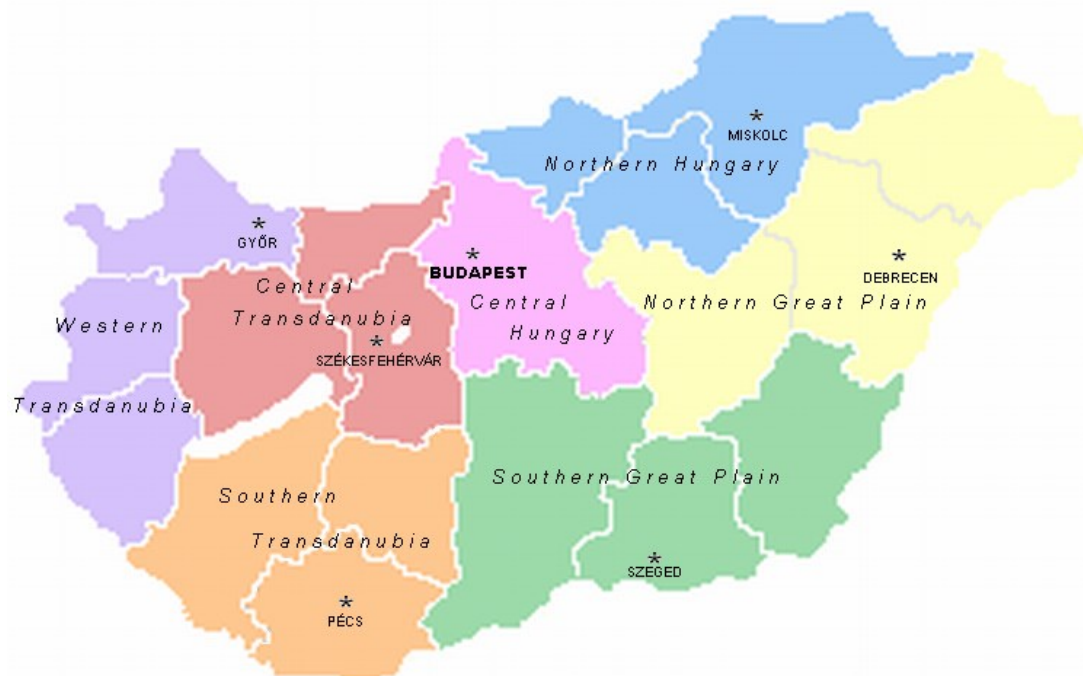
Table 1: Main characteristics of the urban network in the South Transdanubia region .....	9
Table 2: The territorial distribution of the population of South Transdanubia .....	9
Table 3: Installed and planned renewable energy capacity in South Transdanubia .....	38

## 1. General description of the region

### 1.1. Geography

South Transdanubia, Dél-Dunántúl in Hungarian, is located in South-west Hungary and is one out of seven NUTS 2 regions in the country. The region is made up of the three counties (NUTS 3); Baranya, Somogy and Tolna. The surface area of the region is 14,168.6 km<sup>2</sup> or 15 % of the country's total territory. The region is bordering the Hungarian regions of Western Transdanubia, Central Transdanubia, the Southern Great Plane and the Croatian region Eastern Croatia. The region is surrounded by the national borders of Lake Balaton in the north, the River Drava in the west and the Danube in the east. The geography and the location of the region are considered unfavourable and are often mentioned as factors limiting its development, as the natural borders isolate the territory from the South Plain Region and the neighbouring Croatia in an economically unfavourable way.

**Figure 1, Hungary and South Transdanubia (NUTS 2 region HU23)**



The region has a diverse geography, containing the Transdanubian highlands, the Villány and Mecsek mountains and the Danube and Drava river flood plains as well as the southern shore of Lake Balaton. Lake Balaton is shared by several regions and is the largest lake in Central Europe. The region is rich in surface and sub-surface water, as well as thermal water sources, while the Danube and Dráva Rivers deliver significant water quantities.

The climate is impacted by three climate zones: the Ocean, the Mediterranean, and the Continental Climate. Due to its climatic border location the region has a balanced climate, which is warmer and has more precipitation than the eastern regions of the country. The amount of rainfall decreases from its western border, the Dráva floodplains, toward its eastern border of the River Danube.

South Transdanubia has app 80 000 ha of protected areas and The Danube-Dráva National Park, more than 49 000 ha, are considered to be the most important one. The Balaton Highlands National Park extends into the region in the area of Balaton Minor (Government of Hungary, 2007). There are eight bird sanctuaries and 64 special nature reserves.

The forest cover is 25.1 % in the region and the highest value is found in Somogy county - 29.5%. The regions currently most significant and economically utilized mineral resources are the construction materials (the different stones, sand, gravel, clay) (STREDA, 2012).

The largest stock of renewable energy in the region is biomass (energy plantations, bio-ethanol and bio-diesel feedstock). Geo-thermal characteristics are outstanding in South Transdanubia, due to e.g. the rich availability of thermal waters. The high rates of the incident solar radiation and the many hours of sunshine provide excellent opportunity for utilising solar energy (primarily using solar collector systems) (Government of Hungary, 2007).

As for the environmental condition of South Transdanubia, the average quality of water, soil and the air show better values in the region than at national level. This is a result of the low level of industrial activities and mining which has decreased in the last decade, and the quality of environment has consequently improved. The highest environmental burden occurs in the bigger towns and cities and in the municipalities along Lake Balaton since the social and economical activities are most intensive there. Nevertheless, South Transdanubia is not free from environmental conflicts. The solution of the outstanding environmental problems requires external resources, and national funds are needed also for the management of conflicts (e.g. the management and decontamination of the toxic waste produced and dumped in the region).

## **1.2. State of infrastructure**

### **1.2.1. Environmental infrastructure**

The region lags substantially behind the European Union levels in the field of water and wastewater treatment. The proportion of settlements with a sewer network only reached 20.7% in 2003. In relation to the total number of houses in the region, the ratio of homes connected to sewerage system reached only 54.4%, while the national average is 57 % ((Government of Hungary, 2007 and Eurostat). 100 % of the waste water treated is undergoing biological or advanced treatment (Hungarian Statistical Office). Wastewater treatment is a particular problem in the region's small settlements, since in Hungary the grant system for implementation does not favour the resolution of wastewater treatment problems in small settlements (below 2000 population equivalent).. The level of waste water treatment is therefore lower in micro-village areas, and in villages where settlements are located remotely from one another. In 2009, the region had a public water supply connection rate of 96.5% (Eurostat). The situation has significantly improved since the 1990's when only 70 % of the settlements had access to drinking water supply. Water quality complaints occur more frequently than the national average, predominantly because of chemical components (mainly iron, manganese, ammonium, and arsenic) (ROP). The organised removal of settlement solid waste became full-scope in the region in 2003. In the end of 2005, there were 24 operating water treatment plants.

### **1.2.2. Transport**

The ST region is in a peripheral position from a transport perspective as a result of its situation and hard-to-cross natural boundaries. The accessibility of the region is considered as a limiting factor to development due to the conditions that access to most of its settlements is rather difficult from either foreign or domestic economic centres. European road corridors V and V/C, railroad corridors V/B and V/C, as well as river corridor VII (the Danube) pass through the region. Only corridor V has been developed into an expressway. The road access to Budapest was improved by the construction of the M6, M60 and M7 motorways, although these connect only the northern and eastern parts of the region. The motorways do not reach the borders of the region and the isolation remains significant (STREDA, 2012). The territorial distribution of the region's railroad network is uneven, and of low quality. The technical standard of railroad corridors is not considered satisfactory, the network is single tracks and permanent speed limits of 60-80 km/h are dominant over long stretches. As a consequence, rail passenger transport and cargo freighting is decreasing.

According to the findings of the South Transdanubia Region Transport Strategic Development Programme, overall transport volume in the region is lower than in more developed areas of the country, and transport is significantly concentrated by area. The side-road network is of low quality and incompletely constructed in the South Transdanubia region (Public Road Databank), the rate of the road network's deterioration is high, which is threatening the sustaining of safe accessibility of the regional centres.

The modal-split figure in the region is estimated at around 55% of passengers travel by public transport. The situation is however very diverse: there proportion of private transport is much higher in towns, and especially the largest towns (South Transdanubia Region Transport Strategic Development Programme). The number of vehicles is increasing steeply and the proportion of public transport passengers is expected to decline further even if there have been major improvements in public transport. The South Transdanubia region does currently not have the infrastructural conditions for the development of bicycle riding, an alternative mean of transport (Government of Hungary, 2007).

### **1.2.3. IT**

In terms of information and communication technology, South Transdanubia is among middle ranked regions. The national average computer penetration among the population is 30%. In this respect the situation of South Transdanubia can be considered average (29%), it ranks fourth place among the regions (Government of Hungary, 2007). The share of households with broadband access was 44% in early 2010, the second lowest in Hungary (national average being 52%) (Szalavetz, 2011).

## **1.3. Demographics**

The ST region is the least populated region in Hungary and is characterised by a large number of smaller settlements with poor accessibility. The total population of the region is 940,585 and the population density is 66 inhabitants/km<sup>2</sup> (2011), the average population density in Hungary is almost the double of 107 inhabitants/km<sup>2</sup>. The population has a decreasing trend and is projected to continue decrease in the coming years (the estimation for 2013 is 923,000 inhabitants). In the period 2001-2011 the population was reduced by app 60,000 inhabitants (HSO). Despite the small population, one fifth of the country's settlements can be found in the region due to the small village structure, in particular in the counties of Baranya and Somogy. The decrease of population exceeds the national average as a result of the low number of births, high mortality rates (life expectancy in the region is low) and the migration of its population. This is especially prevalent in micro-villages areas. The insufficient number of workplaces (especially jobs demanding higher qualifications), moreover the lack of services – mainly in micro-village, deprived, disadvantaged areas – are the major reasons for migration. The development of population trends are also negatively influenced by unhealthy lifestyle, and poor living circumstances. The region's increasing aging is a further demographic feature (ageing index 125.5) (Government of Hungary, 2007). 28.2% of the population in the whole of Transdanubia is at risk of poverty or social exclusion in 2012 (Eurostat, tgs00107). The population decrease is a national problem and the total population in Hungary has been decreasing over the last decade. Only the region of Central Hungary, i.e. Budapest is growing (Statistical Office of Hungary).

The main urban centres (of country rank) are the centers of the counties; Pécs (158 000 inhabitants), Kaposvár (70 000) and Szekszárd (34 000). In addition, also the citites of Komló (25 000) and Siófok (24 000) can be mentioned. There are 653 municipalities in the region. Nearly three-quarters of the region's settlement network consists of micro-villages where app. 20% of the population lives. Among micro-villages, the number of inhabitants in 342 settlements does not even reach 500. In Baranya county there is a very high number of micro-villages – nearly 70% of villages have less than 500 inhabitants (28% in Tolna, 44% in Somogy). These regions are characterised by high unemployment, ageing population,



emigration of youths and poor infrastructure. In addition, Baranya county also has the highest urban population with 66 %, while the average of the region is 46%.

**Table 1: Main characteristics of the urban network in the South Transdanubia region**

Category of settlement	Number of towns	Distribution of the region's population
Small town with less than 10 thousand people	19	10%
Medium town with between 10 to 30 thousand people	12	19%
Large town with more than 30 thousand people	2	10%
Large town with more than 100 thousand people: Pécs (without conurbation)	1	17%

Source: Government of Hungary, 2007

**Table 2: The territorial distribution of the population of South Transdanubia**

Name	Population 2001 (thousand person)	01/02/2001 – 1/10/2011			Population density	Population density
		Natural increase / decrease (thousand person)	domestic and international migration (thousand person)	Population 2011 (thousand person)	2001 (person/km <sup>2</sup> )	2011 (person/km <sup>2</sup> )
Baranya	407	-17	-2	388	92,0	87,6
Somogy	335	-19	2	318	55,5	52,7
Tolna	250	-12	-6	231	67,4	62,5
South Transdanubia	992	-49	-6	938	70	66,2

Source: STREDA, 2012

The region has a high proportion of ethnic groups, app 16.6% of the population (the Hungarian average is 3.1%) in (2001). The proportion of the Roma minority is significantly higher in the region than the national average and its position is extraordinarily unfavourable from the employment perspective just like nationwide. Energy poverty is a significant problem in Hungary and app. 80% of the population pay more than 10% of their net income to energy expenses. 15% of Hungarian citizens declared to be unable to afford to keep their homes adequately warm (Ürge-Vorsatz et al., 2010).

#### 1.4. Administrative structure

The ST Region consists of the three counties on NUTS 3 level Baranya (HU 231), Somogy (HU232) and Tolna (HU233). Below county level, Hungary is subdivided into 150 districts (kistérségek) and 3,157 municipalities (községek).

#### 1.5. Governance

Hungary is a parliamentary republic and the legislative power is exercised by the unicameral National Assembly consisting of 386 members. Members of the National Assembly are elected for four years while the head of state is elected by the National Assembly for a term of five years. (<http://www.kormany.hu/en/hungary>).

The following official territorial levels exist: State, counties (NUTS3), districts (LAU1) and local municipalities (LAU2). Hungary has traditionally been a centralised country and the regions do not have any administrative power. Following the EU recommendations, statistical-

planning regions were created but their main role is only to provide inputs and signal the needs of the region for the national government. The regions, which cover the NUTS2 level areas of Hungary, exist only from statistical point of view, without any administrative tasks and elected representatives (Borkovits, 2013). The region of South Transdanubia is therefore considered as a planning region only and regions have no legislative decision making power. Municipalities may voluntarily take on certain tasks of self-government.

Therefore, regulations are not initiated on regional level; instead the municipalities, authorities and other actors of the South Transdanubian region have to consider the national regulations and strategies. A recent public administration reform took effect on January 1st, 2013 where subregions are replaced by districts, which is the smallest administrative unit. In Baranya 9 districts are established, in Tolna 6 and in Somogy 8 (STREDA, 2012). However, regions have a role in regional planning and e.g. business location development. The South Transdanubian Regional Development Agency is the managing body of the Regional Operational Programme of the Structural Funds.

The new district (following the recent reform) offices will offer public services in the following fields; guardianship, social and child protection and family benefit affairs, children's services, animal health and minor offences among others. The formation of district offices has three important goals: redefinition of the division of tasks between local governments and the state; the better and more sustainable financing of tasks; and the creation of a public administration system that serves citizens to the highest degree possible (Ministry of Public Administration and Justice, <http://www.kormany.hu/en/ministry-of-public-administration-and-justice/news/public-administration-reform-will-also-create-budget-stability-for-local-governments>) .

## **2. Regional economy**

### **3.1. Overall economy of the region**

South Transdanubia is ranked among the less developed regions both by national and international standards. In 2009, the regional GDP was 26.8% of the EU average (the national average for Hungary was 38.7%). The territorial disparities in terms of economic development in the region are large. This is clearly following the settlement structure and there are big disparities to be found among the urban regions and the small regions along Lake Balaton, where the highest level of development are found, and in the inner part of the counties. According to the regulation accepted in 2004 (Government Decree 64/2004) 18 of the region's 24 micro regions are disadvantaged, and of these, 9 belong to the group of those in the most disadvantaged situation. In 2010, 24% of the most disadvantaged small regions were found in STD. which is a percentage that has risen since 2001. This means that almost half (47.5%) of inhabitants in the region live in disadvantaged areas, and within that, close to 20% in the most disadvantaged areas. The latter proportion is only higher in two regions – North Great Plain (40%), and North Hungary (37.6%). With the exception of the low number of urbanised areas in the region, only a few areas have seen economic development founded on the basis of local characteristics and assets (Government of Hungary, 2007).

The structure of the economy underwent substantial transformation in the 1990's after the change of the political system. This led to that the mining sector (mainly black coal and uranium) which was previously dominating the region was cut back and suffered huge losses. Also other types of industrial activities were diminished, causing a significant economic downturn in the area, especially in the cities of Pécs, Komló, Szászvár, and Nagymányok. Until the mid-1990s, the South Transdanubian region was still at a medium level of development as compared to other European regions, as its former development temporally remained. After mid 1990's the national economy got into a period of accelerated growth in a different socio-economic environment, where the region was not able to position itself to the new requirements and fell behind the more dynamic and prospering regions.

The lost output has not been compensated by local entrepreneurship or by newly established foreign subsidiaries. Today, the region is the least industrialized in Hungary and the industrial output was only 5% of total Hungarian industrial output in 2009 (Szalavetz, 2011). Structurally the region's growth is hindered by the weakness of the processing industry, which derives from the low level of industrialization it inherited from the former regime and from the region's poor accessibility (Borkovits, 2013). The enterprise structure in the region is dominated by micro- and small-sized enterprises. The ratio of active SMEs is however the lowest in the region on a national comparison and there are a low presence of big companies. Only 0.3 % of the enterprises in the region is larger, and has more than 300 employees (RIS). The region hosts 19 industrial parks, but several of them still have large unused capacities. Parallel to industry being forced to the background, the performance of the service sector has become stronger. The strong position of the services sector is outstanding even at regional comparison, and only the Central Hungary region exceeds it in the rankings. The employment in knowledge intensive services is 33.6%, the Hungarian average is 34.5 % and the EU average 39%.

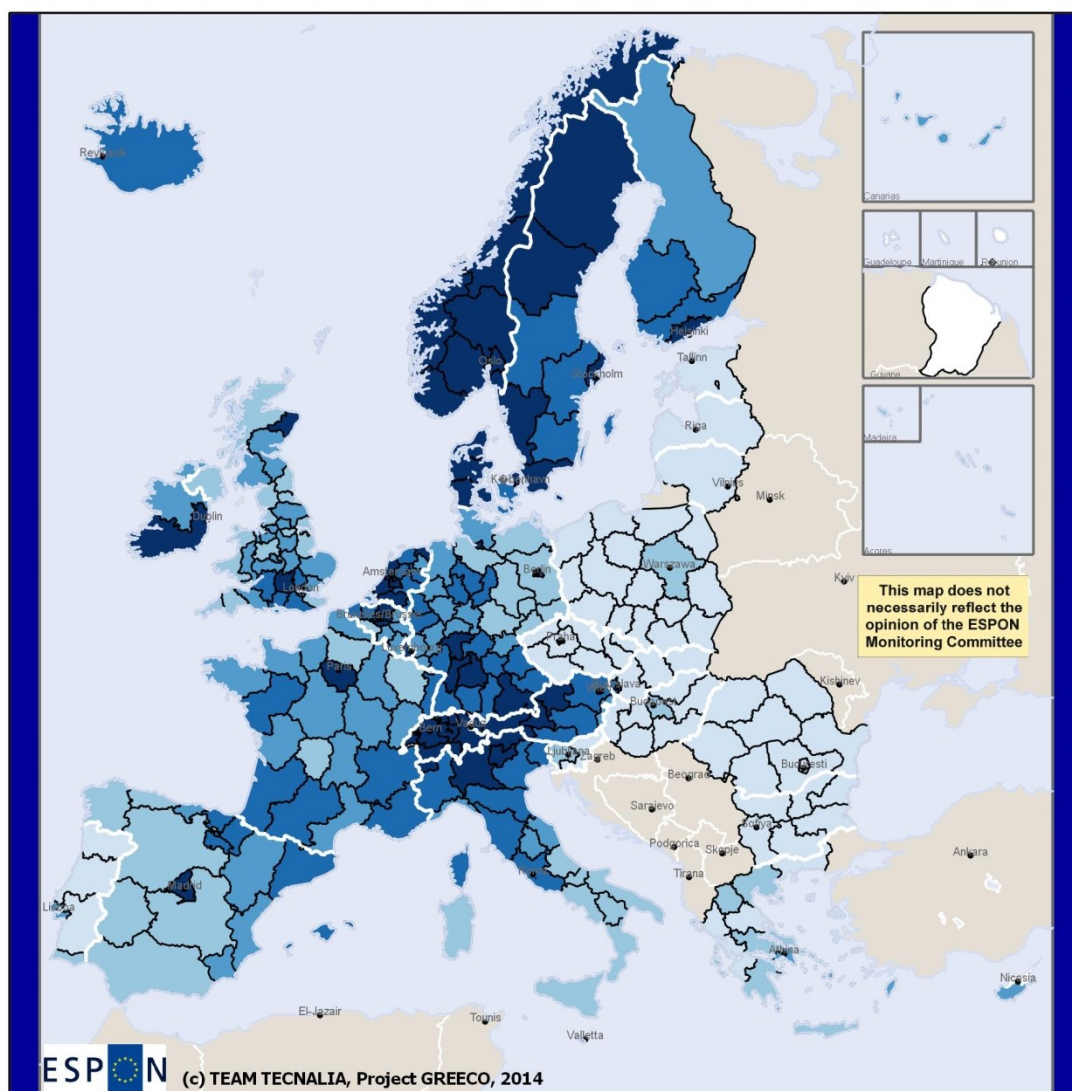
The public sector is currently in an unfavourable financial situation and the municipalities have an increased level of debt. This situation is growing along the continued global financial crisis and the national indebtedness. A 2010 study of the financial performance of municipalities among the 23 districts of Budapest and the 23 cities of country rank put two out of three country seats in STD the bottom rank (Pecs ranked in the last place and Kaposvár third from the bottom) (STREDA, 2012).

### **3.1.1. GPD and value added**

	STD	Hungary	EU-average	Year	source
GDP per capita (in current market prices)	6,300 EUR	9,100 EUR	23,500 EUR	2009	Eurostat, nama_r_e2gdp
Growth in GDP per capita	1.2 %	2.2%	1.1 %	2000-2010	DG regio, country factsheet 2013
Real productivity growth in industry and services. Average annual change	1.4	2.0	0.9	2000-2008	DG regio, country factsheet 2013

GDP in the region has fallen considerably compared to the national average. In 2010, its GDP per capita was 44% of EU27 and 68.2% of the national average (down from 75.1% in 2000). In terms of GDP, the region ranks in the fourth place among the seven Hungarian regions (HSO, [http://www.ksh.hu/docs/eng/xstadat/xstadat\\_annual/i\\_qpt014.html](http://www.ksh.hu/docs/eng/xstadat/xstadat_annual/i_qpt014.html)).

**Figure 2, GDP per capita in EU-27**



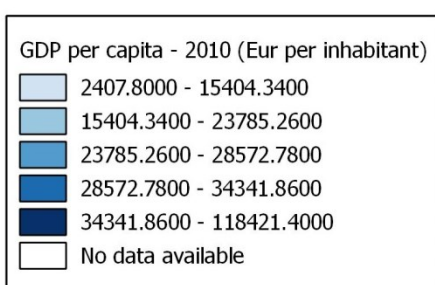

 EUROPEAN UNION  
 Part-financed by the European Regional Development Fund  
 INVESTING IN YOUR FUTURE

Regional level: NUTS 2, version 2010

Source: Eurostat 2013

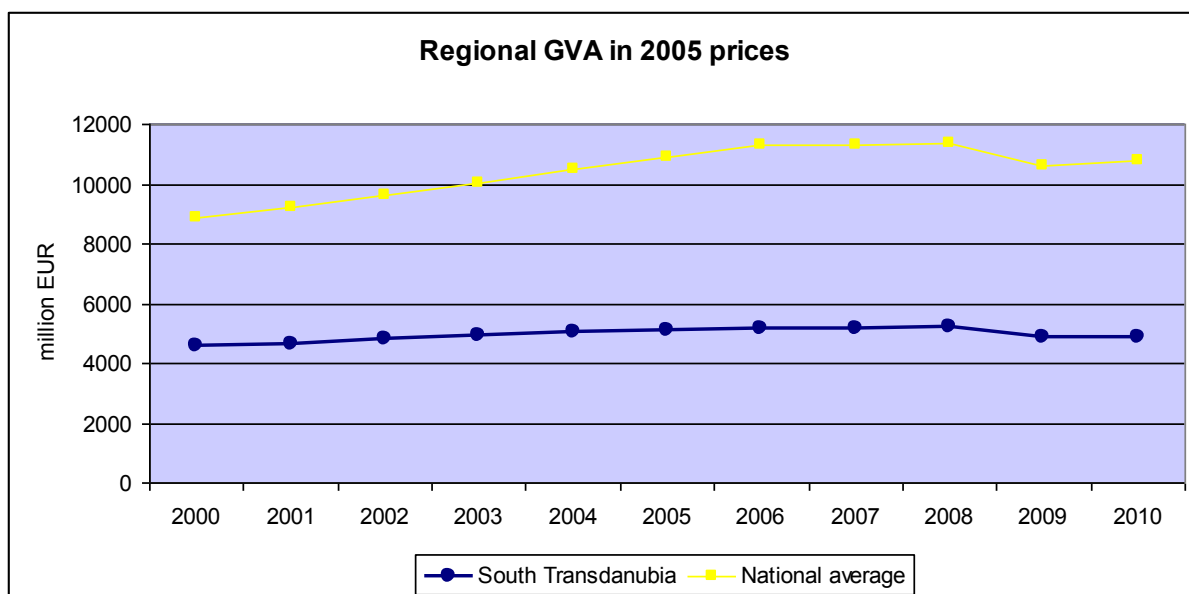
Classification method: Quantiles

© EuroGeographics Association for administrative boundaries



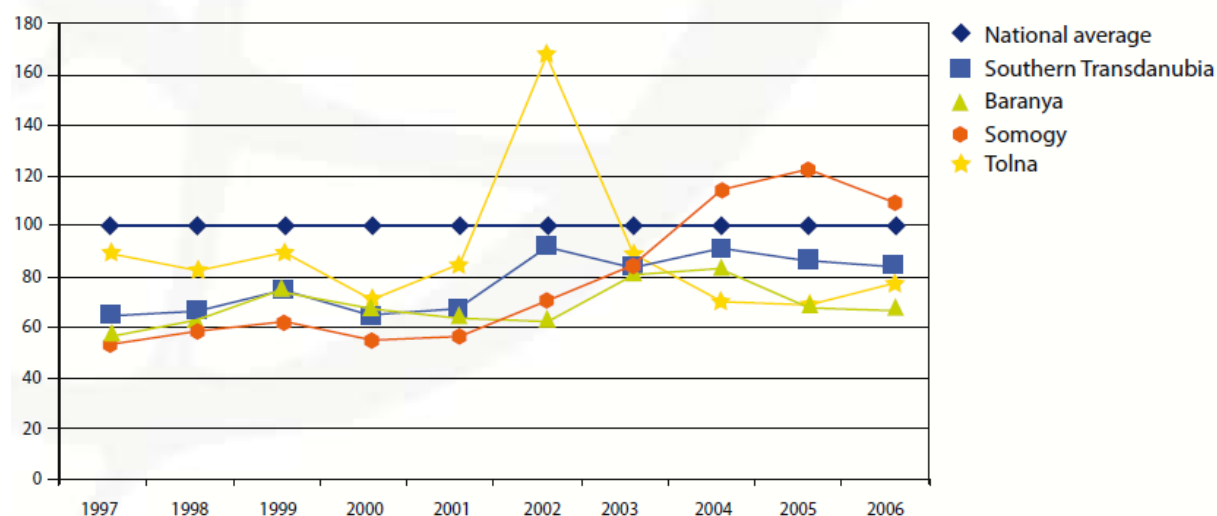
As regards to the GVA of the region, the development can be seen in the graph below. After a positive trend 2000-2007, the GVA started falling after 2008.

**Figure 3: Gross Value Added of the South Transdanubia region GDP per capita in EU-27**



In comparison with other regions in the EU the STD region is ranked very low in terms of economic performance the region takes the 255<sup>th</sup> place among the 271 regions in the EU, and consequently has the 16 lowest GDP per capita value (PPP) (energy strategy). GDP (current market prices per capita) has been reduced in the STD region since 2007, from 6,700 to 6,300 EUR in 2009 (Eurostat, nama\_r\_e2gdp). Broken down in NUTS 3 level, GDP per capita is highest in Tolna 6,900 EUR, followed by Baranya 6,300 EUR and Somogy 5,800 EUR. It can be seen that Tolna county has the highest GDP value proportional to the population which was four-fifth of the national average. Tolna county's relative position among the counties of Hungary has improved in the latest years and in 2009 it took the 8th place. One of the reasons is that the only Hungarian nuclear power plant is operating in the county. In addition, to the advancement seen in the last two years contributed such projects of national importance like the construction of the M6 Motorway or the establishment of the hazardous waste landfill in Bataapati contributed to the advancement and thus the performance of Tolna declined less than some other regions (RIA strategy). In the case of Baranya, the presence of Pécs and its gravity zone is a key element of economic performance. Somogy County has been strongly influenced by the special features of the southern coast of Lake Balaton which are mainly related to tourism facilities (Borkovits, 2013).

**Figure 4: Investments per capita as percentage of national average**



source: (Local Government of Baranya County, 2009)

### **3.1.2. Employment**

The unemployment rate was 12.7% in 2011 which is higher than the national average of 10.9 % (EU average of 9.6%). 5.9 % of the active population have been in long-term unemployment. The rate of employment significantly differs within the region and is higher in the urban areas and can be up to three times lower in certain rural areas, up to 25% (Government of Hungary, 2007). Even though unemployment is high in the region a significant problem is reflected by region's activity rate<sup>1</sup>, which is the lowest in Hungary: 51.8% in 2009, whereas the national average is 54.7% (Szalavetz, 2011).

### **3.1.3. Foreign Direct Investments**

Due to the weakness of the processing industry and the low level of industrialization the region is not successful in attracting external capital, which is seen to be the main reason why it has fallen behind with respect to economic performance. (Borkovits, 2013)

With respect to attracting foreign capital, the situation of South Transdanubia can be considered the least favourable among all the regions in Hungary. 5% of businesses with foreign stake operate in the region, but the amount of capital they invested only represented 1.2% of the national total in 2008. The amount of foreign direct invested capital (FDI) per resident was only 12.5 % of the national average in 2008.

The inferior-to-the average competitiveness and FDI attraction potential of the region is also reflected by poor export performance: in 2009, industrial export sales accounted for only 4.4% of Hungarian industrial exports. Economic actors' average investment per capita between 2001 and 2007 was 83.8% of the national average (Szalavetz, 2011).

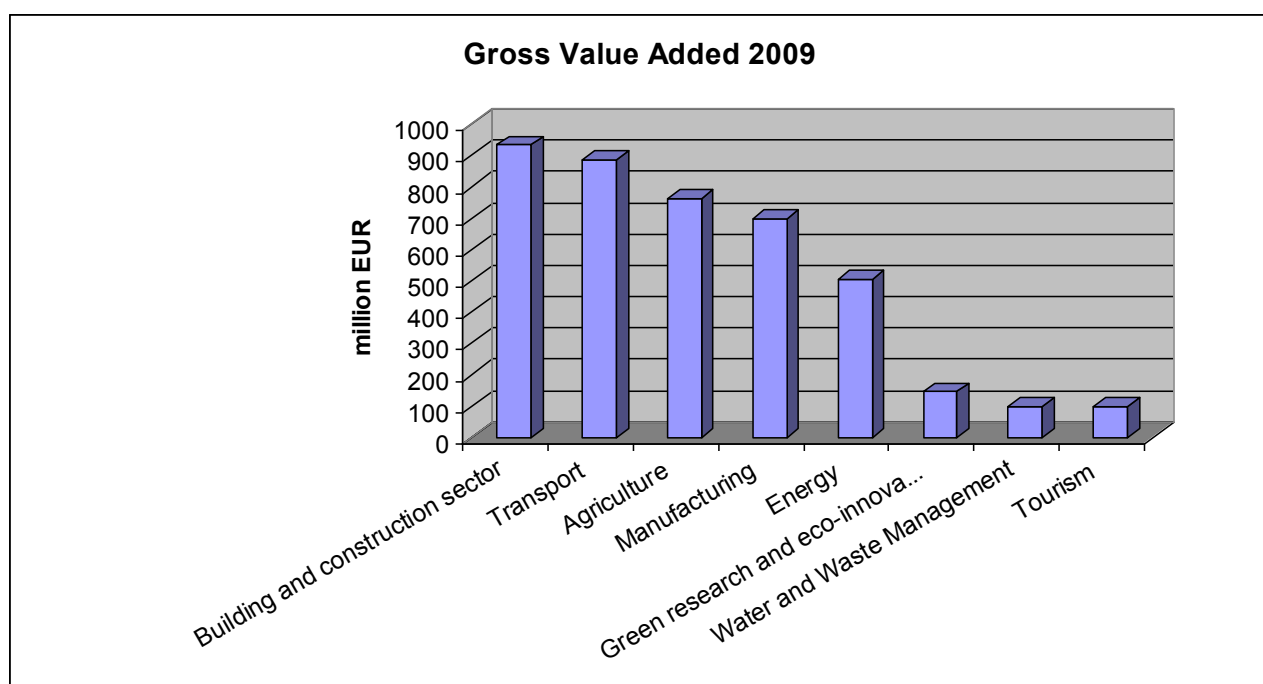
## **3.2. Importance of different economic sectors in the region**

To assess the relative importance of the different green economic sectors in South Transdanubia a quantitative analysis was carried out of the gross value added (GVA) per sector, as defined by NACE rev.2. Secondly, an analysis has been carried out based on stakeholder consultations, regional strategies and what the region include in the concept of green economy.

**Figure 5: GVA of the green economy sectors in South Transdanubia 2009 (million EUR, current prices)**

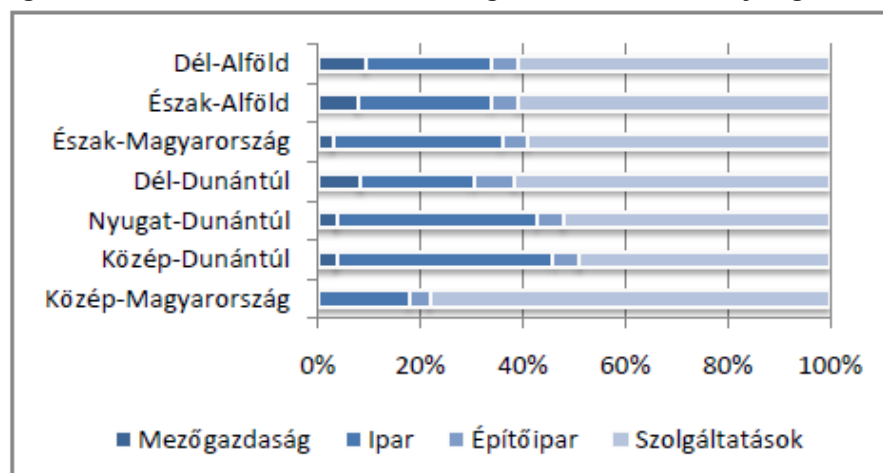
---

<sup>1</sup> labour force/population of working age



The data for all economic sectors are not complete and the above table should therefore be considered as indicative of the size of the sectors and their relative proportion to each other. Data on GVA for 2000 are not available why it is has not been possible to calculate the GVA growth rate.

**Figure 6: The sectoral structure of the gross added value by regions in Hungary**



*Note: Agriculture, industry, building sector, services*

*Source: Regional Energy strategy*

### **3.2.1. Building and construction**

The building and construction sector has a GVA of 933 million EUR which makes it the largest economic sector in the region. Real estate activities (NACE rev.2. L28) and Construction (F) are the biggest sub-sectors with a GVA of 429 and million EUR respectively.

There is a backlog of investments in public areas over the past decades which is characteristic in the majority of the region's towns, which has an unfavourable influence on the image of the towns, and the quality of the living environment. Primarily, it is also negatively affecting the energy performance of buildings. It is especially typical of major



towns, as well as former mining and industrial areas that are lagging behind urban districts and compounds of deteriorating status and condition can be found, where poor, disadvantaged population groups are concentrated, including the Roma population, and unemployment is high. A significant part of the region's population is living in block of flats (panel houses) (STREDA, 2012). Most of the buildings are constructed in the 1961-1990 period and a substantial part of the buildings are in need of renovation. The Hungarian building stock is among the most energy intensive among in the EU, and ranks in top ten EU27 countries in terms of specific dwelling energy consumption in residential sector with 247 kWh/m<sup>2</sup>/year compared to the EU average of 220 kWh/m<sup>2</sup>/year in the period 2000-2007). In addition, Hungary was the only EU Member State in the period 2000-2007 in which the energy efficiency of the residential sector as measured by the ODEX indicator for households worsened. The high energy consumption of the average residential unit in Hungary is a consequence of the long time subsidised energy prices and of the deterioration of the residential stock. Renovation of building stock to increase energy efficiency have large potentials for green economy development (Ürge-Vorsatz et al., 2010).

Hungary has a relatively high level of CO<sub>2</sub> emissions per useful floor area, around 70kgCO<sub>2</sub>/m<sup>2</sup> (BPIE, 2011). The building sector contributes to nearly half of the total CO<sub>2</sub> emissions in Hungary and is consequently a key to the climate change challenge.

A study made by the Centre for Climate Change and Sustainable Energy Policy at the Central European University in Hungary shows that deep renovation<sup>2</sup> could have a significant employment effect by 2020, ranging from 52,000 jobs in the moderate renovation rate (S-DEEP3) scenario to the 131,000 jobs created by the more intensive (S-DEEP1) scenario. The result of the study demonstrates that deep renovations are one of the most employment intensive investments for climate change mitigation or other economic recovery attempts. It would also significantly reduce the energy costs of households and public buildings, Hungary's gas dependency and making further contributions to mitigate climate change. The results indicate that the benefits would be distributed across the country and would also be a good strategy for the STD region (Ürge-Vorsatz et al., 2010).

### **3.2.2. Transport**

The total GVA of the regional transport sector is 887 million EUR. Within the transport sector, wholesale and retail trade; repair of motor vehicles and motorcycles (G) dominate with 419 million EUR, followed by transportation and storage (H), 321 million EUR.

### **3.2.3. Bioeconomy**

The region has a strong role in the fields of agriculture, forestry and fisheries (A). The GVA for the sector is 763 million EUR which makes it the third biggest sector in the regional economy. Agricultural GDP per capita was 142.7% of the national average in 2008. The importance of the sector in a national context is significant and the share of agriculture is higher than the national average (8.9% versus 4.2%). In the ST region, the value added is 5.1 times as high as the EU-27 average and 2.4 times as high the Hungarian average. The importance of agriculture is also reflected by the employment shares where agricultural employment accounts for 5.6% of regional employment (2009), while the national average is 3% (Szalavetz, 2011).

### **3.2.4. Industry**

The region has a relatively low share of manufacturing. With a GVA of 697 million EUR, the size of the manufacturing activities is much lower than the national average. The share of

---

<sup>2</sup> Deep renovation could save up to 85% of Hungarian heating energy use, and the corresponding CO<sub>2</sub> emissions, can be avoided by a consistent and wide-spread deep retrofit programme in the country. The research has also highlighted the important risk related to less ambitious renovation programs. If renovations aim at keeping today's retrofit depth such as the ones currently being implemented by existing programmes (i.e. reducing around 40% of present energy use in existing buildings on average), this risks to result in a significant lock-in effect.



manufacturing within total industrial output is the lowest among all Hungarian regions with 73.8% of national average, and only 5% of total Hungarian industrial output in 2009. Industrial GDP per capita is merely 45.3% of national average (Szalavetz, 2011).

Among the sectors, the proportion of the processing industry has the lowest value in the country. As described above, in terms of the processing industry's performance, South Transdanubia belongs to the most underdeveloped regions of the country, which is a permanent problem of the regional economic sectoral structure (STREDA, 2012). Within the sector, manufacturing of computer, electronic and optical products (C26) has the highest GVA of 113 million EUR, followed by manufacture of machinery and equipment (C28), 106 million EUR. Also the significance of food processing, as well as of the textile and tanning industry can be highlighted.

### **3.2.5. Energy**

The presence of the nuclear power plant, the Paks Nuclear Power Station, which is the only of its kind in Hungary significantly increase the size of the sector. The Electricity, gas, steam and air conditioning supply sector (D) have a GVA of 506 million EUR in 2009, which is representing app 17 % the total added value in the sector on a national level. The sector employs app 6000 persons in the region.

In 2011, Hungary had a relatively low share of RES in the gross final energy consumption; 8.1 % despite rather favourable conditions for renewable energy production. The situation in South Transdanubia region is similar to the national situation (Eurostat and STREDA, 2012).

### **3.2.6. Green research and eco-innovation**

As can be seen in the figure above, the sector has a rather small share of the GVA, 146 million EUR. The region falls behind EU average and the other Hungarian region in most aspects related to innovation, research and development. The region's increasing competitive disadvantage is the most severe with respect to its research and development expenditure. The region's share of national expenditure on R&D is only 3.33% (2004) and the share of R&D expenditure in the regional economy is even decreasing.

Despite the rather gloomy outlook of the research and innovation sector in the region, environmental technology research, especially in the field of waste management, has grown in South Transdanubia, along with businesses and organisations active in the area of the environment industry. According to the surveys, the proportion of organisations active in ecological research within the total R&D sector is 17.3%. It should also be mentioned that the region has a substantial R&D capacity that however, is mainly limited to the Pécs University centre. In the field of waste utilisation, there are two sorting plants, two rubber grinding mills, three electronics waste processing facilities, as well as seven plastic processing plants operating in the region that are lighted as important establishments in the environmental technology sector (Government of Hungary, 2007 and Szalavetz, 2011).

### **3.2.7. Water and Waste**

In recent years, a number of environmental technology achievements have been made in South Transdanubia, especially in the field of waste management where large projects were implemented with the support of EU grants:

- The South Lake Balaton and Sió Valley Waste Management Project was implemented from 13 billion HUF (65% EU grant) and involved the establishment of environmentally sound waste disposal and treatment plants (in 3 settlements), waste yards (in 17 settlements), transfer stations (in 4 settlements), composting sites (in 8 settlements) and the recultivation of the abandoned landfills.
- The Mecsek-Dráva Waste Management Programme based on the existing regional landfills (in 3 settlements) from a 17 billion HUF budget (70% EU grants) involved:

waste yards and a collection island type selective waste collection system, waste management centres (Kökény, Marcali, Barcs) and the recultivation of the abandoned landfills.<sup>57</sup>

- The Kapos, Paks, Central Danube Valley, West Lake Balaton and Homokhátság projects enable the complete coverage of South Transdanubia's app. 600 municipalities.

The national targets of waste recycling are ambitious and in fact higher than the EU targets stipulated in key directives (50% of household waste by 2020). And additional investments into the waste sector in the region will be necessary in the coming years.

As mentioned in section 2.2.1 above, the region has a lower than average share of waste water treatment, only 54% of the waste water generated is treated. The level of waste water treatment is particularly low in micro-village areas, and in villages where settlements are located remotely from one another. There is big potential for improvements in this field which would have a positive impact on public health and also have a positive affect on the green economy.

### **3.2.8. Tourism**

The GVA of the tourism sector is 97 million EUR which makes it the smallest of the studied sectors in the region in terms of GVA. According to available data, 25 000 employees work in the tourism sector. The region has several assets with valuable tourism potentials, such as Lake Balaton, thermal baths well as the wine regions of Villány and Szekszard. Tourism plays a rather important role in the region's economy and the visitor turnover was only exceeded by the regions of Central and Western Transdanubia. According to HSO, STD has the lowest share of international visitors, 17.6 % in 2007 of total international visitors. The average length of stay in 2007 was 2.4 days. The average length of stay for foreign visitors was 3.3 days.

Tourism in the region is concentrated in space: the area along the shore of Lake Balaton (Somogy county) has a 57.1% share of the region's visitor turnover, while the Pécs-Villány-Siklós area has 28%. The two other counties remain below the national average in terms of average length of stay for tourists. The standard of tourism products and services in the South Transdanubia region is of inferior quality. There are only a few high comfort grade hotels, despite a rise in demand for high-standard hotels in the region. Providing complex tourism products from attractions separated both thematically and geographically is not achieved effectively due to the frequent deficiency in co-operation among the actors, and human capital being underdeveloped, while the efficient promotion of the existing product range is not effectively achieved either because of improper co-ordination among different regional levels, and the lack of marketing activities. Only few information services are available online, while the standard of tourism and catering services are not characteristic and location specific. In addition, the region's unfavourable accessibility hinders its integration especially into foreign visitor turnover. (Government of Hungary, 2007) Visitor numbers are therefore decreasing.

Strengthening the Region's Tourism Potential is one of the seven priorities of the ROP 2007-2013 and it receives approximately 18.6% of total funding. The objectives under this priority are to increase the competitiveness of the region's tourism sector, increase the number of tourists visiting the region and encourage tourists to stay for longer periods of time. The priority targets support at integrating regional tourism attractions and quality tourism services, and developing a regional tourism destination management organisation.

There are a few examples of eco-tourism projects, e.g. the Integrated Ecotourism Development project of the Dráva Basin, supported by the ERDF, which aimed at mobilising the Dráva river area's potential by investing in tourism and nature conservation, and by constructing new facilities for local communities and renovating run-down tourist attractions (EC, DG Regional Policy, project examples).

### **3.3. Selection of key green economic sectors**

In the sectoral structure of the regional GVA, the most important sectors are the fields of building and construction, transport, and bio-economy. The transport sector will however not be included in the more in-depth green economy analysis as the transport sector can not be considered as green in itself and there is no record on efforts trying to green the transport sector in the region. The building and construction is the economically most important sector but will not be analysed here as it is mainly impacted by national policy framework. The industry sector, the entire industry, and within that the manufacturing industry – relatively plays a significantly smaller role in the performance of the region than the national average in spite of it being the second most significant sector in the region in terms of GVA. The main branches of the manufacturing industry are production of electronic products, machinery and equipment which is not considered as green and this sector will therefore not be included among key green sectors to be analysed.

Weighting the economic significance of the region together with the importance and potential allocated to the sector in regional strategies and during consultations with regional stakeholders the following sectors have been selected for further analysis: Bioeconomy, Energy and Green research and innovation. Compared to the national average, the South-Transdanubian region plays a role, above the national average in the traditional fields of bioeconomy and also, within the branches of energy, in electricity, gas, steam and water supply. Neither the agricultural nor the energy sector is currently particularly “green” with low level of organic farming and a share of RES in gross energy consumption much below the EU average. However, both these sectors are selected due to their inherent potential of developing green economy in the STD. In addition, the smaller sectors of green research and innovation are considered among the consulted stakeholders as sectors with growing potential for green economy development. The sectors are further analysed in detail in section 4 below.

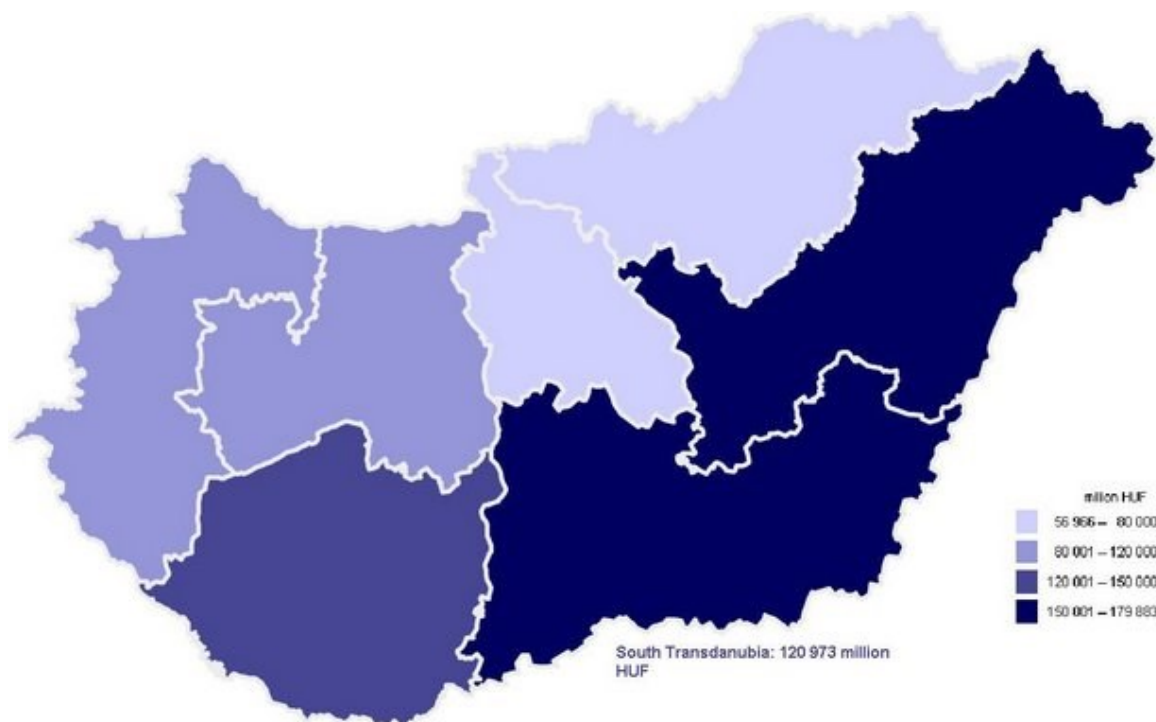
## **3. Sectors of the Green Economy**

### **4.1. Bioeconomy**

#### ***4.1.1. Performance of the sector***

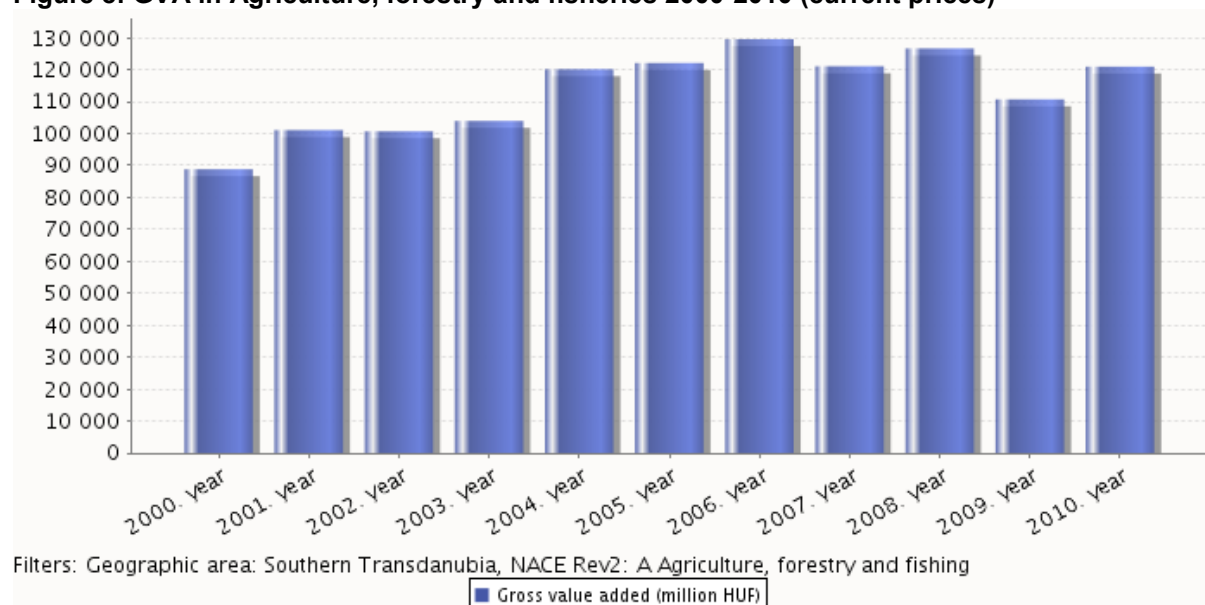
The weight of agriculture, fisheries and forestry in the South Transdanubian economy is significantly higher than the national average. In fact, the value added is 5.1 times as high as the EU-27 average and 2.4 times as high as in Hungary on average. The map below shows that the GVA of the sector in the region is among the strongest in the country. The region contributes with 17 % of the total added value of the sector in Hungary.

**Figure 7: GVA in agriculture, forestry and fishing 2010**



Source: HSO, Retrieved on 2013-05-30

**Figure 8: GVA in Agriculture, forestry and fisheries 2000-2010 (current prices)**



Source: HSO, Data from Sept 2012. Retrieved on 2013-05-30

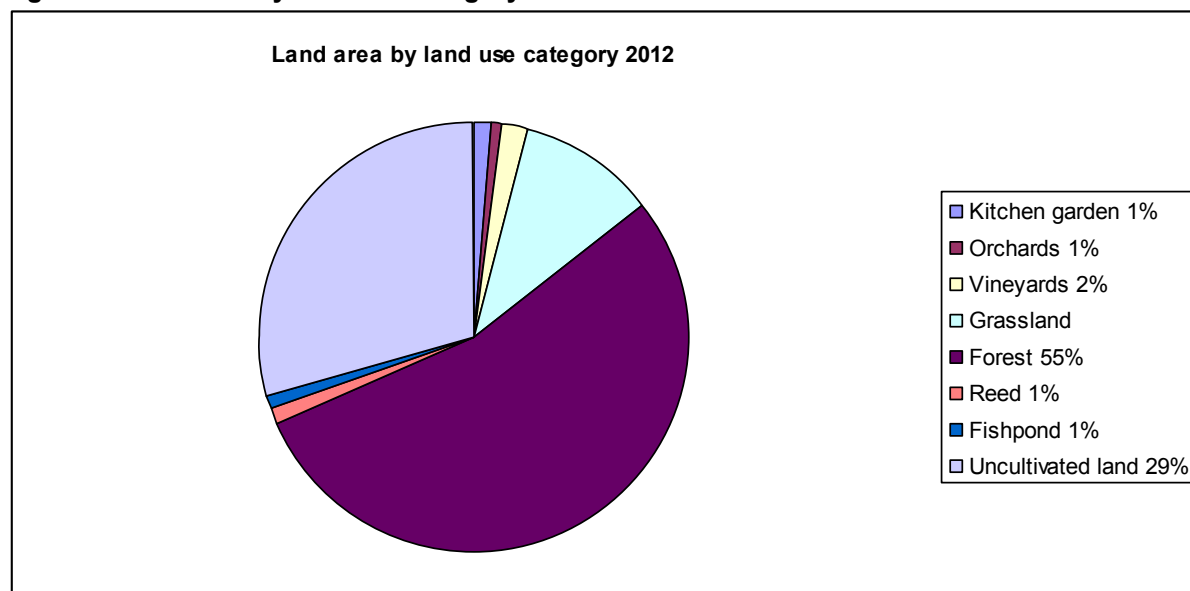
As can be seen in the figure above, the GVA of the sector has decreased slightly since 2007. Also literature shows that the sector's dominance has been decreasing since 1995. Data from 2004 showed that in spite of a dramatic fall in the number of people employed in agriculture after the change of regime, the agricultural employees were 9.2% of the total employees which was nearly twice as much as the national average (STREDA, 2004). There is no data available on the current levels of regional employment in the sector. The latest available data on employment in the agricultural sector in Hungary show that 4.5% of total employment (data from World Bank, 2012).

In some smaller settlements, agriculture and the related food industry is particularly important and these activities may be the only way to make a living. The geographical conditions and

the climate are favourable for growing crops and there is a very long tradition of agricultural production, especially in terms of wine production.

51 % of the total land area of the region is arable. The land area is divided by land use as can be seen in the figure below. The percentages are the share of the total arable land.

**Figure 9: Land area by land use category in South Transdanubia**

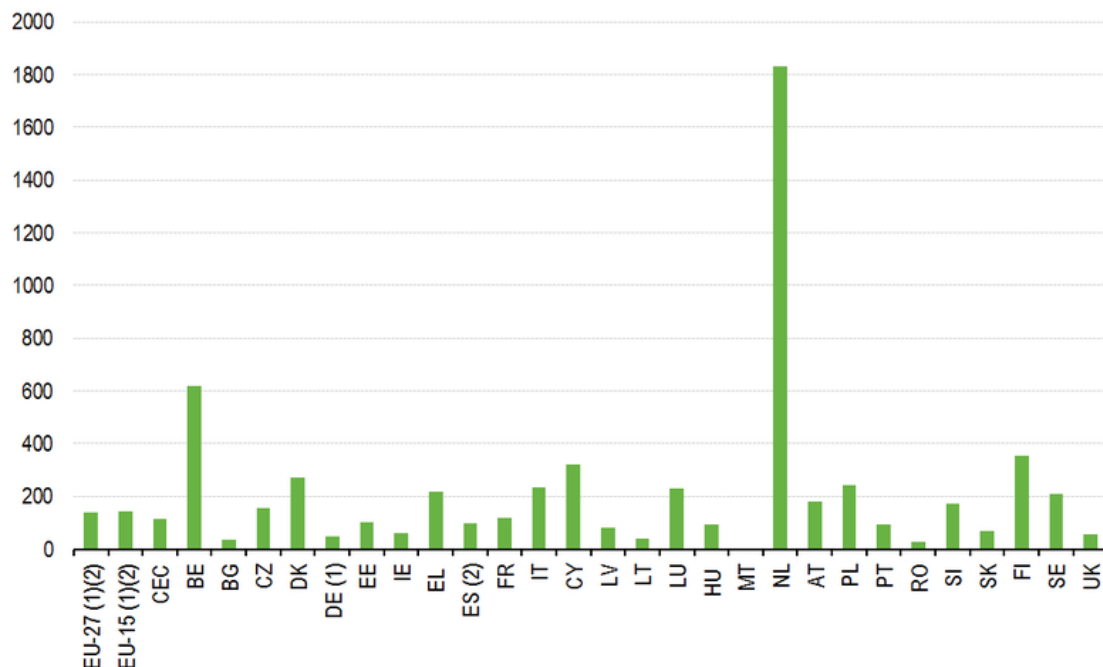


Source: HSO

The agriculture sector in the region is characterised by small farms and 32.4% of the total arable land is cultivated by small holdings. 63.4% of the holdings have less than 0.5 ha to cultivate, and the aggregate area of these farms amounts to a mere 5.2% of all arable land. The small farms have little capacity of improving their profitability as their income generating capacity is low and they consequently have difficulties purchasing the necessary machinery to grow further.

The share of agriculture in total energy consumption has been reduced during the last decade; from 5.7 % in 2000 to 2.9 % in 2010. This share is lower than the EU-27 average as can be seen in Figure 10 below. However, the decline might be partly explained by the reduced agricultural activities during the same period. The fuel types in the energy consumption of agriculture reflects the overall energy situation in the region; Approximately 55 % of the energy is oil-based, 25 % - gas, 15% - electricity and around 5 % is based on RES (Eurostat).

**Figure 10: Energy consumption by agriculture, EU-27, 2010, kgOE per ha used agricultural area (UAA)**



(1) DE missing data in 2010 for oil, solid fuels and gas

(2) ES UAA 2010=2009

Source: Eurostat, [http://epp.eurostat.ec.europa.eu/statistics\\_explained/index.php/Agri-environmental\\_indicator\\_-\\_energy\\_use](http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Agri-environmental_indicator_-_energy_use)

In terms of water productivity of the agricultural sector, the irrigated area (with licence) in Hungary has decreased with app. 33 % in the period 2000-2011. The irrigated area is 4200 ha. The water sales for irrigation has however been reduced with 50 % which gives an indication that the irrigation system has increased its water efficiency. Compared to other Hungarian regions, the amount of irrigated water per ha is the lowest among all regions, with 769 m<sup>3</sup>/ha in 2011 (HSO).

Hungary has a relatively low level of CO<sub>2</sub> emissions in relation to agricultural production value, in fact among the lowest in EU-27 (GREECO agriculture report).

The Old-Drava programme (which includes the major part of the Ormánság) was approved in a Government resolution in July 2012. The 10 year includes 46 municipalities and covers sustainable development of water management improvement, agricultural industry, biomass, etc. The programme is also expected to generate a spill-over effect and bring positive effects for the overall economy and employment in the region.

#### *Viticulture*

As mentioned above, viticulture is the strongest element of the region's agriculture sector, and the grapes as well as the wines produced are sold locally but are also widely exported. Five of the 22 Hungarian wine districts are found in the region, and the most renowned being Villány and Szekszárd. 15% of the wine produced in Hungary comes from the region, although the area of vineyards has decreased significantly during the last decades. The total harvested production is down to 86 544 tonnes in 2011 from 104 936 tonnes in 2000 (HSO). The region has a high share of quality wines.

The viticulture are, like agriculture, dominated by small family holdings (with vineyards of 0.5-5 ha) that are active in the small scale sale of grapes, wine making and the sale of wines in the region. These holdings in general operate without logistical support or up-to date technology and rely only on their own resources in their efforts to keep their market shares which restrict their possibilities in submitting project proposals and receiving credits.

Viticulture in the region is characterized by obsolete structure of varieties, underdeveloped transport infrastructure and an uneven processing technology. The conditions are not suitable for the introduction of technologies allowing the production of competitive products (STREDA, 2004). There is no data available on the production of organic wines.

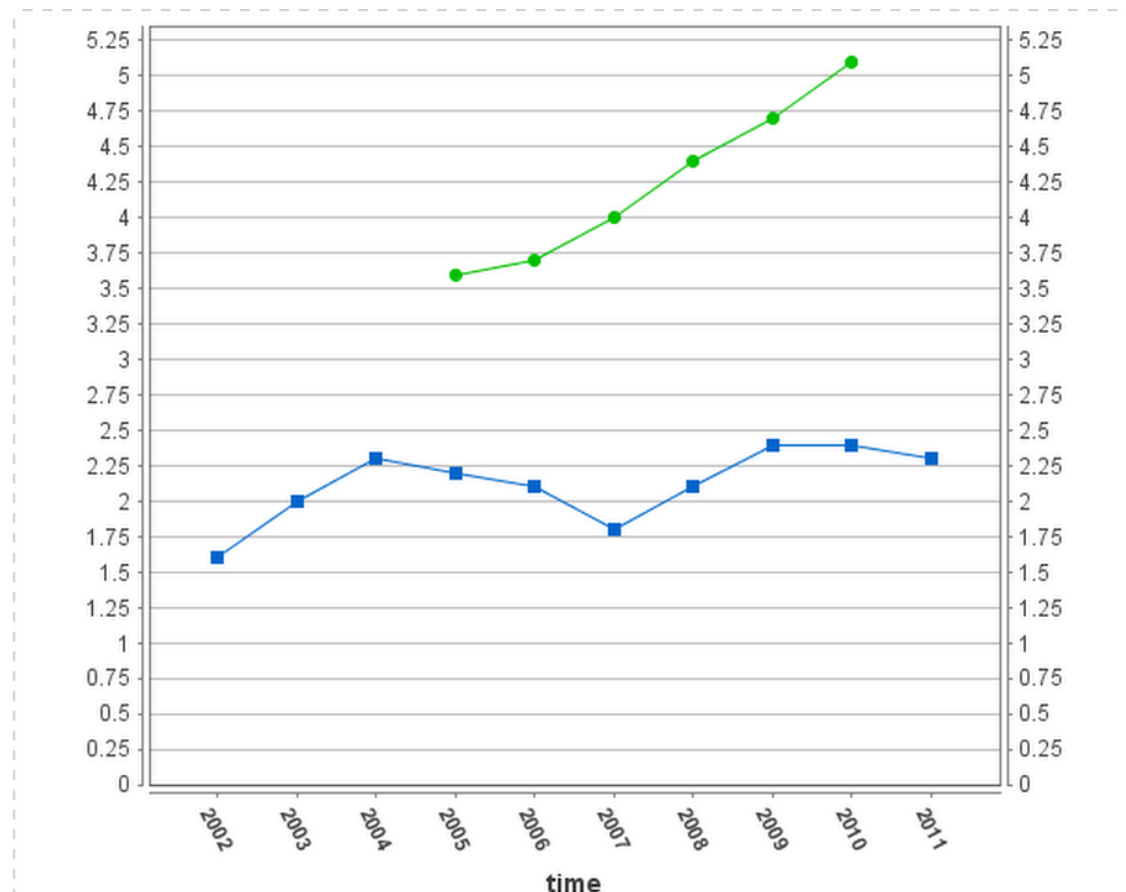
#### *Organic farming*

There are currently 127,000 ha of certified organic land which represents app. 2.3% of the total agricultural area in the country (2011) which is less than half of the EU average (5.1% in 2010) (Eurostat). More than 1500 enterprises produce approximately 25 million EUR (equivalent) of organically certified food. Hungary is one of the few European countries where the organic sector has not been expanding during the last years (Dezsény & Drexler, 2012). According to the Eurostat Farm Structure Survey, the ST region is the region in Hungary which has the lowest share of organic area in total UAA with less than 1 % (Eurostat).

Although more than half the organic area is grassland, organic animal husbandry is relatively insignificant compared to crop production. Today, organic products in Hungary have just a small market share. About 85% of total organic production is exported. There is little capacity for organic processing capacity in Hungary and most of the export leaves the country as raw materials or as low added-value produce.

The awareness of organic products is very low in Hungary and a large share of the consumers can not define what organic means, and tell the difference from non-organic products. It is however anticipated that market demand for organic products will continue to steadily increase in Hungary (Dezsény, Zoltán & Drexler, Dóra, 2012).

**Figure 11: Area under organic farming, share of total utilised agricultural area.** Hungary (blue) and EU-27 average (green)



Source: Eurostat

### *Forestry*

As mentioned above, South Transdanubia is the region richest on forest in the country. The highest value is found in Somogy county which have 29.5% forest cover. The forest areas consist mainly of indigenous species (turpentine tree, beech, oak, native poplar and hornbeam) but beside them denizen or cloned species (acacia, hybrid poplar) can be found too. The forest creates good conditions for game which is another important export product.

The forestries of the three counties (one in each county: SEFAG Forestry and Wood Processing Private Limited Company, Mecsek Forestry Private Limited Company, Gyulaj Forestry and Hunting Private Limited Company) are owned by the Hungarian Development Bank (HDB) and are therefore governed on national level. Sustainable forest management is supported through management plans that are compiled each 10 years, and which define the appropriate renewal of the forests. The plans are prepared in cooperation with the nature protection organizations (Danube Drava National Park). All lumbering have to be replanted within 5 years.

The large forest areas imply that there is a significant potential for bio-mass production in the region which represent the largest stock of renewable energy in the region (energy plantations, bio-ethanol and bio-diesel feedstock). Biomass production: the waste wood that remains after logging (e.g. twigs) can be collected and used in biomass boilers. This activity is governed by the HDB. This is intended to feed local boilers with smaller capacities, rather than large power plants.

### *Food industry*

The food industry is relatively strong in the region and represent app 20 % of the region's industrial output (in 2001). There are approximately 300 firms in South Transdanubia



operating in the food industry, 60% of them are SMEs. The food industry is an important employer with app 15 % of all employers in the industry sector (in third place after machine and textile industries). The number of employees has however decreased since 1998.

Most of the products supplied by agriculture and forestry are processed within the region as the capacities required are available here. The processing of meat and milk constitute the main branches of the food industry, but the baking industry also has considerable capacity. In addition to viniculture, brewing, production of fruit juices and sugar are also significant.

#### **4.1.2. Drivers, barriers and enabling conditions**

The below section includes an inventory of the drivers, barriers and enabling condition that are crucial for the development of the bioeconomy sector of the green economy.

##### **4.1.3.1. Identification and description of external drivers**

South Transdanubia host favourable territorial assets for development of green economy in the bioeconomy sector. The region has very good agricultural potential due to favourable climate and geographic conditions such as rich soil conditions etc., favourable for both agricultural and wine production as well as for forestry. The whole territory of Hungary is a GMO free zone.

The territory also provides favourable conditions for improving the share of renewable energy as the rich forest cover provides plenty of opportunities for energy production based on biomass and the favourable conditions for geothermal energy provide a rich source of e.g. heat energy. Rising energy prices and the high levels of energy poverty is creating the need for small scale energy production where biomass plays the most important role. Small scale, autonomous biomass powered systems based on local conditions are starting to appear across the region.

##### **4.1.3.2. Policies as an internal driver**

The below sector analyses three different levels of policies having an influence on the green bio-economy development in South Transdanubia; EU policies, national policy and legislative framework and the regional/local development concepts. It should be kept in mind that the ST region exists only from statistical point of view, without any administrative tasks and elected representatives. The municipalities, authorities and other actors of the South Transdanubia have to consider the national regulations and strategies, to a large extent.

##### ***EU policies and communications***

The EU level is highly important for greening the agricultural sector. It makes up the bulk part of support for greening processes through the CAP and through targeted research in the framework programs.

Accordingly, the most prominent EU policy for greening the bioeconomy is the **Common Agricultural Policy** (CAP). Launched in 1962, the CAP is a partnership between agriculture and society and Europe's farmers. Its main aims are to improve agricultural productivity, so that consumers have a stable supply of affordable food and to ensure that EU farmers can make a reasonable living. Today, the CAP absorbs around 41% of the EU budget.

The CAP aims to ensure that its rules are compatible with environmental requirements and that its measures promote the development of agricultural practices preserving the environment and safeguarding the countryside. Priorities include:

- Biodiversity and the preservation and development of 'natural' farming and forestry systems, and traditional agricultural landscapes;
- water management and use;

- climate change.

Farmers are encouraged to play a positive role in the maintenance of the countryside and the environment. This is supported by targeting aid at rural development measures promoting environmentally sustainable farming practices, like agri-environment schemes and by enhancing compliance with environmental laws by sanctioning the non-respect for these laws by farmers through a reduction in support payments from the CAP. The CAP is currently subject to reform and a new policy will be presented in 2014. The new CAP will be more in line with the current EU 2020 strategy and better support development of an intelligent, sustainable and inclusive growth. In October 2011 the Commission presented a set of legal proposals designed to make the CAP a more effective policy for a more competitive and sustainable agriculture and vibrant rural areas.

### **European Action Plan for Organic Food and Farming**

(Communication from the Commission to the Council and the European Parliament of 10 June 2004, (COM(2004) 415)) The action plan sets out 21 initiatives to achieve the objectives of developing the market for organic food and improving standards by increasing efficiency, transparency and consumer confidence. The plan aims to achieve measures such as improving information about organic farming, streamlining public support via rural development, improving production standards or strengthening research.

### **EU biodiversity strategy to 2020**

The new strategy was adopted in May 2011 to halt the loss of biodiversity and ecosystem services in the EU by 2020, and is a follow up on the 2006 strategy. There are six main targets, and 20 actions to help achieve its goal. They cover:

- Full implementation of EU nature legislation to protect biodiversity
- Better protection for ecosystems, and more use of green infrastructure
- More sustainable agriculture and forestry
- Better management of fish stocks
- Tighter controls on invasive alien species
- A bigger EU contribution to averting global biodiversity loss

A resolution, adopted in April 2012, provides a follow-up to the biodiversity strategy to 2020 stresses the economic value of biodiversity. It also highlights the importance of mainstreaming biodiversity protection and conservation in the development, implementation and funding of all other EU policies in order to make the EU's sectoral and budgetary policies more coherent and ensure that it honours its binding commitments on biodiversity protection.

**Biodiversity Action Plan for Agriculture (Volume III)** The action plan was adopted in 2001 and is based on a number of CAP instruments benefiting biodiversity. It includes measures that encompass environmental requirements integrated into market policy and targeted environmental measures that form part of the Rural Development Programmes. The priorities of the Action Plan are:

- the promotion and support of environmentally-friendly farming practices and systems that benefit biodiversity directly or indirectly;
- the support of sustainable farming activities in biodiversity-rich areas;
- The maintenance and enhancement of good ecological infrastructures, and the promotion of actions to conserve local or threatened livestock breeds or plant varieties.

### **Biomass Action Plan (COM (2005) 628)**

This action plan sets out measures to increase the development of biomass energy from wood, wastes and agricultural crops by creating market-based incentives to its use and removing barriers to the development of the market.

### **EU thematic strategy for soil protection**

The strategy puts forward measures to protect soil and to preserve its capacity to perform its functions in environmental, economic, social and cultural terms. The strategy sets up a legislative framework for the protection and sustainable use of soil, integrating soil protection into national and EU policies, improving knowledge in this area and increasing public awareness. It sets out measures to promote biomass in heating, electricity and transport, followed by cross-cutting measures affecting biomass supply, financing and research.

### **EU Forest Strategy**

The Strategy from 1998 established a framework for forest-related actions in support of sustainable forest management based on the co-ordination of the forest policies of the Member States and Community policies and initiatives relevant to forests and forestry. The revision of the strategy started in 2011 and a new strategy is foreseen to be published during 2013.

**Regulation on organic production and labelling of organic products** (Council Regulation (EC) No 834/2007). The regulation establishes the legal framework for all levels of production, distribution, control and labelling of organic products offered and traded in the EU. It determines the continued development of organic production through the provision of clearly defined goals and principles.

### ***National policies***

**The National Environmental Programme 2009-2014** (Nemzeti Környezetvédelmi Program) includes the sustainable use of biodiversity, improvement of the conservation status of 'Natura2000 species' and Reducing the quantity of annually produced waste by 20% (from 2009 to 2014), producing no more than 20 million tons of by 2014.

The Hungarian Government recently approved the **National Rural Strategy 2010-2020** (Új Magyarország Vidékfejlesztési Program) (March 2012) that was recently approved by the government sets ambitious objectives for the future development of organic agriculture and aims to generate demand for high-quality, GMO-free, locally produced food. The document considers organic agriculture as a strategic sector which deserves strong support. The objective is to have 350,000 hectares of certified organic land by 2020, which would be an almost threefold increase on the current area. It is anticipated that subsidies for organic conversion and for yearly certification costs will play a major role in achieving the targets. Additionally, the Strategy is committed to supporting family run farms, protecting our environmental treasures, and ensuring sustainable farming in Hungary. The Strategy also includes plans to increase the number of people employed in agriculture to 700 thousand by 2020, to increase the ratio of products directly distributed locally by farmers to 20 percent, and to increase the proportion of young farmers from 21 to 30 percent.

An additional 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.

There is no separate national policy for Biomass production. Instead the National Renewable Energy Programme includes a chapter on biomass and a few priorities related to bio mass production. Renewable energy production based on biomass is also the key prioritised areas on a national level and set out e.g. in the new National Energy Programme for 2030.

The **draft Ecological Farming Action Plan** of the Ministry of Rural Development's was completed in May 2013 and will be subject to social debate during the summer of 2013. The Action Plan sets down the tasks for the period 2014-2020 and aims to increase both producer

and consumer awareness, and cooperation by producers, as well as to aid the establishment of consumer and producer networks.

A **new National Agricultural Strategy** will be published later in 2013 and will have a main objective of increasing exports of fruits and vegetables, from the current 800 tonnes a year to 1.2 tonnes.

**The National Biodiversity Strategy** (A biológiai sokféleség megőrzésének stratégiája)

- contains actions for all relevant sectors in order to conserve and enhance biodiversity;
- handles all levels of biodiversity from genetic diversity to the variety of ecosystems;
- pays special attention to the genetic resources of wild flora and fauna as well as domestic plants and animals, including species which have adapted to the unique circumstances and characteristic of the Carpathian basin and are very important in climate change adaptation.

Increasing forest areas and rational use of wood are central elements of **the National Forest Program for the 2006–2015 period** (Government resolution 1110/2004. (X.27.))

**The Second National Energy Efficiency Action Plan of Hungary until 2016 with an outlook to 2020** (Magyarország II. Nemzeti Energiahatékonysági Cselekvési Terve)

The NEEAP includes several measures related to Energy saving measures in the productive, including agricultural sector e.g. Energy-saving renovation of agricultural buildings and production of agricultural energy from renewable energy sources (biomass furnaces) (within the framework of the New Hungary Rural Development Programme)

### ***National legislation***

For the forestry sector the **Forest Law** which regulates the forestry since the 19th century is the most significant (current version: 2009. évi XXXVII. törvény). The law is ensuring sustainable forest management according to the regional stakeholders consulted.

**The Act on Vine Growing and Wine Making** (Act XVIII/2004) contains provisions on the technological processes of vine growing and wine making, regulates related administrative issues and quality protection. It is not deeply concerned with issues of market regulation. **The Act on Vine-Growing Communities** (Act CII/1994) (amended as of January 1, 2004) has increased in the competences of the vine-growing communities. It defines vine-growing communities as a public body established in order to protect origin and quality and defines important new tasks and competences related to the protection of origin, source/genesis and quality both for the council of the vine-growing community and the national council. Since 2000, it is possible to found grass-root and voluntarily organized vine growing districts.

### ***Regional policies***

The food industry is a strategic sector in the **Regional Innovation Strategy** (2004) and is reflected in two of the priority axis 1) Improvement of the market position, expertise of industrial enterprises and of the quality of the manufactured food products and 2) Improving the market position and competitiveness of enterprises in viticulture, oenology and wine tourism. The priorities focus on the development of agricultural and viticulture and wine production businesses capable of the production of high value added foods; increase of the number of highly processed, innovative and competitive food industry products; the establishment of their distribution systems (bio-products, health preserving foods, region-specific traditional foods). The strategy points out that of all the industries in the economic structure of South Transdanubia, food industries (along with machine, textile and leatherwear industries) had an above-average tendency for innovation because of their performance and the number of people employed.

### **County regional development concept**

In accordance with the **Act on Regional Planning**, all three counties in the South Transdanubian Region county governments have prepared county development plans and long-term county regional development concept (involving cities with county rights). The concepts include measures in forestry which is mentioned as an area to be developed in terms of related areas.

#### *4.1.3.3. Institutions as an internal driver*

**The South-Transdanubian Regional Food-Innovation Cluster** established in April 2011 has the overall goal to foster the cooperation of companies, organizations, institutions in the field of food industry in the region as well as development of high added valued, so called strategically important food (functional, organic, conventional) according to the current trends in consumer behaviour, moreover to produce products which meet with the customer needs in a sustainable manner.

**The Regional Food Science Competence Centre** is a result of the efforts to harmonise the concentrated knowledge base(s) of the knowledge potential of the universities; to increase competitiveness of SMEs operating in the region by generating feasible innovations based on a cooperation of the academic and consulting sector in the food industry (<http://www.ddrek.hu/>). The establishment of the center was a priority in the Regional Innovation Strategy.

The main functions of the Centre includes bridging between the research and development knowledge bases and the businesses, sectoral innovation service, consulting and business development tasks, organizing professional trainings and providing sector-specific transfer organisation that provides professional support for small and medium-sized enterprises; organisation of networking cooperations.

**The University of Kaposvár** has relatively intensive research on agro-innovation and is a key actor in providing a scientific basis and capacity in the region that is capable of producing competitive research findings in the agricultural sector. The University is mainly performing research on natural sciences like agricultural technology and food chemistry (STREDA, 2004).

**The Regional Food Office** (RÉI) will have the task of developing the regional system of trademarks, of arranging evaluation by the jury, controlling, planning and arranging the communication of the registered trademarks. **The Regional Wine Office** (RBI) will have the task of elaborating the wine marketing strategy of the region in cooperation with the wine-growing enterprises and professional organisations, elaborating of short- and medium-term marketing programmes, the coordination of implementation, the elaboration, coordination and practical assistance of their communication. There is also a Research Institute of Viticulture and Oenology established in Pécs

#### *4.1.3.4. Financing as an internal driver*

##### *Role of Structural and Cohesion Policy Funds in the region*

Hungary will receive more funding from the **EU's Common Agricultural Policy** in the next programming period 2014-2020, increasing from 2.36% to 3.19% compared to the previous financial period. The total amount will be 12.3 billion Euro in agriculture funding (Government of Hungary, Press release February 19, 2013)

In terms of EU rural development funding, Hungary expects to receive a total of some 3.4 billion Euro in rural development funding for the 2014-2020 programming period. Local development projects managed by communities will receive greater emphasis. At least 25% are earmarked for climate change measures.

Some agriculture related investments can receive support by the ERDF for which South Transdanubia is eligible. **The Environment and Energy Operational Programme 2007-2014** includes eight priority axes; and the third priority “Wise management of natural assets” includes measures on Creation of the infrastructure basis for habitat-conserving agriculture and forestry (investments) and for Development of the forest school network. The EEOP also support energy efficiency and the use of RES in agricultural production.

#### *Role of regional and local funding for the sector*

Organic producers will receive priority in future calls from the Rural Development Ministry for diverse support programmes, such as the young farmers’ initiative. Organic animal husbandry and apiculture will receive particular support, as these are priority areas within the Ministry’s agricultural development policy.

#### *Role of economic instruments*

**Agricultural subsidies** financed from the national budget in accordance with the EU regulations on agricultural subsidies include support to community agro-marketing, the development of food safety and quality management systems, as well as consulting.

Since August 2000 wine is listed among the excise goods which have caused problems in Hungary. However, this system is suitable not only for generating state revenue, but for the protection of product origin as well. The extremely complicated domestic regulation, however, shows a strong preference to the income side and it is less suited for the true protection of the wine-growers’ market position.

In case of forestry, farmers have to pay a fee for each logged tree to the **National Re-forestation Fund**. The fund provides subsidies for the re-forestation, which are supervised by the forest management authorities after 1, 3 and 5 years. The subsidies are provided in steps, if it is proved that the new forest is growing.

##### *4.1.3.5. Others drivers*

The START initiative by the National Employment Agency where support to financing of new employees (during 10 months) are used for creating jobs in the biomass sector in the region, e.g. by collecting biomass.

##### *4.1.3.6. Description of problems and barriers encountered within sectors*

The below factors are identified as creating barriers for the green economy development of the bioeconomy sector.

#### *Geographically disadvantaged area*

The peripheral location of the region is considered as a barrier. In addition, the transport infrastructure can be considered as a restricting factor as the transport network is poor which makes the logistics obsolete and can limit export opportunities for bioeconomy products.

#### *Lack of efficient policy initiatives*

The low share of organic agriculture is partly due to a lack of efficient policy incentives, such as e.g. subsidies, administrative support and of coordination of export marketing initiatives. The new national strategy on organic farming might provide a positive initiative in the sector once it is enforced.

Regulations can pose hindrances to the biomass production, as the National Park administration can prohibit the lumbering in protected areas, even if the national forestry administration gives permission for logging. Farmers are not compensated by the state (forestry’s) in such cases, as custom in other countries.

#### *Lack of cooperation between stakeholders*

There is a lack of coordination among different stakeholders such as between producers, traders, umbrella organisations, certifiers, and research institutions. Better cooperation between stakeholders is required for the sector to move forward. Cooperation and a better communication between the actors is crucial for effective lobbying work and for Hungarian agriculture to play a role in facing up to global challenges, such as climate change or water and oil scarcity.

#### *Market conditions*

Potential barriers facing the sector and in particular the food industry sector include the concentration of commercial chains (often multinational) which creates a difficult situation for enterprises in the food industry where local producers cannot meet the demands on price and volume and are therefore losing market share to large supermarket chains. It is also highlighted that SMEs in the food industry have difficulties to follow the stricter food safety regulations, imposed by e.g. EU regulations. To install monitoring system for the whole production process is for instance a challenge.

In terms of biomass production, it is perceived as less economical to use the bi-product from forestry as biomass than to sell the lumber. Respecting the forestry regulations also mean less profit for the farmers, as the lumber production is maximized.

#### *Enterprise structure*

The agricultural structure in the region, dominated by small farms, is limiting the capacity for value added production as their ability to grow further and invest into greening is very narrow. The small scale farmers can however have some added value in terms of keeping the nature values and for tourism development.

#### *Low level of awareness*

There is low awareness of the benefits of organic farming both among producers and consumers and regionally produced crops and food. Currently, local food producers does not have any advantage of providing a regional product as it is in general not considered an advance among consumers. This can largely be attributed to the lack of labelling or visualisation of food products manufactured in the region. There is a lack of any broad awareness-raising campaign for organic products and locally produced food for domestic and regional consumers. For instance, a large part of the crops that are organic produce is still sold as conventional goods.

### **4.1.3. Spatial dimensions of the development of the bio-economy sector**

The conditions for bioeconomy naturally vary within the region following the territorial characteristics, but are in general favourable. The ST region is mainly rural, with the exception of a few urban centers. The rural area is also where, in general, the bioeconomy sector is most significant and where the major share of agricultural, forestry and fishery holdings are located. The shift towards a greener bioeconomy sector therefore needs to take place in the rural areas. Urban areas are however dependent on rural areas for agricultural products. Urban areas, as the main consumers, therefore have a changing the demand for different types of products, by for instance requesting ecological products.

The interaction and closeness between urban and rural areas can open up for recreational visits to nearby farms and farm shops. This is also something that could have a positive influence on the understanding of rural areas, farming, green agriculture and the impact of food production. It could also facilitate possibility to diversify into tourism or shops. In addition, the provision of renewable energy, such as biomass production, can be seen as an urban-rural interaction between supply and demand.

Territorial conflicts in the forestry sector derive from the utilization of wood as biomass, which could be used also in the industry (for paper, fiberboard production). An inherent conflict for

biomass is regarding the usage of the land. Some smaller forest associations, companies cut down whole areas of forest which is an illegal action. The Pannon Power Plant, which is the main producer for bio energy in the region, officially, only log trees not fitting other purposes but there are accusations that they not always apply that approach in reality.

Illegal logging for heating purposes by local citizens is another problem in the region, especially as Transdanubia has a large share of its population living in less developed areas and in micro villages where energy poverty is a significant problem.

#### **4.1.4. *Links with other sectors***

Bioeconomy has links to several other economic sectors and play an important role for environmental protection as well as it is a key factor in tourism and cultural preservation. The regional products in terms of its locally produced food and wine are a valuable asset for the tourism in the region and forests provide a variety of wildlife and recreation activities. Also the many small size-farms in the region which can on the one hand be considered as a hindering factor for regional economic development, provides on the other hand a valuable asset for tourism. Locally produced crops, food products as well as traditional farming practices are attractive for visitors as well as they create opportunities for eco-tourism. Concerning either its production or its consumption there is a close relationship with the productive-servicing activities, e.g., with tourism.

Wine is closely related to locally produced cuisine and drinks which is also a reflection of the local territory, its geographic conditions, to the local customs, culture and traditions. There is a lot of potential in further developing the wine tourism in the region. Five wine routes have been developed with the combined aim of promoting the production of good quality wines and protecting the ecological image of the vineyards, increase the demand for the region's wine and to developing wine tourism and rural tourism. These organizations are currently very weak and would need further support.

Waste is an important externality of agriculture and the waste produced and the existing waste management system therefore influences the greening of the sector. Also transport has close links to bioeconomy, because of the spread out structure of farms, transporting resources to the farms and commodities from the farms to processing. In terms of forestry, and in particular for bio-mass production the collection radius is a very important aspect of the greening process. Ideally, collection radius should be small and the source of the biomass needs to be close to the production plant to achieve reduced environmental impact. Distances and means of transport is therefore of importance.

Research and innovation is important to increase agricultural productivity in a sustainable manner through e.g. increased resource efficiency throughout the production and consumption chain, both in the way inputs are used and waste is managed. Practically this requires research and innovation towards new practices, and education and information to make sure such new practices will be applied at the farms and by consumers.

#### **4.1.5. *Potential for development of the sector***

According to "UNEP Towards a green economy (2011): Agriculture investing in natural capital" the greening of agriculture refers to the increasing use of farming practices and technologies that:

- Maintain and increase farm productivity and profitability while ensuring the provision of food on a sustainable basis;
- Reduce negative externalities and gradually lead to positive ones; and



- Rebuild ecological resources (i.e. soil, water, air and biodiversity “natural capital” assets) by reducing pollution and using resources more efficiently.

As highlighted above, there is a strong agricultural potential in the region due to the favourable climate and geographic conditions. Farming and food production are especially favourable as the need for artificial agents are limited as a result of the good quality soil and the well-established, traditional plant and animal species. The Hungarian constitution bans the use of GMOs and many of its low-intensity agricultural areas (mostly pastures, meadows, fallows) are free from the effects of agro-chemicals. Hungary and the ST region therefore have significant advantages in switching to organic agriculture. There is a significant lack of organic processing capacity in Hungary which could provide interesting potential market opportunities for organic food processing companies in STD as the traditional food industry is already strong. The current low level of organic farms is a indication that the full potential of the sector has not been used and there are numerous unexploited opportunities to take advantage of (Dezsény & Drexler, 2012). According to Dezsény and Drexler, the future development of organic agriculture in Hungary is to a large extent dependent on the national implementation of the CAP and the realisation of the new National Rural Strategy from 2012. The new Action Plan on Ecological farming, which is currently undergoing public debate, might improve the conditions by providing objectives and a strategic framework for organic farming in Hungary and in particular in the STD region. Organic farming as a higher value activity is especially profitable for small-scale farmers, which constitute the majority in the region. It is also clear that organic production needs a stronger practice-oriented research basis and awareness raising of consumers, but also among producers as well as dissemination needs to be key ingredients - all underpinned by local scientific evidence (Dezsény & Drexler, 2012).

Innovation in the bio-economy sector creating greener agricultural practices and production patterns have good potential in supporting the region to recover and reduce the development gap to the level of other regions in the country.

Perhaps the most important aspect of greening of the sector is the energy. Agriculture in ST uses primarily fossil fuels. There is a scope for energy to be a driver in the greening of the sector with development of on-farm bio-energy facilities (both for heating and fuel), integration of wind mills and solar panels with existing structures, and with new electric engines for tractors and other equipment (driers, etc.).

Biomass is the most significant potential renewable energy source in South Transdanubia. The extensive forest areas are a rich source of biomass and mean great strength of the region. Based on Hungary's Renewable Energy Utilisation Action Plan and the data contained in the Regional Energy strategy, South Transdanubia has excellent agro-ecological conditions. Therefore the power plant utilization of renewable energy resources and the production of the fuels (e.g. biomass, biofuels) could be sustainable and competitive. Biomass is one of the most easily accessible, inexpensive energy resources in rural areas, its utilization could mean an important tool of rural development and employment policy (e.g. public work programmes related to its collection). Further utilization of this resource is therefore significant in the greening of the regional economy.

## **4.2. Energy**

### **4.2.1 Performance of the sector**

The contribution of the energy sector to the national GVA, as a share of GDP is around 4 % in Hungary, a relatively high number indicating that energy sector is important for the national economy. The energy sector's GVA has seen an increasing trend. The electricity, gas and hot water supply sector is the most important sub-sector, representing app. 2.6 % of total national GDP. In the ST region, the presence of the only nuclear power plant in the country, the Paks Nuclear Power Station, significantly increase the size of the sector and the relative

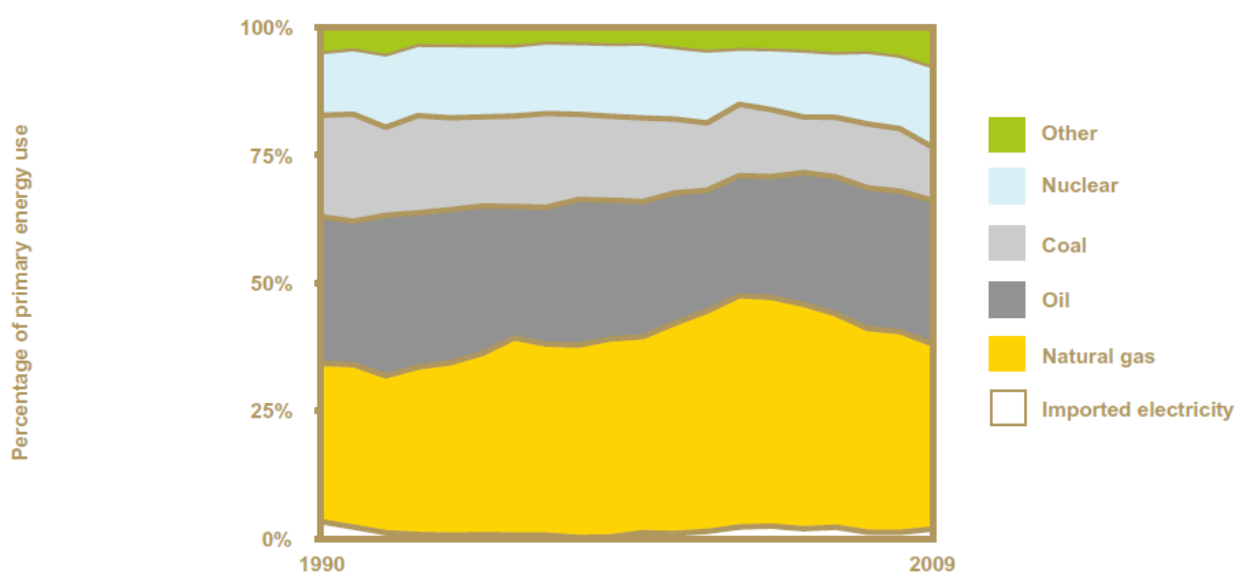
importance of the sector in the regional economy 2009, which is around 8-13 % of the total regional GVA. Compared to other regions in EU-27, the ST is among the top three in terms of the relative importance of energy sector in the regional economy.

On a national level, the energy sector employs around 50 000 people (Eurostat), which represented close to 1.5 % of the total employment, in 2009. In terms of the different subsectors contributions in the energy sector's employment levels, the electricity, gas and hot water supply sector is the single biggest source of employment (app. 0.7% of total employment). The mining and quarrying of energy producing material represents smaller shares. In contrast to the rise of GVA over the last decade, the number of jobs in the Hungarian energy sector has been shrinking with 32 % in the period 2000-2009. The job losses have been largest in the mining and quarrying of energy producing materials sector (-73.8 %) followed by the electricity, gas and hot water supply sector (-23.7%). In terms of the relative regional labour importance of the electricity, gas, steam and air conditioning supply sector 2009 the share of employed labour force is in the range 1-1.5 %.

### *Energy consumption*

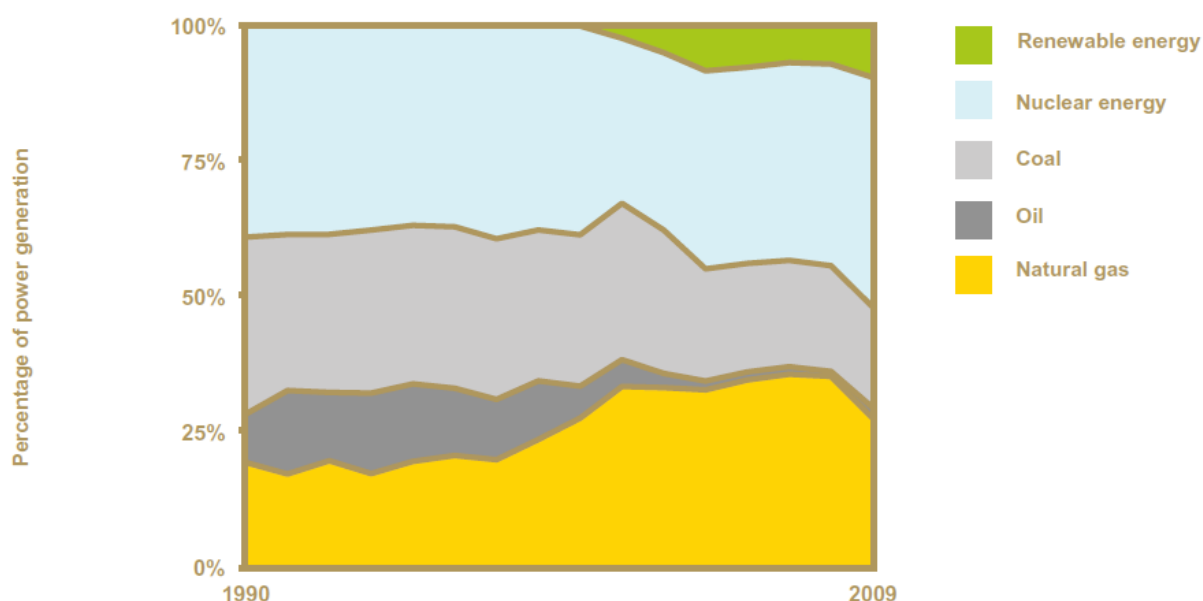
The energy intensity of the national economy is high, 295.4940 kg of oil equivalent/1000 EUR, which is almost the double of the EU average of 152.0800 in 2010. The energy intensity has however been reduced significantly during the past years as it was as high as 420.0000 in 1995 (Eurostat). National CO<sub>2</sub> emissions from the energy sector are exceeding the EU-27 average. The most polluting economic sectors regarding the greenhouse gas emission are electricity, gas, steam, although the load magnitude and rate is decreasing due to the technological progress. Hungary is highly dependent of energy import, mainly from Russia. The amount of natural gas piped to the region is constantly decreasing. Compared to 2007, the consumption has decreased with 14 %. The biggest reduction is seen in Tolna and Somogy county. This is explained by an increased use of alternative sources such as biomass but also to energy efficiency improvements in households as well as the general economic slowdown. Conversely, the consumption in the municipal, industrial and agricultural sectors grow continuously and after experiencing a sharp drop in 2009, it is again close to the levels of 2007, where the peak consumption was measured.

**Figure 12: Hungary's primary Energy use**



Source: (Ministry of National Development, 2012)

**Figure 13: Electricity generation in Hungary**

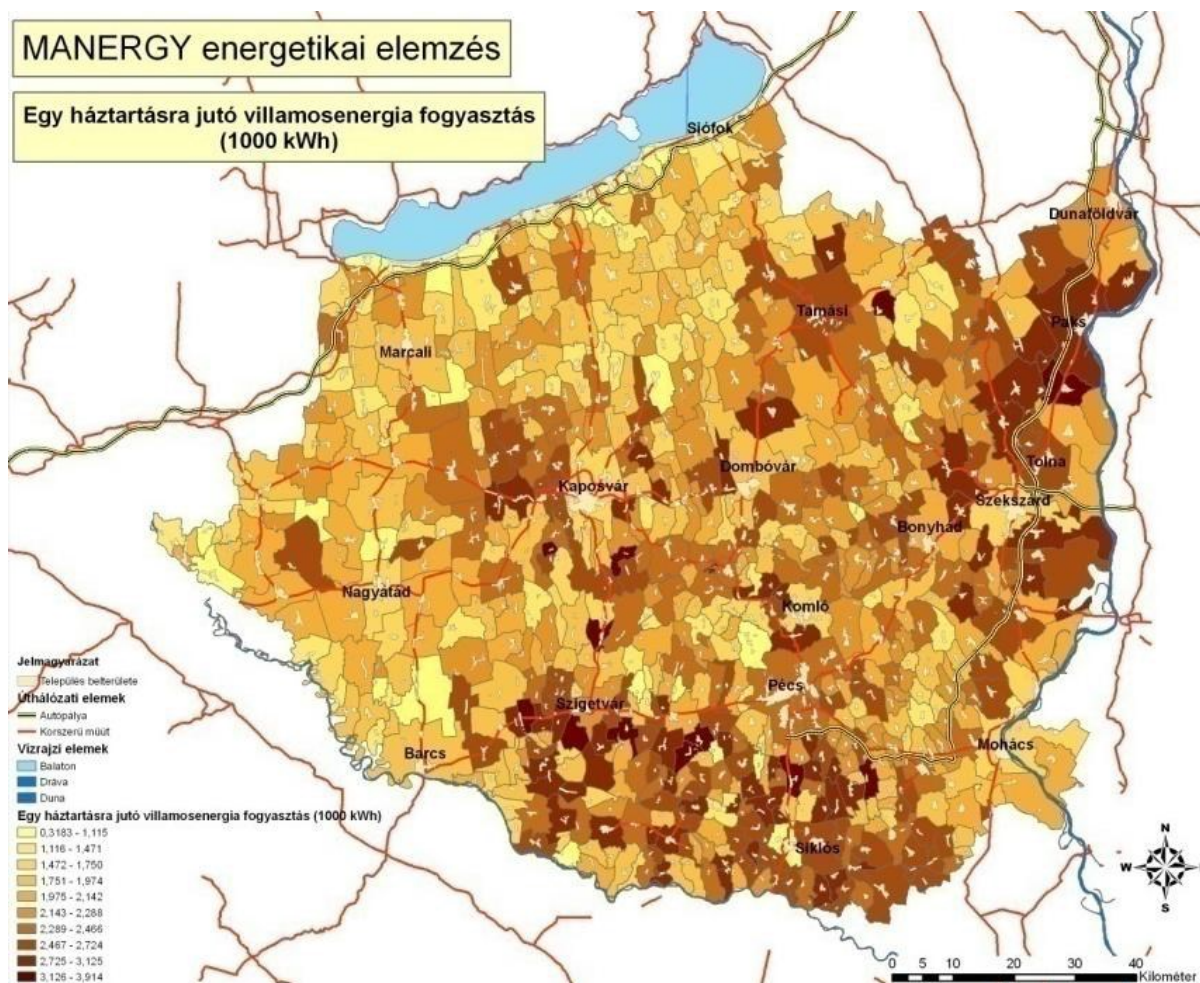


Source: (Ministry of National Development, 2012)

The only nuclear power plant of the country is located in the region (in Paks) and produces 40% of the electricity generated in Hungary (total installed capacity is 2000MW). It improves the economic indices of Tolna county to a great extent, but is not an integral part of the region's economy as its impact being restricted to the surroundings of the town of Paks (STREDA, 2004). In 2009, the government approved the expansion of the power plant and two new units are planned by 2020-2030 (STREDA, 2012).

The quantity of electricity supplied in South Transdanubia increased by 1,045% in 2011. However, the electricity in fact meant a 0,29 % decline compared to the national percentages. The share of electricity supplied to households is 11 % higher in ST region compared to the national average (42% and 31 % respectively). This is an indicator of the poor economic development in the region and implies that the energy supplied to the industry sector is lower than average. The map below shows the territorial distribution of electricity consumption per household in the region. The region's share of supplied electricity in the national total was 6.8% in 2011. The slight increase of electricity supplied in the region (1.05%) meant a 0.29% decline in comparison with the national percentages. 64% of the households are supplied with piped gas (STREDA, 2012).

**Figure 14: Electricity consumption per household in South Transdanubia, 2011 (1000 kWh)**



Source: (South Transdanubian Regional Development Agency, 2012, p. 86)

The map above shows that there is no correlation between the energy consumption and the most developed areas. For instance, the areas of Szigetvár and Tamási are characterised by high electricity consumption despite belonging to some of the most disadvantaged areas in the country.

### *Renewable energy capacity*

In 2011, Hungary had a relatively low share of RES in the gross final energy consumption; 8.1 % while the target for 2020 is 14.6% as stipulated in the National Renewable Energy Action Plan 2010-2020 (NREAP). The EU-27 average was 13% in the same year. The use of RES has nevertheless seen a steady rise since 2004 when the share was only 4.4%. Hungary is therefore not predicted to achieve the target. There is no regional data on the share of RES but the situation is estimated to be similar to the national situation with low levels of RES in the energy mix.

x. Due to lack of data, it is difficult to assess the renewable energy capacity in Hungary, even more so in South Transdanubia.

A survey in 2010 conducted among central local governments of 25 micro-regions in the ST region shows that renewable energy amounts to only 2 % which would imply that it is even significantly lower than the national share of RES. The lowest share of RES was in Somogy county where seven micro-regions claimed that the share was 0%. The types of RES existing were dominantly solar power (80% of the micro-regions) followed by biomass and geothermal.



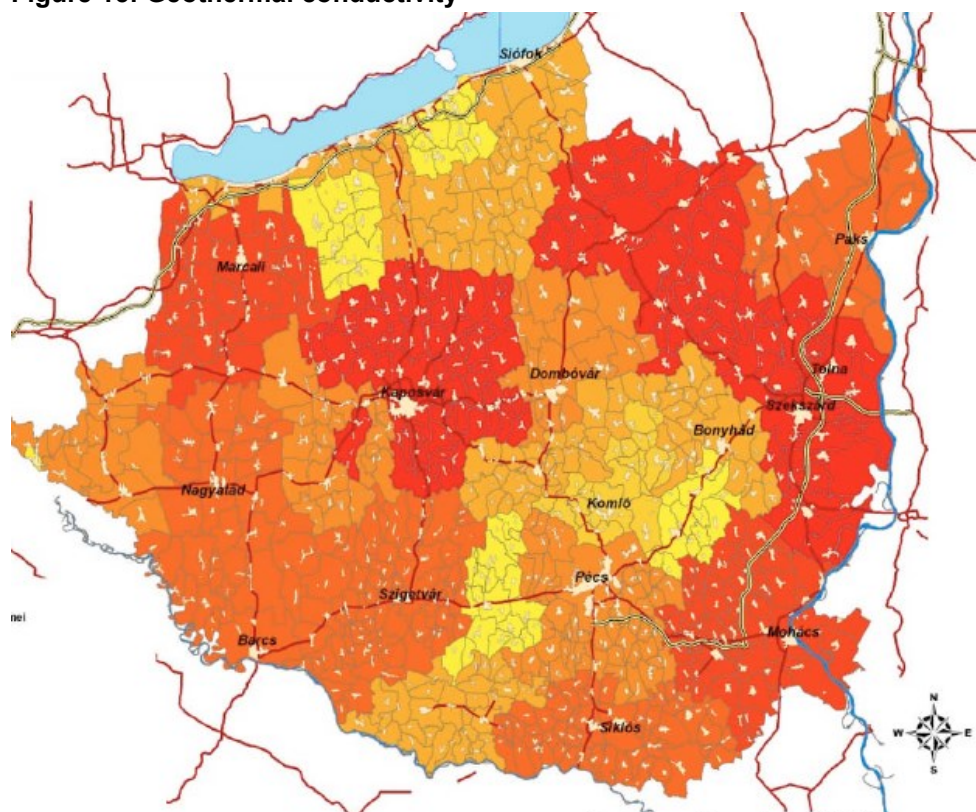
energy. Future expansion plans were representing the current situation where solar power was a priority among micro-regions (STREDA, 2012).

The RES used for the heating sector is below 10%. The target set in the NREAP is 18.9% by 2020. According to a study by Energia Klub, among renewable heat production solutions, biogas plants have the highest potential, throughout its life-cycle, of creating jobs (Energia Klub, 2011). The share of renewable energy sources in the electricity and heating/cooling sector in Hungary is dominated by biomass (almost 80%) of the total. The two existing plants have a combined capacity of 121.8 MW. Two new planned power plants and an extension of the Pecs power plant will add another 80 MW. There is an increasing development of biogas and landfill gas power plants in the region. Currently seven power plants are established and there are plans for an additional six power plants in the region.

Expansion of the existing capacity in bioethanol and biofuels power plant as well as geothermal energy is foreseen with the construction of new plants as can be seen in the table below.

Geothermal energy represents app 8.2% which is a very low share -0.16 %, of the total energy balance of Hungary, despite the significant resources available (Horváth, Reményi & Tóth, 2012). Hungary has large potential for geothermal energy and 169 thermal wells are identified in the region. However, for the utilization of the current wells, an approach for optimized and rational use is lacking. The potential is estimated to be 2-3 times higher than the world average.

**Figure 15: Geothermal conductivity**



Source: (South Transdanubian Regional Development Agency, 2012)

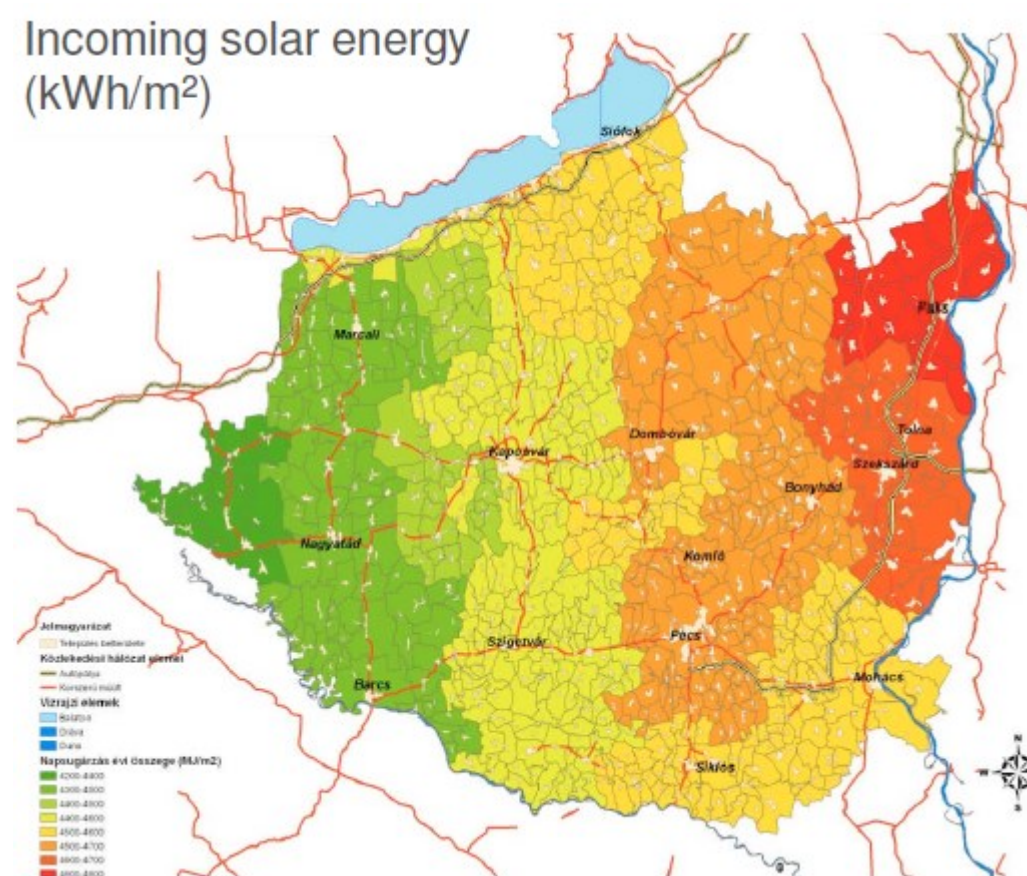
There is currently no installed capacity for wind power. Two new wind farms are however planned with a combined capacity of app 55 MW. Despite the planned extension, the regional conditions for wind power are only partially favourable as there are few mountainous areas, precipitation varies in time and space and the rivers have small gradients. This means that there is no fixed wind direction, duration and strength in the region. In addition, there is an

extensive coverage of natural protection areas such as Natura 2000, Ramsar and which limits the possibilities for the expansion of wind turbines. Some capacity can be exploited in the North-East part of the region.

Only one small hydropower plant exists in the region. The regional energy strategy states that small-scale hydropower should be primarily used before considering large scale options.

The region has 1900-2100 sunny hours/year; representing 1250-1300 kWh/m<sup>2</sup>. There are some good examples of solar installations in the region. In the small settlement of Orfű (Baranya county), public lightning is provided by photovoltaics that has operated during three years without necessary operational costs and repairs.

**Figure 16: Incoming solar energy**



Source: Presentation Manergy project

**Table 3: Installed and planned renewable energy capacity in South Transdanubia**

Renewable energy source	County	Existing capacity	Planned power plants	Comment
Biomass	Baranya	Pannon Power Holding cPlc, (24MW heating, 109.9MW electric)	Pannon Power Holding cPlc. (35MW)	From an economic and ecological point of view biomass-collection is reasonable within 20 km radius. The planned capacity, are however based on a 50-80km radius of
		Komló Heating Plant cPlc, (59MW heating, 11.9MW electric)		
	Somogy		DRÁVA Wood Industry Ltd. (10MW)	
			ELMIB biomass power plant (35MW)	

				collection.
Biogas, landfill gas	Baranya	Bicsérdi Arany-Mező cPlc. (0,635MW)	Bikal Nonprofit Ltd. (0,5MW)	According to Hungary's Renewable Energy Utilisation Action Plan the biogas production of the country is expected to double by 2020.
		ENER-G Energy Technology cPlc, (0.5MW)	Sombereki Biogas Power Plant cPlc. (0.65MW)	
	Somogy	Hungarian Sugar cPlc. (N/A)	NDA	
		Kurtsjens B. V./ BIO-E Ltd. (N/A)	Energreen Power Ltd. (1.625MW)	
			Drawa Agricultural and Forestry limited partnership	
	Tolna	Pannonia Mg. cPlc. (1,36MW)	Bioweg Ltd. (12+7MW)	
		Kaposzsekcső Agricultural cPlc. (0.84MW)		
		Mil-Power cPlc., (1.2MW)		
Bioethanol, Biofuel	Baranya	Pannonia Ethanol Zrt. Ethanol Europe Renewables Ltd. (240l ethanol/year based on corn)	Pannonia Ethanol Zrt. Ethanol Europe Renewables Ltd. (240l ethanol/year based on corn)	Hungary's Renewable Energy Utilisation Action Plan foresees the establishment of 5-10 thousand tons/year capacity small plants in connection with the development of agriculture.
	Somogy		SEKAB Bioenergy Hungary Ltd (biomass and organic waste)	
			Bio Tech-Energy Ltd. (corn)	
	Tolna		Agrár-Béta Agricultural Limited Liability Company (0,006l/year based on corn)	
			Fagen (corn)	
			Rodeport Ltd. (corn)	
Geothermal energy	Baranya	PannErgy Plc./Szentlőrinci Geotermia Zrt., and the Szentlőrinc Public Works Non-profit Ltd. (5MW)		In the STD Region 169 thermal wells have been identified and are used for building heating, domestic hot water supply, and spas' water and heat supply.
		Municipality of Bóly		
	Somogy		Municipality of Csurgó/Csurgói Geotermia cPlc.	
	Tolna		Tamási Geotermia Municipality of Villány Plc. (8MW)	
Wind energy	Baranya	No installed capacity	Kozármisleny Wind Energy Project Ltd. (20MW)	
	Tolna		Alerion Földvár Wind Farm Ltd. (30-35MW)	
Hydropower	Tolna	Blue Stream Ltd. (0.04MW)		
Briquettes	Tolna	Klopcsik István, private owner (300 tonnes/year)		
	Baranya		Alt. Energy Ltd	
Municipality of Villány				

Source: (STREDA, 2012)

### *SME's in the energy sector*

In general, the activities of the SMEs of the energy sector focus on services and commercial activities rather than production. There are just a few companies in the region producing measuring or filtering equipments, or components of energy production appliances. The most common profiles of the related SMEs are: building engineering (which also includes installing of PV panels, solar collectors, heat pumps, etc.); software developers for the building engineering sector (for planning and sizing different technologies) and surveillance of renewable energy systems; performing energy audits for buildings; producing insulations and energy efficient doors and windows; enterprises in the metal industry producing different parts for boilers, nacelle parts for wind turbines, parts of biomass plants, buffer tanks, etc.; providing geological measurements (for geothermal heating systems, LPG storages, etc.); planning, configuration and establishment of different types of electric and heat energy distribution systems; supporting other enterprises in joint energy procurement from the market as well as compiling tenders for different EU or national programmes.

Strong “Western” firms appeared only in the energy sector when the surviving enterprises came to be privatized, and the number of green field investments by large companies was very small (RIS).

#### **4.2.3      *Key milestones***

- While most of national energy policy lacks clear targets, the National Renewable Energy Action Plan adopted in December 2010 is the key policy setting targets RES production and assess the potential for further expansion. This policy has provided the framework for developing the Regional Energy Strategy.
- The new Regional Energy Strategy (2012) is the first effort to formulate energy priorities on a regional level. It builds on four pillars out of which two aim at increasing energy efficiency and the use of renewable energy. The strategy was developed during 2012 but has not been officially approved. STREDA, who developed the strategy are trying to get the approval from the three county councils in order to raise the authority of the strategy. The approval process is taking place during the second half of 2013.

#### **4.2.4      *Drivers, barriers and enabling conditions***

The below section includes an inventory of the drivers, barriers and enabling conditions that are crucial for the development of the energy sector of the green economy in the region.

##### **4.2.4.1      *Identification and description of external drivers***

Due to the increase of energy price over the past few years and the increasing energy poverty in the region there is an increasing number of consumers that start to search for alternative energy solutions and sources instead of natural gas. Such solutions of small-capacity, autonomous systems based on local conditions (mainly powered by biomass) are starting to appear across the region. Currently they are only producing thermal energy but the possibilities for electricity production are possible given some additional investments (Horváth et al., 2012).



#### 4.2.4.2. *Policies as an internal driver*

Stricter environmental policies and legislation, both on EU level and on national level is identified as a driver among the consulted stakeholders in the region. As previously described, NUTS 2 regions do not have any administrative jurisdiction and regulations are not initiated on regional level. The below sector analyses three different levels of policies having an influence on the green energy development in South Transdanubia; EU policies, National policy and legislative framework and the regional/local development concepts.

### **EU Policies**

#### **Europe 2020 Strategy for smart, sustainable and inclusive growth.**

Released in 2010, EU 2020 Strategy is a long-term growth strategy for the EU, which aims to create the conditions for a more competitive economy in Europe with a higher employment. It steers the transition to a greener economy through promoting growth that is smart, sustainable and inclusive; by promoting a more resource efficient, green and a more competitive economy. The Strategy has targets related to increasing the energy efficiency, modernization the building sector and increasing the green investments. The 20-20-20 targets are headline targets of the strategy. This reflects the recognition that tackling the climate and energy challenge contributes to the creation of jobs, the generation of "green" growth and a strengthening of Europe's competitiveness.

#### **The Roadmap for moving to a low carbon economy in 2050**

The Roadmap is one of the long-term policy plans put forward under the Resource Efficient Europe flagship initiative. The Roadmap suggests that, by 2050, the EU should cut its emissions to 80% below 1990 levels through domestic reductions alone. It sets out milestones which form a cost-effective pathway to this goal - reductions of the order of 40% by 2030 and 60% by 2040. It also shows how the main sectors responsible for Europe's emissions, power generation, industry, transport, buildings and construction, as well as agriculture - can make the transition to a low-carbon economy most cost-effectively. Energy efficiency will be a key driver of the transition. More locally produced energy would be used, mostly from renewable sources.

#### **Energy Roadmap 2050 [COM (2011)885]**

The EU is committed to reducing greenhouse gas emissions to 80-95% below 1990 levels by 2050 in the context of necessary reductions by developed countries as a group. In the Energy Roadmap 2050 the Commission explores the challenges posed by delivering the EU's decarbonisation objective while at the same time ensuring security of energy supply and competitiveness. The Energy Roadmap 2050 is the basis for developing a long-term European framework together with all stakeholders. The 20-20-20 objectives are also headline targets of the Europe 2020 strategy for smart, sustainable and inclusive growth.

#### **The renewable energy roadmap COM(2006)848**

The roadmap was adopted following the growing concerns over climate change, and the realization that the indicative targets set by the Renewable Electricity and Biofuel Directives were unlikely to be achieved. The Roadmap set out the Commission's long-term strategy for renewable energy in the EU and aimed to enable the EU to meet the twin objectives of increasing security of energy supply and reducing greenhouse gas emissions. The strategy proposed an overall binding target of 20% share of renewable energy in total energy consumption by 2020 and a binding minimum target of 10% for transport biofuels by 2020.

#### **The Energy and Climate Change Package**

The so called "20-20-20" targets, set three key objectives for 2020:

- A 20% reduction in EU greenhouse gas emissions from 1990 levels;
- Raising the share of EU energy consumption produced from renewable resources to 20%;
- A 20% improvement in the EU's energy efficiency.

## **EU Biomass action plan**

In December 2005, the EC presented the Biomass action plan which identified 32 key activities for boosting the bioenergy market and encourage Member States to establish national Biomass Action Plans. There is no national plan for Biomass in Hungary.

## **National Policies**

### **The New Széchenyi Plan (Új Széchenyi Ter)**

The New Széchenyi plan that was launched on 14 January 2011 is the key economy development programme of the government's responds to the challenges Hungary is facing, and aims to ensure a growth scenario that can be sustained over the long term. Improving competitiveness, creating one million new jobs within ten years along seven break-out points are the main objectives of the plan. The plan defines the potentials that green economy development is interpreted in a broad sense. Apart from renewable energy and energy efficiency, it includes the field of environmental technologies and environmental industry. Accordingly, it contains sub-programmes concerning green energy, energy efficiency, green education, green employment, environmental industry, green research and development and innovation.

Based on the priorities stated in the document, the plan regards energy management mainly as an industry with job potential. The most important objectives of the green economy development programme within the New Széchenyi Plan are the facilitation of establishing a more liveable, more energy- and cost-efficient institutional and economic structure by diversifying energy supply and developing the environmental industry; this structure could – on the basis of Hungarian conditions – create new jobs and contribute to a well-balanced and sustainable development of rural areas.

### **The National Reform Programme**

The NRP contains the national commitments relating to the Europe 2020 targets. Hungary intends to increase the share of renewable energy sources to 14.6% by 2020, achieve total energy savings of 10% as well as limit the increase of greenhouse gas emissions at 10 per cent (relative to the level of 2005) outside the EU Emissions Trading Scheme.

The NRP contains several measures related to energy including renovation of buildings and industrial actors to increase energy.

### **The National Energy Strategy 2030<sup>3</sup>**

The Strategy was published by the Ministry of National Development on the 14th of February 2012 and includes energy policy measures proposed to be implemented by 2030 and an outlook until 2050. The strategy aims to ensure the long term sustainability, security and economic competitiveness of energy supply in Hungary and to reduce energy dependency. Five priorities are drawn up to achieve the objectives set in the Strategy:

- increasing energy savings and energy efficiency,
- increasing the share of renewable energies,
- integrating the Central European grid network and constructing the required cross-border capacities, and
- maintaining the existing nuclear capacities and utilising the domestic coal and lignite resources in an eco-friendly manner for power generation.

The strategy aims to achieve a 20 % share of renewable energy in primary energy use by 2030. Among the renewable energy sources, biomass and bio gas cogeneration plants are given priority. In terms of heating, geothermal energy is will be used primarily.

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

---

<sup>3</sup> Available at:

<http://www.kormany.hu/download/8/d7/70000/Hungarian%20Energy%20Strategy%202030.pdf>

economically feasible potentials; expert estimations vary greatly (between 100 and 1300 PJ/year).

#### **National Renewable Energy Action Plan 2010-2020<sup>4</sup>**

The NREAP was approved in December 2010 as is among stakeholders in the region seen as the most important national strategy as it provides concrete targets for RES production. The plan includes a target of achieving 14.65 % of RES of total gross energy consumption, which is higher than the target set by the EU of 13 %. Through this, Hungary intends to demonstrate that through appropriate energy saving and energy efficiency programmes and an energy-intelligent (green) economic policy, it is possible to achieve economic growth, create jobs, increase the competitiveness and an increase in the standard of living along a low-carbon path, without increasing the consumption of energy sources. It is anticipated that this would have a significant effect on the green economy development in the country and its effect on employment is estimated to the creation of at least 150 000 to 200 000 jobs, including 70 000 jobs in the renewable energy sector.

The action plan presents and marks out financial incentives to projects that promote the generation and utilisation of renewable energy sources. An outline is given of the regulatory incentives and administrative methods of promoting the spread of alternative energy sources and other measures, including education and awareness raising, are set out to change the social conditions in the interest of achieving this ambitious target figure. 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.

#### **The Second National Energy Efficiency Action Plan of Hungary until 2016 with an outlook to 2020<sup>5</sup> (NEEAP)**

The second NEEAP is an update of the first NEEAP from 2008. The primary objective of the second NEEAP is to achieve the highest possible savings in final energy use by 2016 by using available resources efficiently. Hungary's second NEEAP outlines ongoing and planned energy efficiency measures which will make it possible to reduce Hungary's energy use in sectors set out in the Energy Services Directive by 1% per annum on average in the 9 years of the period between 2008 and 2016. The target saving is 54.4 PJ in the total energy use by 2015. The commitment of Hungary for 2020 is 10% total energy savings. It is stated that within the framework of restructuring the development of green economy in accordance with the New Széchenyi Plan is one of the possibilities for the economy of an "energy-efficient Hungary" to achieve a breakthrough.

The action plan states that the highest energy savings can be made in the field of residential buildings, households, local governments and public institutions. The NEEAP includes several measures related to energy saving measures in the productive, including agricultural sector e.g. Energy-saving renovation of agricultural buildings and production of agricultural energy from renewable energy sources (biomass furnaces) (within the framework of the New Hungary Rural Development Programme)

**The National strategy for Building Energy Strategy** is planned to be published later in 2013. The strategy is a response to the stricter energy regulations that will come into force from 2015 with regard to public buildings, and from 2019 concerning private buildings. The requirement of close to zero energy use will come into effect within the European Union with regard to public buildings from 2019 and in relation to private buildings from 2021.

---

<sup>4</sup> Available at:

[http://www.kormany.hu/download/6/b9/30000/RENEWABLE%20ENERGY\\_REPUBLIC%20OF%20HUNGARY%20NATIONAL%20RENEWABLE%20ENERGY%20ACTION%20PLAN%202010\\_2020.pdf](http://www.kormany.hu/download/6/b9/30000/RENEWABLE%20ENERGY_REPUBLIC%20OF%20HUNGARY%20NATIONAL%20RENEWABLE%20ENERGY%20ACTION%20PLAN%202010_2020.pdf)

<sup>5</sup> Available at: <http://www.buildup.eu/sites/default/files/content/HU%20-%20Energy%20Efficiency%20Action%20Plan%20EN.pdf>

The country's agricultural and rural development strategy is rather closely related to the green economy development (and energy strategies in general). The **National Rural Development Strategy 2010-2020** is closely linked to the National Energy Strategy, as well as the regional energy strategy. One of the objectives is that rural regions attempt to produce the highest possible share of energy satisfying their own energy needs, with regard to sustainability requirements. It is highlighted that the sustainable energy management of rural areas is based on a significant decrease in absolute energy demand (energy saving). The 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. It also promotes the use of primarily forestry firewood and wood chips, pellets, straw and wooden bricks, agricultural by-products, 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 bi-products.

#### **The National Forest Program for the 2006–2015 period**

The programme includes the promotion of 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.

Geothermal energy is regulated by a number of different laws and regulations. Besides the Act on mining (1993) there are six acts of Parliament and numerous government and ministerial decrees.

**The National Climate Change Strategy for Hungary** for the period 2008-2025 (2007) is a key programme supporting greening of the economy. The operational branch of the strategy, the National Climate Change Programme includes a set of concrete programmes which puts priorities of concrete actions in the area of energy efficiency (insulation, remote heating modernisation) for the private and public sector.

#### **National Regional Development Concept**

In accordance with Act XXI of 1996 on regional development and regional planning, the government prepares the National Regional Development Concept. 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. The objectives of the strategy are: Regional competitiveness, Regional catching up, Sustainable regional development and heritage protection, Regional integration into Europe and Decentralization and regionalism.

The objectives related to the Balaton region (where South Transdanubia is included), which is one of the integrated development regions with national importance includes the encouraging of the environment-friendly technology and energy-efficient operations of the region's businesses; 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 aim 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.

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.

### ***Regional Strategies***

#### **South Transdanubian Regional Energy Strategy (2012)**

Besides the priorities defined on national level in the above mentioned documents, the STREDA decided to elaborate a more specific framework for future green developments, which is reacting more efficiently to the regional energy consumption features and renewable energy potentials in the ST region. It is the first attempt of setting energy priorities for the region. After conducting analyses on energy consumption (mainly regarding the public sector) and renewable energy potentials of the region, STREDA elaborated the Regional Energy Strategy of South Transdanubia. The strategy that will serve as a background document for regional energy development projects was finalized in October 2012, after considering the suggestions of energy experts and municipal decision makers. The next step is the official approval of the document, which is planned to take place during the autumn 2013. Due to the fact that regional political level doesn't exist in Hungary, the strategy will have to be approved by the Regional Development Consultation Forum, which is authorized to officially represent the standpoint of the region. In the Forum is composed of the presidents of the three counties' general assemblies (Baranya, Somogy and Tolna).

However, although without the formal approval the strategy is fulfilling its objective. Municipalities are using it as an example on what kind on how to formulate local development concepts, measures can be taken and investments to be prioritized. Also, STREDA is using the strategy as a background and guidance when developing the regional concepts.

The regional energy strategy is to a certain extent directly affected by the national and regional development and planning concepts and programs, but indirectly their influence is much more significant. The strategic, long-run aim of the South Transdanubia Region is the establishment of a more sustainable energy management in the region. The strategy has been supported by and developed in the framework of the Manergy project. All three counties, including the three main cities, have been consulted regarding the priorities to be included in the strategy. Its pillars are the following:

1. Reduction of the region's total energy consumption – absolute value – by increasing energy efficiency;
2. Increasing the percentage of renewable energy resources and reducing the proportion of fossil energy resources in the region's energy consumption;
3. Facilitating energy access of the disadvantaged, lagging social groups;
4. The general development and boosting of the economy by reducing energy costs and by attracting investors into the region that produces and operates technologies utilizing renewable energy resources

The following targets have been set for the region:

- Final energy consumption to be reduced by 10% from the present level by 2020,
- The proportion of RES to increase with 10% in the primary energy consumption
- The GDP value of the region's produced goods to exceed at least by 5% the 2012 level by 2020,
- The amount of sufficient quality energy resources (primarily firewood) for the households in poverty and deep poverty to increase with at least 20% from the current level

The following tools facilitate the achievement of the objectives above:

- support of building energetic investments for both residential and institutional buildings (revolving fund);
- stricter energy requirements for new constructions or renovations of buildings;
- support of the more efficient operation of district heating systems and of the utilization of renewable energy resources in district heating production;
- green (public) procurements;
- giving preference to local businesses in the building modernization projects;
- local government capacity expansion and establishment of institutional framework and an energy management system;
- improvement of deprived people's energy supply (public works programmes, organization of village guardianship);
- free-market energy purchases;
- control of major investments of national importance, representation and co-ordination of local interest;
- school and pre-school education programmes;
- adult education programmes;
- launch and expansion of awareness-raising campaigns, competitions, prizes;
- collection of realized energy investments and best practices.

### **Regional Development Programmes**

The South Transdanubian region, as a planning region, has strategic development programs in the following six areas: business services, rehabilitation of brown field belts, environmental development, transport development, tourism development and development of public human services. The Regional Energy Strategy and the above development programs must be in harmony. In terms of green energy development, the environmental development program contains objectives of relevance:

- Environmental industry – eco-harmonic energy management, with the aim of expanding the use of the region's energy sources, including renewable resources and secondary raw materials and satisfying the increasing energy demand with regional resources. The program prefers complex, local, small-scale projects, and is aimed at the development of related technologies and strengthening the industrial businesses in these areas in the region.

### **County Regional Development Concepts**

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.

The three county concepts for the region lack targets and development directions related to energy production and use. Few local governments have regional or local strategies specifically in the area of energy management in the region. Some of the settlements have however started to embed green energy aspects into their development concepts by defining the pool of renewable energy sources available in their area, and setting targets of improving the district heating system, public lighting, energy efficiency of public buildings, etc.

### **Local Development Concepts for micro-regions**

In addition, beside county development concepts, certain micro-regions (e.g. the micro-regions of Kaposvár, Siklós) have their own regional development concept. Few local governments have strategies in the area of energy management in the South Transdanubian Region.

### **Municipal strategies**

The city of Pécs have started to elaborate the “Energy strategy of Pécs city”, which will make certain commitments in terms of energy efficiency and RES. However, the effectiveness of the document is not yet known.

### **The Regional Innovation Strategy (2004)**

The RIS includes a measure supporting development of renewable energy processes, equipments and products, in particular the growing and processing, of industrial and energy plants is included under its priority. Among the environmental protection measures of the European Union and Hungary the limitation of the cultivation of plants for the purpose of food consumption has an outstanding role. As an alternative to the use of arable lands the cultivation and utilization of energy plants is being gradually increased. Therefore, the measure is aimed at:

- increasing the sowing area of industrial plants,
- covering the income situation of the agricultural producers,
- purchasing local biomass heating equipment (providing thermal energy), and the investments of firms producing bio-diesel, bio-ethanol and bio-gas.

#### **4.2.4.3.     *Institutions as an internal driver***

According to the DravaGeo project, there is no clearly defined institutional system that would ensure predictable, favourable conditions for potential investors into renewable energy on a national level. There is a lack of coherence between ministries concerned and the supervision is performed by several ministries; Ministry of National Development and Ministry for National Economy. This is an issue that is called for in the National Energy Strategy 2030.

In the region there is no specific institutional infrastructure at the moment for the implementation of the green economy related national strategies or the regional energy strategy. This task is undertaken mostly by the **South Transdanubian Regional Development Agency** and the **South Transdanubian Regional Innovation Agency**. These two organizations are supporting the implementation of the priorities by elaborating and managing projects funded by the European Territorial Cooperation Programmes (Interreg IVC, CENTRAL EUROPE) and the 7th Framework Programme of the EU. The elaboration of the regional energy strategy was financed by the MANERGY project (CENTRAL EUROPE), while energy efficiency analyses of public buildings are supported by various projects (like: MANERGY - CE, STEP - Interreg IVC, EEPannonia – Hungary-Croatia IPA CBC programme (under evaluation)). Additionally, the Development Agency is providing support to the local municipalities in the elaboration of their local energy concepts and related action plans. The two agencies also support the coordination of the implementation of the strategy and provide a link between the local/county governments and potential collaborative partners. Although these initiatives by the two regional agencies follow a clear strategic vision, they can be considered only as ad hoc actions at the moment.

All different levels of the regional decision-making organizations should participate in the strategy's implementation, and the responsibility lies with both the local and the county government, however several measures are presented that are better to be implemented with a region-wide collaboration. Therefore it is a priority in the South Transdanubian region to establish a regional organization responsible for energy development that supports the decision making of the public administration levels responsible for the developments by can present available financial schemes. The Development Agency and the Innovation Agency are therefore preparing the establishment of a Regional Energy Agency. In the frame of the above mentioned MANERGY project a feasibility study has been prepared and a business plan will be worked out by December 2013. The foreseen energy agency will have a public character and will work on non-profit basis (Borkovits, 2013). Currently, the ownership issue is of key concern and will be the most crucial issue to solve. Both STREDA and RIA are both interested to have ownership, but also the University and other stakeholders needs to be involved.

The agency could also support inter-regional cooperation in terms of tender applications, preparation of feasibility studies. The compilation and continuous improvement of the regional energy strategy would furthermore allow local governments in the region to exchange their experiences, resolve their possible conflicts of interest, and benefit from the synergies and proportionalities arising from the common utilization of energy sources covering the administrative area of several municipalities. According to Hungarian regulations, energy agencies are not financially supported by the state. The regional agency would therefore ensure its operations partly by tendering and partly by market activities. There is currently only one example of a functioning regional energy agency in Hungary, in the North Great Plain region.

There are some examples of clusters within the energy sector such as **the South Transdanubian Energy Cluster** which unite organizations with interest in the energy sector, to promote cooperation, to improve competitiveness, to support presence on the domestic and international markets, as well as to increase the efficiency of energy consumption of consumers. The cluster is also supporting energy consciousness, attitude forming activities and social involvement, Alternative energy producing systems, energy efficiency and building engineering developments, complex energy efficiency and energy production advising for public and office buildings and residential communities (<http://www.ddeklaszter.hu/index.php?lang=en>). **The Blue Economy Innovation Cluster** provides integrated services supporting municipalities in terms of e.g public lightning and energy efficiency in buildings.

The primary objective of the **Renewable Energies Competence and Innovation Centre** is the creation of a bridging organisation in the field of renewable energies and environmental industry, i.e. an industrial technology and service centre. The future task of the centre is to support the establishment of the South Transdanubian Environmental Industry Cluster and the satisfaction of the demands of the potential partners by providing technical, market research or human resources related services. Part of the project is to establish a special library that offers up-to-date information to the small and medium-sized enterprises of the region by the introduction of the latest research and development achievements of the sector. A further objective of the project is the creation of a Regional Integrated Spatial Informatics Database Centre for the support of environmental and regional data at regional and micro-regional level; and also to work out a pilot system for the Agro-energetics Parks (STREDA, 2008, [www.komekik.hu](http://www.komekik.hu)).

**The Centre for Renewable Energy and Environment** may play an important role as the organisation may efficiently promote the cooperation of the various participants supporting the implementation of the Regional Innovation Strategy and the Energy strategy (STREDA, 2004).

#### **4.2.4.4. Financing as an internal driver**

*Role of Structural and cohesion policy funds in the region;*

The availability of EU grants, which is identified as a key driving force of green economy development in the region, strongly depend on the capital supply and expertise of the applicants. It will therefore be imperative to develop co-operation or networks among the mainly small and medium-sized enterprises operating in this field (Borkovits, 2013).

For energy related investments the **Environment and Energy Operational Programme** (EEOP) is the most important driver. The OP includes eight priority axes; for energy related projects two of them are providing adequate funding:

- Axis 4: Increase of the use of renewable energy sources
- Axis 5: Efficient Energy

The retrofitting of buildings, improving insulations, introducing new technologies is usually financed by project that gained funding in this programme. However, only enterprises, municipalities and state owned organizations are able to apply for funding in this OP.



However, their energy management actions mainly focus on the energy audit of public buildings in accordance with the relevant EU directives and national regulations (Borkovits, 2013)

The green component of the new CAP coming into force from 2014 supports climate protection, consequently in the case of the first pillar subsidies of the CAP – direct agricultural subsidies – 30% of the disbursements will support climate protection. The field of rural development supported by the **European Agricultural Fund for Rural Development** and managed by the Ministry of Rural Development and the Hungarian National Rural Network provides sources for the development of the field of sustainable energy use and the elaboration of projects.

The **Hungary-Croatia cross boarder IPA programme** is an additional source of funding. The GeoDrava project is co-financed by the programme and illustrates a positive example. The aim of the project is to collect comprehensive information on geothermal systems, particularly those located on the border lands, using surface studies and data of past exploratory drillings. The resource assessment provides a framework for setting long-term energy policy and for strategic decisions made by industry and government (<http://geo.dravamedence.hu>).

### ***Role of national funding***

**Subsidy programmes** promote pilot projects among public bodies, companies and non-profit organisations which are entitled to apply for a grant supporting the planning and realisation of pilot projects on the use renewable energy sources. They grant favourable loans for the own contribution to the eligible projects for winning projects under a number of already terminated subsidy programmes. The main support scheme for the use of renewable energy in the transportation sector is a quota system supplemented by a reimbursement of excise duty. There are a number of policies intending to promote the development, installation and use of RES installations. However, some policies are currently not available due to exhausted funds of the related subsidy programmes (<http://www.res-legal.eu/search-by-country/hungary/>).

Renewable energy plants shall be given priority grid connection and grid access. The costs for the connection of renewable energy plants to and the expansion of the grid are borne either by the plant operator or by the grid operator, depending on certain criteria.

The **National Office for Research and Technology** is providing grants for the support of regional innovation, in particular supporting innovation initiatives of micro- and small enterprises.

### ***Role of regional and local funding for the sector***

There are no regional funds available for energy investments. With the new regional administration reform, the importance of the Counties has however increased. It is expected that their budgets will be increased and it is very probable that energy project can receive increased funding from their funds. The energy issue is a priority that will most likely be seen also in the spending of the county budgets.

According to the Regional Energy strategy plan, the municipality has to separate sources from its own budget for the implementation of the energy strategy. These sources can cover the involvement of experts, the writing of applications and the own contribution necessary for their implementation, communication goals and subsidies to be given to the energetic investments of the people (as supplements to be applied for). Usually these sources mean those ones which are to be spent on the optimizing of energy use, modernization, shaping people's attitude by the municipality in any case, therefore it does not necessarily mean a further burden but only the planned, timed and strategic use of the sources.

Municipalities also use the LEADER programme to a large extent in realizing local energy projects also hand in applications with rural development goals through LEADER groups,

local NGOs and farmers. Renewable energy projects (e.g. biomass utilization) can be prepared and implemented from this source in the future. Based on a survey conducted in 2012 in the Manergy project, the main funds for the local energy investment were the own resources of the municipalities, 30% of the responding municipalities did not use any other source (loans, bonds etc.). 35% of the surveyed municipalities received regional or national grant (STREDA, Energiaklub, 2013, p. 30).

### ***Economic instruments***

Private persons can apply for funding in the **Green Investment Scheme** (GIS), which is financed by the revenues from the sale of Kyoto units. The Kyoto Protocol of the UN Framework Convention introduced international quota trade, i.e. the trade in greenhouse gas emission allowances, between the joined industrial countries. Hungary has a substantial quota surplus. Pursuant to Act LX of 2007, to Government Decree 323/2007 (XII. 11.) on particular rules on the implementation of the law, and to the quota contracts, the revenue originating from the sale of Kyoto units is used for climate protection purposes in the framework of the GIS. The GIS was created in 2009 to recycle funds from the emission trading system. As a basic principle of the GIS, funding is provided only for measures that are most effective in reducing the emission of greenhouse gases. So far four sub-programs have been announced in the framework of the GIS, with a primary focus on the building energy sector: over three-fourths of quota revenues collected so far have been allocated to the funding of energy efficient buildings. This area is of particular importance, as emissions related to buildings account for 30% of total national carbon dioxide emissions.

On a national level, electricity from renewable energy sources is supported mainly by a **feed-in-tariff**. The feed-in tariff is regulated by the Electricity Act from 2007. The subsidized feed-in tariff is different for electricity produced from renewable energy sources and for that generated from waste, and the feed-in tariffs are also differentiated on the basis of size (nominal electrical capacity), the date of obtaining eligibility (before or after January 1, 2008), zone time and technology (solar energy, wind energy). The feed-in system is considered as not being encouraging enough and is currently undergoing review.

#### ***4.2.4.5. Others drivers***

No municipality of the region has joined the Covenant of Mayors as of now, therefore the local governments of Tolna, Baranya and Somogy counties have not prepared Sustainable Energy Action Plans. A positive step was recently taken to the CoM. Pécs and Tab municipality are since June 2013 registered as well as a group of 16 smaller municipalities that were also registered as one unit.

Smart metering will be introduced to domestic energy consumption. There is a ongoing pilot action to install smart metering in households in the region. But according to STREDA this is not a given success as it depends heavily on the Energy Service Providers in the region and might in fact be more beneficial to the service providing companies rather than to the consumer

#### ***4.2.4.6. Description of problems and barriers encountered within the energy sector***

##### ***Lack of complex strategy***

The current strategic framework for developing green energy in the region is weak. The national Renewable Energy Action Plan provides some direction but in terms of regional priorities there are no official targets or priorities. The Regional Energy Strategy from 2012 is a good initiative but is lacking any formal power. The approval of the strategy among the county councils would strengthen the authority of the strategy.

The energy consumption of the public sector is largely influenced by the Act on Public Procurement (Act CXXIX 2003) which is currently hindering expansion of energy efficiency in

its formulation. Energy efficiency is not represented as a factor for decision making and moreover, there are no compulsory environmental criteria to take into account. Rather, it is the principle of lowest price which is the steering factor which in general not always benefits energy efficient equipment and techniques.

A problem related to the geothermal energy production is the regulation on usage of old drilling holes. Holes still remain from drillings made in the 70- and 80-es in search for geothermal waters and smaller municipalities use these as a source of heating. According to national regulations, thermal waters used for energy/heating purposes need to be returned to the ground after use. This is a complicated process and it is difficult for smaller municipalities and settlements to find funding for this process. Leaving the source unused is considered as a waste of easily accessible energy by the local population.

#### *Unfavourable price setting of RES*

The current environmental and health regulations pose a hinder for the utilisation of geothermal energy and other sources of RES. The cost of using thermal waters is high and gas heating is the prioritised option as price is low for the community and that is consumption can be foreseen and planned in a conventional way.

As in several other countries, authority licensing procedures are the greatest obstacle in the spread of energy producing equipment utilizing renewable energy sources in Hungary. For the development of the regional energy concept the new regulation on licensing and installation of energy producing equipment is therefore of fundamental importance (STREDA, 2012, p. 44). The process is complicated and lengthy and can scare off potential investors.

#### *Low level of knowledge*

There is a lack of energy experts within companies and municipalities. The main obstacles standing in the way of the utilization of so-called energy plants are the scarcity of knowledge about these plants and the difficulty of getting those (STREDA, 2004). There is also low awareness of the funding opportunities provided by the European programmes such as the IEE, CIP, etc. The use of these funds is limited to the University, STREDA, the regional chamber of commerce etc.

#### *Lack of data*

The regional data shortage is a result of the shortcomings of the Hungarian energy statistical system, the narrow scope of data published by the Central Statistical Office, the Centre for Energy and the Energy Office. The HSO regularly carries out detailed household panel studies where 'external' needs can be taken into account and as for the energy consumption of companies and local governments there is data collection in the framework of the OSAP: National Statistical Data Collection Programme. The most difficult aspect to measure and quantify is the amount of energy allocated to deprived people. To assess this, a special data request is required from all municipalities in the region, repeated annually, given that municipalities keep records of collected/purchased amounts of fuel (Borkovits, 2013).

#### *Lack of cooperation*

There is currently a weak cooperation among the universities, research facilities, enterprises and municipalities and in many cases the links are not established in order to provide a substantial framework for supporting RES development in the region.

#### *Weak economic situation*

The poor economic development, the increase of the currency exchange rates and consumer prices during recent years, has caused serious uncertainty for many households. The majority reserves savings for unexpected expenses, purchasing cars or houses, renovation and recreation has decreased and reduces the number of potential energy investments. Therefore the financing of significant energy investments cannot be executed in the residential sector without high-intensity grant opportunities.

The poor municipal finances are also a major obstacle for the necessary municipal-level energy investments: funding energetic modernization of public institutions, improvement of public transportation and residential investments. There is also lack of funds for providing co-financing for European projects and EU-supported investments (STREDA, 2012).

#### *Unfavourable settlement structure*

The demographic structure with a very high number of small and micro-villages, often with low development levels and a population with low income levels and consequently poor infrastructure creates an obstacle towards improving energy efficiency. As shown above in Figure 14, the poorer areas have in general higher energy consumption than the more developed areas and the urban centers. To improve energy efficiency in the region must be combined with social improvements, renovations of public infrastructure and buildings.

#### **4.2.5. Spatial dimensions of the development of the sector**

Urban areas are the main consumers of energy while generation and refining of renewable energy is often found in rural areas. Being mainly a rural area, the ST region would be a suitable area for in particular biomass production from agriculture and forestry.

The many micro-villages and poorer areas have a high energy consumption and energy efficiency measures in those areas would have the possibility to significantly reduce energy consumption while at the same time improve living conditions in the disadvantaged areas. Increased RES production in would also reduce the dependency on energy import and the dependency on nuclear power.

The location of renewable energy production plants are sometimes a debated issue that creates conflicts between the local population in municipalities and villages and energy companies or with the county administration. The construction of a biogas plants located between two villages in the vicinity of Kaposvar was during a long time hindered by the local population.

#### **4.2.5. Links with other sectors**

Energy has close links to several other economic sectors. From a supply perspective the energy sector closely relates to all sectors in economies as these are consuming energy for performing their activities. The energy performance of other sectors such as bioeconomy and industry therefore has an influence on the green economy development of the energy sector. On the supply side, there is a close link to the bioeconomy sector as biomass is a resource from forestry and biogas is a bi-product from agricultural production. The key waste management projects being implemented in the region closely affect the energy sector being potential energy sources for the existing and future regional and national power plants (e.g. waste incinerators, thermo-catalytic power plants) (STREDA, 2012, p. 65).

From a social perspective the availability and affordability of energy carriers such as electricity and gas is a critical element of quality of life. This is an important aspect in South Transdanubia as there are many disadvantaged villages and micro-regions where energy poverty is an issue.

#### **4.2.5. Potential for green economy development of the energy sector**

The greening of the energy sector needs to be built along the following pillars:

- throughput substitution (of fossil fuels);

- residue recycling and;
- materials and energy flow productivity (energy efficiency).

The application of the green strategies in the energy sector has potential for creation of new jobs and value added. This view is supported by the OECD (2011) which highlights four key elements that provide the economic rationale for applying green growth strategies to the energy sector:

- Economic costs of environmental damage and poorly managed natural resources associated to the use of fossil fuels and unsustainable practices.
- Innovation to achieve environmental and economic objectives.
- Synergies between environmental and productivity growth objectives.
- Opportunities for new markets and industries.

RES deployment is a key pillar in the greening of the energy sector and can constitute a backbone for green economy development in regions. Currently, the ST region has a very low share of RES in the gross energy consumption. Based on Hungary's Renewable Energy Utilisation Action Plan and the data contained in the Regional Energy strategy, South Transdanubia has excellent agro-ecological conditions. Therefore the power plant utilization of renewable energy resources and the production of the fuels (e.g. biomass, biofuels) could be sustainable and competitive. Unfortunately, the national data show that despite the conditions, in 2011 the rate of RES is still low - only 8.1 %. The region is thus still far from achieving the national target of 14.65 % of RES in total gross energy consumption. The region is additionally far from the EU average and the target set by the EU which is both 13 % share of RES. The National Energy Strategy sets an even more ambitious target for Hungary of 20% share of renewable energies by 2030 in primary energy use.

Biomass is the most significant potential renewable energy source in South Transdanubia which has been further discussed in the previous section, 4.1.

The Hungarian geothermal gradient is significantly above the world average and further development of geothermal energy has outstanding potential in the region. In the South Transdanubian region, 169 thermal wells have been identified and are used for heating of buildings, domestic hot water supply, spas' water and heat supply. However, in the case of several existing wells, an approach ensuring the rational and optimal utilization is missing. Geothermal energy is inexpensive and could be an economical and green path for the region to embark on. Renewable energy production based on biomass and geothermal energy is also the key prioritised areas on a national level and set out e.g. in the new National Energy Programme for 2030.

Further developing the large inherent territorial potential for RES in the region would not only increase the energy security of the region and support the achievement of the national and EU targets for energy efficiency and renewable energy resources, but would also mean a significant source of employment opportunities, and value added to the regional economy, especially as RES development is strongly associated with rural and agricultural sectors which are already significant in STD. It could, in addition, stimulate innovation and high-tech-manufacturing in the region. Not the least, it would protect the climate and the environment from the impacts of fossil fuels use.

In terms of energy consumption, urban areas have the biggest potential for energy savings and energy efficiency measures are therefore crucial in urban areas. Large gains can be made in terms of energy efficiency in the region, i.e. by retrofitting buildings.

The cooperation among the universities, research facilities, enterprises and municipalities should improve in order to facilitate the knowledge transfer and application of research results. This way the researches could better focus on the needs of the local stakeholders. Several research initiatives are conducted at the two universities of the region, which should support the operation of the (innovative) SME's in the energy sector, but to reach the desired

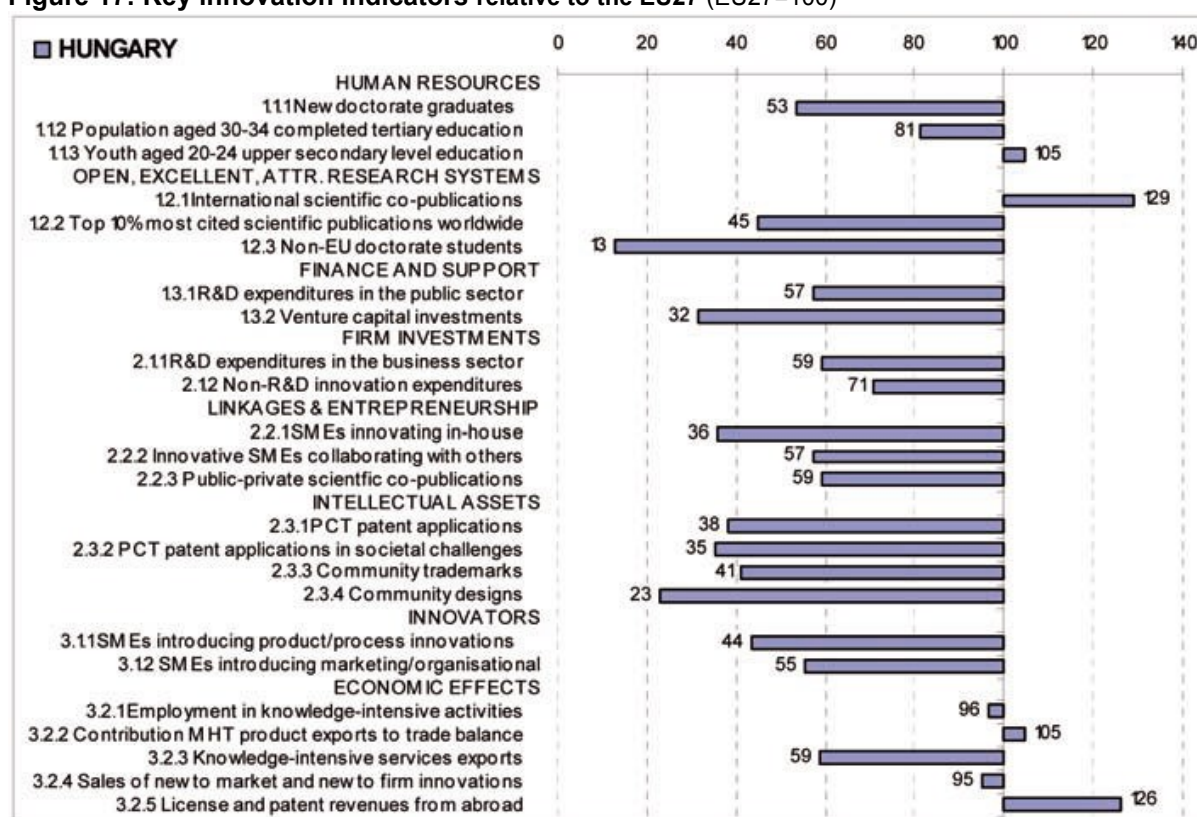
synergies, the cooperation among the actors of the knowledge transfers has to be improved. The potential for green economy transition in the energy sector in the region would be facilitated by the establishment of a regional energy agency for the coordination of strategic planning and investment preparation activities. It would also provide support in, considering possible co-operations among different municipalities/enterprises that might result in a higher level of cost/energy efficiency due to the exploitation of synergies of economies of scale; applying university research results at local investments; fostering the cooperation among the local enterprises by the energy clusters (e.g. Blue Economy Innovation Cluster). By these actions, successful projects can be implemented, which are based on a clear vision, ensuring the local utilization of local research results, contributing to the improvement of the local economy, and raising the level of employment (Borkovits, 2013).

### 4.3. Green innovation and research

#### 4.3.1. Performance of the sector

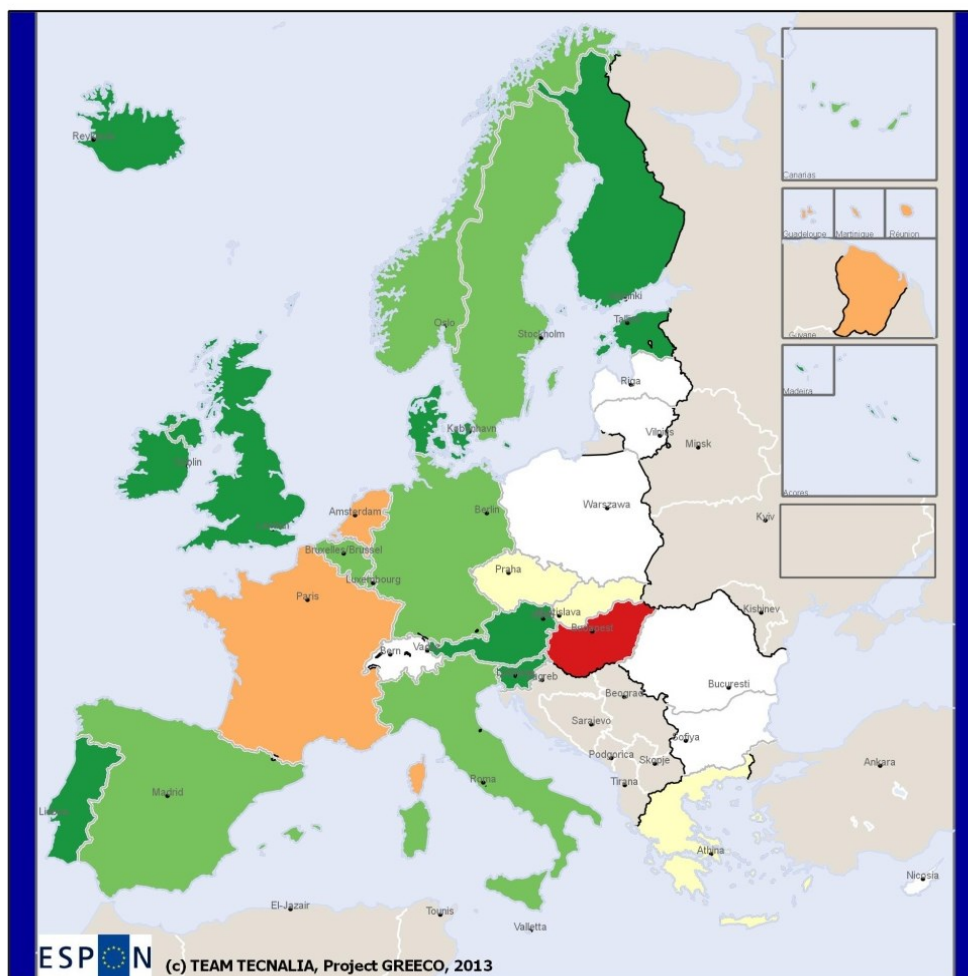
On national level, Hungary is considered to be a moderate performer in the Innovation Scoreboard 2013. Relative strengths of the sector are found in the Human resources and economic effects. High growth is observed for R&D expenditures in the business sector and Community trademarks. Growth in venture capital investments has been the highest of all Member States. A strong decline is observed for non-R&D innovation expenditures. Growth performance in human resources, Intellectual assets and economic effects is above average and in firm investments and Innovators well below average (European Union, 2013). It can however be noted that, although the indicators in Figure 17 are still low, there has been a growth in many of the indicators in the figure above.

**Figure 17: Key innovation indicators relative to the EU27 (EU27=100)**



Source: (European Union, 2013)

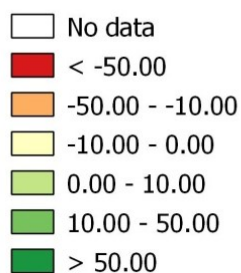
**Figure 18: Governments environmental and energy R&D appropriations and outlays (% of GDP) Percentage of change between 2004 and 2011**



EUROPEAN UNION  
Part-financed by the European Regional Development Fund  
INVESTING IN YOUR FUTURE

Regional level: NUTS 2  
Source: Eco-Innovation Observatory, 2004, 2011  
Origin of data: Eurostat (gba\_nabsfin07)  
Classification method: Manual breaks  
© EuroGeographics Association for administrative boundaries

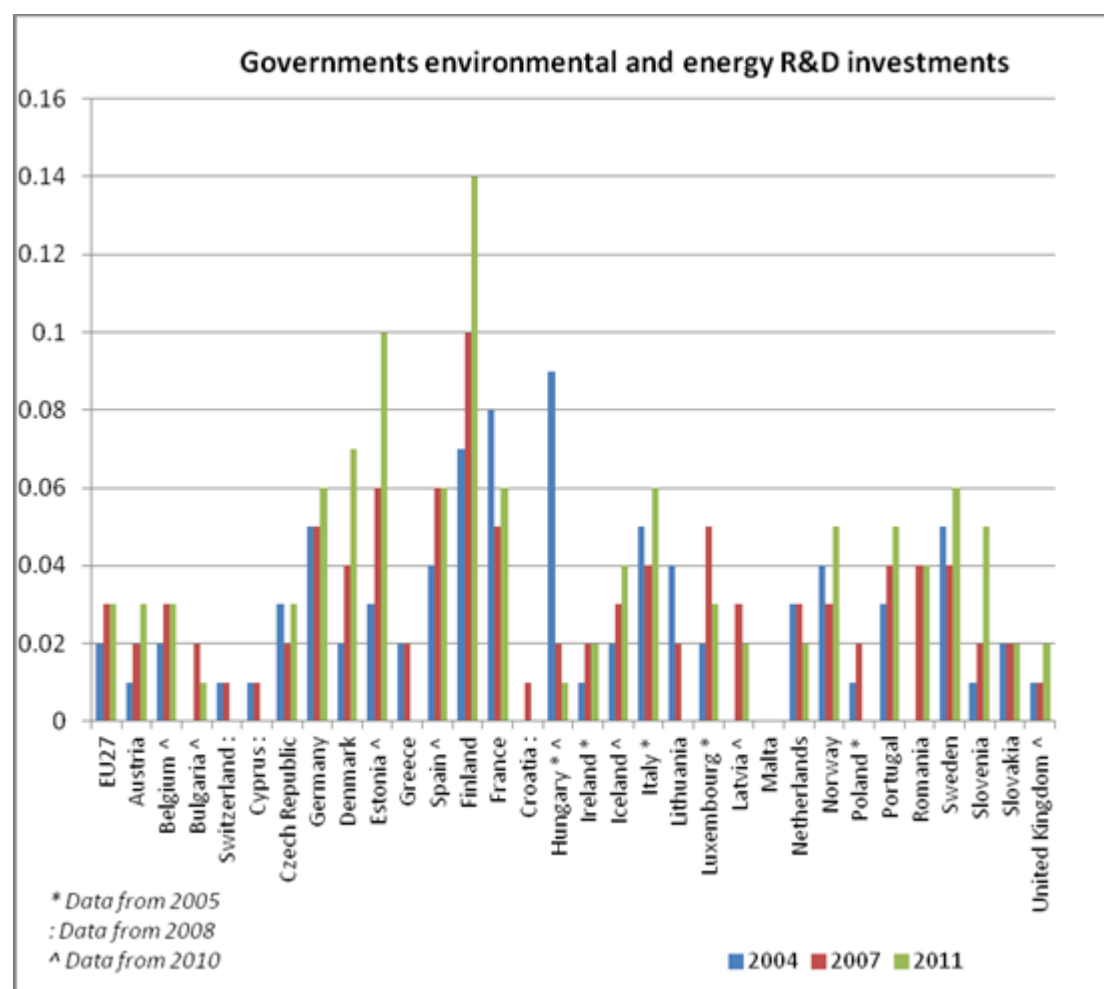
Governments environmental and energy R&D appropriations and outlays (% of GDP). Percentage of change between 2004 and 2011



(Source: Eco-Innovation Observatory).

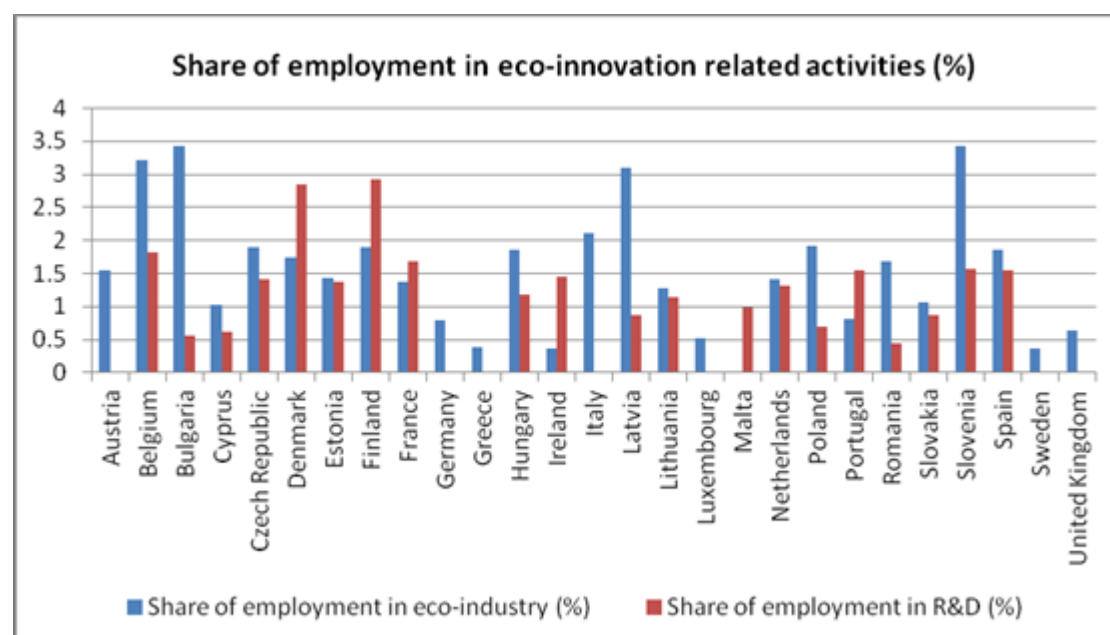


**Figure 19: Governments environmental and energy R&D appropriations and outlays (% of GDP).**



Data source: Eco-innovation Observatory; Data origin: Eurostat (gba\_nabsfin07)

**Figure 20: Share of Employment in eco-innovation related activities (% of total workforce) in 2008**

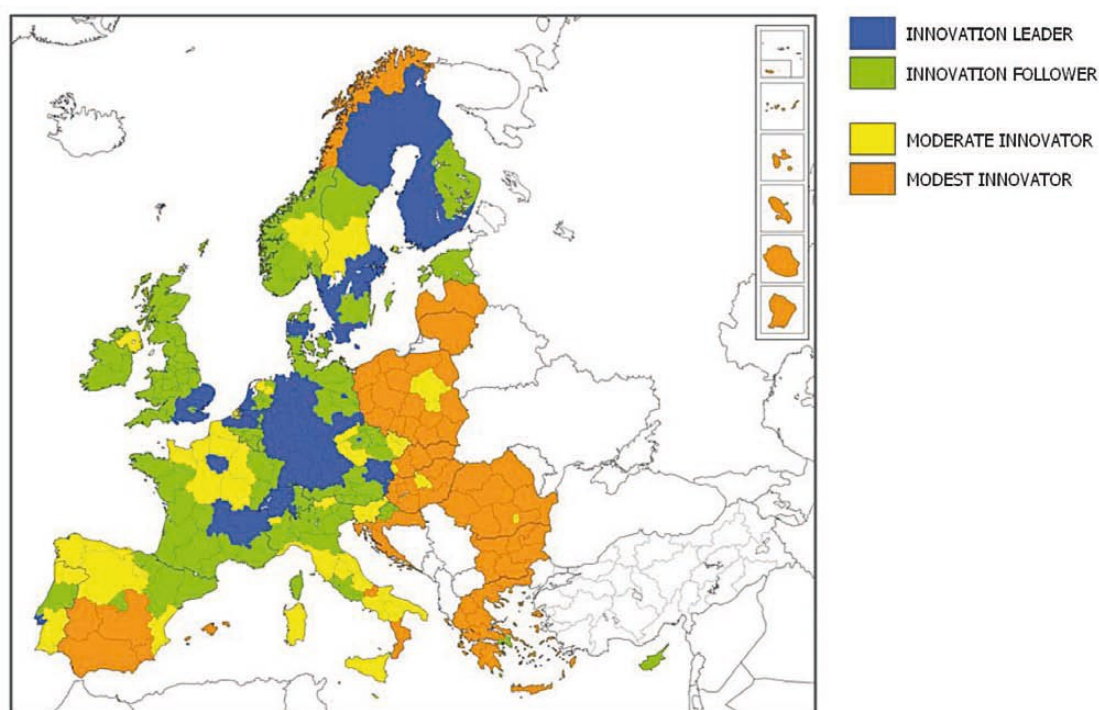


Data source for eco-industry employment: Eco-innovation Observatory; Data origin for eco-industry employment: N.A. – Data source for R&D employment: Eco-innovation Observatory; Data origin for R&D employment: Eurostat (rd\_p\_perslf)

### *Regional performance*

The current regional performance of the sector is relatively modest, and the GVA of 146 million EUR is far inferior to the more traditional sectors such as building and construction, agriculture and transport. According to the Innovation Union Scoreboard 2013, the region is placed in the last group of performers, modest innovator (European Union, 2013). Looking more into detail, South Transdanubia is considered to be in the medium layer of the modest innovators. The main relative strength of the region is the enablers (i.e. human resources and finance and support) and lower performance on output indicators (i.e. innovation and economic effects). The sector has however developed positively during the last few years due to national and regional support to the area and investments into the institutional framework through e.g. establishing the Regional Innovation Agency etc and is therefore considered as one of the key sectors with potential to greening the economy of the region among the consulted stakeholders.

**Figure 21: Regional Innovation Scoreboard**



Source: (European Union, 2012)

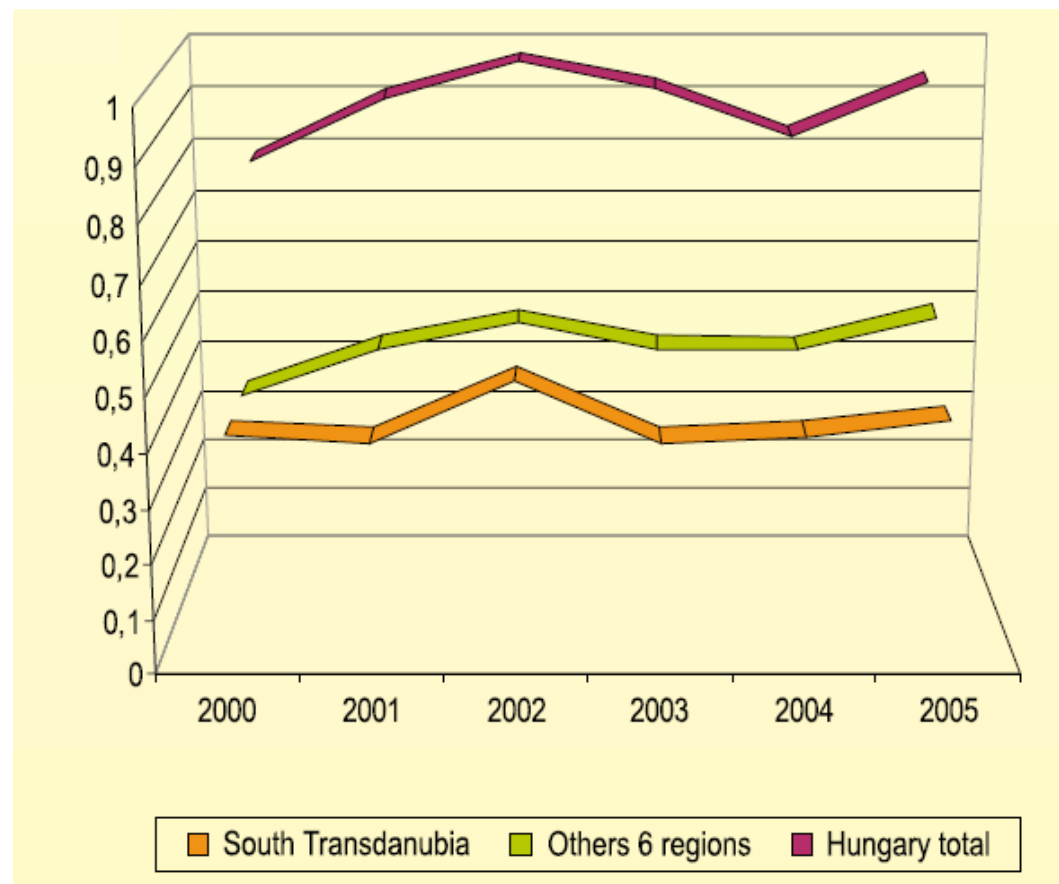
There are a number of positive examples of innovative SMEs in biotechnology and eco-industry in the region. Environmental technology research, especially in the field of waste management, has grown in South Transdanubia, along with businesses and organisations active in the area of the environment industry. Research and development of fuel cells is implemented by an SME, located in Pécs. Also component of wind turbines are being produced. Several researches are conducted at the two universities of the region, which aims to support the operation of the above-mentioned companies.

In 2011, there were 210 R&D organisation operating in the region and the number of FTE researchers were 748 (HSO). App. 18 % of the enterprises classified as “innovative” was environmental and 11.5 % fell in the category of agricultural sciences. In the ranking of counties, Baranya, where 76% of regional expenditure was concentrated (due to the Pecs University), took the 8th place in 2004. In terms of patents registered the region is among the bottom performance on a national comparison, ahead only of the North Hungary region.

R&D employment lies around the average of the other regions (South Transdanubian Regional Innovation Agency, 2008).

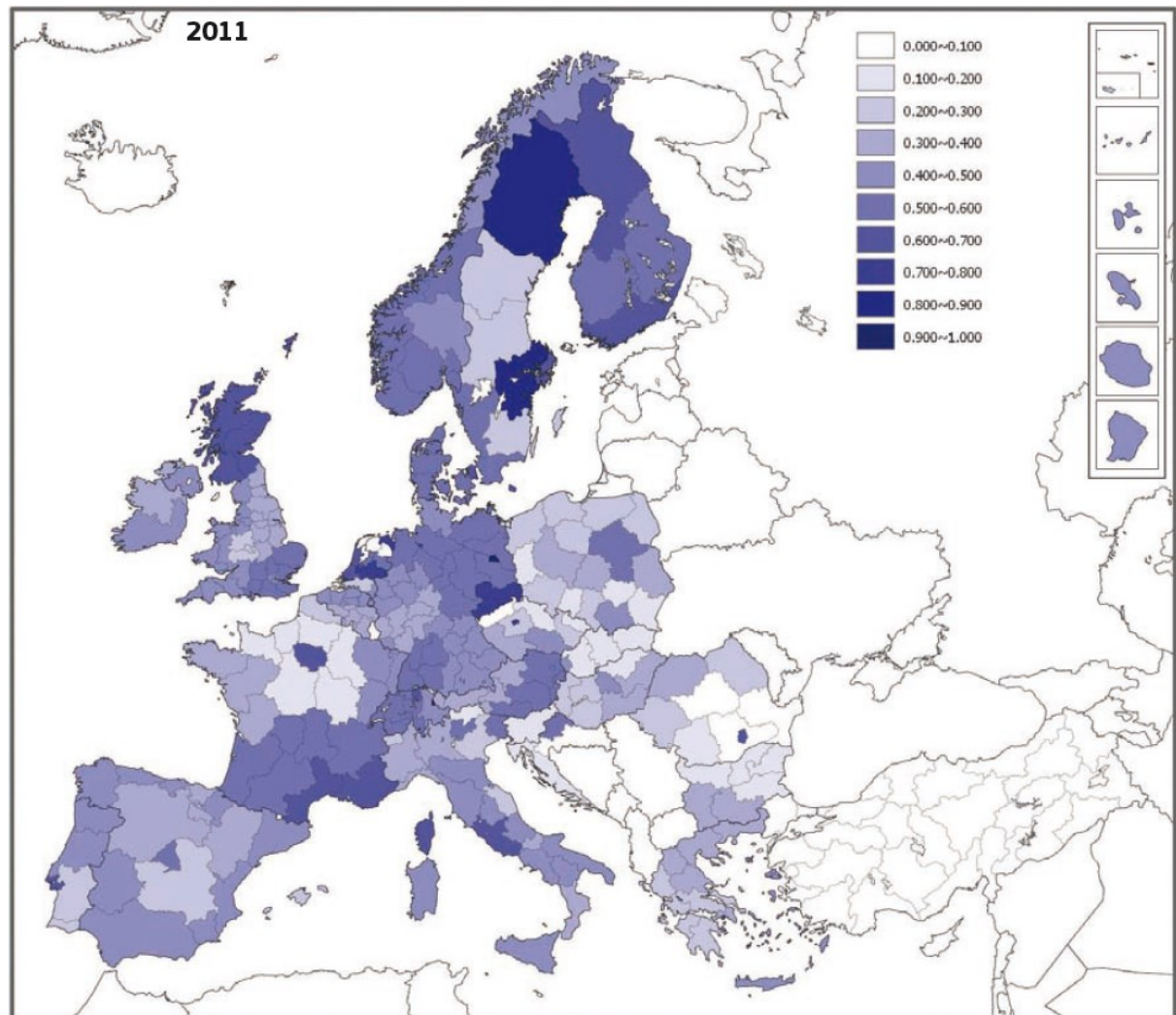
The share of SME's innovating in-house was 1 % in 2006, according to Eurostat. This indicator has however been considerably improved since then. A study made by the Hungarian Academy of Science among a representative selection of regional enterprises indicates that 31.5% of the companies surveyed can be considered as innovative. The indicator on innovation co-operation has also improved in the last couple of years. The number of SME's cooperating with other innovative actors in their sector has risen from 31 % in 2006 to 50 % in 2009.

**Figure 22: Breakdown of the regional R&D expenditure**



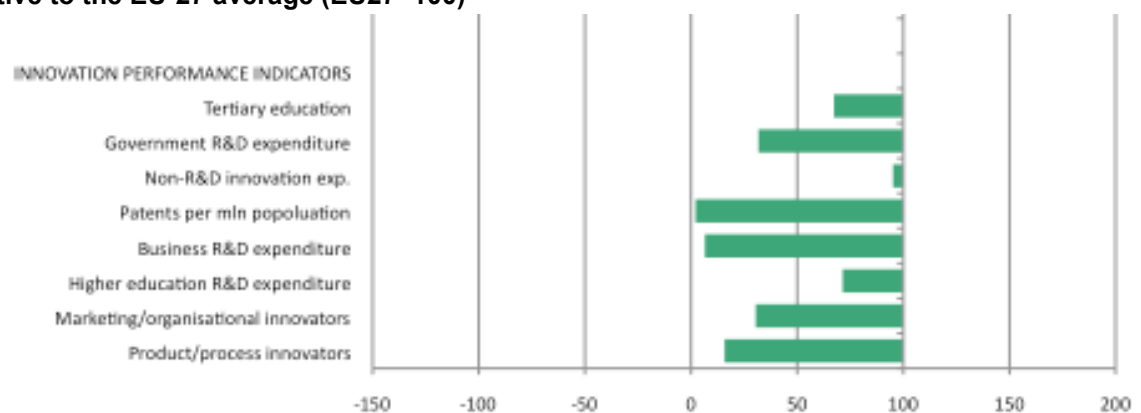
Source: (South Transdanubian Regional Innovation Agency, 2008)

**Figure 23: Public R&D Expenditure 2011 (as a percentage of regional GDP)**



(European Union, 2012)

**Figure 24: Innovation performance indicators for South Transdanubia and change relative to the EU-27 average (EU27=100)**



Source: (Szalavetz, 2011)

The expenditure on R&D in the region (GERD) was 0.46 % (as a percentage of GDP) in 2010 (Eurostat), which is far behind both Hungarian average of 1.17% and the EU 27 average of

1.9%. The regional R%D expenditure has however experienced a positive rise in 2009 when GERD increased with 22 % to 26.3 million EUR. Also the number of researchers grew (from 673 to 748). Still this number is very low, 3.6 % total in Hungary. According to Szalavetz (2011) recent positive tendencies reflect a promising start but the pace of recent overall improvement in innovation performance indicators needs to continue and accelerate for many years to permit the region to catch up to the national average (Szalavetz, 2011).

According to the Innovation Union Scoreboard, there is a positive relationship between innovation and socio-economic performance and more innovative regions show on average higher levels of development and a higher rate of energy efficiency. It has also been seen that there is a stronger link between innovation performance and the socio-economic indicators in low income regions, compared to high income regions. This would suggest that low income regions gain proportionately more from innovation (perhaps due to the benefits of than high income regions, mainly from being able to benefit from so-called “low hanging fruit”). Policies stimulating innovation in low income regions are expected to encourage these regions to “catch up” with higher-income regions.

#### **4.3.2. Key Milestones**

- The increased availability of favourable national funding opportunities, providing support to the implementation of green technologies for different sectors. A very big need appeared on the market as the need for green for green technologies equipment was bigger than the current supply, which had to be satisfied. The new funding sources have stimulated many industries to open for green solutions, which have, in turn, stimulated the green R&D sector.
- The regional innovation strategy was approved in 2004.
- The establishment of the Regional Innovation Agency in 2008.
- Establishment of the Szentágothai Research Centre at the University of Pecs in 2012 with large research capacity, primarily for medical science that can also be utilized for green economy research.

#### **4.3.3. Drivers, barriers and enabling conditions**

The deteriorating condition of the region's environment, stricter regulations in environmental protection and the raising awareness on exhaustion of the fossil energy resources have all contributed to the emergence of a new and growing market offering products and services related to the protection of the environment: the environmental industry. The below section includes an inventory of the drivers, barriers and enabling conditions that are crucial for the development of the green research and innovation sector of the green economy in South Transdanubia region.

##### **4.2.3.1. Identification and description of external drivers**

There is a strong regional knowledge base for research and innovation in the region mainly due to the presence of the Pécs University and Kaposvár University. The University of Pécs is the largest provincial university centre in Hungary in terms of the number of students and has significant research capacities in certain fields. The University's affiliated research centres and knowledge clusters includes the Biotechnology Innovation Base (an accredited cluster with 19 biotech companies) and the recently established Biosciences Centre. The research activities of the University of Kaposvár focus on agricultural, veterinary, medical, environmental and food sciences.

The education level of the population in the region has improved continuously during past decades, exceeding the national average. Despite this background, South Transdanubia has a lower than national average share of students in technical higher education and the proportion of research places in technical and natural sciences remains below the national average, which could set back the development potential of the region in the fields of processing industry, micro-electronics and informatics.

There is an increasing number (although still low) of innovative SMEs especially in the environmental technology and the bio-technology sector.

#### **4.2.3.2. Policies as an internal driver**

National innovation policies started to increasingly take the regional/spatial dimension into account in the early 2000s, which were for instance illustrated by the regional character of the Research and Technological Innovation Fund where 20 million EUR were allocated to the regions to distribute. The regionalization process of the national innovation policy was however reversed in the second half of the 2000s and the allocation of funds is now increasingly centralized. There is no real decision making power in regional innovation policy today (last statement from presentation).

The importance of policies driving the green research and innovation sector differs between the SME's and the R&D institutions. SME's (industrial and service) are mainly affected by the regional and national policies and funds. R&D institutions and innovative SMEs on the other hand are more influenced by EU trends, policies and funds.

The EU policies are considered to be the most important drivers but are considered as being difficult to live up to and there are only a few actors in the region that have the possibility to finance the necessary measures. The regional policy framework has started to be formed however; there is still a long way to go and the results achieved so far are poor. As have been expressed in the interviews, there is a belief that objective route in terms R&D of will be clarified in the region in a few years.

### **National Policies**

Research is regulated by the **Act on Research and Development and Technological Innovation** setting out government duties and the basic principles of government support. It also relaxes financing rules for research centres, enables easier mobility of experts between research centres and businesses, and helps improve the public perception of scientific research and technical development.

**The New Széchenyi Plan** places innovation in a key position to reach economic growth, and increasing competitiveness. One of the take-off points are the Science-Innovation-Growth triangle, which directly aims at developing knowledge economy with the help of R&D&I. One of the high-priority objectives of the Plan is to reach 1.5 % of GDP rate for R&D input by the middle of the decade. Further to this, Hungary's innovation-related performance should catch up to that of the EU in this period, and reach up to the first third of the EU Member States during the next cycle.

**The National Research, Development and Innovation Strategy 2020** was approved by the Hungarian Government on June 13, 2013. The basic aim of the RDI strategy is that Hungary increase the R&D investments up to 1.8% GDP by end of the decade and to provide an economical environment, where the R&D oriented and innovating companies and public firms can develop equally, in line with the social expectations. The implementation of the strategy also aims at smart specialization of the regions.

In 2005, the government presented a visionary plan by launching pole programmes. The pole program in Pécs involved environmental industry. The program was however not firmly established and the realization was cancelled before the start of the pole programmes.

### **The Economic Development Operational Programme (2007)**

The first objective, out of four, is related to innovation and knowledge economy; Increase in Research & Development and innovation capacity, activity, as well as cooperation.

### ***Regional Policies***

Innovation priorities of the region are to create innovative, knowledge-based and creative industries based on local experts. Some of the sub-priorities are the establishment of innovation networks, business modelling for environmental externalities economic policy purposes. In terms of environment industry, the following priorities are relevant to the green economy development:

- Agricultural Innovation (cultivation/production, technological advancements, functional foods, dietary supplements),
- development of renewable energy (geothermal, biomass, power plants, solar and wind energy, etc.),
- organic gardening and organic food industry, biotechnology,
- adaptation to climate change,
- Improving the energy efficiency of buildings,
- Nature and Water Conservation

**The Regional Innovation Strategy in the South Transdanubian Region**, approved by the South Transdanubian Regional Development Council (STRDC) in 2004, is the only regional policy directly focusing on innovation. The strategy was elaborated by the coordination of the South Transdanubia Regional Development Agency and financed by the 5<sup>th</sup> Framework Programme of the European Commission. It also acts as a basis for the Structural Funds programming. The strategy has the objective of the “creation and development of a competitive and innovative enterprise sphere, that is capable to generate high income, and achieve rapid and at the same time sustainable development”. The key objective of its development efforts is to enhance the regional innovation potential through the promotion of regional SMEs. The strategy has a sectoral approach and includes the following strategies: food and wine industry and agricultural innovation, machinery industry and metal processing, textile and leather industry, environmental industry, health industry and cultural industry. Horizontal measures include technology development, financing innovation, market oriented vocational training and re-training and adaptive and flexible business services in the background. Priorities relating to developing green economy in the innovation sector consist of Priority 7; Establishing coordinated cooperation between the environmental service/manufacturing companies, the R&D sphere and the economy and its related measures:

- Establishing a Competence Centre for Renewable Energy and Environment
- Supporting the elaboration of renewable energy concepts on regional or micro-regional level
- Supporting the environment-focused operation of SMEs
- Establishing a complex waste management system

The strategy is currently being updated and the revision started in 2009. The main difference is that there are no decentralized financial resources for local actions and the introduction of defined monitoring indicators.

### **The University of Pécs, Research and Development and Innovation Strategy 2011-2020.**

As the nave for the innovation capacity in the region and one of the larger employers, the



university has developed an innovation strategy that was approved in 2011. Some of the priorities include:

- Intelligent building management, building design, energy efficiency, environmental effectiveness analysis
- Artificial Intelligent settlement specifically for alternative energy research and focusing on energy production
- Complex rural development and energy management including environmental management coordination principles of modern architecture and Innovation networks, business modelling and environmental externalities economic policy purposes
- Materials science including, environmental physics, theoretical particle physics

**The Ecotown-Ecoregion Programme** for Pécs and Pécs-subregion is a local concept which conception was created first in 2004 and it was later rewritten in 2012<sup>6</sup>.

**The South Transdanubia Regional Operational Programme** 2007-2013 sets three specific objectives where one of them is “competitive economy based on local characteristics”. Actions also target competitiveness increase: cluster development, SME promotion and the financing of industrial park development in the textile and food industries, machinery and electronics industries; eco-, health- and cultural industries. 46 regional innovation related projects has been supported in the frame of the OP.

There is also an ongoing process to develop a document for the City of Pécs, in addition to the “Energy strategy of Pécs city”, that will provide viable support to the development of green R&D&I.

#### **4.2.3.3.     *Institutions as an internal driver***

The regionalisation of Hungary’s innovation policy is in terms of its institutional framework illustrated by the establishment of Regional Innovation Agencies (RIAs), starting in 2005. Institutions that coordinate regional innovation are key drivers of regional innovation performance and the institutional framework for green innovation has significantly improved during the last couple of years. ST has established a variety of innovation and transfer institutions. The most important one is the South Transdanubia Regional Innovation Agency but the presence of industrial parks, incubators, technology transfer offices also contribute to the development. These institutions all contribute to the implementation of the Regional Innovation Strategy. Additionally, several clusters have been established over the last few years that help drive the development of the green research and innovation sector.

However, according to a recent survey prepared by the Centre for Regional Studies of the Hungarian Academy of Sciences in 2009, despite the development of the institutional framework for innovation, the demand for the activity of transfer institutions is much below the national average.

#### ***National institutions***

The mission of the National Office for Research and Technology (NKTH) is to promote Hungarian and international R&D&I activities in order to support Hungary’s achievement in high technological development. NKTH plays a key role in elaborating and implementing Hungary’s science, technology and innovation policies. NKTH was founded in 2004. The Office is a public body, supervised by the Minister for National Economy, The aim and task of NKTH is to relocate public funding into Hungarian economy by supporting R&D&I activities primarily through a system of calls for proposals.

---

<sup>6</sup> Available at: <http://www.okovaros-okoregio.hu/index.php/hu/pmiv-okovaros-okoregio-program-2012>



## **Regional institutions**

The main governance level for the design of innovation policy in the region is the regional level. **The South Transdanubian Regional Innovation Agency (DDRIÜ)**, an independent non-profit organisation since 2008, is considered to be the main actor and the key coordinator of innovation in the region. The mission of the agency is to design and implement the regional innovation strategy, in particular to improve regional SMEs' innovation capacity, to support the technology transfer activities of regional knowledge bases and to foster the international knowledge exchange. The agency is the only RIA with a Brussels representation office. DDRIÜ is working with full independence in the design and update of the regional innovation strategy. The agency also manages the Regional Innovation Agency Network. Nevertheless, following political changes, DDRIÜ's autonomy with respect to the strategy implementation has become increasingly limited over the past couple of years, because of the increasing centralisation of innovation policy implementation by the central government. Currently, the innovation support programmes are decided upon centrally (by the NKTH) and DDRIÜ task is restricted to identifying key strategic sectors to receive the support.

In 2005, the South Transdanubian Regional Development Council (STRDC) set up the **South Transdanubian Regional Innovation and Economic Development Committee (STRIEDC)**, which is the preparatory body for decision-making of the STRDC in the field of regional innovation policy. The members of the committee, in addition to political decision-makers, are professional and economic actors involved in innovation: the regional director of the Hungarian Association for Innovation, leaders of the businesses representing the STRIS sectors, and the two universities of the region. The Committee assists to the activity of the Council with its recommendations, opinions and control activity concerning the preparation and implementation of innovation programmes financed from the Research and Technology Innovation Fund.

**The University of Pécs and the University of Kaposvár** are both key institutions in the green innovation sector. By receiving the major part of the national and European funds allocated in the region, the universities of the region have greatly contributed to the improvement of the basic indices of innovation in ST in recent years. As explained above they both conduct research in relevant subjects. The universities act as important pillars in the regional institutional framework and are key partners in projects, cooperation networks, clusters etc. The University of Pécs affiliated research centres and knowledge clusters include the ST Co-operation Research Centre, Medipolis: the Transdanubian Regional University Knowledge Centre; and the Biotechnology Innovation Base (an accredited cluster with 19 biotech companies that produce products and services in the field of agro-alimentary sectors (<http://www.bibnet.hu/Pages/Main.aspx>)). New centres were recently established: the Biosciences Centre; the Environmental Sciences Centre and the Information Technology Centre. The János Szentágothai Research Centre fills a gap that existed in the scientific life in the South Transdanubia Region. The centre concentrates the previously fragmented research potential around the health industry and environment industry defined in the Pólus programme. Some of the research fields are: smart city technology and green chemistry. The centre aims to provide a high-level background of instruments and knowledge and is linked to the Universities innovation strategy (<http://szkk.pte.hu/>).

The strengthening of the emphasis of market-oriented research activity is marked by the **South Transdanubian Cooperation Research Centre of the University of Pécs**. The Centre is supported from the Innovation Fund and is responsible for the mediation of interdisciplinary natural and technical sciences researches to the economic sector, mainly in the joint research of the broadest possible applications of lasers, biomechanics, molecular biology and informatics (South Transdanubian Regional Innovation Agency, 2008).

Recently, a number of cluster formations have appeared in the region supporting green development, research and entrepreneurship. In the past years, many clusters appeared and disappeared. The funding system enabled clusters to be developed, but it was difficult to stay alive, so many of them disappeared. According to views expressed in interviews it is difficult for SME's active in the sector to maintain its activities without having a stable network behind

and the clusters are therefore acting as a supporting framework for the companies in the green innovation and research sector. It is however important to note that the clusters are still in their “childhood” and have not been able to present their real effects yet. Concerns have also been expressed by regional actors meaning that no real output has been produced by the clusters. A part of the problem is that the members of the Environmental Industry cluster were mainly service providers and large, partly state-owned firms, many of them with a Budapest headquarter. There are however a number of good examples such as the Blue Economy Innovation Cluster (BEIC) that was initiated by the University of Pécs, Faculty of Business and Economics in 2011 and is an alliance of university research groups, research institutions and for profit organizations that share the vision of socio-economic-ecological sustainability. The BEIC is based on a concept that envisages regional economies that rely on local resources and competences without the exploitation of those local resources. The concept of Blue Economy also emphasises that economic activity on the regional level is to be organized via the coordination of the local actors (SMEs) exploring and using their synergies and complementarities. The Cluster is to implement Blue Economy innovations; to manage market participants in a systematic, complex way. The cluster has 15 members and around 20 external members. The cluster provides integrated services supporting municipalities in terms of public lightning, energy efficiency in buildings, infrastructure and waste cycles (<http://www.blueeconomycluster.eu/>).

#### **4.2.3.4. *Financing as an internal driver***

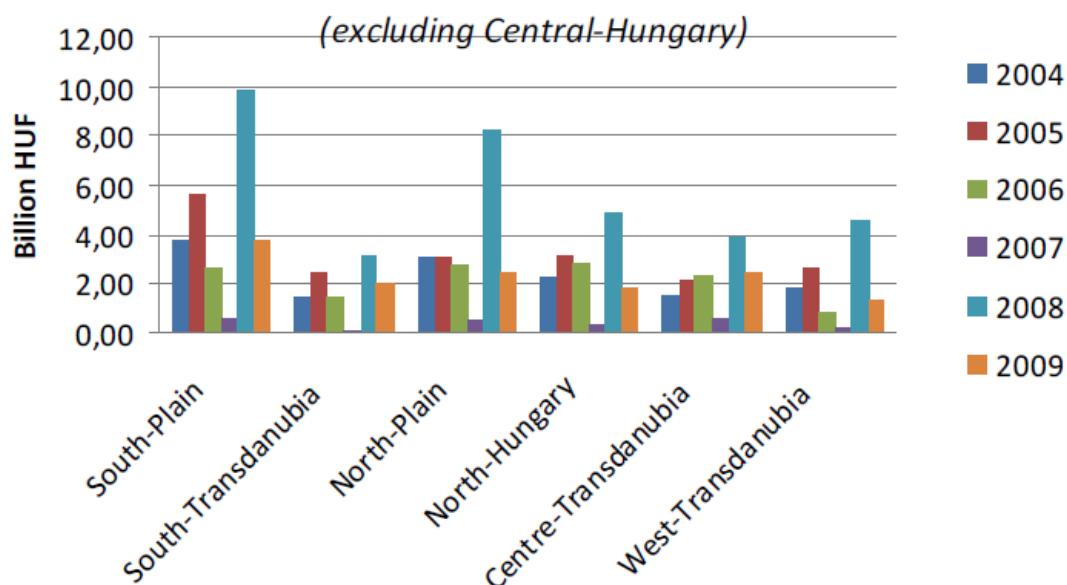
The share of business R&D expenditures as % of GDP (BERD) is the lowest among all regions, 14.1% (Hungarian average is 46.3 % and the EU average 64%) in the 2000-2008 period. The low level of business R&D expenditure is most probably a result of the low number of innovative companies.

In the period 2004-2008, the share of governmental funding was the highest in ST region among all regions. Funds available for R&D activities are concentrated in the capital with about two thirds of all R&D expenditure realized in Budapest (STREDA, 2004). The universities of the region are receiving the major part of the support programmes managed by the National Office for Research and Technology and of the R&D programmes of the European Union.

The availability of EU grants is the most significant driving force of this sector and is strongly dependent on the capital supply and expertise of the applicants, it is therefore imperative to develop some kind of co-operation or network among the mainly small and medium-sized enterprises operating in this field (Borkovits, 2013). Following the administrative system in Hungary, there are no regional funds.

The most important source of funding has been the KEOP (environment OP) which is ending in 2013. Another key source for the implementation of the regional innovation strategy is the Research and Technological Innovation Fund, managed by the NKTH and is an instrument expected to serve as one of the means to achieve the R&D&I objectives of the New Széchenyi Plan. 25 % of its total resources are distributed with the involvement of the regional development councils according to the objectives set in the innovation strategies. The distribution of this amount among the regions is determined by the region's population (with a weight of 0.5) and by the region's development level (the weight of this determinant is also 0.5). The fund is based on the so-called innovation levy, which is an important means of Hungarian science, technology and innovation policy. Every company is required to pay in 0.3% of its turnover as a contribution to the fund, with the exception of small businesses. The budget allocates a contribution equivalent to this amount to the Fund. The amount may be reduced by the costs of the R&D activity carried out or ordered by the company. In the past 2004-2010, a total amount of 216 billion HUF has become available via an open call for proposals system, 40% of which was received by small and medium-sized enterprises.

#### **Figure 25: Subsidies by regions**



Source: (NKTH, 2010)

Further important funding source is the **Economic Development Operational Programme**. **The Baross Gábor Programme** also provided support of R&D activities. The absorption capacity of the region has been good, e.g. capturing 100% of the earmarked funds for the region.

The **Hungarian Scientific Research Fund** (Hungarian abbreviation: OTKA) has been the major funding agency of basic science and scholarship since 1986 when the transition to competitive research funding started in Hungary. The OTKA has been operating as an independent non-profit organisation since 1991 in order to provide independent support to scientific research activities and infrastructure, to promote scientific achievements of international standards, and to provide assistance to young researchers. With regards to the funds provided within the annual budget of the Republic of Hungary, The appropriations of OTKA are administered via the budget of the Hungarian Academy of Sciences, funds are provided within the annual national budget (OTKA).

#### 4.2.3.5. *Others drivers*

An initiative to promote innovation in the region is the annual **South Transdanubia Innovation Prize** which is awarded by the DDRIU, with the support of corporate sponsors. The prize is rewarded in several different categories. The award ceremony usually receives big publicity in the region.

Stakeholders also mention that green and sustainability requirements need to be included in R&D&I tenders and projects but in practice these results have not been seen yet.

#### 4.2.3.6. *Description of problems and barriers encountered within sectors*

The innovation activity in the ST region is below a critical mass. Like in the other sectors of the economy, part of the barriers can be traced back to the legacy of the socialist system: poor accessibility and unfavourable settlement structure and economic structure. Other barriers related to green innovation include the low presence of multinational companies, and regional economic actors' overall low innovation activity.

A main problem for the green research and innovation sector in the region is the poor economic situation among regional actors. There is also views expressed that the implementation of the relevant policies are missing as the stakeholders in the region are fighting for their survival and suffering from lack of money why they do not have the capacity to focus on green initiatives.

Another barrier is constituted by conflicting interest among different sectors. This is apparent e.g. in the policy framework where many actors have got involved and elaborated strategies on their respective level without ensuring their coherence and without matching them with policies, funds and the real economical and environmental conditions.. The city of Pécs can be given as an example where strategies are developed for “City development”, “Energy strategy of Pécs”, “SEAP”, the Regional Energy Strategy in addition to the “Regional innovation strategy” etc. These documents have been elaborated by different actors, often without negotiation among the parties.

There is also opinions expressed that there are too many companies operating within the same market. When the national funding is not available, it will be difficult to sell their products and technologies as the market will be saturated.

Regional stakeholders also perceive the local policy making, at all levels in administrative hierarchy, as anti-protectionist and corrupt which inhibit local demand for local products.

Another barrier is the relatively weak link between the University sector and the business environment in the region. Many of the above problems could be solved by increasing the links between the regional actors.

The Regional innovation Monitor points out the key challenges for innovation in the ST region which is also acknowledged in the interviews, as described below.

*Poor ability to capture national and European resources available to support innovation*

The stakeholders for green innovation in South Transdanubia have a low ability to capture national and European resources which is reflected by the share of resources gained over the amount of available resources. Few of the companies and institutions in the region are capable to participate in national and European tenders that could provide support to innovation activities due to the large share of co-financing required (often above 50%). Another important barrier is that the region’s ability to capture national resources is inferior to that of other regions.

*Poor performance in terms of commercialisation and technology transfer*

Innovation activities in the key innovative sectors such as biotechnology and eco-industry are focused mostly on basic research and industrial applications are still rare. There is a low rate of exchange between industrial companies and science centers about ongoing research activities and results as well as the needs of the private actors.

*Dominance of traditional sectors, small share of industries with high R&D-intensity*

The economic structure in the region, based on traditional sectors and a lower-than-average share of manufacturing (in particular with high R&D intensity) and of the services sector, the industrial sector itself features a structural burden. In addition, the enterprises are mostly small firms with low ability to penetrate export markets. The regional market for technology is therefore underdeveloped. Key technology- and knowledge-intensive industries such as ICT (software development), eco-industry, biotechnology etc. are present, but their output is still below the necessary threshold (Szalavetz, 2011).

#### **4.3.4. Spatial dimensions of the development of the sector**

The innovation potential is centralised in the urban centers, and equally university establishments of Pécs (Baranya county) and Kaposvár (Somogy). The inequalities of the capacity of the institutions within the region are well reflected by the fact that three quarters of

the existing research places of the region can be found just in Baranya county, mainly in the county seat of Pécs.

#### **4.3.5. Links with other sectors**

The innovation sector has strong links to other green economy sectors as innovation and research for development are crucial for the further development and greening of sectors, e.g. agriculture, energy and manufacturing. Innovative SME's are found in both the agricultural and the energy sector and research is undertaken in both sectors at the university seats and other research institutions.

#### **4.3.6. Potential for development of the sector**

Although the performance of the green innovation sector in South Transdanubia is poor, the last few years have seen a positive development. The sector is also seen as holding some of the biggest potentials for green economy development by the consulted stakeholders.

The biggest potential for green economy development of the region lies in better using the know-how and capacity of the University of Pécs. To realise the inherent potential, the university has to improve its innovation performance and more over better provoke spin-off technologies. The municipalities of the regions need to put efforts and financial support to realizing the ideas of the university. The education system of the university also needs to improve its connection with the industry sector.

There is also a need to find local companies that want to operate in the region and create an attractive environment for them in order make them contribute to the regional economy by e.g. developing products or provide services. This would keep the knowledge in the region at the same time as employment opportunities are created. The municipalities in the region therefore need to strengthen their support to local enterprises and to find new areas of business for such support. The lack of larger companies in the region should however not be an obstacle. According to the Eurobarometer, green jobs are largely created in SMEs as opposed to large firms.

To support the sector is of key importance to increase the consumer demand for green products. According to the Eurobarometer, the main reason for SMEs in the surveyed countries to sell green products or services is demand from customers (48%). Companies' core values (32%) and image (30%) also play a role in this respect ([http://europa.eu/rapid/press-release\\_IP-12-316\\_en.htm](http://europa.eu/rapid/press-release_IP-12-316_en.htm)). In EU-27 as a whole, the biggest markets for green markets for SMEs is the domestic market, as 87% of SMEs involved in green business (or the green economy) operate in their national markets. Hungary on the other hand, the green market is to 50% represented by export to the European Union, indicating that there is potential for improving the national market by raising the domestic demand for green products. Currently the national market only has a 41% share of the green products ([http://ec.europa.eu/public\\_opinion/flash/fl\\_342\\_fact\\_hu\\_en.pdf](http://ec.europa.eu/public_opinion/flash/fl_342_fact_hu_en.pdf)). According to some interviewees, the biggest potential for the green research and innovation sector in the region lies in the domestic market and more precisely in the household sector, as there is a growing interest among private persons to build green energy solutions in their homes. Smaller cities as communities are also potential fields in the community consumption point of view.

According to the Regional Innovation Monitor, South Transdanubia is "a lagging region with meagre innovation performance, and a small number of isolated innovation actors that has been transformed into a networked regional innovation system". Moreover, Szalavetz adds that "the only way for the South Transdanubian region to recover from its present economic difficulties is to transform its now obsolete economic structure and give priority to the use of more modern technologies in manufacturing". The institutional framework has been improved contributing to stakeholder cooperation, awareness raising awareness among SME's and corporations and helping to offer an improved culture for innovation in the region. It has been observed that SME's innovation performance has improved and that the environmental technology sector is growing.

It can therefore be said that South Transdanubia today possesses promising potential to continue improving the conditions for green innovation in the region. Further to developing conditions and framework supporting green innovation, there is potential for also showing a continued improvement in the green innovation performance indicators over the coming years and to close the gap between ST region and other Hungarian regions. Improving the green innovation performance and its application in the region would also benefit other economic sectors opening up for resource efficiency leading to savings. It would also have a positive effect on increasing the added value of produced goods, employment and increase the region's competitiveness. An important factor for realising the region's potential would be to apply the achievements of researches in practice and to strengthen the cooperation between the academic and the economic sector.

A central strategy is needed that is communicated and can be understood by the actors of the field. This should be backed with an objective funding system that is strategically planned.

#### **4. Horizontal drivers, enablers and barriers**

##### *Favourable environmental conditions*

The recent downscaling of industrial activities in the region and the generally low level of industrialisation has in many economic sectors been identified as a barrier to green economy development. On the other hand, the low industrialisation of the region provides some advantages as it has resulted in that a relative good environmental status has been maintained and serious ecological degradation has been avoided. The quality of the environment, with the exception of the Komló-Pécs-Beremend industrial zone, is therefore better in South Transdanubia than in other regions of the country. This is an asset of the region that could encourage new initiatives of the private sector in economic development using the rich nature values and drive the implementation of restructuring and the revitalization of the region (Borkovits, 2013).

##### *Cross-sectoral greening policies on national level*

Some of the cross-sectoral policies that have priorities in terms of greening the economy have been mentioned above in the section on the prioritised sectors. One example of such is the new Széchenyi Plan which includes a priority of green economy development. The plan anticipates that projects connected to green economy will yield 150 000 to 200 000 new jobs, of which 70 000 are to be created in the renewable energy sector. The plan offers 520 million EUR for Green economy development and there is a Green development fund planned.

A strategy that has not been given much notice previously is the Regional Operational Programme for South Transdanubia which involves Community support under the Convergence Objective. The total budget of the Programme is approximately 829 million EUR and includes community investment through the European Regional Development Fund (ERDF) of some 705 million EUR (approximately 2.8% of the total EU money invested in Hungary under the Cohesion Policy for 2007-13). The overall objective is to close what is currently a significant gap between the national and regional GDP growth rates. The strategy is not directly targeting green economy but the three specific aims identified have potential to work in that direction:

- develop a model region of high environmental quality;
- establish a competitive economy built on local characteristics;
- halt the increasing intra-regional social disparities.

In line with the National Strategic Reference Framework, the Programme will also contribute to achieving the objectives set out in the Growth and Jobs agenda.

Additionally, the economic greening policy in Hungary is widely supported through the National Climate Change Strategy for Hungary (Nemzeti Éghajlatváltozási Stratégia, NÉS) for the period 2008-2025 (2007). It covers most of traditional environmental policy. The operational programme of the strategy the National Climate Change Programme defines concrete actions in the areas of:

- Energy efficiency (insulation, remote heating modernisation) for the private and public sector,
- Development of transportation, including public transport (however no systemic change is called for),
- Measures in sustainable forest management and agriculture,
- Development of waste management and sewage services (larger scale),
- Environment and biodiversity protection measures,
- Water management and flood protection,
- Information and education on climate change,
- Research and Development.

They actions are financed through the Operational Programmes of the New Hungary Development Plan from EU funds. This strategy has provided directions for policy formulation, however – employment is not treated as a main aspect of greening policies. The strategy is almost completely tied to the development programme of Hungary;

Several of the barriers discussed in the sector analyses above are common for all sectors such as the region's geographical location, the settlement structure in the region and the low level of economic development. Additional drivers and barriers which cannot be assigned to individual sectors are introduced below.

#### *Lack of regional power*

A factor that has been touched upon in the sector analyses above but that is worth to highlight again is the regional governance aspect, or in fact the lack of regional administrative jurisdiction. Hungary have traditionally been a centralised country and even tough some regionalisation processes were undertaken during the last decade, regions in Hungary have in recent years lost their administrative rights. Today, after the most recent reform in January 2013, regions have no administrative power and only exist from a planning perspective. Below the national level, districts and municipalities are the next official administrative level. This is making the regional governance issues more complicated and it is not possible to enforce any binding strategies or targets on a regional level. The ST region is however still trying, mainly driven by the Regional Development Agency, to increase the economies of scale by creating voluntary strategies and try to get their official approval by working with the regional county council and with the municipalities.

#### *Brain drain*

Two universities provide various courses in the region, which could potentially satisfy the local enterprises' needs of professional labour force. Pécs university is the first University in Hungary, established in the 14<sup>th</sup> century, with around 26 000 students and 2000 teaching staff. However, a remarkable part of the graduates apply for jobs outside of the region after finishing their studies – mostly in the capital Budapest. This situation is leading to drainage of educated labour force in the region creating obstacles for finding highly skilled workers necessary in a knowledge based, green economy transition.

## **5. Assessment of the regions' potential to develop green economy in the future**

This section provides an overall assessment of the region to develop green economy which is based on the potential identified in the studies sectors. The economic sectors with big potential of developing green economy analysed in this report is the bioeconomy, energy and the green research and innovation sector.

The bioeconomy is a traditionally strong sector in South Transdanubia and the added value and employment is higher than average in the region, both in a Hungarian and European context. The potential is further reinforced by the favourable climate and geographic conditions. There is a scope for energy to be a driver in the greening of the bioeconomy sector with development of on-farm bio-energy facilities (both for heating and fuel), integration of wind mills and solar panels with existing structures, and with new electric engines for tractors and other equipment (driers, etc.). The region has a low share of organic agriculture production and there is scope for significant improvements of organic farming as the climate is favourable for low input of fertilisers and pesticides. In addition, the whole country is a GMO free zone.

The region is still far behind the national and European targets for RES consumption need to significantly increase. The national average was 8.1% in 2011 while the national target for 2020 is 14.6%. Further developing the large inherent territorial potential for RES in the region would not only increase the energy security of the region and support the achievement of the national and EU targets for energy efficiency and renewable energy resources, but would also mean a significant source of employment opportunities, and value added to the regional economy. Moreover RES development is strongly associated with rural and agricultural sectors which are already significant in ST region. Biomass is the most significant potential renewable energy source in South Transdanubia. The region has a rich forest cover providing an inexpensive source of biomass. Being a predominantly rural area with significant agricultural production, South Transdanubia also makes a suitable area for in particular biomass production from agriculture residues and forestry. The second significant potential resource for renewable energy production is geothermal energy. The geothermal gradient in Hungary, and likewise in the ST region, is significantly above the world average and therefore has outstanding potential for renewable energy production, in particular heat production. 169 thermal wells are identified in the region. Still, geothermal represents a very low share, 0.16 %, of the total energy balance of Hungary, despite the significant resources available suggesting that there is affluent potential unexploited. Energy production based on biomass and geothermal energy is the key prioritised areas on a national level which is spelled out e.g. in the new National Energy Programme for 2030.

In terms of energy efficiency performance, there are large scale improvements to be made in the region. The Hungarian building stock is among the most energy intensive among in the EU as a consequence of long time subsidised energy prices and of the deterioration of the residential stock. With regards to the energy efficiency of the residential sector, Hungary is the only EU country which is experiencing a negative trend in terms of households energy consumption. Renovation of building stock to increase energy efficiency have large potentials for green economy development (Ürge-Vorsatz et al., 2010).

With regards to the green research and innovation sector, the current performance of the region is poor and ST ranks in the bottom group of performers as compared on a European level. Nevertheless, the region has potential in this area, not the least by better capitalizing on the knowledgebase and capacity available in the region through the presence of two universities, among them the University of Pécs which is the oldest and biggest in Hungary. The sector has seen a positive development lately following national and regional initiatives and institutions building and is a prioritised area among regional stakeholders which has led to more favorable conditions for green innovation by establishing a networked regional innovation system. It has been observed that SME's innovation performance has improved and that the environmental technology sector is growing. The environmental technology research, especially in the field of waste management, has grown in South Transdanubia,



along with businesses and organisations active in the area of the environment industry. To further strengthen the links between the universities, and other research institutions, and the business sector would further improve the performance.

A sector that has not been sufficiently highlighted in this case study is the tourism. Tourism plays a rather important role in the regional economy and the region has the third highest visitor turnover in the country. The region has several assets with valuable tourism potentials, such as Lake Balaton, thermal baths well as the wine regions of Villany and Szekszard. Tourism in the region is territorially concentrated to Somogy county and in particular to the area along the shore of Lake Balaton (57.1% of the region's visitors). The standard of tourism products and services in the South Transdanubia region is of inferior quality and there is large potential for improvements of the sector. The favourable environmental conditions, rural character and high nature value makes the region suitable for developing green/eco tourism in the region. Such initiatives could increase visitor number in the already popular Somogy county but also attract new visitors to other parts of the region and at the same time improve tourism's GVA performance and create numerous job opportunities.

## **6. Transferability**

The present activities in Southern Transdanubia can provide a useful experience in regions where green developments is starting from a lower level and which are facing the similar problems such as having an ad hoc character to planning, lack of well-established co-operations among different actors, demographic problems and socio-economic inequalities.

South Transdanubia faced a range of difficulties during the collection of the necessary data for the development of the regional energy strategy; mapping those organizations and experts who should be involved into its implementation, creating the ground of a consensus among the decision makers of the different administrative levels, setting up creating a network in the region by involving municipalities, clusters and several relevant experts, finding the most adequate way for the operation of an energy agency. Conclusions from Southern Transdanubia could provide ideas for other regions in terms of the data collection process (Borkovits, 2013). The region can also provide an example on how to take advantage of EU programmes and the cooperation with other European regions on in developing regional energy strategies and for establishing a regional network for energy development, through receiving financial support and getting a platform for sharing experiences and good practices.

When transferability is concerned, it is important to take into consideration the Hungarian governance system which has a weak regional level and stronger national and local level. The structure influences strongly the room for action of different actors and the efforts and ambition for greening the economy is therefore relatively dependent on the political will at national and municipal level.

## **7. Conclusions and key measures**

The South Transdanubia region is a poor performer on several green economy indicators as well as on general socio-economic development indicators. The region is, in general, lagging behind the other Hungarian regions and is significantly behind the EU-27 average performers. The region has a low share of renewable energy sources in its energy mix, high energy intensity, low eco-innovation performance, low levels of organic farming, etc. Despite the current situation, there are good potentials for development of green economy in the region based on the inherent regional assets in terms of good agricultural conditions, rich biomass, abundant geothermal resources and the available knowledgebase.

The EU funds provide a fundamental role for green economy development in the region as the national funds are limited and there is no regional funding per se, due to the administrative structure. The capacity to absorb the EU funds among the institutions in the region is however limited, especially among municipalities. In particular, the co-financing requirement is a limiting factor and the capacity of the institutions is weak in terms of human capital and knowledge.

The regional stakeholders consulted in this case study have a good understanding of green economy as a concept and that moving in such direction would bring substantial benefits to the region. It has been mentioned that green economy development would in particular bring savings to municipalities and local governments, e.g. through energy savings and reduced maintenance costs. A number of regional institutions and cluster networks have been established to support such initiatives, even though their capacity is sometimes low due to lack of financing and regional expertise. To tackle these challenges and improve its capacity, the region is participating in a number of regional projects, e.g. regarding sustainable energy, mainly managed by the Regional Development Agency. This suggests that there is a will in the region to further developing in a green economy direction and an understanding that regional cooperation is crucial in this process.

Moving towards green economy development could be a way to turn the negative development trend of the region and transform the regional economy based on renewable energy sources, energy efficiency and green technology development and research. To catch up with the other regions and increase the value added content of products and improve the regional competitiveness it is imperative to further exploit the rich resources for renewable energy production, give further support to the green research and innovation sector, strengthen the links and cooperation between research and business sector and further realise the practical application of the research findings.

#### *Suggested key measures:*

- Raise awareness of the local policy- and decision-makers on the green economy and the adjacent opportunities it can bring for the municipal economy as a whole. The mindset of the business sector, and of citizens in general is often referred to as an obstacle towards green economy development in the region. Increased awareness and knowledge would facilitate local level anchoring and implementation of the EU and national level objectives concerning green economy.
- Better strategic planning and goal setting towards green economy by the municipalities and in the county development concept would create a more coherent framework for greening the economy. To develop green public procurement policies could create an example, provide a market for green products and set a framework for greening the economy locally.
- Improve the regional data collection and monitoring systems, in particular for the energy sector. A robust knowledgebase is important in order to create strategic plans and measures for achieving the national and European green economy targets.
- Improve stakeholder cooperation on a regional and local level. An often referred to obstacle towards greening the economy is the lack of cooperation among different institutions and stakeholders, both across sectors and within. To improve the links among different regional actors would facilitate the achievement of common goals and promote knowledge transfer. It would also provide support in, considering possible co-operations among different municipalities/enterprises that might result in a higher level of cost/energy efficiency due to the exploitation of synergies of economies of scale; fostering the cooperation among the local enterprises. By such actions, successful projects can be implemented, which are based on a clear vision, ensuring the local utilization of local

research results, contributing to the improvement of the local economy, and raising the level of employment.

- Further develop cluster networks - the SMEs can decrease their competitive disadvantage by forming cooperative alliances, since on account of their size they are often unable to organise the individual activities required for successful performance in the market. Cooperation will enable the SMEs to unite their comparative advantages and overcome the relative disadvantage of the individual firms. There are a number of positive examples of cluster formations supporting green economy development of local SME's that could be further supported and developed.
- Improved application of research results by strengthening the link between research institutions and the business sector. The cooperation among the actors needs to be improved to provide a stronger link between the needs of the local SME's, the business sector and the research conducted at the universities and other research institutions. This would in turn ensure the local utilization of regional research results that would enable local investments contributing to the improvement of the green economy, and raising the level of employment.
- Create an attractive environment for local SME's active in the green economy field in order to keep the knowledgebase in the region. Providing an enabling environment for local entrepreneurship could limit the drainage of educated labour force in the region that are currently creating obstacles for finding highly skilled workers necessary in a knowledge based, green economy transition.
- Improved access to funding and increase absorption capacity of regional institutions. It is essential to develop networks and establish cooperation supporting SME's and municipalities in providing support for application procedures. This would enable Structural Funds from the upcoming programming period 2014-2020 to be increasingly channelled into greening the different economic sectors and improving the integration of environment and climate change into all relevant sectors. The challenges are to mainstream the environment and climate change in all planned investments.
- Raise awareness on the availability of European funding programmes for green economy development in order for the regional institutions to better utilise the available financing mechanisms. The awareness raising needs to be coupled with capacity building for project application processes.
- The current governance structure in Hungary limits initiative and high-quality green development activities of the region. It would be beneficial to have a governance structure in-between the state and the municipalities where the region would be a suitable level in order to create economies of scale and to establish coherence among the municipal priorities and measures. A new governance model in Hungary should thus be developed that gives more decision-making power to the regional and local level and would help to rationalize their work.

## 8. References

- BPIE, (2011) *Europe's buildings under the microscope, A country-by-country review of the energy performance of buildings*,
- Dezsény, Zoltán and Drexler, Dóra (2012) *Organic agriculture in Hungary. Past, present and future. ECOLOGY & FARMING*.
- EC, DG Regional and Urban Policy (2013), Country Factsheet Magyarország
- EC, DG Regional Policy (2009), *Project examples, Eco-tourism flows into the Dráva River basin*
- EnergiaKlub, C P I, Varga, K and Csanaky, L (2011) *What role can renewables play in Hungary's heat supply?*
- European Union (2012) *Regional Innovation Scoreboard 2012*
- European Union (2013) *Innovation Union Scoreboard 2013*
- Government of Hungary, *Press release: Increased Funding for Hungarian Agriculture in 2014-2020* February 19, 2013, <http://www.kormany.hu/en/ministry-of-rural-development/news/increased-funding-for-hungarian-agriculture-in-2014-2020>)
- Ministry of Public Administration and Justice, *Press release: Public administration reform will also create budget stability for local governments*, December 19, 2012, <http://www.kormany.hu/en/ministry-of-public-administration-and-justice/news/public-administration-reform-will-also-create-budget-stability-for-local-governments>)
- Government of Hungary (2007) *South Transdanubia Operational Programme 2007-2013*.
- Horváth, Reményi and Tóth (2012) *Geothermal Resource Assessment of the Drava Basin*
- Local Government of Baranya County (2009) *Baranya county, the cooperative partner*.
- Ministry of National Development (2012) *Hungarian Energy Strategy 2030*
- NKTH, (2010) *Research, Development and Innovation in Hungary - Research and Technology Innovation Fund*
- OCED (2011) *OECD Regional Outlook Building Resilient Regions For Stronger Economies*
- STREDA (2008) *Innovation in the South Transdanubian region*
- STREDA (2004) *Regional Innovation Strategy in South Transdanubia*
- STREDA (2012) *South-Transdanubian Regional Energy Strategy, English summary*
- STREDA, Energiaklub (2013) *Set-up Conditions of the South Transdanubian Regional Energy Agency, Analysis*,
- Szalavetz, A, Technopolis (2011) *Regional Innovation Monitor, Regional Innovation Report (South Transdanubia) To the EC Enterprise and Industry Directorate-General Directorate D – Industrial Innovation and Mobility Industries*,

Ürge-Vorsatz et al., (3CSEP) (2010) *Employment Impacts of a Large-Scale Deep Building Energy Retrofit Programme in Hungary*

### Websites

<http://www.blueeconomycluster.eu/>

<http://www.ddeklaszter.hu>

<http://www.ddrek.hu/>

[http://europa.eu/rapid/press-release\\_IP-12-316\\_en.htm](http://europa.eu/rapid/press-release_IP-12-316_en.htm)

[http://ec.europa.eu/public\\_opinion/flash/fl\\_342\\_fact\\_hu\\_en.pdf](http://ec.europa.eu/public_opinion/flash/fl_342_fact_hu_en.pdf)

Hungarian Statistical Office, [www.ksh.hu](http://www.ksh.hu)

<http://geo.dravamedence.hu>

<http://www.kormany.hu>

[www.komekik.hu](http://www.komekik.hu)

<http://www.res-legal.eu/search-by-country/hungary/>

The World Bank Indicators, <http://data.worldbank.org/indicator>

### Stakeholder meeting, South Transdanubia, Hungary, 6 February 2013

Participating institutions	
STREDA	Balázs Borkovits, senior project manager, Foreign Relations Unit
South Transdanubia Regional Innovation Agency	Milán Kiss, project manager Rita Temesvári, project manager
City of Pécs	Ákos Hegyi, Natural and Human Resource Development Committee, Vice President
Hungarian Academy of Sciences (HAS), Centre for Regional Studies	Andrea Suvák, junior research fellow
ECOSynergy, Blue Economy Innovation Cluster	Judit Károly Bedőné
Baránya County	Tótsimon Péter, General assembly

### Interviews and questionnaires:

Balázs Borkovits, senior project manager, Foreign Relations Unit, South Transdanubia Regional Development Agency, 28-01-2013 and 11-07-2013

Judit Bedőné Károly, Blue Economy Innovation Cluster/ECOSynergy Kft. 15-07-2013

Tamás Kocic, Director Regional Innovation Agency, previously working in the forestry sector, 01-08-2013

Rita Temesvari, South Transdanubia Regional Innovation Agency, 27-08-2013

Andrea Suvak, research fellow, CERS HAS Institute for Regional Studies, 02-08-2013



[www.espon.eu](http://www.espon.eu)

The ESPON 2013 Programme is part-financed by the European Regional Development Fund, the EU Member States and the Partner States Iceland, Liechtenstein, Norway and Switzerland. It shall support policy development in relation to the aim of territorial cohesion and a harmonious development of the European territory.

ISBN