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**PALETA**



AZ ESZTERHÁZY KÁROLY FŐISKOLA KÖZÉLETI, KULTÚRÁLIS ÉS TUDOMÁNYOS HAVILAPJA



 **ekfajódöntés**

**STATUS REPORT**  
OF THE ENERGY REGION EGER  
RESEARCH MODEL AREA

**2014**

# STATUS REPORT OF THE ENERGY REGION EGER RESEARCH MODEL AREA

**COMPLEX EXAMINATION OF THE POTENTIAL  
USABILITY OF RENEWABLE  
NATURAL RESOURCES IN LIGHT OF CLIMATE  
CHANGE TO ESTABLISH AN ENERGETICALLY  
SUSTAINABLE MODEL REGION  
WITH HUNGARIAN-GERMAN COOPERATION**

TÁMOP-4.2.2.A-11/1/KONV-2012-0016

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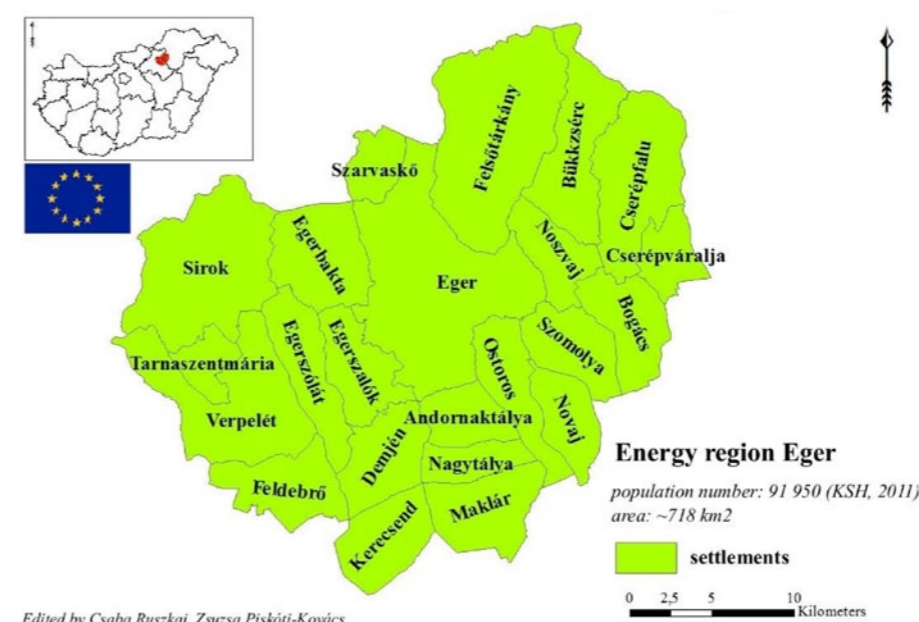
## INTRODUCTION

The Eszterházy Károly College is a determinant higher educational institution of Northern Hungary. Consequently, the consolidation of its proactive role in the region economic development belongs to the most important elements of its mission. Accordingly the Agria-Innoregion Knowledge Centre of the College carries out targeted basic researches in the field of renewable energy sources and climate change in the framework of TÁMOP-4.2.2.A-11/1/KONV project fitted to determinative national and European directives. In parallel, a GIS database is being built, where the applied software is ArcGIS 10.2. The project covers the following professional contents:

1. Investigation of quantitative and qualitative characteristics of natural and landscape resources;
2. Determination of local amount and characteristics of renewable energy sources; analysis of their adaptation opportunities; foundation of regional energy strategy planning basics;
3. Exploration of data relating to demography and living conditions; exploration of series of economic and infrastructural environment; mapping the energy consumption of settlements;
4. Natural/environmental risk analysis by surveying the risk factors; determination of planning basics of climate and disaster management strategies.

Connecting to Point 3 an energy map will be realized, which can provide detailed information about the current energy consumption. Besides that, different measurements improving energy efficiency and utilization opportunities of renewable energy sources could be worded. Hungary as member of the European Union has to fulfil the following requirements in the field of energy: to reduce greenhouse gas emissions by 20 % compared with 1990; to increase the share of renewable energy sources in final energy consumption to 20 %; to improve energy efficiency by 20 % (SAVOVA, I. 2012). Energy map of the sample region could successfully contribute to the implementation of Europe 2020 Strategy in Hungary.

The applied methodology of energy map will be introduced detailed in the second part of the article taking the Hungarian circumstances into account as well. The article concentrates on demonstrating the steps of creating an energy map in a theoretical way, moreover discusses questions emerging during the practical implementation.



*Edited by Csaba Ruszkai, Zsuzsa Piskóti-Kovács*

FIGURE 1. THE RESEARCH SAMPLE AREA



## THE BRIEF DEMONSTRATION OF THE INTERNATIONAL RESEARCH PROJECT

The research divided into fifteen thematic work teams analyses the adaptation opportunity and geographical, economic limitations of all local available renewable energy sources. The geological and geothermal capabilities, soil conditions, spatial situation of biomass potential, characteristics of wind conditions and other climate factors, moreover the social and infrastructural attitude conditions determine jointly the questions relating to the hidden potentials of the region. The results will be presented in map file based on GIS database involving more thematic layers.

The demarcation of the model region is determined by geological, physical and social geographical factors as well. In sense of social geography, the sub-region is based on Eger and its catchment area, which extension is formatted southward fitted to the physical and transportation geographical frames of the region (Figure 1).

The aim of the research project is not only the exploration of available resources, but the definition of basic conditions of their adaptation, which facilitates greatly the preparation of necessary investments and provides information for the potential national and foreign investors. The scientific project draws outstanding attention to the recognition of the structure and the average size of energy consumption, the economic location of energy generating units, as well as the determination of the size of necessary infrastructure.

The ultimate goal is to form a model region using 100 % renewable energy by the help of "positivist" basics provided by science. Accordingly a regional development study is written in the first stage of the project which provides information about the natural, economic and social characteristics of the model region. Due to the main goal of the project, emphasis will be put on energy sector. The renewable energy sources are less appropriate for transporting into larger geographical distance due to their characteristics; so renewable energy means local production and utilization at the same time. Consequently it is important that so-called "energy region" will be created in a micro region level providing appropriate scale to organise this new type of process.

The exploration of capability has to be the first step in realizing the energy region; the following questions have to be answered: what kind of renewable energy types are available in the region (geothermal, wind, water and solar energy, biomass); in what scale; moreover the optimal locations have to be found where this sources could be utilized economically.

Exploring the energy consumption is an outstanding important aspect, since it is necessary to create utilization plans and projects. However this process is slow and time-consuming if a sufficiently detailed analysis is attempted to be realized, which takes all aspects into consideration. Similar initiatives have been carried out in Hungary previously as well, but there is no example for examining such a large geographical extension and providing such detailed information. The results provide direct usable data for further scientific researches, regional development ideas, foundation of certain investments, energetic development. According to the plans, one part of the system will operate as a public, available website, where users could select data visualised in digital maps depending on their personal interest. The foundation of value-added regional partnerships is the essential goal in the second stage of the project, which is appropriate for supporting the economy of the region through the realization of management of regional value-added chains/partnerships carried out through the project. The management of partnerships based on regional development conception is the adaptation of a new method of rural development, which could be an appropriate way for the local utilization of renewable energy sources in the field of value-added chains. Different local and regional stakeholders might create strategic associations, which contribute to the increasing utilization of renewable energy sources and the development of regional economy (PAJTÓK-TARI, I. ET AL. 2013).

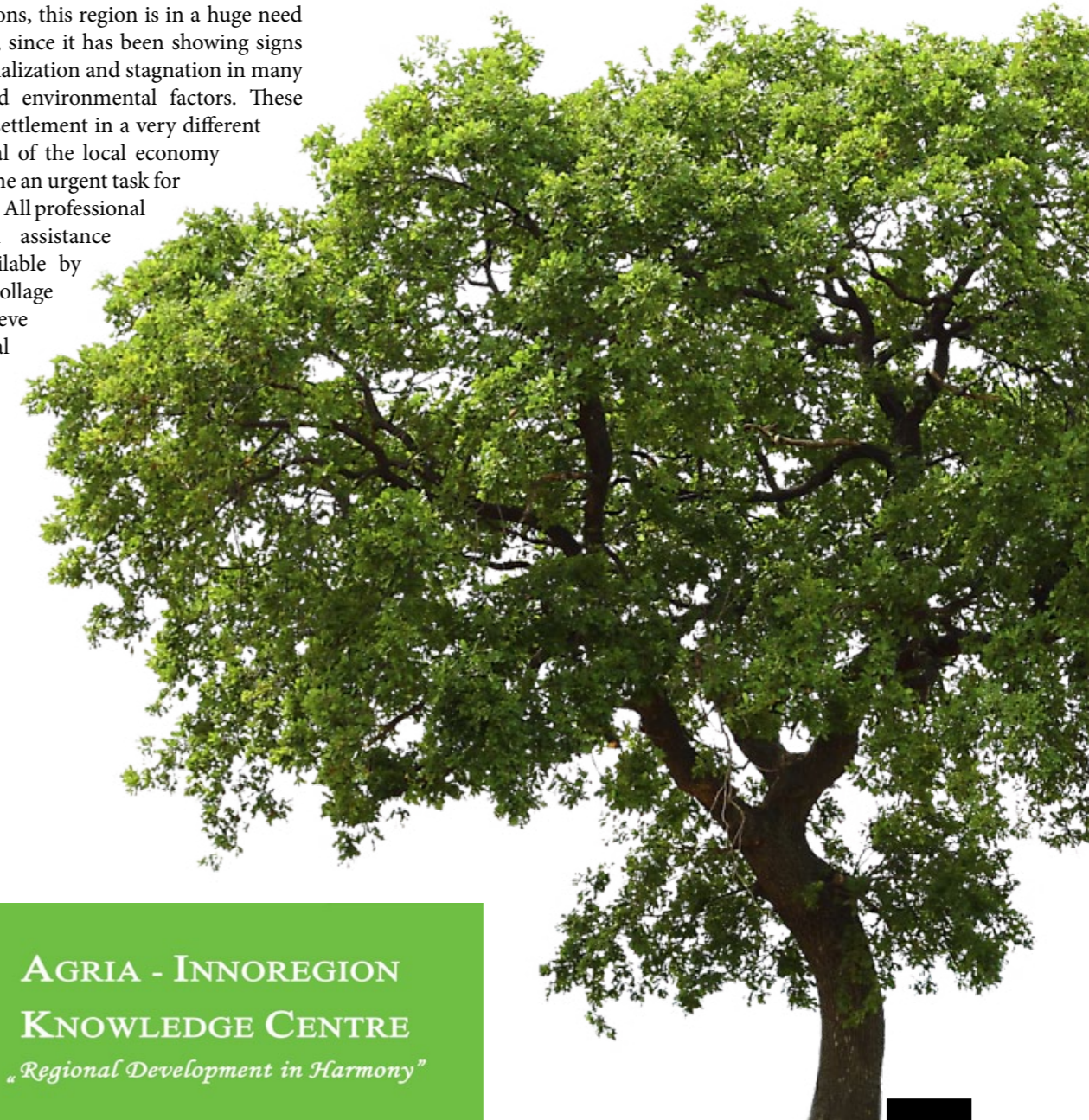
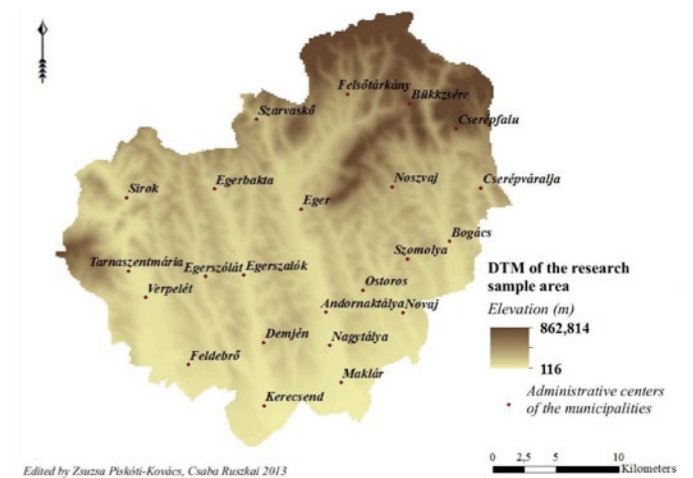
The GIS has got a significant role in the project: on the one hand a sub-regional level GIS database will be made, on the other hand micro-regional, catchment zone and settlement-level thematic maps will be created, which support the regional planning and the regional development policy decisions.

## COMPREHENSIVE SUB-REGIONAL STATUS REPORT

The unit of research model area formed by county town of Eger and its attracted twenty-two settlements is indicated by a homogenous geographic framework. Demarcation has been terminated through tourism and geographic conditions, which forms a stable basis of the creation of an economically sustainable and regional self-financing-focused development initiation.

The Energy Region Eger Area Action Group is a thermal and wine region with a strong national image and an international reputation. It has good potential in natural resources and in economy, which can provide the basis of the economic development of the region even in mid-term (3-5 years). According to our preliminary calculations, this region is in a huge need of such development, since it has been showing signs of progressive marginalization and stagnation in many social, economic and environmental factors. These factors exist in each settlement in a very different way, thus the renewal of the local economy and society has become an urgent task for local decision makers. All professional and methodological assistance has been made available by Eszterházy Károly Collage in order to achieve all developmental purposes.

FIGURE 2. DTM OF THE RESEARCH MODEL AREA



AGRIA - INNOREGION  
KNOWLEDGE CENTRE  
"Regional Development in Harmony"



NATURAL GEOGRAPHICAL FEATURES

Natural geographical features of the Eger model region have been incorporated in varied topographical and landscape characteristics which have significant untapped economical potential. In addition, the region is perfect for the experimental and then practical development of added-value-chains of energy, forest and agricultural configuration, which has not been applied in our country yet. In respect of regional conditions, 80-85 % of the area belongs to the micro-region of Eger-Bükkalja. It forms a transition between highland and lowland landscape with its tectonics valleys (Tarna, Kígyós- Laskó- and Eger brooks) and its fault peaks (Figure 2). This form of relief may be suitable for using a variety of clean technology of energy production. Such hypothesis will be definitely sustained by our exploratory research of renewable energy potential. We have been defining not only the conditions of energy production, but also the production of healthy, high-quality regional food and traditional local articles. There will be detailed with joint configuration of infrastructure in the conception of development of model area. Establishment of clean energy technologies and making of the basis of regional supply can boost the tourism sector of the area as well.

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DEMOGRAPHIC STATUS

The range involves four classes of station based on number of population (Figure 3). The category of tiny village (settlement under 500 inhabitants) is represented by Cserépváralja, Szarvaskő, and Tarnaszentmária. The next level of category is the small village which is also the backbone of the spatial structure. This group consists of thirteen settlements out of the 23 ones. The third category in geographical sense is the middle village to which belongs also the other city of the region: Verpelét. The County Town of Eger, with its about 56.166 inhabitants (2011), exceeds above the other settlements of the region. This fact shows well the urban-rural character of the whole region, which means that the actual spatial structure is not affected by other small and medium-sized urban settlements (between 10.000-30.000 inhabitants). Only the centre and its attracted settlements appear in the spatial structure. However, satellite-like towns are aligned on the edge of the region, such as Mezőkövesd, Füzesabony, Bélápatfalva, Pétervására, but none of them has a more significant attracting impact on the rural settlements of the model region than Eger.

In the region the situation of demographic shows a declining trend. The number of the population has been reducing which has become even more progressive as a consequence of the growing economic crisis. In a year time, between 2010 and 2011, the region has lost about 1% of its inhabitants, more than 1000 residents (Figure 4). The centre of the region, Eger, has lost about 3,000 people of its inhabitants in ten years' time. This figure

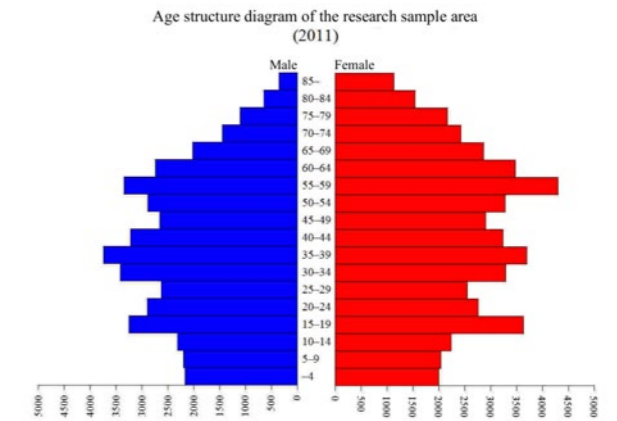


FIGURE 5. AGE STRUCTURE DIAGRAM IN THE REGION EGER

is a strongly warning fact in spite of the positive image of the city. A wide range of professional and political collaboration is required against the rapid decline of the population. Since the decrease of the population is mainly due to migration, this process could be prevented only by a persistent, purposeful and dialogue-based development policy. The tapered bottom and urn-shaped population pyramid shows the need for an intervention. The presence of an increasing aging is obvious (Figure 5). The reasons of demographic deficit are summarized as follows. The static maps (i.e. maps which show the balance of immigration and migration) cannot display the rate of the migration unequivocally.

It is a fact that the suburbanization of Eger and its surroundings has intensified to a high degree since the beginning of the 2000's. The winners of this phenomenon have been Ostoros, Noszvaj, Szarvaskő, Felsőtárkány, Andornaktálya and Maklár. Despite of it, the migration balance of Eger is within the statistical margin of error (Figure 6).

If the change in the number of working-age population (between 15 and 64 years) and population between the ages of 20-39 was ignored, the actual situation would give us the illusion of a kind of demographical stability in the aspect of migration. The demographic problems are exceeded in the working-age population, and even more so in the group of young workers, who are the driving force of the economy of the future. Due to it, the time frame of intervention moves in a narrow field (Figure 7).

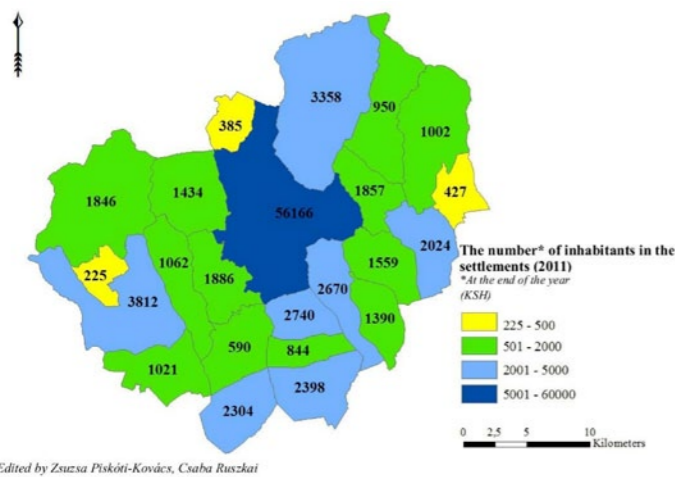


FIGURE 3. THE NUMBER OF RESIDENTIAL TOWNSHIP POPULATION GROUPED BY CATEGORIES

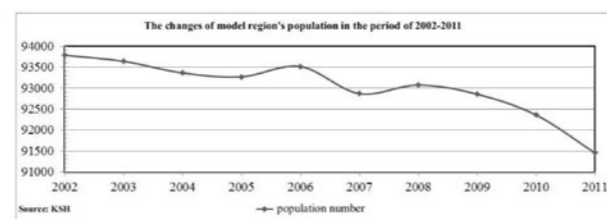
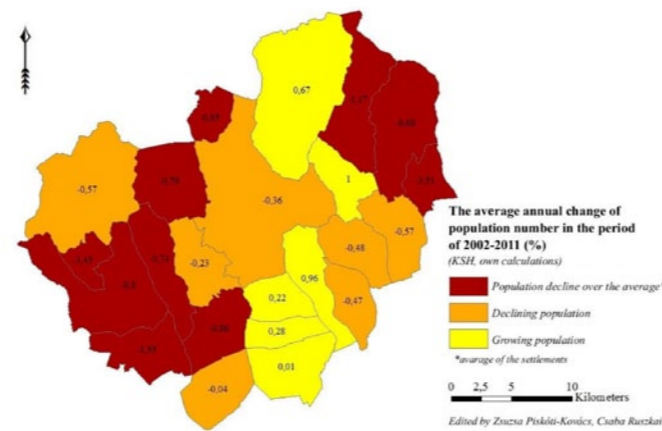


FIGURE 4. CHANGE OF MODEL REGION'S POPULATION IN PERCENT BETWEEN 2002 AND 2011

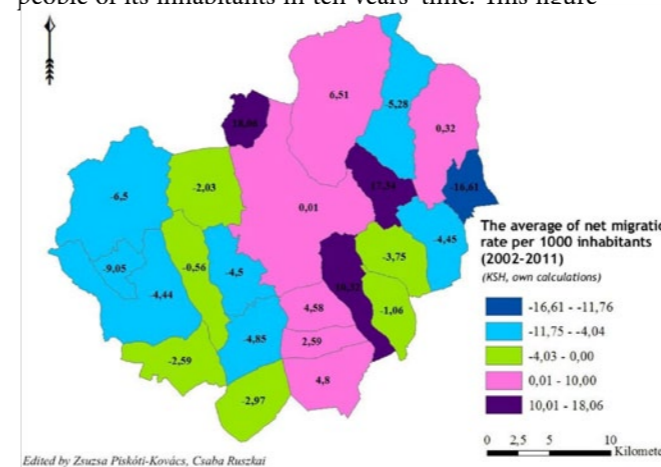


FIGURE 6. NET MIGRATION RATE PER 1000 INHABITANTS IN PERIOD OF 2002-2011



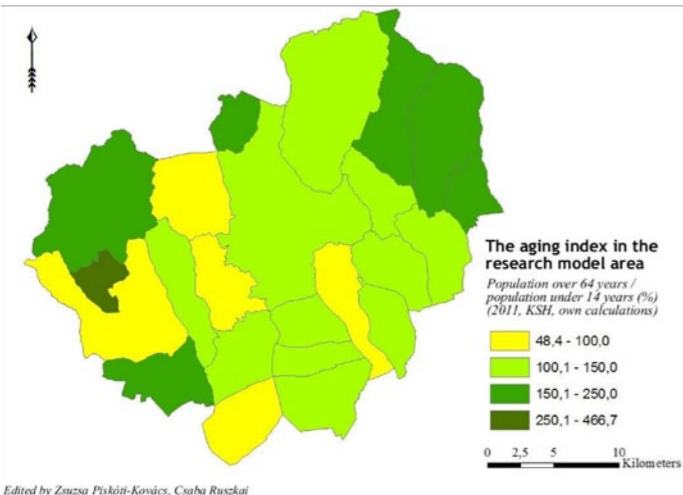


FIGURE 8. THE AGING INDEX IN 2011

In order to give a correct representation of the real situation it must be emphasized that the number of young adult population in the settlements of the suburban area has increased approximately as much as the number of those who have migrated there from Eger and from other small villages. However, this fact does not set off the rate of aging in the settlements of the region, which is a determining factor in the decline of the local economy (Figure 8). In some settlements, aging causes problems only to a certain extent in regional development, since foreign and domestic elderly people, who are retired or close to the retirement age, have been buying property in the excellent tiny villages which have a beautiful site. Everyday problems of municipalities could not be solved by the tendency as above. Their catching up requires a special situation assessment and a thoroughly prepared definition of their functions.

In the future the decreasing number of young population will have to support the increasing number of population above 65 years old, thus the aging rate will create new challenges in the system of social network as well. Economic

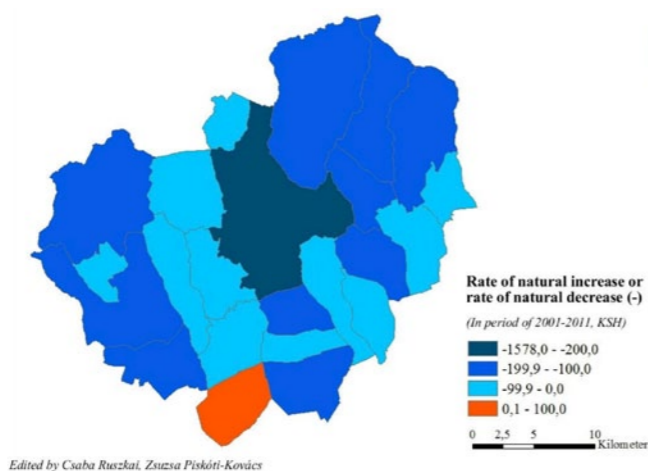


FIGURE 9. AVERAGE OF 11 YEARS NATURAL INCREASE OR NATURAL DECREASE IN MODEL AREA

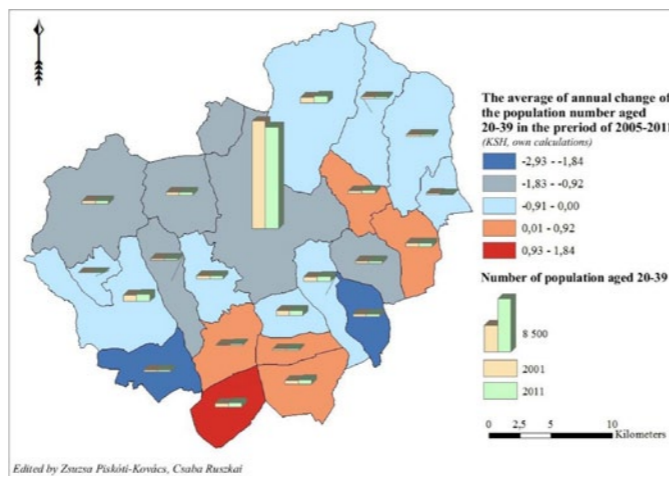
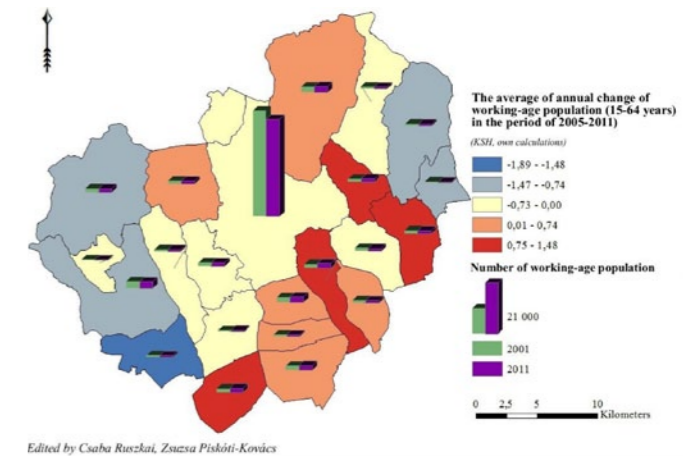


FIGURE 7. THE AVERAGE OF ANNUAL CHANGE OF POPULATION NUMBER IN AGED 20-39

imbalances can be extrapolated from demographic trends. The growth of the number ratio and the reproduction of the marginalized ethnic groups will cause further difficulties even in the short term. The unfavourable development of demographic processes has been expanding nowadays, but there are not any updated and authentic statistical sources at our disposal in connection it. In order to create the feedback of the rural development projects, the database of situation analysis will be refreshed continuously with new incoming data.

The net population processes, in other words,

FIGURE 10. THE CHANGE OF NUMBER OF WORKING-AGE POPULATION BETWEEN 2005 AND 2011



the changes in the number of live births and deaths, show an absolutely negative trend, which strengthens our reservation in regard to population statistical biases. For instance, the positive migration balance is able to reduce slightly the population decline of Eger. According to the data from 2011, the positive migration balance shows basically the mobility of senior citizens. There is only one settlement in the region which has a growth of population from natural increase. This is Kerecsend, a settlement showing demographic dangers and having a significant minority of gypsies (Figure 9).

## OVERVIEW OF THE FUNDAMENTALS OF ECONOMY

Consolidation of the diversification of economy, the setting of new industries and the expansion of the existing ones requires the availability of quality labour force. The most important factors are the stability in the number of the population of employable age and the existence of the required level of education, as well as its adoption to the demands of the labour market. In Eger and in seven settlements of the region the proportion of the employable age population showed stagnation and a slight decrease in the period of 2005 - 2011. In the other settlements the values have scattered varying degrees (Figure 9). The winners of suburbanization – such as Ostoros, Noszvaj, Andornaktálya, Nagytálya, Maklár – show increasing labour supply, the quality components of which are suitable, although require more research. But in Egerbakta, which is confronted by serious social difficulties, and even more in the case of Bogács and Kerecsend, the indicators show the exceeding regional average growth of low-skilled and economically inactive population of employed age. In support of our argument we recommend to study the thematic maps of the participation rate and those of the participants in the social employment (Figure 10).

It has needed to start public works programs in the depression, but these programs distort the



transparency of the operation of the economy, and they also can reduce the value of GDP in this region. In terms of participation rates, according to the situation in 2011, about 56-70% of the population of employable age (people between 15-64 years old) has been working. These values are 6-8 percentage points higher than those which would follow from the real economic situation. In spite of that, an active work zone with the centre of Eger has been bordered, but it is not sufficiently perceptible because of the distorting effect. In terms of economic activity, the superior settlements are Eger and its suburban commuter zone, since they reveal the most important activity. Aging and gipsy-inhabited settlements (for instance Bogács, Szomolya, Kerecsend, Szarvaskő, and Verpelét) show least significant activity. (Figure 11)

The spatial distribution of people who receive unemployment benefit is one of the most appropriate devices that may help the social and economic catch-up

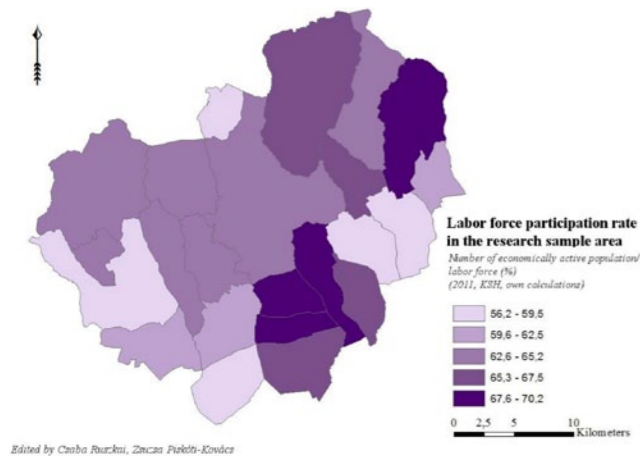


FIGURE 11. THE LABOR FORCE PARTICIPATION RATE IN THE RESEARCH SAMPLE AREA

of the settlements, or at least it may concentrate the efforts that are needed so prevent further social gaps. (Figure 12) A western crisis zone as well as a south-eastern critical group of settlements appears clearly in attached map. The qualification of labour force that lives in the relevant territorial unit – they are mainly employed as public workers – does not meet the requirements of establishing enterprises, which product high added value. This fact renders more difficult the closing up of the region (Figure 13). Ratio relative to the population of those who have a professional certificate shows a better image, however the job-creating effects have not prevailed; the reasons of which are influenced by the combination of several factors. On the one hand, their professional qualifications are not suited for proper matching of labour market; on the other hand, many employees have found a job in Western Europe. Supporting this, the map of those who have a professional degree and the figure of the unemployment are stated on the same page (Figures 14-15). The clarification of the factuality of the assumptions will be forced by correlation calculations in the extended version of the development concept.

The very high level of the unemployment rate requires an immediate intervention in all settlements, because the labour force of the region and its established values are not able to raise the needs of social operation. This area needs a continuous outside help (national and European subsidies, aids, public work programs). The region with its already existing structures is being forced in a deteriorated economic and social structure. Due to the unfavourable status, an immediate solution is needed, because the few prosperous settlements are not able to offset the region's poor and the problems resulting from poverty. Apart from the decrease in the number of the population, one of the most obvious aspects of the existing social crisis is the acute problem of a long-term unemployment (those who do not get a job even after a 180-day searching), as well as the high proportion the long-term unemployed compared to the total value of unemployment (Figures 16-17). It is a very serious problem to lead those people back to the labour market who are permanently outside of it. This problem has existed since the end of the communist regime and it has been the part of the objectives of the development policies. In spite of the efforts unemployment it is a severe problem even today. While defining the foundations of regional self-sufficiency and the basis of the self-financing regional development we pay special attention to those people who have poor work culture and are low-skilled. Basically, the solution of all regional problems can be managed in an efficient manner only at regional level, and it is even more valid in connection with the issue of unemployment. In order to achieve the goals, it is needful to build up the functional network of the region at micro region level. These areas – as the area of the organization of economy – with the building of the added value chain at micro region level can fight against the bad demographic and labour market situations in a more effective way.

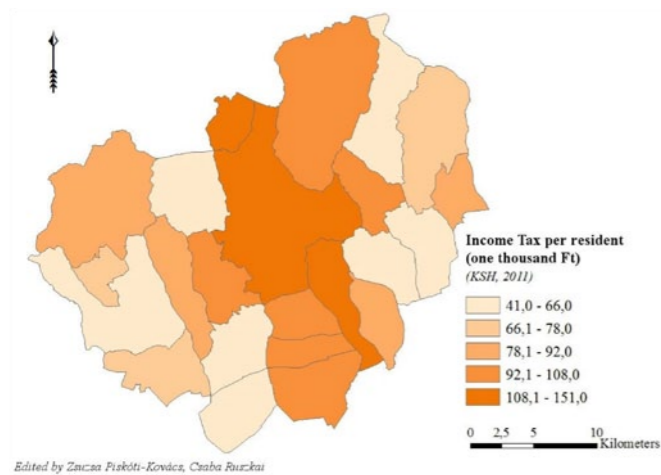


FIGURE 18. INCOME TAX PER ONE PERMANENT INHABITANT IN SETTLEMENTS

THE REGION AS A CONSUMER MARKET, BUSINESS, ENERGY ISSUES

The determination of the force of the regional market consisting of twenty three settlements is essential in order to restructure economy and establish new industries. One of the conditions of the ability to attract capital is the size and liquidity of local money circulation, which is particularly important in the case of our region. With the development of regional value-added chain we would like to make the best of the existing potential of the region in order to meet the demands of local consumption. Since the region has been shrinking, the local market is narrowing. In the age of globalization such effect on the local market can be set off for a certain period of time with the help of internationally competitive businesses that operate in the region. Nevertheless, it is not allowable that this

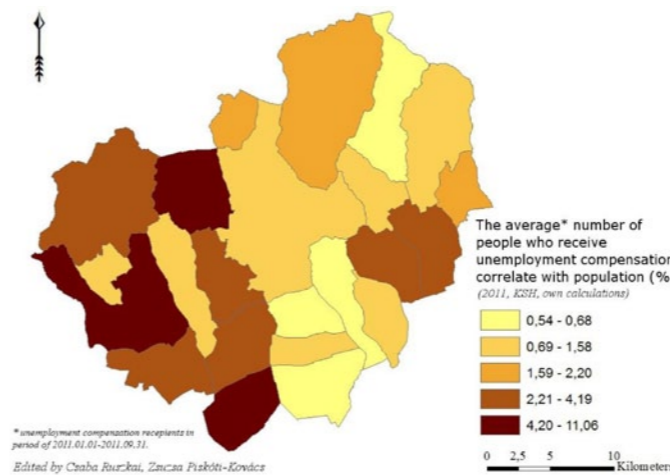


FIGURE 12. PEOPLE WHO PARTICIPATE IN PUBLIC WORKS PROGRAM

fragile state divert the attention of decision-makers from the need for structural interventions, which are not confined only to a symptomatic treatment.

The power of the region of Eger – as a consumer market – can be estimated by the scale and spatial distribution of income tax, which has to be paid after regional income (Figure 18). The central zone of the region can spend three times as much as those people who live in the periphery, but this amount is less than half of the European average. Of course with this calculation we are not able to demonstrate the impact of the incomes from the gray and black

economy. The incomes of IT reflect reliably the rate of revenue. Economic power in a settlement or in a region is implied its exact status by the magnitude of energy consumption. Since the energy needs of economic activities are more times as much as private consumption, the consumption of high electricity and strong economy are interchangeable. Therefore the consumption of high electricity and strong economy can be interchangeable.

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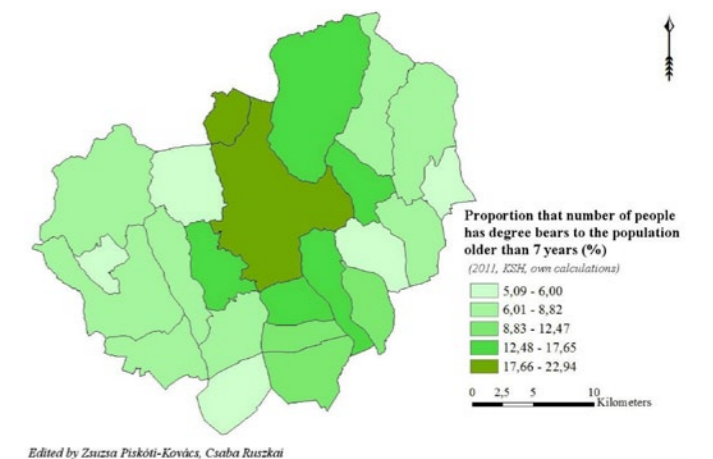


FIGURE 13. THE PROPORTION OF NUMBER OF PEOPLE HAS DEGREE IN MODEL AREA

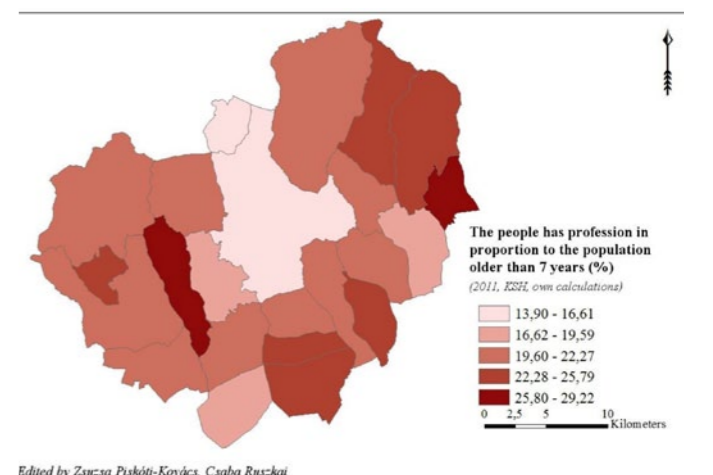
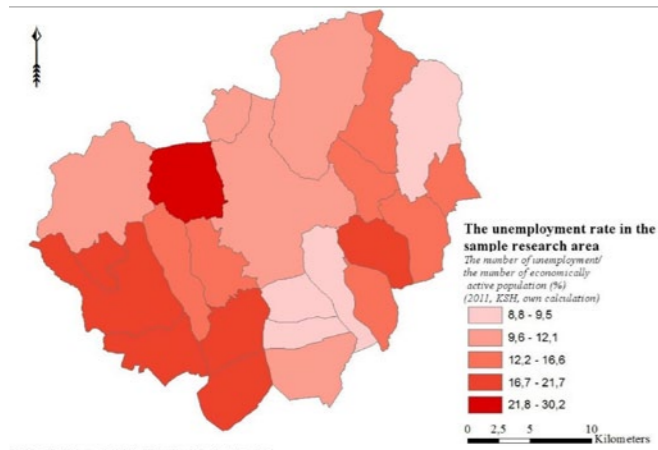


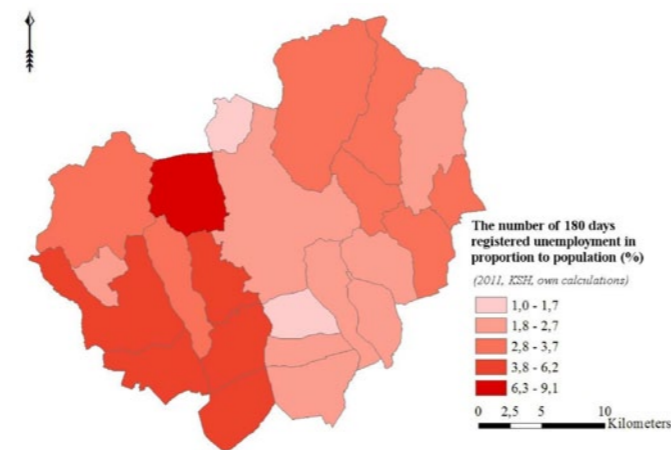
FIGURE 14. PROPORTION OF THE PEOPLE HAS PROFESSION IN THE SAMPLE RESEARCH AREA





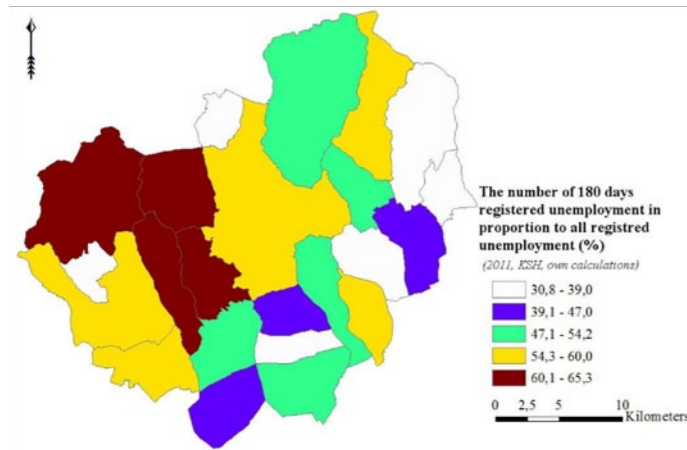
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FIGURE 15. THE UNEMPLOYMENT RATE IN 2011



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FIGURE 16. THE NUMBER OF PERMANENT UNEMPLOYMENT IN THE RATIO OF POPULATION



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FIGURE 17. THE PERMANENT UNEMPLOYMENT IN THE RATIO OF UNEMPLOYMENT RATE

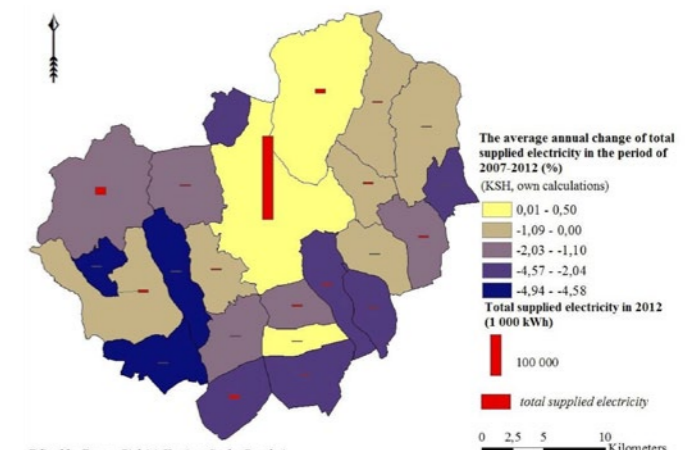
energy consumption are a determining factor in the periods both of economic crisis and prosperity. The services and especially the industrial production are real power-consumption activities, the effect of which is demonstrable in the statistics. Based on the above mentioned facts our model region shows decreasing tendency in the consumption of electricity, as well as in the case of three settlements (Egerszólát, Feldebrő and Tarnaszentmária) where electricity consumption has a significant setback. In other arms of the balance there are Eger, Felsőtárkány and Nagytálya which have achieved a modest economic growth. Of course the changes can be connected with the decline of population, the

impoverishment of the people and with considerations of energy saving. Relating to energy saving there are examples mainly in case of new facilities and less in the case of residential modernization. The energy efficiency of the population consists of the replacement of the old-style light bulbs for the energy efficient light bulbs. Nevertheless, the smaller and smaller average values have indicated decreasing economic activity.

On the one hand, financial strength of the population can be measured well by the changes of natural gas consumption; on the other hand, gas consumption has an effect also on the tendency of the burden on the environment (Figure 20). The majority of the settlements of the region have used less gas since 2000, but this trend raises serious qualms. The decline of gas consumption could be considered as the result of conscious sparing, but at the same time as the fact of that there are even more people who use firewood and fossil fuels.

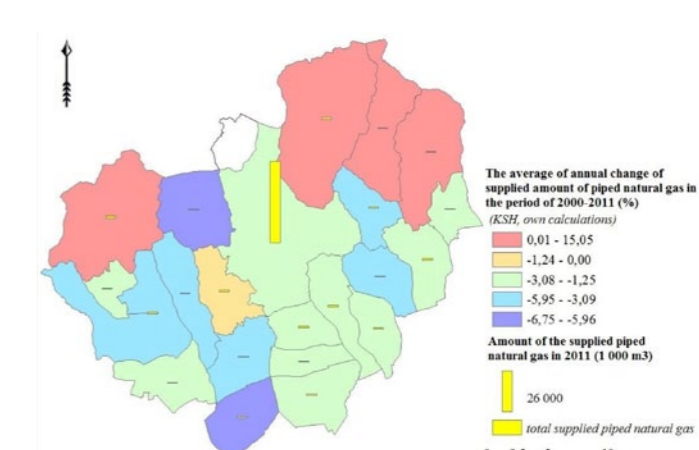
In winter when air stratum is stable, wood and coal burning with vehicular traffic contaminate significantly the environmental. This fact implies an increased risk in a tourist region like our one, not to mention the impact on the health conditions of the population. The settlements, situated in the narrow valleys, reach quickly the health-damaging level of the concentration of air pollutants in case of inversion stratification at winter and weak air circulation.

FIGURE 20. THE AVERAGE OF ANNUAL CHANGE OF SUPPLIED AMOUNT OF PIPED NATURAL GAS IN THE PERIOD OF 2000 -2011



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FIGURE 19. SUPPLIED ELECTRICITY IN THE PERIOD OF 2007-2012



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## CONCLUSION

The research model area was delimited by virtue of uniform landscape and geo-economic framework. Thus, the implementation of the tasks related to our initiation which aim is to develop this region utilizing its local natural resources can be ensured in a highly effective way. According to our calculation, the region needs a structural renewal in order to be able to hold and increase the number of their inhabitants, stabilize and improve the power of its economic strength and it would be also important to save its natural values because it is the main basis of traditional tourism.

The most important issue of the renewal is to establish the bases of the regional energy supply. It could guarantee for the investors the energy security of their investments by applying clean energy technologies and increasing considerably the level of the industry/residential energy efficiency. With the establishment of value chains based on renewable energy resources, as well as local forest and agriculture, we can make one more step towards the self-financing region. This can be a significant help for the unemployed to lead them back to the labour market.

Last but not least, the expansion of the productive infrastructure, the development of the society's level of knowledge, as well as the strengthening of the regional cooperation of decision-making is an important objective of our idea of development. The contents of the concept of local development priorities made of three axes can be realized most effectively with the help of CLLD funds.

With the creation of a plan based on the results of scientific research involving expert scientific elite on the regional level our aim is to create a model region throughout Central Europe, which is able to operate economically and environmentally in a sustainable manner and it can maintain its population.



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# NEW

## SZÉCHENYI PLAN

COMPLEX EXAMINATION  
OF THE POTENTIAL  
USABILITY OF RENEWABLE  
NATURAL RESOURCES  
IN LIGHT OF CLIMATE  
CHANGE TO ESTABLISH  
AN ENERGETICALLY  
SUSTAINABLE MODEL REGION  
WITH HUNGARIAN-GERMAN COOPERATION

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