HOW CAN THE UN SUSTAINABLE DEVELOPMENT GOALS, SPECIFICALLY A CORRECT ENERGY POLICY, HELP THE SUCCESS OF A SMALL REGION?

HOGYAN SEGÍTHETIK-E AZ ENSZ FENNTARTHATÓ FEJLŐDÉSI CÉLJAI, KÜLÖNÖSEN A MEGFELELŐ ENERGIA POLITIKA EGY KISTÉRSÉG SIKERESSÉ VÁLÁSÁT?

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ABSTRACT

The biggest challenges of the 21st century in Europe in rural areas are environmental change (climate change) and social change (ageing, depopulation). In our research, the correlation between success and sustainability was examined, as well as their connection to the energy policy of a settlement. Detailed analyses were conducted in the sample area, Alsómocsolád, looking at success, sustainability, as well as energy use. It was concluded that there can be no direct connection drawn between success and sustainability, as they often require opposite attitudes from settlements. However, the correct energy policy can serve as a link, and potentially the right foundation for small settlements in the countryside.

INTRODUCTION: CHANGES IN THE RURAL POPULATION, THE SITUATION OF SETTLEMENTS

Before the World Wars, the vast majority of the Hungarian rural population lived off agriculture in extremely difficult conditions, the main reasons for which were the underdevelopment of the large estate system and industry (Andorka 1979).

The era of socialism meant a major change, with council law, collectivizing agricultural policy, and vigorous industrialization resulting in significant social change and exacerbating territorial disparities. Together, the processes induced significant social changes, population movements (commuting, migration) started in the direction of agglomerations and developed industrial areas in the northern part of the country, and aging and depopulation became more characteristic in disadvantaged settlements (Beluszky 2007).

Following the change of regime, the Local Government Act of 1990 meant a completely new legal status for many settlements, and each (municipal) local government was granted full settlement independence. With the development of the market economy, the competition of the settlements also intensified, "the villages entered the free market of the settlements" (Beluszky 2007).

As a result of the settlement network and the urbanization of society, the emigration of young people to cities has intensified, the population of rural villages has decreased, and society has aged (G. Fekete 2015). In addition to the changing role of the villages, the social demands placed on them also changed, the “urbanization” of the villages, the expansion of the range of locally available services and the improvement of their quality became basic expectations. At the same time, in the age of digitalization, the village is seen as the opposite of the accelerated urban way of life, and the calm living environment and the “rural” way of life are becoming more and more important (Henkel 2012).

SUSTAINABLE DEVELOPMENT GOALS (SDGS) AND RURAL DEVELOPMENT

The United Nations addressed environmental protection at the 1972 Stockholm Conference the very first time when 2,850 participants from 113 member countries gathered to work together (UN 1973). After decades of work, the UN adopted the Millennium Development Goals (MDGs) in 2000, which ran until 2015. The Rio + 20 Conference concluded the Sustainable Development Goals (SDGs) Agreement in 2012, followed by several years of preparatory work, leading to the completion of the Framework of SDGs with 17 goals and 169 subgoals, adopted by 193 countries in New York in September 2015. (KSH 2019).

SDGs are more ambitious than MDGs and, for the first time, recognize the prominent role of civil society organizations (Corella 2020).

It is important to emphasize that goals are interlinked and cannot be achieved in isolation as synergies and tradeoffs occur among the different targets (Lusseau-Mancini 2018).

SDGs can be of great importance for rural development, as the Framework Convention repeatedly emphasizes that the global goals can only be achieved with local results, in as small territorial units as possible, with the widest possible involvement of society. Although governments have taken responsibility for creating the tools for SDG localization, little progress has been made so far. In 2018, a research presented at the High Level Political Forum examined 51 international microregions in more than 30 countries, and less than 10% of the research participants received government assistance to adopt SDGs, while small regions began to align their strategies with SDGs as bottom-up initiatives (NRG4SD 2018).

Barabási describes success not as an individual phenomenon but as a collective one, according to which “success is never about you, but not even about your performance. Success is about us and how we see

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Fig. 1: Alsómocsolád and its surroundings. (SOURCE: HTTPS://WWW.OPENSTREETMAP.ORG)

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The social aspect of settlement success must not be forgotten either, Barabási emphasizes the importance of the local leader, which also determines the success of the "settlement enterprise" (Bódi-Böhm 2000). From a social point of view, in general, population attractiveness is a success factor (Szörényiné Kukorelli 2010), while from an economic point of view, competitiveness and local economic power are.

When examining the success factors, the Hungarian literature mostly turns to Enyedi's "successful city", among the success factors defined by him, the economic factors dominate, factors related to society and living standards are less emphasized (Enyedi 1997).

However, the key to the development and success of rural areas is not only innovation, but also sustainable development, a competitive rural space, a knowledge-based rural society, and the acceptance and settlement of the need for new functions (Szörényiné Kukorelli 2015). It seems important that although sustainable development is part of the list, most success research does not discuss environmental factors. According to Kurt Lewin, certain states of functioning organizations result from a balance of two forces: some forces promote change, and there are restraining forces. To determine equilibrium, it is often easier to reduce braking forces than to search for new driving forces (Veresné Somosi 2004). In many cases, municipalities see environmental factors as a disincentive, and therefore try to minimize the resulting disincentives (e.g. in the field of economic development) instead of exploiting their potential. However, the success of settlements is unthinkable without long-term sustainability. The European Economic and Social Committee (EESC) is also highlighting this issue, which they believe is important for the revitalization of Europe's rural areas and the dissemination and promotion of good practice. (Dassis, 2018).

Success and sustainable development can be linked, but the content and meaning of concepts change dynamically, as does the reality around us. We have already recognized that sustainability can only be achieved if we address all aspects of reality at the same time and make our decisions holistically.

The SDGs are a framework that, to the best of our knowledge, may be the most comprehensive planning tool for achieving and maintaining sustainability.

Achieving the SDGs requires a change of attitude in all areas of life - economy, society and environment. As energy based any acts happen in nature or human society based in energy change (Moran et al 2018), it is a fundamental sector that we have to analys in the terms of sustainability. In this research we analys the energy mix, which refers to the combination of the various primary energy sources used to meet energy needs in a given geographic region. (https://www.planete-energies.com/en/medias/close/what-energy-mix) The world's energy demand is growing, and energy supply and security of supply are essential to maintain and increase living standards (Vajda 2009). Energy production, energy supply and transport are responsible for almost 80% of greenhouse gas emissions in the European Union. Greenhouse gas emissions have changed between different economic sectors, but the leading role of emissions related to energy production and consumption (Figure 1) has remained unchanged since 1990, so addressing this will be a priority for sustainability.

SUCCESFULL REGIONS

Our intention was to examine the potential for realizing sustainable development goals in a region, which has multiple parts that can be considered successful. However, success can be manifold. Therefore, it is necessary to consider the definitions of success in literature about settlement areas.

Success used to be considered a narrow field in earlier studies about settlements and regions, taking into account primarily economic factors. When examining the success factors, the Hungarian literature mostly turns to Enyedi's "successful city", among the success factors defined by him, the economic factors dominate, factors related to society and living standards are less emphasized (Enyedi 1997). The social aspect of settlement success must not be forgotten either, Barabási emphasizes the importance of the local leader, which also determines the success of the "settlement enterprise" (Bódi-Böhm 2000). From a social point of view, in general, population attractiveness is a success factor (Szörényiné Kukorelli 2010), while from an economic point of view, competitiveness and local economic power are.

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Pict. 1: View of Alsómocsolád (FORRÁS/SOURCE: ALSÓMOCSOLÁD ÖNKORMÁNYZATA)

Pict. 2.: Harmony (FORRÁS/SOURCE: ALSÓMOCSOLÁD ÖNKORMÁNYZATA)

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Success, however is not of individual nature, neither is it an internal value, as judgement is a necessary aspect of it. Barabási describes success not as an individual phenomenon but as a collective one, according to which “success is never about you, but not even about your performance. Success is about us and how we see your performance.” (Barabási 2018) However, settlement and regional research treated success as a much narrower area. In the past, economic considerations dominated the most

SAMPLE AREA SURVEYS

Taking into consideration the advice of Albert-László Barabási, we chose Alsómocsolád in Baranya County as the sample area, as this small settlement has proved to be “successful” in several respects in recent decades:

- In 2009, Alsómocsolád won the Youth-Friendly Local Government and the Elderly-Friendly Local Government awards,
- Also in 2009, it won first place of the Hungarian Village Renewal Award,
- It won the European Village Renewal Award in 2010 for "high-quality, sustainable, complex village development in line with the motto of the call", which corresponds to the shared 2nd place in the European competition.

Alsómocsolád was also at the forefront of the cooperation established with the local governments, economic actors, institutions and non-governmental organizations of Bikal, Mágocs, Mekényes and Nagyhajmás settlements in 2014, under the name of the Northern Hegyhát Micro-Regional Union. In the past year, they have become Hungary's first "Smart Region". Behind its successes lie significant, tangible achievements.

Its mayor has not changed since 1990, its population can be considered relatively stable (10% decrease since 2013: from 300 to 273). Several successful international and domestic tenders provided financial resources for the development of the settlement, during which several investments important from the point of view of sustainability were realized, e.g. organica type wastewater treatment plant operates in the settlement. In recent years, the developments have been mainly for tourism: the village house has been built, a youth camp has been set up (Conference Center, Service House, Health House, Planetarium and Plane Simulator, Youth Information Point, Forest Gymnasium, Educational Trail and Excursion Center, Multifunctional Festival Space) and they also took part in the launch of the Hét Patak Gyöngye Nature Park Association. The civil society is quite active, there are several associations and circles in the settlement (https://www.bama.hu/pr/vagy-talalunk-ott-utat-vagy-epitunk-egy-2162475/). To stop the decline of the population, a future-weaving program was launched, during which those wishing to move to the settlement are helped with a tender (http://menu.jovo-szovoalsomocsolad.hu/).

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EXAMINATION OF SUCCESS INDICATORS IN ALSÓMOCSOLÁD

The results (successes) of Alsómocsolád are known nationally, the name and results of the village can be found at

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Pict. 3.: Welcome to Alsómocsolád (FORRÁS/SOURCE: ALSÓMOCSOLÁD ÖNKORMÁNYZATA)

Pict. 4: Spring in Alsómocsolád (FORRÁS/SOURCE: ALSÓMOCSOLÁD ÖNKORMÁNYZATA)

professional conferences and in the press. In addition to the titles and awards won, the success of the village is also shown by its position in the region,

Alsómocsolád and its neighbouring settlements ar elocated in one of the one of the most disadvantaged parts of Hungary, which is characterized by an ageing population and high unamployment. The majority of settlements have small population sizes and poor demographic indicators. The majority of their population works in agriculture. With assistance from the University of Pécs, the „Energy trail" („Energia ösvény") concept was realized in the Seven Creeks Nature Park, located in this region. This demonstrates the commitment of Alsómocsolád to sustainable energy. The state of villages within this region is not equal, the indicators of Alsómocsolád are significantly better compared to its similar neighbours. The comparison is based on the classification of beneficiary settlements and the system of conditions of Decree 105/2015 (IV.23.)[1] and the data of the local government cluster analysis prepared by the Ministry of the Interior in 2019 (Illésy-T. Nagy-Számadó 2019).

Examining the individual data, it can be stated that Alsómocsolád really stands out among the villages with similar endowments, its situation is more favourable from the economic, social and demographic point of view:

– The migration difference of Alsómocsolád is positive – 18.99 per thousand inhabitants – it has an order of magnitude better than the other settlements. (Moreover, in the case of Bikal, Mágocs and Szalatnak we speak of a migration loss).
– The proportion of buildings built in the last 5 years compared to the total housing stock in Alsómocsolád is 2.82%, which is a higher proportion than in other settlements, moreover, no new flats were built in other settlements during this period, except for Bikal and Mágocs.
– The number of registered jobseekers is the second lowest (6.02%) compared to the working-age population, with only fewer registered unemployed in Bikal.
– In Alsómocsolád, the proportion of dwellings connected to the public sewerage network is almost 60%, which is worse than the indicator of Mágocs and Szalatnak, but in the other three villages the sewerage network has not yet been built, so the value of the indicator is 0.

1 Pursuant to the provisions of Section 2 (1) of the Government Decree, a complex indicator formed from social and demographic, housing and living conditions, local economy and labour market, as well as infrastructure and environmental indicators (four groups of indicators) must be taken into account when classifying settlements on the basis of territorial development. The scope of the data and the calculation methodology are defined in Annex 1 of the Government Decree. (The data were provided by the KSH.)

– The income per capita of the PIT base is slightly higher in the case of Bikal and Mágocs than in Alsómocsolád, however, the indicators of the other settlements with almost the same population are much lower. (Ág', Gerényes' average income is less than half that of Alsómocsolád.)
– The number of operating enterprises per thousand inhabitants is 40, which is slightly less than the Bikali and Mágocsi indicators, but two to four times the indicators of the other villages.
– The ratio of the local tax revenue of the local government to the total revenue is remarkably high in the case of Alsómocsolád (36.59%), which is much higher than the ratio of Bikal or Mágocs, and by orders of magnitude higher than in other villages. (In the case of Ág and Gerényes, this ratio does not reach 3%).
– The proportion of people with at least a high school diploma among the population over the age of 18 is 24.2%, which is again only orders of magnitude higher than that of Ág, Gerényes or Szalatnak. (Bikal and Mágocs have a ratio of over 30%).
– The number of non-profit and non-governmental organizations per thousand inhabitants in Alsómocsolád is 54.31, which is orders of magnitude more than the number of non-governmental organizations in other settlements - the value between 10 and 20 is typical, and in the case of Szalatnak the number of non-governmental organizations is 0.

ALSÓMOCSOLÁD AND THE SDGS

We have received a completed questionnaire on SDG awareness from Alsómocsolád. Based on the answers and the activities of the settlement, it can be said that almost all SDGs were already dealt with in Alsómocsolád, even before the UN SDG framework was created.

We highlight some activities through the lenses of SDGs. The Our Bread and the Social Land Programs (Dicső, 2015), contribute to SDG2: Zero Hunger. The local Forest School with rich equipment and local educational modules contribute to SDG4: Quality Education. The installed living machine ecological wastewater treatment plant contributes to SDG6: Clean water and sanitation. There are several large companies and 26 microenterprises in the administrative area of Alsómocsolád, providing a total of

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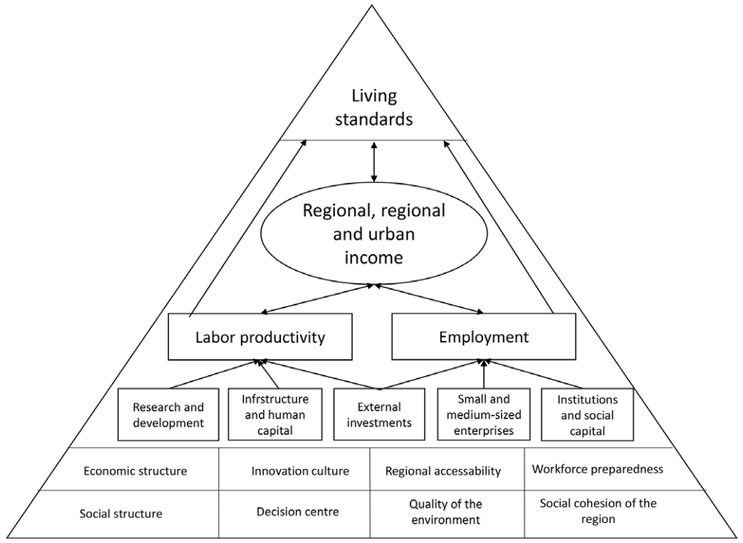
Fig. 2: Rokström-Shudev: Pyramid of SDGs (2014) (SOURCE: HTTPS://ECOACSA.COM/EN/SDG/)

Fig. 3: The Pyramid Model of Regional Competitiveness (Lukovics, 2008)



450 jobs (HEP, 2018), which contributes to SDG8: Decent work and economic growth, and SDG9: Industry, innovation and infrastructure. Rigac, the local money launched in 2013 (Szemerédi, 2019), contributes to SDG10: Reduced inequalities. The strong cooperation between the municipality, local NGOs, residents and the business sector, as well as the regular community planning processes and the creation of a new type of municipal model (Dicső 2015) contributes to SDG17: Partnerships for the goals

Regarding this paper SDG7, Affordable and Clean energy, is the most relevant goal to discuss. Alsómocsolád contributes to this goal with the biomass-heated boilers, which are operating in the settlement. In 2015 Alsómocsolád installed solar systems on public buildings to reduce the maintenance costs of Alsómocsolád five municipality buildings. The installed solar systems increase the renewable electricity generation and usage, and at the same time reduce the greenhouse gas emissions by 28.016 tons/year (https://alsomocsolad.hu/?oldal=367&menu=486), and so the same project significantly contributes to SDG13: Climate action.

There is still a lot that can be done, and some suggestions are mentioned in the Energy management of Alsómocsolád section of this paper.

Considering all of the above, it can be concluded that Alsómocsolád made significant advancements in both success and sustainability. However, these two factors can only be measured in very different ways: Despite their efforts in the field of sustainability, it is apparent in the case of Alsómocsolád that the metrics used to measure success and those used to measure sustainable development goals are based on different principles. This difference is illustrated by figures 2 and 3, which both show pyramid models of social needs, but the different methodologies result in different models.

ENERGY MANAGEMENT OF ALSÓMOCSOLÁD

To make the most efficient use of renewable energy, the natural endowments of the area must be examined, and it is also important to look at the state and development opportunities of industry, innovation and infrastructure. In the case of the micro-region, we examined the renewable energy potential, the environmental impacts of each resource and the production opportunities.

Developments related to energy management contribute not only to environmental sustainability goals but also to the development of industry and technology. In Baranya county, the potential of wind energy is not significant, it cannot be utilized economically with the current technological development. The potential of geothermal energy and biomass is of outstanding importance (Regional Development Concept of Baranya County 2013). The combustion utilization of biomass only for the production of electricity without heat recovery is uneconomical, the efficiency of the Szakoly power plant is 33% (Popp-Potori 2011). In energy insutry both herbaceous (eg. Helianthus annuus L., Miscanthus sinensis, Agropyron sp.) and woody plants (eg. Salix sp., Popolus sp., Robinia pseudoacacia) are used. (Gyuricza 2014) There are serious conservation concerns about energy grass (Agropyron sp.), as it is questionable whether they become invasive species, interbreed with related species, and the extent to which pollen pollution may occur (Gyulai 2006). The issue cannot be neglected in terms of air pollution either, as one of the sources of particulate matter emissions is biomass combustion (Sárváry 2011). As a member of the Mecsek Energy Circle, the heating of municipal institutions with biomass boilers has also been implemented or is planned in Alsómocsolád (Csanaky-Fülöp-Irmalós 2014), which will reduce greenhouse gas emissions in the short term. At the same time, geothermal energy utilization is worthwhile in the long run, the solar energy potential is significant (Figure 5), and by 2020 the municipality can supply several municipal buildings with solar electricity, which is the initial step in the transition to renewable energy sources (Csanaky-Fülöp-Irmalós 2014). Especially considering that the largest consumers in the settlement are the municipal institutions.

To demonstrate sustainability, we examined the renewable energy potential of residential energy consumption, so it becomes visible to what extent a small town can become energy independent. This could even mean an economic recovery in the long run, as the use of renewable energy sources is constantly becoming more efficient. As the residential energy consumption is also significant in the settlement, it is worth examining the extent to which the construction of solar systems can be implemented in the case of residential buildings, as an environmental load of this energy source

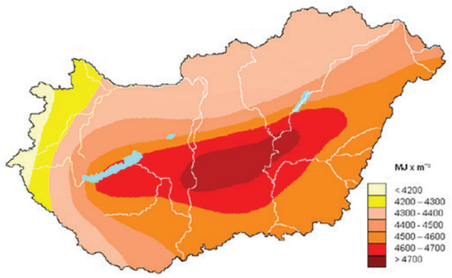


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Fig. 4: The average annual amount of global radiation in Hungary (Horváth 2011)

during operation is extremely low. For the calculation, we took into account the local building regulations of Alsómocsolád, the average consumption per household determined by national utilities (https://www.nkmenergia.hu/aram/pages/aloldal.jsp?id=550565) and the performance and dimensions of solar panels (http: //www.ingyennapelem.hu/blogok/mennyi-napelem-kell-egy-hazhoz). For electric car consumption, we used a low-consumption car (https://villanyautosok.hu/2019/12/26/ezek-a-legkisebb-fogyasztasu-elektromos-autok). We used estimation in our calculations.

According to the local building regulations of Alsómocsolád, the minimum plot size of the residential areas is 800 and 900 m², respectively, and the build ability is 30%. Each plot contains the residential building and outbuilings, such as summer kitchen and farm buildings. (Település Arculati Kézikönyv, Alómocsolád 2017) The built-in area of the 900 m² plot was estimated at 15% and solar cells were placed in our model at 25% of the surface, from which 33 m² solar cell coverage came out. A 1 kW solar cell produces an average of 1,150 kWh of electricity in Baranya County (Csanaky-Fülöp-Irmalós, 2014). To produce 1 kW of electricity, we need 4 solar cells with a size of approx. 7 m². Thus, approximately 5405 kWh of electricity can be generated in the 33 m² area per year. According to the calculations of the National Utilities, the annual consumption of a consumption site is 2168 kWh / year. This means that a household in Alsómocsolád can fully switch to a renewable energy source in terms of electricity, and is likely to be able to achieve additional production. According to our calculations, approx. 3237 kWh hours of extra production can be realized in a household, so it is worth examining whether the solar cell can provide consumption when using an electric car. We considered the consumption of a mid-range, Hyundai Kona Electric, which is 15 kW / 100km. Taking into account the daily 50 km commute when using the car, this means an annual consumption of 3600 kW 20 days a month, which is close to the remaining extra consumption. Based on our calculations, the transition to a fully renewable energy source in terms of electricity and transport available in residential energy consumption in Alsómocsolád.

Based on our calculations, it is clear that the use of residential electricity can result in economic growth in addition to self-sufficiency, even in the short term, without further construction and the use of grasslands. Economic growth in this case is compatible with the principles of sustainability. To estimate the investment we choose a 3 kW system (https://pentelesolar.hu/napelem-rendszer-arak.html) which cost around 1,4 million HUF with the installation. As a part of the new energy strategy of Hungary (Új Nemzeti Energyiastratégia 2020) the government support the installation of solar system for households. We can count on 40% support, that means the cost of the solar system is 840000 HUF. The 3 W system produces 3450 kW electricity yearly. According to the average consumption, which is 2168 kW yearly, the households save 67440 HUF yearly. The overproduction is 1282 kW and we count with 85% of the price of electricity that the provider pays for the production, that is 31700 HUF yearly. The overall save and income is 99140 HUF. This means that the investment needs around 8 and a half year to return.

We have examined the potential of solar energy in more detail, but it is important to note that the inclusion of more energy sources in electricity supply is necessary due to the network characteristics. As the sun is not a controllable, flexible resource, weather-independent energy sources must also be involved in the production to maintain the system effectively. At the regional level, it is worth mentioning the planned biogas plant (Csanaky, Fülöp, Irmalós, 2014), whose environmental load is also low (Tamás, Blaskó 2008), and uses the waste generated at the livestock farms and the Alsómocsoládi Pick plant in the region. Using solar, biomass, geothermal energy and biogas, a multi-legged energy production strategy can be developed. The 20 kV medium-voltage line connecting Alsómocsolád to the network also ensures the security of energy supply.

CONCLUSIONS

Based on our research, the majority of success indicators quantify economic and social success. Data on environmental well-being is limited, so they are weightless for policymakers.

In many cases, sound principles are not or not consciously applied, despite the fact that our studies have shown that their application can be very effective in improving the state of both society and the environment in the medium term, which is essential for long-term development.

The five years that have passed since the adoption of the SDGs have yielded few tangible results, with most progress being in theoretical terms. Decision-makers and the public (including communities) in most cases do not consciously apply the SDG framework.

Thinking in complex systems can help to avoid developments that promise good results only in the short term. What we mean by sustainability or success today, is changing dynamically, as is our external reality. SDGs will provide a supportive framework until 2030, but after 2030, we will likely need to rethink what goals can contribute to sustainable development.

Sustainable development goals and sustainable energy policy can contribute to the prosperity of a small region, as well as to its long-term competitiveness. Therefore, while environmental and social considerations are viewed as limitations on economic development, they can also contribute to it.

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ÖSSZEFOGLALÓ

HOGYAN SEGÍTHETIK-E AZ ENSZ FENNTARTHATÓ FEJLŐDÉSI CÉLJAI, KÜLÖNÖSEN A MEGFELELŐ ENERGIA POLITIKA EGY KISTÉRSÉG SIKERESSÉ VÁLÁSÁT?

A XXI. század legnagyobb kihívásai Európában a vidéki térségekben a környezet megváltozása (klímaváltozás) és a társadalmi változások (elöregedés, elnéptelenedés). A kutatás során áttekintettük a sikeresség és a fenntarthatóság összefüggéseit, valamint azok kapcsolatát a települési energia gazdálkodással. Mint területünkön, Alsómocsoládon részletes elemzéseket végeztünk, mind a sikeresség, mind a fenntarthatóság és az energiagazdálkodás tekintetében. Megállapítottuk, hogy a sikeresség és a fenntarthatóság között nem lehet egyértelmű ok-okozati kapcsolatot vonni, mivel a kettő gyakran ellentétes hozzáállást kíván a településektől. A megfelelő energia politika viszont jó összekötő kapocs és akár kiugrási pont is lehet vidéki kis települések számára.