# 4 SOCIO-ECONOMIC BACKGROUND CRITERIA – STRENGTHENING THE SYNERGIES BETWEEN THE USE OF RENEWABLE ENERGY AND RURAL DEVELOPMENT

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By the early 21st century, solutions favouring the aspects of sustainability are given more and more attention in the local economic development. These are typically built on innovative technologies that give smaller settlements (often in a handicapped situation) a chance for development. Developments related to renewable energy sources are like the ones suggested by Póla (2018).

According to the endogenous growth theory, the successful development of a region depends to a significant extent on the optimum utilization and adequate use of local resources, so local development should be based on local endowments and local resources (Mezei.& Póla 2016*;* Peyrache-Gadeau & Pecqueur, 2004). Our knowledge about these local resources is, however, limited. What quantity and quality are they available in? The largest part of the region, examined by the RuRES project is disadvantaged, because the foundation of a successful strategy is to have a correct list of their own resources as well as the discovery and development of these. An advantage of renewable energy sources is that they can be relatively easily registered on such a list of resources. Their disadvantage, on the other hand, is that their successful application requires complex and conscious planning in the development process. Additionally, the necessary background of human resources is already a task that requires a lot of time and resources.

Capital is a product created by the economy for production in the future, and this is also valid for human capital. Different ecosystem services (energy carriers, minerals, raw materials, etc.) all belong to the category of natural resources (Mezei & Póla, 2016). These kinds of resources, above all renewable energy sources, will allow the integration of territories into the system of economic development that struggle with a basic lack of resources, so new land use patterns can appear in these areas (Lukács 2009). It is very important, though, that the economic impacts will only be felt if a significant part of the tools and services related to the production (transportation, distribution, consumption) of renewable energy is local and regional products. This is also an important and not easy to meet criterion. It is clear that one of the most crucial elements of capital is human capital the development of which is indispensable for the adequate valorisation of renewable energy sources.

## 4.1 Renewable energy sources in multi-functional rural economy

It is logical that rural spaces are excellent for the production and utilization of renewable energy sources. The economic resource potential of rural areas is definitely above that of urban territories. An animal farm can be heated with biomass; huge building roof structures are excellent for the instalment of photovoltaic panels that generate electricity. In Western Europe, these buildings have been designed for years in a way that allows them to use renewable energies. In this respect, a perspective change is required both in Hungary and Croatia.

When building out systems of renewable energy, it is not only the availability of the energy source that privileges rural areas. It is less densely populated areas and smaller settlements where the construction and operation of systems at small scale is a real possibility. While the character of rural areas, with their lower number of population (fewer consumers) is rather a disadvantage for the economic efficiency, a smaller scale can now be an advantage. A similarly important aspect is the employment effect. While in towns and cities, the traditional industry, service and ICT sector have a significant number of employees, and job creation investments tend to target (big) cities in the first place, everything that promises an increase of an activity rate must be seized in villages (Póla, 2018). Developments related to renewable energies do have employment effects although dependent upon the type and technology. Where there is a little chance for alternative income generation (that returns faster and with a higher profit), the possibilities of turning towards renewable energies will increase. It is interesting that although Dalmatia is the region with the largest and Slavonia with the weakest solar energy utilization potential, it is Slavonia where by far the most investments related to photovoltaic energy are realized, and such investments have avoided the Adriatic region so far. The only reasonable explanation is that tourism in the latter region offers alternative investment possibilities paying well in the short run.

A serious challenge for rural regions is to find answers to the issue of unemployment that has risen after the modernization of agriculture that used to be a dominant employment sector. The ability to keep the population is a strategic objective everywhere and the primary tool for this is to create the economy diversification. Taking the employment and local economic development into account, the starting point must be to find local employment possibilities for rural inhabitants thusly allowing providing for their living. This should possibly be done in a way to create economic and/or social values, maintain the environment and cherish traditions.

Of the functions of rural areas (economic, ecological, socio-cultural), two are closely related to the production of renewable energy and energy utilization (Kovács et al., 2018).

The essence of economic function is competitive and profitable production (of typically foods and raw materials for the industry). The elements of the economic function include support for the establishment of alternative economic activities, including the developments concerning renewable energy, improvement of the possibilities of biomass-based energy production that fits well into the objectives of increasing the economy diversification and also matches the efforts for the adequate utilization of agricultural areas with less favourable endowments (Buday-Sántha, 2011). Strengthening of the economic function necessitates, a sort of rural re-industrialization, is one pillar that may lead to the introduction of smaller-scale manufacturing forms related to renewable energy, but above all, the production of renewable energy itself. In addition, the cost-efficient operation of rural businesses (farms and processing industry facilities) and public and private services can also be supported with cheap energy produced by local energy systems (Póla, 2018).

The most important factor concerning the ecological function is that rural areas are capable of providing recreation for urban population and the regeneration and protection of natural elements. The use of clean energy sources can also aid the protection of natural elements.

## 4.2 Conditions for the development of systems utilizing renewable energy sources and the limitations of their application

The design processes, implementation and numerous applications of tools and systems utilizing renewable energy and leading to energy saving have accelerated in recent years (Németh et al., 2015). Developments related to the innovative technology and operation following the investments raise several societal issues. One of the most important preconditions for the efficient valorisation of renewable energy sources is the presence of good quality human capital. The rural territories of the regions involved in the RuRES project are disadvantaged in this respect. Despite the presence of the universities of Osijek and Pécs and thereby the availability of technical skills, this human capacity does not reach the backward rural territories. Rural areas of the regions concerned are characterized by unfavourable demographic processes and low activity rate (Bálint, 2018). The schooling level cannot yet support the proliferation of major innovations and state-of-the-art technologies, and the base of vocational training and adult training is also in need of these regions' development. These problems decrease the capital absorption capacity of the area as well as the socio-economic environment is not favourable for either large businesses or the connected supplying small enterprises. This challenge concerns the cooperation system of local economic actors, the stakeholders of a local foreign direct investment policy and above all, the institutional system suitable for the generation of skilled labour force (Póla, 2018).

Because of the considerable demand of investments for financial resources and the relatively slow payback time, local self-governments with financial difficulties are only able to carry out significant investments in a supporting regulatory and financing environment although it is evident that these developments can lead to considerable savings at the settlements' institutions. The case is similar for inhabitants and businesses – despite the growing interest, investments often fail due to the lack of endogenous and exogenous resources.

The conditions for the integrated utilization of renewable energy sources must be improved. The community use of the resources available in the regions must be promoted. If municipal developments can decrease the energy demand of the infrastructure facilities considered as economic promotion tools (e.g. industrial parks), this may be attract businesses' attention.

So there is an economic development model. The first step of successful adaptation is attitude shaping and conscious economic development activity which, in some places, is the reinforcement of the economic organizational function of municipal self-governments, activation of local businesses and inhabitants, their preparation and involvement in developments.

To sum it up, we can say that a necessary condition for the strengthening of synergies between the development of renewable energies and rural development is the exploration and conscious development of socio-economic background conditions.

## 4.3 Conditions for the utilization biomass and the number one renewable energy of the rural areas

Although the natural endowments for the utilization of geothermal and solar energy are very good in the region involved in the RuRES project, the synergy mentioned above can be expected from energy production built on biomass in the first place. There are two basic reasons for this. One is that the quantity of biomass generated and generable in rural areas allows significant developments; the other is that biomass-based energy production has a much larger employment effect than the other two examined energies. Endowments for the generation of primary biomass are also good but the conscious collection and the use of by-products is very important too. A condition for the successful utilization of biomass for energy production is the quality of cooperation and coordination among the actors. These actors can, among others, be the following:

- agriculture and sylviculture producers;
- merchants and carriers;
- local and national authorities;
- educational actors in the region, etc.

In addition to the problems of cooperation and coordination, the use of biomass is limited by the uncertainties and fragility of ownerships. The users' interests are decreased by the characteristic feature of energy structure which, especially in the Hungarian counties of the examined region, is a serious restricting force coming from the development level of the distribution infrastructure of natural gas and the related state supports as they both set back the profitability of the renewable energies' uses. This is exacerbated by the general lack of capital typical of the rural areas. The considerable employment effect of the biomass use for energy generation is due to the fact that it is difficult to replace labour force (by mechanization) at several points of the process; starting from the preparation of soil through plant protection to harvesting and the collection of by-products or the operation of a micro-regional power station.

According to Németh et al. (2011), decentralized energy production systems, built on wood chops in the settlements with good endowments, are suitable in the Hungarian circumstances for the replacement of fossil energy sources and energy production at a competitive price. Furthermore, they also have a positive impact on the development of their direct environment. By the use of different kinds of biomass generated locally, a part of the money spent on energy carriers remains within the area and generates further development there and contributes to the decrease of imported energy dependence. A paradox situation is that the obstacles to the development and developability of renewable energies, including green energy (biomass), seem to be insurmountable just in those areas where this development direction is the greatest chance (or maybe the only chance). An adequate land use plan, clustering and cooperation (of producers and processors) are the foundation of the effective use of green energy.

## 4.4 Renewable energy sources in rural development strategies

The adequate exploration and then utilization of local resources require training, infrastructure development, local services, cooperation, etc. Although without external economic assistance, there is no chance of development in the most backward peripheral regions, i.e. it is not indifferent how these exogenous resources and supports are used. Conscious planning is the foundation of the effective use of resources.

Regional development based on renewable energy can be really successful if implemented on the basis of a complex strategy adapted to smaller areas. We can experience, however, that cooperation, that is a precondition for effective operation, is still weak. A well-established, bottom-up development strategy starting from a micro-regional level and harmonized at the national level is necessary accompanied by an adequate economic regulation (Lukács, 2009).

Presently, real bottom-up planning in the rural areas has been in progress at the level of local communities (LEADER), but the amount of resources available in this program does not allow larger-scale developments. The resources that would be enough for developments with real impacts and that can also assist the development of renewable energy sources are connected to a less organic strategy making process (see county level development concepts and integrated programs, financed from KEHOP, GINOP and TOP[3]).

The county development programs mention the conditions for the increased use of natural resources, but the necessary connections (e.g. training programs) are not clear (Póla, 2018). Accordingly, we cannot really talk about complex strategies definitely aiming at renewable energies. A positive fact, on the other hand, is the generation of projects implemented in regional cooperation, inspired just by LEADER, a result of which are successfully operating biomass fuelled power stations' instalments.

The rural areas, thus, need a consequent, long-term, legally and economically based renewable energy program whose financing conditions are provided. An integral element in such program is the assessment of the local (regional) energy production and energy utilization possibilities. If municipal developments can decrease the energy demand of the infrastructure facilities, that can be considered as economic stimulation tools (e.g. industrial parks), this may be attractive for businesses.

[3] KEHOP: Környezeti és Energiahatékonysági Operatív Program, Environment and Energy Efficiency Operational Programme; GINOP: Gazdaságfejlesztési és Innovációs Operatív Program, Economic Development and Innovation Operational Programme; TOP: Terület- és Településfejlesztési Operatív Program, Territorial and Settlement Development Operational Programme