Hungarian renewable energy strategy and the uprise of the countryside

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Keywords: renewable energy strategy, rural development, local benefits, Renewable Energy Advisory Service, uprise of the countryside.

SUMMARY FINDINGS, CONCLUSIONS, RECOMMENDATIONS

While the development, processing and logistics of fossil resources is extremely concentrated and monopolysed, the production and utilisation of renewable energy – with the exception of larger hydroelectric plants – is deconcentrated.

It is especially important that the renewable sources of energy available to us might play a decisive role in the uprise of the Hungarian countryside, as green energy production might be profitable even in areas where the land is less suitable for agriculture. There is a hot sea beneath 40% of the territory of the country. Energy derived from this sea could be used to attain various local and national goals. Utilising solar energy on a local scale is an opportunity to earn extra income, and opportunity which exists even in the most underprivileged villages and micro-regions.

The national renewable energy strategy developed by the author would allow Hungary to cover 38.2% of its then 1300 PJ of energy consumption from renewable sources by 2030. It would also create 192 176 new, permanently sustainable jobs.

MAIN FORMS OF RENEWABLE ENERGY

The Fig. 1 gives a summary of the forms of renewable energy.

Renewables offer the greatest reserve, and their relatively low impact on the environment would also justify increasing their share. There are certain requirements that are not yet met, though.

The Table 1 presents the break-down of renewable sources of energy in Hungary.

Table 1

Break-down of renewable sources of energy in Hungary (2006)

Source	percentage
Firewood and other biomass	77.8
Geothermal energy	9.6
Plant and other waste	8.1
Hydropower and wind power	3.0
Biogas and waste incineration	1.5
Solar energy	0.2

Source: Farkas Csamangó, Erika, 2006

The problem with the dominance of firewood and other biomass is aggravated by the fact that the older power plants using these resources for the generation of electricity have an efficiency of less than 30%. Our research has found that Hungary is far from exploiting all the opportunities in the field of renewable energy. This is due mainly to the fact that it lacks a national energy strategy, which has precluded the creation of consistent and systematic programmes (Fig. 2).

Figure 1

Forms of renewable energy

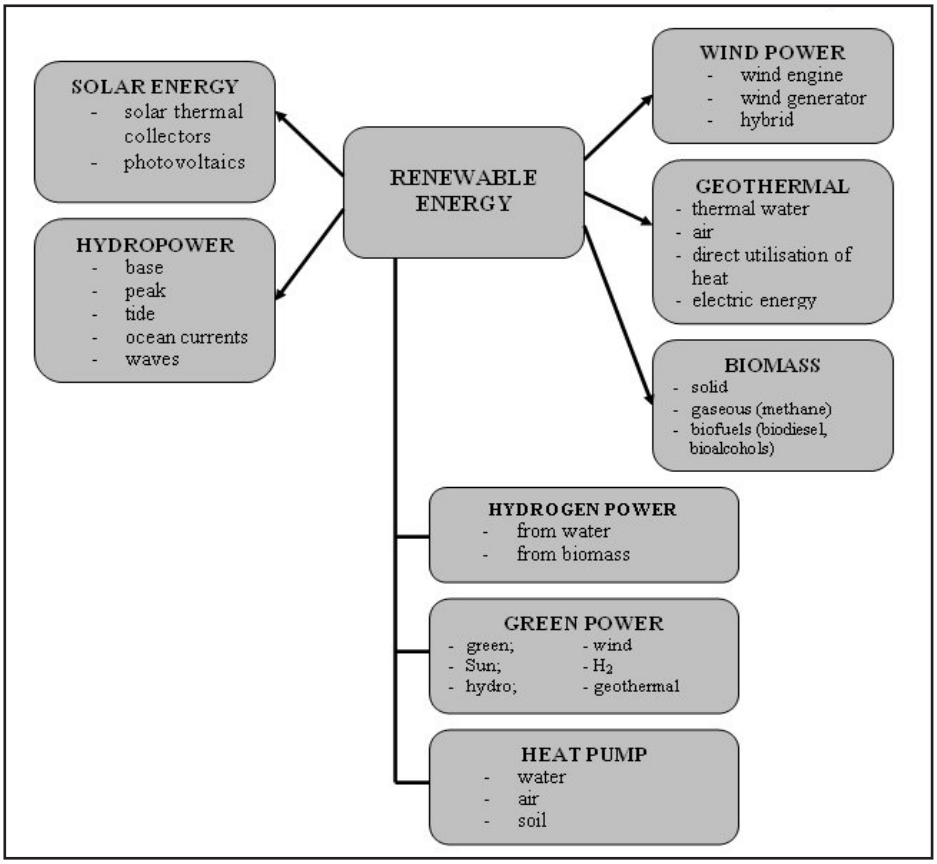
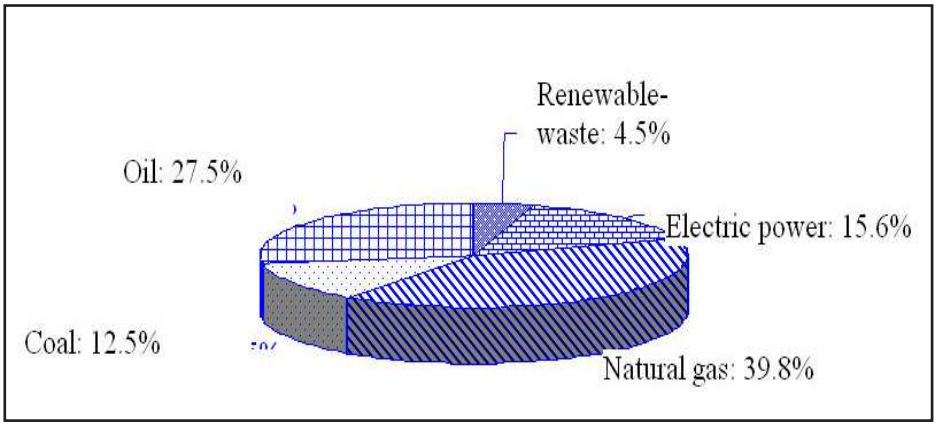


Figure 2

The structure of primary energy supply in Hungary in 2007 (%)



Source: edited based on the work of Energia Központ Kht.

POSSIBILITIES FOR EXPLOITING RENEWABLE ENERGY RESOURCES IN HUNGARY

The Fig. 3 presents the possibilities for exploiting renewable energy resources in Hungary.

Figure 3

Possibilities for exploiting renewable energy resources in Hungary

Source	Possible forms of exploitation
Green energy resources (biomass)	Using green energy resources as fuel on a regional and local (settlements and micro-regions) level (cogeneration and condensation electricity generation, direct production of heat energy, solar hot water, process heat)
	Biogas generation from dedicated crops, and using it as fuel in the ways described above, and/or using it as biofuel
	Production of biofuels and their use as propellants (biodiesel, bioethanol, biobuthanol)
Kitchen waste	Spent frying oil and animal fat
Biogas from biological waste	Using animal dung and liquid dung in regional, micro-regional, settlement or farm-based biogas stations
	Using sewage sludge for power generation and/or in agriculture
	Using food industry waste for power generation and/or in agriculture
	Using communal waste for power generation and/or in agriculture
Solar energy	Solar thermal collectors (solar hot water)
	Photovoltaics
	Energy efficient architecture (solar house, passive house)
Hydroelectric plants	Increasing the useful life of existing hydroelectric plants
	Building the dam/hydroelectric plant system on the rivers Danube and Tisza
	Installation of low capacity local dam /hydroelectric plant systems
Wind power	Local or community level installations
	Resolution of the system control issues via peak water hydroelectric plants and/or better forecasting methods
	Off-grid installations
	Installation of wind farms feeding the grid
Geothermal energy	Generation of heat and/or electricity
	Utilisation in agriculture (greenhouses, the drying of crops, fruits and vegetables, heating of stables and other buildings, fish breeding in heated water)
	Communal applications (balneology, heating of public buildings)
	Heat pump heating

Figure 3 continued

Heat pump	Heat extraction from the soil, water or air using electricity As add-on heating for residential, public and commercial buildings, for solar hot water systems, for increasing the temperature of water used in balneology applications or forced crop applications.
Hydrogen	Electricity generation, fuel for vehicles and stationary machinery without negative environmental impact. Excellent for covering small local demand from local resources, primarily from green energy resources and other biomass.
Green power	Electricity from renewable sources can be used in the same manner as electricity generated from fossil energy resources with extreme cost to the environment can. These applications include heating, cooling, lighting, the operation of vehicles and stationary machinery.

LOCAL BENEFITS OF RENEWABLES

Our paper presents a detailed analysis of the local benefits of both fossil and renewable energy resources, as well as the relevant economic, social and environmental factors.

Hydrogen from renewable sources had the highest score, followed by electricity from renewable sources and green power. Geothermal energy is a close fourth. With respect to its local economic benefits, fossil energy finished last. The reason for it is that it is monopolysed and its development, transport and distribution is overly concentrated (Table 2).

Again, hydrogen from renewable sources had the highest score, followed by electricity from renewable sources, solar energy and green power. Fossil energy finished last on the chart arranged by social benefits as well, due to its monopolysed nature and its tendency to generate excessive gaps between the groups of society (Table 3).

Three forms of renewables had the top scores: solar, hydro and green power. Fossil energy finished last with respect to local environmental benefits again, due to its destructive impact on habitats of the Earth (Table 4).

After summing up the scores awarded for the local benefits, social and environmental benefits of the fossil and the various renewable sources of energy (Table 5), it was found that hydrogen from renewable sources finished first, with the runner-ups being electricity from renewable sources, solar energy, green power and geothermal energy. Fossil energy finished last in the chart of total scores as well, due to its monopolysed nature, its tendency to generate excessive gaps between different groups of society and the unhealable damages done to the environment.

RENEWABLE ENERGY ADVISORY SERVICE (*META*)

A national renewable energy programme will not be successful unless it includes the setting up and efficient operation of the Renewable Energy Advisory Service (META), a network supporting the activities of renewable energy producers and service providers.

A national renewable energy programme requires the concentration of the material and intellectual resources needed for improvement at specific places and in specific persons/organisations/businesses, which is only possible through effective sharing. It is necessary to create, at the same time,

Table 2

Local benefits of renewable energy resources – economic factors

Economic	Fossil	Solar	Wind	Hydro	Geothermal	Heat pump	Green power	Hydrogen from fossil sources	Hydrogen from renewable sources	Electricity from fossil sources	Electricity from renewable sources
Productivity	5	4	5	5	4	4	4	5	5	5	5
Employment	3	4	4	4	4	3	4	3	5	5	5
Research and development	3	4	4	3	4	3	4	3	5	3	4
Infrastructure	2	3	4	4	4	4	4	4	5	4	5
External capital investment	3	4	4	3	4	2	4	2	4	2	3
Small and medium enterprises	2	4	3	3	5	4	5	3	5	5	5
Structure of the economy	2	4	4	4	4	3	5	4	5	4	5
Total	20	27	28	26	29	23	30	24	34	28	32

excellent=5, good=4, fair=3, poor=2, bad=1

Table 3

Local benefits of renewable energy resources – social factors

Social	Fossil	Solar	Wind	Hydro	Geothermal	Heat pump	Green power	Hydrogen from fossil sources	Hydrogen from renewable sources	Electricity from fossil sources	Electricity from renewable sources
Quality of life	3	5	5	4	5	5	5	5	5	5	5
Living standard	2	5	4	4	4	4	4	4	5	5	5
Local income	2	5	4	3	4	4	4	3	5	5	5
Human capital	2	4	3	4	4	4	4	4	4	4	4
Workforce skill level	3	4	4	4	4	4	4	4	5	4	4
Institutional and social capital	3	4	3	3	4	4	4	4	5	4	5
Culture of innovation	3	4	3	4	4	4	4	3	5	3	4
Social structure	3	4	3	3	4	4	5	3	4	3	4
Decision-making centres	2	4	4	3	4	3	4	3	5	3	5
Social cohesion	2	4	4	3	4	4	4	4	5	4	5
Total	25	43	37	35	41	40	42	37	48	40	46

excellent=5, good=4, fair=3, poor=2, bad=1

Table 4

Local benefits of renewable energy resources – environmental factors

Social	Fossil	Solar	Wind	Hydro	Geothermal	Heat pump	Green power	Hydrogen from fossil sources	Hydrogen from renewable sources	Electricity from fossil sources	Electricity from renewable sources
Quality of the environment	1	4	4	4	4	4	4	3	4	3	4
- soil	1	4	4	4	4	4	5	3	4	3	4
- water	1	4	4	4	4	4	5	3	4	3	4
- air	1	4	4	5	4	4	4	3	4	3	4
Energy required for transportation	2	5	4	4	4	4	4	1	4	1	4
Environmental risk	1	5	5	5	5	5	4	2	5	2	5
Total	7	26	25	26	25	25	26	15	25	15	25

excellent=5, good=4, fair=3, poor=2, bad=1

Table 5

Local benefits of renewable energy resources – economic, social and environmental factors (summary)

Form	Economic	Social	Environmental	Total
Fossil	20	25	7	52
Solar	27	43	26	96
Wind	28	37	25	90
Hydro	26	35	26	87
Geothermal	29	41	25	95
Heat pump	23	40	25	88
Green power	30	42	26	98
Hydrogen from fossil sources	24	37	15	76
Hydrogen from renewable sources	34	48	25	107
Electricity from fossil sources	28	40	15	83
Electricity from renewable sources	32	46	25	103

the necessary technical, energetical, biological, crop growing, harvesting, economical and ecological conditions.

META is for providing consultation services to individuals, organisations and businesses involved in the production, transportation, distribution and consumption of renewable sources of energy. The organisation should be characterised by outstanding professional skills, awareness of the newest scientific findings, and the ability to convey all this effectively to the people concerned.

RENEWABLE ENERGY STRATEGY 2010-2030

The Table 6 presents the main features of the renewable energy strategy found to be desirable and possible to implement in the period from 2010 to 2030.

Table 6

Renewable energy strategy 2010-2030

	Arable land	Etoe	PJ	Value of production bn HUF	Number of jobs	Sales/capita million HUF
I. Solar energy						
- Solar thermal collectors	-	352	40.0	116.0	11 600	10
- Photovoltaics	-	476	20.0	58.0	5 800	10
II. Wind power	1	1 190	50.0	145.0	9 667	15
III. Hydropower	10	714	30.01	87.0	4 350	20
IV. Geothermal energy	1	1 190	50.0	145.0	24 167	6
V. Heat pump	0.5	714	30.0	87.0	5 800	15
VI. Green power						
- Biogas	10	200	8.4	24.0	4 000	6
- Bioalcohol	600	1 260	52.8	151.2	25 200	6
- Biodiesel	90	105	4.4	12.6	2 106	6
- Energy from burning: wood	500	1 250	52.4	150.0	25 000	6
- perennial crops	120	396	16.6	47.5	7 920	6
- annual crops	50	200	8.4	24.0	4 000	6
VII Hydrogen	-	238	10.02	29.0	2 900	10
Total		8 285	373.0	1 076.3	132 510	8
By-products and organic waste	-	2 940	123.5	358.0	59 666	6
Grand Total	1 382.5	11 225	496.5	1 434.3	192 176	7.5

We consider the most important part of our calculations of the Hungarian renewable energy strategy for the period 2010-2030 the resulting creation of new jobs. Our research has determined that without any doubt, renewable energy is one of the keys to resolving the problem of employment in the countryside. It offers an increasing employment potential while meeting all requirements of long-term sustainable development. It is also absolutely certain that the relevant demand will grow. The author's calculations indicate that the entire system of renewables can create nearly 192 000 new jobs by 2030, and at least 80% of these job will be created in the countryside. The greatest employment opportunities – more than 59 000 jobs – are created in the field of electricity generation from by-products and organic waste. Runner-up is bioalcohols and wood burning (25 000 jobs), followed by geothermal energy (over 24 000 jobs).

The strategy forecasts a growth of 496.5 PJ, which is considered extremely high if we consider that the relevant figure in 2007 was only 52.9 PJ. The potential quantified in the strategy does not represent the exploitation of all domestic capacities. It is expected that new findings of research, development and innovation will uncover additional potential for growth in the near future. The strategy envisages a gradual growth of domestic energy consumption from 1125 PJ in 2007 to 1300 PJ. By then, the share of renewables in domestic energy consumption will rise to 38.2%, which is equivalent to 11 225 000 tons.

A total of 1 382 500 hectares of arable land will be used. The largest portion, 600 000 hectares will be devoted to bioalcohol crops, while 500 000 hectares will be occupied by tree plantations for the production of wood for burning. Next, 120 000 hectares will be used for growing perennial crops for burning. The decisive portion of the hydropower strategy consists of building 3 dams on the Danube and 2 on River Tisza, which will still not cover the entire hydropower capacities of the two largest domestic waterways.

The legal regulation of renewable energy generation in Hungary is riddled with numerous contradictions, with the biggest issue being that it is overcomplicated. Of the member states of the European Union, Hungary requires the largest number – as many as thirty – of official permits for any renewable energy project.

A further issue is the overcomplicated and annually changing tax regime, which makes return on investment unforeseeable.

State support for renewable energy lacks a systematic vision and predictability. For example, although there is a 40% planting aid for energy crops, but aid for heating plants and small power plants in which firewood is burnt is not handled within the same system. Therefore not breakthrough could be achieved in this field either.

Another issue is that two thirds of the green power aid (KÁT) was granted to gas engines running on natural gas in the recent years.

Controversies in the regulatory and subsidy framework are also highlighted by the fact that in 2009, 1.6 million cubic metre of firewood was converted to energy in coal power plants having an energetical efficiency of 26-27%, while modern small cogeneration plants could achieve an energetical efficiency as high as 60%.

One of the major goals of the renewable energy strategy is to create jobs and livelihood for disadvantaged populations in underprivileged communities, microregions and regions. The strategy envisages to assist especially agricultural workers, the unemployed, the disabled and the Roma population to find jobs and thus improve their living standards.

BASIC FACTORS IN THE STRATEGY FOR THE UPRISE OF THE HUNGARIAN COUNTRYSIDE

Based on our research on rural development and renewable energy, the essential factors of a rural strategy for the uprise/success of the countryside are outlined below.

- Fundamental improvement of the effectiveness of governmental operations based on the national strategy, and enforcing their character as a service.
- The government recognises the importance of the countryside in the national strategy, which is finally developed, as well as the regulations adopted to implement the strategy.
- One of the most important breakthrough factors for the countryside is industrialisation. This should focus on the creation and development of competitive processing industries, which require qualified labour, innovation, modern technologies, extensive use of sales methods and the components of network economy, as well as a modern system of joint purchasing and selling. Until economic regulations create much more favourable conditions for domestic small and medium enterprises, however, we cannot expect the countryside to begin the difficult road of development.
- Setting up environmental and renewable energy industries, creation of associated research, development and innovation capacities and services, domestic production of the required tools, equipment and technologies, and exporting the same on the largest possible scale. Both industries are the industry of the future, and the Hungarian countryside has huge advantages for both. It would be especially desirable to combine the biological and agricultural expertise available domestically with the achievements of the two hundred years of industrial culture, as both industries are based on the biological ad information/IT revolution. A nation that misses this boat will suffer a great loss.
- Strategic discovery and utilisation of the versatile capabilities of rural areas, and implementing regulatory measures (among others) to encourage local investment of the resulting revenues.
- Much more efficient use of the country's great agricultural resources, increasing the value of agricultural output and export by at least 50%. This should focus on the production of fruits and vegetables, as well as on quality livestock operations.
- Doubling the production of food products with high added value and of food products with hardly any chemicals, and effective domestic and export marketing in this respect.
- Long-term programmes based on genuine benefits to capitalise on our exceptional natural endowments such as thermal water, the beautiful countryside and medicinal/wellness tourism. This requires us to become a country of healing.
- Developing agriculture as a green industry for renewable energy, but only by following a strategy. This will create a large number of new sustainable jobs even in the regions less suitable for agricultural production.
- The countryside will be the place where new, modern, renewable forms of energy are produced, as Hungary is fifth in the order of nations ranked according to the per capita geothermal energy resources. Additionally, Hungarian countryside is beautifully suited to harnessing solar, hydro ad wind power. This new function of the countryside can only be exploited by following a relevant strategy – and by favouring long-term national and community interests over monopolistic ones.
- Improved efficiency in industry, agriculture, services and quaternary sector due to network building, cooperation, interest networks and integration.
- The introduction of components of network economy – industrial parks, clusters, logistics centres, technology incubator houses, regional transfer centres – for the sustainable use of rural resources and

for boosting its competitiveness for a long time to come. The newer and more complicated an activity is, the more important it is to use the components of network economy in setting up and pursuing such activities.

• Meaningful involvement of development hubs in planning and implementing development activities in rural areas. This would require development hubs to refrain from isolation and by measuring their performance by the improvement of the opportunities available to the rural population living in their area.

• Strategy-based development efforts centred on town with employment potential. Creating a division of work – in terms of cultural, community, administrative, services and economical responsibilities – between towns and the neighbouring settlements to take account of their individual capabilities and leverage synergies for the benefit of all parties involved.

• A change of thinking and attitude to give precedence to enduring assiduity, high standards, joint effort, and performance achieved by clean means.

• A mix of competition and cooperation adapted to the specific scenarios and resulting in increases competitiveness of the country and of the rural areas.

• The key to improved competitiveness of the countryside is the development of human resources through access to knowledge, causing changes in the knowledge leant, in the way of thinking and in the motivation for work.

• It is obvious that to improve the situation of rural areas in Hungary, a fundamental improvement in the general level of knowledge should be attained.

• Embracing the idea of lifelong learning is a fundamental factor for improving life in rural areas as well. Let's face it – we have a lot to do in this respect as well.

• The rules of Hungarian capitalism should be transformed to approach the Scandinavian/German model because in the absence of truly working social solidarity, even individuals who regularly find ways to avoid their public dues will not feel comfortable in their homeland.

• It is an elemental interest of the Hungarian countryside – an also of the entire country – to put the overtaxation and overregulation mania, which causes increasing damage and confusion, but shows no sign of abating, under social control.

• Finally, let us repeat that the uprise of the Hungarian countryside – and with it, of Hungary – cannot be achieved without a national strategy.

From the success factors for rural areas it follows that the uprise of the countryside can only be attained through a long-term national strategy of at least 15-25 years, a regional strategy based on the national strategy, as well as a micro-regional strategy offering synergistic benefits in conjunction with the former two.

Even though rural development subsidies are indispensable to the development of rural areas, success will only come if detailed scientific research is conducted to further identify the comparative advantages of individual micro-regions and communities, and if development efforts are based on such inherent reserves. Such comparative advantages include the breathtaking beauty of the landscape, the excellent quality of the natural surroundings, of air and water, the existence of medicinal springs and thermal water, traditions in vegetable and fruit growing, viticulture, winemaking, animal farming and the growing of crops, as well as the subsequent possibilities for tourism. Additional comparative advantages are offered by the nearly two hundred years of industrial ad mining culture, which have ensured that industrial communities are equipped with skills very much suitable for recycling, after the necessary re-training, of course. The several hundred thousand hectares of land available for ligneous green energy crops is another comparative advantage. Rural development subsidies should be focused to favour underprivileged micro-

regions in a way which promotes capitalising on the comparative advantages of the relevant micro-region.

This requires the concentration of activities and resources, as otherwise no breakthrough can be achieved in any of the fields. Regional, county-level and micro-regional efforts to promote job creation, entrepreneurship, to create a more favourable environment for businesses and to improve the quality of human labour available need to be better coordinated. Harmonisation of rural development and human labour development efforts elevates the role and responsibility of micro-regional hubs and ton without prejudicing smaller communities. To the contrary: the former may give smaller communities a chance to leave their underprivileged status. This requires fundamental adjustments to the distribution of resources, though, as the prevalence of local decision-making and decentralised activities governed by a strategy is still low. Only a comprehensive regulatory attitude promoting such transformation can assist underprivileged micro-regions effectively. Industry-specific and regional objectives should be effectively interrelated both with respect to planning and implementation. Regional, county-level and micro-regional coordination in the plans and efforts of sectors, industries, ministries and professional fields should be made more effective.

It is our conviction – supported by our research – that there are good chances for the uprise of the Hungarian countryside and for the Hungarian nation, as we are richly endowed for producing high-quality delicious food, have an abundance of renewable energy resources, as well as water, the basis for life, and possess a wealth of intellectual assets, although the utilisation of such assets (among others) could be improved. It is up to us to create a national strategy together and follow it to rise among the nations living in harmony. Such an uprise of the nation can only be accomplished together with the Hungarian countryside.

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