STUDIES

THE PRIMARY FACTORS OF THE NATIONAL STRATEGY FOR UTILISING "GREEN ENERGY" (BIOMASS) BY INCINERATION TECHNOLOGY

Dr. GERGELY, SÁNDOR

Key words: land utilisation methods, "green energy", clusters, cluster actors, fair relationship between actors, coherent legal and economic regulation.

SUMMARY FINDINGS, CONCLUSIONS, RECOMMENDATIONS

On the basis of the current trends we can state that green energy production is becoming increasingly important in the utilisation of agricultural areas. In our paper we compare the characteristics of land utilisation by energy forests, energy grass, energy hemp, and china reed (Myscanthus gigantheus). The analysis is based on market position, equity requirements and profitability, the effects on the national economy and/or on a particular region, as well as the environmental and social effects. We have established that plants that can be used as raw materials for green energy can achieve an increasingly favourable market position.

The Economic Strategy based on the National Strategy and as a part of it, the Energy Strategy, which is still to be developed, could lay the foundation of the development of the national strategy for utilising "green energy" (biomass) by incineration. Hungary lacks fossil energy resources but has a vast amount of renewable energy sources. We have a better than average solar energy supply, wind-power is average or weaker in some places. Due to the location of Hungary and the climatic conditions and natural features of the neighbouring countries our hydro-capacity is worse than average. We have exceptionally favourable geothermic potentials, which have been poorly exploited. We have the greatest reserves in green energy (biomass), and this holds true of all three methods of utilisation. Due to the extensive nature of the subject we have to leave out biogas and motor-fuels and focus solely on the National Strategy concerning utilisation by incineration.

Of the factors of bulk production and use of green energy we will lay particular stress on the price of fossil fuels, the increased dependence of the national economy on the international energy markets, the necessity of a comprehensive national green energy programme, the absolute necessity of favourable EU and national economic regulations, and, on a micro level, the cooperation of biomass producers and energy users.

A successful national green energy programme cannot be created without coherent legal and economic regulations whose characteristic features are as follow: predictable regulation for a period of at least 10 years, and the creation, imposition, and guarantee of the conditions for prolonged cooperation between producers, suppliers, and consumers. The regulations will have to create and support systems operating with stable internal balances, which distribute the proceeds of the whole verticum between the participants in direct proportion to work, capital, and risk. The actors of the national green energy programme are the cluster centre, the land and forest owners, the permanent leaseholders, ser-

vice providers, and the scientific and local government background. Apart from alleviating energy dependency, the national green energy programme produces a number of favourable effects in agriculture and rural development. Among other effects it can reduce developmental differences between regions, provide employment, and help to establish a new production culture.

The implementation of a coherent national green energy programme prepared by the government and created by the National Assembly could be a valid answer to future energy challenges.

THE CHARACTERISTICS OF "GREEN ENERGY"

The following table summarises the economic, agricultural, and rural developmental characteristics and effects of green energy (Table 1).

It must be pointed out that green energy is currently not able to fulfil the role of the tax collector. This will be possible only when fossil fuel users have to pay for environmental rehabilitation or when the general increase in energy price generated by the price rise of fossil fuels makes it possible. If the current trend continues on the world market, this will happen before long. Only organisations not waiting idly by will be able to adapt successfully.

Table 1

The economic, agricultural, and rural developmental characteristics and effects of green energy

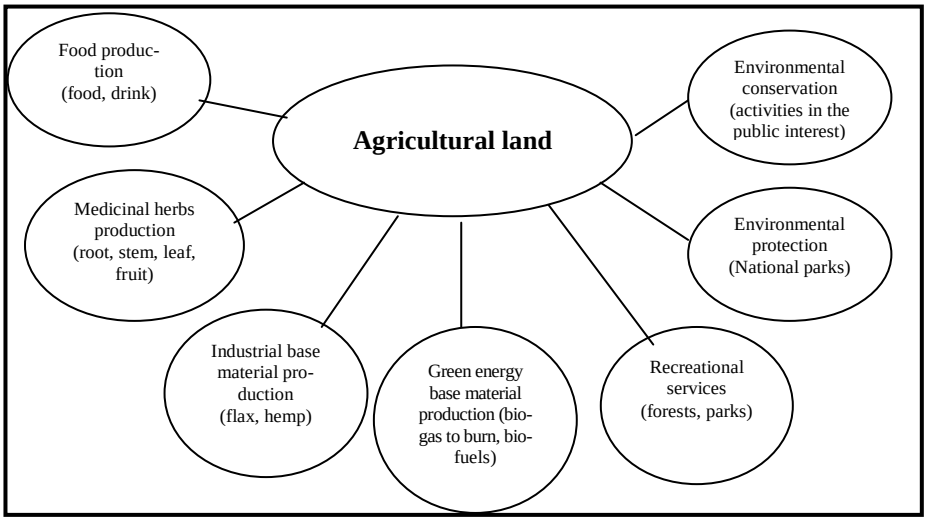
- Recommended to produce only in targeted production (long-term contract with end user)
- It does not currently have general and proportionate taxation sharing (its competitors, for example natural gas, are subsidised)
- If CO_2 quota is redeemed, it is reasonable to share the proceeds of the quota sale between the producer and the end user
- The profile of the Producer Group must be extended with it
- Reduces potential food producing area
- New income and employment prospects in unfavourable production site conditions
- Neglected and fallow areas can be kept cultivated over an extended period
- Reduces the size of allergen fallows
- Reduces the country's import dependency
- Reduces the import of energy sources
- It improves the trade balance of the country
- It has an effect against the growth of fossil fuel prices.

AGRICULTURAL LAND USE ALTERNATIVES

In order to get a realistic idea about the possibilities in producing the base materials for green energy we have to compare different land use methods, which can be seriously taken into consideration in Hungary. The next table shows the most basic utilisation alternatives, and a new method, namely the production of base materials for green energy is also included.

Figure 1

Agricultural land use alternatives



Source: Own compilation

Due to lack of space we cannot present the land use characteristics of each and every group of plants so the next table illustrates only the characteristics of land utilisation by energy forests, energy grass, energy hemp, and china reed (*Myscanthus gigantheus*). The analysis is based upon market position, equity requirements and profitability, the effects on the national economy and/or on a particular region, as well as environmental and social effects. We have named the advantages and disadvantages according to the above-mentioned aspects.

The table reveals that plants that can be produced as base material for green energy in targeted production, those that can be used for power generating purposes, and those whose secondary products (straw, stem, stalk) can be used as base material for green energy, can achieve an increasingly favourable market position. Although the profitability of these ligneous and herbaceous plants is on the upswing, it is currently unsatisfactory, but the rise in the price of fossil fuels will probably guarantee reasonable income. However, it must be stressed that the market position and profitability of plant base materials not produced for quality food products do not hold out much promise of long-term advantages. The fundamental tendency is the deterioration of these products' market position and profitability.

"GREEN ENERGY" CLUSTER

The production and utilisation of "green energy" requires long-term, fair, and profitable cooperation from the participants to which the organisational framework could be provided by the Producer Group on the producers' level, while the cluster could realise this role for the whole system. Within the cluster the basis of a fair relationship between the actors is that they have a fair share of the profit in proportion to their investment, work, and the assumed risks.

The Table 2 introduces the four actor groups that can prove decisive in the production and utilisation of green energy.

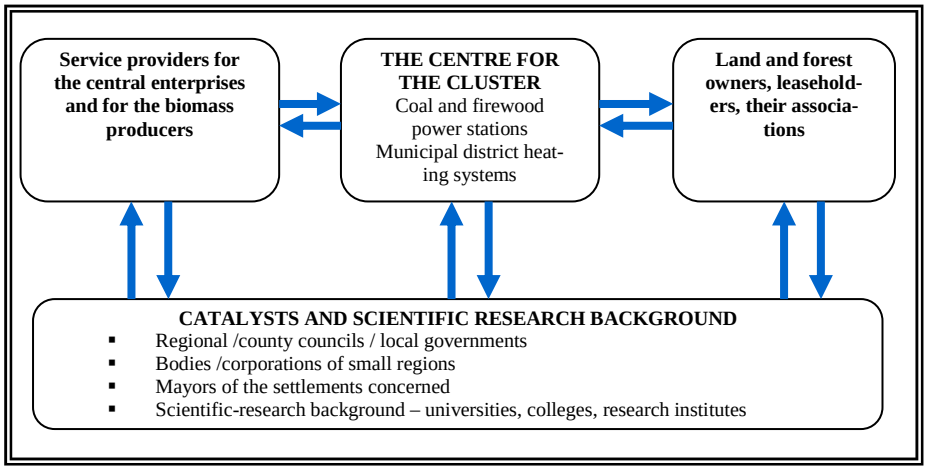
Table 2

A comparison of land utilisation methods

		Advantage	Disadvantage
Energy forest	Market position	Sowing structure inflexibility due to medium to long term land occupancy	
		Long-term demand market	
	Equity requirements and profitability	Very short period of capital recovery	Exceptionally high investment requirement
		Potential profitability in the short or medium run for the landowner or leaseholder if there are appropriate economic regulations in place	Will bring profit after several production cycles with domestic regulations
	Effects on the national economy and/or the region	Favourable effects on energy balance	
		Favourable effects on energy import balance	
		Promotes regional development	
		Permanently promotes regional development	
	Environmental effects	Negligible danger of erosion	
		Negligible danger of deflation	
		Mediocre recreation potentials	
		On the whole excellent environmental effects	
	Social effects	Promotes cooperation	Requires collaboration, integration activity, and specialisation from participants
		Raises living standards	Raises great demand for cooperation mentality
		Raises the standard of cooperation culture	
Energy grass, energy hemp, and china reed (Myscanthus giganteus)		Long-term demand market for these products	Further technological research is required for its large scale application
		Elasticity in sowing structure due to short term land occupation except for china reed	
	Equity requirements and profitability	Very short period of capital recovery except for china reed	Moderate investment requirement
		With the exception of china reed these crops will bring profit in the short run for the landowner or leaseholder if there are appropriate economic regulations in place.	China reed has an exceptionally high investment requirement
	Effects on the national economy and/or the region	Energy use possible	
		Favourable effects on energy balance	
		Favourable effects on energy import balance	
		Promotes regional development	
	Environmental effects	Minimal danger of deflation, erosion	
		Favourable effect on environment	No recreational potential
	Social effects	Raises the standard of cooperation culture	Requires collaboration, integration activity, and specialisation from participants
			Raises great demand for cooperation mentality

Figure 2

The actors of the green energy (biomass) cluster

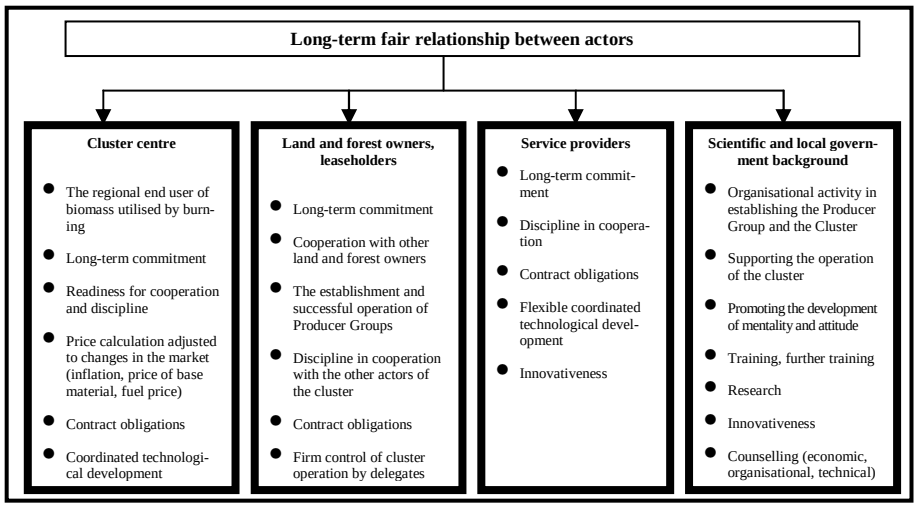


The actors of green energy production and utilisation are the cluster centre, the land and forest owners, service providers, and the scientific and local government background. All four actor groups will have an important role in the long-term, successful operation of the green energy cluster. The failure of any of the actors to carry out appropriate and effective activity will have disadvantageous effects on the operation of the whole system (Figure 2).

Consequently, a successful green energy project cannot come into existence without a long-term and fair relationship between the actors. The next table demonstrates its basic conditions and characteristics (Figure 3).

Figure 3

The conditions and characteristics of the long-term and fair relationship of the actors



THE NATIONAL CONDITIONS OF THE UTILISATION OF GREEN ENERGY BY INCINERATION TECHNOLOGY

The table below summarises the conditions of utilising green energy by incineration derived from the National Strategy. (Figure 4)

THE STATUS OF GREEN ENERGY PRODUCTION AND UTILISATION IN HUNGARY

In 2004 the share of non-fossil, renewable energy sources in power generation was 13.9% in the European Union, which is planned to increase to 22.1% by 2010. This share in Hungary in 2004 was 2.2%, which is to be increased to 3.6% by 2010, as agreed at our accession. This obligation was fulfilled in 2005 due to the fact that four municipal district heating systems, one large industrial heat generating plant, and five power plants switched entirely or partially to biomass incineration, which primarily means firewood. Burning firewood does not endanger sustainable forestry since the ratio of ready-to-cut trees that remain standing is 20-25% annually. The following table shows the already realised and planned power generation in Hungary using biomass energy sources. (Table 3)

Figure 4

The conditions of the utilisation of green energy by incineration technology (ranking)

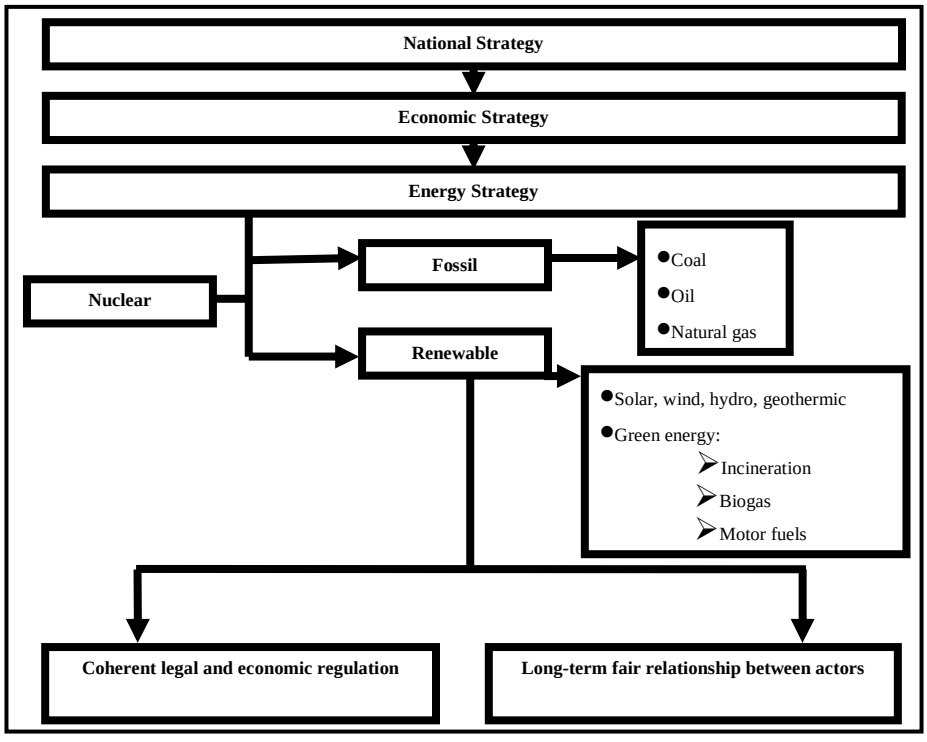


Table 3

Planned and implemented power plant power generation from biomass energy resources in Hungary between 2005-2010

Power plant	Method of incineration	Built-in capacity (MW)	Annual biomass use 2005 (thousand t/year)	Planned annual biomass use 2010 (thousand t/year)	Expected power generation (PJ)
Hungary					
Ajkai	Biomass	30	210	260	178
AES Borsodi	Biomass	40	280	350	270
AES Tiszapalkonya	Combined-incineration	-	145	180	65
Pécsi	Biomass	49.9	380	480	360
Mátrai	Coal/wood mix	-	0	400	-
Total	-	**119.9**	**1015**	**1670**	**873**

Source: Ministry of Economy and Transport, own compilation

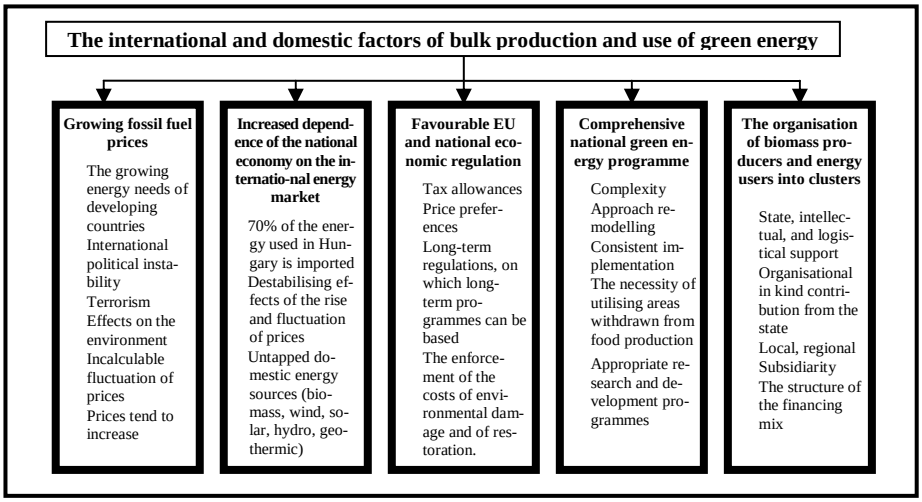
Taking the natural conditions of Hungary into consideration it can be stated that the current production and utilisation of green energy lags far behind its potential. Due to its location and natural conditions Hungary has great potential in exploiting renewable energy sources, in particular with regard to biomass. Hungary occupies third place amongst the 25 EU member countries in this respect. Within this, besides utilising the by-products of field crops, fruit- and vine growing, and forestry, the greatest potential is in energy plant production.

THE INTERNATIONAL AND DOMESTIC FACTORS OF BULK PRODUCTION AND UTILISATION OF GREEN ENERGY

The next table summarises those international and domestic factors that can have a decisive effect on bulk production and utilisation of green energy in Hungary.

Figure 5

The international and domestic factors of bulk production and utilisation of green energy



THE CHARACTERISTICS OF COHERENT LEGAL AND ECONOMIC REGULATION

The Table 4 presents the characteristics of the legal and economic regulations whose coexistence is a basic requirement for a green energy programme, which can operate successfully in the long run.

We are confident that despite the limited space available to us, we have provided sufficient proof that there are more and more reasons for placing the creation and realisation of a coherent national green energy strategy on the agenda without delay, as the answer to the expected energy challenges of the future.

Table 4

Coherent legal and economic regulation

- The professional preparation, development, introduction, and implementation of the national "green energy" strategy
- At least 10 years of security (in the price of green current and in the conditions of reception)
- An acceptance obligation with reasonable conditions for a period of at least 10 years from the users of green energy
- A firm legal background and the guarantee of contracts for cooperation between producers, service enterprises and users for a period of at least 10 years
- Area based EU and domestic subsidies for the producers (approximating it with arable land subsidies)
- EU and domestic subsidies for producers for planting and cultivating green energy tree plantations (40-50%)
- Making producers' subsidies dependant on membership of integrated organisations (producer group, cluster)
- Amplification of the Producer Group legislative provisions with green energy aspects
- The establishment and implementation of regulations for green energy cluster classification
- The stipulation of cluster obligations for all actors
- The establishment of the operating, legal, and economic conditions for the green energy cluster, which creates internal income equilibrium in the long run
- The amplification of the national, economic, energy strategy with green energy specifications
- The amplification of forest laws with the regulation of short-, medium-, and long-clearing cycle green energy tree plantations, and energy forests
- To create legal possibilities for land use based on the majority decision of the owners (profitable size, shadow effect)
- Proportional division between producer and user of the income from CO_2 quota sales

REFERENCES

(1) Buzás N. – Lengyel I. (2002): Ipari parkok fejlődési lehetőségei: regionális gazdaságfejlesztés, innovációs folyamatok és klaszterek. SZTE GTK, JATEPRess, Szeged, 125-153. pp. – (2) FVM (1998): Erdővagyon, erdő- és fagazdálkodás Magyarországon. Budapest – (3) Gergely S. (1989): Energiaerdő. Mezőgazdasági Kiadó, Budapest, 173 p. – (4) Gergely S. (2001): Alternatív gazdasági stratégiák. Energiaerdő. Főiskolai jegyzet. SZIE Gazdálkodási és Mezőgazdasági Kar, Gyöngyös – (5) Gergely S. (2005): A vidékfejlesztés kézikönyve. Szaktudás Kiadóház Rt., Budapest – (6) Gergely S. – MTA-Károly Róbert Észak-magyarországi Regionális Kutatócsoport (2005): Heves megye „zöldenergia" tartalékai és a hasznosítás feltételei. Károly Róbert Főiskola, 240 p. – (7) Gergely S. – MTA-Károly Róbert Észak-magyarországi Regionális Kutatócsoport (2005): Heves megye „zöldenergia" tartalékai és biomassza

klasztere. Magyar Mezőgazdaság, 2005. október 5., 2. p. – (8) Gergely S. – MTA-Károly Róbert Észak-magyarországi Regionális Kutatócsoport (2005): Tüzeléses biomassza termelés és hasznosítás Észak-kelet Magyarországon. Fenntartható energiaellátás. Sárospatak, előadás, 2005. október 13. – (9) Gergely S. – MTA-Károly Róbert Észak-magyarországi Regionális Kutatócsoport (2005): A biomassza hőhasznosítási célú előállításának perspektívái. Előadás, Intézményi Tudományos Nap, Károly Róbert Főiskola, Gyöngyös, 2005. november 11. – (10) Gergely S. – MTA-Károly Róbert Észak-magyarországi Regionális Kutatócsoport (2005): A biomassza energetikai klaszter hatása a regionális fejlődésre. Magyar Regionális Tudományi Társaság, előadás, Sopron, 2005. november 24-26. – (11) Gergely S. – MTA-Károly Róbert Észak-magyarországi Regionális Kutatócsoport (2006): Energetikai biomassza stratégia tényezői. Előadás, Ajka, 2006. március 16. – (12) Halupa L. – Tóth B. (1988): A nyár termesztése és hasznosítása. Mezőgazdasági Kiadó, Budapest – (13) Keresztesi Béla (1978): Nyárak, füzek termesztése. Mezőgazdasági Kiadó, Budapest – (14) Keresztesi Béla (1984): Az akác termesztése és hasznosítása. Mezőgazdasági Kiadó, Budapest – (15) A biomassza hasznosításának lehetőségei, Mezőgazdasági Kiadó, Budapest, 1985. Szerk.: Láng I. – (16) Magda S. (2000): A régiók mezőgazdaság- és vidékfejlesztése. Gazdálkodás 44. évf. 2. sz. 60-67. pp. – (17) Magda S. – Gergely S. (2006): A magyarországi termőföld hasznosítás átalakítási lehetőségei. Gazdálkodás, 50. évf. 3. dz. 14. p. – (18) Csemetekert. Erdészeti csemetetermesztés. Mezőgazdasági Kiadó, Budapest, 1986. Szerk.: Pápay G. – (19) Solymos R. (2001): Erdőtelepítési programok Magyarországon – egy sikertörténet. Magyar Tudomány, 2001. 4. sz. – (20) Szepesi L. (1966): Erdőgazdasági gépek jellemzői és használata. Mezőgazdasági Kiadó, Budapest – (21) Szontágh P. – Tóth J. (1988): Erdővédelmi útmutató. Mezőgazdasági Kiadó, Budapest – (22) Talajvédő gazdálkodás hegy- és dombvidéken. Mezőgazdasági Kiadó, Budapest, 1965

ADDRESS:

Dr. Gergely Sándor
igazgató
Károly Róbert Főiskola
Kutató, Fejlesztő Iroda
3200 Gyöngyös, Mátrai út 36.
Tel.: 37/518-482, Fax: 37/518-473
E-mail: sgergely@karolyrobert.hu