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Methods of Promotion of Renewable Energy among Local Municipalities of Poland

1. Overview of the European and Polish Status-quo on Renewable Energy

It's known that the "Kyoto Protocol" has already been signed by 159 countries and foresees a reduction of GGE (greenhouse gas emissions) by 5% by the period 2008–2012 with respect to the base year 1990. After the signature of the Kyoto Protocol in 1997, the promoting actions for the renewable energies hold a core-role through the *European Directive 2001/77/EC* [5]. This directive is very important, since she provides in its annex indicative targets to be met until 2010 from the European Union of the 27 State-Members. These targets concern the contribution of renewable energy sources (RES) into the gross national electricity consumption of each country, the contribution of large-scale hydroelectric plants being included.

According to European data of 2004 [4], coal-fired power and cogeneration plants dominate electricity generation in Poland (production from coal in Poland is more than 92.8% [16]. More than the half of this capacity was built in the 1970's and thus, nowadays, significant investment in new generation and modernization of existing generation is required. Regarding renewable energy, electric utilities of Poland maintained a relevant portfolio of 2.4% in 2001 (2.5% in 2002 and 2.65% in 2003). A target of 7.5% of primary energy production from renewable sources was set for 2010 (14% for 2020). However, renewable energy in Poland has counted for 3% in 2005 [16], while there is a slight discouragement towards large scale renewable development in the future. The key resource for achieving the target is likely to be biomass, mainly forestry and agricultural residues and energy crops. The biomass has produced 31 GWh of electricity in 2002, whereas the large

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hydropower plants were of an installed capacity of 630 MW in 2004. The installed capacity of wind parks was 57 MW in 2003. Photovoltaic cells are not used in Poland, and solar thermal collectors are used in a few areas. Around 1.000 solar installations for the heating of water have been installed in Poland with the total surface area of the collectors exceeding 10.000 m^2.

Current installed capacity using geothermal energy is approximately 68.5 MWt, of which 26.2 MWt is from heat pumps, which generate 0.02 Mtoe of energy on an annual basis.

A further potential of renewable energies ready to be exploited is still present in Poland, like for example the geothermal energy which seems to be a great opportunity, especially for new applications such as spa's and sanatorios. Some potential on solar energy also exists, which could mostly be used for electrification and heating. Polish hydro power has also chances for development as neither the big hydro power plants are fully used in Poland (due to antiquated equipment) nor the small plants are nowadays in a common use.

Biomass has a strong potential as well: Only in Wroclaw, 20% of wastes from 2 millions cm^3 of wood can be retrieved [10]. Energy crops as well, could be used for the production of biofuels; at present there are 200 ha energy crops grown and estimations indicate that 1.5 million ha of arable land is available for energy crops. Last but not least, a wind potential of 5–6 m/sec exists.

For the promotion of renewable energy, there are some governmental supportive mechanisms in Poland, such as the obligation for Green Power Purchase, a new law on biofuels, environmental funds in all levels of administration supporting RES as well as an organization called ECOFUND that support environmental protection projects (including RES) and low interest credits from banks when the loan is used for environmental projects. Nevertheless, the renewable energy system in Poland still suffers from inadequacies and delays mainly due to the large volume of administrative documents which are needed to be presented during environmental and construction authorizations.

Beside this problem the potential dangers of geothermy's use for the environment and the human health, as well as the potential damage from the renewable energy projects (especially the hydroelectric plants and the wind parks) on cultural and natural heritage, are some of the main concerns of Polish communities which prevent the increase of renewable energy projects in the Polish energy portfolio.

In the rest of the paper and taking as a given the present supporting profile as well as the administrative reluctance of the central governance regarding renewable energy, we are trying to approach a new governmental instrument for the central management, mainly based on individual human forces and collective willingness.

2. Insights for a Proposed Promotion Strategy for Renewable Energy Projects in Poland

As practical case-studies have shown, the governmental support and the maturity technology are not the only way of effectively promoting renewable energy: In an era where the time-limit which is left for successfully arriving at the aim of 7,1% from renewable energy is restricted and when climatic changes play at the same time a very dangerous game for the future of our planet, governmental efforts should turn towards a factor who will attribute a new dynamism at the development of renewable energy projects, pushing them almost vertically at an increased rate of use. This factor is the societal one and the driving forces born.

According the roadmap for renewable energy of 10 January 2007 of the European Commission, "the local and regional authorities can contribute at a large scale at the realization of fixed objectives (regarding renewable energy)". Moreover, according to scientists, social capital may be regarded as one of the most influential sociological concepts [12] and could be a "useful explanatory factor for the management of natural resources" [13]: Local actors play a very important role in the sustainable development of their territories, which is logical, since local problems cannot be solved only from central Government itself. It's the local societies who better know their habitat, their potential and their needs and it's the local societies who can act the soonest possible and in a very active way, against any risk arisen. In the end, it's local municipalities who decide how many MWs of renewable energy projects will be installed in given territories: Therefore, as local societies are the first beneficiaries of every new project installed, many national legislations give local actors the right not only to follow, but also to decide on the integration of energy projects installed.

The large number of these "local actors" include the local residents, the local authorities, the private local enterprises, the local press & communication networks, the institutions and the non-governmental organizations, the local administrative services, the local financing institutions, etc. The system of actors which interfere in any kind of decision (even with often contradictory opinions) is therefore of a "non-hierarchical", "multi-acting" type. These actors could be classified into the decision-makers (local authorities), the actors who try to influence the decision-makers towards their own system of values (ecologists, etc.), the passive actors (the actors who are directly concerned from any energy evaluation taking place in their territories and who follow-up passively any intervention in their environment), the shadow-actors (the actors who indirectly influence any procedure of decision-making – for example the national governmental authorities) and the actors who follow-up and intervene in a more dynamic way (press & communica-

tion networks, local research and academic institutions). All these actors are usually trying to have a more participative role in any decision concerning their proper areas with actions which become even more important in fragile areas with particularities and sensibilities (like the „protected by Law areas", or the „monuments of natural beauty").

Polish Chamber of renewable energy, carefully collected opinions of local municipalities, regarding potential benefits from renewable energy [16]. Among them a priority has been granted to the need for local electricity security: The influence from the problem created in the past between Ukraine – Russia, as far as the closing down of natural gas's feeding was concerned, seems to strongly influence Polish energy policy.

Concerns that centralized energy as it exists today could easily betray the energy feeding of local municipalities, as well as the fact that the price of Russian natural gas seem to be higher during the following years, ask for examples such as Scandinavian countries which aim at energetically autonomous economies based on renewable energy. What seems also important for Poland is the expected increase of local business turnover and of jobs in local and national level, as well as the resulting economic benefits for local municipalities.

The ecological image and the increase of tourism attraction through specific projects and equipments of renewable energy (such as e.g. geothermy for spa's, etc) seem also important.

Finally the increase of farmer's income mostly by the use of biomass might be important. Pollution and emitted greenhouse emissions seem not to be a problem for Poland, even if climatic changes could even put in danger the renewable energy sources potential itself (as it already happens with the evaporation of water in Austria).

Taking into consideration the above mentioned benefits of renewable energy, local societies have already initiated to actions further promoting the renewable energy's promotion:

The identification of potential and existent resources in specific areas,

- the update of all information regarding renewable energies,
- a coordinating role of the actions concerning renewable energies,
- some efforts for the dissemination of results and information,
- the adoption of local objectives and the facilitation of national ones,
- the organisation of frequent meetings with local people in order to dissolute doubts and to answer questions,
- a program for ecological education in rural communities on a "do it yourself" basis.

3. Recommendations

Nevertheless, further actions should be implemented for the increase of renewable energy use. To this extent the governmental support is necessary: Legislative framework (nowadays, inadequate in Poland), lancing of green certificates, attribution of part of the profits to the local municipalities[1], obligatory consensus from the local communities for the erection of renewable energy projects in their territories[2], time planning of the licensing and construction procedure, etc. should become legally "binding". A constant communication between governmental and local authorities, is also necessary. A solid legislative framework will take advantage of the "positive points" of a liberalized energy market and will allow the activation of the Polish territories, the circulation of energy products, and the achievement of cooperation between countries and foreign investors.

In light of the above mentioned, it is observed that a "collective management system" is needed, where participative processes should be realized and an integrated promotion strategy should be incorporated. The promotion strategy may respond to current system state and to future potential of sustainable energies being based at the formation forces (creation of a niche, creation of a new demand, introduction of a new functioning).

Renewable energy market segmentations and the establishment of "consuming-networks" (client-cables)' (buildings, domestic, industry, mobility sector etc) are therefore important [9]. Market segmentation could be accomplished according to criteria of local specific characteristics and/or to vendor and consumer's type criteria[3]. The creation of consuming-networks is important for Polish RES market given the absence of market niches from the energy system.

Towards this aim, a suitable and promising strategy could be in consistency with the "model of individual decision-making" which obeys to the following causal explanation [9]: "Product familiarization leads to consumer's persuasion, and consequently to his choice's confirmation, to the product's selling and finally to the structure of a consuming network".

Within this strategy, the role of key actors in each Polish Region should be identified. Roger's innovation theory's contributions towards the adoption of innovation systems [14] constitute the backbone when designing policies meet with specific conservative and reluctant characteristics of local societies.

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[1] In the Hellenic case investors are currently obliged from the Law 3468/2006 to award a percentage (3%) of their profits to the local municipality of the territories where RE projects are installed [7].

[2] The opinion of local societies should be obligatorily required during the environmental procedure of renewable energy projects' integration (for example Hellenic Laws 2773/99 and 3468/2006 [6])

[3] A more extensive and detailed elaboration on the criteria of the market's segmentation is presented in [17].

Hence, the adoption of innovative systems by local municipalities is easier, if the following conditions are met:

- RES's strengths are easily revealed (advantages brought from the system are evident at a good value for money);
- there is compatibility between the technologies and the existing infrastructures;
- there is the potential to assess the outcome of the system;
- procedures for the system's implementation are simplified (neither intensive information nor special capacities are demanded).

Clear objectives should be also set, as well as a clearly established action plan. Objectives, should aim at:

a) turning out local societies to be sensible towards sustainable development activities;
b) eliminating poverty;
c) encouraging the elaboration of environmental studies from the municipalities and the dissemination of results among all municipalities;
d) informing local authorities for new possibilities on European projects and financing;
e) finding mechanisms to follow-up the progress of renewable energies in each territory;
f) facilitate the communication of municipalities with research institutions of Poland and abroad;
g) encouraging "study-visits" in foreigner countries with successful examples;
h) demanding for a coordinator in each municipality on actions regarding sustainable development (including RE) activities.

The action plan should be drawn following the listed requirements:

a) setting of priorities in respect to needs and potentials of specific territories, the local degree of acceptance and familiarization as well as political willingness;
b) set-up of a long-term vision to provide citizens with sufficient time for the adoption of new ideas;
c) research of suitable means of advertisement depending on the preferences of the selected target groups (i.e. television in most of the insular areas [11];
d) establishment of a centralized mechanism for the output assessment which will serve as a feedback mechanism for regular update of the national strategy.

A special attention should be attributed to the compatibility between the selected promotion and the national natural and cultural heritage features. European funding mechanisms for the RES promotion should be used and strong motivation mechanisms should be created, rather at a local level[4].

It has to be noted that promotion strategy should not neglect the intrinsic characteristics of the Polish society's mindset: Basic actions should include a research on the special characteristics of each municipality, mainly its energy characteristics in relation with the socio-economic ones, the demographic ones, the professional ones, the natural resources, the territories' dimensions, the geo-morphologic particularities, the local administrative flexibility, the education level (which is important for the acceptance of new technologies), the level of familiarization with energy projects, the level of ecologic mentality, as well as relevant future tendencies. A focus should be brought on the particular elements which result at the special vulnerability of areas, as well as on the solutions that renewable energy projects could provide. In the case for example, where territories are located in isolated areas away from the country, the promotion idea should be based on the concept that the use of these projects will increase regional competence, and improve local quality of life, via the increase of funds for municipalities (in Greece the Law 3468/2006 oblige investors to dispose the 3% of their profits on the selling of wind electricity at the Municipality of the territory where the project is built). On the other hand, where territories are characterized from small physical dimensions of a territory (like those of islands), the emphasis should be attributed to the use of energy plants orientated to the restriction of the visual pollution coming from oil stations or wind-turbines. Solar systems or hydraulic stations should be preferred in this case. Moreover, in the case of territories with ecological fragility and the existence of protected areas, promotion actions should be orientated towards ecologic technologies which don't emit any polluting gazes, whereas in the case of territories with abundant natural resources /infrastructures or limited ones the main idea should depend on the existence or lack of first materials and infrastructures. In areas with inadequate funds or competences finally, renewable energy projects should support the idea of poverty's elimination, and the exploitation of the very well known mental and physical strength of Polish young people via the creation of new job posts, and their specialization on innovative technologies. The strengthening of local enterprises and local investments, as well as the avoidance of immigration towards other European countries will be some of the results of this ambitious concept.

[4] For the RE promotion, the European Commission itself has lunched numerous campaigns. The first campaign was lunched during the period 1999–2003, as a part of a strategy described in the *White Book for the European Strategy and Framework of Actions for RE*

Therefore, governmental support is again essential, especially through processes which provide a continuous communication between governmental and local authorities. What decision makers should always keep in mind though is that RES should be beneficial in terms of environmental, economic and social points of view and that local population are finally these benefits' end-users.

In a promotion strategy indications for the economic return of the investment on renewable energies (any substitutions from the Government, the annual decrease of cost of renewable energy's technologies and the annual increase of solid fuel's cost, as well as any external cost which could be internalised, should be taken into consideration) is important. Local societies should be encouraged as well to have shares in the renewable energy projects while all social groups of a municipality should be included in the strategy, putting the emphasis on schools.

All educational programs should be in compliance with the rules and the special particularities of Polish Municipalities and not in compliance with norms from foreigner countries. Polish cultural identity should always be kept in the epicenter of all policy regarding renewable energy projects, towards the objective of how these projects not only will maintain, but also further promote the special traditional elements of each region (like it happens for example with wind mills in Cyclades of Greece).

Towards this aim, only the renewable energy projects which are compatible with the special characteristics of an area will be integrated. If possible, each municipality should possess a local planning for renewable energy projects integration in their own territories, before setting their strategy.

In all this context, the important constraint to be taken into consideration is that different municipalities of Poland have their own particularities, and therefore maybe more than one strategies are needed.

Last but not least, an integrate approach should be used, where renewable energy projects should be linked with other ecological or cultural projects (bio-cultures, ecological cultural festivals, activities concerning ecotourism, etc.).

In order to be in a position to assess the results of a given policy and in order to improve a given action plan, the use of indicators (such as the degree of using natural resources, and technologies, instruments and transports friendly to the environment, the degree of saving energy and recycling, is necessary.

Therefore, "even if there's not any contribution from the scientific bibliography on how the social capital influence the sustainable development of given areas, there are ways for a qualitative-quantitative assessment of these effects" in order to reach a conclusion of how „local collective powers can create a comparative advantage".

5. Conclusions

According to international experience and to scientific literature, social capital is considered to be the most crucial parameter for the integration of renewable energy projects and technologies into the national energy mixes and the local territories. Therefore, together with the governmental financial supportive mechanisms and the maturity of technology and research, promotion policies for the use of RES should be drafted at a national and local level, aiming mainly at the sustainable welfare of local populations.

This research has been conducted thanks to the support of the Hellenic Institution of Scholarships (in Greek: IKY).

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