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EXAMINING THE RENEWABLE ENERGY INVESTMENTS IN HUNGARIAN RURAL SETTLEMENTS: THE GAINED LOCAL BENEFITS AND THE ASPECTS OF LOCAL COMMUNITY INVOLVEMENT

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Abstract: The results of the paper are based on a research project which examines the renewable energy investments carried out in Hungarian rural settlements. The study will focus on the municipality-led renewable energy developments, determining the most important local benefits and the aspects of the local community involvement. Altogether 748 rural settlements have been identified, which have implemented at least one renewable energy project through the Environmental and Energy Operative Program between 2007 and 2013. A questionnaire has been sent out to these municipalities, and 159 full answers have been collected and analysed. We have investigated the importance and presence of local benefits deriving from renewable energy investments, and examined what effort is put into the information and involvement of the local community. The study concludes that although several local benefits occur at local level while implementing renewable energy projects, the effect of direct benefits remain at a low level. Furthermore, it can also be stated, that only moderate effort is put into the issue of local community involvement. The study also determines several major threats that can endanger the successfulness of the previous investments, and prevent the further renewable energy developments at local level.

Key words: renewable energy utilization, rural development, local benefits, community involvement

1. Introduction

Nowadays, more and more focus is put on the renewable energy sources, on the necessity, constraint and opportunities of their utilization, on the positive benefits it can bring, as well as on their opposition. Taken into account the possible future exhaustion of the fossil energy sources, the actual and near danger of the climate change, the drastic increase of the greenhouse gases in the last 200 years, as well as the growing need for sustainable development and liveable environment, the increasing necessity of the renewable energy sources have become clear.

If we take a look at the situation in Hungary, the present energy trend raises questions and concerns about competitiveness, energy safety and sustainability. The Hungarian energy production is fundamentally based on the nuclear power plant in Paks (38%), while the biggest proportion of the production and import is given by natural gas and petroleum (KSH 2012). The long-term energy-strategy of Hungary does not intend to change this trend, which is confirmed by the security supply and the lack of resources for the necessary investments. (NFM 2012) Within the import, the volume of hydrocarbons is the highest, especially natural gas (with 90%). (KSH 2015) Bearing in mind the threat of high energy dependency, it is crucial and necessary to improve the energy-position of Hungary with other, mostly local and bottom-up initiatives. And for this, renewable energy utilization could be an effective tool. In accordance with the European Union directive (2009/28/EC), Hungary has to increase the share of renewable energy sources to 13% within the energy consumption. The government has set to go beyond this, and set a target of 14.65% by 2020 in its National Renewable Energy Action Plan. There is a wide acceptance among the literature and researchers that Hungary has huge potentials regarding the renewable energy sources (Penninger 2012, Kocsis 2012, Magda 2011, Göőz 2013, Lukács 2010). The average quality of soil, the size of land per capita, and the total hours of sunshine all prove the favourable conditions. Besides this, in some regions the potential of wind and geothermal energy is also remarkable. However, despite the high potentials, the utilization remained rather low. The primary production from renewable energy sources was 9.5% in 2014 (KSH 2017), and although it has doubled during the last 10 years, it is still well below the set target rate. Furthermore, the renewable energy production is not well balanced: biomass is giving almost 70% of the total renewable energy production, (KSH 2017) and there is no significant progress in the utilization of the other renewable energy sources (especially geothermal and solar).

However, not only the national energy-security and energy-policy confirm the need to examine the utilization of renewable energies. Rural areas face nowadays numerous challenges, conflicts and problems. A recent complex rural research have identified several major factors that determine the current situation of Hungarian rural areas, including the loss of population retention capacity, the decreasing social capital, the economic stagnation, the lack of local job opportunities, and the low-grade infrastructure systems (Perger et al 2014). On the other hand, in certain rural settlements, the signs of rural innovation can already be seen: new functions emerge and the emphasis of the local economy is changing (Szörényiné Kukorelli 2015). Therefore, also from the side of rural development, it is highly important to analyse development paths that are able to bring added value to rural areas in the long term.

With our study and empirical research, we tend to contribute to the better understanding of the processes behind rural renewable energy investments. To demonstrate this, the investments of rural local municipalities have been chosen, because they have a decisive role in rural development: they dispose of the local resources, and they also decide on their utilization. Moreover, the preparation and information of the recipient space (i.e. the local community) is also their task. Although, there is a wide acceptance on the fact, that renewable energy utilization has a number or local benefits at local level, currently there is a knowledge gap on examining the presence of these benefits, as well as the involvement of the local community on a quantitative basis – especially in Hungarian terms. However, analysing these investments can serve as an edification for future investments, and giving opportunity for rural settlements to learn from each other.

Within the paper, we will focus on several broader issues, and therefore the aim of the paper is threefold: (1) determine the importance and presence of *local benefits* deriving from municipality-led renewable energy investments; (2) to give an insight in the involvement of *local community*, and to see, what effort has been put into this issue; and (3) to identify the main problems and concerns regarding the renewable energy investments of the Hungarian rural settlements. This way, the paper also gives opportunity to draw conclusions that are also valuable for other countries.

2. Theoretical background

It is becoming clear, that renewable energy sources are being widely recognized as an effective response to the global issue of climate change (SREA 2009, Fouquet-Johansson 2008), due to their contribution on greenhouse gas emissions reduction. Moreover, also the international environmental treaties and policies stress the need of reorientation of the countries' energy models towards the utilization of the alternative energy sources. (Liarakou et al 2008) However, besides the global contribution to the adaptation capacity, according to the literature, there is a wide acceptance, that renewable energy utilization is able to generate positive *local* effects, and create added value. These benefits can be generalized basically around six main topics: economic benefit (contribution to the GDP, cost-savings), employment benefit (generation of new workplaces, created added value), innovation benefit (networking, knowledge transfer, clustering), enhancing energy security (decreasing import dependency, transition from fossil fuels), environmental benefit (reduction of greenhouse gases, better air quality), and social benefit (changing attitude, increased social capital).

This study will particularly focus on the presence of two local benefits: the cost-saving deriving from renewable energy utilization (economic benefit), and the generation of new workplaces (employment benefit). The reason behind it is twofold: (1) they are relatively easy to measure and (2) for local municipalities, these benefits are of high importance, probably higher, than the environmental benefits. By examining the motivations of mayors in several case studies, Busch and McCormick (2014) also indicated that climate change only plays a minor role as a driver in the renewable energy development processes. Furthermore, they stated that economic advantages are of high importance for the success of renewable energy projects. This means, that even though other local benefits might also occur, mayors and local municipalities will primarily focus on those, which are able to bring direct and visible advantages – like the cost cuts on energy, as well as the generated new workplaces across the settlement.

There are a numerous researches investigating the measurement possibilities of local benefits, in many cases examining concrete investments. Some studies focus on the presence of economic benefits (like the performance and capacity of investment, the operational costs of the facility, the effect on the income and employment rate, the effect on local taxes in the case of Hirschl et al 2010); some others investigate the employment benefit (Llera et al 2013 or Moreno-Lopez 2008), while there are also studies focusing on environmental benefits (Ortega el al (2013) have examined renewable energy investments in Spain, by focusing on savings from the reduction of greenhouse gas emissions). Not only the measurement types, but the results of these studies (i.e. to what extent these local benefits are present) also show great differences. Some studies conclude, that only the environmental benefit was present, while others also claim the positive effect from economic or social side as well. For example, Del Rio and Burguillo (2009) have examined three large scale renewable energy projects, and concluded, that the investments were useful from an environmental point of view, however their local social and economic effect was only moderate. On the contrary, Póla (2014) focusing on the photovoltaic systems concluded, that the main local benefits occurred are the cheaper local energy, and the appearance of innovative economic actors. Another case study examining 125 household biogas plants showed that biogas plants had a great role in enhancing not only the local ecology, but the economy and human health as well (Agoramoorthy, Hsu 2008). Since there are considerably less studies focusing on the positive local benefits occurred through the renewable energy investments led by local municipalities, therefore we have a little understanding on how these benefits actually look like in rural settlements.

Probably the most intense debate occurs around the local employment effect. According to some empirical researches, the local job creation potential of renewable energy investments is only marginal (Munday et al 2011, Varjú 2014). However, the examinations demonstrating macro-scale employment impacts tend to present large numbers. A national analysis predicts that the green economy will create at least 150–200 thousand workplaces, from which the renewable energy sector itself 70 thousand (Olajos et al 2011). The Hungarian Energy Biomass strategy indicates that until 2030, only the biomass systems will create more than 70 thousand new workplaces, 80% of this at rural areas (Lukács 2010). On the other hand, there is also a danger that by implementing a renewable energy project, only few of the actual investment is done by the local manpower. This also happened at the solar power park of a Hungarian settlement, where only the concreting was done by local businesses (Varjú 2014).

Besides the positive, local benefits, it is also important to emphasize that there are several barriers and obstacles that might hold back the rural renewable energy investments. It is important to emphasize, that these investments cannot be understood in a merely economic or technological sense. Examining the bioenergy sector through several case studies, McCormick and Kaberger (2007) identified the economic conditions, the know-how and the institutional capacity, as well as the supply chain co-ordination as the key barriers. They claimed that the lack of experience, knowledge gap and limited awareness hindered the investments. Moss et al (2015) highlight the organisational and ownership difficulties and institutional challenges by examining the German energy transition. It seems evident, that during renewable energy investments, non-technological barriers are even more characteristic, than technological barriers.

Presumably, one of the biggest barriers of successful renewable energy investments is the lack of knowledge and trust from the side of the potential users, i.e. the local community (Lukács 2010). No technological or legislative choice regarding the energy model can be effectively implemented without social consensus. However, the acceptance of the renewable energy sources is not always apparent (Liarakou et al 2008). According to Wolsink (2007), poor communication represents an important factor during the decision making process regarding the renewable energy investments at local level. Lack of information dissemination, awareness and community participation in energy choices and issues can rather lead to negative perceptions and social attitudes (Liarakou et al 2008). Pasqualetti also mentions the social barriers of the renewable energy sources. It is emphasized that social issues can be as important as – or in many cases more important than – simple technical issues. The mistake commonly made is to consider the technical and economic challenges as the only obstacles that must be overcome. (Pasqualetti 2011) Although, the willingness to participate in the processes is going to increase, if

the individuals get better understanding and a clearer picture of the issue of renewable energy investments (Rogers et al 2008). Through the empirical study, we wanted to analyse, what effort has been put into the issue of local community involvement in those rural settlements, where renewable energy investments have been already realized.

3. Methodology

It is important to make it clear that we were particularly focusing on municipality-led developments and left out other (private or household) developments from the examination, since these investments would demand different examination aspects, and by focusing only on municipal developments, the results of the empirical research are more comparable. By choosing the statistical sampling, two factors were kept in mind: only those settlements could be added to the sample, where at least one municipality-led renewable energy investment has been already made, and given the fact that the research is focusing on rural areas, the population of the settlement had to be under 10,000. The main difficulty of formatting the sample was that there is no official data concerning the renewable energy utilization of municipalities. However, municipalities are usually not able to implement such intense investments only by relying on their own financial resources. This is why the national or EU level financial supports are essential tools in the implementation, and it is worth approaching the question from this side.

During the 2007–2013 programming period, the national government of Hungary have launched several strategic planning programs, in order to supervise and assist the expenditure of the EU funds. One of these strategic programs was called the Environmental and Energy Operative Program, and it also aimed to give resources for local municipalities for renewable energy utilization. The list of municipalities, who have successfully applied for funds at this operative program is open and available. A database has been created listing all renewable energy projects of the above mentioned operative program. Altogether, 2,545 projects have been listed throughout the whole country, and then tightened according to the population of the settlements ($p < 10{,}000$). Finally, 748 settlements have been found, where the local municipality have implemented at least one renewable energy project, and the population was under 10,000. A questionnaire has been sent out to these municipalities, and 159 full answers have been collected (with the response rate of 21%[2]). The online data collection was conducted during November and December of 2016.

The territorial dispersion of the examined settlements is balanced throughout the country. We have collected answers from all the 19 counties of Hungary. According to the permanent population number of 2014, the smallest examined settlement has 214, while the biggest 9,121 inhabitants. The average population number is 3,270 with the median of 2,808. Taken into account the classification of Tóth (2002), the following table summarizes the distribution of the settlement-categories in the sample (Table 1).

Tab 1. Distribution of settlement-categories in the sample according to the population size. Source: questionnaire survey

Classification	Population	Frequency	Percentage
Tiny villages	$p < 1000$	23	14.47%
Small villages	$1000 \leq p < 2000$	34	21.38%
Big villages	$2000 \leq p < 5000$	67	42.14%
Huge villages	$5000 \leq p < 10000$	35	22.01%

The majority (50.3%) of the questionnaires were filled in by an employee of the local municipalities' office. However, in many cases (35.8%) the answers were given by the mayor. Fewer examples have been found to answers from notaries (11.9%), and board members of the local government (1.3%), as well as the vice major in one single case. In the followings, the concrete results of the questionnaire survey will be analysed.

[2] This means, that the confidence level is at 85%, with an uncertainty of less than 5%.

4. Results

Regarding the activity of the local municipalities, the 159 examined settlements have implemented altogether 422 renewable energy projects on different scales and from several financial sources. The highest number of implemented renewable energy project was 11, while the average project number is 2.65 per settlement. As for the financial sources of the investments, the high dominance of EU funds is clearly visible. More than 88% of the implemented renewable energy projects were financed through European Union grants. Considerably few projects were implemented through national resources (11.4%), and almost none has been realized through bank loans or private investments (0.2% each).

The organizational background at the local municipalities in the sample is worrying. As it is visible from Table 2, there are only 7 local municipalities (4,4%), which employ at least one person responsible for energy issues, and 2 further, who employ a professional together with other settlements. Although the positive answering rate is higher in the case of written energy strategy or concept, in 91% there are no such documents available at the local municipalities.

Tab 2. Organizational background of the local municipalities in the sample. Source: questionnaire survey

	Employee responsible for energy	Written energy strategy
Yes	4.4%	8.8%
No	94.3%	91.2%
Together with other settlements	1.3%	-

There were only 3 municipalities among the examined settlements, which both employ someone responsible for energy issues, and also dispose of a written energy strategy. In 139 cases (88.5%), none of it was present. Employing professionals together with other settlements could be a well justifiable measure, especially in the case of smaller rural settlements. However, as the sample shows, this kind of cooperation was only found in 2 cases. It can also be added to the analysis of organisational background, whether local municipalities examine the energy consumption of the municipality buildings. According to the response, although 78% of local municipalities examine the energy use of these buildings, only 26.5% do this on a monthly basis. 39.5% only examines the energy costs yearly, and 34% in turn only do this regarding to tender opportunities.

During the implementation of a renewable energy investments, it is very important to make the development professionally grounded. It is especially true in the case of rural settlements, where the available and easily exploitable local resources should determine the utilization. Therefore, measuring the local renewable energy potentials can be highly necessary. According to the sample, almost 40% of the settlements stated, that they have previously measured the local potentials. However, all of the examined municipalities have already made at least one renewable energy investment, which means, that 60% of the settlements have chosen renewable energy sources basically without professional advice.

5. Examining the local benefits

One of the most visible and firstly observed local benefit originating from renewable energy investments is the energy cost saving occurred at the municipality. Bearing in mind, that a local municipality has to cover the energy costs of a wide range of local institutions (for example, the mayor's office, nursery schools, house of culture or medical institutions, etc.), through the renewable energy investments, and the local energy production, they can decrease their operational costs and generate savings.

Regarding the possible cost savings, at first, it is important to esteem, how much the local municipalities spend on energy. Since there is no official statistical data on energy costs at municipal level in Hungary, municipalities were asked in the questionnaire, to give the rate of energy costs compared to the total municipal operational costs. The answers vary from 'below 1%' to 'above 30%' (Figure 1).

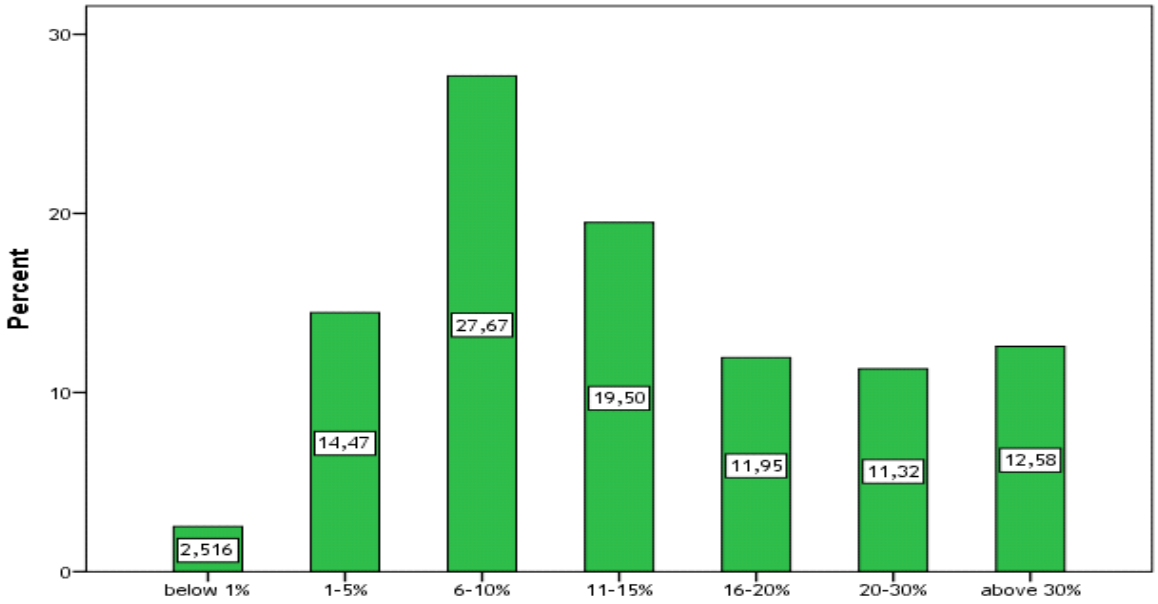

Fig 1. Rate of energy costs in the total operational budget according to the sample (N=159).
Question: Please, indicate in the followings, what is the percentage of energy costs in the total municipal budget?
Source: questionnaire survey

The answers show that in most cases, the energy costs have a share of 6–10% of the municipalities overall spending. The answers '11–15%' and '1–5%' were also frequently chosen and in many cases, the energy spending was above 30%, which can be understood as a huge expenditure. It is presumable, that the main reason behind the high energy costs is the low energy-efficiency of the buildings maintained by the local municipality. According to an estimation, an average Hungarian municipality spends 3–4 times more on energy, than a municipality in the EU15. Also the European Commission states, that the energy use of public buildings could be decreased by 30%, by focusing more on the issues of energy efficiency (Fülöp 2009).

As for the generated energy cost savings deriving from the total number of renewable energy investments, it can be stated that generally the energy cost saving was between 6–10% (Figure 2).

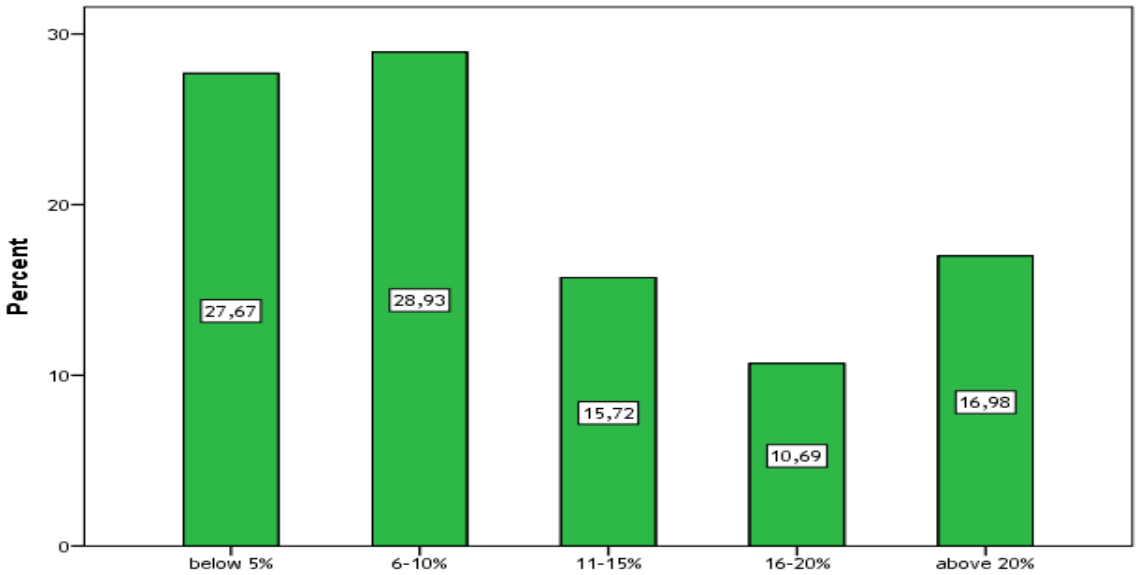

Fig 2. Proportion of the generated energy cost savings according to the sample (N=159).
Question: Within the extent of the municipality, what was the percentage of the generated energy cost saving since the renewable energy investments have been launched?
Source: questionnaire survey

As it is visible from the figure above, in almost 60% of the cases, the cost savings were under 10%, which could be understood as a relatively low rate of savings. On the other hand, 17% of the local municipalities achieved more than 20% cost saving, and in this term, they can be considered as more effective and successful in implementing the renewable energy investments. Empirical evidence shows, that the municipalities with higher cost savings implemented more renewable energy projects than the others (3.74 projects on average, compared to 2.65 in the total sample). Furthermore, they were also more active in examining the energy consumption of municipal buildings: 88% of them observed the consumptions regularly (33% did this on a monthly basis). Therefore, it can be stated, that those municipalities performed better in the cost savings, which put greater emphasis on gaining the necessary information about their current energy status. Presumably, they were aware of their deficiencies in energy-related issues, and could better choose and utilize the necessary investments.

As the previously presented literature emphasizes, besides the energy cost saving function, there are several more (additional) local benefits that can derive from renewable energy investments. In the questionnaire, municipalities were asked to determine and rate those positive benefits, which occurred at the settlement through the renewable energy investments. (Figure 3) The values of each local benefit can vary on a scale between -1 (negative effect) to 1 (positive effect). Values around 0 basically mean no perceptible changes, they can be considered as neutral. It is visible, that none of the local benefits are located in the negative range, which means, through the renewable energy investments, positive benefits indeed occurred at the settlements, however to a different extent. According to the empirical results, the most important local benefit is the positive impact on energy security (with a value of 0.7). Positive changes in the air quality (as an environmental factor), as well as the better health condition of the locals (deriving mainly from the latter benefit) are also frequent added values on local level. However, only a moderate impact can be observed on the appearance of new businesses, as well as on the local employment (with practically no positive effect).

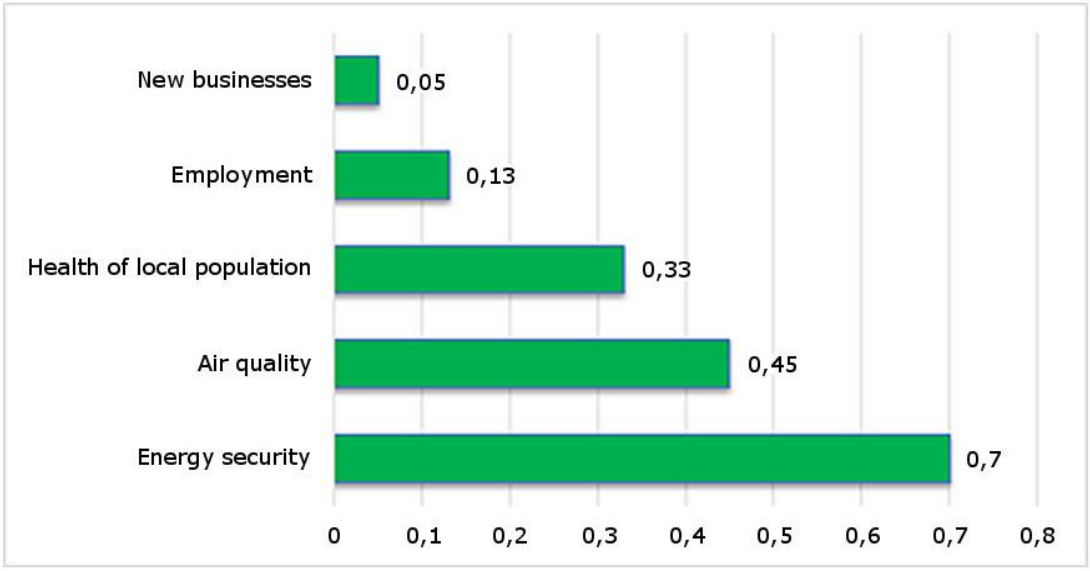

Fig 3. Importance of local benefits originating from renewable energy investments. (N=159)
Question: How do you rate the local municipality's renewable energy investments regarding the improvement of life quality? Please indicate, whether the renewable energy investment had a positive/negative or neutral effect on local level.
Source: questionnaire survey

To take a deeper look at the local employment effect, local municipalities were asked to give the number of created workplaces generated by the renewable energy investments (Table 3). As it is visible, in most cases the renewable energy investment did not generate a single job. The concrete number of created workplaces has also been estimated, by multiplying the frequency with the average of the answering option. This broad estimation shows a total number of 133.5 generated workplaces across the total number of 159 settlements, with an average rate of 0.84 generated workplace per rural settlement. Although, we can only estimate

this number, the high rate of zero created workplace suggests that the local employment effect of renewable energy investments is indeed only marginal at rural settlements.

However, it is possible, that by estimating the created new workplaces by the renewable energy investments, the local municipalities in the sample only considered the direct employment effect, which is a narrow interpretation. We can also mention the *indirect employment effect* (Cai et al 2011, Kucera 2009). This means, that the employment possibilities can be very extensive regarding the renewable energy investments. It might range from a single road construction through the production and maintenance of different machines and tools, to the wide spectrum of agriculture.

Tab 3. The number of new workplaces generated by the local municipalities' renewable energy investments. Source: questionnaire survey

Answering options	Frequency	Percentage	Calculated number of new workplaces
0	118	74.2%	0
1–3	35	22%	70
4–6	2	1.3%	10
7–10	1	0.6%	8.5
more than 10	3	1.9%	45[3]
Total	159	100%	133.5

6. Local community involvement

Besides the local benefits, we also wanted to examine the connection between the municipalities' renewable energy investments and the social innovation aspects. We wanted to analyse, how and to what extent the local community is being involved in the process, to see, how appropriately the municipality prepares the recipient space for the renewable energy utilization, and whether they are aware of the danger, that insufficient community involvement can hinder the success of the whole process. At first, we have asked what type of communication interface was used most often by the local municipalities regarding the renewable energy investments, by offering 10 alternatives (Figure 4).

The figure shows the frequencies of each type of different communication tools. There were 12 municipalities (7.5%) who have not at all implemented any of these tools, which means there has not been any kind of communication or local community involvement process regarding the renewable energy investments. 147 (92.5%) municipalities have implemented at least 1 method of community involvement or information, and there were 60 municipalities (37%), who have implemented all of the listed methods[4].

From the analysis of the frequencies, we can state, that the most widely used communication tool in the sample is the release of news on the municipalities' webpage regarding the different renewable energy investments. Quite often, different articles and reports appear in the local media, as the tool of informing the local community. Only the third most frequently used communication interface contains actual face-to-face contact with the local population, in the form of residential forums. However, it is important to emphasize, that regarding the renewable energy investments, not only the information is important, but the local community also needs to be involved in the processes as far as possible (Koncz and Nagyné Demeter 2015). And in this sense, the rate of efforts put into the training and education is concerning. Only 50% of the municipalities provided some kind of training or education activity for the youth in the local education institutions, while the rate of training provided for the adult population is below 40%, and the least attractive form of communication interfaces. The results of the empirical analysis show that local municipalities tend to apply one-way communication tools.

[3] with the estimated middle value of 15

[4] However, it needs to be mentioned, that the different tools of local community-involvement were already listed. If the local municipalities' have had to mention the methods by themselves, we assume that only few municipalities would have listed 10 methods.

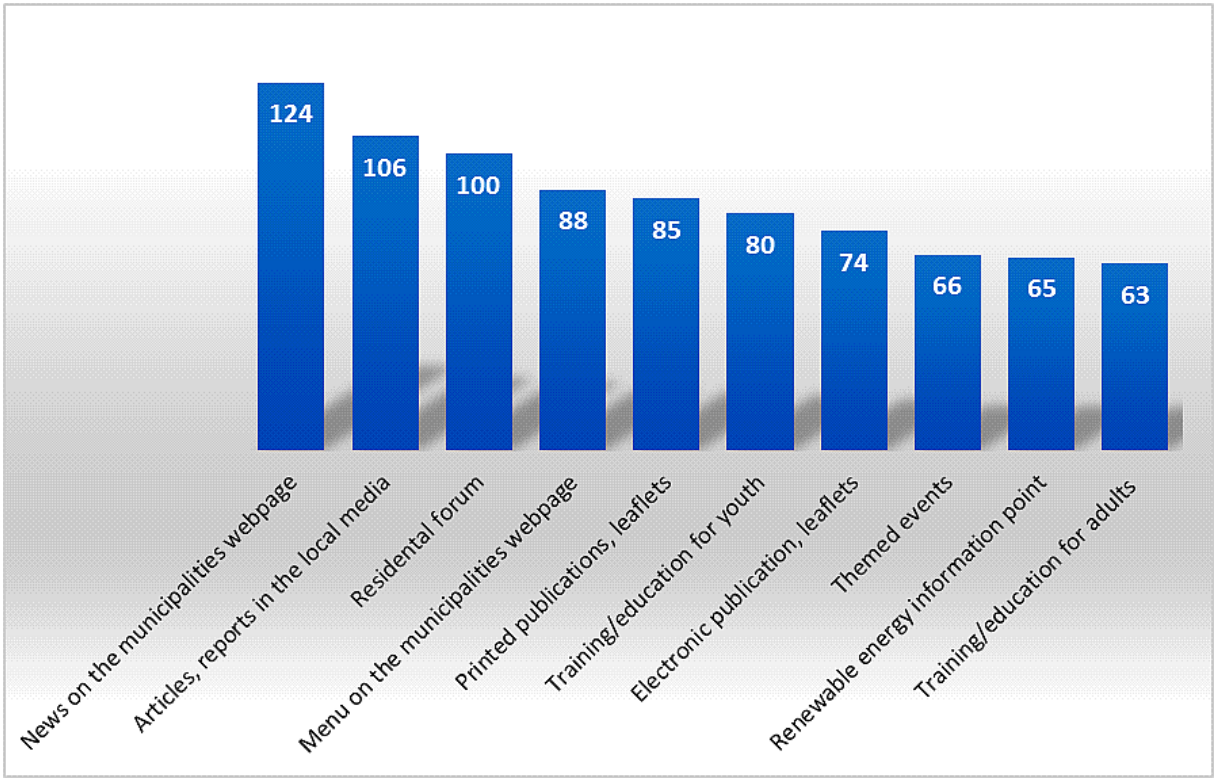

Fig 4. Frequencies of the communication interfaces in the sample (N=159).
Question: What kind of communication/information interface is ensured by the local municipality regarding the local renewable energy investments?
Source: questionnaire survey

As for the effectiveness of the different tools, further questions were also raised about the personal (face-to-face) meetings organized for the local community, and about the feedbacks on the municipal webpage. 35% of the municipalities have not at all organized any face-to-face meeting during the last one year, where the issues of the renewable energy have been mentioned. 62% have organized 1–3 meetings, while only 4% have done quite frequent (4–6) meetings on the renewable energy issues. These events usually attracted a small number of local residents, generally between 10–30 persons (55.3%), and there was only one single event, which attracted more than 100 people. We have also asked, whether besides the local population, the local civil organizations and the local business have been present at these events. The answers show, that the local business have been involved in the majority of cases (57.3%), while the civil organizations have attended these events very frequently (87.4%). It seems evident, that there is a need for the common platform from the side of the local businesses, as well as from the civil organizations. However, the possibilities often have to be created by the local municipalities themselves.

Regarding the effectiveness of the municipal webpages, we can state, that it is far less capable of appropriately serving as a platform for communication about the renewable energy issues. We have asked the local municipalities about the number of electronic feedbacks on the municipal webpages regarding the renewable energy issues during the last one year. The vast majority of the municipalities (71%) stated, that there was not a single feedback on the webpage. In few cases (25.8%), there were less than 10 feedbacks, and only in one case was the number of the electronic feedbacks more than 50. Bearing in mind, that according to the frequently used communication interfaces, the municipal webpage was far the most favourite tool, the effectiveness of the local community involvement in the renewable energy issues is highly questionable.

If we take a look at the engine of the local renewable energy investments, in most of the cases (64%), the starter of the development process was the mayor. However, this may not be such a surprising result. Busch and McCormick (2014) also state that mayors play a determinant role

in the renewable energy processes, especially in small municipalities. In 30% the local municipal office, and in 5% an external organisation was behind the investments. However, there was not a single case where the local community was the initiator. Once the investment had started, others have also joined and were involved in the development process. Still, the involvement of the local community shows great deficiencies (Figure 5).

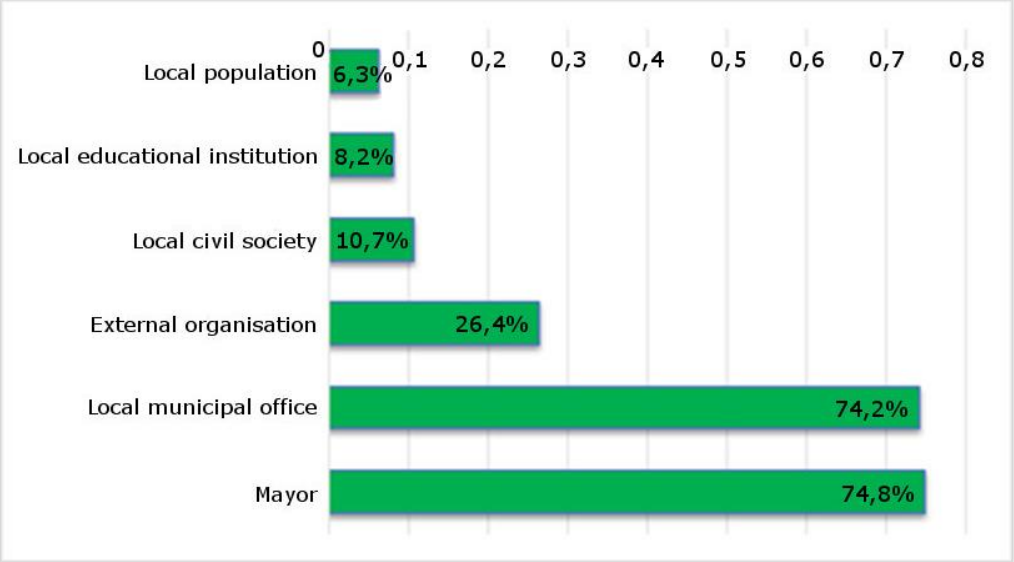

Fig 5. Participants of the renewable energy investments at local level (N=159).
Question: Who are taking part in the realization of renewable energy investments at local level? Who are those, who are actively supporting the process?
Source: questionnaire survey

It is visible, that after the initial decision about the renewable energy investment, the mayor (alongside with the local municipal office) remained the leader of the whole development process. Local civil organisations, local educational institutions and the local population were only very rarely involved in the implementation. On the other hand, external organisations played a higher role than the local community in the realization of renewable energy investments.

7. Discussion

The examination of municipality-led rural renewable investments raise several concerns and problems. Through the analysis of the results, we have identified four major threats that endanger the successfulness of the already implemented investments, and can also hinder the future renewable energy developments. These major threats can be summarized as follows:

(1) High rate of external subsidies and lack of private investments

By looking at the renewable energy investments implemented by local municipalities, it is visible, that the availability of EU funds played a highly determinant role. Almost none of the examined settlements have implemented renewable energy projects on their own (i.e., by using bank loans or private investments). This basically means, that local municipalities were utilizing renewable energy sources based on directives and incentives from the (sub)national level. However, this raises several questions. On one hand, in order to gain EU (or national) funds, local municipalities have to adjust their local needs to a more centralised project-system – and these project systems are not necessarily in accord with local resources (especially in terms of the most effectively utilizable renewable energy). On the other hand, high dependence on EU funds also make concerns about the future renewable energy investments: what happens, if local municipalities will not be able to utilize these sources anymore? Will they stop investing in renewable energy?

(2) Problems of the organisational background, lack of expert knowledge

The second threat is the weak organisational background and the lack of expert knowledge behind the renewable energy investments. It could be seen from the results of the survey, that local municipalities do not employ a professional responsible for energy issues, they barely dispose of a written energy strategy, and they do not really review the energy consumption on a regular basis. It is also possible, that because of the lack of expertise, local municipalities are not even aware of the true and valid energy saving capacity of the utilized renewable energy source as well. This also indicates, that the planned and already implemented renewable energy investments is highly concerning, because the strategic planning is questionable. How can local municipalities ensure that they are utilizing the most effective renewable energy source, if the expert background is missing?

(3) Low rate of direct local benefits

If we take a look at the gained local benefits deriving from local renewable energy investments, it is visible, that the direct effect remains rather low. As for the energy-cost saving (as an economic benefit), in most of the cases the energy saving was below 10%. Furthermore, in almost 2/3 of the cases, the renewable energy investment did not generate a single job at the rural settlement. It is true, that several positive benefits occurred locally, but these are rather connected to more global issues, like the better air quality or the enhancement of energy security. This result is concerning, because if local municipalities do not gain direct and tangible benefits from the utilization of renewable energy sources, they might stop the further developments.

(4) Insufficient local community involvement

And last, but not least, the insufficient local community involvement can be a clear danger regarding the successfulness of the renewable energy investments at rural areas. Local municipalities prefer to use one-way communication methods (like the municipality's webpage or the local media), although these tools are far less capable of appropriately serving as a platform for communication. Considerably, few municipalities put attention to the actual education and training regarding the renewable energy sources, although this would be able to increase the local social capital. Furthermore, in many cases, external organisations take part in the implementation, rather than the local population or the local civil society. Again, if the community involvement is neglected, and no support is coming from their side, local municipalities may decide to stop further developments.

Although these results derive from the examination of only Hungarian rural settlements, the above identified threats might be current and valid for others as well. In order to enhance the municipality-led renewable energy investments, it is highly important to differentiate financial sources, and also to give more space to actual bottom-up initiatives (nevertheless by keeping the national and EU funds available). It is crucial to increase the renewable energy expert knowledge among rural settlements, especially in the form of cooperation between them (for example, by hiring one energy professional responsible for more settlements). National financial and/or legal support could also speed up and support this process. Also in Hungary, there are several good examples of municipality-led rural renewable energy investments. It would be important, to share the knowledge, and make settlements aware of the direct benefits that can be gained through appropriately implemented renewable energy projects. Networking and shared knowledge could also be helpful to identify those (settlement-specific) problems that hinder the acquisition of higher positive benefits. And finally, an accurate stress need to be put on the local community involvement. If the local community accepts and understands the renewable energy investments, they can also become supporters and users of further developments.

8. Conclusions

The study wished to contribute to the better understanding of the processes behind the rural renewable energy investments led by local municipalities. Utilization of renewable energy sources is necessary from two sides: on one hand, it is important for Hungary to enhance energy security

on a national level, and to make steps towards the diversification of energy sources. On the other hand, utilizing renewable energy sources can also bring added value to rural areas, and with this, it can designate a new development path.

It is visible from the empirical results that several positive benefits occurred on local level, while implementing renewable energy projects. However, the easily visible and direct local benefits (mainly the cost-savings and the number of created workplaces) remained at a low level in many cases. As for the aspects of local community involvement, the results show, that only moderate effort has been put into the issue. Although most of the municipalities applied several communication/information tools, one-way communication techniques are the most widely implemented methods. It raises several concerns about the effectiveness of the local community involvement, furthermore these methods are not able to increase the local social capital.

Finally, four major threats have also been identified according to the analysis that can hinder the successfulness of previous investments, and also prevent future renewable energy developments. It is also visible, that these investments are majorly dependent on EU funds and tenders, so in most of the cases, the bottom-up approach is completely missing. Especially for rural settlements, it is highly recommended to take these dangers and threats into account when investing in renewable energy.

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