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Renewable energy's impact on rural development in northwestern Romania

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ABSTRACT

Romania has increased its production of electricity from renewable sources by relying on projects situated in rural areas. This paper explores the impact of renewable energy projects on rural development in northwestern Romania. The critical review of the literature has revealed that most studies stress the positive effects renewable energy projects can have on employment, demographics, revenues to the local budgets, and agriculture in the host communities.

We observed, however, that none of those studies had a quantitative approach and they do not study in a comparative manner these effects. This paper takes a step further and compares the evolution of the four variables for villages with and without implemented renewable energy projects. We compared the evolution of employment, demographics, revenues and processed agriculture land from 2010 to 2014. For the two groups of villages, the data shows no difference between villages with and without implemented renewable energy projects.

Introduction

Between 2009 and 2013, the share of renewable energy sources (RES) in the EU's energy generation mix increased from 9 to 16% and it is expected to grow up to 20% by 2020 (Eurostat Newsletter, 2016). This has brought about important changes in both the energy industry and public policy. The fast development of renewables put a lot of pressure on the energy system and requires new technical solutions to integrate renewable energy generation into the existing infrastructure. Because of these challenges, more and more authors discuss the impact renewables have on energy systems, price formation, and on the security of supply (Bolton and Foxon, 2014; Destouni and Frank, 2010; Goldthau, 2014; Markard, 2011). Others are concerned with the ecological impact of REP (Dincer, 2000; Quaschning, 2005). A smaller number of studies are separately addressing some of the changes that REP are producing in the economic and social landscape of local communities (ADAS Consulting, 2003; del Rio and Burguillo, 2008; Emmanouilides and Sgouromalli, 2013; Kammen et al., 2004).

From all the studies that analyze the link between socio-economic development and renewable energy projects (REP), we were interested in those that discuss the effects that renewable energy projects can have on the villages they are located in. Most papers that discuss the relationship between renewables and rural communities rely either on case-study research, or they look at national and regional data to make generalizations. On both these levels, scholars have found that renewable energy projects can have a positive impact on rural development in terms of employment, income, electricity prices, social capital, business opportunities, innovation or demographics. While certainly interesting and valuable, these papers have major drawbacks as they lack comparability and better contextualized understanding.

Looking only at the national or regional data on development does not tell us whether rural communities are profiting from the REPs. Also, focusing only on a few communities with implemented REPs does not tell us whether they are performing better than similar communities without such investments. But, how can we be sure that the development level is linked to the renewable energy projects at all? Would it be possible that renewable energy projects and rural development are only co-variating and in fact are dependent on a third, independent variable? Having these reasonable doubts in our mind, this paper wants to assess what is the impact that renewable energy project can have on the development of communities they are located in.

We take a step back and question the potential impact of renewable energy projects on rural development in terms of employment, revenues to the local budget, demographics and agriculture development. Relying on a large-N, quasi-experimental research design we observe the impact renewable energy projects can have on rural development

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by comparing villages that implemented renewable energy projects with villages that did not implement such projects. Since we cannot assume that solar, wind, hydro or biomass units produce the same effects on rural development, we will investigate the impact of each type of REPs on the economic and social well-being of local communities.

Our research focuses on the case of Romania. Between 2010 and 2014, the quantity of electricity generated from renewable energy sources[1] in Romania has increased tenfold. The increased share of renewables is the result of a development support scheme deployed by the Romanian Government in order to encourage the development of the REPs and comply with the Europe 2020 target goals set by the European Union. The fast development of this sector presented local authorities with promising new opportunities, but their results have not been properly assessed so far. Data from Transelectrica (the national electricity transport operator in Romania) indicate that the development of REP happened after 2010. Therefore, this paper uses 2010 as a starting point for assessing the impact of REP on employment, revenues to the local budget, demographics and agriculture development. Drawing on the findings of previous case studies, this research focuses on a smaller number of variables but compares a larger number of cases.

To answer the research question, this paper is structured along the following points:

1. Renewable energy and rural development - a critical review. This section discusses the existing literature and the link between renewable energy and development. The goal of this review is to discuss the main findings of other authors and identify the main shortcomings of their research. Through this critical review we will also argue why we selected the above mentioned four variables and why those are perceived by different studies to be affected by the deployment of a REP.
2. Methodology. This section presents the main methodological structure discussing the population and the sampling method, the data sources we rely upon and the specific methods used to analyze the data.
3. Analysis. In the first part of this point we present the state of renewable energy projects and existing renewable energy potential in North-West Romania. Here we will also discuss, based on a series of descriptive statistics, the main characteristics of the researched samples. In the second part of this section we compare the groups with installed projects with those that have attested renewable energy potential on the main socio-economic indicators. The use of descriptive and inferential statistics lay the foundation to discuss the main research question through hypothesis testing.
4. Conclusions and discussion. This section presents some possible explanations for the results and further implications of our research.

Renewable energy and development – critical review

Employment and demographics

Probably one of the most discussed effects of renewable energy projects is its effect on employment. Considering that renewable energy projects are developed mostly in rural areas (Dulcinea Cuellar, 2009; OECD, 2012;) one would expect that the villages where those projects are developed are benefiting in terms of employment, revenues to the local budget, demographics and agriculture development.

According to Del Rio and Burguillo, renewable energy projects can have a significant employment creation and income generation during the construction phase. In the operating phase, the employment effects can vary depending on the type of renewable energy project (del Rio and Burguillo, 2008, 2009). A wind power project for example, can produce relatively modest employment effects. However, a biomass power plant project will have a stronger impact on local employment given the necessity of harvesting raw materials, transportation to the production facility, and other operations required by biomass power projects (del Rio and Burguillo, 2008).

OECD research also highlights the positive effects that renewable energy projects are producing, especially in rural areas (OECD, 2012). The research notes that "in a small rural community with less than 1000 inhabitants in Extremadura, for instance, a large-scale (50 MW) CSP installation employs up to 40 people on open-ended contracts," (OECD, 2012). Further on, Kammen et al. argue that overall renewable energy projects have a positive effect on employment and that renewable energy generates higher employment per MW of produced energy than fossil fuel based energies (Kammen et al., 2004).

Probably the most emphasized example of positive impact on employment comes from Germany. The German Environmental Ministry reported that since 2004 the total number of green jobs increased by 55%, and by 2007 more than 250,000 people were working in the sector (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, 2009). Along the same lines, Buchan argues that the German case is a good example of the job creating potential of renewable energy projects. Buchan stresses also that if the German state would be able to keep the same positive employment dynamics while decreasing the direct subsidies to renewables, then REPs could become a viable long-term solution to unemployment (Buchan, 2012).

It is important to highlight however that most studies mentioned earlier do not measure employment effects throughout time linking those with the local community as well. We believe however that we cannot discuss about real effects on employment if those effects are not persistent throughout time, meaning an increase level employment. If however the projects increase the employment for a limited period of time, during the construction phase, but cannot sustain this effect we believe it is rather an overstatement to discuss about job creation potential at the local level. In that specific case we can discuss of positive externalities connected with a specific stage of project's deployment, a stage which itself can be quite limited in time. In our understanding, long lasting impact on development of a community is directly connected to a permanent type of employment that has the potential to generate sustainable development within the community. While it certainly is a positive externality of some projects, temporary employment cannot be considered as a sustainable, positive effect of a renewable energy project.

Alongside the positive effects on employment, del Rio and Burguillo highlight the positive impact produced by REPs in three rural settlements in Spain. While none of the projects led to migratory in-flows to those villages, the REP contributed to "keeping of some people in the local territory" thus preventing emigration. (del Rio and Burguillo, 2009). Given the increasing general migration trends from rural to urban areas (Lang, 2010), keeping people in rural areas is can be considered a positive effect of REPs. By looking closely at the case of Navarre in Spain, Faulin et al. found positive effects on youth employment (Faulin et al., 2009). Based on those findings Faulin et al. suggest that for the case of Navarre the development of REPs had also a positive impact on the structure of the population by employing more young people, thus preventing the aging of the local population (Faulin et al., 2009).

While they differ in type of argument and geographical area, all of the studies mentioned above agree on the positive effect that renewable energy projects can have on employment. Whereas less discussed, the positive effect on demographics is also connected with the development of renewable energy projects.

We believe however that there is an important aspect neglected by these studies. Specifically, none of the researches looked at employment and demographic dynamics in villages without REPs. In order to observe the real impact a project can have in a specific rural community we have to compare communities that host REPs with similar communities that

[1] Romania has a big part of electricity generation coming from hydro-power plants. Even though hydro generation is considered renewable energy sources, according to Romanian legislation only hydro-power plants with a maximum installed capacity of 10 MW can be entitled to renewable energy support scheme. In this context, renewable energies in this paper will refer to all types of renewable energy sources, excluding hydro-power plants with an installed capacity bigger than 10 MW unless otherwise stated.