Assessment of social acceptance of geothermal energy exploitation in southern Italy

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Keywords: social acceptability, geothermal energy, Termini Imerese, VIGOR Project, South Italy

ABSTRACT

This paper presents the preliminary results of a cultural and social acceptability assessment of geothermal energy exploitation in southern Italy; this research was carried out in the frame of the national project 'VIGOR' led by CNR (Italian National Research Council) and the Italian Ministry of Economic Development to investigate the potentials of geothermal energy exploitation in southern Italy. The research was designed as a case study and carried out in the province of Palermo, Sicily, where CNR has conducted geological prospecting in order to establish the geothermal potential in the area of Termini Imerese.

The area of Termini Imerese was selected as case study as a step towards designing approaches for "upstream" public engagement, i.e. engaging citizens in the early steps of eventual technology developments that impact their daily life.

The case study has two basic components: (1) Focus Groups were conducted with four different groups of citizens and stakeholders from the selected area; (2) a Survey with a sample of 400 citizens calibrated by gender, age, education and residence was carried out in the province of Palermo.

Energy issues are clearly perceived as very politicized at the moment and major concerns rise from lack of confidence towards politicians, energy companies and institutions in general, to adequately manage innovation processes in the energy sector in general.

Our tentative conclusions are that there is considerable openness and interest in geothermal power but there is still quite a lot of work on societal dialogue to be done to accommodate public concerns, reduce uncertainties and set the eventual development of geothermal energy exploitation on a socially and culturally sustainable path.

1. INTRODUCTION

Socio-political and community acceptance are increasingly recognized as being of primary importance for the successful implementation of renewable energy policies (hereafter renewables) policies (Pellizzoni, 2000, 2010). However, until recently, systematic studies of social and community acceptance of technologies that exploit geothermal energy have been somewhat neglected perhaps because preliminary indications of high levels of public acceptance have been interpreted as unwavering support for the future (Dowd, 2010, Wüstenhagen, 2007).

In Europe, the results of Eurobarometer surveys on the evolution of the public opinion on science and technology matters indicate that the public strongly encourages the exploitation of renewable energies, particularly solar and wind. Compared to traditional fossil fuels and nuclear power, the European citizens regard low emission technologies with considerable optimism and confidence, however and this point needs to be underlined, they also expect to have a voice in decision making, particularly when it directly affects their communities (Gaskell, et al 2010, Gaskell et. al. 2011). The results of the 2010 Eurobarometer survey on energy technologies show that a large majority of Europeans support the use of solar (87%) and wind (84%) as sources of energy, while nuclear energy is as much opposed (39%) as it is encouraged (39%).

In recent years, there has been a sustained growth of criticism in the field of science and technology studies

(STS) on the traditional understanding of the complex interactions between risk, responsibility, and the science–policy relationships. Such criticism builds on the idea that the natural and social orders are ‘co-produced’. In this view, scientific facts are neither a mere registration of reality nor the epiphenomenon of social and political interests. Rather than discovery, knowledge is a matter of invention or manufacture; yet this means more than just ‘social construction’: it is the result of human intermingling with materiality. The social and natural orders are co-produced (Pellizzoni, 2010). ‘‘Science offers a framework that is unavoidably social as well as technical since in public domains scientific knowledge embodies implicit models or assumptions about the social world’’ (Irwin and Wynne 1996, p. 2). In other words, ‘‘the ways in which we know and represent the world (both nature and society) are inseparable from the ways we choose to live in it’’ (Jasanoff,2004, p. 2). There is a ‘‘continual interpenetration of political choices or commitments and the production of reliable knowledge’’ (Jasanoff, 2005).

This line of scholarship has been further fuelled by a series of public controversies over the last two decades, such as the furore over GM food or high speed trains and confusion over vaccines are just few of the very well known examples of such epic controversies that have brought about new approaches to the relationship between science and society. (Siune et al, 2009) What has become known as “upstream” public engagement with technological progress, meaning that citizens should be engaged in the policy process from the early stages, is by now an essential component of the *Responsible Research and Innovation (RRI)*. A new approach that has become increasingly important within policy narratives, in particular in Europe, where it will be a cross-cutting issue under the prospective EU Framework Program for Research and Innovation “Horizon 2020” within which societal dialogue is seems aspivotal to successful implementation of innovation policies (Von Schomberg, 2013).

The research that this paper reports upon has three primary objectives. First, to explore the views and opinions of local communities regarding the potential and real exploitation of geothermal energy through a detailed case study conducted in southern Italy in late 2012. Second, to contribute to the literature on public engagement with technologies in Italy (Allansdottir & Veltri, 2011) Finally, to contribute to the growing scientific and social-scientific literature on social acceptance of geothermal energy, valuable in itself but is also an important input into policy making in this area.

2. THE VIGOR PROJECT

This paper presents the preliminary results of a cultural and social acceptability assessment of geothermal energy exploitation in southern Italy carried out in the frame of the national project ‘VIGOR’ led by the Italian National Research Council (CNR) and the Italian Ministry of Economic Development (MiSE) to investigate the potentials of geothermal energy exploitation in southern Italy. The MiSE, CNR, and Region Sicily selected as case study the area of Termini Imeresein the province of Palermo, Sicily, where CNR has conducted geological prospecting in order to estimate its geothermal potentials.

Hydrothermal circulation in this area is proved by the occurrence of two main and well-known hot springs, “BagniVecchi” and “Bagni Nuovi”, with flow rates between 5 and 15 l/s and temperatures around 42 °C. Additional indications of hydrothermal activity make this area particularly interesting for low enthalpy exploitation (Iorio, M., VIGOR Conference, 20th November 2012).

Geological, morphological, and hydrogeological analyses, as well as geochemical sampling and geophysical investigation shave been conducted in this area, and a comprehensive model of flow circulation has been reconstructed.

Based on the geothermal potential rated by these studies and on the environmental sustainability of the proposals some power plant solutions have been suggested (Iorio, M., VIGOR Conference, 20th November 2012).

Three main scenarios of low enthalpy flow exploitation have been suggested: in the traditional touristic and therapeutic sector (thermal baths), for district heating by low enthalpy aquifer, and in the fish farming industry.

The area of Termini Imerese was selected as case study as a step towards designing approaches for “upstream” public engagement, i.e. engaging citizens in the early steps of eventual technology developments that may impact their daily life. The various socio-economic parties of Termini Imerese (citizens, stakeholders) were particularly sensitive when fieldwork was conducted to issues regarding innovation and energy policies. The poignancy of the situation was further accentuated by impending regional elections at the moment of fieldwork, when the Region Sicily was in a moment of political transition.

3. METHODS

To explore the social attitude towards geothermal energy technologies, we used a mix of qualitative and quantitative methods. Ourcase study has two basic components: (1) Focus Groups were conducted with four different groups of citizens and stakeholders from the selected area. (2) A survey with a sample of 400 citizens calibrated by gender, age, education, job condition, and residence was carried out in the province of Palermo. All fieldwork was conducted in October 2012.

3.1 Focus groups

Four focus groups were conducted with members of the general public during October 2012. Participants were recruited by a survey agency and a total of 32 people attended the focus groups.

The four focus groups comprised a homogeneous sample of University students (Students Focus Group), members of the general public of Termini Imerese (Citizens Focus Group), stakeholders of the energy sector (Stakeholders Focus Group), and ex-workers of the Fiat plant of Termini Imerese (Fiat workers Focus Group).

Each focus group was conducted by a facilitator and an observer and lasted one half hour. We transcribed focus group dialogues and we analyzed data by N-Vivo Software.

3.2 Questionnaire

A survey agency recruited a sample population of 400 citizens living in the Palermo Province, calibrated by: gender (52% female/48% male); age (27% between 18 and 34 years, 36% between 35 and 54 years, 37% more 55 years and more); education (22% low school, 35% middle school, 43% high school/university); size of the town of residence (28% up to 20 thousand inhabitants, 32% living in town between 10 thousand and 100 thousand, 40% living in town with more than 100 thousand inhabitants); job condition (entrepreneur, retailer/artisan, employee, student, unemployed).

Twelve closed questions on energy issues, environment, and renewable energies compose the survey. All, except one question were ranked, on a six-point scale ranging from 1 (very low level of agreement/acceptance) to 5 (very high level of agreement/acceptance), and including 0 to for agreement/acceptance of uncertainty. The survey was administered by phone using CATI (computer assisted telephone interviewing) method.

4. RESULTS

4.1 Support for geothermal

The survey results show that views on geothermal energy are less formed amongst citizens than views on technologies that exploit and harness solar and wind energy. These findings can be helpful for the community of scientists, engineers and policy makers shaping the future of field of geothermal energy.

When asked if technologies would improve our way of life in the next 20 years, 54% of the respondents of the survey answered that solar power would have a positive impact, 46% thought so of wind power, while only 17.5% thought the same of geothermal energy (Fig 1).

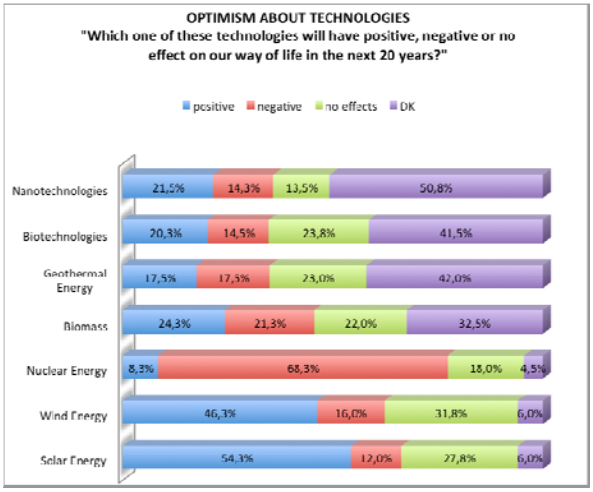

Figure 1: optimism towards energy technologies

Exactly the same proportion believes that geothermal energy would make life quality worse, while the proportion of respondents claiming the same for solar power stands at 12%, wind power at 16%, and nuclear power at 63%. The important difference is the high percentage of uncertain (“I don’t know”) answers: 42% for geothermal energy and 6% for solar and wind energies. Interestingly, geothermal energy appears to be perceived in manners more similar to biotechnology and nanotechnologies, which have been included in the survey for comparative purposes (Fig 1).

During the focus group, support and concerns surrounding geothermal exploitation were discussed in more nuanced detail. Our findings suggest that on the whole, the general public regards low emission technologies, geothermal plants included, with considerable optimism and confidence. It should be noted that no concrete plans were put before the participants to seek their approval or rejection at this stage.

In general, focus group participants associate geothermal energy exploitation with potentially positive consequences on employment, environment, advancement of innovation in Sicily, reduction of energy costs and much desired dependence from other countries when it comes to energy provision.
Participants show this support by comments like the following.

“A new energy technology is welcome for the development of Sicily. For new employment opportunities. For costs of energy bills. For the environment”. (Fiat workers focus group)

“I’m positively impressed, the discussion is very interesting, these projects [geothermal plants] are very good for the future… bringing down the pollution, we that geothermal could make energy costs lower…” (Fiat workers focus group)

4.2 Energy policy and public participation

The participants of our four focus groups see the Sicilian as well as national bureaucracy, politics, and culture as the major obstacles for the development geothermal. Economic investments are perceived as inevitably and intricately connected with financial speculation, corruption, and mismanagement.
Energy issues are clearly perceived as very politicized at the moment, and major concerns rise from lack of confidence towards politicians, energy companies and institutions in general, to adequately manage innovation processes in the energy general sector.

“We are badly administrated”. (Citizens focus group)

“We miss a culture of common goods”. (Fiat workers focus group)

“Bureaucracy is too slow”. (Fiat workers focus group)

“We have two kind of problems: one is bureaucratic and the other one is political”. (Stakeholder focus group)

“There are too many interests of political and Mafioso order”. (Citizens focus group)

“Geothermal heat exploitation is a good idea, but we saw how it worked for wind farm: they took money from energy subsidies but many plants are not working”. (Citizens focus group)

“Politic depends on excise tax on fossil fuels”. (Citizens focus group)

The strong Sicilian identity of the participants in the focus groups was highly salient, and respondents called for greater involvement of citizens on land management and energy decision-making. Perhaps this level of general lack of confidence in politics was more of a Sicilian concern and while levels of confidence are of course of great importance for the development of the sector, care should be taken not to extrapolate to other European communities at the moment.
Several participants mentioned Sicilian interest in opposition to the Italian ones, and direct social and economical advantages for the Sicilian people are cited as fundamental prerequisites for geothermal exploitation on regional land. The economic interests of the big energy companies are often perceived as in contrast to interests of Sicilian citizens.

“The problem is that Sicily has always been a land where people speculated. Where in every possible way Sicilian citizens have been cheated.” (Citizens focus group)

“It is better to exploit renewable resources than the fossil fuels. What is important is that Sicily has its return. The geothermal energy of Sicily belongs to Sicilians”. (Student focus group)

“Sicily is under the heel of Italy. We are considered as a holder of votes”. (Fiat workers focus group)

Apart from the aforementioned bureaucratic and political concerns, the main limits perceived by the citizens to a diffuse development of geothermal technology are the high costs of power plants, for which public incentives are seen to be necessary.

Other recent studies on social acceptance of geothermal technologies carried out in Australia show concerns about water usage, seismic activity, and gas emissions (Dowd, 2010). The very same themes were present in our discussions in Sicily, but were not the prevalent concerns. Environmental concerns of geothermal plants development seem to be perceived as of secondary importance. Much of the industrial area of Termini Imerese has been recently dismantled, and the participants were primarily focused on the potentialities and positive impacts on local employment potentially offered by the harnessing of geothermal power plants in their area.

The conversion of the current industrial area of Termini Imerese, at the moment mostly unused, is supported.

“The damage on the land has already be done… Since the industrial area is there, we could use it to develop new social opportunities”. (Students focus group)

“Termini Imerese has already an industrial area which is becoming a ghost town. We should convert it instead of living it empty”.(Citizens focus group)

Within this general support, the students show more skepticism about the potential positive impacts of geothermal energy exploitation, and are much more vocal than the other three groups in demanding more information about the benefits and risks of the exploitation of geothermal energy.

4.3 Geothermal energy and public information

Both questionnaire and focus groups show the common need to generate and distribute more information about renewable energies, primarily geothermal. Compared to other renewable energies, our respondents in general feel less informed about geothermal technologies: different types of heat exploitation, i.e. high-low enthalpy, are not differentiated.
Questionnaire results show that only 17% of the participants have heard about geothermal energy. When asked which subject of geothermal exploitation they would like to be more informed about, the interviewees show more interest for the economic impacts on the local community than for environmental consequences (fig. 2).

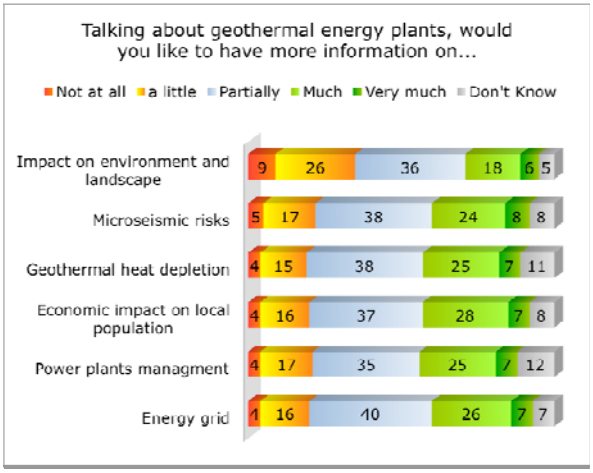

Figure 2: information required on geothermal plants

During the focus group, information issues regarding geothermal exploitation were discussed in more detail.

Participants feel not enough informed about green energy opportunities and more efforts in communication and education programs are felt as required to enhance public awareness.

“We need more information. I work in the schools and we never talk about renewable energies. School goes on by single projects, we miss a long term plan on environmental education”. (Stakeholders focus group)

“Environmental law is not included in the programs of Sicilian law faculties”.(Stakeholders focus group)

“What I see is a diffuse ignorance and no efforts to overcome this ignorance. In my opinion, politics works better in ignorance and that’s why they want to keep this situation”. (Stakeholders focus group)

“We miss a public information, which is different from marketing information” (Citizens focus group)

“To say if we are in favor to this kind of energy exploitation, we need to have all the information to balance pros and cons” (Students focus group)

When asked about the reliability of information sources, interviewees show high level of confidence in researchers and universities (37%). The lowest rates of trust are associated with local administrations and

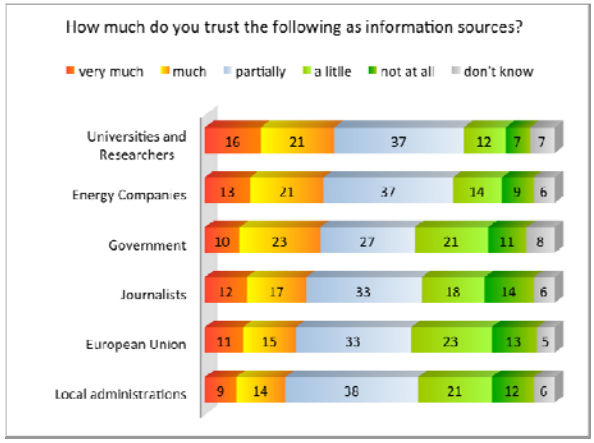

Figure 3: confidence in sources of information

(24%) and European Union (25%). (Fig. 3)

“We can meet and talk about it, but we are not expert. Researchers should find the right place for development and go there and illustrate opportunities”. (Citizens focus group)

“If in Tuscany they already have this kind of plants, Sicily could be inspired by the experience of that area. They should ”. (Citizens focus group)

“This discussion was very interesting: we talked fit together many aspects. We miss this kind of discussion and participation”. (Citizens focus group)

“To discuss this subject, we need more information. We are not experts and we don’t know how geothermal plants could impact”. (Students focus group)

“As Enel Green Power we are giving many lessons in Sicilian schools”. (Stakeholder groups)

“We need more information. What we know is most from companies advertising”. (Stakeholder groups)

In conclusion, we can say that information on renewable energies is perceived as crucial for a participated development of geothermal plants. This is for many reasons: to educate young people, to spread a new culture environmental friendly and to educate new experts at high level. Experts (researchers and scientists) are indicated as the most reliable actors to spread this kind of information.

5 Conclusions

The results from the case study at Termini Imerese in the province of Palermo, Sicily, indicate that there is considerable openness towards, and interest in,the potentiality of geothermal power exploitation in the considered area. However, the results also indicate

rather profound confusions and low levels of knowledge on the subject. This underlines the need to strongly reinforce societal dialogues and information campaigns in order to accommodate public concerns, reduce uncertainties, and set the eventual development of geothermal energy exploitation on a socially and culturally sustainable path.

Findings show apparent contradictions between political, citizens and companies interests. In this sense a developing strategies for of stakeholders to become mutual responsive is strongly needed.

Crisis seems to highlight, if not accelerate ,the necessity to consider environmental, social, economic and political processes as a whole in which dialogue and interaction between different stakeholders - both on local and global scale - are now essential.

When talking about new technologies and land management, upstream involvement of citizens is strongly related with the success of projects itself. Public debate and social acceptance enables the setting of innovation and politics agenda priorities on a path toward social desirable development.

According to the results of our study, efforts for public involvement of citizens in Termini Imerese should be based on a sound concerted communication action strategy. In this regards is it important to stress that the respondents, both to the survey and those who participated in the focus groups clearly perceive researchers and scientists to be the most reliable sources of information and play an important role in the public dialogue towards socially suitable innovation processes.

Geothermal activity is of course nothing new to the local communities in the province of Palermo. However, the potential opportunities offered by the exploitation of geothermal energy are mostly unknown by local citizens. A reasoned debate over the path of future innovation in this field Must be based on adequate levels of knowledge of the benefits and risk.

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Acknowledgements

The present activity has been performed in the frame of the VIGOR Project, aimed at assessing the geothermal potential and exploring geothermal resources of four regions in southern Italy. VIGOR is part of the activities of the Interregional Programme “Renewable Energies and Energy Savings FESR 2007-2013 – Axes I Activity line 1.4 “Experimental Actions in Geothermal Energy”. The authors acknowledge the management of VIGOR Project, and in particular Dr. Piezzo of MiSE-DGENRE (Directorate General for Nuclear Energy, Renewable Energy and Energy Efficiency of the Ministry for Economic Development) and Dr. Brugnoli, Director of CNR-DTA (National Research Council of Italy, Department of Sciences of the Earth System and Environmental Technologies).