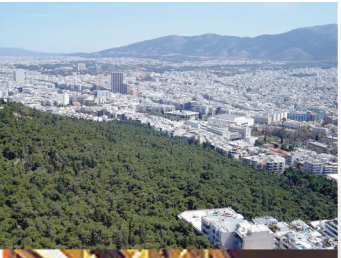

ENGINE

ENhanced Geothermal Innovative Network for Europe

Workshop 6

Increasing policy makers' awareness and the public acceptance

13 - 14 September 2007

ATHENS-GREECE

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Workshop Abstracts

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Edited by: Evgenia Kontoleontos (CRES)

ΚΑΠΕ
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Cover pictures
Thumbnail upper top: view from Lycabetus Hill, Athens, Greece.
Thumbnail lower top: Hotel Holiday Inn, Athens, Greece.
Background: Drilling exploration in Milos Island, Greece.

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EL SALVADOR

ABSTRACT SUMMARY

SESSION 1

CASE STUDIES ON POLICY MAKERS' AWARENESS AND PUBLIC ACCEPTANCE


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Policy makers' awareness and public acceptance on geothermal projects in the Paris Basin

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Geothermal district heating (GDH) in the Paris Basin was initiated, in the late 1960s, on the emblematic Melun l'Almont site, South of Paris, pioneering the well doublet concept of heat mining. This design was extended later to the Paris suburban areas, leading to the completion of 53 GDH grids of which 34 remain on line to date, supplying yearly 1,000 GWht to over 100,000 equivalent dwellings, thus suppressing ca 500,000 tons of CO2 atmospheric emissions. The initial stimulus was provided under a private enterprise scheme, a joint venture associating a heating service company and an equipment supplier /installer, irrespective of any energy price crisis whatsoever. Development follow-up, further to the first and second oil shocks, could be achieved thanks to a thorough, massive, involvement of the French State addressing relevant pre-feasibility /feasibility assessments, legal/institutional, mining risk/insurance, loan/financing, supporting measures. GDH grids, most of them operated by public entities (townships, social dwelling agencies), serviced social dwelling buildings and public offices and educational/recreational facilities. From early infancy diseases to teen and mature age, GDH experienced a critical learning curve period (mid 1980s-mid 1990s). Only could the "stakeholder" supporting policy, pursued during the early exploitation stages, enable GDH to survive and overcome severe technical, and more over, managerial and financial shortcomings in an adverse, high debt/equity ratio, low income and economic environment.

Needless to say, during this critical period GDH built a poor image. It was perceived by end users as an expensive, poorly reliable technology leading occasionally to troublesome, noisy, smoky and foul-smelling heavy maintenance (well work over) operations. Simultaneously, GDH, delicate euphemism, received a weak support from two major stakeholders, public energy (power, natural gas) utilities, sought as competitors (electric, individual gas heating) rather than partners in spite of profitable returns from GDH supplies/sales (ca 70,000 MWhe and 350,000 MWht respectively). Summing up, until recently, there had been little interest from the public and the media towards geothermal energy and GDH issues. Indifference, at the best, prevailed instead. Long regarded as an exotic curiosity of limited energy impact, GDH is progressively gaining consideration from authorities and stakeholders, sympathy and awareness from the public, echoes from the media.

This is a consequence of growing environmental clean air concerns, oil and gas prices escalation, correlated GHG emissions vs global warming evidence and, last but not least, a credit paid to both managerial and entrepreneurial maturity of GDH operators and efforts of the geothermal community at large in bridging a long noticed communication gap and attracting wider social acceptance. The latter resulted in increased lobbying among concerned, local/regional authorities and national/EU institutions and communication streams via open door events, stakeholder informative meetings, news/press releases, well documented topical websites/homepages, training/educational short courses and lectures (universities, engineering schools), school teaching staff briefings, primary/high school "initiation to GE "games and tests.

Worth mentioning are the changes, compared to their previously, poorly motivated, wait and see attitude, noticed within the energy utilities, advocating their, recently discovered, dedication to REs. As a result, (i) attractive natural gas prices could be negotiated by GDH operators to meet their relief/back up natural gas demands, and (ii) support to heat pump designed systems provided by the power utility.

Such actions should be maintained and further initiatives promoted in order to perpetuate and extend the present GDH scheme in a sustainable geothermal resource management vision, targeted fifty years ahead from now. This requires an increased participation of all concerned parties, ad-hoc policy makers/executive agencies, enlarged stakeholders' involvement, local township commitments and interactive communication between the operators and the public.

Geothermal Development in Mt. Apo National Park, Mindanao, Philippines

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The Philippines is endowed with abundant geothermal resources and remains in second position among the leading geothermal countries in the world. The country's installed capacity of 2,027 MWe is now being sourced from seven production areas, two of which were carved from environmentally sensitive areas declared as national parks. Until the late '80s, development of geothermal areas in the country was given government approval through issuance of Presidential decrees. On the other hand, The Mt. Apo project in Mindanao and the Northern Negros project in Mt. Canlaon had to pass environmental certification procedures prior to start of the development phase. Mt. Apo was developed as part of an energy diversification program in response to an impending power shortfall in the island of Mindanao, which relied heavily on hydroelectricity. During that period, environmental groups, civic societies, non-government organizations (NGOs) and religious clergy had been spearheading opposition to major infrastructure projects of government.
The development of the project was stopped in 1988 after the successful drilling of two wells. It was put to test because the mountain was a national park, and it was considered the ancestral domain of indigenous tribes. Several legal, socio-cultural, economic, environmental and ancestral tribal rights issues had to be resolved by all stakeholders. After 4 years of protracted consultations and consensus building, an environmental compliance certificate was issued. The controversy associated with the project became the reason for foreign funding institutions not to extend their loans and assistance. From its own funds, PNOC Energy Development Corporation successfully commissioned the first 52 MW power plant in 1997. As the project had mastered full support and acceptance of all stakeholders, its development would later become a model for future projects needing to undergo deep environmental and socio-cultural scrutiny.

Stakeholders involvement in the geothermal projects: Learning from PR experience for geological disposal of the radioactive wastes

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A wide application of the geothermal energy is hampered by not only the economic and technological problems, which remain though the main ones, but also by insufficient awareness of this kind of the geoenergy by decision-makers and public. Furthermore, the exploitation of the geothermal energy in some places causes the environmental problems, including the psychological environmental discomfort. Therefore, the active communication to the public and decision-makers remains a very important issue. As an example, the operation of the only geothermal plant in Lithuania was brought under serious risk recently. The activities related to the geological disposal of the radioactive wastes (GDRW) count almost half a century. Yet, there is no disposal site operating in the world so far. The main factor, besides to technological problems, is the negative public acceptance of the options, which, in a way, was the reaction of the public to PR mistakes. During the recent years GDRW projects considerably progressed in some countries. The break-through was achieved mainly by overcoming the public opposition by extensive involvement of the stakeholders into the all stages of the GDRW activities. Lithuania faces the same problems related to RW management in the country. The overview of the experience, both negative and positive, of different countries in stakeholder involvement is summarised in the presentation, including experience gained in Lithuania.

An overview of the barriers for sustainable development of GEOTHERMAL ENERGY potential in Nisyros-GR, Pantelleria-I and Guadeloupe-FR Islands.

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Exploitation of geothermal resources for electricity production and other direct uses is especially well suited to islands without primary energy sources. It is competitive with fuel powered plants and is an indigenous, environmentally -friendly renewable energy source. This is well illustrated by the successful development of geothermal energy at Bouillante, Guadeloupe (F.W.I.) where a 14 MWe geothermal power plant is operating. Other peripheral islands of the European Union are doted with geothermal resources, e.g. Nisyros in Greece and Pantelleria, Italy. However, until now, there is no exploitation.

The project GE-ISLEBAR, supported by the European Commission (5th FP), provided a benchmark of these 3 case studies (Nisyros, Pantelleria, Guadeloupe). Its goals were to analyse barriers to the development of geothermal exploitation on these islands, to compare them and to propose actions in order to overcome these barriers.

The implementation of a geothermal exploitation in such islands has to face several potential barriers related to:

- Availability of a geothermal resource with characteristics compatible with a commercial exploitation
- Local demand in energy sufficient to justify a development project
- Economical attractiveness of the investment
- Environmental constraints
- Public acceptance
- Conflict of interests with other economic operators
- Lack of a strong entity to manage a development project

Each of them has been considered as a criticality and a "criticality index" has been set up in order to scale the "height" of these barriers. It appears that despite a quite homogeneous economical attractiveness, Guadeloupe differs from the two others islands on the absence of important environmental, sociological or organisational barriers that can jeopardize the development of projects.

Furthermore, one of the main barriers for the small-scale geothermal exploitation well-suited for peripheral islands is related to the high and risky investment costs of additional exploration and drilling. This barrier can be overcome by setting an appropriate mechanism covering the "Mining Risk" supported by Public Funds, like in Guadeloupe.

Other strong barriers are related to the lack of strong entity/investors who take on the unavoidable technical and financial risks of a project, and to the public acceptance of such

projects - local population as well as tourists are not keen to see industrial facility in beautiful landscapes. Efficient actions of dissemination towards the local community, decision-makers, investors, showing the potential benefits of geothermal exploitation appear to be a prerequisite to overcome these barriers.

Geothermal projects in El Salvador and its environmental and social aspects

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In El Salvador as in several countries worldwide, the geothermal power projects are widely believed to be an environmentally friendly alternative for electricity generation and other direct uses, in particular because they produce only small amounts of greenhouse gases. However, in practice, some geothermal projects receive very strong opposition from local and environmental groups, to the point where some projects have been held up for years, or completely stopped. In order to achieve a successful development for a geothermal project the aspects concerning to the local communities and environmental groups must be addressed to their satisfaction, even though sometimes this means going beyond the mandates of law. LaGeo as part of its Corporative Values has Social Responsibility issues that covers several local communities involve activities like geothermal education, computer class for primary school, banana farm, wildlife conservation, etc. In spite of Social Responsibility concerns, the public acceptance for the geothermal development is not yet in the level to move forward smoothly. This kind of development is seen in LaGeo as both a moral imperative and good business practice.

GEOTHERMAL DEVELOPMENT AND SOCIETY. The case studies of Milos and Nisyros Islands

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The present project studies the area of geothermal energy and concentrates to the recording, processing and evaluation of data that structure the relation between geothermal development and local community. The study concerns the islands Milos and Nisyros, areas with rich geothermal potential capable to cover a wide range of applications, but also areas with historical evidence related to the subject matter. The public survey that took place during the spring of 2004 in Milos Island and during the autumn of the same year in Nisyros Island covered a major sample of the two societies and multiple parts in the subject of geothermal energy. Special attention has been given in the representative samples, in relation to the age, the occupation and the cultural level. The conclusions that result from each unity are of particular interest and they configure a frame of self-examination that can constitute the creative base for the development of geothermal applications with assistance of the local society.

Fair-minded communication in good times pays-off in times of crisis – Experiences of the GFZ research project Gross Schoenebeck, Germany

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The development of renewable energies is not only a technological process, but also highly politically and emotionally charged. Lack of information, distrust and ignorance of public fears can cause major problems up to complete failure of a project. Therefore an open-minded communication and information strategy based on longterm considerations is imperative to initiate public and private understanding and to build confidence in his complex process.

In Germany geothermal energy enjoys a positive image in general. Geothermal heat production took a successful development within the last years attracting broad public interest. But also EGS research projects focusing on the feasibility of geothermal power production receive active public and political support. The project at Gross-Schoenebeck Northeast of Berlin is one of the pioneering EGS R&D projects in Germany, supported by public funding since 2000.

The presentation shows experiences of the project, which started at a time when the potential and the chances of geothermal energy were not yet really obvious in this region. The location of the wells amid a UNESCO biosphere reserve in Germany, a favoured hunting ground and recreation area - how to convince people that geothermal research activities in such an area are worthy to be supported? Once the political will was established, the challenge was to involve and convince the people in charge of the biosphere reserve, local politicians and authorities, the local forestry administration and last not least the neighbouring community. All of these groups needed different arguments and approaches to not only tolerate but actually support the endeavour. Environmental and forestry concerns were dealt with by agreeing to plant new trees in another area close to the nature reserve. The local population is constantly informed about the progress. The importance of and international attention created by the project are communicated at public hearings in town halls, open days at the site and frequent meetings with town officials. A good basis for communication has been developed by establishing a personal dialogue on different levels, communicating the chances and risks of geothermal research and involving people via public events, on-site field-work presentations and media information.

Problems arose when seismic tests were carried out that reached beyond the well-informed core community. The explosions frightened people, leading to critical news coverage in the local media. These incidents during the exploration experiment in the framework of the European I-GET project, carried out in January 2006 in the surroundings of Groß Schönebeck, caused a critical situation and highly emotional reactions in the region. An immediately installed telephone help-line, on-site personal contacts and an open information campaign helped to better understand the specific regional situation and to limit the damage. However, this problem showed how negligence in prior information can cause a sudden erosion of local support. Prior information not only through local newspapers but also at he

town hall level, informing every mayor and police station in the region personally turned out to be indispensable measures that could have avoided the critical situation.

In general, after 7 years of research activities, series of in situ testing and drilling operations, the project Groß Schönebeck enjoys today public credibility and a high degree of confidence. The experiences outlined above showed that successful communication needs to clearly identify what is important to the target audience you are attempting to reach. To address their concerns, it is necessary to keep in mind the regional and social situation and to take people seriously in their specific environment. Demographics such as the local identity, education, economics, social and political affiliation will affect how people receive and perceive messages and how they will participate in the process. The public should be informed comprehensively about the project at each stage as actual as possible via:

- online web presentations

- project brochures and newsletters

- local newspapers, tv and radio considering the site-specific media scene

- scientists go public - open days, site presentations, public hearings

- personal contacts and frequent meetings with town officials

- by actively initiating talks with sceptic and critic groups.

The Soultz EGS project: juridical and administrative environment

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After the successful exploration by drilling of the Soultz EGS reservoir, we are now facing the surface development in terms of juridical and administrative procedures. In France deep geothermal energy projects are ruled by the Mining Code. Therefore, they are, from the administrative point of view, treated as coal or oil mining projects. In order to start a deep geothermal project, it is necessary to ask for a "Geothermal Research Exclusive Permit" (PER in French), which is then put in a competitive call by national authorities. The PER determines an area within which the permit holder has exclusive rights of prospecting, in exchange of which he is committed to realize a certain amount of works within 5 years. Then, so as to begin to drill a borehole, it is necessary to send to authorities a "request for exploration workings beginning permit" (DOTEX in French), which is subjected to a public inquiry among the population. Once the geothermal field has been discovered, an exploitation concession has to be requested to get the exploitation rights. It defines the conditions which the concession holder is subjected to, so as to be able to benefit from the discovered geothermal field. The French law distinguishes high temperature geothermal resources (≥ 150°C) and low temperature geothermal resources (< 150°C). For the latter, procedures are more simple. Moreover, if, as in the case of the Soultz project, it is necessary to use binary fluids (like isobutane), a specific authorization has to be asked for exploitation, which is called "Plant listed for environmental conservation" (ICPE in French). Depending on the case, this could also be subjected to a public inquiry. Consequently, the administrative study of all the above procedures could last up to 3 years. And this is in the best case, that is, without any opposition or complaint.


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SESSION 2

MEASURES TOWARDS THE INCREASE OF KNOWLEDGE AND FLOW OF INFORMATION IN ORDER TO INCREASE THE PUBLIC PERCEPTION AND ACCEPTANCE


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Effective policy making for sustaining a renewable energy society in Iceland

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During the 20th century Iceland has emerged from one of European's poorest countries, dependent upon imported oil and coal, to a country with one of the highest standard of living where practically all stationary energy, and roughly 72% of primary energy, is derived from indigenous renewable sources (54% geothermal, 18% hydropower) with near carbon-free electricity production. This is the result of an effective policy in making renewable energy a long-term priority in Iceland. Nowhere else does geothermal energy play a greater role in providing a nation's energy supply. It is the policy of the Government of Iceland to increase the utilization of the renewable energy resources even further, e.g. in the transport sector, in harmony with the environment. A broad consensus on conservation of valuable natural areas has been influenced by social opposition, increasing over the last decade, against large hydropower and some geothermal projects. Moreover, some energy companies plan to take green-initiatives in minimizing visual impact of geothermal power-plants to further increase public acceptance of geothermal utilization for electric power production. The Icelandic Government decided in 1997 to develop a Framework Programme for potential power projects. All proposed projects are being evaluated and categorized on the energy efficiency and economics but also on the basis of the impact that the power developments would have on the environment. This complete Framework Programme on the energy resources and the value of their conservation is to be presented to the Icelandic Parliament for formal consideration in 2010.

GTR-H - GeoThermal Regulations for Heat in Europe

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The GTR-H project follows on from the Kistelek Declaration which was announced in Hungary in April 2005 and did the initial work in identifying the key issues resulting from the absence or shortcomings of geothermal regulation in the EU and therefore the need for regulation. An initial compilation of regulations for several of the EU countries was made during the K4RES-H project and results of a preliminary review of these regulations indicated that any regulatory framework for geothermal energy must serve the following main purposes:

- Secure environmentally friendly use of geothermal energy, in particular concerning protection of underground drinking water resources, emissions, etc.

- Regulate competing uses and securing sustainable use of geothermal energy

- Grant an investor certain right to use geothermal energy in a given area and to a given extent, as the basis for business plans.

GTR-H aims to provide solutions and the implementation steps necessary to address these key issues identified in the form of a standardised transferable framework for geothermal regulation across the EU. Both from the K4RES-H project conclusions and initial results from the GTR-H project, it is apparent that the present lack of regulation for geothermal energy exploitation over most of the EU is inhibiting the effective exploitation of this underutilized resource. The process is planned to outline and encourage investment in geothermal energy by private and public sector partnerships. Preliminary indications from roundtable events and interviews so far show broad acknowledgement of the need for regulation for geothermal energy to ensure the successful development of the sector. Furthermore lack of clarity or inadequate regulation can be as restrictive as no regulation. Discussion at the roundtable events also emphasized the need for better access to information and dissemination of information. The availability of resource data and in some cases the cost associated with purchasing this has shown to be inhibiting investment and growth in the sector. This is seen as key to the development of the sector through private sector investment.

Significance of the Institute for Geothermal Research in distribution of new knowledge in the field of investigation and development of geothermal resources

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It is known, that up to 10 % of total explored resources of geothermal waters (GTW) of Russia is concentrated within territory of Daghestan. But at present a quote of commercial reserves of GTW makes up about 20% and rate of increasing a share of geothermal power in energy balance of the republic of Daghestan does not exceed 1%. Only 100 thousand consumers are provided in Daghestan with geothermal heat.

One of the reasons of such a situation it is focusing the economy of the republic to use of traditional energy sources. For example, heat supply of industrial objects and housing estates of towns and settlements of the republic is carried out with boiler district heating, using organic fuel: natural gas and heavy fractions of oil. Simultaneously reorientation of republican systems of heat supply to application of geothermal technologies with using of heat pumps will allow economizing up to 30 % of traditional heat sources.

For popularization of technical possibilities and scientific achievements in a sphere of development of geothermal energy Institute for Geothermal Research organized and conducted the International Conference "Renewable energy: problems and prospects"(September 2005). The main purpose of the Conference was exchange of information about achieved level of scientific technologies of renewable energy sources (RES) development in Russia and other countries for a period 2000 – 2005. More than 100 scientists and specialists of different scientific and industrial organizations and high schools of the country, including from Moscow, Sankt-Petersburg, Novosibirsk, Saratov, Jaroslavl, Petropavlovsk-Kamchatsky and other cities of Russia took part in the work of the conference. Papers of scientists and specialists from Iran, India and some other countries were represented in the program of the conference. Two volumes of Proceedings, including 80 papers and innovative projects, have been published.

Work of the conference was widely represented in mass media and its organization in Daghestan was a new impact for development of theoretical and experimental investigations of RES. So, together with the Corporation "Energija" (Novosibirsk) an experimental system of geothermal heat supply of dwelling house in Makhachkala city with application of heat pump HT–300 and low-enthalpy (48 ^{o}C) thermal water is elaborated and approved. A number of innovative projects of the Institute, including "Creation of energy-biological complex on a basis of explored geothermal resources of the Northern Daghestan", are assumed to introduction.

For evaluation of technogeneous pollution of environment when developing geothermal resources of Daghestan chemical composition of highly saline waters of the main geothermal fields was tested and technology of their purification from the most toxic organic substances – phenols and aliphatic alcohols – is worked out. Together with the Corporation "Twell Invest

Technology" (Moscow) planning of technological complex is carried out for production of lithium salts by utilizing geothermal brines of the Seaside and Northern Daghestan.

Drawing attention to the acute lack of scientific and engineer personnel in a field of power engineering and simultaneously a good experience of organization in Daghestan of Trainings of Young Scientists under the aegis of UNESCO and RAS, the conference recommended to conduct "Schools of Young Scientists" on problems of renewable energy sources in the Institute for Geothermal Research regularly.

The last one of them was scientific school of the young scientists "Actual problems of development of renewable energy resources" – worked in Makhachkala in September 2006. IGR DSC RAS and IVTRAN – participants of the ENGINE project took part in the work of the School and inform young specialists about purpose and task of coordination project ENGINE. The main directions of the work became analysis of the state of the art and prognosis of long-term directions in elaboration of scientific technologies of the RES development, at first geothermal energy, what sounded in the leading scientists' and specialists' reviews and papers and also in young scientists', post-graduate students' and students' posters. Monograph "Geothermal energy: problems, resources and technologies", and also methodical manual on the most important aspects of using geothermal resources, solar and wind energy and another types of RES are written by Alkhasov A.B. and preparated to publication by recommendation of the School's Organizing Committee.

Policy makers' awareness and public acceptance on geothermal projects in Larderello (ITALY)

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The utilization of geothermal resources for industrial purposes began in Larderello with boric salts production in the early1800's, with the first experiment of electric energy generation in 1904 and the installation of the first 250 kW unit in 1913. This makes of Tuscany the birth-place of geothermal activities. At present, the Italian geothermal power plants are located in 3 areas (Larderello, Travale and Amiata) with different for development history and installed capacity.

After the 2nd world war electricity generation is continuously increased (about 5200 GWh in 2006) and a significant increase has been planned for the next few years (5600-6000 GWh in 2012), as the result of new specific projects or development of resources located by previous deep exploration programs. However an uncertainty about the feasibility of these projects exists and is strictly linked to the non-technical barriers that are mainly represented by "Economical Sustainability", "Environmental Aspects" and "Political Contest".

Economical Sustainability is an important issue since geothermal exploitation needs high investment costs to locate the resource (mining investment) and to build gathering systems and power plants. Without financial incentives there are no possibilities to realize a geothermal project, but in Italy there are two favorable circumstances: Enel experience in the exploration allows the reduction of mining risk, hence of the required investment, furthermore Italian laws provide incentives that increase the economical sustainability.

Environmental Aspects can play a prevalent role as non-technical barrier. Usually, in the world, geothermal generation is developed in areas where the landscape is not affected by geothermal activities, but in Tuscany geothermal development involves a region characterized by high population density and historical and artistic peculiarities. This put the environment at the centre of the general interest and the main real worries are related to land use and visual impact, to the noise coming from power plants and wells during drilling and production tests, to the air quality especially for the smell nuisance due to H_2S emissions. Moreover many worries are also induced by statements of some "scientists" in cases like the induced seismicity ("Geothermal activities increase the local macro-seismicity"), the hydrogeology ("Geothermal exploitation impoverishes the drinking water reserves") and the effects on health.

Induced worries feed an hostile political contest more than the real ones and local committees, as well as political parties, are often against any level of geothermal development.

Enel is seriously engaged in managing these non-technical barriers with technical approach. In particular, to reduce the environmental impact Enel developed and designed an innovative technology (AMIS) for the Hg and H_2S abatement that will be installed on 16 power plants in 2007, with an investment of about 40M€, and approved a budget of more than 30 M€ for land

recovery and new architectural solutions both for power plants and gathering system. Furthermore, Enel is also engaged in increasing the social acceptance of the geothermal development by mean of cooperation and relationships with local communities, agreement with the Tuscan Council requirements about environmental issues and knowledge diffusion.

Not always technical and political approaches are sufficient because the weight of psychological aspects is prevailing. To contrast not real worries of the population is necessary an action involving not only the industrial operator, but all the stakeholders.

In this effort the scientific community can help geothermal industry, supporting knowledge spreading, assuming unambiguous positions to avoid unjustified population fears about negative effects coming from the presence of geothermal plants on their lands, emphasizing the uncertainties of geo-scientific interpretations in order to avoid their incorrect use or ill-exploitation.

SESSION 3

GENERAL ASPECTS IN POLICY MAKERS' AWARENESS AND PUBLIC ACCEPTANCE


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Analysis of Environmental Impacts through Geothermal Power Generation in Germany

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Even without having high-enthalpy resources, geothermal energy has experienced a rising interest in the last years in Germany. Encouraged by the German Energy Research Programme and even more by the amendment of the German feedin law, several projects aiming for geothermal electricity generation are under development. A wider use of geothermal energy for power generation however is only acceptable if it results in general benefits for the environment compared to the existing alternatives. Based on this, the environmental impacts need to be analysed precisely at the beginning of the market introduction in order to pursue an environmental optimized expansion, meeting e.g. respective mitigation measures in terms of regulatory guidelines or administrative directives.

Therefore the Government - represented by the Federal Environment Agency of Germany (UBA) - has commissioned a study from June 2006 to July 2007 to fundamentally analyse the environmental impacts through geothermal power production considering regulatory and site specific frame conditions in Germany.

This presentation will provide an insight into the project results. On the one hand, the environmental impacts during the whole life cycle (i.e. construction, operation and deconstruction and including the respective prechains) will be estimated; on the other, local site specific impacts on the natural environment are analysed. Based on theses results, advices regarding an environmental optimized wider use of geothermal energy for power generation are derived.

Geothermal Energy for heating and cooling – a roadmap to 2020 (EU-project K4RES-H)

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The promotion of geothermal energy on the European level until now was only considered for electricity, within the EC Directive for the promotion of electricity from renewable sources from the year 2001. Geothermal heating and cooling received little political attention, in spite of its consider-able potential. In the framework of activities to increase the use of renewable energies on the heating and cooling sector, also geo-thermal energy received new attention as one of the most reliable sources of renewable energy. The goal of the current EU policy is to increase market deployment in all relevant energy sectors: electric power, transport, and heating/cooling. While transport for geothermal energy only is an option via secondary energy carriers like electricity or hydrogen, both the sectors of electric power generation and heat/cold-supply are now in the focus for support measures.

An educational program on geothermal energy for young people: one way to increase public acceptance

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The ignorance of geothermal and the technologies that the use of this energy require, makes people afraid from this technology It's necessary to present what is geothermal energy so that these problems will be disappearing It's absolutely precise to facilitate information so that the education programs can offer geothermal as an energy with possibilities To prepare educative materials for the students and the professors with suitable style and without losing the technical rigor is urgent. IGME has developed to a program of this kind of material referring to groundwater with respect to its protection in quality (polluting processes, marine intrusion, etc.) and as far as its protection in amount, introducing the concept of sustainable use. The geothermal energy requires the preparation of materials of this type.


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