



# Evaluation Report from transnational activities

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# Evaluation Report

## from transnational activities

WP7

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## Executive summary

This report deals with the activities and results achieved by the seven Joint Activities established in the course of the Geothermal ERA-NET with a minor effort on human resources and financial support. The activities were planned and coordinated as working groups participated by the project partners, and produced survey reports and/or workshop Minutes.

The following table lists the main results achieved.

Name	Main conclusion	Link to Report
<b>OpERA</b>	Produced a State-of-the-Art Report for Operational Issues in the geothermal sector (OpERA Magna Carta). Organized the preparation of a web-based knowledge transfer system, named “OpERApedia”	<a href="http://www.geothermale-eranet.is/media/publications-2015/Geothermal-ERA-NET-JA-Report-OpERA_publication_def_MC_Update_20161010.pdf">http://www.geothermale-eranet.is/media/publications-2015/Geothermal-ERA-NET-JA-Report-OpERA_publication_def_MC_Update_20161010.pdf</a>
<b>EGIP</b>	The activity and the organized survey allowed a first prioritization of the contents that should be implemented in an EGIP. Guidelines for data harmonization has been organized.	<a href="http://www.geothermale-eranet.is/media/publications/Geothermal-ERA-NET-JA-REPORT-EGIP.pdf">http://www.geothermale-eranet.is/media/publications/Geothermal-ERA-NET-JA-REPORT-EGIP.pdf</a>
<b>New Concepts</b>	The organized workshop concluded that there is much potential for expansion of geothermal energy through smart and innovative applications and that there is scope for a joint call for demonstration of new concepts in geothermal.	<a href="http://www.geothermale-eranet.is/media/publications/Geothermal-ERA-NET-New-Concepts-Proceeding-August-2016-v1.pdf">http://www.geothermale-eranet.is/media/publications/Geothermal-ERA-NET-New-Concepts-Proceeding-August-2016-v1.pdf</a>
<b>NWW</b>	The organized survey and Workshop	
<b>PRGeo</b>	The organized workshop concluded that Public Relation requires further optimization, and it can only be successful if it manages to create a basis of trust in which early, honest and strategically oriented communication has a crucial role.	<a href="http://www.geothermale-eranet.is/media/publications-2015/Geothermal-ERA-NET-JA-PR-Geo.pdf">http://www.geothermale-eranet.is/media/publications-2015/Geothermal-ERA-NET-JA-PR-Geo.pdf</a>
<b>ReSus</b>	The organized survey highlighted the most important topics ranked by the respondents: reservoir evolution, insurance process and geologic risk as regards to economic profitability; hydrothermal eruption, induced seismicity and chemical pollution as regards to environmental impact; effluent valorisation, information/communication and induced seismicity as regards to public acceptance.	<a href="http://www.geothermale-eranet.is/media/publications-2015/Geothermal-ERA-NET-Joint-Activity-Report-ReSuS.pdf">http://www.geothermale-eranet.is/media/publications-2015/Geothermal-ERA-NET-Joint-Activity-Report-ReSuS.pdf</a>

<b>GeoStat</b>	The activity and the organized survey produced an overview of the State-of-The-Art in the statistics, evidencing inconsistencies and gaps, and proposes an iterative review process of data submissions to existing international organizations to make the statistics interoperable.	<a href="http://os.is/gogn/Skyrslur/OS-2015/ERA-NET-International-Collection-of-Geothermal-Energy-Statistics.pdf">http://os.is/gogn/Skyrslur/OS-2015/ERA-NET-International-Collection-of-Geothermal-Energy-Statistics.pdf</a>
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**Table 1: Main results of transnational activities**

# 1 Introduction

In order to proceed with the implementation of trans-European cooperation on geothermal energy, which is the core of WP7, following a bottom-up approach described in D4.2, seven topics were considered the most urgent or raising the main interest, and therefore the most suited for corresponding joint activities:

- OpERA – RD&D Knowledge Exchange on operational issues of geothermal installations in Europe
- Tuning EGIP (European Geothermal Information Platform) for target users
- New Concepts for geothermal energy production and usage
- NWW – New ways of working: Financial Instruments and Funding of RD&D and Geothermal Projects
- PRGeo - RD&D Knowledge Exchange on public relations for geothermal energy
- ReSus - RD&D Knowledge Exchange on reservoir sustainability
- Geostat - Towards Consistency of geothermal data

A first level of joint activities (JA1) with a minor effort on human resources and financial support was established, in order to present the effectiveness of transnational cooperation and to smooth the way for more complex future joint activities (JA2 & JA3). After defining the working groups of the various activities, an action plan was defined and described in Deliverable D4.2. On the base of preliminary results from these JA1 activities, an important project meeting held in Brussels on October 2015 defined the evolution of JA1 to JA2, i.e. what topics could be implemented by participating countries as co-funded activities. Of the seven themes implemented as JA1 activities, also in consideration of time and budget limits, only two JA1 activities (EGIP for the establishment of a European Geothermal Information Platform and OpERA related to operational issues in geothermal installation) proposed a follow up in the form of co-funded Calls.

In this report we describe the final results in the frame of all JA1-2 activities.

## 2 OpERA – RD&D Knowledge Exchange on operational issues of geothermal installations in Europe

Within the framework of WP 4 “Development of Joint activities” the working group OpERA (Operational issues in geothermal energy installations) was founded in 2015.

The working group aimed on the establishment of a trans-European knowledge exchange on operational issues at geothermal sites.

To realize this, OpERA organized a workshop on operational issues on the 1st & 2nd of October 2015 in Vaals (NL). 37 experts from 11 countries participated in the workshop. On the first day country overviews from Hungary, Italy, the Netherlands, Slovenia, Germany, Iceland, Switzerland, France, Denmark and Austria were presented to create a summary of the most urgent operational issues in

Europe. These issues were documented in the “OpERA-Magna Carta”<sup>1</sup> which shows solved and unsolved issues on scaling, gas content, corrosion and reinjection by country.

The second day was structured with four topical sessions on scaling, scaling & gas content, corrosion and re-injection issues. In these sessions 13 presentations on specific issues, possible solutions and examples from different locations were held.

Both days were enveloped by discussion & summary sessions moderated by a specialist for operational issues from the oil & gas industry. The experts participated very actively in the fruitful discussions and solutions for several issues were addressed on a European base.

As a follow-up for this event, the “OpERA-Expert Group” was founded, to create a joint publication as a kind of enhanced “Proceedings of the 1st OpERA workshop on operational issues of geothermal installations”. Besides the country statuses and the mentioned “Magna Carta”, specific chapters on Scaling, Corrosion, Gas handling and Re-injection are part of the paper. When ready, the publication will be made available on [www.geothermaleranet.eu](http://www.geothermaleranet.eu).

Due to the positive feedback from the geothermal community, the ERA-NET consortium decided to continue the work of OpERA.

As a Joint activity, level 2 (JAI, see D4.1 & 4.2), the planning for a web-based knowledge transfer system, the “OpERApedia”, has been started.

An interactive information platform, filled with information from (in the beginning) five European countries, edited by a specialist from the oil & gas industry will go online in the first half of 2017 (planned).

### **3 Tuning EGIP (European Geothermal Information Platform) for target users**

The main aims of the EGIP JA are as follows: *i*) to define the principal groups of stakeholder (SH) interested in the implementation of a European Geothermal Information Platform (EGIP), *ii*) identify where will EGIP add the most value – or meet requirements of SHs, *iii*) assess the EGIP interest and necessity, and rank priorities of implementation of EGIP, *iv*) strengthen the shared understanding or awareness of SHs on some available portals. To this aim, the EGIP WG decided to organize a web survey. Launched on spring 2015 and distributed to 385 SH in the six geothermal ERA-NET nations participating in this JA plus a few trans-national organisations, the survey closed on September 2015 with 130 answers, i.e. 34% rate of success, the highest achieved among the project surveys.

The most relevant findings were:

- The most important and most interested SH groups are Industry, Administration/Regulation and Academia.

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<sup>1</sup> The name was chosen to honor the 800th anniversary of the original **Magna Carta Libertatum**, which was signed on the 15<sup>th</sup> of June 1215 in Runnymede, England.

- High to very high interest was raised by aspects about *hydrothermal settings, assessment of geothermal potentials, research and innovation and investment/demonstration projects*. Also aspects illuminating *power generation and direct use of heat* often were considered as very interesting by many SHs.
- *Hydrothermal settings* raised considerably more interest than *petrothermal settings* (although the latter showed a bipolar distribution of interest, so there is still a relatively large stakeholder group with a very high interest).
- *Simple visual access* to the data and information with *download functionality* was considered of very high importance.
- *Specific data and information for specialists* was seen as more important than *general information* for laymen and education purpose.
- A large group of SH recognised the importance of *harmonization* of geothermal datasets, although most SH did not know *INSPIRE*.
- Raw data: *well logs, geophysical surveys and production data* are all considered to be of very high importance.
- Interpreted data: *Temperature maps, geological information, surface heat flow maps, interpreted seismic lines and socio-economic data* are seen as important or very important interpreted datasets by most SHs.
- Documents: *Best practice and guidelines* documents are by far the most important documents EGIP should provide, followed by *relevant laws and geothermal national roadmaps*. Other document types ranked lower.

The web survey showed a good general perception of the EGIP concepts by the SHs.

The results of the survey allow a prioritization of the contents that should be implemented in an EGIP. Some of the identified SH priorities fall clearly within the vicinity of national platforms and responsibilities. This allows a further focus on the topics that must be treated on a trans-national level like EGIP. This is important to prevent that a future EGIP just duplicates national platforms.

A report describing the survey results has been issued, available through the Geothermal ERA-NET website at the link <http://www.geothermaleranet.is/media/publications/Geothermal-ERA-NET-JA-REPORT-EGIP.pdf>

A follow-up of the activities was proposed in the form of a Joint Call for implementing further the platform content and for improving the web-based front-end. During the exchange among project participants, it was evidenced that for most country the organization of platform content should remain at a domestic level, provided that guidelines for data harmonization were defined. To this aim, a Group of Experts (GE) was established on December 2015, after a call for volunteer among participating countries to be part of it. This group, with representation of France (leading), Hungary, Italy, Iceland, Switzerland, has prepared the Guidelines.

## **4 New Concepts for geothermal energy production and usage**

As a first step towards showing and stimulating new opportunities in Europe and beyond, the Geothermal ERA-NET “New Concepts” group and IEA Geothermal Annex VIII organized a joint workshop entitled ‘New concepts - new and innovative applications of geothermal energy’ on the 30th of October 2015 in Genève (CH).

The aim of the workshop was to stimulate creative concepts for European innovators in geothermal utilization and technology, and to bring together new ideas and inspire each other with what is innovative throughout the world in geothermal energy utilisation. The concepts of interest included opportunities in direct utilization of low enthalpy geothermal energy such as geothermal heating & cooling for smart cities, food production, and other uses. Also, new concepts in geothermal electricity generation and process heat were part of the programme.

The workshop had four sessions with presentations on ‘new concepts’, highlighting Enhanced Geothermal Systems (EGS), direct use applications in the built environment, direct use applications in the industry and other sectors, and a session where direct use applications worldwide were in focus.

The closing session of the meeting, dedicated to the future of geothermal, showed that there is much potential for expansion of geothermal energy through smart and innovative applications. An important conclusion of the meeting was that there is scope for a joint call for demonstration of new concepts in geothermal.

A report has been issued, available through the Geothermal ERA-NET website at the link <http://www.geothermaleranet.is/media/publications/Geothermal-ERA-NET-New-Concepts-Proceeding-August-2016-v1.pdf>

## **5 NWW- New Ways of Working: Financial Instruments and Funding of RD&D and Geothermal Projects**

The overall objective of NWW JA1 activity was to improve the synergies between different players in the field of geothermal utilisation and improve the working practice of national funding institutions and the collaboration with their European counterparts. The WG mainly focussed on a) Analysing the financial instruments that are available and how they operate – and map the operational structure of the different national funding bodies, including policy and funding rules in R&D and industrial projects; b) Highlighting the main barriers and opportunities, and how these instruments can more easily work together. The NWW WG organized a survey and a workshop that was held in Brussels just before the Geothermal ERA-NET meeting.

## **6 PRGeo - RD&D Knowledge Exchange on public relations for geothermal energy**

The JA-PRGeo aimed to exchange knowledge on the diverse approaches of Public Relations (PR) experienced in different countries of Europe in order to minimise the negative public attitude and to promote a deeper understanding on the real risks and advantages of various uses of deep geothermal energy. The PRGeo WG organized a side event at the German Geothermal Conference at Haus der

Technik in Essen on November 4<sup>th</sup> 2015. Invited speakers from Germany, Italy, Switzerland and France covered various topics of social acceptance expertise in Europe. The JA steering committee has prepared meeting proceedings incl. abstracts & discussion conclusions.

The workshop concluded that although the PR work has been reinforced among project developers and operators in the recent years, it still can be optimized, especially by streamlining focused messages to the different target groups. Another important conclusion was, that the general knowledge of the public on geothermal energy is surprisingly low, often leading to the opposition of a geothermal project by the local community. Therefore, all possibilities have to be used to make geothermal energy and various technologies better known among the public. It has to be emphasized that each geothermal energy project is unique. This applies both to the geological and technical characteristics as well as to the socio-demographic conditions. A misleading communication (e.g. using the downsides of shallow geothermal events as reason for opposing deep EGS) – either coming from the lack of knowledge, or on malevolent purposes – must be avoided by all means.. Although different types of project examples were presented and discussed at the workshop, it was generally concluded that the acceptance of geothermal projects is a question of trust. PR work can therefore only be successful if it manages to create a basis of trust, in which early, honest and strategically oriented communication has a crucial role.

The meeting proceedings are available through the Geothermal ERA-NET website at the link <http://www.geothermaleranet.is/media/publications-2015/Geothermal-ERA-NET-JA-PR-Geo.pdf>

## **7 ReSus - RD&D Knowledge Exchange on reservoir sustainability**

The goal of the ReSus JA is to study geothermal reservoir sustainability. Beyond the scientific community, the topic of such JA clearly interests the regulation authorities and the operators who seek for sustainable development strategies. To capture the current state-of-the-art and explore possible scenarios for future economic and sustainable exploitations, this JA promoted a discussion for comparing the current practice used by the operators, highlighting the best solutions and studying the unsuccessful cases.

The ReSus JA working group organized a web questionnaire to highlight the objectives of the stakeholders (SH) regarding reservoir sustainability and to collect their practices to achieve them. The survey was conducted firstly in September 2015 and re-opened in March 2016 in order to retrieve more input from European stakeholders (SH). The survey was proposed to 161 SH belonging the countries participating in this Joint Activity among those involved in Geothermal ERA-NET project. 19 SH answered to this invitation by completing the survey, which corresponds to 11.8% of the invited SH.

The results show a good correlation among the groups of the respondents, their domains of activity and their interests. Principal respondents group are: Research and innovation, Upstream geothermal industry (drilling, company, technology suppliers, etc.), Consulting engineering. Those groups are interested mainly in Research & Innovation, Assessment of geothermal potential. Low temperature and EGS resulted as the most interesting geothermal systems at all horizontal scale and at medium to deep.

The SH were asked to comment the reservoir sustainability considering three different points of view (pillars) by rank (or adding) criteria relevant for: economic profitability, environmental impact and public acceptance. For each pillar, the most ranked topics were:

- For economic profitability, reservoir evolution, insurance process and geologic risk
- Hydrothermal eruption, induced seismicity and chemical pollution are the principal aspects that affect environmental impact
- On public acceptance pillar, the most ranked criteria resulted effluent valorisation, induced seismicity and information/communication

The survey results are available through the Geothermal ERA-NET website at the link <http://www.geothermaleranet.is/media/publications-2015/Geothermal-ERA-NET-Joint-Activity-Report-ReSuS.pdf> (main report) and <http://www.geothermaleranet.is/media/publications-2015/Reservoir-Sustainability--ReSus---Responses-.xlsx> (responses)

## **8 GeoStat - Towards Consistency of geothermal data**

This JA coordinates with main international organizations on reviewing and unifying statistics in the geothermal sector using the existing framework and regulation. It has set up an iterative review process of data submissions to existing international organizations to make the statistics interoperable, with the main aim of defining clear and measurable indicators, reducing of duplication and increasing collaboration at domestic level, and simplifying the process across organizations.

The work in GeoSTAT, shared also with IGA, resulted in a first report issued in Feb 2015, available at the link <http://os.is/gogn/Skyrslur/OS-2015/ERA-NET-International-Collection-of-Geothermal-Energy-Statistics.pdf>

An advisory board has then been established and a survey organized - aimed at country reporters, in order to identify problems causing the inconsistencies identified in the GeoSTAT report. An updated report is in preparation.

## **9 Conclusions**

Joint activities in JA1 stage can be considered concluded, their reports being issued and results available on the Geothermal ERA-NET website.

Further steps are the organization of OpERApedia, a platform for sharing information regarding operational issues, that will result from a Joint Call for Tenders, and the EGIP Expert Group guidelines providing an overview of the European Geothermal Information Platform and prepare its implementation.





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