



D3.4

Regulatory Framework for Geothermal District Heating (GeoDH) in Europe (Draft)

November 2013

Public Consultation



Co-funded by the Intelligent Energy Europe
Programme of the European Union

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I. Introduction

1.1 The background and objectives of GeoDH Project and 'Draft Regulation Framework for Geothermal District Heating Systems in Europe'

the purpose of the IEE funded project GeoDH 'Promote Geothermal District Heating Systems in Europe' is to stimulate the use of geothermal energy sources for heating, using geothermal district heating instead of burning fossil fuels. The Project aims to provide effective tools and guidance for stakeholders so that the number of geothermal DH schemes increases.

In 2012 there were over 5,000 district heating systems in Europe (including 216 geothermal district systems), covering some 10% of the heating market.

Despite the significant potential of deep geothermal energy in several European countries geothermal DH systems have been poorly developed so far. This situation is mainly due to the lack of adequate national and regional policies concerning district heating and geothermal district heating systems (the latter as part of RES heat sector); there is no comprehensive set of regulatory acts related to the RES sector which would create a proper long-term environment for geothermal projects' planning and development. Only a solid legal framework, continuity and the predictability of legal, administrative and incentive acts/provisions will create a proper background allowing strategic decisions in both the RES heat and geothermal heat sectors to be taken.

Against this background, the specific objectives of GeoDH Project are:

- **Proposing the removal of regulatory barriers in order to promote the best circumstances and simplifying the procedures for operators and policy makers.**

National codes and legislation referring to geothermal energy and its uses for DH are required, as well as a regional geothermal regulatory frameworks and a local planning systems favourable to geoDH development. This need is met by 'Draft Regulation Framework for GeoDH in Europe' which is presented now for national consultations in GeoDH Project Partners' countries. The proposals in this document will recommend to local decision makers ways to optimise and simplify the regulations by translating the best rules into regional and local regulatory systems. The next step will be to engage the relevant authorities involved in decision making for endorsing GeoDH Partners' regulatory proposals for geothermal;

- **Developing innovative financial models** for geoDH in order to overcome the current financial crisis which is hampering the financing of geothermal projects which are capital intensive;
- **Training technicians and decision-makers** of regional and local authorities in order to provide the technical background necessary to approve and support projects.

The 'Regulatory Framework for geothermal District Heating in Europe' (of which this document is the draft) is one of the major outputs of the GeoDH Project. It shall contribute to an increased

awareness of the current situation in terms of regulations and barriers prevailing in Europe and will provide a set of recommendations for removing regulatory market barriers, improving national and local regulatory framework and increasing national market penetration of geothermal energy.

The introduction of complementary and cohesive legal and regulatory system is an essential condition to create a long-term and stable system for GeoDH development in Europe.

1.2 Basis for the preparation of a “Regulatory Framework for Geothermal District Heating in Europe”

Information regarding the current regulatory framework was collected, analysed and summarised in order to identify specific barriers hampering geothermal district heating development in each of the fourteen European countries covered by the GeoDH Project. Recommendations on how to remove these regulatory barriers were then drafted and are presented in this document. The presented “Regulatory Framework” was prepared on the basis of:

- selected outcomes of the IEE Project ‘Geothermal Regulations Framework – Heat’ (GTR-H), in particular provisions included in ‘Final Regulations Framework’ of that Project (2006 – 2008);
- the outcomes of 14 national workshops and a questionnaire;
- screening of selected recent literature screening, e.g. papers submitted to European Geothermal Congress 2013;
- some findings of the [GEOELEC Project](#).

This version of the document is mainly addressed to national and regional public authorities in charge of regulations and local development since they are deeply involved in the licensing process and other procedures relating to activities concerning geothermal energy exploration, exploitation, use and management. It puts forward specific recommendations addressing simplification of procedures, attribution of licenses and ownership of resources in fourteen EU Member States.

This document was prepared by PAS MEERI (WP3 leader) with the inputs from other Project Partners who adapted it by adding national specifications. Main recommendations are:

- Administrative procedures for geothermal licensing should be fit for purpose - they should be streamlined wherever possible and the burden on the applicant should reflect the complexity, cost and potential impacts of the proposed geothermal energy development.
- The rules concerning the authorisation and licensing procedures must be proportionate must be simplified. The administrative process must be reduced.

2. Definition of geothermal energy resources and related terms

- 2.1. The term “geothermal energy”, as well as “geothermal heat”, “geothermal water” shall be introduced in national and regional specific policy and legislative acts (e.g. Mining and Hydrocarbons legislation) in countries where such provisions do not exist.
- 2.2. A clear definition of geothermal energy should be included in state and regional legislation, in line with Directive 2009/28/EC:

‘Geothermal energy is the energy stored in the form of heat beneath the surface of the solid Earth’.
- 2.3 A definition of ‘*geothermal water*’ as ground water containing and carrying geothermal energy on the surface by natural springs or wells should be included in legislation. Although such term has been in common use in several countries it should be formally accepted as a synonym of ‘thermal water’.
- 2.4 It is recommended to unify the basic terminology using only the term ‘geothermal energy’, with a view to introducing transferable clear solutions and incentives from country to country and across the EU as a whole.

3. Geothermal resources ownership and regulations

- 3.1. The ownership of the geothermal resource (geothermal energy, geothermal water) shall be clearly defined at national level (as with other natural resources such as minerals, hydrocarbons, groundwater). The geothermal resource shall belong to the State.
- 3.2. Legislation should give the State the right to use the geothermal resource and to grant licences for exploration, development and production of geothermal energy.
- 3.3 Existing regional legislation on: natural resources, geology, water abstraction /exploitation, environment, planning, and building can be used, with modifications if necessary, to regulate the shallow and deep geothermal sectors (*including for GeoDH*).
- 3.4 The geothermal licensing system (including GeoDH activities) should grant a licensee the exclusive rights and legal security for the exploration and development of geothermal resources over a defined area and for a specified period of time. The area and the duration of the license should be appropriate for the size and type of GeoDH development and the potential capital investment.
- 3.5 The GeoDH/ geothermal licensee must be protected from other external parties depleting or damaging the geothermal resource available within their license area. The licensing authority will be required to take into consideration other existing natural resource licenses (e.g: mining, hydrocarbon, carbon capture and storage, quarrying, groundwater abstraction) before issuing geothermal exploration and development licenses, as interaction between various resources may occur.
- 3.6 The geothermal licensing authority should be responsible (with the other licensing authorities) for ensuring that there are no conflicting rights claims concerning use of the underground.
- 3.7 There may be competition for the underground as onshore carbon storage and geothermal energy projects may target the same deep aquifers or the same areas within sedimentary basins. Geothermal energy may also be produced from rocks below the depth range for potential carbon storage sites. Carbon capture and storage is essentially a bridging technology whereas geothermal energy is a sustainable energy resource. Therefore areas of deep geothermal energy resources should be identified and priority given to geothermal energy over carbon storage exploration licenses.
- 3.8 The legislation should set priorities among natural water resource use taking into account the following: potable water use, water for agriculture, geothermal water as a renewable energy

source, balneotherapy, conventional energy and auxiliary uses of the underground, sports & recreational water use.

- 3.9 In case of geothermal water, depending on its temperature, priority for use should be granted in the following order: CHP (combined heat & power – cogeneration), GeoDH, individual and other heating systems, balneotherapy / recreation. These uses shall be recommended to be realised in a cascaded system.
- 3.10 'Large scale systems' could be regulated through existing local planning laws when necessary. In the case of open loop geothermal systems, a groundwater pumping flow rate threshold could be used to define projects requiring a groundwater abstraction/exploitation license in accordance with national or regional legislation. A capacity threshold could be applied in the case of large multiple borehole collector arrays. The licensing authority could set minimum and maximum water temperatures for re-injection from geothermal systems for geothermal and aquifer management purposes.
- 3.11 Appropriate exemptions from the regional/local planning regulations and environmental impact assessment regulations should be considered for geothermal energy projects in order to assist in the development of the sector.

Appropriate exemptions from regulation related to national/regional planning and EIA should be considered for the exploration and exploitation stages of GeoDH projects. Waived or reduced cost of national drilling permits for the completion of geothermal energy boreholes has to be provided.

- 3.12. The EIA for GeoDH and public consultation should be open for a reasonable and not excessive period and useless and burdensome procedures should be limited as much as possible so as to avoid unnecessary costs.

4. Licensing systems for geothermal exploration and development concerning GeoDH systems (including simplification of the procedures)

4.1. In line with Article 13 of Directive 2009/28/EC it is highly recommended that the permitting/ licensing procedures for exploration and exploitation of geothermal energy should be streamlined

- by transferring licensing procedures to the competences of regional administrations,
- introducing a single licensing system /one-stop-shop licensing process.

This would encourage investors and boost investments.

4.2. A Protection zone for the geothermal resource for which the license / permit is issued shall be defined in the license in order to protect the licensee against other mining activities.

Firstly, the exploration field shall be determined and legally secured to allow for preliminary geological investigations or exploration drillings. Based on these results a sufficiently large exploitation field shall be determined to secure a long-term exclusive right for exploitation.

4.3. The administrative process for the granting of deep geothermal exploration or development licenses for GeoDH should not exceed 6 – 12 months.

Reduction of the administrative process associated with the development of GeoDH needs to be addressed (the post-feasibility procurement process should last less than 40 weeks).

4.4. Exploitation permits should be granted for 3-5 years.

The payback time for GeoDH is 15 years in the best case; therefore GeoDH developers require long licence periods. It is recommended that development licenses should therefore be granted for a fixed duration of a minimum of 25 years with the possibility of extension to 50 years (because the pay-back time for this type of investment is off 15 years in the best cases). This long period will protect the GeoDH developer.

- 4.5. The duration of a geothermal exploration permit / license should not exceed six years. There should be an agreed exploration work programme and expenditure, against which the performance of the licensee would be monitored by the licensing authority.
- 4.6. Deep Geothermal Energy development licenses for GeoDH should have a duration appropriate to the normal minimum lifetime of the exploitation/development wells. A renewal option for a defined period should be made available to the license holder. The license extension should be subject to a review by the licensing authority of the production rates and their associated impacts on the geothermal reservoir and other natural resources as well as the economics of the project.
- 4.7 An application for a geothermal development license should be accompanied by a development plan supported by exploration results, technical and financial models. This data should fulfil all requirements of the legislation for natural resources, planning, protection of the environment and groundwater in accordance with relevant EU Directives.
- 4.8. Conditions for the disclosure of all submitted data associated with licensed geothermal exploitation operations should be specified in the legislation as for other strategic natural resources. Any confidentiality clauses should clarify the length of time for which the resource and production data are confidential.
- 4.9 Cascaded GeoDH systems where geothermal water is not reinjected (balneotherapy, spas) should follow surface water discharge licensing requirements with relevant local authorities. Minimal environmental impact of such systems and sustainability of the resource should be demonstrated.
- 4.10. The cost of geothermal exploration licenses should be set lower than the petroleum and mineral exploration licensing costs to reflect the comparatively lower economic return potential and to promote geothermal energy development as part of the national and regional renewable energy action plans (NREAPs, RES Directive-2009/28/EC). For this reason, licences for GeoDH could be granted for free.

5. Licensing for district heating (DH) – *to prepare*

6. Geothermal energy (GeoDH) and the licensing authority

- 6.1. The licensing authority for exploration and development of deep geothermal resources could be a regional authority / department responsible for licensing mineral or other resources in consultation with other relevant authorities and experts.
- 6.2. The geothermal authority should have the necessary level of expertise in geothermal energy, and adopt geothermal industry best practice standards.
- 6.3. The administrative structures and organisation, as well as the respective responsibilities of national, regional and local administrative bodies for geothermal procedures must be coordinated and clearly defined.
- 6.4. This geothermal authority will be responsible for the issuing of licenses for exploration and development of geothermal resources, reviewing and awarding the licenses on a case specific basis, as well as facilitating and monitoring the geothermal license application system.

Though having several competent administrative bodies to assess an application for geothermal licenses is fair, a one stop-shop process should be the rule for each phase of a project.

- 6.5. Where licensing systems do not currently exist, the licensing authority could be a department already responsible for natural resource exploration licensing. For example, the regional authority could administer the permit procedures for GeoDH systems.
- 6.6. Where possible the same authority should be responsible for both granting the license and monitoring the activities carried out under the license. However, where the monitoring and licensing authorities are different, the authority responsible for monitoring should advise the authority responsible for licensing.

7. Access to information on geothermal resources suitable for GeoDH

- 8.1. Elaboration of databases of geothermal resources, the prospective for regional/local GeoDH and an obligation to consider the needs of future regional/local energy supply planning is highly recommended.
- 8.2. Elaboration of a database of national and regional experts and companies specialising in GeoDH is highly recommended. Such databases shall be accessible to the investors on the proper conditions.
- 8.3. Elaboration of guidelines for GeoDH which should be publicly available on e-platforms (regional, local administration, self-governments) and a common basis for developing these in EU Member states should be considered.
- 8.4. It is advisable to establish a competent professional body responsible for promotion and development of the GeoDH sector specially in countries/regions where geothermal heat markets are juvenile and in transition (*example of France in the 1980s*). This could be the regional licensing authority or an independent expert body (competent professional body or cooperative network of competent authorities).
- 8.5. Specific guidelines on the application procedure for deep geothermal exploration and exploitation licenses for GeoDH should be developed. These guidelines should outline the legislation regarding the granting of rights of ownership and of access to geothermal resources, nominate the relevant licensing authorities and describe the application process and guidelines for technical inputs, work programs and reporting requirements. These guidelines should help streamline the application process.

A reference guide to regional legislation for geothermal energy exploration and development, outlining the regulations with respect to licensing, taxation and fiscal conditions, should be provided for stakeholders.
- 8.6. A set of Geothermal District Heating Maps and related information will be available on-line as a result of the GeoDH Project. This should be used by local authorities to help plan for GeoDH projects.
- 8.7. The provision of information through a portal per administration for deep geothermal license applications and legislative guidelines is recommended.

9. GeoDH in national, regional and local energy planning and management

9.A) National

- 9.1. Within the framework of the implementation of Article 14 of Directive 2012/27/EU, governmental strategies for District Heating Development in the countries where no DH exists so far should be introduced.
- 9.2. If non-existent (as is the case of some countries with prospective resources to develop GeoDH), a national geothermal regulatory framework shall be introduced. This may be done via existing relevant regulatory acts or via legal act dedicated specially for geothermal energy.
- 9.3. GeoDH should be part of the energy strategy and National Energy Action Plans (NREAPs) under central government control, as with other RES (heat). Regional authorities should play a key role in implementation. GeoDH potential should be properly assessed and included in national and regional strategic documents on energy and RES (NREAP, SEAP, Energy strategies). Regional and local authorities should play a role key in the implementation of national governments' priorities, e.g. the role of local authorities in the DECC's Heat Strategy (UK).
- 9.4. National, regional and local administrations should be obliged to actively participate in the initiatives and publicly funded /co-funded projects (including EU-sources) related to RES and to apply their results, outcomes and recommendations.

9.B) Regional and Local

- 9.5. District Heating Action Plans as part of the implementation of National Energy Strategies should be introduced at a regional level. These strategies/policies need to provide clear integration and development targets for geothermal energy resources in areas that have been mapped as having potential (*presented, among others, in a series of maps and relevant information developed by the GeoDH Project and available at www.geodh.eu*).
- 9.6. District Heating and Geothermal Energy shall be identified as parts of regional / local energy policies as well as regional plans of supply with heat and electricity.
- 9.7. Transfer and adoption of proven legal, regulatory as well as technological solutions from other countries or regions is highly recommended since it may speed up the GeoDH development.

Knowledge transfer from best practice examples (e.g. from mature to juvenile markets) is highly recommended.

- 9.8. Transparent and fair decisions on RES-heat support and promotion including for the development of GeoDH should be developed based on sound economic considerations reflecting the cost development of geothermal energy at local level, taking into consideration the economic conditions, the local heat market and obligations under given regulatory and legal acts.

These shall be facilitated by the introduction of criteria for RES support (which would facilitate GeoDH development in several cases). Decisions about public support for DH and RES DH should be taken on the basis of periodic evaluations of economic effectiveness of such support for various RES (i.e. unit expenditures for a given unit of generated energy). It is suggested that the obligation of such regular comparisons should be introduced in relevant state and regional legal acts, and form a basis for decisions on further support and be publicly available.

- 9.9. The realisation of new or expansion of already existing GeoDHs (as one of possible RES prospective for heating purposes) shall be considered in energy and land use planning policies.

- 9.10. Several regional agencies have to work together. Regional authorities have to define the environmental strategy submitted to public examination. When local planning, need evidence on geothermal. After examination, control of application procedures.

- 9.11. In the cities and communities with prospective geothermal DH resources and interested in their deployment it is recommended that a coordinator/department is created especially for geothermal energy.

10. Role of public (decision makers, regional/local governments, administrations) and private stakeholders (ESCOs, DH operators, etc.)

- 10.1. Decision makers, civil servants in regional/local governments or administrations represent a very important group for the development of GeoDH. A lack of knowledge, awareness and interest, weak or scarce activities to promote, consider and initiate GEODH systems to a great extent result in a minor role for geothermal energy (including heating systems) in energy planning strategies, REAPs and SEAPs.
- 10.2. As for other RES, a system of regular education / promotion on GEODH addressing various groups of decision makers, politicians of various levels, local/regional administrations, energy and planning officers, local municipalities, DH designers, ESCOs, public should be introduced. This is an indispensable condition to create awareness on geothermal energy resources therefore better conditions for its wider use. Peer-to-peer learning networks on GeoDH are recommended.
- 10.3. Obligation to apply by decision makers the data, information from existing databases and information / especially funded from public sources,
- 10.4. The governments shall encourage regional administrative bodies in particular to include district heating and cooling from geothermal energy sources in the planning of city infrastructure where appropriate.
- 10.5. The ESCOs and DH companies should consider GeoDH during the planning and implementation of DH and modernisation of existing and constructing new buildings, along with technical and economic analyses of other RES.
- 10.6. ESCO DH companies should be encouraged to participate in the analysis and preparation of regional energy. It is recommended that ESCOs and DH operators are legally bound or at least encouraged to consider GeoDH.

- 10.7. Awareness campaigns for Renewable Heating and Cooling (RES-H) technologies and in particular for GeoDH which proactively target professionals from ESCO, DH operators groups (engineers, architects, installers, etc.) have to be foreseen.
- 10.8. More fairness in providing the energy service to the whole community, selecting particular energy / RES source and maintaining at the same affordable tariffs should be introduced.
- 10.9. There should be a recommendation to connect new buildings to a DH network when it exists nearby. In particular, geothermal energy shall be promoted in particular when it offers a competitive price compared to the MWh price in the DH. If in some given area a DH system is operational the energy users, new and planned buildings shall be encouraged by regional authorities to connect to DH/GeoDH.
- 10.10. Legal and regulatory acts as well as other strategic energy documents and development plans have to take into account the technological development in the RES sector. The technologies in early stages of development at present are constantly developing and therefore will play a larger role in the long term. Many will be sufficiently advanced for it to be both possible and profitable for them to be introduced. This recommendation refers to many RES as well as geothermal and GeoDH systems (eg. EGS technologies providing solutions for GeoDH /CHP systems).
- 10.11. It is justifiable to derogate from the obligation to operate GeoDH in cogeneration systems (CHP) where geothermal resources are suitable for GeoDH but not for generation otherwise many geothermal resources appropriate for DH will remain unused.
- 10.12. Consistent cooperation between both state and regional institutions, and the geothermal sector shall be encouraged as it will greatly facilitate the realisation of long-term policy to promote, support and enhance GEODH development.
- 10.13. Investors, ESCOs, DH companies should take into account the analysis above and use it as a basis for projects when applying for permits to retrofit, construct, or expand heating systems.
- 10.14. Energy – RES planning and management departments and officers should be Established in municipalities and regional offices for planning and cooperation with ESCOs, DH, GeoDH

developers, and operators in order to streamline the work of regional authorities and administrations responsible for energy management, supply, and the implementation of REAPs.

10. New proposals

References (selected)

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