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Regulatory Framework for Geothermal District Heating in Europe

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TABLE OF CONTENTS

- I. Introduction 2
- II. Definition of geothermal energy resources and related terms..... 5
- III. Geothermal resources ownership and regulations 6
- IV. Licensing systems for geothermal exploration and development concerning geoDH systems (including simplification of the procedures)..... 7
- V. Licensing for district heating (DH)..... 9
- VI. Geothermal energy and the licensing authority.....10
- VII. Access to information on geothermal resources suitable for geothermal district heating systems.....10
- VIII. Geothermal district heating systems in national, regional and local energy planning and management11
- IX. Role of public and private stakeholders (energy service companies, district heating system operators, etc.)13
- List of abbreviations.....14
- References15

I. Introduction

1.1. Background and objectives of the Regulatory Framework for Geothermal District Heating in Europe

The “Regulatory Framework for Geothermal District Heating Systems in Europe” is one of the main outcomes of the IEE Project “Promote Geothermal District Heating Systems in Europe”, GeoDH (IEE/11/813/SI2.616373). Its main purpose is to provide effective tools and guidance for stakeholders and to stimulate the use of clean renewable geothermal energy for district heating systems thereby contributing to the implementation of Directive 2009/28/EC on the promotion of the use of energy from renewable sources (RES).

In 2012 there were over 5,000 district heating systems (DH) in Europe (including 237 geothermal systems), covering some 10% of the heating market. Despite the significant potential of deep geothermal energy in several states geothermal DH systems have been poorly developed so far. This is mainly due to the lack of adequate national and regional policies and legislation 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’ development. Only a solid legal framework, continuity and predictability of legal, administrative and incentive provisions will create a proper background allowing strategic decisions in both the RES heat and geothermal heat sectors to be taken.

Against this background, **one of the main objectives of the GeoDH Project was to propose the removal of regulatory barriers in order to promote the best regulatory environment and the simplifying of procedures for geothermal district heating system operators and policy makers.** It has been pointed out that national codes and legislation referring to geothermal energy and its uses for DH are required for these purposes, as well as regional geothermal regulatory frameworks and local planning systems favourable to geoDH deployment. This need is met by the “Regulatory Framework for Geothermal District Heating Systems in Europe” which makes recommendations to decision makers on ways to optimise and simplify the regulations by translating the best rules into local and regional regulatory systems. Key stakeholders were consulted on the Framework and it was endorsed by relevant authorities in the 14 European countries involved in the GEODH Project.

The other two main objectives of the GeoDH Project were to:

- Develop innovative financial models for geoDH in order to overcome the current financial crisis hampering the financing of geothermal projects which are capital intensive (the outcomes are available at www.geodh.eu);
- Train technicians and decision-makers of local and regional authorities in order to provide the technical background necessary to approve and support geothermal district heating projects (training material is available at www.geodh.eu).

The three essential objectives listed are complementary and their realisation should facilitate an increase in the use of geothermal energy in district heating systems in Europe which is appropriate to the resource base, the requirements of Directive 2009/28/EC, a sustainable low-carbon energy policy, and market and social demand.

The “Regulatory Framework for Geothermal District Heating in Europe” provides legal and administrative recommendations which should facilitate the introduction of complementary and cohesive legal and regulatory provisions essential to creating a long-term stable system for the development of geothermal district heating in Europe.

Key recommendations

- **National and local rules must include a definition of geothermal energy resources and related terms, in line with Directive 2009/28/EC;**
- **Ownership rights should be guaranteed ;**
- **Administrative procedures for geothermal licensing have to be fit to 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 and simplified, and transferred to regional (or local if appropriate) administration level. The administrative process must be reduced;**
- **Rules for district heating (DH) should be as decentralised as possible in order to be adaptable to the local context, and stipulate a mandatory minimum level of energy from renewable sources, in line with Article 13 §3 of Directive 2009/28/EC;**
- **A unique geothermal licensing authority should be set up;**
- **Information on geothermal resources suitable for GeoDH systems should be available and easily accessible;**
- **GeoDH should be included in national, regional and local energy planning and strategies;**
- **Policy-makers and civil servants should be well informed about geothermal;**
- **Technicians and Energy Service Companies should be trained in geothermal technologies;**
- **The public should be informed and consulted about Geothermal DH project development in order to support public acceptance;**
- **Legislation should aim to protect the environment and set priorities for the use of underground: geothermal energy should be given priority over other uses such as for unconventional fossil fuels, CCS, and nuclear waste deposits.**

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

The set of proposals included in the “Regulatory Framework for Geothermal District Heating in Europe” was prepared on the basis of:

- experience and observations regarding the regulatory and administrative circumstances of, shortcomings in, and obstacles to implementing geothermal heating projects;
- the outcomes of fourteen national workshops and questionnaire surveys done as part of the GEODH Project in 2012-2014. During the realisation of these tasks information on the current regulatory framework was collected, analysed and summarised in order to identify the barriers hampering geothermal district heating deployment in each of the GeoDH Project countries;
- the outcomes of the IEE Project “Geothermal Regulatory Framework – Heat”, GTR-H (EISAS/EIE/06/007/2006), 2006 – 2009), in particular selected recommendations included in the “Final Regulatory Framework”;
- screening of selected publications;
- some findings of the IEE Project “Promoting Geothermal Electricity in Europe”, GEOELEC (IEE/10/321 /SI2.591109), 2011 – 2013 (www.geoelec.eu).

1.3. Main recommendations of the “Regulatory Framework for Geothermal District Heating in Europe”

The “Regulatory Framework for Geothermal District Heating in Europe” is primarily addressed to national, regional and local public authorities in charge of regulations and local development since they are deeply involved in the licensing process and other procedures concerning geothermal energy exploration, development, use and management. It puts forward specific recommendations addressing the simplification of procedures, attribution of licences and ownership of resources in fourteen EU Member States (with the intention of also applying them in other European countries). Its main recommendations are:

- The 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 need to be proportionate and simplified, transferred to the regional level of administration (or local if appropriate). The administrative process should be shortened.

1.4. Main focus and wording used in the “Regulatory Framework for Geothermal District Heating in Europe”

- The recommendations presented apply to those situations where geothermal water/geothermal energy are formally considered as mineral deposits and therefore are subject to licensing and other formal procedures. If, however, in some country / region they are not legally recognised as mineral deposits, the formal licensing process, even simplified, becomes unnecessary. On the other hand it is necessary to remember that legal regulations are also there to protect the geothermal water resources (as any other type of ground water) and therefore some appropriate regulations should be applied (not focused on the formal and administrative aspects but on the crucial geological and reservoir issues).

- The recommendations refer primarily to those issues directly related to the exploration, exploitation (this word may embrace both “abstraction” and “injection”) and use (“development”) of geothermal water (geothermal energy, geothermal resource) for the needs of district heating systems. However, some of them relate to broader issues associated with geothermal resources and geothermally-related activities, which result from the specific features of the resource or activities.
- The main focus is put on so-called deep geothermal water/energy resources and deep geothermal wells. The adjective “deep” refers to the depths at which these water / energy sources occur, i.e. from hundreds of meters up to 3 – 4 km in depth.
- The adjective “shallow” in the terms “shallow geothermal water”, “shallow geothermal energy/resource”, “shallow geothermal well” refers to their reservoir temperatures not exceeding ca. 20-25°C and to reservoir depths from several meters to several hundred meters below ground level (usually not more than 1 km). The exact maximum depths vary from country to country (usually they are less than 1 km b.g.l.)
- Explanations of abbreviations are given immediately after their first use in the text, as well as in the list of abbreviations at the end of the text.

II. Definition of geothermal energy resources and related terms

- 2.1. The term “geothermal energy”, as well as the terms “geothermal heat” and “geothermal water” should be introduced into specific national and regional policies and legislative acts (e.g. mining, geology, hydrocarbons legislation) in countries where such provisions do not yet exist.
- 2.2. A clear definition of geothermal energy should be included in state and regional legislation, in line with Directive 2009/28/EC on the promotion of the use of energy from renewable sources: *“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 to the surface and discharging it by natural springs or wells should be included in legislation. Although such a term has been in common use in several countries it should be formally accepted as a synonym of “thermal water” which is still used in legislation acts in some countries.
- 2.4. It is recommended unifying the basic terminology using the terms “geothermal energy” and “geothermal water” with a view to introducing transparent, transferable solutions and incentives from country to country and across the European Union as a whole.

III. Geothermal resources ownership and regulations

- 3.1. The ownership of the geothermal resource (geothermal energy, geothermal water) should be clearly defined at national level (as is the case with other natural resources such as minerals, hydrocarbons, groundwater). The geothermal resource should belong to the State.
- 3.2. Legislation should give the State the right to use the geothermal resource and to grant licences for its exploration, exploitation and use (development).
- 3.3. Existing regional legislation on natural resources, geology, water exploitation / abstraction, the environment, energy, 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-oriented activities) should grant a licensee exclusive rights and legal security for the exploration, exploitation and use of geothermal resources over a defined area and for a specified period of time. The area and the duration of the licence should be appropriate to the size and type of geoDH development and the potential capital investment.
- 3.5. The geothermal licensee should be protected from other external parties depleting or damaging the geothermal resource available within the licence area. The licensing authority should take other existing natural resource licences (e.g.: mining, hydrocarbons, quarrying, groundwater abstraction) or carbon capture and storage into consideration before issuing geothermal exploration and development licences, as interaction may occur between various resources and activities.
- 3.6. A protection zone should be defined in the licence for the geothermal resource for which the licence / permit is issued in order to protect the licensee against other mining activities. Firstly, the exploration field should be determined and legally secured to allow for preliminary geological investigations or exploratory drillings. Based on these results a sufficiently large exploitation field should be determined to secure a long-term exclusive right for the exploitation and protection of the geothermal resource.
- 3.7. The geothermal licensing authority should be responsible (with the other licensing authorities) for ensuring that there are no conflicting rights claims concerning the use of the underground resources.
- 3.8. There may be competition for the underground resource for use for onshore carbon storage and geothermal energy projects may target the same deep aquifers or the same areas. In this regard it is necessary to point out that geothermal energy may also be produced from rock formations below the depth range for potential carbon storage sites. Carbon capture and storage is essentially a bridging technology in a development stage whereas geothermal energy is a sustainable energy resource and developed as a commercial technology. Therefore areas of deep geothermal energy resources should be identified and priority given to geothermal energy resources over carbon storage exploration licences.
- 3.9. The legislation should set the priorities among underground resources. Geothermal water as a renewable energy source should be given priority over unconventional fossil fuels, CCS, and nuclear waste deposit.

- 3.10. In the case of geothermal water, depending on its temperature, priority for its exploitation and use should be granted in the following order: combined heat & power – cogeneration (CHP), geoDH, individual and other heating systems, balneotherapy / recreation. It is recommended that these uses be developed in multipurpose (“cascaded”) systems to ensure the most efficient use of energy.
- 3.11. “Large scale” geothermal DH 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 can be used to define projects requiring a groundwater exploitation licence in accordance with national or regional legislation. A capacity threshold can be applied in the case of large multiple borehole collector arrays. The licensing authority can set maximum and minimum injected water temperatures for proper aquifer management purposes.
- 3.12. Appropriate exemptions from local and regional planning regulations and environmental impact assessment (EIA) regulations should be considered for the exploration and development stages of geoDH projects in order to assist in the development of the sector.
- 3.13. The EIA for geoDH should be open to public consultation for a reasonable and not excessive period. Useless and burdensome procedures should be limited as much as possible so as to avoid unnecessary costs.
- 3.14. Consider the introduction of a dedicated “Geothermal Act” and licensing provisions in line with the specificities of the geothermal energy sector.

IV. 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 permit/licensing procedures for exploration and exploitation of geothermal energy should be streamlined:
 - by transferring licensing procedures to the competences of regional administrations,
 - by introducing a single licensing system (a one-stop-shop),
This would encourage investors and boost investments.
- 4.2. The geothermal licensing procedures and the issuing of licences should be handled by a single dedicated regional authority. The sharing of responsibilities on these matters among various authorities should be avoided since this produces unfavourable effects on the projects.
- 4.3. The administrative process for the granting of licences for deep geothermal for DH should be reduced and the time scale should not exceed 6 – 12 months.
- 4.4. The duration of a geothermal exploration permit / licence should not exceed 6 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.

- 4.5. Deep geothermal energy/water exploitation permits / licences should be granted for a fixed duration of a minimum of 20 – 25 years with the possibility of extension to 50 years. This recommendation results from the duration appropriate to the normal minimum lifetime of the exploitation wells and the payback time for geoDH which is ca. 15 years in the best case scenario. Therefore geoDH developers require long licence periods. This long period will protect them and also ensure a greater possibility of establishing a viable financial engineering structure for investment.
- 4.6. A renewal option for a defined period should be made available to the exploitation licence holder. Extension of the licence should be subject to a review by the licensing authority taking into account the production rates and associated impacts on the geothermal reservoir and other natural resources as well as the economics of the project.
- 4.7. An application for a licence covering geothermal exploitation, use or development should be accompanied by a development plan supported by exploration results and technical and financial models. This data should fulfil all the requirements of the legislation for natural resources, planning, protection of the environment and groundwater in accordance with relevant legislation.
- 4.8. Requirements set by legal acts or licensing authorities which impose too detailed methodological procedures on the investor (e.g. strictly defined temperatures of the injected water) should be considered disadvantageous. In order to increase geoDH development it is necessary to broaden the investor's freedom of use of the geothermal water/energy in a framework which ensures rational management of the geothermal reservoir.
- 4.9. Simplification of procedures relating to the exploitation of geothermal water (also for the needs of geoDH) should address, inter alia, the elimination of the obligation to develop a mineral deposit (i.e. geothermal water reservoir) development plan (the usefulness of which in the case of any kind of water reservoir/resource is doubtful). This includes also the obligation to develop a plan of operation of the mining plant. It is also recommended that a waiver be considered regarding the establishment of the mining area (unless for protection against other mining activities in the same area or close to it).
- 4.10. In the course of the licensing procedure it is generally unnecessary to agree the licensing decision with the mayor or other relevant local administration representative when the same local authority also issues the decision on the environmental conditions.
- 4.11. Conditions for the disclosure of all data submitted 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 exploitation data are confidential.
- 4.12. Multipurpose (cascaded) geoDH systems where geothermal water is not injected back to the reservoir but used for other purposes (e.g. balneotherapy, spas) and then disposed into surface water courses should follow surface water discharge licensing requirements. The sustainability and minimal environmental impact on the resource of such systems should be demonstrated.
- 4.13. The costs of geothermal exploration licences and drilling permits should be set lower than petroleum and mineral exploration licensing costs to reflect the comparatively lower economic return potential and to promote geothermal energy development as part of national and regional renewable energy action plans (NREAPs, RES Directive-2009/28/EC). For these reasons licences for geoDH could even be provided gratis at the initial stage of GeoDH development.

V. Licensing for district heating (DH)

An enabling technology to produce heating and cooling with geothermal is a district heating system. In Europe the existence of district heating systems varies; from more than 60 % of the population being supplied with district heating to almost not existing. In countries where district heating exists, the regulation of district heating varies, including the regulation of geothermal energy. In countries where district heating is not widely spread, there is typically no or very little regulation on district heating. Here the challenge may be to establish district heating, starting with introducing the regulation of district heating. Hence, the challenges regarding geothermal energy is different, depending on whether district heating is present already and how it is regulated.

- 5.1. Central governments should require the supply of minimum levels of energy from renewable sources to promote the use of renewable energy technologies in district heating systems.
- 5.2. Regulations relating to DH should be as decentralised as possible to be adaptable to the local context (incl. the availability of local renewable sources which could be used in such systems).
- 5.3. The local municipality should play a leading role as the planning authority carrying out the process of public procurement for (geo)DH systems on their territories and /or approving practical projects (including the establishment of collective heat supply plant, and changes, extensions etc. of existing plant). This may also be achieved through the implementation of Sustainable Energy Action Plans, under the Covenant of Mayors.
- 5.4. The supply of energy to DH networks should be subject to an approval regime based on a socio-economic assessment comparing various alternative sources for heat supply, including locally accessible renewable energy sources. This shall be implemented also as a result of the transposition of paragraphs 14.2, 14.3 and 14.4 of the Energy Efficiency Directive (2012/27/UE). Indeed DHs should be built unless there is a more cost-effective solution.
- 5.5. Specific regulations could apply to DH projects regarding networks, production facilities and choice of the types of energy sources available /including geothermal.
- 5.6. Recommendations on geoDH regulations at European level are useful for simplifying. This should be completed with exchange of best practices.
- 5.7. A national frame on Heating and Cooling should serve for designing the heat supply. The purpose of supplying the socio-economic optimal heat supply is obvious and can in many cases be fulfilled with geothermal energy. Such a national plan should apply to both centralised and decentralised installations, and District heating systems should be encouraged.
- 5.8. Regulation should be as decentralised as possible in order to be adaptable to the local context.
- 5.9. Temperature of geothermal water is sometimes too low for direct use in heat exchangers. Therefore heat pumps are used to increase the temperature level, either by electricity (heat pump driven by electricity) or by steam (e.g. from a biomass boiler; absorption heat pump). In this case the project has to apply for approval acc. to regulation for production plants.
- 5.10. National energy policies should aim at reducing the share of electricity in the heating & cooling sector to the lowest possible level, for example to store electricity from various renewable sources. The rest of the supply should come directly from renewable energy sources like geothermal, ensuring the longevity of existing DH systems.

VI. Geothermal energy and the licensing authority

- 6.1. The licensing authority for the exploration, exploitation and development of deep geothermal resources could be a regional body (department) already responsible for natural resource licensing of mineral or other resources in consultation, if necessary, with other relevant authorities and experts.
- 6.2. The geothermal licensing authority should be responsible for the issuing of licences for the exploration and exploitation (development) of geothermal resources, reviewing and awarding the licences on a case specific basis, as well as facilitating and monitoring the geothermal licence application system.
- 6.3. The geothermal licensing authority should possess the necessary level of expertise in geothermal energy, and adopt geothermal industry best practice standards.
- 6.4. Though it is reasonable to have several competent administrative bodies to assess an application for geothermal licences, a one stop-shop process (one department) should be the rule for each phase of a project.
- 6.5. The administrative structures and organisation, as well as the respective responsibilities of national, regional and local administrative bodies for geothermal procedures, should be coordinated and clearly defined.
- 6.6. Where possible the same authority should be responsible for both granting the licence and monitoring the activities carried out under the licence. However, if the monitoring and licensing authorities are different, the authority responsible for monitoring should advise the authority responsible for licensing. This would reduce the complexity of the authorization phase to exploit a geothermal well, which is due to the large numbers of involved administrative bodies.
- 6.7. The responsibility for ensuring that there are no disputes concerning the rights to use the geothermal resources should lie with the licensing authority. It also seems reasonable to indicate the authority responsible for the resolution of disputes between investors.

VII. Access to information on geothermal resources suitable for geothermal district heating systems

- 7.1. It is recommended that databases of prospective geothermal resources for geoDH be developed and an obligation to consider them in future regional/local energy supply planning be imposed. Harmonisation between databases is required at a national level.
- 7.2. It is recommended that support be provided to the development of web-based systems providing maps, parameters of geothermal water / energy resources and the balance of their reserves (periodically updated) as well as creating the conditions for optimising the location of district heating systems based on deep geothermal energy. In this respect it is advisable to pay attention to the dedicated set of Geothermal District Heating Maps and related information on European countries / regions available on-line as a result of the GeoDH Project. Geothermal

maps and databases should have an appropriate level of details. These should be used by local authorities to help them plan geoDH projects.

- 7.3. The National Institute of Statistics or national energy agencies should provide (detailed) data about heat demand and supply.
- 7.4 The development of databases of national and regional experts and companies specialised in geoDH is recommended. Information in such databases should be available to investors under appropriate conditions.
- 7.5 Consideration should be given to the development of publicly available geoDH guidelines (in various forms, also on e-platforms: local and regional central government offices, local and regional government) as well as a common basis for developing these in EU member states. They will help to streamline the application process for the granting of licences and permits. In particular – specific guidelines covering geoDH should be provided for stakeholders. These should cover the application procedures for deep geothermal exploration and exploitation licences. They should outline the legislation regarding the granting of rights of ownership and access to geothermal resources, and geothermal energy / water exploration and development. They should indicate the relevant licensing authorities and describe the application process as regards technical inputs, work programmes and reporting requirements, taxation and fiscal conditions.
- 7.6 It is recommended that information on deep geothermal licence applications and legislative guidelines be provided through a single portal per administration.
- 7.7 It is advisable to specially establish a competent professional body responsible for the promotion and development of the geoDH sector in those countries/regions where geothermal heat markets are juvenile and in transition. This could be e.g. the regional licensing authority or an independent expert body.

VIII. Geothermal district heating systems in national, regional and local energy planning and management

8.A) National

- 8.1. Within the framework of the implementation of Article 14 of Directive 2012/27/EU, national heating and cooling assessments aimed at identifying the potential for district heating infrastructure should take into consideration the geothermal potential.
- 8.2. A national geothermal regulatory framework should be introduced where no such framework yet exists. This may be done via relevant legislation already existing or via separate legislation specifically directed at geothermal energy. This framework will pave the way for geoDH development.
- 8.3. Geothermal energy potential and geoDH should be part of the energy strategies including the National Renewable Energy Action Plans (NREAPs).

- 8.4. National, regional and local administrations should be encouraged to actively participate in publicly funded /co-funded initiatives and projects (including EU-sources) related to RES and to apply their outcomes and recommendations.
- 8.5 Applications and financial reporting for regional or national public funding should be simplified, so as to do not discourage those who want to apply for funding.
- 8.7. To facilitate the procedures by which local authorities may support private undertakings in the development of a geodh, a State Aid General Block Exemption covering geothermal projects is currently in force¹ and should be extended.
- 8.8. Transparent and fair decisions on support and promotion for RES-heat, including the geoDH, should be developed on the basis of sound economic considerations reflecting the cost of development of geothermal energy at local level, taking into consideration the economic conditions and the local heat market and obligations under given legislation acts.
- 8.9. These should be facilitated by the introduction of criteria for the support of RES. Decisions about public support for DH and RES DH should be taken on the basis of periodic evaluations of the economic effectiveness of such support for various RES (i.e. unit expenditures for a given unit of energy generated). It is suggested that an obligation to provide such regular comparisons should be introduced in relevant state and regional legislation. This should be publicly available and form the basis for decisions on further support.

8.B) Regional and Local

- 8.1. Energy management at local level should be carried out in conjunction with energy planning in the form specified by relevant laws which generally oblige municipalities to draw up their policy assumptions or plans for the supply of heat, electricity and natural gas. Such energy planning should be part of energy management by local government units. Municipalities should at the same time have easy and inexpensive access to the information on resources and prospects for the use of geothermal energy in their area (*as recommended in chapter 7*).
- 8.2. It is advisable to use optimisation procedures at all levels of energy planning (from the local community to the national level). Local government units should also draw up and implement "Low-Carbon Economy Plans" with particular emphasis on the use of indigenous renewable energy sources (including geothermal energy) for heat supply and district heating (DH). In this respect, the key issue is appropriate spatial planning at local, municipal level combined with an awareness of the need for more concentrated development of housing and services at least where there are conditions for the use of geothermal energy in district heating systems.
- 8.3. It is recommended that legislative action be taken in the field of spatial planning and development in particular related to, e.g. the simplification of procedures for the preparation of local development plans for the location of geothermal district heating installations.
- 8.4. District Heating Action Plans should be introduced at regional level as part of the implementation of National Energy Strategies. These strategies/policies need to provide clear integration and development targets for geothermal energy resources in areas which have suitable potential.

¹ European Commission Regulation (EC) No 800/2008 of 6 August 2008

- 8.5. It is highly recommended that there is a transfer and adoption process for proven legal and regulatory solutions, best practice and technological solutions among the countries or regions concerned since this may speed up the development of geoDH.
- 8.6 The development of new or expansion of already existing geoDH should be considered in energy and land use planning policies.
- 8.7 It is recommended that a special geothermal energy coordinator/department be created in those cities and communities possessing potential geothermal DH resources and interested in their development. This could help companies to navigate through the administrative departments during the different phases of their project.

IX. Role of public and private stakeholders (energy service companies, district heating system operators, etc.)

- 9.1. Decision makers, civil servants in regional/local governments or administrations should be informed about geothermal, its benefits, and its technical aspects.
- 9.2. A system of regular education / promotion on geoDH is indispensable condition to build awareness.
- 9.3. There should be a recommendation concerning the connection of energy users and new and planned buildings to a geothermal DH network when such a network exists nearby. In particular, geothermal energy should receive special promotion when it offers a competitive price compared to the heat price in the existing DH.
- 9.4. Legislation acts as well as other strategic energy documents and development plans have to take into account the technological development envisaged in the RES sector: the technologies currently in the early stages of development are constantly progressing and therefore will play a larger role in the long term. Many will be technically feasible and sufficiently advanced and profitable to be introduced. This recommendation refers to many RES as well as geoDH systems (e.g. enhanced geothermal systems' (EGS) technologies providing solutions for geoDH /CHP systems).
- 9.5. In those particular cases where the legal provisions require that heating systems operate in cogeneration with power production systems (CHP), it is justifiable to derogate geoDHs from the obligation to operate as a CHP if the geothermal resources are suitable for geoDH but not for electricity generation. Otherwise many geothermal resources appropriate for DH will remain unused.
- 9.6. Consistent cooperation between state and regional institutions and the geothermal sector should be encouraged since this would greatly facilitate the realisation of long-term policy to promote, support and enhance geoDH development.
- 9.7. The public is informed and consulted so as to favour public acceptance.

List of abbreviations

CHP	–	combined heat & power (cogeneration systems)
DH	–	district heating
EC	–	European Community
EIA	–	environmental impact assessment
ESCO	–	energy service company
EU	–	European Union
EC	–	European Commission
geoDH	–	geothermal district heating
GeoDH	–	acronym of IEE Project “Promote Geothermal District Heating in Europe”
NREAP	–	National Renewable Energy Action Plan
REAP	–	Regional Renewable Energy Action Plan
RES	–	renewable energy source

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