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LEGAL AND REGULATORY FRAMEWORK FOR GEOTHERMAL EXPLOITATION IN ROMANIA

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Background

At present, the Romanian legislation is harmonized with European Union principles and supports renewable energies, among which geothermal is specifically mentioned.

In 2003, the Romanian Government approved the "Strategy for the development of renewable energy sources", which sets short and medium term targets in accordance with the EU principles and directives. The Kyoto objectives imply for the European Union, between 2008 and 2012, a reduction by 8% of the greenhouse gases emission compared to the 1990 level (corresponding to about 600 million tons per year of CO_2 equivalent). The European Council Resolution on renewable energies of 8 June 1998 seeks a doubling of the share of renewables from 6% at present to 12% in 2010. These targets have also been assumed by Romania, before joining the European Union in 2007.

The European Renewable Energy Roadmap adopted in 2007, which defines clear targets and goals to reach a 20% contribution of renewable energy to the energy mix by the year 2020, has also been adopted by Romania and included in the Energy Strategy for the 2007-2020 period.

Legal framework

The underground mineral resources (including geothermal) are owned by the State. The Romanian Constitution, adopted in 1991, stipulates that "resources of any nature occurring in the underground, [and] the water with useful energy content, etc., are exclusively public property." Mineral rights are excluded from private ownership. Their exploration and exploitation is regulated by the Mining Law (No. 61/1998, old version, available at http://www.cdep.ro/pls/legis/legis_pck.htp_act_text?idt=231, modified by Law no. 85/2003, available at http://www.cdep.ro/pls/legis/legis_pck.htp_act_text?idt=47261).

Obtaining concession licenses (from the National Agency for Mineral Resources, see below) for exploration and exploitation is regulated by the Concession Law (No. 219/1998, available at http://www.cdep.ro/pls/legis/legis_pck.htp_act_text?idt=18413).

The Environment Protection Law (No. 137/1995 old version, available at http://www.cdep.ro/pls/legis/legis_pck.htp_act_text?idt=16982), modified by Law No. 265/2006 (available at http://omg.ngo.ro/documente/oug_195_2005.pdf), stipulates that the activity of drilling wells for underground fluid production is subject to the environmental authorization procedure. Only water wells for domestic use (residential areas, family houses) with depths of less than 50 m are excepted from this procedure. Wells for (vertical loop) borehole heat exchangers are not specifically mentioned (this is still an unusual technical solution in Romania, most ground source heat exchangers are horizontal, being less expensive). The drilling process is still under the incidence of the Environmental

Protection Law for the storage and disposal of hazardous fluids (fuels, lubricants, drilling mud), as well as air and noise pollution.

The Water Law (No. 107/1996, old version, available at http://www.cdep.ro/pls/legis/legis_pck.htp_act_text?idt=9273, modified by Law No. 310/2004 (available at http://www.cdep.ro/proiecte/2004/300/60/5/leg_pl365_04.pdf) regulates the use and protection of Romania's water resources. All waters - ground and underground - belong to the state. They can be used free for drinking, washing, irrigation and other needs, even in small installations having a maximum flow rate of 0.75 m^3/h, but can not be sold. Otherwise, the right of using both ground and underground waters is subject of authorization. In order to stimulate the development of small and medium enterprises Law No. 346/2004 stipulates that for some small dimension works and activities (flow rates below 36 m^3/h) a notification at the Competent Authority is enough.

The Energy Efficiency Law (199/2000 old version, available at http://www.cdep.ro/pls/legis/legis_pck.htp_act_text?idt=24985), regulates the efficient use of energy. Currently, the Ministry of Industry and Finances (also in charge of resources) elaborates proposals for changes in the Petroleum Law and Mining Law as well as the initial text of the law concerning electric and thermal energy. These legislative projects will soon be forwarded for analysis and adoption to the Romanian Parliament. The Government issued the Ordinance No. 22/20.08.2008 (available at http://www.juris.ro/legislatiedetaliu/Ordonanta-nr-222008-din-20082008-privind-eficienta-energetica-sipromovarea-utilizarii-la-consumatorii-finali-a-surselor-regenerabile-de-energie-/) regarding the energy efficiency and the promotion of renewable energy sources utilization at end users.

The Thermal Energy Law No. (http://www.clr.ro/rep_htm/L325_2006.htm) sets the general rules for district heating systems, and is intended to stimulate the use of renewable energy sources, among which geothermal is specifically mentioned. According to this law, all district heating systems have to be public property, but the operation can be concessioned to a specialized private company or to a public - private joint venture. The district heating company purchases heat from any producer (public or private), transports, distributes and supplies it to consumers.

The Law for the Promotion of Energy Production from Renewable Energy Sources (No. 220/2008, available at http://www.cdep.ro/proiecte/2008/100/70/9/leg_pl179_08.pdf) regulates all aspects regarding the "green certificates" issued for electric and thermal energy produced from renewable energy sources, geothermal included. In general, for 1 MWh energy produced from a renewable source, the producers receives one green certificate. For 1 MWh thermal energy produced from geothermal energy the producer receives 1 green certificate, but for electric energy produced from geothermal energy the producer receives 3 green certificates. Some restrictive conditions apply, different for some renewable energy sources, mainly as minimum or maximum installed capacity and first year of operation. The green certificates can be sold on the Green Certificates Exchange. The maximum price for one green certificate is, for 2009, 42 €. The producers of energy from fossil fuels have annual quotas of green certificates they have to acquire, function of their annual energy production, otherwise they have to pay a fine. These quotas are fixed for each year until 2020, and increase every year. As the available green certificates are much below the demand, their selling price is the maximum one. At the end of the year, the money obtained from fines is distributed to the green energy producers proportional to the number of green certificates they sold, providing an additional income on top of the one from the certificates.

Standards

European standards are currently adopted as Romanian standards too, translated into Romanian and with "SR" added in front. Up to now, the European standards for equipment working under pressure, including heat pumps, have been adopted as Romanian standards. Refrigerants not allowed in the EU are therefore not to be used in Romania too.

SR EN 15450: Heating systems in buildings - Design of heat pump heating systems, gives the minimum and the target SPF values for new

and for buildings for all heat pump systems, including ground source.

SR EN 255: Air conditioners, liquid chilling packages and heat pumps with electrically driven compressors - Heating mode - Part 3: Testing and requirements for marking for sanitary hot water units.

SR EN 14511: SR EN 14511-1 Air conditioners, liquid chilling packages and heat pumps with electrically driven compressors for space heating and cooling - Part 1: Terms and definitions was approved in 2008, together with Part 2: Test conditions and Part 4: Requirements. Part 3: Testing methods.

SR EN 12309-2: Gas-fired absorption and adsorption air-conditioning and/or heat pump appliances with a net heat input not exceeding 70 kW - Part 2: Rational use of energy.

SR EN 378-1: Refrigerating systems and heat pumps - Safety and environmental requirements - Part 1: Basic requirements, definitions, classification and selection criteria. It divides refrigerants in two groups (A and B) according to their toxicity, and stipulates maximum allowed concentrations.

The Government Ordinance No. 89 of August 30, 1999 regarding the trade regime introduces restrictions on the use of halogenated hydrocarbons that destroy the ozone layer.

The Government Decision 827/2002 stipulates the eco-label criteria for refrigeration equipment only (based on 1980/2000/EEC Regulation), but a new one shall include heat pumps.

Another legal regulation relevant for all type of projects, including geothermal and ground source heat pumps, regards *Salmonella Legionaris*: in case hot tap water is stored, the system must have the possibility to increase the temperature in the storage tank above 70°C at least every second month. This is specified in a regulation norm for buildings.

Institutional framework

The National Agency for Mineral Resources (NAMR), established in 1993, is the regulatory authority to administer the mineral resources as well as the Competent Authority which coordinates the mining operation under the Mining Law, according to the provisions of the Concession Law. In particular, the Agency is authorized to institute hydro-geological protection perimeters, for the underground waters (mineral and thermo-mineral), to negotiate the terms and conclude agreements for the exploration and production of mineral resources and to select, finance, and follow up on all geological exploration and exploitation works for geothermal resources.

The Order No. 97/20.05.2008 of the President of NAMR on the technical instructions for classifying and assessing the resources/reserves of natural mineral water, therapeutic mineral water, geothermal water, gases that accompany them, and noncombustible gases defines all these mineral resources, and geothermal waters are defined as “renewable useful mineral substance, represented by the totality of underground water which have the role of transporting the heat from the terrestrial crust, used for energy or as therapeutic mineral waters, with temperatures at the source higher than 20°C” (value also adopted by the International Geothermal Association a couple of years ago).

The National Agency for Environment Protection, established by the Governmental Decision no. 1625/23.12.2003, is the responsible authority under the Environment Protection Law. It has been intended to work so as to ensure a healthy environment, in line with Romania's economical development and its social progress. Its mission consists in ensuring a better environment for the present and future generations, through a continuous enhancement of air, soil and water quality.

The National Administration “Romanian Waters” is the competent authority under the Water Law. Its competence goes to surface waters of the public domain as regulated by the Law of Waters no. 107/1996, with their minor beds, shorelines and lake basins as well as their natural resources and energy potential, underground waters, sea-walls and beaches; dams; permanent and temporary reservoirs and others.

The competent authority for the Energy Efficiency Law is the Romanian Agency for Energy Conservation who is empowered to insure the implementation of the provisions of Law No.199/2000 with regard to efficient use of energy, as republished, referring to the duty of energy consumers to designate their appointee

for energy, to realize periodically energy balances, update energy balances, and identify measures for energy saving, as well as develop own programs of energy efficiency. The Romanian Agency for Energy Conservation uses its mandate to establish a dialogue with energy consumers by insuring free consultancy with regard to modern techniques of energy saving and by increasing knowledge and sensibility about economic gains that may be obtained by making use of energy efficiency management practices.

The economic and technical operation and development of the energy sector (electric and thermal) is regulated, ruled, supervised and monitored by the National Regulatory Authority for Energy (ANRE), which was set up by an Emergency Ordinance in October 1998 as an independent and autonomous public institution. For electric energy, according to the current legislation, TRANSELECTRICA, (the National Power Transportation Company) has to purchase the entire available power produced from renewable resources. The unit price is established by the ANRE, based on the financial and economic assessment study.

For thermal energy sold to a private commercial customer, the unit selling price is usually fixed by direct negotiation between the two parties. In case the customer is a public utility (e.g. district heating), the unit selling price has to be approved by the Local Council and also by the National Regulatory Agency for Local Administration.

In 2008, a national program was set up by the Ministry of Environment and Sustainable Development, called "Green House", aimed to stimulate the development of renewable energy equipment, will be fully operational. The equipment purchased via the "Green House" program will be up to 90% subsidized, provided individuals who want to install alternative energy production systems agree to buy from companies accepted by the ministry. Subsidies for the "Green House" program (planned for implementation on January 5, 2009), will be allocated via the Environment Fund Administration. The Administration benefits from overall financing for the program of 520 million RON (1 EUR ≈ 3.8 RON), of which 400 million RON target financing for eligible projects submitted by individuals and employers' associations. Subsidized energy equipment will include ground source heat pumps, solar panels, photovoltaic panels and even small wind systems. The "Green House" project was set to be a multi-annual program. Unfortunately, due to the current financial crisis, the program has been stopped, at least for this year.

There are two companies in Romania currently exploiting geothermal resources, Transgex S.A. and Foradex S.A., which have the long term concession for practically all known geothermal reservoir.

Transgex S.A. was established in 1970, having as main activities prospecting and geological exploration for mineral resources, by well drilling and mining works. Up to now, the company has drilled about 150 wells for geothermal water. The Transgex S.A. Company was privatised in 2000. At present, as basic activity, Transgex S.A. is developing the use of geothermal energy for district heating in the towns of Oradea, Beius, Salonta, Marghita, and Stei, as well as in the villages Livada, Sacuieni, Cighid, Sinicolau de Munte, Sintion. Geothermal energy is delivered in towns to blocks of flats, administrative institutions and economic agents, and in smaller communities to blocks of flats and administrative buildings.

Foradex S.A. is a large company privatised in 2008. The main part of its activity is drilling (in Romania and abroad). It has a Geothermal Department, but not much information is available regarding its activities.

Turism Felix S.A. is a tourist company owning almost all hotels in Felix Spa, near the City of Oradea, as well as the geothermal wells and the exploitation licence. The geothermal water is only used for health and recreational bathing.

A few other (smaller) companies have exploration or exploitation licences for geothermal sources, the typical example being one low temperature well used for swimming pools. The University of Oradea is a state university established under this name in 1990, based on different higher education institutions of which the first started its activity in 1780. Some of its faculties have geothermal related training and/or research among their activities, such as

the Faculty of Energy Engineering, the Faculty of Environment Protection, the Faculty of Electrical Engineering and Information Technology, and the Faculty of Medicine and Pharmacy. The Faculty of Energy Engineering currently offers B.Sc. training in Thermal energy engineering (strongly oriented to renewable energy sources) and M.Sc. training in Renewable energies. Five members of its current academic staff followed the six months UNU Geothermal Training Programme in Iceland. The university also has a number of research and training departments, including the Geothermal Research Centre and the International Geothermal Training Centre.

Licensing procedures

Long-term licences are awarded by the National Agency for Mineral Resources for either the exploration or the exploitation of mineral resources, including geothermal. The NAMR also authorises companies to carry out certain activities (exploration, exploitation, research, trade, etc.) related to each specific mineral resource. In order to be authorised, the applicant company has to prove its capability to actually perform the respective activities. The list of required documents is available (in Romanian only) from the NAMR website (http://www.namr.ro/main_en.htm).

Exploration licence

Initial data (geological, geophysical, hydrogeological, etc.) can be purchased from the NAMR for reasonable fees. but only by companies authorised by the NAMR to have and work with such data. In most cases though, the company applying for the exploration licence would be the one that actually carried out the preliminary exploration and, in most cases, even drilled the exploration wells (Transgex or Foradex). Therefore, these companies would already have the necessary data. The following documents are required when applying for an exploration licence:

1. Perimeter setting study;
2. Resource assessment study;
3. Technical and economic feasibility study;
4. Environmental impact assessment.

The Perimeter setting study shall define the perimeter of the surface area under which the resource is located. All exploration activity shall only be carried out inside the set perimeter. When deep exploration wells have to be drilled, the NAMR can award, from the State Budget, the necessary funds for drilling such wells, as part of the national geological exploration program. For this, the company has to submit an application based on significant and reliable data justifying the need and opportunity to drill the exploration well. The wells are usually designed, drilled, and completed as potential production wells.

The resource assessment study is usually compiled after at least one deep exploration well has been drilled. Based on all available data, sometimes including a rather simple computer model of the reservoir, the study estimates the long-term sustainable exploitation potential of the geothermal resource, for one or more exploitation scenarios (i.e. with and without reinjection).

The technical and economic feasibility study should comprise: the geothermal energy supply available from the existing (exploration/ production) wells; the potential users in the area and their annual heat demand; the proposed utilisation system (conceptual design); the economic feasibility assessment (discounted cash flow analysis); financing scheme (i.e. source of funds for the capital investment). These are usually small-scale projects, operated mainly in order to monitor the behaviour of the reservoir during short-term exploitation. The exploration licence is usually awarded for a few years only (typically two).

The environment impact assessment study should be carried out for the proposed project during the exploration phase. As any EIA study, it should comprise: the base line (status of the environment parameters before the project start); impact of the proposed project on all environment factors; comparison with other possible projects for the same operation, including the "no project" case.

Exploitation licence

The documents required for an exploitation licence are basically similar to those required for the exploration licence. The main differentces are:

1. The concession is applied for (and awarded, if any) for a long period of time, usually no less than 20 years;
2. The proposed project is usually larger in size, designed to utilise the resource up to its maximum sustainable capacity;
3. All studies are supposed to be more detailed as compared to those submitted for the exploration licence;
4. A very important item is for the company applying for the exploitation licence to prove it has the financial capacity to complete the project.

In certain circumstances, when the geothermal resource is intended to be mainly or only used for district heating, the local community may apply and be awarded the exploitation licence for the resource. There is no such case yet in Romania, but the NAMR regulations specifically mention this possibility. Any entity exploiting a geothermal resource (as well as any other mineral resource) has to pay a royalty based on the unit mass or volume extracted annually. Royalties are relatively low, but they can be included in the unit energy selling price. This price is based on economic calculations, but its approval depends on the type of energy, and in certain cases the type of customer.

Problems with the current legislation

The legal and regulatory framework in Romania is, at present, rather clear and complete (even if a bit complicated and too much bureaucracy), enabling the development of geothermal energy utilisation. Some new regulations are expected in the future, mainly on ground source heat pumps, such as restriction on substances allowed for use in ground source heat exchangers, etc.

The main problems have been created by the inclusion of geothermal water resources in the broader category of mineral resource, under the incidence of the Mining Law. In case of any other mineral resource type is exploited, including oil and gas (example closest to the geothermal resources), the resource is depleted in time and will never occur in the same location. In case a geothermal reservoir is exploited, the extracted water can be replaced either by the natural recharge of the same reservoir, or by reinjection. Even the heat extracted from the rock matrix is replaced, at least by the natural heat transfer through the crust (from inside to the outside), within a reasonable time (about equal to the production time).

Among the documents that have to be submitted to the NAMR annually by any company exploiting a mineral reserve is a report on "reserve displacement", which basically shows how much of the reserve has been extracted and how much is still in place. This type of a report has no real meaning in the exploitation of a geothermal reservoir, but this fact is quite difficult to understand by a person not specialised in geothermal.