

BARRIERS IDENTIFIED		Austria	Belgium	Bulgaria	Cyprus	Czech Republic	Denmark	Estonia	Finland	France	Germany	Greece	Hungary	Ireland	Italy	Latvia	Lithuania
ID	Financial Barriers																
F1	Feasibility Study support									50% (ADEME up to € 150k)	No, in special cases there may be financing as part of a research activity				Recommended as 'preliminary investigation' by Law (art. 104 c.2 D. Lgs. 152/2006)	No, in special cases there may be financing as part of a research project	
F2	GSHP - Guarantee Fund	Direct grants in form of not pay backable subsidies: Burgenland, Kärnten, Niederösterreich, Oberösterreich, Tirol, Vorarlberg, Wien / Indirect grants by residential building funding: Salzburg, Steiermark				Heat pumps for natural persons: 30 % of investment costs, max. funding per installation 2.225 EUR (non-returnable loans provided in 2003: 153.000 EUR)				AQUAPAC (BRGM/ADEME/EDF) >30kW power systems for shallow aquifers <100m depth	No, we have very few open shallow systems, so a general guarantee makes not much sense				We have quite a few of open loop systems and large commercial schemes ongoing, both for private and public buildings, based on 55% reduction of taxes expected on the business investment		
F3	GSHP Support Scheme (Regional/Other)	National Subsidies for efficient utilisation of energy (energy saving measures as heat pumps), Kommunalkredit Public Consulting (KPC) administers the Economic Incentive Programme - Upper Austria on behalf of the federal province of Upper Austria.	There is an up-to-date digital portal (www.energiesparen.be) available which provides an overview of all the different subsidy schemes for RES. Bonus from the exploit of the mains: The exploit of the mains will provide a bonus worth € 210/kVA when installing a water/water heat pump with a COP greater than 4,5 or a	The Bulgarian Energy Efficiency and Renewable Energy Credit Line (BEERECL). In general there is a high potential to developed ground source heat pumps in Bulgaria by using the appropriate financial mechanisms and legislations basis for producing a market in this field	New enhanced grant schemes are in effect since January 2006, which consider geothermal heat pumps as an energy saving technology and provide subsidies of 45% to individual households and 30% to companies and other entities.	The state Environmental Fund and the Czech Energy Agency support projects. Every year, it publishes a new notice on how to obtain financial support for a heat pump. The notice varies according to the final user of a heat pump – public sector, state sector or domestic – and according to the aim of support – training of installers,		In Estonia, there are no special funds, subsidies, tax relief or soft loans available targeted to support the use of heat pumps. Nevertheless, in case of larger heat pump projects the investors can apply for a grant from the Energy Efficiency Programme managed by the Ministry of Economic Affairs and Consumer		Regional Agency Support / National Support	Regional Agency Support, different in different states / National Support		Yes (in preparation) (In 1996 the EU Heat Pump Committee offered to Hungary a financial support.)	Yes - SEI Installations Grants	Regional Agency support, different by Region as occasional financing year by year (EU Structural Fundings?) / National Support*	No defined National or regional support, possibility to ask support from Environmental Fund	Pre-financing by private installation companies in Lithuania using private market fund or soft loans by the banks.
F4	GSHP Preferential Electricity Tariffs (how much?)										Yes - 12€/14€ (not 17€), depending on contracts with electricity supplier		Yes (in preparation)		No, likely under discussion within application decrees after L. 99/2009	May by	
F5	Deep Geothermal Insurance/Risk Fund									Yes - geothermal risk guarantee system (SHORT AND LONG TERM)	Yes, as well public (KW will start the fund soon) as private insurance companies				No, likely under discussion within application decrees after L. 99/2009	No	
F6	Investment Aid	Fiscal profit when installing a heat pump: 40 % of the investment cost for a heat pump with efficiency greater than 3 can be deducted from the (yearly) taxation. The reduction is limited to € 2.650. The heat pump has to be EG-labeled. To be clear, this fiscal profit is granted by the federal government								Yes (ADEME + regional administration based on produced MW <sub>th</sub> power from GT or from CO2 AVOID)	Yes, EEG, MAP, a scientific drilling program is planned			Due to the new developmental Law 3522/06 (Greek government gazette 276/22-12-06) and 3299/2004 (Greek government gazette 261 A/23-12-2004) if an investment includes Renewable Energy Sources this investment will be treated with better terms.	In Tuscany Region the regional programme on geothermal energy permits a financial support to district heating.	No	

F7	Total Data Purchase Costs									Depends on data owner. Megadata are free available	no	Free, in principle, service fees apply. In case of active mining fields, the approval of the mining company is needed.	Free - Provided previous license is not confidential	Free, where available by Regional and/or local authorities. No confidentiality applied, just could need to demonstrate the right to ask (e.g. appointment made with the client). Utilities might want a fee to be paid or don't want to share information.		
F8	Exploration Permitting Costs - Duration								DURATION= 3 y	5 Euro per km2 and increasing per year to a max of 25 Euro per square km - Duration: 3 plus 2 years	5 years	4+2+2 years	6	Deep geothermal: 3-5 years; Shallow geothermal: 0,3-1,5 years. Duration 1 to 1,5 years.	5years	3 - 5
F9	Exploration Fees													Costs based on consultancy fees		
F10	Exploitation/Extraction Permit Cost - Duration								duration=30 y max	No, only administrative on fee. No fix values, usually 20 years	3% of energy value 20 years +5 years	ca. 150. € duration not limited		Administrative costs around 120 €. Shallow geothermal 10-30 year after completion of works for licensing. No limit to closed loop systems.	25 years/ Environmental resources tax on water extraction	5+5+...
F11	Drilling Permit Cost									Yes - Deep Drilling (small)	minimum	yes, ca. 150 €			15- 105 €	
F12	Environmental Impact Assessment Cost									no Environmental Impact Assessment is necessary for heat pumps, in some cases hydrogeological assessment required	minimum	ca. 2000 €	c. €60,000	EIS or EIA sometimes needed based on project size; cost depending and varying on consultancy fees ruling in the market. Fees applied for unconformities.	EIS or EIA needed, decision on EIA after EIS case by case	
F13	Groundwater Production Permit Cost									Water Act suggest licenses is needed to pay charge for using ground water.				Rent to pay to Authorities when there is groundwater abstraction (in Lombardy 1500 € per year for 100 l/s with 500 € as minimum)	yes, mineral water	yes
F14	Royalties								Yes in theory but not in practice	Yes 10% of market value of the resource, but GT is considered to have 0 value	3% as mentioned above	Yes ??			NO	

F15	CO <sub>2</sub> Credits/Certificates to compete with conventional Fossil Fuels									No. CO2 certificat trading under EU regulations is possible but will contribute only to a small amount and is not yet used					2001 Financial Law (Law 388/00) promoted renewables through financial support to District Heating fuelled with geothermal fund creation, by setting aside 3 % of the income from the Carbon Tax.	It starts to compete
F16	VAT Rate on Heat Sales								5.5 % *	19%			Yes, 22 %		10% on domestic and sanitary uses	21% (legal entities); 5% (inhabitants)
F17	Other fees															Water use permit,
F18	District Heating System Support Scheme									Connection of new dwellings to existing system (company specific)	10 euro per metre (different categories)				In Toscana Region the regional programme on geothermal energy permits a financial support to district heating. In the frame of the "2001 Financial Law" (Law 388/00), the Italian Government has taken further steps to promote renewables through: • financial support to District Heating fuelled with geothermal fund creation, by setting aside 3 % of the income from the Carbon Tax.	Water use permit, geological and hydrogeological investigations, land property (subsoil is lend owners property)
<b>Data Availability</b>																
D1	Availability of Geological Data	the nine federal states	The geological information is accessible for everyone in a digital database with handy tools. This database contains information on all the performed (and permitted) drillings and groundwater extractions.	The geological data is limited and believe there is ongoing works. Geological structure is complex. Data is not free from Bulgaria Source, but some can be obtained from EU source		National office of energy inspection and Energy Regulatory Office				Yes	Yes	Yes	Yes	Yes	Yes, National and Regional (geological maps)	Partly available
D2	Availability of ground thermal conditions / Geothermal Data to project developers			No clear information					Yes - including production data from existing plants	Yes - National, specific project data available for viewing from private companies based on agreement	Yes from shallow low enthalpy wells	Yes - National + License Specific	Yes - National		Yes, National (heat flux at different depths)	No detailed information on temperatures and energy amount in different structural layers
D3	Cost of Geological Geothermal Data			No clear information						Depends on data owner. Metadata are free	Minimum	Only service and value added service fees.			Geological data are free. Site specific geothermal data are owned by private companies	Service fees

Legislation & Regulation																	
L1	Geothermal Energy Definition																<p>Law on Underground : In Article 3 it is defined that "underground thermal energy means thermal energy naturally or artificially accumulated in the underground, rocks, water or gas".</p> <p>No definitions</p>
L2	Temperature/ Depth/ Flowrate Cut Off,	make sure there is no direct contact between different aquifers. The possible connections between different water-containing layers have to be sealed off by a clay plug or a sealing mixture of cement. Depth ≤ 50 m below the ground level => Class 3 duty to report / Depth > 50 m below the ground level => Class 2 permit. At least 2 flow indicators															<p>A permit for the special use of water is necessary if: more than 5 m<sup>3</sup> of groundwater is abstracted per one twenty-four hour period; mineral water is abstracted; effluent or other water pollutants are discharged to a recipient; a water body is barred or dammed or the water level therefore is</p> <p>V. Small Plant (between 0 and 100m, 20°C and max output of 232kW) Lower Temperature Plants &lt;150°C Higher Temperature Plants ≥150°C</p> <p>The definition for 'shallow' is &lt; 400m. There are some legal changes &gt; 100m</p> <p>30 oC</p> <p>Groundwater: small schemes if &lt;100 l/s and surface water if &lt;1.000 l/s, large when over; Shallow (actually 'small') schemes: H &lt;400 m deep and thermal energy provided &lt; 2 MWt; Deep (actually 'large') when over</p> <p>Legislation do not regulate using of geothermal energy according to the temperatures, flowrate or other criteria.</p>
L3	Regulation Covering Geothermal Resource Ownership																<p>Yes (Civil Code, L. 896/1986, D.Lgs. 152/2006 mostly), stating each underground resource, surface water and groundwater included, is state property</p> <p>All Subsoil is land owners property</p>
L4	Ownership of the Resource	Appear to be state owned, not landownwe															<p>State - Not landowner</p> <p>State - Not landowner</p> <p>State</p> <p>State</p> <p>Not addressed - seen as a major issue in the development of GT regulation</p> <p>State</p> <p>All Subsoil is land owners property</p>

L5	Coherent GT strategy	consists of nine federal states. Each of these states has different forms of subsidies. Also technical guidelines (e.g. Water right), and requirements on technical documentation and implementation of plants (e.g. requirement of a heat quantity meter) are not consistent all over Austria. There also exists an unequal treatment of alternative heating	installing a heat pump with an electric input greater than 10 kW but smaller than 200 kW, a true municipal permit is needed. A heat pump greater than 200 kW requires a provincial permit. Vlärem II chapter 5.53.2 'The extraction and re-injection well have to be realized in the same aquifer'. This law is applicable for open				of ground source heat pumps need approval from the local authorities and will not be approved for areas planned for district heating. Buildings categorized as low energy houses are free to install heat pumps in district heat areas. The new executive order 1202 leaves the approval procedure to the local authorities, and				Yes	the corresponding heating/cooling systems (ground source heat pumps utilizing ground or water temperatures below 25°C) are issued by local prefecture according to Minister's decision [2] above. This decision specifies no limitations for heat pumps coupled with a ground			Italian legal framework is generally covering the RES and GT one as well quite thoroughly. New developments ongoing aimed for better recognition of GT, both shallow and deep.	NO
L6	Complexity of permitting and development process	A committee established for approving the different proposals for realising a certain project and decides as to which proposal should be chosen and subsidised by public funds. Permits Class 2 for open ground source systems	For vertical loop systems, it's obliged to have an announcing at the local government for shallow loops (<50m) and to submit a permit demand to the provincial government (>50m). For horizontal loop systems, no permit requirements are obliged. In general, ground-source heat pumps for domestic use do not need a	The investor who intends to utilize geothermal energy is expected to develop simultaneously other geothermal applications	ground coupled heat pumps are treated as an energy conservation technology in the relevant legal and grants schemes	there are no laws or secondary level legislation regulating the use of heat pumps, it is complicated to obtain permission from local authorities to drill boreholes for heat exchanger, because of fears to cause groundwater pollution				Complex mainly due to federal structure	Ministry should issue an open call for tenders	Rather complex with legal gaps and collisions	N/A but regulation of other natural resources is streamlined for exploration but can have delays in exploitation	Complex and changing region by region but for national regulated matters	According to the law On Subsoil the permits on drilling and use of subsoil is necessary. There are no regulations on geothermal energy	
L7	Professional Code of Practice	An important guideline that is introduced just recently (from 2006) is the 'heat pumps, code for good practice', it's available on the internet for everyone.	The procedure for obtaining a concession for water use is very complicated and time consuming.						Yes - Drilling & Environmental impact	State Guidelines for licensing borehole heat exchangers. Technical guidelines (DIN, VDI) and QA/QC systems	Mining Law, Ministerial decree 09B/0166/00k20076/ΓΔΦ115258/329 (OEK B. 1530/7.11.2005)	No - installers required to be approved by national authority for users grants	Professional Registers (engineers, designers, geologists etc.) have their own Ethic Code; none is applying for installers and drillers; UNI (National Standardisation) is at work on Heat Pumps Standards	No		
L8	Groundwater Abstraction Permit Length		chapter 53.6 'Drilling of groundwater wells and groundwater reextractions which will be used for a heat pump system': This law is applicable for open source heat pump systems. It specifies the type of permit you need to obtain to install a groundwater well that will be used for a heat pump installation as a		a hydro-geological survey must be carried out before a ground/water heat pump system can be installed. Drilling deeper than 30 m requires permission under mining laws. Application of all these regulations and other directives makes ground/water or water/water heat pumps expensive and complicated.	areas of activity requiring consideration of need for environmental impact assessment: groundwater abstraction where the annual volume of water abstracted is 50 000 – 200 000 cubic metres.			Depends on state and system		It depends	Not currently required - this will change in the medium term	A hydrogeological survey is recommended before installing a heat pump system. A desk hydrogeological study could be needed for closed loop systems. Max length depends on local hydrogeological conditions. Nevertheless BHs deeper than 30 m requires communication before starting and after completing works.	Hydrogeological investigations must be done before the getting of water use permit. Water use is necessary when water volume exceeded 10m3		

L9	Drilling Permit / Notification Requirement - Length	Important barrier is formed by the permits. Both open as closed systems require a permit in order to allow the drilling activities. The administrative approval takes up a lot of time as a function of the size of the GCHP-system from 1-4 months. When performing a drilling until a depth of 50 m or less (according to ground	No clear information						DRIRE - Notification for GSHP (>10m) & Permit required for Deep GT (Exploration & Exploitation). Complex Admin process for small residential users	Yes for all drill holes >100m	In order to obtain the necessary permit a utilization study should be prepared by competent persons (engineers and geologists)					Licence on well drilling according to the law On Subsoil
L10	Total Overall Administrative time for Exploration Phase Permitting								c. 6 months	several months or more	6 months after the issue for calls for tenders	1-2 months			1-18 months for shallow geothermal; 12-36 months for deep geothermal	several months
L11	Total Overall Administrative time for Exploitation Phase Permitting								c. 12 months	several months or more	6 months	min. 1 year for big projects			3-6 months after completion of works for shallow geothermal; estimated 12 months and more for deep geothermal	several months for shallow wells, more than 1 year for deep
L12	Overall stability of Regulation	Vlarem, chapter 55.6, governs the installation of the ground source system. Permits Class 1: Province, Permits Class 2: Municipality. Duty to Report: Municipality. These systems are never allowed in protected areas for groundwater collection which are designed for the public water supply	The Energy efficiency agency is a juridical person, supported by the budget with headquarters in Sofia and has a statute of an executive agency to the Minister of economy and energy resources.	Regulation 429/2006 states that new buildings or buildings subject to major renovation of total area exceeding 1000 m², heat pumps (including ground coupled heat pumps) should be considered as an option in terms of technical, environmental and economic feasibility			You have to have approval from the municipality to install a heat pump. They will evaluate the project with relation the Environment Protection Law (bekendtgørelse 522, 2. dec. 1989).			High	Geothermal resources higher than 250C belong to the State and are leased through a complex procedure. Responsible Authority are local Region for T<90oC and the Ministry of Development for T>90oC. Geothermal resources of T<250C belong to the property owner and licencing for ground source heat pumps is	Rather instable, under changes	High	Since 1927 and 1933 regulations have been starting ruling. After that, Laws in 1986 and in 2006 updated the previous ones. Today a review dedicated to low, medium, high temperature geothermal resources is expected in due time (6-12 months?)	Rather instable, often changes	
L13	Legal Obligation For Re-injection	For groundwater systems, it's obliged to have a reinjection well that returns groundwater in the same aquifer as the extraction well	Permit for re-injection shall be granted in case of: 1. de-watering of mines, quarries and construction engineering facilities, 2. use of waters for production of hydro-geothermal energy						No (but area and aquifer dependant)	No (based on technical guidelines GSHP & case by case for deep Geo)	No	Yes			Discharge into surface water bodies (rivers, creeks, lakes, ponds etc.) and/or reinjection to groundwater are recommended with no obligation so far. Just discharge into sewage systems could not be allowed. Quantitative and qualitative control needed. Somewhere not allowed to reinject water over 20° C temperature or with + or - 5°C variation.	NO

Other Barriers (outside scope of the GTRH project)																									
O1	Drilling costs		Belgium has another great disadvantage which has its impact on the investment price: there are just a few geothermal drilling firms that are experienced in geothermal drillings (groundwater, vertical heat exchangers). Most of the drilling firms are specialized in drillings for groundwater extractions.															High, possibly decreasing by using double headed systems in overburden soils. Medium in soft rocks and clays.	High						
O2	Capital costs		High	High, 100€/m														High							
O3	Lack of qualified specialists in the sector		Compared to gas boilers, HVAC installers consider heat pumps as a difficult technology. They also have to turn to a specialized drilling company to perform the drilling activities. Coupled with bad experiences in the past, this makes an important barrier for the widely spread introduction of heat pumps in the Belgian	Lack of administrative and practical expertise in geothermal development, Lack of enough financial resources – state, municipal and private, Lack of enough information regarding the possibilities on the ground heat coupled pumps.															Yes, there is new academic education as in Aachen, Bochum, Karlsruhe, Mainz, The Drilling School in Celle is expanding. Still lack in all fields and especially for shallow.	Very few experts are available for both high temperature geothermal and ground source heat pumps	partly true		Academic education/courses in some five universities (e.g. Rome, Milan, Siena, Pisa). Drilling school at work at high school level in Veneto, Tuscany, Sardinia. Qualification made by being members of professional registers and joining their CPDs schemes, made quite relevant since 2008 by CNG (and UGI).	very few experts on geothermal energy, both deep and shallow, no training and certification for drilling specialists	
O4	Lack of a dedicated GT office for provision of clear and expert information on permitting process and independent assessment of the project for the benefit of the local granting authorities and to define gov. policy		A great barrier for GCHP-systems consist in the lack of knowledge of these systems. Specific guidelines are applicable for the use of heat pumps (Vlaem, chapter 16.3: installations for the physical threat of gases).	Lack of administrative and practical expertise in geothermal development																N/A, Germany has a strong geothermal community and is well organized. There seems no need for a central office. Policy consulting is organised.	Yes, a dedicated GT office is not present in Greece	True		CNG with its Committee dedicated to Geothermal Energy Development and UGI are representing the Geothermal community in Italy.	True

Lux	Malta	Netherlands	Poland	Portugal	Romania	Slovak Republic	Republic of Slovenia	Spain	Sweden	UK + N. Ireland	Framework Statement	Ranking (L M H)
			No consider providing funding in special cases of highest risk	No. In some cases may be supported as a research activity	WB GeoFund program, Technical Assistance (TA) window			Yes. In some Autonomous Regions as Basque Country			Feasibility Study Support may be useful to develop the GT sector in low sector uptake	Low, Medium
						National Funding Sources for GE Development	Public Funding, Agency for Efficient use and Renewable energy Resources and Environmental development fund for RES investments for companies and households	Yes, in some of the Autonomous Regions. Several funds programs as a RES and energy efficiency. Up to 40% of overcost			Guarantee Fund could facilitate development of large commercial systems - not a requirement for private system	Low
Installation of HP for heating or sanitary hot water. Subvention on up to 40% of effective costs, with a maximum of 4.000 euros for an individual house. Apartments: 40% of effective costs, maximum = 4.000 euros multiplied by number of apartments.				Portugal has not yet assumed the Ground Source Heat Pumps has equipment using renewable energy, and this market is only in the beginning.	Green House* national program of the Ministry of Environment and Sustainable Development, up to 90% of investment grant, max. 7,000 EUR for private pers, 70,000 EUR for legal persons, 75,000 EUR for public institutions; For GSHP: 1. POS CCE AP4 DM12 - The Operational Programme for Economic Competitiveness Increase		The government supports the use of geothermal energy through different projects where few development. In recent years the government funding improved. For example, in years 2004/05 Public Fund of the Republic of Slovenia for Regional Development and Preservation of the Settlement of Slovene Rural Areas will support eight geothermal projects (drilling for exploration wells) with 0.8 million € funding and 0.6 million € loans (estimate that this is half of the cost for all eight research projects).	Regional Agency Support/ National Support  In Castilla y León Autonomous Region: Installation of HP for heating and cooling. Subvention up to 420 €/kWp for vertical closed-loop exchangers, 300 €/kWp for horizontal closed-loop exchangers, 147 €/kWp for open-loop. The maximum subvention is 200.000 €  There are some subsidies available this year in Madrid regional government applicable for GSHP systems i.e. 490 €/kW for open circulation, 1000 €/kW for horizontal closed-loop and	Yes - DETI installation grants (due to end April 2008)	Finacial Support for the Installation of GSHP systems would generate a significant uptake in shallow GT	High	
				Not formalized yet							A low tariff time or a peak cut off system can help management of large utilities and provide additional lower running costs	Medium
		Not established yet but funds (5 mln euro) allocated for 2010 budget year	No Establish a fund along with the lines of?	Only of private origin	WB GeoFund program, Risk Insurance (RI) window						Insurance/Risk Funds are essential for the development of the deep GT sector and incentive sector investment	High
		Yes various both fiscal and cash grant tender schemes	No Commercially viable projects should be bankable -Low interest loans -		30% investment grant for investments in district heating systems (public property) with renewable sources, through the Romanian Agency for Energy Conservation			Some soft loans and credit lines managed by IDAE		Yes - but capped at low level	Essential for development of the sector but should be dependant on the feed in tariff and/or other support schemes	High



		Negligible	High C? Needs to be eliminated in line with geological data trend world wide		Rather low fee, only available to companies authorised to work with such data. No data for GSHP applications			We need to have good public and free cost databases to incentivate the investment of the private sector on the geothermal industry. The oil and gas exploration data should be accessible as well		Some charges - relatively low	National Data Purchase Costs should be waived for geothermal projects (private company data should be released from confidentiality)	Medium
		Modest authorisation costs but substantial costs of application file preparation. Long permitting times - application dependant	125euro/Km <sup>2</sup> - high level decisions. Decentralize the process- Application Dependant	Yes. Settled by contracts with State administration that are subjected to direct negotiations	Only for deep geothermal - Minimal (for submitting the documents); 5+3 years - N/A for GSHP applications		1+1 (water law); 1+5+3 (mining law)	In high and medium enthalpy as a section B resource. Exploration permit 2y + 1y. Investigation permit: until 3y + low fee		6 (min) O&G (5)	Geothermal Exploration Permitting Costs should be low but the duration should be sufficient to implement an exploration programme but require an annual review (max 6)	High
		No costs charged ?	Yes	Yes. Settled by contracts with State administration that are subjected to direct negotiations				Yes			These should not be implemented on the basis that the Permitting Costs should include these. No need to increase the administrative process	High
		No costs charged ? Long period - currently under revision	€50/km <sup>2</sup> -another tax- consider waiver for a period or overall reduction in tax to encourage development (eliminate this or some of the other taxes)	No fixed values. Usually more than 50 years. Settled by contracts with State administration that are subjected to direct negotiations	Only for deep geothermal - Minimal (for submitting the documents); 20 yrs.+5 yrs. Renewal - N/A for GSHP applications		max 30 y (water law) / max 50 y (mining law)	Exploration license 1 year duration, cost varies by regions but averages 10-15 €/km <sup>2</sup> ; Investigation license has a duration of 3 years and the cost per year varies significantly by regions between 30 and 700 €/km <sup>2</sup> (depends on tenement sizes as well); exploitation license is for a period of 30 years of the project life; the cost is about 300 € per year and per km <sup>2</sup>		N/A but licence fees for minerals and hydrocarbons	The permit duration for extraction and exploitation of deep Geothermal projects should be a minimum of 20 year with an option for review/extension. Production license termination processes should be included	High
		No costs charged ?	yes/200€	No cost charged				4-5% civil works of well site in deep drilling			No Cost should be incurred	Low
		Difficult to say, only in specified cases, dictated by other factors rather than geothermal.	Not high costs	No cost charged. May be mandatory according specificities of the projects	Depends on project. The environmental impact assessment is made by specialized engineering companies or by the specialized compartment of the applicant. The cost of the assessment depends on the project dimension (number of working hours for the assessment / study) and is not higher than 400-500 Euro. The authority that issues the permit is the			For deep geothermal EIA is needed for drilling and then for the surface installations. It is difficult to get a fix cost because it will depend on each project, but it could vary from 30000 to 40000 € for the two environmental impact studies to be undertaken In Cataluña Autonomous Region EIA is needed for open loop with focused high loads		Dependent on project scale and environmental risk	Will always be a requirement under other legislations	Low - out of scope
		check (irrelevant for deep geothermal)	No should not be applied if water reinjected	Included in F9 and F10	yes, included in the project cost for deep geothermal - For GSHP application, the applicant doesn't need a permit, but only a notice that is obtained from the local / county branch of National Water Authority :Romanian Waters" for a rather symbolic fee (less than 100 Euro) based on a water administration study that is realized by specialized companies both for	yes	yes	Yes		Yes but may be minimal if no net abstraction	Should not be implemented in shallow or deep GT for the purpose of heat abstraction if the net water abstraction budget is 0 or less than national guidelines	High
		Yes in theory, waved in practice (stimulation policy)	Yes Consider Waiver while sector develops	Included in F9 and F10	yes, 1% of sold heat for deep geothermal - N/A for GSHP applications		yes				Should not be implemented for GT and waived in the legislation if present	High

		No (being subject of discussion)	No necessary Introduction of green certs	Not yet formalized	yes, for deep geothermal district heating, N/A for GSHP applications						Crucial economic tool to encourage GT energy development and to substitute for fossil fuel CO2 emissions	High but out of scope
		19% going up to 20. Discussion on desirability of charging VAT on green energy	22% Needs Reduction in line with renewables in other EU states, follow French case-5%		19%				16%		Crucial economic tool to encourage GT energy development and RES-H energy generation to compete with conventional fuels	High but out of scope
			Surface infrastructure Consider planning exemptions for RES	Mandatory minimal exploration and exploitation investment, plus bank guarantees and small administrative taxes				Important fees on local governments over the investment on civil works (from 3 to 10% of the investment on infrastructure)		Planning permits?	Planning allowances should be made for Renewable Energy Projects	Low out of scope
		Yes fiscal grant if sustainable energy is used			30% investment grant for investments in district heating systems (public property) with renewable sources, through the Romanian Agency for Energy Conservation						Incentives for the construction of large scale heating system from Res	High out of Scope
		Yes	yes	Generally accessible for everyone	yes, from the National Agency for Mineral Resources and Geological Institute of Romania (Geological Survey)			Available data on the geological survey of Spain but needs to be updated and digital		Limited	Should be made available or in the public domain after specified confidentiality periods set out in legislation	High
		Yes - National	yes - national	Presently there is still scant data available	yes, from the National Agency for Mineral Resources and Geological Institute of Romania (Geological Survey)			Some information available on the geological survey of Spain relative to the work done by this survey on the years 1970-1980. Exception for deep geological and geophysical data of oil companies, that is more confidential and should be public		Yes - when released from confidentiality	Regulation should specify the geothermal data to be reported to the licensing authority	High
			yes in particular stages of projects	Depends on data owner.	Rather low			Usually low		Some charges - relatively low	On national data should be waived or low	High

No references to geothermal energy, only to heat pumps	Have to check (not an issue in Holland)	No -definition of thermal water: of Temp pf 20° C at the surface (spring well)	One of the first Portuguese Laws that mention the geothermal resources was "Decreto lei n.º 90/90 de 16 de Março de 1990" (law-decree number 90/90 of 16th March 1990), which introduce the general principles for the development and exploration of the geothermal resources. Geothermal resources are "the fluids and underground resources	Romanian Constitution: "water with useful energy content". In 2008 the Romanian Parliament adopted the NATIONAL SUSTAINABLE DEVELOPMENT STRATEGY - ROMANIA 2013-2020-2030 in which the geothermal energy is for the first time, taken into consideration as a renewable source of energy. The previous National Strategy for Renewable Resources							Adopt EU definition	High
	Deeper than 500m	Not strictly regulated	Not strictly regulated	More than 50 m depth, mining under the National Agency for Mineral Resources; less than 50 m depth, National Authority "Romanian Waters" notified for small private users, licence issued for large commercial projects. "Classic" geothermal waters applications that exploits sources at less 50 m depth - Permit NO needed; "Classic" geothermal waters				Without permission for groundwater abstraction up to 3000 m3/year. Without water authority concession up to 7000 m3/year. Mining Law of Spain	The substantial increase of the number of vertical ground source heat pump systems, has led to a general concern on how to avoid thermal influence in between boreholes. The general guidelines recommend a borehole be established at a minimum distance of 10 m from the boundary of the curtilage. In some dense populated areas this is impossible to comply with. In those cases local authorities may require a longer borehole to reduce the thermal influence radius. All secondary loops for ground source		A CLEAR definition that COULD include depth, temperature and flow rate	High
	Mining Code for resources below 100m: permit required but once produced ownership is transferred to concession holder	Geological and Mining Act	Decrete Law n. 87/90 and n. 90/90, of 16th March, determine that geothermal resources belong to the public domain, but private companies and municipalities can apply for the right of exploration and exploitation, on the basis of a concession granted by the Ministry of Economy, or in the Autonomous Region of Azores by the Regional Secretariat of Economy	Romanian Constitution and Mining Law for deep Water Law for shallow (< 50 m)			Mining Law: 22/1973 Water Law: 29/1985	all ground source heat pumps require local authorization.			Ownership requires to be defined in the primary legislation	High
	See above : State for > 500 meter	State Treasury	State	State		State	State		Not defined - needs addressed		Ownership requires to be defined in the primary legislation	High

									Water Law (Real Decreto Legislativo 1/2001, 20th July): This Law is designed to regulate the water resources on Spain, the use of that water, and the competences of the Government. It also gives some basic rules for the protection of the continental water and defines the superficial continental water and the underground renewable water as a unique resource which is public and because of that regulated by the Government.	guideline on how to design a vertical borehole for ground source heat pumps has been published by Geological Survey of Sweden in collaboration with the Swedish Heat Pump Association (SVEP) and GEOTEC (trade association for drillers). These guidelines include instructions on how to avoid any damage to buildings and to prevent contamination of the ground and ground water during drilling. The guidelines require a steel pipe to be injected from the ground level down to 3 meters into solid rock. This is prescribed to avoid surface water to contaminate the ground water in the		Clear goal for geothermal energy contribution in the heat market at national level - long term heat tariff projections	High
		Complex but high quality : complexity mostly in relation to subject matter; some oddities	High provide clear GT regulation without having to redraft all the legislation	Complex but procedure similar to other geological resources	Easy for shallow, more complex for deep, and only for authorised companies - For GSHP applications - Easy			Complex for open loop and deep geothermal	One of the reasons behind the tremendous success for ground source heat pumps in Sweden is that laws and regulations regarding ground source heat pumps are liberal. There are however some laws and regulations that applies to any type of activity that may have a detrimental impact on the environment.	N/A but well-established minerals & hydrocarbons licence processes	Simplified to achieve a rapid geothermal sector uptake and minimise administration time	High	
		Not for deep; existing for storage (check) and yet non-existent for GSHP's	yes	No state guidelines for installers or installations. However exploration project and practice must be approved by energy departments of state administration. Exploration must be managed by a technical director approved by state administration departments	Companies need to be authorised by the National Agency for Mineral Resources for deep, by the National Authority "Romanian Waters" for shallow, and by the Ministry of Environment and Sustainable Development for the "Green House" program. No specific Code. For GSHP applications - NO professional code of practice, NO specific training or			Not specific for geothermal work. Code of Safety in mining works and regulations about building construction and thermal installations. A guide line of good practices on GSHP has been published by Madrid regional government in 2008	guideline on how to design a vertical borehole for ground source heat pumps has been published by Geological Survey of Sweden in collaboration with the Swedish Heat Pump Association (SVEP) and GEOTEC (trade association for drillers). These guidelines include instructions on how to avoid any damage to buildings and to prevent contamination of the ground and ground water during drilling. The guidelines require a steel pipe to be injected from the ground level down to 3 meters into solid rock. This is prescribed to avoid surface water to	No - but GSHP grants linked to accredited installers	Could be included as a national guideline for GSHP installation, drilling and implementation of deep gt projects	High out of Scope	
		Established on individual basis (for deep); > 20 years	yes-but the length depends on individual applicant	Included and dealt within the overall project concession grant	Not for small private systems		The mining right for geothermal energy utilization is calculated as follows. For one m3 of exploited geothermal water 5 points are prescribed, and the mining rights are 2 % from 5 points. The value of one point in year 2005 is 1.216 SIT (0.5 €). The measurement unit is not appropriate, because the density of hot water or vapour is considerably different from cold water. At the present there is no conflict, because there isn't any geothermal energy concessionaire following the mining legislation. In the future it should be changed to kg as is	Till 50 years depending of case conditions		Being defined	Should be issued based on national water regulation and reflect the re-injection requirements	High	

		Yes	yes-but the length depends on individual applicant	presently a few months	the permitting 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. Permit included in the license. Length not specified (as long as it takes). For GSHP applications - NO specific drilling permit needed (only Water Authority)			Depending on Regional Authority. Geothermal surveys require a permit to drill. The administrative approval takes up a lot of time as a function of the kind of the GCHP-system: open or close loop	Laws concern the protection of the ground water as well as handling of HFC refrigerants. On a local level municipal regulation may set some specific requirements for boreholes in water protected areas. In general, all ground source heat pumps require local authorization. In other areas the local authorities are satisfied as long as the official guidelines are full filled.		Should be implemented to provide successful regulation of the deep geothermal sector. Keep record of GSHP installations with vertical open loops	Medium
		7 months excluding file preparation	1-2 years	presently a few months	3-12 months (for "classic geothermal)			Over 12 months in deep geothermal		N/A but minerals/hydrocarbons >4 months	Administrative process should approximately 6 months. Permitting guidelines should be available and process should be made under a single submission	High out of Scope
		7 months excluding file preparation	1-2 years	presently a few months	3-12 months			Over 18 months in open loop			Administrative process should approximately 6 months. Permitting guidelines should be available and process should be made under a single submission	High out of Scope
			low-can be subject to change	High	Rather high now.			There is not specific regulation		High	Reflects the national renewable energy development strategy	High
		Yes	no (but area and auifer dependant)	Generally No (Not specifically foreseen yet by law. However in complex cases may be considered mandatory. Decided on a case by case basis)	For "classic" geothermal - Only if production (abstraction) is above the approved annual average flow rate, or if surface disposal is prohibited for environmental reasons.		there are two legislation acts that regulate the exploitation fees (water act and mining act) and there are also several regulations which regulate the environmental tax. The terms for the thermal water concessions according the water act are still in preparation. One of discussed possibility is that concession should be proportional to extracted water quantity and to heat quantity that could originate from thermal water that would cool down by conduction in the environment with the constant temperature of 285 K. This potential energy approach is	No. There is not specific paragraph in the law but obviously ReInjection is needed to preserve the aquifer volumens and to do not waste brines on the surface			Should refer for EU directive and national geoundwater legislation, should be encouraged based on target conditions	Medium

		High	high	High	Rather high and expected to increase.				<p>In general, back filling of boreholes is not required.</p> <p>This is perhaps the most important reason for drilling being relatively cheap in comparison to many other countries in Europe.</p> <p>The other reason is that most of the Swedish bedrock constitutes of crystalline rock which simplifies drilling. The official guidelines for drilling will be updated by the end of 2006.</p> <p>The update will include a revision of safety distances between energy wells and wells for drinking water.</p>	High	Increasing the capacity of the sector (through national renewable energy strategy) will decrease the cost	High	
		High	high	High	High when drilling is needed, but support is available.		high	High		High	Soft, Adapted and annually revised Loans from national government banks can incentivise the growth of the sector	Medium	
the lack of geothermal engineers and industries		starts to become a possible constraint	enough amount in general	Generally there are very few deep drilling specialists and in particular there is a lack in deep drilling specialists for geothermics	Yes for GSHP, as it is a rather new technology for Romania. The certified specialists are trained only in USA by IGSHPA.			There is a lack of experience in the field of deep geothermal. Lack of engineers, geologists, drilling experience and knowledge of this sector	NO: The competence of the drillers is assured by a voluntary certification scheme that was introduced 2005. There is however still no requirement that drilling has to be performed by certified drillers	Sector in infancy - a problem	Educational system for academia to professional bodies of expertise and use the existing one in a more efficient way	High	
the lack of geothermal engineers and industries don't permit Luxembourg to disseminate information on this technology. The solution could be to create an organisation helping the Luxembourg State in this task			yes	Possibilities and advantages of HP technology are not completely recognized by building owners, architects and developers, because of relatively new and expensive technology. Knowledge about HP technology advantages and results of operations is not yet well-known.	No dedicated office. If asked, the Romanian Geothermal Association and some universities can offer information and consulting.			It is necessary more lobby activity in the european institutions to provide them with credible and viable research lines, that can meet the commitments when are evaluated by the bureaucrats to obtain funds from the European Framework Program		Yes, a problem	National Geothermal Expert Body should be encouraged to coordinate, support the GT sector as well as a consultation body for developing projects	HIGH	