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LEGAL ANALYSIS OF CONDITIONS FOR GEOTHERMAL PROJECTS IMPLEMENTATION IN SLOVAKIA

FINAL REPORT

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ANALYSIS

The legal analysis of the conditions for implementation of geothermal projects in Slovakia ("the analysis") is divided into four parts:

- **Part 1:** Overview of the legislative framework and identified legislative restrictions
- **Part 2:** Analysis of the current permitting processes concerning geothermal projects in Slovakia and identified obstacles and bottlenecks
- **Part 3:** Analysis of national and international experience and good practices in at least 2 other countries, comparison with the situation in Slovakia and identified obstacles
- **Part 4:** Proposed measures to improve legal and regulatory frameworks of of geothermal energy use in Slovakia

1. Legislative framework overview and identified legislative restrictions

1.1. Applicable legislative framework

Geothermal energy is a renewable thermal resource that can contribute to energy mix diversification and reduction of greenhouse gas emissions. Geothermal energy development requires a comprehensive legislative framework ensuring not only technical and economic feasibility of projects but also protection of the environment and safety of interventions in the Earth's crust. The current legislation of the Slovak Republic pertaining to that area is comprehensively linked to a number of laws and regulations in the sector.

Several basic categories of legal regulations apply in geothermal energy promotion:

- **regulations governing the energy legislation –** they regulate the entire energy sector, obligations and procedures of renewable energy resources promotion;
- **regulations regulating geological works and mining activities –** they define the concept of geothermal energy, procedures applicable to geological works performance and interventions in the Earth's crust;
- **regulations on environmental protection and environmental impact assessment –** they ensure environmental control and protection upon geothermal projects implementation;
- **zone planning and building regulations** – they regulate installations erection and planning including building permits that are mandatory for geothermal projects implementation;
- **ancillary and regulatory measures** – they include also guidelines and specific rules of geothermal energy use and promotion.

These categories overlap and form a comprehensive system ensuring that geothermal projects are not only technically feasible but also sustainable and environmentally safe.

1.1.1. Energy legislation

Energy legislation	**Act No. 251/2012 Coll. on energy and amendment of certain Acts** ("the Energy Act")	This Act lays down basic principles of the energy sector operation, rules of energy generation, transmission, distribution and supply as well as certain conditions that apply to renewable sources including geothermal energy.
	Act No. 250/2012 Coll. on regulation in network industries ("the Regulation Act")	This Act is key especially from the perspective of prices regulation and conditions of connection to the grid and networks, which has a direct impact on operation of heating, electricity and gas supply systems.
	Act No. 657/2004 Coll. on thermal energy ("the Thermal Energy Act")	This Act regulates generation, distribution and supply of heat and lays down technical and administrative conditions that must be met upon integration of geothermal resources into heat supply systems.
	Decree of the Regulatory Office for Network Industries No. 207/2023 Coll. setting out the rules of internal electricity market operation, the content of rules of operation of the network operator, short-term electricity market operator as well as the scope of business terms and conditions that are part of	The market rules regulate a comprehensive framework of the electricity system operation including access to the grid, short-term market organization and cross-border electricity exchange, connection and operation of electricity installations, electricity transmission, distribution and supply (including balancing electricity), ancillary services, system and flexible services providing as well as responsibility for imbalances, assessment, imbalances settlement and offsetting, registration

	the network operator's rules of operation ("the Electricity Market Rules")	of participants, overloading prevention measures, procedures upon suppliers and aggregators switching, central billing, data management and sharing and access to end customers' data.
	Decree of the Regulatory Office for Network Industries No. 312/2022 Coll. laying down price regulation in the thermal energy sector	The Decree regulates price regulation in the thermal energy sector that applies to heat generation, distribution and supply and is implemented by determination of the method of calculation of the maximum price of heat generation, distribution and supply.
	Regulation of the Government of the Slovak Republic No. 382/2024 Coll. setting out the maximum price of regulated heat supply for certain end consumers for year 2025 and the terms of the price application	The Regulation sets out, on the basis of the statutory authorization pursuant to Section 16a of the Regulation Act, the maximum price of regulated heat supply for end customers in residential buildings, long-term care facilities registered in the register of social services, children's residential care and protective facilities and student homes up to the limit of the heat price increase, however EUR 199 per MWh including the value added tax at the maximum
Regulations on geological works and mining activity	**Act No. 569/2007 Coll. on geological works** ("the Geological Act")	This Act defines the concept of geothermal energy. The provisions of the Act and implementing Decree set out how geological works including hydrogeological surveys that are necessary before the erection of geothermal installations may be carried out.
	Decree of the Ministry of Environment of the Slovak Republic No. 51/2008 Coll. implementing the Geological Act	
	Act No. 51/1988 Coll. on mining activity, explosives and the state mining administration ("the Mining Activity Act")	According to the mining legislation, interventions in the Earth's crust, including erection and operation of installations for geothermal energy use, belong in a special category of mining interventions. The Mining Act and related regulations regulate the conditions, permits and technical standards that must be met upon implementation of such interventions.
	Act No. 44/1988 Coll. on the protection and use of mineral resources ("the Mining Act")	
	Decree of the Slovak Mining Office No. 89/1988 Coll. on the rational use of exclusive deposits, permitting and reporting of mining activity and reporting of activities carried out in a mining method	In the context of geothermal resources, the Decree lays down, *inter alia*, certain procedures upon permitting and reporting of mining activity and activities carried out in a mining method.
Regulations on environmental and water protection and environmental impact assessment	**Act No. 24/2006 Coll. on environmental impact assessment and on amendment of certain Acts** ("the EIA Act")	This Act establishes the procedures of environmental assessment of proposed activities including geothermal projects that may have a significant impact on the environment.
	Act No. 364/2004 Coll. on water and on amendment of Act No. 372/1990 Coll. of the Slovak National Council on infringements as amended ("the Water Act")	The Water Act plays an essential role in the matter of geothermal energy, in particular as regards the protection, use and regulation of groundwater from which geothermal energy is extracted.
Zone planning and building regulations	**Act No. 25/2025 Coll. on construction and amendment of certain Acts** ("the Construction Code")	The new building regulations that entered into force on 1 April 2025 represent a significant change in the legislative framework concerning the construction and permitting of geothermal energy installations. Those regulations have been amended to better ensure energy efficiency of buildings, promote integration of renewable energy sources – including geothermal systems – and to simplify the process of building permits obtaining.
	Act No. 200/2022 Coll. on zone planning ("the Zone Planning Act")	
	Act No. 555/2005 Coll. on energy efficiency of buildings and on amendment of certain Acts	Although this Act primarily aims at improvement of energy efficiency of buildings, the provisions of the Act may be relevant for projects involving integration of geothermal systems into buildings.
Ancillary and regulatory measures	**Act No. 309/2009 Coll. on the promotion of renewable energy sources and high-efficiency cogeneration and amendment of certain Acts** ("the Promotion Act")	The legislation on the promotion of renewable energy sources allows for the raising of funds that can also be invested in geothermal projects, as well.
	Act No. 358/2015 Coll. on the regulation of certain relations in the field of state aid and *de minimis* aid and on amendment of certain acts ("the State Aid Act")	This is the basic Act governing state aid granting.

1.2. Overview of legal environment on relevant markets

In this chapter we are going to analyze the legal framework that affects the geothermal energy development in Slovakia. The subject of the analysis consists in a comprehensive view of the market including identification of barriers and obstacles that may hinder efficient use of geothermal resources.

According to the 2021-2030 Integrated National Energy and Climate Plan, geothermal energy[1] plays an important, albeit limited, role in Slovakia's energy mix, in particular in district heating systems. The plan states that geothermal energy is among the renewable sources that can contribute to greenhouse gas emissions reduction and energy efficiency increase while geothermal energy use is associated with the growth of energy potential along with solar, biomass and biogas energy.

The Plan charts foresee a gradual increase of geothermal energy use – for example the estimated values of capacity and contribution to heat generation increase from lower values in the early years to higher values in 2030. This gradual increase is part of a broader target to increase the overall share of renewable energy sources in gross end consumption, with the 2030 target being 25%.

The place of geothermal energy use in the Slovak Republic is the following:

a) use of thermal energy from a geothermal source for individual heating and heat supply, ensuring the heat supply to a particular facility or a small network of installations for their own consumption;
b) use of thermal energy from a geothermal source for central heating where one or more geothermal energy sources are used within a large-scale system with a central source or exchanger station;
c) placement of electricity on the commercial market.

Therefore, when assessing the regulatory conditions, we have decided to focus on two key market segments (commodities) – electricity and heat – as these areas are the cornerstones of our energy sector and at the same time they are the environments in which the use of geothermal energy is an option. This approach will allow us to assess in more detail how the existing legal and regulatory conditions affect different segments and what measures could contribute to their improvement and support geothermal energy development.

1.2.1. Geothermal installation construction as means to provide for entity's own thermal needs

Also, in the context of increasing emphasis put on energy self-sufficiency, many customers are interested in the possibility of heat supply to their supply points from their own energy resources. In this case, geothermal energy sources and in particular their thermal potential are also a viable option (without assessing the economic advantage or return on investment).

However, it is necessary to point out that in accordance with European legislation, in the case of an existing heat consumption facility connected to an efficient district heating system[2], the legislator protects efficient district heating systems from disconnection of customers and only allows disconnection from "inefficient" district heating systems. If a heat consumption facility is connected to an efficient district heating system, it is necessary to meet the statutory condition of heat generation in a decentralised source exclusively from renewable energy sources or waste heat[3].

When constructing a brand new heat consumption facility, it is necessary to point to the institute of mandatory connection to an effective district heating system. If construction of a new heat consumption facility with designed annual heat consumption exceeding 30 MWh is planned in a delimited area[4] or an area adjacent to a delimited area of heat supplier from an efficient district heating system[5], the new heat consumption facility should be connected to the efficient district heating system and the heat consumption should be preferably provided for by the supplier supplying heat from the efficient district heating system. That does not apply if it is technically impossible or not cost-effective (Section 21(4) of the Thermal Energy Act).[6]

[1] https://www.mhsr.sk/uploads/files/A65vdZlY.pdf?csrt=6435597916620554546
[2] Section 2(z) of the Thermal Energy Act
[3] Section 20(2)(d) of the Thermal Energy Act
[4] A delimited area is "an area in which a supplier is required to distribute and supply heat" (Section 2(q) of the Thermal Energy Act).
[5] An area adjacent to a delimited area is an area where it is technically possible and cost-effective to construct a heat distribution lines.
[6] Also Section 21(5) of the Thermal Energy Act imposes an obligation to connect and have the thermal needs preferentially provided for in the same way, the only difference is that the said obligation applies to existing heat consumption facilities in which extensive renovations are planned and in the delimited area or an area adjacent to the delimited area of which there is a supplier of heat from an efficient central heating source from RES, i.e. until the end of 2025, it means a central heating source supplying at least 65% of heat from RES and after 1 January 2026, a central heating source supplying at least 75% from RES.

Save for the situations above, there are no major legislative and legal obstacles preventing the construction of geothermal installations in the Slovak Republic. However, as in the case of any other construction of geothermal installations, it is necessary to undergo the applicable permitting procedures that we are going to discuss in the following chapters of this analysis.

1.2.2. Electricity market

The technology used in geothermal installations is usually based on the ORC (Organic Rankine Cycle) technology that converts thermal energy to electricity through an organic working fluid. The basic feature of the ORC technology is that the installations are adapted for constant, bandwidth electricity generation which means in practice that they are less flexible in providing energy outputs or performing tasks related to regulatory services. Technological constraints stemming from the very principle of the cycle therefore predestine this technology for the commercial market in which supply predictability and stability are key.

Operating aid schemes should also be taken into account when considering various options of geothermal resources use. In the Slovak Republic at present, operating aid for geothermal resources is available only for geothermal installations with the total installed capacity of up to 500 kW or for cogeneration installations with the total installed capacity of up to 1 MW inclusive (subject to further conditions)[7] which does not allow projects profitability at the current feed-in tariffs.

From the legal and legislative point of view, there are generally no significant barriers to electricity generation and supply from geothermal energy. After an initial investment in the facility construction (whether with investment aid or not) and the facility connection to the distribution network, it is in principle possible to supply electricity to customers on a market basis. Concluding a Power Purchase Agreement, i.e. a contract by which an electricity consumer undertakes to offtake electricity generated from renewable energy sources ("RES") directly from the electricity generator, is not excluded either.[8]

In any case, a person interested in a geothermal facility operation who wishes to sell the generated electricity needs to undergo the process of relevant permits obtaining – not only the license to generate electricity but also building permits and certificate under the Energy Act.

1.2.3. Heat market

Since a majority of geothermal technologies in Slovakia will be designed primarily for heat generation, it is necessary to approach the use of them from two key perspectives – technical and market perspectives. On the one hand, these are innovative technologies that can provide a stable and environmentally friendly heat source that would find a suitable application in local conditions. On the other hand, it is necessary to take the fact that the heat market in Slovakia is historically dominated by well-established entities operating monopolistic district heating systems into account. That is inevitably reflected in the legislative and regulatory environment.

Furthermore, when assessing the geothermal energy potential and its placement options, two perspectives need to be taken into account – a view of entities who currently control the market and simultaneously entities who wish to enter the market (third parties). Operators of district heat systems have a developed infrastructure and contractual relationships with customers which represents a significant barrier to entry for new players. On the other hand, for those seeking opportunities to diversify heat sources and reduce environmental burdens, geothermal energy offers an attractive alternative. In the next chapter we are going to analyze in detail the heat market, its structure and possibilities of geothermal sources integration.

The local heat management system composed of a centralized heat supply system has the characteristics of a network industry which presupposes that large physical networks interconnecting customers will need to be built. In addition, many of the centralized heat supply systems are operated in individual localities based on the natural

[7] Section 3(4) of the Promotion Act
[8] Section 2(3)(q) of the Promotion Act

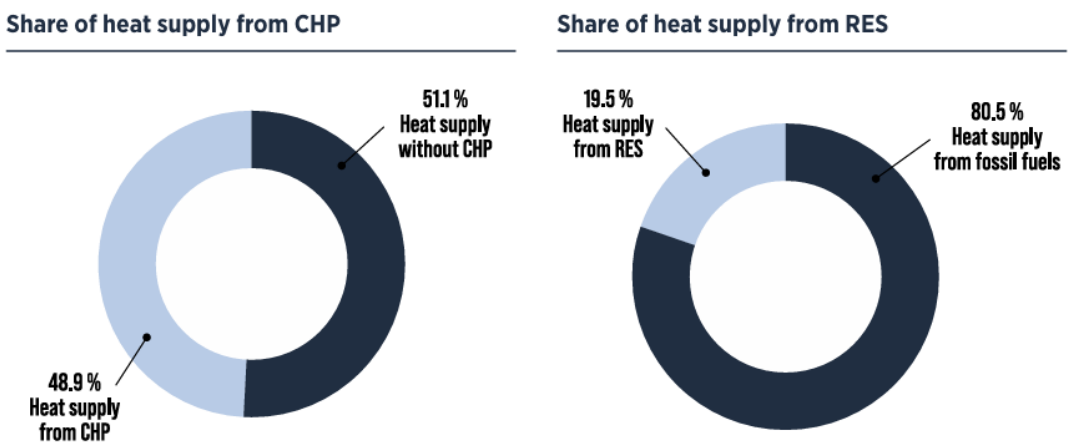
monopoly principle[9]. Title to and usufruct of generation installations enable one entity to control both heat generation and distribution. Economically it means that one entity is capable of producing the same amount of heat at a lower unit cost than if was produced by several entities while high input costs hinder efficient construction of parallel networks.

The dominant role on the market is played by the largest heat companies that often combine heat and electricity generation and thus benefit from the sale of electricity[10] in addition to revenue from heat. Ensuring a long-term and stable customer base is therefore key to achieving economies of scale and ensuring return on investment when building district heating systems in which case while efficiency of installations increases with the number of connected customers.

In these markets, the state introduces sector-specific regulation to reduce the risk of inefficiencies. In order to prevent unreasonably high prices being charged, price regulation is set out for products and services provided to end customers. Depending on the structure of a particular local market, a certain degree of liberalization may be introduced, for example on the level of generation resources while the natural monopoly remains on the level of distribution networks. Discrimination from distribution network operators is prevented by the introduction of rules on third party access to the grid.

Slovakia is characterized by a developed district heating system providing for more than 54% of total heat consumption[11]. The following graphs show an overview of the heat supply structure. Figure 1 shows that 48.9% of thermal energy supplied to the system comes from cogeneration which underlines its importance in the overall heat supply. Figure 2 shows that only 19.5% of heat is produced from renewable sources and a majority of heat is produced from fossil fuels which points to prevailing dominance of traditional sources in the heat sector.

Graph 1: Share of heat supply from CHP and RES



Source: 2023 Annual Report of the Regulatory Office for Network Industries

In input energy sources from which heat is generated in district heating systems in Slovakia, heat generation from natural gas has been prevailing for a long time. In recent years, use of renewable sources, of which biomass is the most important, at the expense of fossil fuels, has been increasing but it is used mainly in heat generation by high-efficiency cogeneration, i.e. together with electricity generation. Nevertheless, in more than 50% of central boiler rooms and heating plants, the fuel base comprises natural gas. If a producer opts for one type of energy source or has a generation facility that can use several energy sources, they can then choose from several suppliers of a

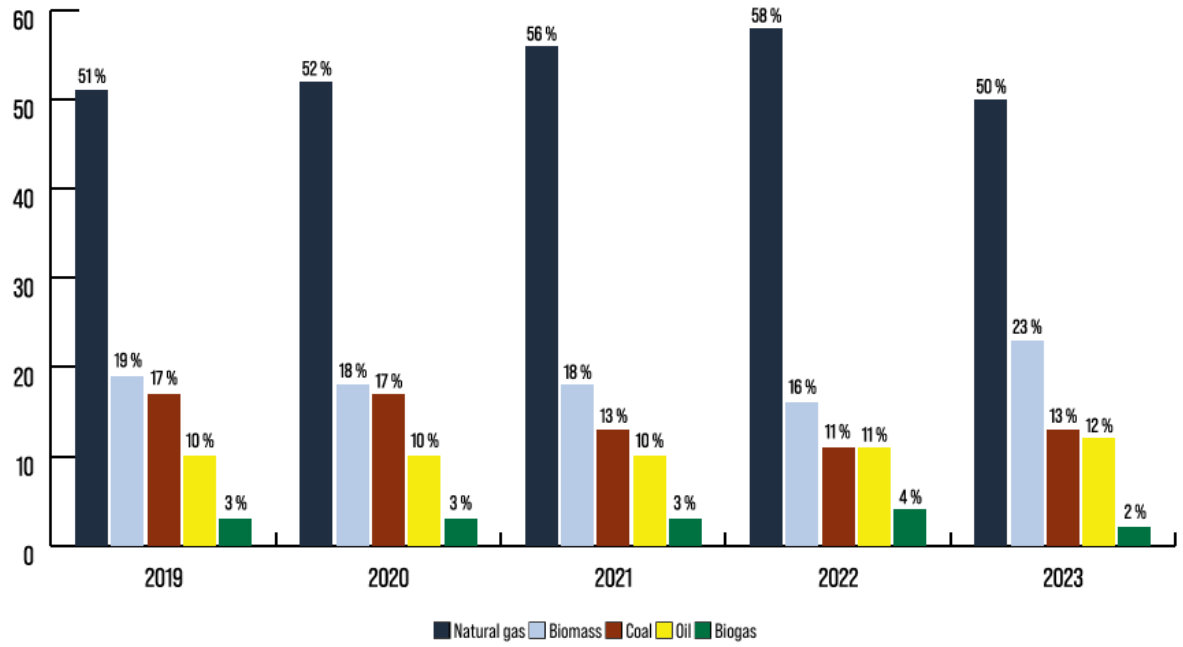
[9] The natural monopoly of district heating systems is attributable mainly to the existence of distribution networks and facilities. Unlike in electricity or gas, distribution of heat and hot water in district heating systems is exceptional in that due to significant heat losses, it can serve only local customers located within a limited distance from the generation source. Whether the heat generation itself also has the attributes of natural monopoly will depend on the conditions and extent of a district heating system in a particular location. In some cases where the generator is also the owner of distribution networks and is the only one with access to those networks and the only end heat supplier, the entire district heating system may be considered a natural monopoly.

[10] In 2023, 48.9% of heat was generated in heat systems using CHP technology. The rest of regulated heat was generated in mono-generation, without CHP. The share of RES in total heat supply increased slightly compared to 2022, to 19.5% of total heat supply. RES were used in both technologies above. (Source: 2023 Annual Report of the Regulatory Office for Network Industries)

[11] Source: Methodology for assessment of suitability of low-temperature district heating systems building, SIEA, 2023

particular type of energy. However, a potential change of certain fuel type use is hampered by high cost of generation facility replacement.

Graph 2: Share of fuels on heat production between the years 2019- 2023



Source: 2023 Annual Report of the Regulatory Office for Network Industries

It follows from the above that in district heating systems that are key for a more significant penetration of geothermal energy, the use of fossil fuels (in particular gas) currently predominates and almost half of the heat is generated together with electricity in the cogeneration process. On the market, there is a natural tendency on the part of district supply systems operators to stick to existing technologies, relying on the well-developed natural gas distribution infrastructure. For the transition to greener solutions, namely geothermal energy, the right conditions should be created to encourage district heating systems operators to change technology and fuel, in the area of legislation, subsidies and regulation.

It is equally important to identify elements that create opposite incentives in those areas, for example in the area of subsidies granted for objectives that contradict the objective of greater penetration of geothermal energy. Potential state aid granted to district heating system operators (as energy producers) enabling them to use fossil fuels may force out greener alternatives including geothermal energy. That of course depends on the conditions and form of such aid. When setting up decarbonization aid schemes, it is therefore necessary to explain and demonstrate how they will ensure that the aid contributes to achieving the Union's 2030 climate target and 2050 climate neutrality target and, in particular, how a lock-in of the gas-fired energy generation will be avoided and how it does not displace investments into cleaner alternatives that are already available on the market, thereby impeding the development of cleaner technologies and their use (section 397 of the Commission Guidelines on State aid for climate, environmental protection and energy 2022 ("the **CEEAG**")).

For these reasons we discuss in this analysis also the existing systems of promotion of energy generation and we propose solutions that can contribute to development of geothermal energy use in district heating.

1.2.3.1. Price regulation in thermal energy segment

In no other energy segment, we can observe such significant price differences as in thermal energy segment. That phenomenon is attributable mainly to the local nature of thermal management, diversity of thermal installations and different ways of supplying heat in individual towns and villages.

With regard to the supply of heat from the district heating system, a rather strict price regulation based on the cost + fee principle and expressed through the so-called maximum price of heat applies. Parallelly, a so-called crisis

regulation also applies[12] which orders heat suppliers to charge prices below the maximum price of heat to customers, i.e. below their economically justified costs. Currently, the heat prices for certain customers in Slovakia are capped at the 2022 level (with a slight increase) following a government regulation[13] while the State compensates the suppliers for the difference. In fact, that compensates for the high price of fuel used to produce heat, in particular natural gas. That system that was initially adopted only for the period of energy crisis in 2022 and 2023, passes on to the state budget a large portion of the customers' costs that would normally be reflected in the contractual price of heat. That does not provide the necessary price signals on the market that *(signals)* may influence the decision of energy producers to seek alternative technological solutions. It is based on the assumption that an energy producer will be less tempted to look for alternative technological solutions if its customers are not pressured by high prices of existing fossil fuel.

However, the current crisis regulation in the Regulation Act is drafted too broadly, allowing for the state intervention in the event of an emergency situation on the market, a threat posed to consumers by a sharp increase in the price of goods or a threat of significant economic damage to the state. Such a broad understanding of crisis regulation is provided beyond the European Union legislation according to which crisis regulation of activities, goods or prices (even below the cost level) is permissible only if an electricity price crisis pursuant to Article 66a of Directive (EU) 2024/1711 of the European Parliament and of the Council of 13 June 2024 or a natural gas price crisis pursuant to Article 5 of Directive (EU) 2024/1788 of the European Parliament and of the Council of 13 June 2024 is declared.

The price regulation of heat as a commodity is regulated by Decree No. 312/2022 Coll. setting out price regulation in the thermal energy sector as amended. Although price regulation in the thermal energy sector applies to heat generation, distribution and supply regardless of the type of technology used, it is set as an overall approved price for a particular supplier. Unlike in other energy sectors, prices are not set separately for each level. The regulated price of heat in the Slovak Republic is set as the maximum price and it is based on the cost method principles which means that the scope and structure of justified costs together with a reasonable profit are maintained. After the end of the regulatory period, suppliers are obliged to offset the estimated costs against real costs and return any difference to customers.

The maximum price of heat comprises two components – a variable component and a fixed component in which a reasonable profit is included. The price approved for a certain producer or supplier of heat is, with certain exceptions, uniform for all offtake points within the given town or municipality. The variable component is expressed in €/kWh, it includes fuel and energy costs and the amount of variable component is determined according to the estimated heat consumption. By contrast, the fixed component expressed in €/kW of total regulatory input reflects the actual heat consumption and it includes justified, permanent costs that do not depend on the amount of generated heat – such as depreciations, repairs, maintenance, costs linked to statutory obligations and a calculated reasonable profit.

As regards the generation of heat from RES in general and geothermal energy in particular, the price regulation rules contain few elements that can be called incentive-based. Decree No. 312/2022 Coll. enables a regulated entity using at least 20% RES to increase the value of reasonable profit if its calculated variable component does not exceed EUR 0.09/kWh and simultaneously the fixed component does not exceed EUR 270/kW. The practice shows that these limit values are set too low and can only be used by a limited number of regulated entities. Those who cannot reach these limits follow the price regulation rules applied to other regulated entities, regardless of the fuel and technology used. On the other hand, the Decree allows for the costs of heat generation from geothermal energy to be reflected only in fixed costs, with the exception of only some variable costs such as the costs of transport of geothermal water. We refer here to the previous legislation in force until 30 June 2024 that allowed for at least 30% of the total economically justified total costs of heat generation from geothermal energy to be reflected in variable costs. That was relevant in particular in the context of limiting the value of the regulated part of fixed costs as well as the maximum amount of other economically justifiable fixed costs approved in the

[12] Section 16a of the Regulation Act

[13] Regulation of the Government of the Slovak Republic No. 382/2024 Coll. setting out the maximum price of regulated heat supply for certain end consumers for year 2025 and the terms of the price application

heat price.[14] The practice has long sought a more significant increase in the set limits, arguing that too low limits limit the regulator's willingness to invest.

The strictness of price regulation within the heat sector is underlined by the newly introduced price regulation of natural gas used for generation and supply of heat which, with the effect from 1 January 2026, sets a maximum price of trader's services consisting of the commodity and other items including margin (save for regulated costs of gas transmission and distribution) and penalizes natural gas suppliers[15]. Imposing administrative restrictions on the free formation of contract prices poses a risk of further market distortions, resulting in incorrect price signals that do not incentivize energy producers to choose geothermal energy or another greener fuel. We must also add that we will know the real consequences on the market only after the price regulation implementation by the Regulatory Office for Network Industries and the conclusion whether it would lead to artificial lowering of the prices of gas for heat generation will depend on it.[16] In our view, such a price regulation is not in line with Article 4 of Directive (EU) 2024/1788 of the European Parliament and of the Council of 13 June 2024.

This allows us to arrive at the conclusion that the heat capping mechanisms that are currently in place may have an impact on the investment decisions of energy producers in general, not only upon the technology replacement in order to switch to greener alternatives including geothermal energy. At the very least, the market regulated so does not offer the right price signals to energy producers or their customers. The upcoming price regulation of prices of gas for heat generation can only exacerbate this problem but it will all depend on the result of the regulation implementation from 1 January 2026.

1.2.3.2. Support mechanisms for electricity and heat generation

At present, the market conditions in the energy sector do not allow sufficient economic attractiveness of investments in geothermal resources. Any large investment is reflected in heat prices within the price regulation logic which can lead to socially insupportable heat costs, especially for households. It is therefore essential to put in place comprehensive support mechanisms that include not only investment incentives but also operating aid where appropriate. Investment measures can provide the necessary capital to build modern infrastructure while operational mechanisms will ensure stability and efficiency of long-term projects.

As mentioned above, almost 50% of heat generation in the Slovak Republic is done by combined heat and electricity generation. Promotion of electricity generation from RES and high-efficiency cogeneration is one of the commitments of the Slovak Republic towards the European Union. Given that electricity generation from RES and CHP is a new and often costly technology requiring a large initial investment, the provision of financial aid is a prerequisite for primary development of energy generation from these sources.

The use of geothermal energy and promotion of development of local heat supply systems is a priority in the 2021-2027 programming period under the 2021-2030 Integrated National Energy and Climate Plan. In addition to the direct technological and investment aspect, the plan also includes measures to promote the use of RES in the heat sector through operating aid introduction. Operating aid may be provided in the form of an annual surcharge or green bonus financed in part from the proceeds of emission allowances auctioning and it should be targeted at the construction of new heat generation installations from various RES including geothermal energy. The said support should ensure that investments are economically sustainable and the resulting heat price remains affordable for consumers.

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[14] Under Section 4(8) of Decree No. 312/2022: "Total economically justified fixed costs include fixed costs of the purchase of heat, costs of the regulated component of fixed costs to the extent specified in Annex No. 1 and other appropriate economically justified fixed costs of property insurance, taxes, rent, revisions and statutory inspections, costs of of financial statements verification by an auditor, depreciation of tangible and intangible assets directly related to heat generation and distribution, costs of maintenance and repairs directly related to heat generation and distribution, interest on investment loan and interest on operating credit." The regulated component of fixed costs includes personnel costs, depreciations, consumed purchases, services, taxes and fees, financial costs and other operating costs. The limit is determined in maximum values depending on the amount of regulatory input (heat consumption in the past) pursuant to Section 4(9) of the Decree.

[15] Section 69(2)(z) of the Energy Act, Section 19a of Decree of the Regulatory Office for Network Industries No. 147/2024 Coll. laying down price regulation of regulated activities in the gas industry and certain conditions of performance of regulated activities in the gas industry

[16] The commodity price within the maximum price of trader's services is based on the index of standard annual stock exchange product, the remaining cost items of the price will be determined by the Regulatory Office for Network Industries at a coefficient interval of 1.2 to 1.4 (i.e. 1.2 to 1.4 times the index).

It is also necessary to mention the guarantees of origin of electricity or heat generated from RES – they can be obtained in Slovakia in the case of electricity or heat generated from RES which means also electricity or heat from geothermal energy (Section 8a *et seq.* of the Promotion Act). The guarantees have the nature of a tradable guarantee of origin within the meaning of Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources, and short-term electricity market operator is in charge of the process of the guarantees issue, recognition and registration. Save for producers participating in operating aid by a surcharge, any electricity or heat producer may apply for a guarantee of origin and issued guarantees may be transferred to another entity within the 12-month period of the guaranteed validity in which case the legal consequence is a binding certificate of purchase of energy from renewable sources. The legal regulations also associate guarantees of origin with the possibility of exemption from excise tax on electricity.[17] For the sake of completeness, it is necessary to point out that issuing guarantees of origin for heat generated from RES is a relatively new power of the short-term electricity market operator (in force since 1 December 2022) and to date, no auctions of this type of guarantees have taken place that would enable us to estimate the evolution of their price. In any event, the guarantee of origin and transferability thereof to a purchaser or third party offers a possibility to obtain further revenues also otherwise than by mere placement of a commodity on the relevant market.

Below we discuss the existing support measures affecting geothermal energy development.

1.2.3.2.1. Promotion of electricity generation from CHP

As is also apparent from the 2021-2030 Integrated National Energy and Climate Plan, the Slovak Republic prioritizes transition to efficient CHP for sustainable and economically efficient heat supply. It has chosen to promote high-efficiency cogeneration from natural gas as a means of achieving this objective, as the transition from conventional to high-efficiency cogeneration appears to be a natural and technically and financially attractive solution given the strong gasification of the country.

The result of this strategy is the introduction of an aid scheme to support the further operation of the existing cogeneration installations through operating aid for renovated or modernized installations[18] and at the same time to support transition from mono-generation (gas-based) to high-efficiency cogeneration in smaller installations with a capacity of up to 1 MW. According to estimates[19], approximately 80 such smaller local mono-generation installations could switch to high-efficiency cogeneration.[20]

Promotion of electricity generation from CHP in the Slovak Republic is governed by the Promotion Act.[21] With effect from 1 September 2009 (or 1 January 2010), the said Act laid down a regulation which has brought, via a 15-year guaranteed purchase price (feed-in-tariff), a legal and investment security in the field of RES and CHP. The method of support and the conditions of promotion of electricity generation from RES and CHP are regulated in particular in Sections 3 through 3c of the Promotion Act.[22]

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[17] Section 7 of Act No. 609/2007 Coll. on excise duty on electricity, coal and natural gas as amended

[18] Such aid is to be provided for 11 projects included in the list of approved investments annexed to Commission Decision SA.54318 (2020/NN) of 4 March 2021.

[19] Article 2.2(11) of Commission Decision SA. 54318 (2020/NN) of 4 March 2021

[20] In fact, it is sufficient to supply 75% of usable heat generated by combined generation of electricity and heat (Section 2(z) of the Thermal Energy Act) in order to meet the condition of an effective CHP

[21] The draft Act on promotion was drawn up on the basis of Resolution No. 383/2007 Coll. of the Government of the Slovak Republic on a draft strategy for the increased use of RES in the Slovak Republic in order to implement Directive 2004/8/EC of the European Parliament and of the Council on the promotion of cogeneration based on a useful heat demand in the internal energy market and amending Directive 91/42/EEC at the same time. The draft Promotion Act also implemented the original RES Directive and Directive 2001/77/EC of the European Parliament and of the Council on the promotion of electricity produced from renewable sources in the internal electricity market, which have already been transposed into existing legislation.

[22] Section 3 of the Promotion Act defines different ways of promoting electricity generation from RES and CHP and lays down the basic conditions of that promotion. Support for electricity generation from RES and CHP under the Promotion Act is provided in five basic ways:

1) priority connection of electricity-generating installations to the distribution system, priority access to the system and priority electricity transmission, distribution and supply;
2) electricity purchase by electricity buyer at the cost-based price;
3) surcharge;
4) taking responsibility for imbalances by electricity buyer;
5) extra payment.

Heat generators using CHP therefore receive operating aid known as surcharge support[23], defined as feed-in-tariff (FIT) support that may be characterized as support based on the payment of a fixed price of electricity to producers for each unit of electricity generated. Support by means of a surcharge may be granted only for electricity generated from cogeneration[24], i.e. electricity generated in a cogeneration process together with useful heat[25]. That means that in order to receive a surcharge on the electricity generated, the generator needs to place an adequate volume of generated heat on the heat market.

The duration of the surcharge form of support is 15 years of the date of the installation commissioning. A large portion of heat producers, both large and small, participate in the support scheme described above. That means that for installations commissioned immediately after the Promotion Act entered into force, the support period is currently nearing its end, it has ended or will end in the near future.

In addition, support by surcharge has continued to be provided and will be provided for new cogeneration units with an installed capacity of up to 1 MW and for renovated and modernized plants with an installed capacity of up to 125 MW included in the list of approved investments, annexed to Commission Decision SA.54318 (2020/NN) of 4 March 2021 ("the Commission Decision"), approving the State aid scheme in the form of operating aid following from the provision of Section 3(4)(b) and Section 3c of the Promotion Act. The scheme budget is EUR 1,050 million in total for 15 years, with the annual limit of EUR 70 million.

It follows from the foregoing that a support scheme based on a feed-in-tariff incentivizes CHP producers to generate electricity since they receive an extra payment for each unit of generated electricity. When operating electricity and heat generation plants (normally cogeneration units), it is necessary to ensure a stable heat offtake which implicitly forces out other technologies, especially those based only on mono-generation of heat.

Such producers have are not motivated to replace the use of natural gas in cogeneration from the perspective of the objective of switching to efficient CHP[26] since any new technology (including geothermal energy) would crowd out the use of natural gas for subsidized electricity generation. For the duration of the support (15 years), such an energy producer has almost no incentive to substitute heat generation for geothermal energy. We would like to point out that any failure to meet the condition of transition to an efficient district heating by the end of 2025 is not connected with any consequence other than the right of customers to disconnect and arrange for individual resources to provide for their own needs.[27]

We therefore believe that it is precisely this type of operating aid or rather feed-in tariff as a form of granting it, that may clash with the requirement of the existing State aid rules that allow gas-based support only if it does not displace more environmentally friendly alternatives, in this case geothermal energy (Section 397 of the CEEAG). Please note that based on Section 361 of the CEEAG 2022 (Chapter 4.8, Aid for security of electricity supply), the requirement not to provide incentives displacing less polluting forms of energy is generally met when the measure is paid per capacity (in EUR/MW) and not for the volume of generated electricity (in EUR/MWh)[28]. That means that the support scheme for CHP could also be deemed a scheme that does not displace greener alternatives if it did

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The Promotion Act lays down specific conditions of each of those forms of support which constitutes fulfilment of the obligation of the Slovak Republic under Article 13(2) of the original RES Directive. According to the Directive, Member States must clearly define any technical specifications for generating installations and systems which are a precondition for benefiting from support schemes. Some are common to all forms of support and some apply specifically only to certain categories of electricity producers/types of RES.

[23] Section 6(1)(c) of the Promotion Act

[24] Commission Decision 2008/952/EC of 19 November 2008 establishing detailed guidelines for the implementation and application of Annex II to Directive 2004/8/EC of the European Parliament and of the Council (OJ L 338/55, 17 December 2008)

[25] Useful heat is the heat generated by cogeneration process to satisfy an economically justifiable demand for heat or cold (Article 2(38) of Directive (EU) 2023/1791 of the European Parliament and of the Council of 13 September 2023).

[26] The current definition of efficient CHP in Section 2(z) of the Thermal Energy Act considers efficient CHP to be district heating which ensures the distribution of at least 50% of heat produced from renewable energy sources, 50% of waste heat, 75% of usable heat produced by cogeneration or 50% of heat produced by a combination of them. In accordance with Article 26 of the Energy Efficiency Directive, the share of renewable energy sources is gradually increasing and efficient district heating will require at least 50% renewable energy, 50% waste heat, 50% renewable energy and waste heat, 80% high-efficiency cogeneration heat or at least a combination of such heat and energy in which the share of renewable energy is at least 5% and the total share of renewable energy, waste heat and high-efficiency cogeneration heat is at least 50%.

[27] Article 24(2) of Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources requires Member States to allow customers of district heating or cooling systems that are not efficient district heating and cooling systems and that do not become such systems by 31 December 2025 to disconnect from the system by terminating or modifying their contract in order to generate heat or cold from renewable sources.

[28] Under the Guidelines on State aid for environmental protection and energy 2014-2020, operating aid could only be granted as a premium in addition to the market price at which generators sell electricity directly on the market (paragraph 124(a) in conjunction with paragraph 151).

not incentivize producers to generate electricity and heat together with it but instead allowed the available output of cogeneration installations to be placed on the ancillary and regulatory services market. We emphasize that the transmission grid operator expects insufficient resource adequacy in the medium term[29]. We believe that in this sense it would be possible to modify the said aid scheme and to enable (support) the producers to operate cogeneration units in a way that would also allow geothermal heat to be placed on the market.

For the sake of completeness, the Commission[30] recommends in Section 468 of the CEEAG 2022 that Member States amend, where necessary, existing environmental and energy aid schemes to comply with these Guidelines.

1.2.3.2.2. Operating aid for geothermal resources

Compared to the support for heat generation from CHP described above, geothermal sources (excluding investment support options) can get support through operating aid applicable to electricity generated in accordance with Section 3(4)(a) of the Promotion Act. However, surcharge support applies only to installations using geothermal energy with a total installed capacity **of up to 500 kW (inclusive).** Geothermal energy can also be used in CHP systems (via the ORC cycle) but support with a surcharge for new heat generation installations is only possible for cogeneration installations **with a total installed capacity of up to 1 MW (inclusive)**, of which at least 60% of generated heat is used to supply district heating and the saving of primary energy is at least 10% (Section 3(4) of the Promotion Act). If this is the case, support can only be provided for electricity generated from cogeneration. Operating aid therefore applies only to geothermal sources that generate electricity and not to geothermal sources used for heat generation only.

It is necessary to point out here that the current feed-in tariffs[31] intended to support electricity generation from geothermal energy do not consider all the relevant investment costs associated with electricity generation from geothermal energy. Although the methodology of calculation of the average cost of electricity generation (LCOE) is highly non-transparent (the Regulator Office does not publish it), it is clear that it includes only the costs of the technological part of an electricity generation facility[32] without the well costs[33]. In addition, aid granted as a premium excludes the possibility of concurrent the investment support (Section 3(13) of the Promotion Act) which ultimately makes it impossible to combine investment support for drilling with operating aid related to an investment in electricity generation technology, therefore this form of operating aid finds almost no use in practice.

In addition to the above support mechanisms based on a premium, the Promotion Act enables the Ministry of Economy of the Slovak Republic to launch a tender (so-called auction)[34] in order to increase the share of RES or CHP that may be technologically neutral or focused on a specific type of technology, for example geothermal energy. A tender may be launched for technologies with an installed capacity of between 10 kW and 50 MW. The selection and award criteria should be determined by the Ministry in the call; the Ministry may also set a maximum

[29] See the EC SR Resource Adequacy Assessment 2040 (Mid-Term SEPS Adequacy Study) of October 2023: MAF_SEPS.pdf (sepsas.sk)

[30] "The Commission shall propose to the Member States the following appropriate measures pursuant to Article 108(1) of the Treaty:

a) Member States shall, where necessary, amend existing aid schemes in the fields of environmental protection and energy to comply with these Guidelines by 31 December 2023 at the latest.

b) Member States shall express their explicit and unconditional agreement to the appropriate measures proposed in Section 468(a) (a) within two months of the date of publication of these Guidelines in the Official Journal of the European Union. In the absence of a reply, the Commission will assume that the Member State concerned does not agree with the proposed measures."

[31] The feed-in tariff for electricity generated from geothermal energy for installations with an installed capacity of up to 500 kW commissioned from 1 July 2024 shall be EUR 128.04/MWh. The feed-in tariff for electricity produced by high-efficiency cogeneration in the Rankine organic cycle with an installed capacity of up to 1 MW and for installations put into operation from 1 July 2024 corresponds to EUR 160.62/MWh (Section 47(5) and (6) of Decree No. 154/2024 Coll.).

[32] The technological part of an electricity generator's installation is "a set of individual technological parts of an electricity generation installation necessary for electricity generation, forming a single technological unit, consisting in particular of a facility for storage of the primary energy source, a facility for treatment of the primary energy source, a facility in which conversion of the form of primary energy into electricity is carried out, a facility performing qualitative treatment of electricity, measuring equipment, control equipment, monitoring equipment and environmental protection equipment." (Section 1(i) of Decree No. 154/2024 Coll.)

[33] "The price of electricity [for geothermal power plants] shall apply if electricity is generated exclusively in that installation of the electricity generator and at the same time the installation of the electricity generator contains all the technological parts of electricity generator's installation that carry out the entire process of energy contained in the primary fuel converting into electricity." (Section 47(10) of Decree No. 154/2024 Coll.)

[34] Section 5c of the Promotion Act

[34] Section 5c of the Promotion Act

bid price. The successful bidder is entitled to receive a so-called surcharge[35] for each unit of electricity generated from RES or CHP for 15 years of the plant commissioning. The surcharge is determined as a difference between the successful bid and market price of electricity. It follows from the above that the State may also tender for geothermal technology without applying the said restrictions of installed capacity that apply to the aid granting by surcharge. However, the State has not carried out any tendering procedure as at the date of this analysis.

Operating aid implemented in that way lacks support for technical solutions that generate heat only. For comparison, the Czech Republic has in place a system of operating aid for heat generation from RES (including geothermal energy) through a so-called green bonus paid to heat generators for heat generated from RES and supplied to customers[36], without being obliged to generate electricity in the same installation. To ascertain the amount of heat generated from geothermal energy, the system of guarantees of origin of heat generated from RES, organized by the short-term electricity market operator pursuant to Section 8a of the Promotion Act, could be used.

1.2.3.2.3. Investment support for geothermal resources

In addition to operating aid for geothermal resources, it is also possible to request investment support through support mechanisms set up by the European Union to support investments to modernize energy systems and improve energy efficiency. These are schemes in line with Commission Regulation (EU) No. 651/2014 of 17 June 2014 declaring certain categories of aid compatible with the internal market in application of Articles 107 and 108 of the Treaty as amended ("the Block Exemption Regulation") that offer an opportunity to receive subsidies for modernization of energy systems including energy storage and energy efficiency improvements, and to support the construction and reconstruction of plants using renewable sources including geothermal sources. The investment support focuses on projects that not only increase the efficiency of CHP and district heating systems but also contribute to reduction of primary energy consumption and greenhouse gas emissions.

However, we should begin with pointing out that in the case of use of support programmes financed from the state budget for construction of new sources, concurrent operating aid under the Act on Support[37] is excluded which means that if investment aid from the Slovakia Programme or the Modernization Fund is used, it is impossible to receive support by a surcharge or any other form of operating aid during operation.[38]

As regards the possibilities of financing exploratory geothermal wells, two calls[39] are to be submitted in 2025 under the 2021-2027 Slovakia Programme, i.e. a call for promotion of prospecting, exploration and verification of geothermal energy sources for energy use with the Ministry of Investment, Regional Development and Informatization of the Slovak Republic as provider, from the Just Transition Fund, and a call concentrating on promotion of prospecting and exploration of geothermal energy sources in order to make them available for energy purposes with the Slovak Innovation and Energy Agency as provider, from the European Regional Development Fund[40]. The first of these two calls was already published as Call No. PSK-MIRRI-023-2025-DV-FST as of the date of this analysis. The second call is planned to be published in the third quarter of 2025.

There are also calls from the Modernization Fund based on the approved State aid scheme from the Modernization Fund to support investments in energy generation from renewable sources, renewable hydrogen generation and promotion of high-efficiency cogeneration, that *(scheme)* will allocate EUR 350 million between 2024 and 2026 and facilitate recurrent evaluation rounds, namely Call No. 2/2024 "Heat Industry" to support investments in modernization of energy systems including energy storage and energy efficiency improvement, and Call No. 3/2025

[35] Section 6(1)(e) of the Promotion Act
[36] Section 23 *et seq.* of Act No. 165/2012 Coll. on supported energy sources and on amendment of certain Acts
[37] Section 3(13) of the Promotion Act
[38] This does not apply to support for renovated or upgraded CHP installations
[39] The Slovakia Programme is a delivery instrument for the European Regional Development Fund, European Social Fund Plus, Cohesion Fund, and Just Transition Fund in the 2021-2027 programming period.
[40] According to the information available, a justified expenditure will be studies, geophysical surveys, boreholes surveys, reinjection boreholes, hydrodynamic tests, final reports and geological works) (https://eurofondy.gov.sk/wp-content/uploads/2023/11/Program-Slovakia-2021-%E2%80%93-2027-schvaleny-European-Commission-dna-22.-11.-2022.pdf).

"Energy Generation from RES" to support investments in energy generation from renewable sources and high-efficiency cogeneration.

Ad Just Transition Fund Call No. PSK-MIRRI-023-2025-DV-FST

The objective of the call is to support studies or advisory services including energy audits that are directly related to investments in geothermal energy use for heat generation, electricity generation or combined heat and electricity generation in order to support prospecting, exploration and verification of geothermal energy sources for energy industry use. The call allows for support for a number of surveys and analytical activities including exploratory wells and performance of hydrogeological, thermal-energy or energy audits and assessments. However, it applies only to projects implemented in the Banská Bystrica region, Košice region and two districts of the Trenčín region (Prievidza and Partizánske). The total budget of the call is EUR 10,571,085, allowing for repeated evaluation rounds. With the exception of projects in the Banská Bystrica region, the supported surveys and analytical activities should be related to investments in installations for electricity generation from RES and green hydrogen and use of them in the applicant's energy systems or to support deployment of smart metering systems including RES storage. However, only a person holding a decision on exploration area designation or having a contract in place for use of such a decision for an own project with a person holding such a decision at the time of application may be an eligible applicant. An applicant does not need to be an entrepreneur in the electricity or heat industries. For the sake of completeness, we would like to add that the second announced call from the Slovakia Programme envisages support for all regions of Slovakia save for the Bratislava region, with an estimated budget of EUR 13,096,436.

Call No. 2/2024 from the Modernization Fund

The objective of the "Heat Industry" call is to support investments to modernize energy systems including energy storage, improve energy efficiency and increase the number of efficient CHP systems. The focus of the call is twofold – to support the construction, reconstruction and modernization of CHP plants and the construction and modernization of heat distribution systems in CHP systems, thereby reducing the consumption of primary energy sources and greenhouse gas emissions. Both activities may be suitably combined.

The call supports primarily projects aimed at increasing the share of energy produced by CHP in which the geothermal projects can only be applied to a limited extent since simultaneous electricity and heat generation in the cogeneration process is required (e.g. projects using ORC technology). The scheme does not allow financing of geothermal energy projects generating only heat. However, only justified expenditures related to the objective of the call, i.e. primarily cogeneration technology or heat distribution technology but not the costs of the well can be financed. Eligible beneficiaries are only entrepreneurs in the thermal energy industry. On the other hand, the scheme allows for support for solutions using natural gas (in the context of reconstruction and modernization) as a substitute for the decommissioned coal-fired Nováky thermal power plant, and the practice shows that CHP operators are interested in such a support. The aid rate for this call starts at 45% for projects using exclusively RES and increases depending on the size of the applicant's enterprise. The call permits aid granting up 100% of the liquidity gap for construction of distribution lines. However, it does apply the possibility of aid granting for the RES construction of up to 100% of justified expenditures during the bidding process despite the fact that the superior aid scheme enables it to do so.

Call No. 3/2025 from the Modernization Fund

The call named "Energy Generation from RES" aims to support investments in renewable energy generation, renewable hydrogen generation and CHP. The objective is to increase the share of renewables in the energy mix, improve energy efficiency and contribute to reduction of greenhouse gas emissions. Financing of geothermal energy projects, including heat-only projects is therefore permissible under that scheme. Within the same call, it is possible to finance only energy generation installations or heat distribution lines[41] but not expenditures related to wells. Activities related to construction of electricity generation and heat distribution installations may be combined.

[41] Aid should be granted exclusively for connection of new or existing installations for heat and/or cold generation from RES, waste heat or from cogeneration based on RES, or for connection of new or existing consumers of heat or cold who have not been connected to an energy-efficient district heating system, to a new or existing district heating system and whose consumption would be provided for by heat/cold generated from RES or waste heat.

Eligible projects under the call are divided into several categories that include investment projects of construction of installations for electricity generation from RES (excluding biogas), electricity storage projects, storage of biomass fuels and projects of construction of CHP installations using renewable sources or waste heat, investment projects of hydropower plants and projects of construction and modernization of distribution lines within the CHP systems. These activities aim to increase efficiency of energy generation, extend the lifetime of equipment and support the transition to RES, thereby reducing fossil fuels consumption.

Contrary to the previous scheme, this aid is concentrated exclusively on RES and technology which does not envisage financing of fossil fuel-based installations. Only entrepreneurs in the thermal energy industry may be applicants for aid in this call.

The aid rate under this call is relatively low, starting at 45% and allowing for an increase depending on the size of the applicant's enterprise. Unlike the previous call, this call does not allow a higher rate in the RES area despite the fact that the aid scheme under which this call is published also allows for aid granting of up to 100% of justified expenditures if the aid is granted in a bidding process (see Annex 1.1).

The aid under the said calls from the Slovakia Programme and the Modernization Fund may be granted concurrently on provided that it concerns different provable justified costs. However, as mentioned above, we do not have such a possibility for operating aid granted under the Promotion Act. We can therefore conclude that following the publishing of the calls for support for prospecting and exploration of geothermal energy sources, a comprehensive support framework will be established in Slovakia for geothermal energy development. In practice, the amount of allocated resources may be questionable in particular as regards geothermal water resources exploration. Since those calls are new, it is too early to assess the said support framework adoption by the market.

1.2.4. Third party access

Pursuant to Article 24(4b) of Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources ("the RES Directive"), Member States are required to encourage operators of district supply systems to connect third-party suppliers of renewable energy sources and waste heat to the grid or to offer to connect and purchase heating or cooling from renewable energy sources and waste heat from third-party suppliers. The Directive limits the application of this requirement to system operators with a thermal output above 25 MW and those who have not yet fulfilled the conditions for efficient district supply.

In this context, the installation of geothermal installations through third party access represents one of the prospective options of RES integration into district heating systems. That form brings a number of significant benefits for the existing CHP systems:

a) **Diversification of heat sources:** Geothermal energy provides a stable and renewable heat source that may significantly contribute to increase of the share of RES in the heat mix.
b) **Support for environmental objectives:** Geothermal energy use helps to reduce greenhouse gas emissions which is in line with the decarbonization strategies of both the EU and Slovak Republic.
c) **Energy security:** Geothermal resources integration may reduce dependence on fossil fuels and ensure a stable heat supply which is important for long-term energy independence.
d) **System flexibility:** Through third party access, operators of district heating systems have the possibility to expand their supplier portfolio without having to invest in geothermal installations which allows for faster and more efficient adaptation to the changing market conditions and technical innovations.

Article 24(5) of the RES Directive enables an operator of a central heating or cooling system **to refuse to connect** and purchase heat or cold from third-party suppliers only where:

a) the system lacks the necessary capacity due to other supplies of heat or cold from renewable sources or of waste heat and cold;
b) the heat or cold from the third-party supplier does not meet the technical parameters necessary to connect and ensure the reliable and safe operation of the district heating and cooling system; or

c) the operator can demonstrate that providing access would lead to an excessive heat or cold cost increase for final customers compared to the cost of using the main local heat or cold supply with which the renewable source or waste heat and cold would compete;
d) the operator's system is an efficient district heating and cooling system.

The Slovak Republic has a long-standing mechanism of mandatory offtake of heat from renewable energy sources and waste heat as well as heat from high-efficiency cogeneration (Sections 21(1) and (2) of the Thermal Energy Act). The institute of mandatory heat offtake applies to heat distribution permit holders operating inefficient CHP and impose an obligation on heat distribution permit holders to connect and offtake heat at a regulated price from each producer from RES or waste heat on condition that the following have been met:

a) compliance with the technical conditions of connection[42] specified in the rules of operation of the heat distribution permit holder;
b) not increasing the price of heat for consumers of the heat distribution permit holder.

The mandatory offtake of heat at a regulated price from each RES producer should apply to the extent of the heat volume contracted by the district heating system supplier.

When revisiting the wording of the RES Directive, the Slovak legislation appears to be more strict than the provisions of the Directive. The Slovak legislation lacks an explicit authorization for the heat distribution permit holder to refuse connection and offtake of heat from producers using RES or waste heat in a situation where the system suffers from a lack of capacity due to other supplies of waste heat and cold, heat/cool from RES or heat/cool produced by high-efficiency cogeneration, as referred to in Article 24(5) of the RES Directive.[43]

To conclude, it is necessary to point out that there are no known cases in practice where the institute of mandatory heat offtake has been successfully applied. The entities operating the generation installations usually agree with district heating system operators on contractual terms of connection. The fact that mandatory heat offtake can be achieved only with solutions that do not increase the price for heat consumers which is hardly achievable in the current investment and regulatory environment, may be significant.

[42] Section 21(6) through (8) of the Thermal Energy Act
[43] We believe that heat distribution permit holders may claim the right to refuse such a connection, referring to the need for a European-conform interpretation or even direct effect of that article of the EU directive in practice.

2. Analysis of the current permitting process for geothermal projects in Slovakia and identified obstacles

2.1. Environmental regulations

2.1.1. Environmental impact assessment

Environmental Impact Assessment (EIA) is a key tool to ensure that strategic decisions and investment projects are made in line with the principles of sustainable development. Since 1994, this process has been part of the Slovak legislation and its current form is defined by the EIA Act. Following the accession of the Slovak Republic to the European Union and subsequent harmonization with European directives, the statutory provisions have been amended several times. The latest amendment that entered into force on 1 January 2025 was drafted in order to adapt Slovak legislation to the current requirements of the European Union and also to respond to the specific needs of renewable energy sources development. It brings a fundamental shift also in the area of geothermal energy sources permitting.

The last amendment to the EIA Act, in force since 1 January 2025,[44] puts the main emphasis on separation of the screening process[45] from the impact assessment itself. This change reflects the need to eliminate unjustified delays and optimize administrative procedures, which is particularly important in the context of geothermal energy projects where the time window for implementation is often a key factor for their economic viability.

The main objective of the EIA is to ensure that each project – including those focused on the use of geothermal resources – is assessed in terms of its impact on all environmental factors (water, soil, air, biodiversity, social environment and cultural heritage).

In the application of the Act, we distinguish two main ways of assessing[46]:

a) mandatory if the planned activity meets the criteria for mandatory evaluation that applies to activities listed in Annex 8 to the EIA Act, Part A,
b) optional for activities that are estimated to have only a small impact or for which it is not entirely certain how significant the impact could be on the environment, such significance of the impact needs to be established in a so-called screening procedure. It applies to activities listed in Annex 8 of the EIA Act, Part B.

The "mandatory assessment" is carried out in accordance with Act No. 71/1967 Coll. on administrative procedure ("the Code of Administrative Procedure"). In the final opinion[47], the competent authority should state, in addition to the overall assessment of the effects of the proposed activity or its modification, whether it agrees or disagrees with its implementation, under what conditions it agrees with it and in which implementation variant, as well as the required scope of the post-project analysis. The final opinion should be binding for the further development consent procedure and only the validity of the favorable final opinion should entitle the developer of the proposed activity or its change which must be subject to an impact assessment, to submit a proposal for the commencement of the development consent procedure for the proposed activity or its change in the variant agreed by the competent authority in the final opinion. The final opinion should be valid for three years, unless otherwise specified by the competent authority in the final opinion, with the possibility of renewal for up to 7 years but should not lapse if the relevant permitting procedure is initiated during its period of validity.

With effect from 1 January 2025, the screening procedure is exempt from the Administrative Procedure Code. In accordance with Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment (the "EIA Directive"), it becomes a purely technical process, with no possibility for the public to intervene in determining whether a proposed activity or its modification has the potential to cause significant effects on the environment and therefore

[44] Act No. 350/2024 Coll. amending Act No. 24/2006 Coll. on environmental impact assessment and on amendment of certain acts as amended
[45] "Screening procedure means a procedure intended to determine whether a proposed activity or a change to it is likely to have significant adverse effects on the environment; the result of this procedure is a binding opinion from the screening procedure, which determines whether the proposed activity or its modification requires an environmental impact assessment" (Section 3(c) of the EIA Act).
[46] The EIA procedures are governed by Part Three of the EIA Act (Sections 18 to 39)
[47] Section 37 of the EIA Act

whether it is to be subject to an environmental impact assessment process. The public is informed of everything but is not involved in commenting on the administrative procedure. The screening procedure begins with the submission of the intention of the[48] proposed activity and ends with the issuance of a binding opinion in which the competent authority determines whether the proposed activity or its change is to be assessed under the EIA Act. If it is decided not to assess the proposed activity or its modification, the permitting process follows according to the relevant (building) regulations. If it is decided that the proposed activity or its change is to be assessed under the EIA Act, the scope of the evaluation should be determined and the process should continue with the mandatory assessment. The advance ruling should be valid for a period of three years, unless the competent authority has determined otherwise in the advance ruling, with the possibility of renewing it for up to 7 years but should not lapse if the relevant permitting procedure is initiated during its period of validity.

2.1.1.1. Specifics of the assessment of geothermal resources under the EIA Act

In the case of geothermal resources, the EIA should focus on specific factors that may affect groundwater quality, geological stability and thermal exchanges in the territory.

The amendment to the EIA Act in relation to geothermal projects brought a fundamental change in the thresholds that determine whether an investment project is included among the projects that will be subject to the screening procedure. Under the new legislation on geothermal energy, **the environmental impact assessment will not apply to wells with a depth of up to 300 meters and wells for the use of geothermal energy and geothermal waters, including wells for heat storage and the installation of heat pumps from 300 m and above, will be subject only to a screening procedure**[49] and not automatically to a mandatory environmental impact assessment, as was the case until the entry into force of the amendment which was administratively and time-consuming.

The amendment of the thresholds for geothermal wells aims to shorten the permitting process. However, if an environmental risk is identified during the deep well screening procedure, the investor will be required to carry out a full environmental impact assessment. The overall acceleration and simplification of the permitting process is one of the milestones of the Recovery and Resilience Plan[50] to support the development of geothermal energy in Slovakia.

Article 4(2) of the EIA Directive allows Member States for selected projects listed in Annex 2 which include geothermal wells, to determine whether they will be subject to an environmental impact assessment, either on the basis of a case-by-case examination or on the basis of thresholds and criteria set by the Member States, or by applying both procedures. As stated above, in accordance with Article 4(3) of this Directive, the Slovak Republic has therefore decided to set a threshold of 300 m for geothermal wells which stipulates that projects up to 300 m do not even need to be subject to a screening procedure.

Annex 2 to the EIA Directive lists, among the projects which do not necessarily have to be subject to an impact assessment, deep drillings, **in particular** geothermal drillings, drillings for the storage of nuclear waste material and drillings for water supplies, except for drillings for investigating the stability of the soil. The term geothermal drilling is not known to Slovak legislation, so the question has arisen whether it also means exploration drilling or only drilling already serving the use of geothermal energy.

In its document Interpretation of the Project Category Definitions of Annexes I and II to the EIA Directive,[51] the European Commission states the following: "Annex II(2)(d) to the EIA Directive contains only an indicative list of deep wells. The wording of the EIA Directive uses the term "primarily" which means that the list of examples is indicative and not exhaustive, and this applies to exploratory wells as well as drilling related to mining. In Case C-531/13, Kornhuber et al., **the Court of Justice held that exploratory drilling is a form of deep drilling within the meaning of Annex II(2)(d).**"

[48] The intention intended for the screening procedure is submitted to the competent district environmental office within the territorial scope of the proposed activity.
[49] Annex 8 of the EIA Act
[50] https://www.planobnovy.sk/kompletny-plan-obnovy/zelena-ekonomika/
[51] https://www.enviroportal.sk/dokument/f/interpretacia-definicii-kategorii-projektov-prilohy-i-a-ii-smernice-eia.pdf

In its judgment in Case C-531/13 (Marktgemeinde Straßwalchen and Others v Bundesminister für Wirtschaft, Familie und Jugend), the Court of Justice of the EU concluded that exploratory drillings may also have significant effects on the environment and should therefore be assessed in the context of an EIA if there is a likelihood of such an effect. It follows from this ruling of the CJEU that even an exploratory (test) well which is an integral part of the extraction process, can have significant effects on the environment and should therefore not be excluded from the environmental impact assessment in view of the purpose of the Directive. [52]

It follows from the above that exploratory drillings should be assessed under the EIA screening procedure, as they are already likely to have significant effects on the environment. Excluding these wells from the assessment would be contrary to the objectives of the EIA Directive and the jurisprudence of the Court of Justice of the EU. In the future, however, it is not excluded to reassess the current threshold of well depth which is set at 300 meters in Slovakia. Increasing this threshold could further reduce the administrative burden for projects with a lower environmental impact, while encouraging the development of geothermal energy. In addition to changing the well depth threshold, consideration may also be given to taking into account other criteria within the meaning of Annex III to the EIA Directive, such as considering the capacity and performance of installations, the location of projects or the technologies used.

For the sake of completeness, we would like to draw your attention to the fact that an impact assessment is carried out even if, according to the professional opinion of the state nature and landscape protection authority, it is likely, alone or in combination with other activities, to have a significant impact on the area of the network of protected areas, despite the fact that it is not listed in Annex 8 to the EIA Act (Section 18(1)(g) of the EIA Act). In the case of several consecutive changes to the same activity which do not individually reach the thresholds set out in Annex 8 but in total reach or exceed them, these changes to the activity should be considered as a single activity (Section 18(4) of the EIA Act).

The time-consuming nature of the proceedings under the EIA Act has so far been the subject of considerable criticism from both the professional and the investor environment. Ideally, it was possible to conclude the screening procedure within 3 to 4 months. However, the mandatory evaluation which considers the scope and type of the project, the involvement of the public concerned and the competent authorities, as well as the need for additional studies and the collection of relevant data, usually extends the whole process for several months – in most cases even for more than a year.

The aim of the latest amendment, also taking into account the obligations arising from the Recovery Plan, was to stabilize and significantly shorten these periods. The amendment introduces adjustments to the internal structures of the screening procedure, giving the competent authority more time to carry out individual actions. From the submission of the initial documentation – the intention or notification of the change of the proposed activity – the time limit should no longer exceed 60 days; in the case of particularly complicated and justified cases, this period may be extended to a maximum of 90 days.

At the same time, the internal structure of the entire EIA process has been modified so that the total period of assessment, including all administrative and consultative acts, does not exceed 6 months, as provided for in Section 37(2) of the EIA Act. These changes are intended to significantly speed up the permitting process and contribute to the development of investment plans, including geothermal energy projects, without compromising environmental standards.

However, it is necessary to point out that the planned construction of industrial installations for the generation of electricity, steam and hot water, i.e. construction of the heat source itself (and possibly electricity) using geothermal energy is also subject to the EIA regime. These installations from 5 MW up to and including 50 MW are subject to the screening procedure and to the mandatory assessment of the installation from and including 50 MW.

[52] In its judgment, the Court of Justice of the European Union states the following: "Article 4(2) of Directive 85/337, as amended by Directive 2009/31, read in conjunction with point 2(d) of Annex II to that directive, must be interpreted as meaning that the obligation to carry out an environmental impact assessment of a deep drilling operation, such as that at issue in the main proceedings, may arise from that provision. The competent national authorities are therefore required to examine specifically whether, in the light of the criteria set out in Annex III to Directive 85/337, as amended by Directive 2009/31, an environmental impact assessment must be carried out. In that context, it is necessary, in particular, to examine whether the environmental effects of exploratory drilling may, because of the effects of other projects, be more significant than in the absence of those other projects. That assessment cannot depend on the boundaries of the territory of the municipality."

2.1.2. Environmental objectives to achieve good water condition

Geothermal resources, exploration of their potential, construction and operation are all activities that can affect the quality of surface and groundwater. Under Slovak and European legislation, these activities should be subject to a comprehensive and rigorous assessment in terms of environmental objectives. Changes that may arise as a result of new sustainable development activities, such as geothermal projects, watercourse modifications or other infrastructure investments, must be carefully analyzed in terms of their impact on ecosystems and the long-term sustainability of water management.

In an effort to implement the objectives of Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for Community action in the field of water policy (hereinafter referred to as the *"Water Framework Directive"*), provisions for the achievement of environmental objectives have been introduced into the legal order[53]. The Water Framework Directive sets environmental objectives for surface water bodies and groundwater bodies. The main environmental objective is to achieve good water condition in the Community and to prevent its deterioration. Member States should aim to achieve the objective of at least good water condition by defining and implementing the necessary measures within integrated programmes of measures, considering existing Community requirements. Where good water conditions already exist, it should be maintained.

The Directive also provides for a so-called "exception" to the achievement of environmental objectives where failure to achieve good water condition, good water potential or failure to prevent deterioration of water condition is the result of new changes in the physical characteristics of surface water bodies or changes in the level of groundwater bodies, or where failure to prevent deterioration of the status of surface water bodies from very good status to good status as a result of new sustainable human development activities and at the same time the conditions laid down in Section 16(6)(b) of the Water Act are met[54]. The possibility of obtaining an exemption from the fulfilment of these environmental objectives under specific conditions is allowed in the legal environment of the Slovak Republic through the procedure in the Utah. Section 16a of the Water Act.

It follows that any new sustainable human development activity that may affect bodies of surface water or groundwater must be assessed in terms of its impact on the achievement of environmental objectives. The assessment of these new human activities under Section 16(6)(b) of the Water Act and under Article 4(7) of the Water Framework Directive is a necessary condition for the development consent procedure.

The essence of the provision of Section 16a of the Water Act consists of a two-stage approach to assessing the proposed activity. A person who intends to carry out a proposed activity is obliged to apply (together with the submission of the project documentation) to the state water authority (district office in the region) for a binding opinion on whether an exemption is required before the activity can be permitted.

The competent district authority then proceeds in the following ways[55]:

a) if it appears from the application and the project documentation submitted that the nature of the activity does not require an assessment by professional opinion, it may issue a binding opinion without a professional opinion of the authorized person; in that case, it should issue a binding opinion within seven days of receipt of the request; or
b) request, within seven days of receipt of the request, that the authorized person issue a professional opinion to determine whether realization of the activity may result in a failure to meet the environmental objectives of the affected water bodies, that *(opinion)* will serve as a basis for the binding opinion issue.

[53] Section 5 of the Water Act

[54] The cumulative fulfillment of the following conditions is required:

a) all practicable steps shall be taken to limit the adverse impact on the condition of the surface water or groundwater body;
b) the reasons for modifications or alterations to surface water bodies or groundwater bodies are specified and explained in the river basin management plan (Section 13) and the environmental objectives are evaluated every six years;
c) the reasons for those modifications or alterations follow from a superior public interest or the benefits of achieving the objectives referred to in section 1 for the environment and society are outweighed by the benefits of the new modifications or alterations to human health, human safety or to sustainable development; and
d) the expected benefits of those modifications or alterations of the water body cannot, for reasons of technical feasibility or disproportionate costs, be achieved by other means which are a significantly better environmental option.

[55] Sections 16a(3) and (4) of the Water Act

If the binding opinion shows that an exemption from the environmental objectives is required[56], it is necessary to apply to the district authority in the region where the activity will be carried out to permit the derogation, together with the project documentation of the activity and a report on compliance with the conditions pursuant to Section 16(6)(b), points 1 to 4, of the Water Act.[57] Exempting is possible if the conditions under Section 16(6)(b) of the Water Act are met in relation to the applicant's activity.

However, from the point of view of practical application, the procedure under Section 16a of the Water Act is associated with a number of practical problems, in particular as regards the administrative and time burden that arises when obtaining binding opinions. According to the available information, the process of drawing up a professional opinion drawn up by a single authorized person – the Water Research Institute[58] – may take several months. This delay leads not only to prolongation of the entire permitting procedure but also to an increase in financial costs, since the report is subject to a fee[59]. The solution to this situation may be, for example, to set a specific legal period for the preparation of a professional opinion.

Another crucial aspect is that the procedure laid down by law under Section 16a requires not only the publication of a binding opinion on the websites of State water authorities and the Ministry but also the possibility for the public to submit its written opinion on the report. This open participation mechanism, while contributing in theory to the transparency of the decision-making process, adds to the administrative complexity in practice, as the public can influence the final decision to grant an exemption with its comments. As a result, the whole process becomes not only long-lasting but also administratively demanding which can negatively affect the development of new projects, especially in the field of geothermal resources where rapid implementation and issue of permits is important.

The process is in many respects ambiguous and highly duplicative with regard to existing environmental assessment procedures, with no reference to the specific requirements of geothermal projects. In practice, projects that may have an impact on the environment, including on water quality, are subject to a comprehensive assessment under the EIA Act and also under the Water Act which also includes a detailed evaluation of the potential impact of geothermal water discharges on surface streams, together with their continuous monitoring and evaluation. The solution to this issue is to integrate the requirements of the Water Framework Directive into the environmental assessment procedures and to align and integrate the assessment under Section 16a with the procedures under the EIA Act which would simplify and speed up the whole process, eliminate duplications and minimize the administrative burden without compromising the level of environmental protection.

Such an option is even envisaged by one of the milestones for the implementation of the Water Policy Concept[60] of the Slovak Republic until 2030 of June 2022 and for its monitoring which is the "legislative amendment to link the assessment under Article 4.7. WFD with an environmental impact assessment process to limit the deterioration of the status of water bodies in relation to the authorization of exemptions from environmental objectives for new infrastructure projects".

Speeding up the processes would also increase the number of authorized persons who could issue professional opinions, thereby reducing the burden on a single entity which is also the Water Research Institute, and shortening the time needed to produce opinions. Given that the Water Research Institute is currently the only body with the relevant data and capabilities, this does not currently allow entrusting other authorized persons with the task of

[56] Section 16(10) of the Water Act: "Failure to achieve good groundwater condition, good ecological status or good ecological potential, or to prevent deterioration of the condition of bodies of surface water or groundwater as a result of new changes in the physical characteristics of a body of surface water or changes in the level of a body of groundwater, or to prevent deterioration of the condition of a body of surface water from very good condition to good condition as a result of new sustainable human development activities, or changes thereto, may occur only on the basis of an exemption from the environmental objectives pursuant to Section 6(b), authorized by a water authority on request, subject to the conditions of Section 6(b)(1) through (4)."

[57] At the same time, the status of the public as a party to the proceedings with the right to submit a written opinion on the activity and the method of publishing documentation and decisions in those proceedings on the website of the state water administration authority is established.

[58] https://www.vuvh.sk/wp-content/uploads/2023/04/4_6_P1_poverenie_infrastrukturalny-projekt.pdf

[59] According to the information provided on the website (https://www.vuvh.sk/sluzby/odborne-posudky-a-konzultacna-cinnost/) the price of the service (assessment of the applicability of Article 4.7 of the WFD and preparation of an professional opinion) is: EUR 51.66 with VAT/1 hour; i.e. 42.00 excluding VAT + 9.66 VAT (23%). The total cost of the service depends on the number of hours worked. The price list is valid from 1 January 2025.

[60] https://www.minzp.sk/files/sekcia-vod/kvps2030_web.pdf

issuing professional opinions. However, increase in the number of the Water Research Institute staff qualified to issue professional opinions could also speed up processes.

Nor is it excluded to amend legislation to redefine the conditions and criteria for granting derogations specifically for geothermal projects, taking into account their social and strategic importance, in order to optimize the process of permitting geothermal projects (for example, without the need to draw up a professional opinion from an authorized person which lengthens and complicates the permitting procedure). Instead, specific conditions could be introduced to allow derogations to be granted on the basis of pre-defined criteria, while maintaining proper control and monitoring of the impact of the activities carried out on water quality. In addition, such a modification would contribute to the transparency and predictability of the decision-making process by clearly setting out the conditions under which geothermal projects can be exempted, ensuring that such projects are supported without undue delay while at the same time focusing on environmental protection.

Legislation should reflect the need to streamline permitting procedures, especially in areas of significant strategic and economic importance, such as geothermal projects. In this context, it is essential to revise not only the technical and administrative procedures but also the interconnection between water legislation, environmental assessment and regulatory mechanisms applicable to environmental impact assessments.

2.2. Legal framework of permitting processes

Permitting geothermal wells extends to several areas of law. The basis is the **Geological Act** and its implementing decree that regulates the survey itself and professional oversight. The **Water Act** also plays an important role in the process as geothermal water is groundwater and using it (both extraction and reinjection) requires permits under the Water Act. The **Construction Code** is equally important: it deals with the permitting of facilities – in the context of geothermal projects, especially surface structures (well shelters, distribution pipelines, exchanger stations, etc.) but also the wells themselves if they are considered to be structures. Finally, a specific layer is the **Mining Act** – the use of geothermal energy is a specific intervention in the Earth's crust and, from the point of view of mining regulations, it is a mining activity that requires appropriate permits and oversight by the state mining authorities.

The Geological Act regulates in particular the procedures for the design, execution and evaluation of geological works. The fourth part on *the exploration area* (Sections 21-28) and the third and fifth parts, where there are rules for the design of geological tasks and the evaluation of results (Sections 11-20a and 29-32c), are important for permitting processes.

The Water Act supplements the Geological Act at the moment when the geological exploration is transformed into exploitation of the resource. While exploratory boreholes are not water bodies during exploration, from the moment the **extraction of groundwater (geothermal)** for energy purposes is planned, this is a **specific water use** under the Water Act. Section 21 of the Water Act defines which activities are subject to permitting by State water authorities – this includes, in particular, extraction of groundwater above specified limits[61] and any use of groundwater that is not a normal (general) use. Geothermal projects almost always require a permit for the specific use of water, whether it is the extraction of geothermal water (for the surface use of heat), its discharge back into the underground environment (reinjection) or discharge into surface streams after its use (most common in Slovakia). The competent authority is the **District Office, Department of Environmental Welfare** (as a state water authority). The Water Act also defines **a water structure,** i.e. a structure that allows water to be managed. For geothermal projects, permanent boreholes used for the pumping or infiltration of thermal water, pipeline connections between them and technological equipment in contact with geothermal water (e.g. heat exchangers, separators) will be considered water structures. As a rule, the realization of a water structure requires a permit in the so-called **Water Act proceedings**. Pursuant to Section 26 of the Water Act, Water Act proceedings are usually linked to proceedings on a construction project when it comes to water structures permitting – i.e. a joint decision on the construction project is issued as well as a Water Act permit. A relative novelty is also the introduction of an

[61] The provisions of the Water Act (e.g. Section 6(5), Section 21(8), (9)) set limits that form an imaginary boundary between water extraction to cover a household's own needs – subject only to less regulation – and other extractions requiring larger quantities of water, which are already subject to stricter regulation.

exemption for groundwater extractions for use through heat pumps in order to exploit their thermal potential (with the exception of geothermal waters)[62] in the form of an exemption from payment of fees and charges.[63]

The Construction Code in the relevant period (from 1 April 2025) represents a new legal framework – this is Act No. 25/2025 COll., the Construction Code (replacing the old Construction Code No. 50/1976). This Act and the related Zone Planning Act (No. 200/2022 Coll.) introduce a modernized process of land-use and construction proceedings. For geothermal wells, it is essential that if an object is considered a **construction,** it must be authorized under the Construction Code (unless it is excluded from the permit obligation). Exploratory borehole (geological work) as such is not a construction but some geothermal borehole installations or permanent equipment may already fall under the definition of a construction. The new legislation puts emphasis on coordinated permitting - for constructions requiring assessment by several authorities, cooperation with the authorities concerned and a single information system are envisaged. In the field of water structures, the Construction Code retains the specificity that the state water administration body acts as a special building office for water structures. That means that, for example, permitting a borehole as a water structure or permitting pipelines for geothermal water may be the competence of the water authority in charge of the construction agenda for those specific objects. On the contrary, surface structures not directly related to water (power plant buildings, exchange stations, energy connections, etc.) are permitted by the general building authority.

Finally, **mining regulations** come into play in terms of exploiting geothermal resources. Under Section 34(1)(d) of the Mining Act, the use of geothermal energy is a special intervention in the Earth's crust. Such intervention is considered a **mining activity** within the meaning of the Mining Activity Act and requires a permit from the District Mining Authority pursuant to Section 11 of the Mining Activity Act and related regulations. In addition, Section 3(h) of the Mining Activity Act expressly states that machine drilling of wells with a depth of more than 30 m and machine drilling of wells with a length of more than 30 m for purposes other than those referred to in Sections 2 and 3(a) to (g) which include specific interventions in the Earth's crust, are to be regarded as activities carried out by mining. That means that the drilling of deep geothermal wells is itself subject to the oversight and reporting obligations of the mining authorities. For an investor, this means in practice the need to obtain a so-called **mining license** – a permit to carry out mining activities (either directly or through a supplier holding such a permit). Mining regulations thus ensure that wells and installations meet safety standards and also protect the interest of the state in mineral wealth – geothermal resources (heat-generating mountain structures) are part of the mineral wealth of the Slovak Republic pursuant to Section 5(2) of the Mining Act. This corresponds to Article 4 of the Slovak Constitution, according to which mineral wealth is owned by the state. Thus, the investor never acquires title to the geothermal water or the heat contained in it.

In sum, the legal framework of permitting processes for geothermal wells is multilayered and requires compliance with several laws. In the following chapters, we will look at how this legislation interacts in a specific step-by-step procedure for permitting a geothermal well.

2.3. Geological regulations

In relation to the implementation of exploratory geothermal wells, the relevant legislation concerning geological works in the Geological Act which geological works in the Section 2 is divided into **geological research** (basic and regional) and **geological exploration**.

Geological exploration is a practical implementation stage of geological works and is further divided into specialized types of exploration and their stages. In particular, Section 2(3) of the Geological Act provides for a breakdown into reservoir geological survey, hydrogeological survey, engineering geological survey and geological environmental

[62] The fee obligation shall not apply to groundwater extractions where they are taken exclusively to exploit their thermal potential by means of heat pumps and, after cooling, are reinjected into the same water body. However, the exemption does not explicitly apply to geothermal waters, defined by the Water Act as groundwater serving as a medium for the accumulation, transport and exploitation of earth heat from a rock environment. In practical terms, this means that standard groundwater circulating in a closed thermal circuit within a heat pump installation is exempted from charges, while geothermal water remains subject to charges even under the same technological regime (Section 79(3)(i) of the Water Act).

[63] Act No. 277/2024 Coll. amending Act No. 364/2004 Coll. on water and amending Slovak National Council Act No. 372/1990 Coll. on infringements as amended (the Water Act).

survey. Each one of them has three stages: search (indicative), detailed and complementary (generation). In practice, this means that the survey is carried out gradually from general verification of assumptions through detailed examination to additional work confirming the results.

Hydrogeological **exploration** is crucial for larger geothermal projects, as in addition to verifying geological conditions for the erection and operation of installations for the use of geothermal energy, including geological conditions for use of geothermal energy sourced from the heat of dry rocks, covering groundwater and geothermal water. The Geological Act defines **geothermal water** for the purposes of geological works as groundwater with a minimum temperature of 20 °C at the point of exit (Section 3(e) of the Geological Act). This definition is linked to geological exploration and takes into account that geothermal waters are part of the hydrogeological conditions for the use of Earth's heat. From the point of view of the Water Act, geothermal water is characterized functionally as groundwater serving as a medium for accumulation, transport and exploitation of earth heat from the rock environment (Section 3(3) of the Water Act). Both definitions are complementary - the Geological Act emphasizes the temperature aspect while the Water Act emphasizes the function of water in the heat removal process.[64]

Geological exploration is also related to the legislative term **geological work**, defined by the Act as a surface or underground work in the Earth's crust, serving to perform geological works (Section 3(a) of the Geological Act). That includes in particular boreholes, grooves, mining works and other interventions carried out as part of exploration. Importantly, drillings carried out during geological exploration have a specific legal regime applicable to geological works – they are not waterworks and do not require a separate permit by the State Water Authority.[65] This exemption from the waterworks regime should apply only during the exploration phase, once completed, the status of the well may change.

Geological works include, in addition to drilling, a number of preparatory and related activities. Pursuant to Section 2(4) of the Geological Act, this includes geophysical and geochemical methods, laboratory and technological work, field measuring work, **drilling, underground and earthworks,** the construction of temporary measuring objects (monitoring probes, pushing and observation stations), testing installations and the establishment of temporary workplaces or access roads. These activities are part of the exploration and usually do not require special building permits if they are carried out as part of an approved geological task. Geological exploration thus often takes place in the field with temporary installations that must be removed or secured after completion of the works. These temporary interventions (as well as other activities within the meaning of the Geological Act) are subject to state geological oversight[66] which ensures that the works are carried out professionally and in accordance with the project and regulations.

2.3.1. Exploration area and special exploration area

Exploration area

In the context of geothermal wells, it is also important to understand the concept of exploration area. This is a territory defined by a decision of the Ministry of Environment[67] in which the commissioner of geological works has the exclusive right to carry out selected geological works, including hydrogeological exploration[68] of geothermal waters, mineral waters and natural rock structures for the establishment and operation of installations for the use of geothermal energy. The decision on exploration area designation[69] for geothermal exploration is in fact a license

[64] If the geothermal water discovered by the borehole had exceptional properties (e.g. healing effects, mineralization) and the Ministry of Health of the Slovak Republic recognized it as natural healing or mineral water, the regime of Act No. 538/2005 on natural healing waters, natural healing baths, spa sites and natural mineral waters and amending certain acts would apply. However, this mode is rare and refers more to the spa. For energy projects, it is essential that geothermal water is considered primarily as a thermal, not a mineral spring (see Guideline of the Director-General of the Water Section of the Ministry of the Environment of the Slovak Republic No. IX/3/2020 on geothermal water and the competence of state water authorities of 20 May 2020).

[65] See Guideline No. IX/3/20220 of the Director-General of the Water Section of the Ministry of the Environment of the Slovak Republic on geothermal waters and the competence of state water authorities of 20 May 2020.

[66] Section 37(1) of the Geological Act: "The State Geological Supervision shall determine how contractors of geological works, commissioners, holders of exploration areas and other natural and legal persons fulfil the obligations laid down in this Act, generally binding legal regulations issued on the basis thereof, and decisions of the Ministry."

[67] It is not a decision with the character of a decision on construction intention under the Construction Code.

[68] Hydrogeological exploration is "a survey that examines groundwater, including geothermal waters, and mineral waters, detects and verifies their quantity and quality, and processes the geological basis for their use and protection, detects and verifies the geological conditions for the establishment and operation of facilities for the use of geothermal energy." (Section 3(f) of the Geological Act)

[69] Section 23(13) of the Geological Act

for exploration of the designated area – the holder undertakes to invest in the works according to the approved budget and comply with the stages of exploration. Failure to comply with such conditions may lead to the dismantling of the exploration area which protects national interests and prevents the blocking of resources by inactive entities.

The main purpose of the exploration area institute is to provide the explorer with legal certainty and exclusivity – exploration areas cannot overlap even partially for the same purpose[70]. This avoids conflict of interest, duplication of surveys and a "race" for the deposit. According to the information provided by the Ministry of Environment, in 2024 the exploration areas for geothermal energy ranged from 0.0041 to 84.66 km2. From this it appears that some investors who determine only the minimum area of the exploration area do not even need the institute of the exploration area and designate it only in order to comply with the law. On the contrary, in the case of larger areas, the question arises as to whether the exploration area thus designated is justified by the establishment of a single exploratory borehole.

The Act imposes on the holder of the exploration area several obligations of continuous documentation of works. The key is the annual report on exploration activities submitted to the Ministry of Environment within 6 weeks after the end of the calendar year[71]. This report must state the results of the geological works selected and provide evidence of the financial resources spent. The annual report allows the Ministry to continuously monitor the progress of the survey and the implementation of the investment plans. If the holder does not submit the report even at the invitation, the Ministry will decide to cancel the exploration area which underlines the binding nature of this obligation.[72] At the same time, a qualitative evaluation (whether the exploration goal has been achieved) will only become apparent in the final report.[73]

The legislation contains a number of mechanisms to ensure that exploration is actually carried out and to prevent the blocking of areas without investment. Geological works must begin[74] within one year of the date on which the decision on exploration area designation became final, otherwise the Ministry of Environment may cancel the exploration area (optional cancellation). If geological works do not start by the end of the second year, the Ministry of Environment will cancel the exploration area on a mandatory basis (mandatory cancellation). In addition, if the same holder applies for a new exploration area, despite the fact that he has not started geological works in another exploration area in the previous three years, the Ministry of Environment will reject the proposal for exploration area designation.[75]

Another investment criterion is the requirement to spend a significant part of the budget on the exploration work: when applying for an extension of the exploration area, at least 70% of the budget of the geological task should be spent on the selected geological works.[76]

The exploration area should be designated for a maximum of 4 years. The period may be extended by another 4 years, then by 2 years, and if this is not sufficient to complete the works, for another necessary period with the consent of the Ministry of Environment of the Slovak Republic. Extensions must be requested at least 3 months before the expiry of the current period.[77] In practice, the exploration area can therefore be extended up to 10 years and, exceptionally, longer. However, here too the condition of reinvestment has been added: the holder to whom the exploration area is extended should be required to prove that an additional 30% of the budget has been spent by the end of the second year following the extension.[78] Failure to meet these investment conditions leads to the cancellation of the exploration area or the non-granting of a further extension. As stated in the explanatory

[70] Section 21(4) of the Geological Act
[71] Section 25(1) of the Geological Act
[72] Section 22(8) of the Geological Act
[73] Section 16(2) of the Geological Act
[74] Section 22(5) of the Geological Act: "Geological works shall be deemed to have begun if, in the first year of the final decision designating the exploration area, at least 10% of the budget of the geological task referred to in Paragraph 23(13)(l) has been spent on carrying them out, and at least 5% has been spent on oil and combustible natural gas."
[75] Section 23(11)(e) of the Geological Act
[76] Section 25(6) of the Geological Act
[77] Section 22(1) of the Geological Act
[78] Section 25(7) of the Geological Act

memorandum, "*the legislative amendment is intended to achieve continued activity of the holder of the exploration area in order to prevent unjustified blocking of the exploration area to the detriment of other interested parties.*"[79]

The requirement to reinvest 70% of the budget within four years and then a further 30% by the end of the second year after the extension of the exploration area raises a number of questions in terms of logic and practical feasibility, especially for projects with high upfront costs, such as geothermal projects. For geothermal projects, where costs amount to millions of euros, the requirement to reinvest 70% of the budget within four years is a significant financial burden. Despite the possibility of extending the exploration area to 10 years or more, the legislation requires 100% of the amount to be reinvested by the end of the 6th year. That means that even if the exploration area is formally valid for a longer period, the financial commitments are concentrated within the first six years.

In practical terms, this creates a disproportion- although the holder of the exploration area has a designated area (after extension) for 8 years, it actually has to cease activity within 6 years. After reinvesting the entire budget until the 6th year, the holder of the exploration area can theoretically maintain control of the area until the 10th year (or longer) without further significant investments or activities. Thus, the legislation – and the authorization practice based on it – implicitly envisages, even at the time of the submission of the project, that the investor will continuously adjust the budget for the duration of the exploration area. Without that flexibility, there would be no real possibility of obtaining an exploratory site for a period of 10 years or more. If the investor had followed the traditional financing model of "payment for works carried out", it would no longer have had the funds available for further works in the seventh year following exploration area designation, since it would have spent 100% of the budget by then.

Such a set-up can benefit entities that plan to modify the budget from the outset and prepare changes in the geological task project in advance. By using the legislative option to change the budget for the duration of the exploration area, these entities can formally meet the reinvestment requirements, while real investments may be lower or inefficiently spent.

It also clearly sets out the conditions under which the exploration area will not be designated by the Ministry[80]. One of the reasons for rejecting a proposal for the designation of an exploration area is the situation where the State administration concerned (any) does not agree with exploration area designation[81]. The law mentions, by way of example, that these are nature conservation authorities and district mining authorities. That provision confers de facto a right of veto on those authorities concerned. That means that even if the investor fulfils all the technical and financial conditions, a single disagreement by one of the authorities concerned may block the entire process of determining the exploration area.

Such a set-up raises questions from the point of view of constitutional rights to a fair trial and effective legal protection. Article 46(1) of the Slovak Constitution guarantees everyone the right to assert their rights before an independent court or other body. However, in the procedure for designating the exploration area, **the applicant does not have the opportunity to defend himself against the opposing opinion** of the authority concerned. As a rule, this opinion is not issued in the form of a decision addressed to the applicant (often a *"binding opinion"* or statement). Thus, the applicant will not be given the opportunity to contest the grounds for disagreement or to appeal directly against them. The result is the Ministry's decision to refuse the exploration area which, although formally subject to judicial review, makes limited sense – the ground for refusal (disapproval of another authority) is laid down by law. It remains for the Court only to verify that the authority concerned has not exceeded the limits of its administrative discretion; It cannot, however, substitute its own judgment. **The risk of disproportionate interference with the right to a fair trial** lies here in the fact that the fate of an application is effectively decided by a third authority, without there being any remedy against its "sentence". There is also a weakening of **legal certainty** - the investor can spend considerable resources on the preparation of the project but its implementation can be blocked by a single negative opinion without the possibility of correction or compromise. From a constitutional

[79] Explanatory rights to Act No. 311/2013 amending Act No. 569/2007 Coll. on geological works (the Geological Act) and on amendment of certain Acts as amended

[80] Section 23(11) of the Geological Act

[81] In connection with Section 23(10) of the Geological Act, if one of the state administration bodies concerned does not agree with the designation of a given exploration area under special regulations, the Ministry is bound to take that disagreement into account.

point of view, it is questionable whether such *an absolute veto of* the authority concerned is proportionate. Article 46(2) of the Slovak Constitution provides that decisions concerning fundamental rights and freedoms must not be excluded from review by the court – in our context, this concerns in particular the freedom to conduct a business and to own property (if the geothermal project is a business activity). If the legislation completely removes the possibility of reviewing the substantive validity of a dissenting opinion, this may be contrary to the aforementioned constitutional principles. Overall, there is therefore a **real constitutional risk** that the current "statement of the authorities involved" constitutes a disproportionate interference with the right to a fair trial and the legal certainty of the parties.

This approach may also lead to unnecessary administrative delays, hampering the development of innovative geothermal projects. The solution to this situation would be to introduce a mechanism similar to the resolution of disputes under Section 54 of the Construction Code , where disputes between the bodies concerned are resolved by collective decision-making – first by seeking agreement and, in case of failure, by means of requested opinions from the superior bodies, with a possible final decision of the highest authority in case of persistence of the disputes. A procedure in the form of a primary effort to resolve the dispute, with the subsequent possibility (in the event of a protracted conflict) of a final decision by the Ministry of Environment as the authority deciding on exploration area designation, would allow the views of all parties involved to be taken into account in a balanced manner, without a single disagreement being able to block the entire process of designation of the exploration area.

The fee for an exploration area[82] is set progressively- for the first four years, EUR 100 is charged for each started year and for each started km2, EUR 200 for the following four years, EUR 350 for the following two years and EUR 700 for each subsequent year.[83] The payment is divided equally: 50% of the total amount should be the revenue of the Environmental Fund and 50% should be the revenue of the municipality in which the exploration area is located.[84]

As a result, for example, a municipality with a large exploration area may receive thousands of euros per year which is not insignificant for its budget. Nevertheless, it often happens that municipalities disagree with the survey, due to concerns about the reduction of the quality of life of residents in the village during construction works, concerns about the environment or due to non-compliance with the zoning plan. This is a recently observed phenomenon of "not in my backyard" (NIMBY), where residents or local authorities refuse to install energy or other infrastructure projects in their immediate surroundings, even if these projects bring societal benefits. In the case of geothermal energy, NIMBY manifests itself mainly through concerns about environmental impacts, landscape change, increased traffic and potential health risks which can lead to resistance to projects by local residents and complicate permitting procedures.

A financial incentive of 50% of the fees may not always be sufficient. In theory, increasing the share of municipalities (e.g. to 70%) or introducing a one-off compensation in exploration area designation could give municipalities more incentive to support geothermal projects. On the other hand, the Environmental Fund would lose part of the resources dedicated to remediation and environmental projects, so such a change must be well balanced. Therefore, the state is faced with a dilemma: either to increase the economic incentives of municipalities or to strengthen their legal co-responsibility for the development of RES. The current distribution of payments is a compromise that provides municipalities with a share of the *"profit"* from the survey but does not guarantee their consent. However, a potential increase in fees could represent a potential further barrier to the development of geothermal resources by investors.

If the state considers geological exploration to be in the public interest, it should offer adequate benefits to municipalities – whether financial (higher share of fees, infrastructure investments) or procedural (greater awareness, possibility for citizens to engage in projects by their own investment, building energy communities).

[82] Section 26 of the Geological Act
[83] If the holder fails to pay even after the call, the Ministry of the Environment of the Slovak Republic may cancel the exploration area.
[84] If the territory extends over several cadastral areas, the Ministry shall determine the proportions attributable to each municipality according to the size of the parts of the exploration area in those areas.

The aim is for municipalities to see the survey not only as a potential burden and administrative obligation but also as an opportunity for economic and ecological development.

One of the key motivating factors that can persuade municipalities to enter geothermal projects is increased financial support from the state. A higher State aid intensity – i.e. a higher percentage of the project's justified costs covered by subsidies or other support – directly reduces the financial burden on the municipality. Increasing the aid intensity for municipalities must take place within the limits of EU legislation. The key legal framework is the Block Exemption Regulation which defines the conditions under which State aid can be granted without a prior notification procedure. In other words, if the State grants block exempted aid, it does not need to seek individual approval from the European Commission for each project which significantly speeds up and simplifies the process.

For renewable energy sources (including geothermal energy), the Block Exemption Regulation contains a number of relevant provisions. Article 43 specifically concerns operating aid for the promotion of energy from renewable sources and sets limits for so-called small-scale and energy community projects. Under this article, support can be provided (e.g. in the form of a feed-in bonus for green energy produced) for installations with a capacity of up to 1 MW but for projects owned by energy communities the limit is significantly increased – up to 6 MW of installed capacity.[85] For the area of community support, it is also possible to increase the intensity of support up to the ceilings allowed by the Regulation (for several measures, they may reach up to 100% of the justified costs if the aid is determined on the basis of a funding gap methodology or through competition).

Should the block exemption framework not allow to provide a sufficiently strong incentive (for example, the municipality would need support exceeding the permitted limits or the project does not meet the precisely defined conditions), there is still the possibility to notify a new State aid scheme to the European Commission. Based on the CEEAG 2022, the Commission[86] may approve a tailor-made support scheme for geothermal or community-based projects. In this way, the State could also set a higher financial incentive than that allowed by the block exemptions. This part makes it possible, inter alia, to finance projects up to 100% of justified expenditure and also introduces exemptions from the competitive obligation for small projects and communities.

Special exploration area (Section 27 of the Geological Act)

This is a special regime for exploration area designation in the case where selected geological works are financed from the state budget or other public funds.

In such a case, the exploration area is not determined by the "customer", i.e. the person who finances the geological works but directly **by the geological works contractor** selected pursuant to a special regulation. Practically, this means that if, for example, a state institution or an EU research project finances a geological survey, the Ministry of Environment issues a decision designating a special exploration area for the entity conducting the survey.

The contractor in the special exploration area has rights to carry out geological works similarly to the holder of the exploration area but is not subject to a number of obligations and restrictions intended for "commercial" exploration areas.[87] For example, for a special exploration area, no payments are made for exploration areas (Section 26) and the contractor does not have to submit annual reports to the Ministry (Section 25). Neither the possibility of contractual transfer nor the extension rule (Section 22(1)) applies – the duration and extent of the special exploration area are determined by the conditions of the public project.

The Geological Act in Section 28 allows for the conversion of a special exploration area into a "commercial" area by selecting a new holder of the exploration area. In this case, the Ministry of Environment will launch a selection procedure[88] and select a new holder of the exploration area, to whom it will hand over the area for further

[85] This also corresponds to the new energy sharing institute within the meaning of Article 15a of Directive (EU) 2019/944 of the European Parliament and of the Council of 5 June 2019 on common rules for the internal market for electricity and amending Directive 2012/27/EU which allows third parties to own and manage renewable energy installations up to 6 MW.
[86] In particular section 4.1 that relates to the promotion of RES and decarbonization.
[87] Section 27(3) of the Geological Act
[88] The selection procedure is published in the Commercial Bulletin of the Slovak Republic and even in the Official Journal of the EU (Section 28(2) of the Geological Act).

exploration. After paying part of the costs of the geological works carried out which constitutes revenue for the State budget, the selected holder of the exploration area should have the right to determine the exploration area and should be obliged to ensure the continuation of the geological works according to the approved geological task project[89]. Ultimately, the special exploration area thus serves to enable the State actively to carry out geological exploration in the public interest and, at the same time, to have the area reserved for the duration of the project. After its completion, the territory is either freed up or transferred to the standard regime, where the competitive principle and the possibility of entry of private investors apply again.

Although this does not follow explicitly from the law, we are of the opinion that a special exploration area can only be designated in the case of projects that will be financed in full of the state budget or other public funds. A different interpretation, that is to say, that a special exploration area may also be designated for projects co-financed from the State budget or other public funds, would preclude the application of Section 28 which requires, for subsequent commercial use of the exploration area, its conversion into a standard exploration area which must be preceded by a transparent and non-discriminatory selection procedure. Interpreting the law in this way would make it possible to circumvent the legal requirement for a tender procedure by selecting a commercial partner before the designation of the special exploration area, and would also make it impossible to repay the State budget or other public funds in the event of subsequent commercial use which is an essential requirement for the conversion of the special exploration area into a standard one. Therefore, we are inclined to the view that a special exploration area can only be designated for persons who manage public funds, i.e. public administration entities within the meaning of Act No. 523/2004 Coll. on budgetary rules of public administration and amendment of certain Acts as amended.[90] For reasons of legal certainty and greater clarity, it would be appropriate to add a reference to the aforementioned Finance Act in the text of the Act.

Some other issues related to the exploration area

The current legal situation requires the designation of an exploration area whenever selected geological works (Section 21(1) of the Geological Act) are to be carried out, that is, including hydrogeological exploration of geothermal waters, mineral waters and natural rock structures for the establishment and operation of installations for the use of geothermal energy.

Although the territory of Slovakia is historically well-explored geologically, the question of the need for exploration areas in the context of geothermal energy raises a debate. Considerations of abolishing, where appropriate, the "voluntary" designation of the exploration area in the case of geothermal wells would mean that possession of the exploration area would not be a condition for exploration – the entity could carry out the exploration even without formally designating the exploration area. Certain sub-situations are already working- for example, exploration of non-reserved minerals[91], even hydrogeological exploration of all other waters (except geothermal and mineral) for various purposes can take place without identifying the exploration area, only on the basis of an agreement with the landowners and general permits.

The process of using geothermal energy begins with a thorough survey which includes a search of available archival data and subsequent geophysical works. On the basis of these analyses, prospective well sites are identified. If the well confirms the presence of geothermal water in the required quantity, this quantity is approved by the Water Commission on the basis of a professional opinion of an independent opponent with competence for hydrogeological exploration. Any other investor should be required to take into account the existing resources and to ensure that its activities do not affect hydrogeological conditions around existing wells. In practice, a so-called preferential use in the form of exploration area designation means only that the investor has delimited the area on the surface, thereby temporarily eliminating competition.

However, unlike conventional mineral deposits, the hydrogeological structure is not a fixed deposit but a dynamic system – water infiltrates, moves, heats up and builds up reserves. In the case of geothermal energy in dry rocks,

[89] Section 28(5) of the Geological Act
[90] In the sense of Section 2(a) of Act No. 523/2004 Coll. on the budgetary rules of public administration and on amendment of certain Acts, "funds managed by legal persons of public administration; European Union funds and European Union levies and funds provided from the European Union budget for the implementation of the Recovery and Resilience Plan of the Slovak Republic are also public funds."
[91] Section 3(2) of the Mining Act

the impact zone is often limited to just a few meters. Hydrogeological structures contain different amounts of water and different energy potentials. It may therefore not be in the interest of the State to allocate large areas of exclusive exploitation rights to individual investors for an indefinite period of time, as this is a renewable energy source.[92] It is not protected by a defined area on the surface – what is important is the assessed degree of influence of further wells on its source. In practice, protection works through market mechanisms - it can be assumed that no investor will risk millions to drill in close proximity to another if there is a risk of their mutual interference.

From a different perspective, on the part of investors, if the holder did not have a designated exploration area, it would have no exclusive rights which could lead to disincentives to investment and ultimately attenuate the exploration activity.

However, when looking at the size of the exploration areas, the data provided by the Ministry of Environment show that a large portion is controlled by a small number of entities – 331.69 km2 is controlled by six companies (these are two thirds of the total area of exploration areas of 508.99 km2), another 132 km2 by one company. The remaining 44.92 km2 are divided between 12 smaller exploration areas with the area ranging from 0.0041 to 20.3 km2. It seems that most of the holders of these smaller exploration areas would have chosen to work without an officially designated exploration area – had the legislation permitted it.

As regards the professional justification for designation of exploration areas, unlike in the case of conventional mineral deposits, designation of exploration areas for hydrogeological structures makes **sense only if it corresponds with the actual need to carry out geological works**. Too large exploration areas that are not actively explored can lead to instrumental blocking of resources.

Similarly, non-application of the institute of exploration areas to geothermal resources would address the above-mentioned disproportionality of the exploration area designation period and obligation to reinvest funds – if the investor did not have an exploration area designated, their failure to act would have no consequences – another investor could have started exploring the area or the original investor could have continued their activities later.

At the same time, the **administrative burden for investors would be significantly reduced.** Obligations related to exploration area designation and related obligations during the period of designation, the obligation to provide relevant documentation and comply with formal periods would be removed. That would greatly **facilitate entry into the geological exploration process**, especially for smaller or regional investors who often face complex bureaucratic obstacles.

Reducing administration and responsibilities would also accelerate the development of geothermal projects, promote competition and exploit the potential of renewable energy sources more efficiently. Such a measure would be in line with the principles of modernizing public administration and promoting sustainable economic development.

However, instead of legislative intervention in the form of the complete abolition of the possibility of designating an exploration area for geothermal resources, it is possible to consider only voluntary, in the sense that not everyone who wishes to carry out exploration must apply for a exploration area but only those who wish to have an exclusive right and subsequent preferential rights. Logically, these should be projects where the nature of the exploration justifies it - for example, more exploratory wells or more geophysical exploration are planned in a larger area.

The proposed voluntary nature of exploration area designation would allow entities interested in exclusive rights and preferential entitlements to apply for the area designation, thereby obtaining the relevant benefits but at the same time assuming all the related obligations. Conversely, entities not interested in such advantages would not have to apply for the designation of an exploration area which would significantly simplify their administration as they would not be subject to obligations relating to the exploration area. This approach would create a flexible system that takes into account the different needs and intentions of exploration operators.

One suggestion echoed by the professional public is also to allow a simpler regime for the management of exploration areas and to narrow the scope of the obligations of keepers – but at the cost of higher fees. In a way,

[92] The use of the resource by the investor means that n and, for example, if a flow rate of 20 l/s has been confirmed by the well and the structure can provide up to 500 l/s, the investor has a preferential right only for those 20 l/s.

the Slovak system already works like this: payments for the exploration area are set progressively and increase significantly with the holding time. This motivates the holder not to unnecessarily block the territory for a long time. In addition, already after the beginning of the 2nd year without activity, there is a risk of dismantling the exploration area. Unjustified blocking is thus neither financially nor legally worthwhile. Increasing reimbursements beyond the current framework could be a double-edged weapon: on the one hand, it would further discourage inactive holders, on the other hand, it would also make exploration more expensive for honest investors which may reduce the attractiveness of geological exploration in Slovakia.

The introduction of an alternative system of progressive fees in the form of tariffs – where the level of the fee increases in proportion to the size of the exploration area – could contribute more effectively to preventing the unjustified take-up of large areas. This approach would incentivize investors to designate only an area that meets an actual need for geological works while at the same time preventing large areas from being blocked for the sole purpose of a single well protecting.

However, the possibilities for simplifying the management of exploration areas need not be linked solely to the level of compensation – e.g. if the holder has invested significantly more than the minimum and meets all the objectives, some administrative obligations could be eased. On the contrary, if someone repeatedly violates the rules, today the law already allows the exploration area to be abolished; In[93] doing so, the Environment Strategy foresees a tightening of controls and sanctions (including an increase in fees and fines). It follows from the above that the current system already contains elements for the prevention of speculation (increasing fees, threat of withdrawal). There would also be room for simplification in the digital management of documentation or the merging of certain permits – all while maintaining a sufficiently high level of remuneration so that the keeping an exploration area idle does not worth it.

2.3.2. Geological task, carrying out geological works and final report

The holder of the exploration area must submit to the Ministry of Environment an approved[94] project for a geological task[95] with conflicts of interest protected by special regulations, drawn up in accordance with the submitted geological plan[96] (which is part of the proposal for exploration area designation) **within three months** of the date on which the decision on exploration area designation becomes final, otherwise the Ministry will cancel the exploration area.

Geological works – geological exploration – should be announced by the contractor to the State Geological Institute of Dionýz Štúr no later than the date of commencement of the geological task. Geological works can also be reported electronically.[97] Legislation for conducting an exploratory drilling does not require any further building permit, it is only in accordance with the Geological Act.[98] However, for the sake of completeness, it should be added that, within the framework of the hydrogeological survey of geothermal waters, it is necessary to carry out a

[93] "The implementation of control mechanisms will be substantially improved and sufficient financial and capacity needs for control and monitoring will be ensured. Inspections will be tightened and intensified, exploration fees and penalties for non-compliance will be increased. If the inspection finds a repeated breach of an obligation arising from the Geological Act, the exploration area will be cancelled. Equally, the requirements for entities that can become holders of exploration areas will be tightened and speculative action in the designation of exploration areas will be avoided. Companies that owe debts to the state will not be designated an exploration area." Environmental Policy Strategy 2030 https://www.minzp.sk/files/iep/greener_slovakia-strategy_of_the_environmental_policy_of_the_slovak_republic_until_2030.pdf

[94] The design of the geological task, details and particulars are regulated by Decree of the Ministry of the Environment No. 51/2008 Coll., which implements the Geological Act.

[95] "A geological task is the factual, local and temporal delimitation of a range of questions expressing the economic, scientific or technical objective of the task to be designed and solved by geological works and evaluated in the final report of the geological task." (Section 11(1) of the Geological Act)

[96] Pursuant to Section 12(5) of the Geological Act, the geological objective includes the objective, specification and scope of the proposed works with a temporal link to their implementation.

[97] Section 13(1) of the Geological Act

[98] Exploratory wells are permitted by the geological authority without the need for a separate water permit for extraction (short-term pumping for tests is part of the exploration). However, permanent use must take place only after a water permit has been obtained; then the construction of the borehole is subsequently legalized as a water structure. In the past, some investors faced the dilemma of whether they already need a building permit under the Construction/Water Act to drill a well – according to current interpretations, not in the case of an exploratory well, unless it is a water structure used for extraction during exploration. Such drilling is conducted only under the regime of geological law. (see Guideline of the Main Mining Office No. 484-1033/2022-I. of 7 July 2022 concerning the use of geothermal energy). The exception is the carrying out of a hydrodynamic test, for which a permit for specific water use is required.

hydrodynamic test, the primary aim of which is to quantify the available aquifer yield and verify the hydraulic parameters of the well. If the test exceeds five days, it is considered as **a special use of water** pursuant to Section 21(1)(g) of the Water Act. In practice for geothermal sources, this time limit is always exceeded because the relevant technical standard[99] prescribes a **minimum 21-day hydrodynamic test.** It follows that, even at the hydrogeological survey stage, the investor is required to obtain a permit from the State Water Authority for the specific use of water. The test is performed immediately after drilling and serves as a functional operation test of the well; the resulting data form the basis for the calculation of the usable amount of geothermal waters and for other project decisions. The Water Act regime thus applies even in the first phase of the geothermal project.

As regards designated geological works[100], these must also be reported in accordance with the Mining Activity Act.[101]

At the end of the exploration and execution of all geological works, the contractor of geological works is obliged to draw up **a final report** [102]with the evaluation of the results and the calculation of the amount of geothermal energy and water and hand it over to the client.[103] The period for drawing up the final report should not exceed one year from the end of the geological task.[104] This final report is subject to approval by the Ministry of Environment of the Slovak Republic, regardless of the source of funding which has a period of 6 months for approval.[105]

The final report then will[106], among other things, confirm the contractor's findings regarding the results achieved in terms of the geological task and whether the well drilled by geological works will be disposed of pursuant to Section 31 of the Geological Act after having fulfilled its purpose or whether it will be so secured and technically capable that it can serve as a source of geothermal water. If the well is secured in this way, it will then be allowed to be used for specific water use within the meaning of water legislation. The final report should form the basis for further permitting procedures.

It is therefore in the interest of the holder of the exploration area to complete the exploration and to submit the final report within the period of validity of the exploration area, as this is the only way to obtain a preferential right of use, in terms of the possibility of using the approved quantities of water and their energy potential. That means that anyone planning to drill in the vicinity must take into account the already approved quantities of water, while ensuring that the existing resource is not negatively affected. If it had not processed the final report, it would not have fulfilled its obligation to the State (sanctioned in Section 38(1)(c) of the Geological Act with a fine of between EUR 100 and EUR 6,500) and would have been deprived of the “priority right” referred to above.

2.4. Mining regulations

Geothermal energy is an important renewable resource – it is the heat of the earth that can be used to heat, heat water or produce electricity with minimal emissions. In Slovak legislation, however, its use is specifically regulated by Mining Act, as it is considered part of the state's **mineral wealth.** In particular, under Article 34(1)(d) of the Mining Act,[107] the use of geothermal energy is one **of the specific interventions in the Earth’s crust** that are subject to permitting by the mining authorities. According to the explanatory memorandum to the amendment to the Mining Act, this regulation[108]is based on the need to protect underground geological structures and to ensure professional and safe drilling.

[99] STN 73 6614
[100] Technological works, laboratory works, field measuring works and technical works, in particular drilling, underground works and earthworks, construction and operation of temporary measuring objects, pushing and observation stations, testing facilities, establishment of temporary workplaces and access roads to them.
[101] Section 13(4) of the Geological Act
[102] Section 16(1) and (2) of the Geological Act
[103] The final report must also be submitted to the State Geological Institute of Dionýz Štúr within one month of approval.
[104] Section 40(2) of Decree No. 51/2008.
[105] Section 18(2) of the Geological Act
[106] The content and requirements of the final report are laid down in Decree No. 51/2008 of the Ministry of the Environment implementing the Geological Act.
[107] “Special interventions in the Earth’s crust mean, in accordance with this Act, the establishment, operation, securing and destruction of installations for ... (d) the use of geothermal energy”
[108] Explanatory memorandum to Act No. 311/2013 amending Act No. 569/2007 on geological works (Geological Act), as amended, and amending certain acts.

That means that any geothermal well or ground heat recovery device must be treated similarly to a mining work. Pursuant to Section 34(3) of the Mining Act, the provisions on mining activities permitting (e.g. on the protection of deposits, on mining damage, etc.) apply mutatis mutandis to these interventions. The aim is to ensure that the use of geothermal energy also takes place in accordance with the principles of safety, environmental protection and rational use of resources.

In addition to the Mining Act, the Mining Activity Act also regulates **procedures.** Section 2(f) of that regulation classifies specific interventions in the Earth's crust as **mining activities**. The special intervention permit is issued by the district mining authority and the applicant – a so-called *organization*[109] – should submit the prescribed documentation. In other words, a permit for special intervention in the Earth's crust as a mining activity can only be issued by the district mining authority to an undertaking (e.g. a company based on the implementation of a geothermal project). There is already an implicit restriction – ordinary natural persons (non-entrepreneurs) cannot be allowed to do so.[110]

The District Mining Authority acts as the permitting authority – its role is to assess the application, coordinate the process with other authorities concerned (environment, building office, water management oversight, etc.) and issue a permit or refusal decision. The District Mining Authority also ensures state oversight during the implementation of wells and operation of installations.

Once the hydrogeological survey has been carried out in accordance with the Geological Act and the final report with the calculation of geothermal energy has been approved, it is necessary to ensure the protection of the discovered resource – typically **a protected area is designated for special interventions in the Earth's crust** (similar to a protected deposit area for minerals). The District Mining Authority starts the procedure for the designation of such an area on the proposal of the organization and requires the opinion of the nature protection authority and a binding opinion of the building authority (from the point of view of the zoning plan). Such designation is based on exploration area designation but does not necessarily overlap.

2.4.1. Procedure of mining activities permitting [111]

After securing the exploratory phase and territorial protection, the organization submits at least 3 months before the planned start **of works the actual application for permission for special intervention in the Earth's crust** to the district mining office. The application must be accompanied by detailed documentation of the special intervention in the Earth's crust, a safety plan, a security plan and, where appropriate, a liquidation plan, statements by the entities concerned (e.g. if the well could affect the extraction of the exclusive deposit of another organization, statements by that organization pursuant to Section 11(2) of the Mining Activity Act) and other documents specified by Slovak Mining Office Regulation No. 89/1988 Coll. on the rational use of exclusive deposits, the authorization and reporting of mining activities and the reporting of activities carried out in a mining manner[112] ("Regulation No. 89/1988").

Please note that an organization wishing to carry out mining activities must have a mining license issued pursuant to Section 4a of the Mining Activity Act.

In the case of major projects for which an environmental impact assessment (EIA) is also ongoing, the district mining authority will make a decision only after the EIA process has been completed and the final opinion issued.[113]

We should bear in mind that a license of the district mining authority is required only for special interventions in the Earth's crust, including mining works of geological exploration for those purposes where the scope is vertical mining works deeper than 40 m, horizontal or inclined mining works with a length of more than 100 m or shorter if another mining work is derived from them and the length of which together exceeds 100 m.[114] After a positive

[109] Organisation means "legal and natural persons who, in the course of their business, carry out mining activities or activities carried out in a mining method or any other activity regulated by the Act." (Section 3a of the Mining Activity Act)
[110] Guideline of the Main Mining Office No. 484-1033/2022-I. of 7 July 2022 concerning the use of geothermal energy.
[111] Sections 17-18f of the Mining Activity Act
[112] Annexes 9 and 10 to Decree No. 89/198.
[113] Section 18f of the Mining Activity Act
[114] Section 18a(c) of the Mining Activity Act

assessment, the[115] district mining authority issues a **decision permitting the geothermal well/installation** as a special intervention in the Earth's crust. This decision should lay down the specific conditions of operation. During the implementation and operation, the Mining Authority carries out regular checks. The investor has an ongoing reporting obligation (e.g. to report the start of works, extraordinary events) and after the end of use it is obliged to safely dispose of the well (cement, backfill) in accordance with the mining regulations.

2.4.2. Analysis of the issue of special interventions in the Earth's crust

Under Section 34(1)(d) of the Mining Act, the use of geothermal energy is a special intervention in the Earth's crust. Such intervention is considered a **mining activity** within the meaning of the Mining Activity Act and requires a licence from the District Mining Authority pursuant to Section 11 of the Mining Activity Act and related regulations. In addition, Section 3(h) of the Mining Activity Act expressly states that machine drilling of wells with a depth of more than 30 m and machine drilling of wells with a length of more than 30 m for purposes other than those referred to in Sections 2 and 3(a) to (g) which include special interventions in the Earth's crust, are to be regarded as activities carried out by mining.

As regards the unambiguous categorization of wells for the purposes of energy geothermal use, **erection of installations** for the use of geothermal energy under Slovak legislation belongs in the "special intervention in the Earth's crust" category, defined also as a mining activity. Such boreholes cannot be considered as wells in the traditional sense, as their primary purpose is not the extraction of water but thermal energy. In view of the above, the drilling of geothermal wells is regulated as a mining activity and requires appropriate permits and compliance with specific regulations concerning mining activities. However, it is not clear from such legislation whether an exploratory borehole is also regarded as a specific intervention in the Earth's crust. We are inclined to believe that it is not, since in literal terms the exploratory borehole is not yet a facility for the use of geothermal energy. However, in order to avoid errors in the application of individual provisions, it would be appropriate to remove this ambiguity by means of appropriate legislation.

The concept of "specific interventions in the Earth's crust" was introduced by the Mining Act in order to include activities that do not belong in the traditional minerals extraction category but that use underground space or the heat of the Earth in a similar way. In addition to the use of geothermal energy, that also includes storage of gases and liquids in rock structures (e.g. underground natural gas reservoirs), storage of radioactive waste or permanent storage of CO2. A common feature of these activities is the interference with the geological environment which requires special knowledge and oversight. The Act therefore places the use of geothermal energy at the level of mining activity – geothermal boreholes are considered as mining works and underground spaces created by these interventions as mining areas. Practically, this means that geothermal projects are subject to the state mining administration- they must be permitted by the district mining authorities, supervised by the Main Mining Authority and subject to mining legislation (safety, professional staff, etc.).

The current legislation **does not distinguish the size or purpose of geothermal intervention** – formally speaking, every use of geothermal heat is subject to a mining license. The original intention of the legislator (when amending in 2014) was to regulate mainly *the industrial use of* geothermal energy. The explanatory memorandum at the time referred to installations for the **industrial use of** geothermal energy but the word *"industrial"* was not included in the final text of the law. As a result, the legislation now also affects smaller, non-commercial uses and low-temperature sources used by heat pumps. Moreover, as mentioned above, the District Mining Authority can only issue a license to an entity defined as *an organization,* i.e. an undertaking. An ordinary natural person (e.g. the owner of a single-family house) does not meet this definition and therefore it **is not formally possible for him to allow** mining activity – a special intervention in the Earth's crust for the use of geothermal heat. This situation creates uncertainty: small **domestic heat pumps** with geothermal wells (so-called vertical *ground wells* for heat pumps) technically fall under the definition of specific interventions but their owners are generally unaware of the obligation to hold a mining license. In practice, such shallow boreholes (up to 100-150 m) are often only allowed under the Water Act or the Construction Code as wells or heat sources for a heat pump. However, mining legislation

[115] The District Mining Authority should decide on the application within 2 months of the application submission or completion (Section 17(4) of the Mining Activity Act).

contains a provision which lists such wells among the activities carried out in a mining method – in particular, **the machine drilling of wells with the length of more than 30 m** falls under the scope of the Mining Activity Act. This requires at least a notification of the district mining authority of these wells and their realization by a professionally qualified person.[116]

The unclear boundary between small (local) and large (industrial) use of geothermal energy is therefore a problem in the legislation. This shortcoming is also noted in the evaluation report of[117] the Ministry of Economy – an issue that is not sufficiently defined in legislation.

The inclusion of geothermal energy, obtained through geothermal waters, within the scope of the Mining Act as a form of special intervention in the Earth's crust is also a consequence of the unclear distinction of terms in the Geological Act. It uses the term *geothermal energy* in a broad sense – like all the thermal energy of the earth's body – but the regulation also works with its narrower meaning of so-called "dry rock heat", for example in the definition of hydrogeological survey, without making an explicit distinction. That results in ambiguity where energy obtained from the so-called dry rock heat (i.e. without pumping geothermal water) is often used interchangeably with geothermal water.

The introduction of geothermal energy in Section 34 of the Mining Act with the amendment of the Geological Act and other regulations[118] in 2013 was based on the need to restore the state oversight over the use of geothermal heat which was abolished in 2002. However, the reasoning in the explanatory memorandum was only partially accurate – the oversight continued to exist for waters but not for "dry rock heat". Geothermal water as well as ordinary water used by heat pumps for heating and cooling have been subject to the Water Act and State Water Administration similarly to all groundwater so they are currently subject to double state oversight.

However, from a technical point of view, it is questionable whether this form of geothermal energy should be regulated by mining administration and considered to be a mining activity. It is a renewable energy source and therefore it is not fully analogical with mineral extraction. The legislative categorization as "mineral wealth" therefore does not correspond with the actual physical and geological characteristics.

This results in unnecessary legislative requirements and barriers – for example, the designation of a protected area for special intervention in the Earth's crust with the same content as a protected deposit area or the application of rules designed for mining that are not adequate. Therefore, it would also be appropriate to amend the Geological Act to include a clear distinction between different forms of geothermal energy (especially water energy and dry rock energy) which would also eliminate legal ambiguities and duplicate or inappropriate oversight.

In conclusion, the current legislation treats the concept of geothermal energy inconsistently and, with the exception of "dry rock heat", there is no justification, either from energy or geological point of view, for treating the use of geothermal energy as a mining activity or a mineral resource. It is a renewable and sustainable resource that requires a separate legal category and an adequate regime of state oversight.

There are several approaches to precisely define geothermal projects that fall under the category of special intervention in the Earth's crust.

The simplest approach seems to be to revert to the legal situation prior to the 2013 amendment and thus to delete the rule that the establishment of geothermal resources is a specific intervention in the Earth's crust. Drilling wells above 30 m would remain within the scope of mining legislation as an activity carried out in a mining manner (Section 3(h) of the Mining Activity Act).

However, one option is to supplement the Mining Act with a definition that would provide that a specific intervention in the Earth's crust is the use of geothermal energy for business or industrial purposes, excluding the use of geothermal water or the thermal potential of ordinary water, or if the project exceeds the specified limits of output or drilling depth. Such an approach would exempt smaller installations intended for domestic

[116] Guideline of the Main Mining Office No. 484-1033/2022-I. of 7 July 2022 concerning the use of geothermal energy.
[117] https://www.economy.gov.sk/uploads/files/iUGlVknz.pdf#:~:text=predpis%20bol%20prijat%C3%BD%20pred%201,anal%C3%BDza%20vplyvov%20na%20podnikate%C4%BEsk%C3%A9%20prostredie
[118] Act No. 311/2013 Coll. amending Act No. 569/2007 Coll. on geological works (Geological Act) as amended

consumption from mining regulation but could also lead to confusion in the interpretation of industrial activities and may not provide the required simplification of processes, in particular for shallow wells.

Other differential criteria are not recommended – the current inconsistency of concepts, where different regulations (mining, water, EIA) use different criteria for classifying geothermal resources, makes it difficult to navigate in the legislation.

In this sense, geothermal energy installations for the purposes of the Mining Act would then be understood as geothermal resources using the heat of a rock environment without naturally occurring geothermal water (the so-called heat of dry rocks), including related technological installations, particularly the fitting-out of wells, wellheads, pipelines and heat exchangers. Mining legislation would only cover other geothermal sources without hydrogeothermal sources. Mining legislation in this variant would only address geothermal resources that do not use geothermal water naturally occurring in the rock environment.

We are aware that this would deprive hydrogeothermal resources of protection in the form of a protected area due to special intervention in the Earth's crust (see interpretation below). However, this shortcoming could be solved by amending the Water Act by extending the protection zone of the water structure to the entire geothermal source in order to protect this source, its thermal potential, its permanent and long-term yield, etc., by analogy with the protection zones of water sources (see more in Chapter 2.5.3).

2.4.3. The issue of protected areas for special intervention in the Earth's crust

As mentioned above, the provision of Section 34(1)(d) of the Mining Act classifies the use of geothermal energy as "a specific intervention in the Earth's crust." At the same time, Section 34(3) of that Act provides that the provisions of Sections 16, 17, 18, 19 and other paragraphs of the Mining Act should be applied, *mutatis mutandis*, to those interventions (including geological surveys). Those are provisions that otherwise regulate protected deposit areas – an institute for protection of exclusive mineral deposits, making future extraction from those areas impossible or more difficult. In practice, geothermal resources (as a special intervention) also require the designation of a "protected area" analogous to a protected deposit area and the application of certain restrictions there.

Section 34(3) of the Mining Act refers to the *appropriate* use of Sections 18 and 19 (and related Sections 16 and 17) for geothermal energy but without a more detailed methodology or explicit regime for the protection of geothermal resources directly in the Act. This raises questions as to the legality and constitutional consistency of the legislation thus conceived, in particular in the light of the principles of legal certainty and foreseeability of the law.

The key issues at stake are:

- Lack of explicit provision – Section 34(3) of the Mining Act only refers in general terms to the appropriate use of mineral deposit institutes, without specifying the procedure for geothermal resources (no specific methodology for the designation of a protected area for geothermal energy);
- Unclear scope of protection and restrictions – neither the law nor the sub-statutory regulations determine the size or boundaries of the protected area for geothermal resources or the exact content of the restrictions, it is not clear what interventions are to be prohibited or restricted (except by analogy with non-mining constructions);
- The principle of legality – Section 13(1)(a) of the Slovak Constitution requires that obligations and restrictions be imposed on the basis of law and with sufficient certainty. The question is whether the power of attorney thus formulated in general terms (Section 34(3)) satisfies that requirement or whether it is an excessively general rule of law capable of being challenged for breach of the requirements of legal certainty and foreseeability.

The purpose of the protected area institute is to protect the exclusive mineral deposits from activities that could make their future extraction more difficult or impossible. In the protected bearing area there is a fundamental restriction pursuant to Section 18(1) of the Mining Act: "In order to protect mineral resources, constructions and installations not connected with the extraction of an exclusive deposit may not be erected in the protected deposit area unless a binding opinion has been issued in accordance with the Act." In other words, an owner or investor

may not freely build in such an area (e.g. buildings, utility lines) without the consent of the mining authorities. Only in exceptional cases of public interest can another structure be located, even in such a way as to interfere as little as possible with the exploitation of mineral resources; complete disabling of the extraction of key raw materials is only possible in extremely justified cases[119]. The following Section 19 governs the process of permitting buildings in a protected area – in proceedings on a building intention, the district mining authority acts as the authority concerned, issuing a binding opinion. The protected deposit area is therefore an administratively delimited zone around the deposit, also entered in the Land Registry[120], in which certain activities (in particular non-mining construction) are limited to the protection of future mineral extraction.

In practice, the Main Mining Office[121] orders that for special interventions in the Earth's crust pursuant to Section 34(3) with reference to Sections 16 and 17 of the Mining Act, it is necessary to proceed as if a protected area was involved. That means that the district mining authority designates by decision a protected area for the use of geothermal energy, at the request of an organization (investor) or municipality, after an opinion of the nature protection authority has been issued and on the basis of a binding opinion of the building office. Such a designated "geothermal energy protected area" is registered like a mineral deposit protected area and it should prevent collisions of other activities with the intended use of the geothermal resource.

However, it is important to note that the Act does not explicitly regulate the content or name of this institute – term "protected area for special interventions in the Earth's crust" is not defined in any provision, it only arose in application from Section 34(3) of the Mining Act. It is de facto analogous to a protected deposit area, only applied to a geothermal reservoir instead of a mineral deposit. Under this regime, the same restrictions – in particular the prohibition of structures without a permission under Section 18 of the Mining Act – should therefore apply to a given geothermal resource area.

The first problem is that the legislature chose the wording *"proportionately subject to the provisions ..."* (Section 34(3) of the Mining Act) without adding any specific rules for geothermal resources. In other words, there is no explicit methodology or implementing regulation (on the basis of a statutory authorization) that would regulate the procedure of protected area designating for geothermal energy and its regime. For exclusive mineral deposits, there is Implementing Decree of the Slovak Mining Office No. 79/1988 Coll. on protected reservoir areas and mining areas determining the elements of the proposal for a protected reservoir area, elements of the decision on the protected reservoir area and other details, while Section 8 of the said Decree states only sternly that designation, amendment, cancellation and registration of a protected area for special interventions in the Earth's crust are covered by the provisions regulating a protected reservoir area. However, this is inherently difficult to implement – the provisions of the original decree did not regulate geothermal energy.

As a consequence, administrative practice should interpret what is meant by "appropriate" application of Sections 16 to 19 of the Mining Act. In 2022, the Main Mining Authority issued the above-mentioned internal guidance indicating the procedure (organization proposal, authorities' comments, etc.) but the guidance is not a legally binding regulation. Rather, it is an interpretative aid that fills the gaps in the law. From the point of view of the principle of legality, however, it is problematic if the issues of principle are not determined by law or regulation but only by internal instructions.

For example, Section 16(3) of the Mining Act links the designation of a protected deposit area to the moment after the issue of the exclusive deposit certificate. However, in the case of a geothermal source, the term "certificate of deposit" does not make sense (geothermal energy is not a mineral deposit). There is no equivalent – whether the final report of the geological survey approved by the Ministry of Environment or a hydrogeological assessment is to be the basis.

A second set of problems is the lack of clear criteria on how large and what protected area is to be designated for a geothermal resource, and what specific constraints apply.

For mineral deposits, the protected area is typically determined by the extension of the deposit and the necessary safety circuit around it (so that future extraction is not blocked by construction works). For example, for an oil or

[119] Section 18(2) of the Mining Act
[120] Section 17(5) of the Mining Act
[121] Guideline of the Main Mining Office No. 484-1033/2022-I. of 7 July 2022 concerning the use of geothermal energy

gas deposit, it may include an area above the deposit plus a certain horizontal distance. There is no such thing as geothermal energy. Geothermal reservoirs can be of a different nature – they are often large thermal water aquifers in rocky environments, with no clear sharp boundaries. Determining the "borders" of such a resource is a technical question to which the law does not provide an answer. Is only the immediate surroundings of the well (e.g. a few hundred square meters) or the entire reservoir area (which may be tens of km2) to be protected? The first would rather protect the technical infrastructure of the well, the second would protect the heat/water source. The Act does not provide for any "lead" in this respect which means that the Mining Authority must decide with a wide margin of discretion. Different district mining authorities may thus proceed differently which undermines the predictability of the law – similar geothermal projects may receive different "protection zones". This is contrary to the requirement that the *same cases be treated in the same way* (the principle of material equality).

As regards the content of the restrictions, Article 18 of the Mining Act refers only to non-mining constructions and installations. In the context of geothermal energy, the word "mining" may refer to the operation of a well and the consumption of heat. Thus, restrictions in the protected area of a geothermal resource are likely to consist mainly in limiting construction activity that could hinder the later implementation of a geothermal project (e.g. construction of buildings that would make drilling impossible, put barriers in the flow of thermal water, etc.). However, the law says nothing about other potential impacts – for example, regulating other wells nearby. Can another entity drill a competitive geothermal well nearby? Will it be banned in a protected area? Again, this is a systemic uncertainty that stems from the lack of specific regulation – the law simply does not anticipate all relevant situations for geothermal resources.

Section 34(3) thus constitutes a very general blanket reference which places the centre of gravity of the adjustment on an analogy with another situation (a mineral deposit). Such a legislative style without details gives rise to uncertainty as to whether it is at all a sufficient legal basis to restrict property and other rights in the territory concerned.

In practice, there was[122] a case where the investor proposed a radius of 5 km around a geothermal well as a protection zone necessary to maintain the yield of the resource. In the absence of a special scheme for a geothermal protected area, he tried to achieve this under the rules of Water Act by applying for a protection zone for a water structure (bore). However, the Regional Environment Office in Prešov rejected that request on the ground that the institute of the water structure protection zone under Section 55 of the Water Act serves only for the immediate protection of the water structure (bore), not for the protection of the yield of geothermal waters in the territory. Similarly, the courts have confirmed that such a purpose is not known to the Water Act and quantitative protection of geothermal waters cannot be ensured in this way.

From the point of view of constitutional law, the current regulation raises doubts, in particular in relation to Article 13(1)(a) of the Slovak Constitution. That provision states that "obligations may be imposed by or on the basis of law, within the limits thereof and with due regard for fundamental rights and freedoms". The requirement is therefore that restrictions on rights (e.g. property rights of landowners in a protected area) have a sufficient basis directly in law and are formulated with reasonable certainty.

In the case of Section 34(3) of the Mining Act, it may be argued that the imposition of obligations is "by law" but not specific enough. The law refers only to the *proportionate* use of other provisions and does not explicitly state what exactly the entities concerned must or must not do. The addressees of the legal rule (e.g. landowners, investors, municipalities) learn only from a combination of several provisions and their interpretation, for example that the district mining authority may prohibit them from building in a given area without its consent and without clear criteria in the law, only on the basis of an "appropriate" assessment of the situation, a breach of the obligation (e.g. construction without consent) may be penalized, even though the entity concerned may not even have known that it was located in some "protected geothermal area". The principle of legal certainty which is part of the concept of material rule of law under Article 1(1) of the Slovak Constitution, requires clarity and predictability of laws. The addressee of the standard should be able to *foresee the consequences* of his actions and know the scope of his obligations. In our case, however, it is necessary to make a rather complex legal assessment so that, for

[122] Resolution of the Constitutional Court of the Slovak Republic, ref. II. ÚS 193/2013-14 of 19.3.2013.

example, the owner of the land understands that its land (if it lies above the geothermal reservoir) may one day be limited in construction use on the basis of mining legislation.

Moreover, the inconsistency of Section 34(3) of the Mining Act may lead to inconsistent application, contrary to the requirement of equal treatment of similar cases. From the point of view of the right to property (Article 20 of the Constitution of the Slovak Republic), a restriction on the disposal of land in favour of the protection of mineral wealth may be legitimate but it must be *proportionate and in accordance with the law*. If the law does not sufficiently specify the conditions and scope of the restriction, there is a risk that the interference with the right to property will not be "provided for by law" in the material sense.

In principle, it is agreed that it would be appropriate to clarify the legislation. For example, to introduce a specific category of "geothermal resource protected area" with a definition, to at least frame the criteria for determining its boundaries (e.g. based on the results of geological surveys and a forecast of the use of heat or water) and to explicitly define restrictions (prohibitions of activities) in such an area.

It is also questionable whether the current arrangement of the protected area for special intervention in the Earth's crust at all fulfills the State's interest in developing the use of geothermal energy. If a geological structure has a greater potential than that confirmed by a single well, it may not be in the interest of the state or other investors to block the entire territory for various activities and for the further use of geothermal energy which is the case to an unclear extent when designating a protected area.

2.5. Water management structures permitting

The moment the investor wants to start using the geothermal resource (i.e. permanently abstracting geothermal water and using its energy to produce heat (and possibly electricity), the water structure legislation enters into the permitting processes. While the Geological Act regulates (with simplification) where and how a resource can be found and verified, the Water Act regulates under what conditions it can be drawn and used from the perspective of water protection. From the practical point of view, a geothermal borehole from the survey "transitions" to the regime of the Water Act. The fundamental difference is that the permit under the Geological Act is exploratory (temporary), permitting drilling and data obtaining but not permanent use of water. Conversely, a permit under the Water Act is an exploitation (operational) permit that permits extraction and use of water (energy) for a specified period. **A geological borehole** thereby becomes **a water structure that allows special water use or other handling.**

A structure allowing for the use of thermal potential of surface water or groundwater[123] is also separately defined as a water structure while in the context of the definition of thermal potential[124], we speak about heat pumps.[125]

2.5.1. Permit for special water use

Geothermal resources – that is, groundwater used for its thermal potential – are subject to a specific water use regime under the Water Act. That means that the extraction of geothermal water, the discharge (re-injection) of used water into ground waters but also the discharge of used geothermal water into surface streams, requires a permit from a state water authority (district authority, environmental care department).[125] However, with effect from October 2024, the obligation to hold a permit from a State water authority for the specific use of water has been extended for groundwater to the use of its thermal potential without direct extraction, that is to say for the purpose of operating heat pumps. The explanatory memorandum to the amendment to the[126] Water Act states only without further ado that this is due to an increase in the effectiveness of water protection.

[123] For the use of geothermal energy through heat pumps, Guideline No. 2/2020 of the Director-General of the Water Section of the Ministry of the Environment of the Slovak Republic on heat pumps and the competence of State water authorities of 8 January 2020 was issued.
[124] The thermal potential is "the ability of water to provide thermal energy **for use by heat pumps** and is part of the water" (Section 2(ba) of the Water Act).
[125] Section 21(1)(b) and (c) of the Water Act
[126] Act No. 277/2024 amending Act No. 364/2004 Coll. on water and amending Slovak National Council Act No. 372/1990 Coll. on infringements, as amended (Water Act), as amended.

The extraction of groundwater and its discharge into surface waters or into groundwater during a hydrogeological survey with an expected duration of the pumping test of more than five days should also be subject to a permit for specific water use[127].

A permit for the special use of water which may be carried out only with the use of a water structure, must be issued before the decision on the construction project is issued or simultaneously with it in a joint procedure, unless it is an existing water structure or a permitted water structure. The State Water Authority should determine the purpose, scope, time of authorization of special water use, obligations and conditions under which it is issued.[128]

Other legislative amendments introduced a specific period of validity of the special water use permit for the exploitation of their heat potential, i.e. for heat pumps, of 10 years. Other validity periods have not changed with the last legislative amendment and the disproportion remains in the validity periods of the permit only for groundwater extraction (10 years) and for underground discharges (which includes geothermal water reinjection) which is limited by law to a maximum of 6 years.[129] The Mining Authority recommends issuing a permit for the extraction of groundwater and a permit for the discharge of waste water in a uniform manner, i.e. for six years.[130]

The legal limitation of geothermal water discharges into the underground to a maximum of 6 years brings uncertainty for investors. Geothermal projects are long-term (well lifetime 20-30 years) but must regularly renew the operating permit. Although the extension of the permit after 6 years is customary, it is not automatic – it depends on the fulfilment of conditions and the approval of the administrative authority. This increases the investment risk. Moreover, the reason for the 6-year limit is the categorization of cooled water as waste[131] which does not fully correspond to the reality of a closed loop in geothermal systems. Rather, it is a formal loophole in terminology: the Act does not distinguish between polluted waste water and clean geothermal water with a lower temperature. A possible solution is to remove reinjected geothermal water from the waste water regime if it is returned to the original aquifer. A clear definition would allow the maximum duration of a re-injection permit to be extended (e.g. to 10 years as for other waters), while maintaining strict monitoring conditions.

When permitting extraction, the State water administration authority relies on the data of the final report approved under the Geological Act.[132] This report serves as a regulatory basis – it determines the maximum amount of extraction on the basis of a hydrodynamic test so that the sustainable yield of the source is not exceeded.

When permitting groundwater extraction, if this extraction from a single extraction point does not exceed 15,000 m3 per year or 1,250 m3 per month, or when permitting the specific use of water for heat pumps, the national water authority should be bound by the results of a previous survey aimed at:

a) examination and evaluation of the hydrogeological conditions of the area concerned,
b) assessment of the self-cleaning abilities of the soil and rock environment of the site in the specific area;
c) examining and evaluating possible risks of pollution and deterioration of groundwater quality.[133]

Both groundwater extraction and discharge are subject to a charge if their amount exceeds 15,000 m3 per calendar year or 1,250 m3 per month.[134] The rate of the fee for groundwater extraction[135] is set by Slovak Government Regulation No. 755/2004 laying down the amount of unregulated payments, fees and details related to charging for water use.

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[127] Section 21(1)(g) of the Water Act
[128] Section 21(2) of the Water Act
[129] The State water authority may extend the validity of the permit if the conditions under which the permit was issued are not changed. (Section 21(5) of the Water Act)
[130] Guideline of the Main Mining Office No. 484-1033/2022-I. of 7 July 2022 concerning the use of geothermal energy.
[131] Section 2(j) of the Water Act: "Wastewater means water used in residential, manufacturing, agricultural, medical and other facilities and installations or in means of transportation **if the water quality (composition or temperature) is altered after use,** as well as leachate from landfills and tailings ponds; wastewater can be sewage, industrial and municipal; water discharged from farms, ponds and reservoirs especially suitable for fish farming shall not be considered as used water."
[132] Section 21(7)(b) of the Water Act
[133] Section 37(1) of the Water Act
[134] Section 79(2) of the Water Act
[135] By way of illustration, the rate of the charge for extraction of geothermal water and the extraction of other groundwater for energy use is currently EUR 0.0266/m^3.

2.5.2. Permit for water works - water permit

The water procedure is an integrated building and water permit. Required for the construction of a water structure, its modification, change in use, cancellation or removal of a water structure. A building permit[136] may be issued only if a special water use permit is issued if it is required under this Act.[137] The implementation of a simple water facility[138] does not require a decision on the construction plan or a notification to the state water authority.

The district office or district office in the given region[139] as a special building office conducts proceedings under the Water Act, the Administrative Code and also under the Construction Code. If the water structure is part of a set of buildings and another building office is competent for the main construction project proceedings, the State water administration authority should have the status of an affected authority in such proceedings and the building office competent for the main construction project proceedings should act on the water structure project; this also applies in the case of buildings and building modifications for which a notification under the Construction Code is sufficient. The authority of the state water administration which is competent for the procedure on the construction plan of the water structure, will also carry out the approval of the water structure. The State water authority is not a planning authority and does not act in expropriation cases.[140]

After the approval of the water structure, the permit holder can fully operate the geothermal resource within the specified limits.

2.5.3. Particularities of permitting geothermal resources as water structures

Protection of geothermal water resources

As also pointed out by the Ministry of Environment[141], the Water Act does not recognize **the institute of a protection zone** for geothermal waters. This is different from drinking water sources, where protection zones prevent their misuse or endangerment.

For geothermal wells, water authorities partially substitute protection by taking into account already approved quantities when permitting further extractions in the surrounding area (final survey reports serve as "regulatory sheets" for new permits)[142]. Nevertheless, there is a lack of a formal mechanism to recognize a significant geothermal resource as protected – another entity can theoretically open another well nearby (although it must undergo an assessment but there is no clear zoning of the resource). This shortcoming may lead to conflicts between multiple users of a single reservoir.

The solution could be a modification of the provision of Section 55(2) of the Water Act which, in its current version, allows the State water authority, at the request of the owner of the water structure, to determine **a protection zone of the water structure** and, according to its nature, to prohibit or restrict the construction of certain buildings or activities in it. The modification of the legislation should consist in extending the possibility of establishing a protection zone not only for water structures but for the overall protection of the geothermal source as such in order to protect this source, its thermal potential, its permanent and long-term yield, etc. Details in relation to the

[136] The permission of the state water administration authority for the construction or modification of the water structure is also a decision on the construction plan under the Construction Code .
[137] Section 26(1) of the Water Act.
[138] Simple water facilities for groundwater extraction are domestic wells, from which groundwater is drawn manually and spring sinks with a spring yield of less than 10 l/min and portable containers. (Section 18(3) of the Water Act)
[139] Pursuant to Section 60(1) of the Water Act, the district office in the given region decides in administrative proceedings at first instance as a special building office in the case of:
a) a water structure and associated water management which extends over or affects the territory of two or more districts,
b) water structure and associated special use of geothermal waters,
c) a water structure with an energy installation with an installed capacity of more than 100 kW and the associated specific water use.
[140] Section 26(3) of the Water Act
[141] Guideline No. IX/3/2020 of the Director-General of the Water Section of the Ministry of the Environment of the Slovak Republic on geothermal waters and the competence of state water authorities of 20 May 2020.
[142] Section 21(7)(b) of the Water Act

criteria for the establishment of the territory and prohibited activities can be determined in the implementing rules, for example also following the example of the protection of water resources[143].

In this way, protection should be ensured for an essential part of geothermal resources, as most of them are geothermal water resources.

At the same time, an installation producing heat and possibly electricity using geothermal energy is also partially protected by energy regulations. In[144] both electricity and thermal energy, protection zones[145] are designated for such installations but they also represent, in principle, only a space in the immediate vicinity of the installations which is intended to ensure its reliable and smooth operation and to ensure the protection of life, health of people and property.

Ambiguities in the procedure for the use of geothermal resources by natural persons

Section 34 of the Mining Act included the use of geothermal energy among *the special interventions in the Earth's crust*, i.e. under the mining regime. This has given rise to a duplication of rules – under the Mining Act it is a mining activity which should require a permit from the district mining authority, although under the Water Act it is "only" water extraction. This parallel competence has not been clearly resolved for a long time. Only recently issued guidelines[146] have clarified that **smaller geothermal applications** (e.g. individual wells for domestic heating) **are not subject to mining activity** or exploration obligations[147]. For major projects, however, mining legislation formally remains in force. This constitutes a legislative gap – there is no specific law or paragraph for geothermal projects that would clearly identify obligations and eliminate unnecessary double proceedings.

In addition, the Geological Act itself contains ambiguities in the regulation which provides in Section 4(2) that: "Carrying out of geological works by citizens in order to satisfy their personal interests should not be subject to this Act."

It is not clear what the legislature meant by this provision, since any geological work is subject to exploration obligations under the Geological Act and geological works are involved. In simple terms, each well is a geological work drilled as part of geological works. Geological law has no exception.

The explanatory memorandum to the Geological Act states that "geological works carried out as a personal interest, e.g. the processing of geological maps of a particular site, taking of rock samples for personal collections, detection and provision of geological data and taking of samples for the purpose of obtaining professional qualifications (final, diploma and scientific works) and publishing activities are not subject to the Act."

This provision seems to be for the benefit of citizens but the problem is the lack of clarity of the concept of "personal interests". The law does not define the exact boundaries of what is meant by it. In practice, therefore, it is not entirely clear who can all rely on personal interest, or when the activity already goes beyond personal need. This lack of definition creates **ambiguities of interpretation**.

Under Section 4(1) of the Geological Act, geological works may be carried out by a contractor of geological works, namely (a) a natural person - an entrepreneur and a legal person who has a geological permit, (b) the State Geological Institute of Dionýz Štúr established by the Ministry of Environment of the Slovak Republic for the performance of the State Geological Service, (c) the Slovak Academy of Sciences, universities, secondary vocational schools, museums and an organization established by the Ministry for the management of caves, if they carry out geological works in the performance of their scientific tasks, research tasks or pedagogical tasks, (d) a natural

[143] Section 32 of the Water Act
[144] Section 43 of the Energy Act
[145] Section 36 of the Thermal Energy Act
[146] Guideline of the Main Mining Office No. 484-1033/2022-I. of 7 July 2022 on the use of geothermal energy, Guideline of the Director-General of the Water Section of the Ministry of the Environment of the Slovak Republic No. IX/3/2020 on geothermal waters and the competence of state water authorities of 20 May 2020.
[147] *'... in the case of the establishment, operation, provision and disposal of facilities for the use of geothermal energy by natural persons to meet their personal needs, e.g. for heating their own property or adjacent economic objects, etc., this use of geothermal energy will not be considered as special interventions in the earth's crust pursuant to the Mining Act and Act No. 51/1988 Coll. and therefore as a mining activity.'* (see Guideline of the Main Mining Office No. 484-1033/2022-I. of 7 July 2022 on the use of geothermal energy)

person- an entrepreneur and a legal person in the extraction of deposits of reserved minerals pursuant to the Mining Act.

The courts of the Slovak Republic have not yet had many opportunities to comment on the subject but the decision of the Trenčín Regional Court under ref. 8Co/31/2023. It states the following:

"26. *According to the commentary on Section 4(2) of the Geological Act of the authors JUDr. Boris Balog PhD. and JUDr. Rastislav Kašák PhD., the interest of the state is not necessarily to regulate all the activity associated with the intervention in the land, therefore, if someone takes, for example, rock samples for their collection, or in the framework of their scientific activity and publication activity or in the framework of their study, the Geological Act does not apply to such an activity, and no geological permit or professional competence is required for it. The Geological Act uses the term "citizen" but one could say that it is a natural person as such, and this possibility is not associated with nationality. Except in this case when geological works are carried out, there should be a requirement that they be carried out only by persons who have the necessary professional competence.*

27. In the case before the court, it was established by means of evidence that the defendant did not drill in the course of its scientific, publication or study activities, or for the purpose of taking a soil sample, rocks for its collection, that is to say, in the course of its interest activity but for the purpose of preliminary general geological exploration on the ground that his son intended to build a house on the land in question (the defendant's statement at the hearing on 14 December 2022). Contrary to the view taken by the court of first instance, the appellate court concluded from that uncontested factual situation that Section 4(2) of the Geological Act was not applicable to the defendant's conduct which would justify a legal conclusion that the Geological Act should not apply to that conduct. On the other hand, if the defendant intended to carry out a geological survey on its land in connection with the possible planned construction activity of its son, it was required to comply with the provisions of the Geological Code and to carry out the survey only through a qualified and authorized person, in compliance with all the legal procedures and restrictions laid down by that standard and the related legislation. If the defendant did not do so, he (among other things) was exposed to a risk in the event of damage, as was the case in the court proceedings."

The current wording of Section 4(2) of the Geological Act is thus insufficient and unclear. There are no clear limits to what is considered a personal interest and thus problems of interpretation arise in the application of the law to specific situations. This can lead to legal uncertainty for both natural persons and authorities performing inspections and issuing permits. The decision of the Trenčín court shows that this ambiguous interpretation can have real legal consequences, especially in cases where the activity of a natural person is close to a professional geological survey.

2.5.4. Conclusion

Introduction of **a so-called integrated procedure** for geothermal resources that would bring together geological exploration, impact assessment and water permit into a coordinated process could improve the conditions for development of geothermal projects in Slovakia. For example, after the final survey report, a procedure on the permission to use the resource would be initiated automatically, without an unnecessary pause. It would also help **to legislate statutory periods** for individual offices – e.g. to shorten the period for approving the final report by the Ministry of Environment (up to 6 months today).

In this context, we may benefit also from the need to transpose Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources and in particular Articles 15 to 16f thereof which resulted from the latest amendment of the Directive (RED III)[148]. They impose requirements on Member States to ensure that permitting rules for RES plants are proportionate and contribute to the application of primacy of energy efficiency. Pursuant to Article 16f of the Directive, Member States are to ensure, by 21 February 2024, that the planning, construction and operation of renewable energy plants are considered in the permit-granting process as being in the overriding public interest and serving public

[148] The transposition period for most measures already expired on 1 July 2024, for the rest the period is 21 May 2025.

health and safety. Any limitation of this principle to certain areas or technologies can only be implemented by Member States in justified and specific circumstances, of which they must inform the Commission.

Furthermore, Member States are to map the domestic potential and available water areas suitable for the installation of plants for energy generation from RES (by 21 May 2025), adopt, with public participation, one or more plans designating RES acceleration areas for one or more types of RES, including geothermal energy (by 21 February 2026), and lay down in them appropriate rules applicable to the installations that can exclude or at least reduce adverse environmental impacts. Furthermore, the Directive imposes requirements to speed up permitting processes in the designated areas of generation from RES which may include for example shortening of the periods for appeals or excluding their suspensive effect (Article 16(6) of the Directive). Duration of the permit-granting process in RES acceleration areas should not exceed 12 months, and 24 months outside those areas, with a possible addition of 6 months. Member States are also to ensure that the permit-granting process for the installation of heat pumps below 50 MW does not exceed one month. However, in the case of heat pumps for the extraction of geothermal energy, the permit-granting process should not exceed three months.

The above provisions of the Directive enable also the Slovak Republic to adopt integrated legislation that will contribute to the overall acceleration of permitting processes in the area of geothermal projects permitting. For inspiration, reference can be made to the forthcoming Bureaucracy Reduction Act IV in Germany we are going analyze in detail in the next chapter. A suitable means of supporting new geothermal projects may be the creation of a database of geothermal wells and projects (e.g. through the State Geological Institute of Dionýz Štúr) where final survey reports and monitoring results would be publicly available. This would enable new investors to better plan projects based on real data, reducing uncertainty and duplication of survey. Case studies of successful permitted projects (e.g. district heating in Galanta from a geothermal source, geothermal power plant in Ďurkov near Košice, etc.) could serve as a model process, showing what permits were needed and in what order.

Given the complexity of the permitting processes, it is recommended that a single methodology continue to be used by individual permitting authorities – for example, to update and extend the current methodological guidelines in the field of geothermal water. It is also important to retrain the relevant administration and their staff, as geothermal projects are relatively rare and officials do not have a routine in such procedures.

To conclude, although the current legislation of the Slovak Republic allows the use of geothermal resources, the application of it in practice is rather complex. The combination of Geological, Water and Mining Act requires patience and knowledge from investors. Implementation of the above measures – in particular by defining more clearly the rules for geothermal water within the water legislation framework and by removing duplications – would make the permitting process more efficient. This would ultimately contribute to a faster and more transparent development of geothermal projects which is desirable given the potential of that renewable energy source in Slovakia.

2.6. Zone planning and building regulations

On 1 April 2025, the new Construction Code No. 25/2025 entered into force, replacing the previous Act No. 50/1976 on land-use planning and the building code. The aim of this legislative amendment is to simplify and speed up the process of permitting buildings, with the emphasis on the digitalization of procedures.[149]

The first-level approval authority remains the municipality which may or may not create a joint municipal office by associating with other municipalities[150]. The second-tier authority is the regional office which represents the transformed district offices in the seat of the region. The new building law also defines special and other building authorities. Special construction offices are laid down in special regulations for areas such as construction of roads, runways, geological, water and mining works.

[149] As regards industrial undertakings designated by law, the legislation on integrated pollution prevention and control pursuant to Act No. 39/2013 Coll. on integrated pollution prevention and control and on amendment of certain Acts should apply.
[150] Section 15 of the Construction Code

According[151] to the new legislation, construction means a construction structure built by construction works that is firmly connected to the ground or whose installation requires the modification of the substrate.[152] Fixed connection of a building with the ground also means placement under the ground. The construction includes associated underground spaces, above-ground structures, technical, technological and operational equipment, without which the construction would not be complete and capable of operation, as well as connections if, after construction, they will not be part of the network of technical equipment of the territory.[153]

The Construction Code introduces also the concept of a dedicated building which is a building or an engineering structure that is technologically demanding or unusual in design which places increased demands on the organization and coordination of construction activities and on the necessary technical equipment of the construction contractor in terms of the scope of construction works, technology of construction works and construction products used. The Construction Code in the provision of Section 2(8) provides a list of those dedicated buildings.

The correct categorization of buildings is important for permitting processes. Geothermal resources are civil engineering structures while the basic division of civil engineering structures is regulated by Implementing Decree No. 59/2025 of the Office for Spatial Planning and Construction of the Slovak Republic on the division of structures. In the annex to the building categorization decree, geothermal sources are not explicitly listed in individual categories. However, based on the nature of buildings and equipment related to the use of geothermal energy, they can be divided into the following groups:

Section 23: Engineering structures belonging in technical equipment of the area

Group 233: Other structures and facilities belonging in technical equipment of the area

Class 2331: Structures of energy sources

Examples of use: a separate fossil fuel power plant, nuclear power plant, electricity generation source, thermal plant, photovoltaic power plant, wind power plant, large-capacity battery storage.

In view of the above examples of use, it can be assumed that geothermal power plants could be classified in this class as *electricity generation sources* or *thermal power plants* if they use geothermal energy to generate heat. At the same time, they will also be considered as mining or water structures according to the relevant regulations.

As such, the new legislation introduces significant changes in the building permit process, with the most fundamental novelty being the introduction of a one-stage procedure before the building office.[154] Permitting buildings will be based on a decision on the construction intent which combines elements of the previously used planning permit and building permit. This will be the main and only administrative procedure in which the parties, the authorities concerned and the legal persons concerned, such as administrators, owners or operators of transportation and technical infrastructure may submit proposals, objections and comments.

With regard to the time limit for taking a decision, if there is no need for an oral hearing or a local inspection, the administrative authority must take a decision within 30 days of the date on which the application is complete. In other cases, this period should be extended to 60 days. For dedicated or lined constructions, projects with a large number of parties or cases requiring a professional opinion, the time limit is extended up to 90 days, stopping at a time when the administrative authority does not have at its disposal a professional opinion or the result of state expertise.

The decision on the construction plan will be followed by a verification of the construction project which will be analogous to the building permit and will allow the start of construction works. However, this step will not be governed by the Administrative Procedure Code – the verification will be carried out by means of a verification

[151] Constructions are divided into buildings and civil engineering structures according to the construction and technical design.
[152] Section 2(1) of the Construction Code
[153] Section 2(2) of the Construction Code
[154] An important role in the whole process will be played by the designer, who will become the procedural representative of the builder. He/she will be responsible for discussing the construction project with the authorities and persons concerned, whose opinion will be deemed to be in agreement if they do not express their views within the set time limit – usually within 30 days. The designer will also ensure all stages of project documentation, obtaining the necessary opinions and addressing comments.

clause based on the compliance clauses submitted by the designer from the authorities and legal persons concerned, if they have reserved this right. The period for verifying the construction project will be 30 days.

A means of speeding up the permit-granting process provided for in the Construction Code is a procedure whereby a construction intent is integrated with a construction intent pursuant to Section 20(2)(b). Under this regime, the building authority is entitled to carry out the verification of the construction intent at the same time as the decision on the construction intent is issued which eliminates the duplication of administrative procedures and significantly reduces the length of the procedure[155].

The final stage remains the final approval which will continue to be a necessary condition for putting the building into permanent use. After completion of the construction, an inspection will be carried out and if no deficiencies are found, the building office will issue an approval certificate within 15 days.

Since implementing regulations for the new Construction Code have not been issued yet, many details and procedures related to permitting facilities including those of geothermal resources are currently not precisely defined. Those regulations are expected to be gradually developed and published, allowing for better understanding and application of the law in practice.

2.7. Energy regulations

2.7.1. Certificate for the construction of power equipment

If construction of installation for **generation**, connection, transmission, distribution or supply of electricity is planned, it is always necessary to verify in the beginning whether a certificate from the Ministry of Economy of the Slovak Republic is needed for the installation construction. We therefore provide the conditions under which issuance of the certificate is a prerequisite to any other permitting process.

The certificate of compliance of the investment plan with the Slovak energy policy, the update of which is part of the 2021-2030 Integrated National Energy and Climate Plan (hereinafter referred to as the **certificate**), for the construction of an electricity installation is issued pursuant to Section 12 of the Energy Act[156].

Construction of an energy installation for electricity generation must be preceded by the issue of certificate for the construction of an energy installation in accordance with Section 12 of the Energy Act, **save for electricity generation installations with a total installed capacity of up to 1 MW (inclusive) that use another primary source of energy such as solar energy or wind energy**[157].

The Ministry of Economy of the Slovak Republic should decide on the issue of the certificate on the basis of:

a) mandatory elements of the application, laid down by law,
b) the objectives set out in the documents approved by the Government of the Slovak Republic (Energy Policy of the Slovak Republic); and
c) the payment of an administrative fee of EUR 1,000 for each even started 10 MW of installed capacity of the installation.

A written application for the certificate for construction of an electricity installation should be submitted to the Ministry of Economy of the Slovak Republic, the mandatory elements of the application of the application are laid down in Section 12(4) of the Energy Act.[158] The following should be enclosed with the application:

[155] Section 65(2) of the Construction Code.
[156] The specification of energy installations to which the issue of a certificate applies or does not apply is defined in Section 12(1) and (2) of the Energy Act, respectively.
[157] The installed capacity of such a power plant may be increased beyond 1 MW only on the basis of a certificate for the construction of the power plant.
[158] An application for a certificate for a electricity generating installation should include:
a) Identification data of the applicant: business name, identification number, legal form, registered office, first and last name and date of birth of the members of the statutory body,
b) an investment plan that includes:
1. the characteristics of the electricity generating installation,
2. data on the location of the electricity generating installation;

a) a statement issued the regional distribution system operator on (i) the location of the electricity generating installation, (ii) the expected impact of the electricity generating installation on the distribution system from the perspective of safety and reliability, and (iii) how the electricity generating installation is connected to the network;
b) statement of the SEPS on[159] (i) the location of the electricity generating installation, (ii) the expected impact of the electricity generating installation on the SEPS' transmission system in terms of safety and reliability, and (iii) how the electricity generating installation is connected to the network;
c) the municipality's opinion on the conformity of the investment plan with the municipality's zoning plan.

The Ministry of Economy should issue a construction certificate **within 60 days of the receipt** of a complete application while the said period may be **extended by additional 30 days**. If an application for a construction certificate is rejected, the Ministry of Economy of the Slovak Republic must justify rejection of such an application by objective and non-discriminatory arguments, supported by evidence.

The certificate should be **valid for a limited period of time of three years** of the certificate effective date. In order to know the current preparation status and progress of construction of the electricity installation for which the construction certificate has been issued, the certificate holder should regularly, once a year, inform the Ministry of Economy of the Slovak Republic of the preparation status and progress of construction.[160]

The certificate for electricity generating installation construction **serves several purposes:**

a) it is a document that is submitted in the proceedings on the construction intent, and
b) the submission of it is required by the SEPS or distribution system operator when deciding on an application for installation connection to the system.

c) the anticipated impact of the electricity generating installation on SEPS and PRDS in the defined area in terms of safety and reliability (necessity of expression);
d) data on primary energy sources, including data on the type and quantity of primary energy sources for one year of normal operation;
e) the energy efficiency of the electricity generating installation;
f) the anticipated impact of the electricity generating installation on the protection of public health and the environment (consistency with relevant legislation, in particular the provisions of the EIA Act, is recommended; Act No. 355/2007 Coll. on the protection, promotion and development of health and amending certain acts, with relevant implementing decrees; Decree of the Ministry of Labour, Social Affairs and Family of the Slovak Republic No. 508/2009 Coll., laying down details for ensuring health and safety at work with technical equipment for pressure, lifting, electrical and gas and laying down technical equipment to be considered as dedicated technical equipment; Decree of the Ministry of Health of the Slovak Republic No. 549/2007 Coll. laying down details on permissible values for noise, infrasound and vibration and on requirements for objectification of noise, infrasound and vibration in the environment; Act No. 543/2002 Coll. on nature and landscape protection; Act No. 2/2005 Coll. on the assessment and control of noise in the external environment, amending Act of the National Council of the Slovak Republic No. 272/1994 on the protection of human health, as amended; Act No. 146/2023 Coll. on air protection and amending certain acts; the Water Act; Act No. 119/2010 Coll. on packaging and amending Act No. 223/2001 Coll. on waste and amending certain acts, as amended);
g) financial security of the investment project,
h) the impact of the electricity installation on the security of electricity supply in the defined area, in the case of an installation with a total installed capacity exceeding 5 MW;
i) compliance of the investment plan with the municipality's land-use plan, as demonstrated by the municipality's binding opinion;
j) the method of connection to the system,
k) the expected contribution of the generating capacity of the electricity installation to achieving a specified share of RES in gross final energy consumption, saving emissions or improving the quality of the environment;
l) the economic and technical evaluation of the use of the heat or waste heat produced;
m) the consistency of the investment plan with the comprehensive assessment of the national potential for the application of high-efficiency cogeneration in the case of an electricity installation using geothermal energy;
n) the consistency of the investment plan with the comprehensive assessment of the potential for the use of district heating systems, in the case of an installation that may have an impact on district heating;
o) alternatives to the construction of an electricity generation facility.

[159] The procedure for issuing the opinion of the transmission system operator for the purpose of obtaining the certificate is regulated in Chapter 9 of the SEPS' Operating Rules.

[160] With regard to the potential consideration of a later transfer/assignment of rights and obligations from the decision to issue the certificate to a third/other person than the one to whom it is issued, we consider that the decision in question, as a public-law authorization resulting from an individual administrative Act, is in principle non-transferable. This is mainly due to the absence of any legislation (explicit mention in the Energy Act) that would allow for such a possibility.
"The fact that the administrative act also affects the successors must always be expressly stated in the law" (Hendrych, D. et al.: The right law. The General Count. The 6th edition. Prague: C.H. Beck 2006. p. 197).

In summary, the obligation to have the certificate issued before the commencement of the proceedings on the construction intent applies to geothermal power sources generating electricity **with a total installed capacity above 1 MW.**

The time for decision-making by the administrative body – the Ministry of Economy of the Slovak Republic – should not exceed 60 days in the case of a complete and correct application, or 90 days in the case of the period extension.

2.7.2. Certificate for thermal installation construction

Since the geothermal source will, by its very nature, be either a heat generation facility[161] or a cogeneration facility, the construction of such a facility is preceded, in addition to the permit-granting process in the Energy Act, by the permit-granting process under the Thermal Energy Act.

Under Section 12(1) of the Thermal Energy Act, construction of a system of thermal installations or a part thereof may be carried out only on the basis **of a certificate for construction of a system of thermal installations or part thereof** ("the certificate"), issued by the Ministry of Economy of the Slovak Republic or municipality[162] in accordance with the procedure laid down in Section 12 of the Thermal Energy Act and **in the form of a decision issued in an administrative procedure** (Sections 31(c) and 37 of the Thermal Energy Act).

A system of thermal installations is understood as "installations for generation, distribution or consumption[163] of heat", i.e. interconnected installations (primarily heat sources and pipelines) for generation, distribution as well as consumption of heat. Any construction that is subject to proceedings on the construction intent must therefore be also subject to the certification procedure held by the municipality.

In relation to that, it is necessary to point out that construction of a geothermal source could be exempted from the certification process[164] under Section 12(2) of the Thermal Energy Act only if such a source was a decentralized heat source[165], that is to say a heat source intended for heating, cooling, collective hot water preparation or other use **exclusively for the heat consumption facility** in which the source is located.

The certificate is a document in the proceedings for construction intent, therefore it is impossible to commence proceedings under the Construction Code without it, and it is also a document that should be enclosed with the application for connection of a heat generation facility to the distribution network. The certificate should be issued for the period requested in the application but for **three years** of the date of issue at the maximum.[166]

According to Section 12(6) of the Thermal Energy Act: "When applying for a certificate, the person who has submitted the application **for certificate and the holder of permit for heat distribution in the systems of thermal installations concerned** is party to the proceedings." A municipality that has in its area a supplier of heat from a heat source in a district heating system is therefore obliged to act with the supplier as party to the proceedings for

[161] Under Section 2(c) of the Thermal Energy Act, a heat generator is "an installation that converts various forms of energy into heat or captures waste heat or ambient energy, excluding an installation that captures energy from ventilated air; includes building and technological equipment."

[162] "The Ministry shall issue a certificate for the construction of a heat generator with an installed capacity of more than 10 MW and for the construction of a heat generator to be carried out in the territory of more than one municipality; in the procedure for issuing a certificate, the Ministry assesses the compliance of the application for the issue of a certificate with the energy policy of the Slovak Republic. If the conditions laid down in the first sentence are not met, the municipality shall issue the certificate pursuant to Section 31(c)." (Section 12(3) of the Thermal Energy Act)

[163] Section 2(l) of the Thermal Energy Act.

[164] Section 12(2) of the Thermal Energy Act: "Certificate not required for construction of
a) decentralized heat source using exclusively RES or waste heat;
b) decentralized heat source with an installed capacity of up to 100 kW that also uses energy sources other than RES or waste heat, if the heat consumption facility is not connected to the heat installation system of the heat distribution permit holder providing district heating; installed capacity may be increased above 100 kW only on the basis of a certificate;
c) heat distribution installations that constitute an extension, reconstruction or modernization of an existing heat distribution installation in a part of the delimited area of the heat distribution permit holder or in an area adjacent to the delimited area."

[165] Section 2(v) of the Thermal Energy Act.

[166] The validity of the certificate may be extended for a further period of two years upon written request. A written application for an extension of the duration of the certificate shall be submitted by the holder no later than three months before the expiry of the certificate. If the applicant for a certificate does not complete the construction of the system of thermal installations and does not put it into permanent operation within these time limits, further construction may only take place on the basis of a new certificate.

the certificate issue to the extent of all its rights as party to the proceedings under the Code of Administrative Procedure and other generally binding legal regulations.

Section 12(4) of the Thermal Energy Act provides that the municipality is to decide whether to issue a municipal certificate or not **within 30 days** of the receipt of a complete application and only after having performed an assessment of the aspects referred to in the said Section of the Thermal Energy Act. However, the municipality is obliged to assess whether the intent to construct a network of thermal installations complies in particular with the recommendations and conclusions of the issued concept of municipal development in the area of thermal energy (i.e. whether the concept allows construction of such a source at all).

At present, of individual renewable sources used in district heating systems, those that are the most advantageous for producers in terms of prices of heat generation (e.g. preference of biomass over geothermal sources, if available in the given area) are prioritized. When building new installations for heat generation from RES or after the end of the lifetime of existing installations for heat generation from RES, we should give priority to those types that pollute the air to the minimum extent, taking into account the overall trajectory of the RES sourcing, from transport to its final use, having regard to the principle of ecological sustainability.

This can be achieved by introducing or clarifying the aspects set out in Section 12(4) of the Thermal Energy Act, without the evaluation of which the municipality cannot issue a certificate for construction of a new heat source in such a way that one of the aspects will also be assessment of **the potential of geothermal energy use from the perspective of long-term energy sustainability and reduction of greenhouse gas emissions**. At the same time, a new obligation for district heating system operators would be introduced: **continually monitor and asses the local potential of all renewable energy sources including geothermal sources and include the results in the planning of each reconstruction or modernization of heat sources**. That will ensure that investment decisions in district heating systems will be systematically directed towards the most cost-efficient and forward-looking solutions.

2.7.3. Business license for the generation of electricity and heat

An entity operating a geothermal energy source as a source for heat generation (and/or electricity generation) would be a heat market participant as heat (electricity) generator and supplier, having the rights and obligations arising from the energy legislation, in particular the Energy Act and Thermal Energy Act.

Business in the thermal energy industry may be conducted only on the basis of and in accordance with a licence (Section 5(1) of the Thermal Energy Act). The authority granting such a license is the Regulatory Office for Network Industries[167].

The nature of business in the thermal energy sector is the generation[168] of heat, generation and distribution of heat or distribution[169]of heat. By contrast, the nature of business in the thermal energy sector **is not**, inter alia, the generation of heat, generation and distribution of heat or distribution of heat for other persons at the purchase price of fuel for generation of heat or at the price of the purchased heat.

Already when applying for the license, the operator is required to demonstrate professional competence through a designated responsible representative.[170] The function of responsible representative may only be performed for one license holder. The responsible representative of a legal person **may not** be a member of the supervisory board

[167] A model application for the issue of a permit is laid down in Office Decree No. 212/2005 Coll. laying down a model application for the issue of a permit.

[168] The generation of heat within the meaning of Section 2(a) of the Thermal Energy Act means "physical and chemical processes in heat generators resulting in the generation of heat for heating or for the generation of domestic hot water or for other thermal energy uses."

[169] Heat distribution within the meaning of Section 2(k) of the Thermal Energy Act means "the distribution of heat (transmission of heat by public distribution to the customer) and the supply of heat to the customer (sale of heat for heating, sale of heat for domestic hot water generation, sale of heat in domestic hot water, sale of heat for cooling generation or sale of heat for other uses)."

[170] The responsible representative should be a natural person appointed by the license applicant who is responsible for the professional performance of the permitted activities, in particular for the quality, timely and correct fulfilment of the obligations of the producer and heat supplier, and who has given his written consent to be designated as the responsible representative. The responsible representative must be in an employment or other legal relationship with the applicant for the permit, which regulates his personal responsibility for the professional performance of the permitted activity vis-à-vis the applicant for the permit or the permit holder (Section 3(1) of the Thermal Energy Act).

or other control body of that legal person. The responsible representative must satisfy a presumption of professional competence and a presumption of good repute[171].

For the purposes of the Regulation Act, generators of electricity have the status of so-called *regulated entities*. The Regulation Act considers persons who carry out regulated activities on the basis of a permit (issued pursuant to the relevant provisions of the Energy Act), a certificate of compliance with the notification obligation or a certificate of registration (Section 1(c) of the Regulation Act) as regulated entities. For the purposes of the Regulation Act, generation of electricity regardless of the form of fuel is also a regulated activity (Section 2(c)(1) of the Regulation Act).

An electricity producer is also an entity operating in the energy sector that carries out electricity generation on the basis of a license to operate in the energy sector, or a certificate of compliance with the notification obligation pursuant to Section 6(6) of the Energy Sector Act, in the case of the activity of generation and supply of electricity by installations with a total installed capacity of up to and including 1 MW. The authority granting the license is the Regulatory Office for Network Industries, the license may be issued for one or more activities, for an indefinite period unless the applicant requests otherwise.

As in the case of thermal energy industry, conducting business in the energy industry is not generation and distribution of electricity exclusively for an own consumption and supply of electricity, including electricity transmission, distribution and other services incidental to electricity supply to other persons at purchase prices, including components of the price of electricity transmission, electricity distribution and other services incidental to electricity supply without further increase; that does not apply to electricity supply to end consumers of electricity, connected to the local distribution system (Section 4(2) of the Energy Act).

2.7.4. Connecting the geothermal source to the distribution system

Before and during the actual implementation of the construction of the geothermal resource, mutual cooperation with the distribution system operator is necessary in the implementation of the defined construction which is necessary to ensure the connection of the electricity generating installation to the regional or local distribution system in order to ensure the conditions for future connection and future supply of electricity.

"By means of a contract for connection to the distribution system, the distribution system operator undertakes to ensure the capacity for connection in the system at the contractually agreed level and, once the commercial conditions and technical conditions are met, to connect the applicant's equipment for the generation, storage, distribution or consumption of electricity to distribution system and to ensure the agreed capacity according to the contract, and the applicant undertakes to pay the connection price." (Section 26(3) of the Energy Act).

After completion of the relevant administrative procedures and the construction of the geothermal power plant as an electricity generation facility, the process of connecting the power plant to the distribution system (regional or local) begins. The specific procedure and conditions for the connection of electricity equipment are regulated by the Electricity Market Rules, Sections 5a through 5h.

The system operator needs to provide the reasons of any refusal to enter into a network connection contract. The system operator should inform the applicant for connection to the system of the technical conditions or commercial conditions of connection to the system that have not been met and of the measures to be taken in the operator's system or at the applicant's place in order to grant the application for connection to the system (Section 19(12) of the Energy Act).

[171] For the purposes of the Thermal Energy Act, a person shall be deemed to be of good repute if he or she has not been convicted by a final judgment of an economic offence, a criminal offence against property or another criminal offence the facts of which relate to the object of business under the Thermal Energy Act, or if he or she is deemed not to have been convicted. Proof of good repute shall be furnished by means of an extract from the criminal record.

Once the connection agreement is concluded, it is also necessary to conclude a contract with the distribution system operator for access to the distribution system[172] and distribution of electricity[173] under which the distribution system operator undertakes to enable the market participant to access the system and to transport for the market participant, save for a market participant supplying electricity to the connection point, electricity to the distribution system, the volume of electricity limited by the amount of reserved capacity in the distribution system, including services related with the transmission system use and such an electricity market participant undertakes to pay the price for access and price for the provision of distribution services and related services. The contract for access to the distribution system and distribution of electricity should specify the amount of the reserved capacity.

In relation to that, it is necessary to point also to a bottleneck of the intention that comprises the matter of free capacity for connection to the system that is the responsibility of the operators of the distribution systems concerned (Section 5(9) of the Promotion Act). Upon the construction of a geothermal source of a "commercial" nature instead of a local one,[174] it is necessary to allow for the restrictions imposed by the rules regulating allocation of free capacity for connection to the system to electricity generating installations allocated to SEPS.[175]

[172] Access to the distribution system means "the right of an electricity market participant to use the distribution system to the extent of the contractually agreed distribution capacity and, in the case of a market participant supplying electricity to the connection point, access to the distribution system means the right to supply electricity to the distribution system" (Section 2(a)(12.2) of the Energy Act).
[173] "A local distribution system operator shall conclude with the regional distribution system operator to whose regional distribution system its local distribution system is connected a contract for access to the distribution system and distribution of electricity if, through that local distribution system, electricity is supplied to the regional distribution system by an electricity producer or by a local distribution system operator operating an electricity generation facility." (Section 31(13) of the Energy Act)
[174] Local source means "an installation for generation of electricity from a renewable energy source which produces electricity to cover the consumption of a delivery point identical to the delivery point of that electricity generation facility and whose total installed capacity does not exceed the maximum reserved capacity of such a delivery point" (Section 2(3)(o) of the Promotion Act).
[175] https://installedpower.sepsas.sk/

3. Analysis of national and international experiences and good practices in Germany and Poland, benchmarking against Slovak conditions and identified barriers

3.1. Introduction

3.1.1. Scope of analysis

The analysis focuses on geothermal sources primarily for heat or cold generation, not for direct electricity generation, where significantly higher temperatures (>150 °C) are needed which are available at great depths (4 km or more) only in the Central European context. However, from a regulatory point of view, the purpose (i.e. generation of heat or electricity) of the use of geothermal resources is rather secondary and affects in particular the authorization of above-ground structures (e.g. cooling of turbines, self-consumption of electricity) and their connection to the grid or distribution grids (see also the description of the legal framework in chapters 2.2 and 2.3). The analysis focuses on larger installations (hundreds of kilowatts or megawatts of installed heat generation) dedicated to district heating systems or similar installations using deep wells to extract medium to high temperature heat (i.e. 50-150°C) from greater depths. However, in many cases, a higher level of heat generation can also be achieved through a combination of low-temperature shallow wells (typically 100-300 m) and heat pumps, and therefore the permitting process for these sources has been included.

The analysis also addresses in particular the geothermal resource as such, i.e. in particular the way drilling and associated works are allowed in the country (Poland, Germany) which is a key part of the investment and also the greatest risk that the resource will either not be allowed due to a conflict with another legitimate interest (e.g. protection of groundwater, protection of deposits/reserves, disposal of radioactive waste, etc.) or will be rejected by the local community. The authorization of above-ground technologies is then generally addressed by regulating construction works which do not pose a greater risk in terms of complexity of the authorization than other energy sources (building regulations, environmental protection, etc.). However, in Germany, for example, in the context of accelerating the permitting of geothermal resources, a combined permitting of drilling and construction works is proposed (see draft law on geothermal heat acceleration in Chapter 2.2.2) in order to simplify the whole process.

The analysis focuses on conventional geothermal sources which are the most common means of extracting heat from the ground (note: also at the request of the expert panel). It therefore excludes so-called deeply stimulated sources (hot dry rocks/enhanced geothermal systems) that require additional processes to release and transport energy from rock mass, commonly referred to as hydraulic fracturing. These methods are considered unconventional and require further research and pilot projects prior to their normal use and therefore present a significant risk of failure and loss of investment. However, from a regulatory point of view, this is the same procedure which differs in particular in that the applicant has to submit a plan of incentive works which includes, inter alia, the need for detailed seismic monitoring.

On the other hand, it is necessary to point out that these unconventional sources represent a significant breakthrough for the development of deep high-temperature geothermal energy sources capable of co-generating electricity and heat that will not be as dependent on natural conditions as deep hydrothermal sources are.

The analysis focuses on the area of geothermal energy which includes both deep and shallow resources. The shallow sources (referred to in German as “Oberflächennahe Geothermie”) are wells up to a depth of 400 m, usually closed systems (i.e. liquid/water circulates in pipes/heat exchanger installed inside the well without communicating with the surrounding rock, only heat transfer is allowed) or open systems that use shallow geothermal aquifers, i.e. wells are used to pump hot water from underground to the surface where it is used for heating. Deep geothermal resources (referred to in German as "Tiefe Geothermie") are open systems using boreholes with an open section (or perforated mantle) that allow water to circulate between the well and the aquifer.

3.1.2. Methodology

The aim of the text is not to provide a comprehensive analysis of all the regulations and permits necessary for the implementation of the geothermal project in the two reference countries. The aim of the text is to compare key processes, their complexity and differences so that they can be compared with the situation in Slovakia. For this reason, a methodology has been chosen that uses publicly available domain-relevant sources (e.g. laws, methodologies, recommendations from professional organizations) from which relevant data are extracted and then summarized in the description of the regulatory environment, indicating key standards, legislation and other relevant documents.

An important part of the text is not only existing norms and regulations but also new laws designed to accelerate the development of geothermal energy which are listed for both reference countries. This is particularly the case in Germany, where the new legislation on accelerating the use of geothermal energy is undergoing a legislative process. In Poland, new regulation under the so-called roadmap and guide for geothermal investors is expected to be adopted in the second half of 2025.

The author of the text also used personal interviews with geothermal energy experts, who provided a closer look at some practical aspects related to the development of geothermal energy.

3.2. Analysis

The analysis looks at the basic regulatory framework for the exploitation of geothermal resources in Germany and Poland. It is developed on a country-by-country basis, always providing a basic overview of the regulation of the sector and then focusing on the specific permitting process of the geothermal resource. It also provides an annotated overview of key legislation related to the preparation, implementation and subsequent operation of deep geothermal resources in both countries. The following is an overview of examples of good practice, presented briefly in the text, with detailed and structured descriptions in a separate annex. This chapter provides an overview of key sources of funding for geothermal projects, both in the form of investment support and so-called feed-in tariffs during the operation of the geothermal resource. The chapter then concludes by discussing topical issues related to changes in legislation or strategies to support the geothermal sector in the countries concerned.

3.2.1. Germany

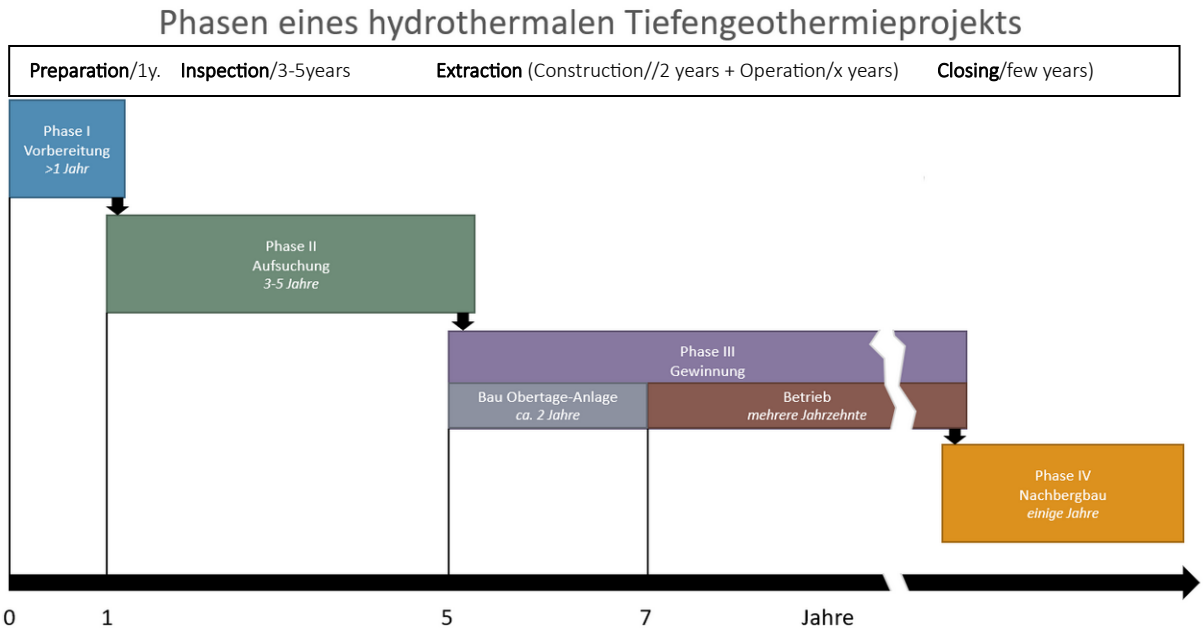
3.2.1.1. General regulatory framework

In Germany, each borehole to a depth of more than 100 meters must be approved by the Lower Water Authority and a notification must be submitted to the relevant mining authority in the respective federal state pursuant to Section 127 of the Federal Mining Act. That authority should decide within two weeks whether it is necessary to submit an operational plan in accordance with Section 51 et seq. Federal Mining Act (GFMA). Depending on the form of use of geothermal energy (geothermal probes, groundwater heat pumps, deep drilling, etc.), there are different application requirements. Outside water protection areas, approval is generally unproblematic. Länder ministries responsible for environmental protection often offer “Guidelines on the use of geothermal energy” with information on permits (see Annex 3.-2, Permit in selected Länder).

Deep geothermal systems

Deep geothermal projects require specific procedures and permitting processes and can take several years from the preliminary planning, research, drilling and construction of thermal power plants, as shown in Figure 1 Phases of a deep hydrothermal project. Three main stages need to be carried out in terms of the authorization process and regulation.

Figure1: Stages of the deep hydrothermal energy project (4 Phases: Preparation, Inspection, Extraction, Closing)



Source: https://www.bveg.de

Title: Vorberaitun – preparation; Afsuchung – survey; Bau Obertage – Anlage – Surface technologies; Gewinnung – energy extraction; Betrieb — Operation; Nachbergbau- Decommissioning at a certain time

The first stage is preliminary and includes general considerations on the project and the necessary public consultation under the Administrative Procedure Act (Verwaltungsverfahrensgesetz), § 25 "Consultation, information, early public participation". Public consultations are mandatory and must take place before the start of the permitting procedure. In general, information on a given project must be provided to the local public administration and published online. It is recommended that further preliminary studies on technical, financial and geological aspects, as well as basic requirements for the relevant regulations, are carried out at this stage.

The second phase mainly involves preparatory work on the target area where future wells should be located in order to obtain a license for exploration of geothermal energy (commercial use) issued by the relevant state ministry (e.g. in Bavaria, state ministry of economy, regional development and energy). In addition to that State law and regulation, the two most relevant legal rules must be complied with, the German Water Resources Act (Wasserhaushaltsgesetz) and the German Federal Mining Act (Bundesberggesetz).

The applicant must provide information on the following topics (example from the Free State of Bavaria, not an exhaustive list, see Merkblatt Erlaubnisse Geothermie in references):

- Definition of the type of (mineral) source to be investigated, i.e. geothermal energy.
- List of permits (Erlaubniskarte) – to be drawn up.
- Work programme – key document describing the exploration process and providing the necessary information on geological and geophysical exploration, well construction, sampling and test procedures, known geological conditions, timetable, cost estimates for exploration works, expected use of geothermal energy (heat or electricity generation), etc. The work programme is the basic document for the decision of the competent authority and is expected to be described in as specific and detailed a manner as possible. The program is usually valid for 2 years.
- Definition of exploration/future source area – precise definition of the future location (well location, extraction area definition) and reliable subsurface modelling, as well as specification of other important aspects (e.g. potential hydraulic and thermal impacts of wells within the deposit and its boundaries) is not possible at this stage due to lack of data. However, it is recommended to use near-compensation wells and consult existing data on geological conditions.

- Competitive applications - there is a special procedure provided for by the German Federal Mining Act if more than one application has been submitted for the same territory; this is a case that may occur more frequently in the future due to the increased use of geothermal energy and the regulator (state) should have a clear procedure to deal with such a situation.

If this stage is successfully completed and an exploration license is granted, a five-year period is usually granted to carry it out, with the possibility of extension for a further three years.

Availability of funds

Evidence of sufficient financial means to carry out a detailed and well-developed survey must be provided to the German authorities. The credibility of the available funds must be demonstrated by means of official documents on the decisions of the entity in question, such as a decision of the board of directors, a resolution of the municipal council, etc. For example, the Land of Bavaria provides the amount recommended for exploration work on the basis of drilled meters (EUR 2 500 per meter per borehole up to 4,5 km) and general costs for other services relating to geological and seismic surveys. In total, an amount of approximately EUR 18.5 million is recommended as an example for a 3.5 km well.

Authorisation process

After submitting a complete application, the competent authority initiates the procedure under Section 15 of the Mining Act (FMA), in which many other institutions, offices and public administration bodies are invited and consulted: Nature and Landscape Protection Authority, Land Use and Regional Planning Authority, bodies dealing with water management, geology, hydrogeology, economic development; in general, the State Office for the Environment and its local branches and the State Mining Office, together with the municipalities whose territory is to be affected, are key actors in this process. In some Länder, specific areas are designated for the extraction of geothermal water which can significantly affect the complexity and length of the permitting process. For example, in Hessen, the Lower Water Authority defines and regulates three different types of areas:

- Favourable areas – hydrological and water management conditions are favourable (located outside the protection zone of water resources, outside the vicinity of drinking water sources and outside areas with soil or groundwater contamination); no specific assessment is required.
- Unfavourable areas – hydrological and water management conditions are unfavourable; an individual assessment of the project is required.
- Prohibited areas – no installation allowed.

The third stage concerns, from the point of view of authorization, the submission of an application for a mining (mining) licence. Once again, the application must be submitted to the competent state ministry (e.g. Bavaria, State Ministry of Economy, Regional Development and Energy). It is assumed that the future licencee will be the applicant (natural person or other legal entity).

The applicant must provide information on the following topics (example from the Free State of Bavaria, not an exhaustive list, see Merkblatt Bewilligungen Geothermie in references):

- Definition of the type of (mineral) resource to be used, i.e. geothermal energy.
- Area demarcation (maps), including depth and exact location where geothermal heat will be extracted as a result of Phase 1 exploration.
- Technical documentation of the circulatory test results demonstrating that the extraction of hot water from the aquifer is technically feasible and financially sustainable. The submission of at least the following data is required:
    - volume and temperature of water that can be pumped
    - Reducing water levels
    - volume and temperature of water that can be re-injected (re-injected underground)
    - Chemical composition of water
    - assessment of the impact on adjacent wells, if this was part of pumping tests

    - Mining plan prepared by a certified mining engineer (may be submitted retrospectively)
- Work plan – plan for the extraction of geothermal energy from the aquifer, including a description of the technical installations/devices in the wells and the connection of two wells to the heat exchanger.
- Geothermal energy plan (i.e. heat, electricity, balneology, etc.). With regard to heat supply, information on heat consumption during the heating period and on the structure of heat consumers, as well as data on the heat source itself, the possibility of combination with other energy sources and possible redundant cogeneration, should be provided. If heat storage is also part of the overall energy concept, it should be described at this stage. N.B.: it is worth noting that, in the case of electricity generation, heat must also be supplied where technically and economically feasible.
- Assessment of the thermal conditions of the aquifer – generally a structural geological thermohydraulic model of the operation of the aquifer within the boundaries of the extraction area based on data (e.g. seismic surveys, pumping tests, etc.) provided during the exploration phase. The assessment should take into account the data provided by the competent authorities (the National Environmental Bureau) based on the geoscience survey and neighboring areas. An important part of the assessment is the groundwater model describing the overall expected character of the aquifer during the groundwater protection permit operation.
- Estimated period of operation- the permit is usually granted for a period of 50 years, with the possibility of extension.
- Proof of availability of funds – similarly to the survey phase, the German authorities require proof that sufficient funds are available for the implementation of the whole project and a declaration that funds are also available for the rehabilitation of the affected area, including unforeseen coverage of damages by sufficient liability insurance.

Environmental Impact Assessment (in response to comments) – Geothermal projects that may require an EIA include projects referred to in points 13.3 (groundwater extraction or discharge) and 13.4 (drilling for water supply purposes). Deep wells must be subject to a general preliminary assessment on a case-by-case basis. For groundwater extraction, projects abstracting more than 10 million m3 per year require a full environmental impact assessment. Projects with a extraction of more than 100 000 m3/year(in the specific case of projects with a extraction of more than 5 000 m3/year if they can significantly affect groundwater-dependent ecosystems) must undergo a general preliminary environmental impact assessment or a site-specific preliminary environmental impact assessment.

Shallow geothermal systems

There are certain specific requirements for shallow well systems, such as a minimum boundary distance of 5 m from neighbouring properties in accordance with VDI 4640. Obtaining the consent of neighbours can provide additional legal certainty where necessary. The distance of 1 m from existing utilities should also be maintained. Old trees on the plot should also be taken into account. According to the Regulation which states that if the wells are deeper than 100 m (which is usually the case for the extraction of geothermal heat), a standard application/notification (for deep wells) must be submitted to the competent mining authority in the relevant federal state pursuant to Section 127 of the Federal Mining Act (FMA). That authority should decide within two weeks whether to draw up an operational plan in accordance with Section 51 of the Financial Markets Act which should subsequently be complied with. In accordance with the provisions of the Land Exploration Act (StandAG), drilling to a depth of 100 m or more now also requires the approval of BASE, the Federal Office for Site Safety. This can take up to 8 weeks to process (according to BASE).

3.2.1.2. Legislative overview

Due to its long history of geothermal energy use, Germany has extensive legislation governing the sector. As in Poland, key legislation applies to the German Federal Mining Act which regulates drilling and related activities. The second most important legal framework is the German Water Resources Act which regulates water management and handling of groundwater from which geothermal heat is extracted. The specific institutional framework, i.e.

the division between the federal level and the different levels of federal states, provides states with strong autonomy in the permitting process and regulation. Regional governments in Poland (voivodship) play a similar role in some way. In addition to official legislation, recommendations from the business sector in the form of standards and best practices are used. This allows regulators to refer to specific standards and practices generally used in the well sector, thus providing more coherent, clearer and predictable requirements, decisions, etc.

An overview of the key pieces of legislation is provided below:

- German Federal Mining Law [Bundesberggesetz]- this law is the key law for regulating drilling activities related to the exploration, extraction and processing of mineral resources (i.e. geothermal resources). It regulates extractive works to be carried out in a safe and efficient manner, minimizing environmental impact and risks to human health and protecting the rights of third parties, and establishes procedures for the compensation of unavoidable damage.

  (https://www.gesetze-im-internet.de/englisch_bbergg/englisch_bbergg.html)
- German Water Resources Act (Wasserhaushaltsgesetz) – this Act lays down rules for the general management of water resources; outlines key aspects such as public use of water resources and ownership, surface water management, categorization of artificial water bodies, use of water for energy purposes, etc. (https://www.fao.org/faolex/results/details/en/c/LEX-FAOC096956/)
- German Civil Code (Bürgerliches Gesetzbuch)- this law primarily regulates relations between citizens; with regard to geothermal energy sources, this law allows people to protest against new energy sources, raises complaints, appeals against permits, etc., and thus significantly slows down permitting processes. (https://www.gesetze-im-internet.de/englisch_bgb/)
- German Building Energy Act (Gebäudeenergiegesetz) – regulates feed-in tariffs for renewable electricity, including geothermal energy (https://www.gesetze-im-internet.de/geg/)
- Regulation on State Levels [Tiefbohrverordnung auf Landesebene] – see links to examples from selected States (Merkblatt)
- The Environmental Impact Assessment (EIA) Regulation is the European and international requirements for certain types of activities that address the potential impacts of a project on both humans and the environment. The competent authority responsible for the project authorization must examine and assess the information contained in the EIA.
- The Geological Data Act (Gesetzzur staatlichen geologischen Landesaufnahme sowie zur Übermittlung, Sicherung und öffentlichen Bereitstellung geologischer Daten und zur Zurverfügungstellung geologischer Daten zur Erfüllung öffentlicher Aufgaben) – the State Geological Survey Act and the transmission, provision and public provision of geological data, as well as the provision of geological data for public tasks, lays down the obligation of the responsible authorities (usually the State Geological Surveys) to ensure their data and availability from the geological survey. By law, any geological survey must be reported to the competent authority at least two weeks before it starts. Individual Länder may introduce additional requirements and define the scope of the law as regards geological surveys. The law also harmonises the obligations relating to the submission of geological data throughout the federal territory and lays down rules for making geological data from both public and commercial investigations available to the public.
- Recommended practices of various organisations such as BVEG – Bundesverband Erdgas, Erdöl und Geoenergie e.V. (https://www.bveg.de/die-branche/tiefe-geothermie-in-deutschland/) and DGMK – Deutsche Wissenschaftliche Gesellschaft für nachhaltige Energieträger, Mobilität und Kohlenstoffkreisläufe e.V. (https://dgmk.de/en/topics/exploration-and-generation-2/) or API – American Petroleum Institute (https://www.api.org/products-and-services/standards)

3.2.1.3. Geothermal projects

In Germany, there are three areas with thermal water deposits at greater depths which are particularly suitable for heat and/or electricity generation using hydrothermal geothermal energy: North German Plain (Norddeutsche Tiefland), Upper Rhine Valley (Oberrheintal) and South German Molas Basin (süddeutsche Molassebecken). Some

hydrothermal deposits in Germany are already well developed. Hydrothermal sources provide heat to many district heating systems in these regions but the most developed is the state of Bavaria and its capital Munich, where most of the total heat output is located. For example, the City of Munich aims to provide central heating based on 100% renewable energy, in particular deep geothermal energy, by 2040. According to the German Geothermal Association, Germany has 42 (2025) deep geothermal energy operational projects. These include 24 in Bavaria, 6 in North Rhine-Westphalia, 1 in Baden-Württemberg, 1 in Mecklenburg-Western Pomerania, 1 in Rhineland-Palatinate, 2 in Brandenburg and 1 in Hessen. Together, they represent a total heat capacity of 343 MWth. Most projects provide heat (31), 9 generate heat and electricity, only 2 generate electricity (Insheim, Dürrnhaar). It is necessary to point out that there are 16 projects in the construction phase and more than 150 in the planning phase.

An overview of German geothermal energy sources, including those with exploration and operating permits, is available here: https://www.bveg.de/wp-content/uploads/2025/02/BVEG-Tiefe-Geothermie-in-Deutschland-2025.jpg. Further reliable and updated information can be found on the website of the German Geothermal Association.

https://www.geothermie.de/fileadmin/user_upload/Aktuelles/Geothermie_in_Zahlen/BVG-TG-Poster-A1-cmyk-2025-01-29-digital.pdf.

Two deep geothermal projects were selected as examples of good practice. The first is an electricity and heat generation project developed between 2007 and 2012 in Insheim, Baden-Württemberg. This project is the second privately funded project in the area, following a successful project in Landau with the same geological environment. Insheim is also known for its seismic activity which has occurred many times since the start of operation but did not cause its suspension. An interesting method of re-injection of used thermal water also contributes to its high operational efficiency. Recently, a lithium mining project was started under a new owner.

The second project is located in Unterhaching in the Free State of Bavaria. This project is one of the pioneering projects in Bavaria and Germany, and in many respects it is a project that has inspired many of its followers. The project was initiated by the municipality and its mayor was one of the key actors that allowed the project to be born.

3.2.1.4. Financial and other support to the geothermal sector

The geothermal sector has been developing in Germany for many decades and is considered a mature market in this sense. Therefore, no direct investment support at federal level is currently provided to potential investors, except for operating aid when a new renewable energy source is developed and connected to the grid (see below). However, some Länder provide their own incentives to further strengthen geothermal energy sectors, such as the Land of North Rhine-Westphalia. Applications are open from 8 April 2025 (available at: https://www.nrwbank.de/de/foerderung/foerderprodukte/60210/produktdetail.html). The aim of the programme is to support exploratory boreholes up to 60% of the cost of exploratory drilling. The maximum grant available is EUR 8 million. Another part of the programme provides support to reduce exploration risks by covering 60% of the justified costs of the first geothermal well. The maximum coverage provided is EUR 10 million. There is also a programme called “Extended Financing Programme” to further support the finance ability of hydrothermal energy projects.

A similar initiative has recently emerged in Bavaria. The German state-owned investment and development bank KfW (Kreditanstalt für Wiederaufbau) and Munich Re have announced a joint initiative to manage development risks in the German geothermal sector. Both institutions have unveiled a new credit program designed to hedge exploration risks and promote further geothermal development. In order to better manage these risks, KfW is preparing a geothermal development loan that will continuously monitor the financing of the Federal Office for Economic Affairs and Export Control (BAFA) which supports pre-well feasibility studies. The new mechanism combines funding with risk protection: A conditionally repayable federal loan offers up to 100% debt forgiveness on a bank loan if the drilling work does not bring any or only limited success. It can also be used together with federal funding for efficient heating networks (BEW). The programme aims to support around 65 geothermal

projects over the next three years to finance 100 projects by 2030. The programme should be launched in January 2025.

- **Feed-in tariffs for electricity generation** – regulated **by the Renewable Energy Sources Act (2014)** Erneuerbare-Energien-Gesetz (§ 45 EEG 2021). As of 2022, producers of electricity generated from geothermal sources are entitled to a subsidy of EUR 0.252 per kWh which is reduced by 0.5% each year. There is also another rule limiting the total amount of the subsidy: if the total installed capacity for energy generation from geothermal sources exceeds 120 MW by 15 December of a given year, the amount of the feed-in tariff should be reduced by 2% in the following year; an additional 0.2 cents per kWh must be deducted from the final value pursuant to Section 53 of the EEG-Act 2021. The Act also created scope for the transition from fixed feed-in tariffs to a tendering system (auction system).

3.2.1.5. Legal obstacles and fast-track legislation

In Germany, a number of initiatives have taken place over the last two to three years, strongly highlighting that (deep) geothermal energy is not sufficiently supported in terms of its potential and that there are many gaps, barriers and barriers that prevent this promising energy source from being used more widely. It is necessary to point out that the initiative came from a state organization- the German Federal Ministry of Economic Affairs and Climate Protection (BMWK) and from a private interest group- the alliance of the German Energy Association. In its first edition, the **"Eckpunkte für eine Erdwärmekampagne"** (Eckpunkte für eine Erdwärmekampagne) focused on the development of medium and deep geothermal energy (400+ m) was released in 2022. It identified 8 critical areas that need to be addressed to support the development of geothermal energy: (i) a focus on stakeholder engagement and dialogue between the private and public sectors, (ii) the development of a national database with geothermal potential, (iii) exploration campaigns exploring 100 sites with good geothermal potential, (iv) changes in legislation, (v) the establishment of federal funding for geothermal heating projects to increase their competitiveness, (vi) financial instruments to reduce investment risks, (vii) retraining projects to provide qualified personnel, and (viii) acceptance campaigns to create regional acceptance of geothermal energy and address bias against drilling projects.

The second document is **the "Opinion on accelerating the development of geothermal energy"** (Positionspapier zur Beschleunigung des Geothermie Ausbaus), published in 2022 by the Alliance of Energy Associations. The document focuses in particular on the need for legislative changes that will allow the expansion of deep geothermal. Concrete recommendations for amending legislation and measures to support not only the development of geothermal resources but also the expansion of thermal networks were put forward. Key proposals include: declaring the use of geothermal energy to be of public interest, simplifying permitting procedures, periods for submission of tenders in permitting processes and their standardization, simplifying legislation in the field of environmental impact assessment and nature protection, reducing the risk of financial programmes, subsidizing the operating costs of central heating networks, collecting geological data, simplifying public procurement legislation, improving acceptance of geothermal projects or increasing training and further training of professionals.

It is quite clear that both initiatives have identified similar problems and many of them have been included in ongoing legislative changes. The German Federal Ministry of Economic Affairs and Climate Protection (Bundesministerium für Wirtschaft und Klimaschutz) introduced a new law called the Bureaucracy Reduction Act IV (BEG IV (Gesetz zur Beschleunigung der Genehmigung von Geothermie-Anlagen, Wärmepumpen sowie Wärmespeichern) which aims to speed up the permitting procedures for geothermal systems, heat pumps and heat storage systems, along with other conditions of the legal framework. The aim of this acceleration is to significantly reduce the approval time of geothermal systems. The Act entered into force in January 2025.

Some of the key elements of the new act are set out below:

- **Procedural simplification of the permitting process** - BEG IV accelerates, simplifies and digitalizes permitting procedures for geothermal energy, heat pumps and heat storage systems; this includes maximum time limits for permitting procedures under the Mining Act and the Water Resources Act.

- Classification of shallow and deep geothermal resources: shallow near-surface geothermal energy systems are defined as systems with wells up to 400 meters deep; Deeper wells are classified as deep geothermal energy systems. According to BEG IV, shallow low-temperature geothermal energy (up to 400 m) does not fall within the scope of the Mining Act and therefore permitting procedures under the Mining Act are not required.
- Introducing the overriding public interest principle – the BEG IV provides that the construction and operation of geothermal systems, heat pumps and heat storage installations, including necessary wells, will be considered an overriding public interest and will be necessary for public health and safety until net greenhouse gas neutrality is achieved in 2045 (similar to the German Renewable Energy Act /Erneuerbare-Energien-Gesetz/ which recognizes the overriding public interest in renewable electricity systems as of 2022). This recognition significantly affects the balancing of conflicting interests during the approval process by setting a predetermined priority which can only be revoked in exceptional cases. As in the electricity sector, a clear prioritization of renewable heat systems is expected to speed up and clarify decision-making, thereby reducing the effort needed to weigh and justify decisions.
- Limitation of legal protection – the BEG IV Directive proposes to speed up the permitting process by removing the suspensive effect of objections and repealing decisions approving geothermal projects, heat pumps and heat storage installations, including wells, as well as decisions to start measures early. Injunctive relief may only be applied for within one month of the notification of the approval decision. In addition, the appeal procedure will be simplified by assigning all disputes concerning geothermal systems and large heat pumps to higher administrative courts. The aim is to speed up the process by anticipating or largely taking into account certain points of review and consideration, thereby limiting the scope of legal protection.
- Civil law- in connection with geothermal projects, the ability to act against neighbouring geothermal projects will be limited due to their impact on property. Because of the BEG IV, damage is considered to be insignificant and must be tolerated under the first sentence of Section 906(1) of the Civil Code (Bürgerliches Gesetzbuch) if the heat supplied or extracted does not change the temperature of the underground by more than 6 kelvins and does not make existing or specific intended use of the property impossible or significantly more difficult.
- Early start of projects – in the context of the newly proposed public interest principle, renewable heat projects requiring approval under water or mining legislation can start before approval is granted; this concerns the German Water Resources Act (Wasserhaushaltsgesetz) and the German Federal Mining Act (Bundesberggesetz) which provide that the use of water bodies or the implementation of such a project may start before authorisation is granted if there is a public interest or a legitimate interest in the entrepreneur starting earlier. This should speed up practical implementation by removing the need for demonstration and extensive scrutiny of the public interest.

Another important change to the legal framework on the use of geothermal energy concerns the two most relevant legal standards, i.e. the German Water Resources Act (Wasserhaushaltsgesetz) and the German Federal Mining Act (Bundesberggesetz).

Amendments to the Water Act indicate that, for example, large heat pumps will no longer require approval unless the competent authority raises objections or requests further information within one month of receiving the notification. In addition, the rules on the use of groundwater without a permit will be extended. In addition to domestic use of groundwater (e.g. extraction, pumping or discharge), the supply of heat through water-based heat generation will also be exempted from permit or approval requirements. This exemption will be further extended to the injection of substances into groundwater for near-surface geothermal energy, as long as no significant negative impact on the water balance is foreseen.

The proposed amendments to the Federal Mining Act also concern the simplification and acceleration of authorisation procedures. As in the case of an amendment to the Water Act, if the authority does not provide a declaration within one month, it will be assumed that it has no objections. The objective of this measure seems to be to encourage the authorities to respond more quickly to questions from other agencies. Another significant change concerns Section 57e of the Act and the transition to a standardized, fully electronic approval process for geothermal projects. This simplified procedure which was previously optional, will now be mandatory, with one

body supervising the coordination and obtaining the necessary opinions. Processing time will be significantly shortened: the authorities must confirm the completeness of the application within 30 days and decide on the approval within one year (down from two years- for major projects). For heat pump projects below 50 megawatts, the period is reduced to three months. The extension should be limited to one six-month period in exceptional cases or to three months in the case of smaller projects. In addition, the periods for assessing wells to a depth of 400 meters in shallow geothermal conditions will be significantly shortened.

3.2.2. Poland

3.2.2.1. General regulatory framework

The generation of geothermal heat in Poland is regulated (as in the case of Germany) by several laws and decrees, in particular at ministerial level. However, an important role is also played by the provincial governments (which can be considered equivalent to the German states in terms of the territorial division of the country's public administration), represented by the president of the provincial govern marshal [marszałek województwa]. The key piece of legislation is **the Geological and Mining Act** (see full and original title in the overview of legislation in Chapter 1.1.2) which regulates mineral exploration, exploration and mining activities.

Geothermal heat is considered thermal waters under Polish legislation and these are classified as minerals requiring a mining license granted to local regional marshals. However, no license is required for the exploration and identification of thermal water deposits. In order to drill a new geothermal well, a proposal for geological works must be drawn up in accordance with the Order of the Minister for the Environment of 20 December 2011. The investor must have rights to the land in which the well is located which can be through ownership or various agreements. Although the written consent of the landowner is sufficient, proof of ownership may be required in specific situations, in particular for municipalities seeking funding under Polish geothermal support programmes (e.g. the National Fund for Environmental Protection and Water Management).

Exploration area and heat extraction in Poland

In Poland, underground resources (including geothermal waters) are owned by the State Treasury, regardless of who owns the land on the surface. Ownership or lease of land on the surface therefore does not imply ownership of the geothermal resources underneath. That means that the applicant (future geothermal resource operator) does not have to own all the land under which the geothermal deposit/source is located. However, it is necessary to have a legal title for the use of the land on which the drilling and installation will take place (e.g. ownership, right of permanent use, rent or easement). Once the concession is granted and the mining area is declared, the licencee has the exclusive right to extract geothermal water in the area, even if the deposit exceeds the boundaries of his land, as long as it is located within the designated mining area and the technical conditions are met.

The first stage in the process of developing a geothermal energy source (geothermal mining power plant) using underground thermal water is the exploration of a potential source by drilling an exploratory well. The exploration and exploration of thermal waters does not require a license. However, their implementation requires the elaboration **of a proposal for geological works** [project of robót geologicznych] prepared by an authorized designer, describing the overall planned geological work. This document must be approved by the relevant regional marshal. After obtaining and before starting any drilling work, the well supplier must also draw up a detailed **mining plan** and be approved by the Mining Supervisory Authority (District State Mining Authority). In some cases, where there is potential for significant effects on the environment, the project must undergo a specific environmental assessment and obtain a decision (consent). The Regulation explicitly states that this procedure is required for each well deeper than 5000 meters, or if the exploration or identification of minerals takes place in specific protected areas, or if the well exceeds 1000 meters and takes place in water reservoir protection zones (the whole list includes Section 3(1)(44) of the Cabinet Order of 10 September 2019). In addition, an Environmental Impact Assessment (EIA) may be required. Supervision of geological works requires persons with a category IV geological qualification as referred to in the Geological and Mining Law Act (Section IV – Qualifications, Professionals and Professional Responsibility, Chapter 1 "Geological Qualifications", Article 50). As deep geothermal wells require both surface and subsurface geophysical exploration, it is important to note that geophysical surveys, in addition to seismic

exploration and drilling, may not meet these conditions. These qualifications enable professionals to carry out, supervise and manage various geological activities related to geothermal projects, such as searching for and identifying groundwater resources such as thermal waters, assessing the hydrogeological conditions of mineral extraction, establishing protected areas for groundwater reservoirs, carrying out, documenting and designing geological works related to the use of geothermal energy (heat) and constructing observation boreholes.

The first phase provides information on the underground water reservoir and its potential through drilling works and hydrogeological tests. If the exploration shows that the geothermal reservoir is suitable for extraction, detailed hydrogeological documentation must be prepared to assess the usable thermal water resources according to the Regulation of the Minister of Environment of November 2016). This documentation should also:

- determine the mining sources of the well and define the boundaries of the mining area (MA) and the mining terrain (MT) according to the 2011 methodological framework of the Minister for the Environment Determination of the boundaries of the mining area and terrain for groundwater deposits recognised as minerals (Ministra Środowiska Wyznaczanie granic obszaru i terenu górniczego dla złóż wód podziemnych recognised as hollows).
- provide an assessment of the physical and chemical properties of the water and information on expected changes in water quality and quantity during operation.
- in the case of multiple geothermal wells, provide details of the conditions for re-injection of the used thermal water back into the geological formation.

The Regional Marshal again approves the related documentation and issues a decision.

The second and final stage is to obtain a license for the extraction of minerals (i.e. thermal water) [ccc] and for mining usufruct, i.e. mining usufruct rights (on the basis of a separate application). This license is granted by the regional marshal upon application which includes:

- bearing utilization project [project zagospodarowania złoża] - bearing utilization project (DDP) must outline the optimal utilization of resources, environmental protection measures and relevant industrial and non-industrial resources. Losses of resources should be considered as a minimum for groundwater classified as minerals.
- decision on environmental protection conditions concerning the authorization for the extraction of minerals, i.e. thermal water [decyzja o środowiskowych uwarunkowaniach zgody na realizację przedsięwzięcia polegającego na wydobywaniu kopaliny]; environmental decisions are required for all geothermal deep well sources (exceptions are defined in the Cabinet Regulation of 10 September 2019). In some cases, an EIA is required, similarly to a Phase 1 geological works project.
- Mining area and terrain map [map of the projectowanego obszaru i terenu górniczego.] – The map of the mining area and terrain provided at this stage should not differ significantly from the map provided at the first stage, however minor changes are acceptable.

Licences should be issued for a period of between 3 and 50 years, unless the applicant requests a shorter period. The concession authority should determine the final duration of the licence and should not be obliged to grant the duration requested by the applicant. The duration of the licence should reflect the expected lifetime of the deposit or the duration of the geological works. A licence should be transferable if the conditions laid down are met.

Once the licence is granted, the regional marshal signs an agreement establishing the mining usufruct right before the licence becomes final, allowing the exploitation of the thermal water to start. The operation of the mining plant is governed by an order of the Minister for Economic Affairs of 25 April 2014 on the basis of the Mine Operation Plan (see also section on overview of legislation prepared by the manager of the mining plant). Under the legislation in force, no fee is charged for the use of thermal water.

Use of abandoned wells for geothermal energy

Polish legislation allows the use of boreholes that are inoperable or decommissioned for geothermal purposes in the form of extraction (generation, extraction) or injection boreholes. This requires a similar formal and legal process as drilling a new geothermal well. The only difference is the need to demonstrate the right to use geological

information for well-being that is converted to geothermal use (for more information see Geological and Mining Law Act, paragraph 1420). At the project development stage, access (not ownership) to the geological data provided by the State database is free of charge upon formal request. However, if detailed hydrogeological documentation is drawn up for the purpose of exploiting a well for the extraction of heat, the investor must demonstrate the right to the geological data in question (by requiring the Treasury which is the administrator of this information) and must pay a fee.

Shallow geothermal sources using well heat exchangers

Under Polish law, the use of shallow geothermal resources using new or existing wells for the extraction of thermal energy (i.e. not thermal water) is regulated by the Geological and Mining Act (heading 1420) but the subsequent operation (heat extraction) of drilling heat exchangers (BHEs), regardless of depth, is not regulated by this Act and does not require separate permits or licenses. The procedure for drilling new wells using shallow geothermal heat is the same as for adapting existing unused wells for this purpose. According to that law, a project of geological works for drilling using geothermal heat must meet the requirements of the Regulation of the Minister for the Environment of 20 December 2011 on the detailed requirements for designing geological works (heading 1696) and must be prepared by an authorized person (category IV or V qualification). However, the project is not subject to approval but only to notification to the local county mayor. If the mayor does not object to the notification (project) within 30 days, geological works can begin. In principle, there are only two grounds for refusal: a) the technological approach of the planned geological works could be harmful to the environment, or b) the project of geological works does not meet the legal requirements. However, the carrying out of geological works related to the construction of the BHE is governed, as mentioned above, by the Geological and Mining Act, with a simplified procedure in place. The commencement of the implementation phase of geological works for the extraction of geothermal heat with BHE which includes the modification of existing wells or the drilling of new ones, requires the operation plan of the mine (usually provided by an authorized person of the drilling company) and the approval of the local director of the district state mining office, provided that the drilling depth for the BHE is deeper than 100 m or the drilling site is located in an existing mining area established for the extraction of minerals. After completion of the geological works and the BHE, the investor must submit to the mayor of the local county so-called other geological documentation. It is necessary to point out that shallow geothermal projects using BHE are not considered to have significant effects on the environment under the Government Decree of 10 September 2019 and therefore do not require a decision on the environmental conditions of the project. In case the construction of above-ground structures (buildings, pipelines, etc.) is required, these works are governed by the Construction Code (for more details see Journal of Laws 2021, item 2351).

3.2.2.2. Legislative overview

As mentioned in the previous chapter, the extraction of geothermal water is regulated by various pieces of legislation and some laws and regulations have been cited directly throughout the text to allow continuity and complexity. Below are the most important legal documents which are briefly commented on.

- Act of 9 June 2011 – Geological and Mining Law Act (Journal of Laws 2011 No.163 item 98, consolidated version in the 2021 Collection of Laws, item 1420) – this Act lays down the rules and conditions for carrying out, carrying out and terminating activities in areas relevant to the geothermal sector, namely geological development works, mineral extraction and protection, groundwater and other environmental elements in the framework of geological works; It also defines the principles for exercising oversight and control over the activities regulated by the Act.
- Journal of Laws 2011, No.288, item 1696 - This Order of the Minister for the Environment defines the requirements for proposals for geological works (projects), including works the performance of which requires a license.
- Cabinet Regulation of 10 September 2019 on projects with significant environmental impact (Journal of Laws 2019, item 1839) – this Regulation applies to almost all hydrothermal projects using thermal water

as a heat source; conversely, closed systems using geothermal heat exchangers to generate heat should not be considered as having a significant impact and should be excluded from this Regulation.

- **Ordinance of the Minister for Economic Affairs of 25 April 2014** on detailed requirements for the operation of mineral extraction installations through drilling (Journal of Laws 2014, item 812). This is in particular paragraph 375 which defines the mandatory documentation that must be drawn up and kept. Documentation includes daily reports on the extracted fluid, data on the extraction works carried out in the well, analysis of fluids in the tank, sampling, future plan for decommissioning the well, etc.
- **Law of 7 July 1994** – Construction Law (consolidated version in the 2021 Collection of Laws, item 2351) – this law applies to construction works related to surface technologies and buildings necessary for the operation of geothermal resources, usually pumping stations, heat exchangers, engine rooms, etc.

Other relevant legislation deals, for example, with documentation needed at different stages of the preparation of a geothermal project, such as (i) documentation of mining plans [w sprawie planów ruch zakładów górniczych] (Journal of Laws 2017, item 2293, Decree of the Minister for the Environment), (ii) hydrogeological documentation and geological engineering documentation [w sprawie dokumentacji hydrogeologicznej i dokumentacji geologiczno-inżynierskiej] (Journal of Laws 2016, item 2033, Decree of the Minister for the Environment), (iii) other geological documentation [w sprawie innych dokumentacji geologicznych] (Journal of Laws 2020, item 2449, Decree of the Minister for the Environment) or (iv) detailed requirements for bearing development projects [wrawie szczegółowych wymagańtyczących projektów zagospodarowania złóż] (Journal of Laws 2012, item 511).

More information on the legal framework for capacity building of key stakeholders (Chapter 1).

3.2.2.3. Geothermal projects in Poland

One of the reasons for Poland's recommendation as an example for comparative analysis was the increasing number of geothermal projects developed in recent years as a result of systematic financial support from the Polish government (see chapter 1.1.4 below) and EU funding. Despite generally good geological conditions according to data from the Polish Geothermal Society which estimates at least 6 600 km$^{of\ 2}$ geothermal areas with temperatures ranging from 27 to 125 °C, the current share of heat generation is lagging behind expectations with zero electricity generation. This corresponds to the situation in other Central and Eastern European countries, with the exception of Hungary but on the other hand, Poland has made significant progress in political and strategic planning which is worthy of recognition. This has led to a steady increase in total installed heat output over the last five years, reaching 155,5 MWt in 2024, starting with 40,7 MWt in 1993. There are currently eight geothermal heat generators in operation in Poland (2024):

1. Bańska Niżna (Podhalska Oblast) – (70 MWt from geothermal energy and ca. 38 MWt peak capacity from natural gas; originally 40.7 MWt), in operation since 1993
2. Pyrzyce (6 MWt geothermal power, 22 MWt total power), in operation since 1996
3. Mszczonów (3,7 MWt geothermal capacity, 2,7 MW absorption heat pump, 1 MW compressor heat pump), total capacity 8,3 MWt; in operation since 2000
4. Uniejów (3,2 MWt geothermal capacity, total 7,4 MW), in operation since 2001
5. Stargard (44.6 MWt geothermal power), in operation since 2005/2012
6. Poddębice (10 MWt), operational since 2013
7. Torun (18 MWt covering around 8% of total consumption and gas-fired CHP and biogas) in operation since 2022
8. Koło (12 MWt), in operation from 2024, covering approximately 70-80% of total consumption

Two interesting examples are given in the template in Annex 3.-1. The first is the example of the small **municipality of Mszczonów** (6 000 inhabitants) which describes the existing district heating system using geothermal energy in combination with other innovative heat generation technologies. It is also the first site in Poland where the borehole was originally abandoned.

A second example is the emerging geothermal central heating project in **the medium-sized city of Sochaczew** (35,000 inhabitants) which declares that by 2026 the geothermal source will cover 40% of the city's heat supply needs. The case is also interesting because it is a progressively developed project, using various financial

instruments provided by the Polish government, and at the same time confirms the importance of consistent and long-term strategic support for geothermal exploration and resource use.

3.2.2.4. Financial and other support to the geothermal sector

There is no feed-in tariff for electricity generation in Poland. The Renewable Energy Act, approved by the Polish Parliament in January 2025, provides a feed-in tariff system for selected renewable energy. Larger systems (above 10 kW installed capacity) may apply for a subsidy through an auction system. The tariffs are set for a period of 15 years and are limited to the first 800 MW, divided as follows: 300 MW for installations below 3 kW and 500 MW for installations between 3 and 10 kW. **However, electricity from geothermal energy is not included in the supported sources**.

National Fund for Environmental Protection and Water Management (NFEPWM)

- *Priority Programme Geothermal Water Access [Program priorytetowy NFOŚiGW Udostępnianie wód termalnych w Polsce]*

This funding scheme was launched in 2020, initiated by the Chief National Geologist and developed by the Ministry of Environment. The eligible entity should be local governments or their associations. The aim of this programme is to support geological projects aimed at exploring and identifying thermal water deposits suitable for heating systems. The aim is to co-finance investments with a high probability of successful documentation of thermal water deposits. Grants should be awarded on the basis of applications and subsequent evaluation against those criteria. The best projects are awarded. The assessment is carried out by the National Fund and the Ministry of Climate and Environment. Funding is offered in the form of a grant covering 100% of the justified costs of the project. The total budget for the programme is PLN 480 million (EUR 110 million), approximately PLN 230 million were provided under the call. In order to facilitate the application process and improve the quality of proposals, a guideline for applicants "Recommendations and guidelines on the design of geological works to ensure access to thermal waters in Poland" has been developed (Rekomendacje i zalecenia dotyczące projektowania robót geologicznych w celu udostępnienia wód termalnych w Polsce).

The first call for applications was launched in 2020 and a total of 35 applications were submitted requesting PLN 623,2 million (EUR 143 million). Finally, 15 projects were supported with a total amount of PLN 229,2 million (EUR 53 million). The second call of this programme was launched in 2022, under which 50 applications were submitted and 12 municipalities received support under this call.

In total, the programme will support 30 cities in the first and second calls. Its budget is PLN 530 million (EUR 122 million), of which PLN 480 million are subsidies and PLN 50 million are ordinary commercial loans. The implementation period is set for 2020 until 2028.

It is necessary to point out that the Polish government implemented another important funding scheme under the NFEPWM in 2016-2019 to explore the geological structure of the landscape for potential geothermal use. This programme identified potential locations for the use of geothermal heat and was a very important precondition for subsequent grant programmes.

- *Priority Program Polish Geothermal Plus - Part 1 Deep Geothermal [Polska Geotermia Plus. Część 1) Geotermia głęboka]*

This programme provides additional funding for sites where thermal water deposits have been identified and documented. The call was launched in 2022-2023 and the selected project is to be implemented by 2025. The available funds amount to PLN 600 million (with the possibility of an increase) and are divided into two forms of subsidies: (i) grants – up to 40% of justified costs (up to 50% for geothermal projects using ORC technology); and (ii) loans – up to 100% of justified costs. For loans – between PLN 1 and 300 million with an interest rate of WIBOR 3M + 50 basis points, at least 2% with a financing period of no more than 20 years.

Financial support may be obtained for the construction of surface technologies such as:

- construction of a new or extension of an existing heat/geothermal power plant or other existing sources of energy generation based on a geothermal source- including the realization of another geothermal generation well or injection well;
- upgrading existing heating and power plants/geothermal power plants/existing geothermal-based electricity generation sources;
- upgrading (or other technical adaptations) an existing geothermal well to improve its operational parameters;

Further information is available in Annex 3.-3a and 3.-3b.

RES programme - Heat source for heating systems

New programme "RES – heat generator for heating systems": Clean energy in heating is a goal of the Ministry of Climate and Environment and NFOŚiGW. Under the "RES – heat generator for heating systems" programme, launched on 16 April 2024, EUR 465 million has been allocated to support investments in renewable heating technologies, such as heat pumps, solar collectors, geothermal systems, as well as heating network connections and heat storage installations. The budget includes EUR 332 million for non-repayable financing and EUR 133 million for loans.

EU programme EU funds – FEnIKS:

Another important source of funding for geothermal investments in Poland is the 2021-2027 European Fund for Infrastructure, Climate and Environment (FEnIKS) programme. With EUR 538 million allocated under Objective 2.2, the programme supports the development and expansion of renewable energy sources for the generation of electricity or heat, including energy storage and the necessary infrastructure. Geothermal energy is among the priority sources along with water, biogas, biomethane and biomass.

The planned support will focus on installations producing electricity, heat and alternative fuels from renewable energy sources (RES), together with energy storage installations that operate with specific RES and connect to the grid. The implementation of heat generation projects will help to upgrade district heating systems to an efficient state. In the heating sector, the development of heat storage technologies will make it possible to better match the size of a resource with demand and reduce the need to use cutting-edge resources.

3.2.2.5. Legal obstacles and fast-track legislation

In 2022, the Polish government introduced a new programme to promote geothermal energy. It includes harnessing the potential of ground-based heat exchangers and geothermal energy at low, medium and high temperatures; storage of thermal energy in geological formations; reducing investment risks associated with geothermal projects; and progress in research and deployment of innovative technologies. The so-called roadmap, developed by the Polish Ministry of Climate and Environment, has been developed under the title "Multiannual Programme for the Development of the Use of Geothermal Resources" and paves the way for the development of geothermal energy by 2040 with a 2050 perspective. The programme focuses on key aspects such as exploration, deep drilling technologies, risk management, scientific research, etc. for both shallow and deep geothermal energy. This initiative also includes a recommendation for legislative changes enabling a wider use of geothermal energy in the near future. Another initiative, the Guide for Geothermal Investors (with some regulatory aspects), is expected to be published in the second half of 2025.

The following two chapters describe the main obstacles related to current legislation, permitting procedures and financial instruments for the promotion of geothermal energy in Slovakia, and propose solutions to eliminate them. The following chapters also describe **the key differences in terms of legislative conditions, authorization procedures and financial support compared to Slovak conditions in Germany and Poland -** including proposals for the application of some selected approaches from these countries in Slovakia.

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- https://globenergia.pl
- Website of Geotermia Mazowiecka SA: https://geotermia.com.pl
- The Polish Geothermal Plan is available at: https://www.gov.pl/attachment/5a0775b2-a5bb-4dbb-a6ae-87af1ac98dd4
- GEOTHERMAL power plant in MSZCZONÓW: http://www.razemdlaklimatu.eu/images/dobre_praktyki/Mszczonow_en.pdf

4. Proposed measures to improve legal and regulatory frameworks of geothermal energy use in Slovakia

This chapter summarizes the existing barriers and bottlenecks (identified in previous chapters 1, 2 and 3) and outlines potential solutions to address them. The barriers and recommendations are divided into four key areas:

a) Legal,

b) Institutional,

c) Socioeconomic,

d) Financial.

4.1. Ad. A) Legal area

As part of the analysis, we identified the following legislative and legal barriers to development of geothermal energy in Slovakia and the following solutions.

Barrier:

Projects using geothermal energy for energy purposes have a high investment intensity. In cases where it is necessary to carry out drilling work, such investments are associated with a high level of risk. The pass-on of these costs to heat prices for customers implies, even under the existing price regulation, a significant increase in heat prices that may not be acceptable for the market. The lack of incentive mechanisms (legislative, regulatory and subsidy) allowing the investors to cover these risks is therefore a barrier. Under the Slovakia Programme, investment aid mechanisms are being developed to help investors finance some of the risks associated with exploratory drilling with a relatively low financial allocation. However, these are only followed by investment aid mechanisms from the Modernization Fund which have a relatively low aid intensity and may therefore not be sufficiently attractive to the market. Existing operating aid for electricity generation from geothermal energy in the form of a surcharge or premium under the Promotion Act excludes concurrence with any other investment aid and does not allow operating aid granting for the generation of heat (without electricity) from geothermal energy which prevents investors from benefiting from a combination of investment aid and operating aid.

Solution:

Modify the existing programmes aimed at geothermal energy promotion so that they cover all the project implementation stages including survey and exploration of geothermal resources, so that they interconnect and are sufficiently attractive to investors. Priority should be given to projects with the highest contribution to decarbonization, for example through substitution of fossil fuels. In addition to support schemes for geothermal wells implementation, it is necessary to parallelly give support for establishment of connection of geothermal resources to district heating systems as those resources are usually located outside those systems. Increasing the aid rate in the Modernization Fund programmes under which the aid scheme allows to grant aid for the development of geothermal energy of up to 100% of justified expenditures would also be beneficial where the aid is granted on the basis of a bidding process (no notification under the State Aid Act is therefore necessary). Allowing the operating aid granting under the Promotion Act concurrently with investment aid and introducing an operating aid mechanism for heat generated from geothermal energy would also be beneficial. It is also necessary to introduce appropriate regulatory instruments to incentivize heat producers to switch from natural gas to geothermal energy, for example by lifting restrictions on the fixed component of the heat price and transferring part of the fixed costs to the variable costs of the heat price upon heat generation from geothermal energy. Higher price limits when determining the reasonable profit regarding heat generated from geothermal energy would be beneficial as well.

Barrier:

In the Slovak Republic, there is developed gas infrastructure and a persistently high share of natural gas use in heat generation. It is therefore necessary to focus also on policies that motivate energy producers to stick with the existing technology and thus compete with the aim of increasing the use of geothermal energy. The price of heat is currently capped at the 2022 price level (with a slight increase) below the economically eligible cost of heat generation. The difference is compensated by the state budget. This interference in contractual pricing results in erroneous price signals that counteract investment decisions in the field of technology switching. In addition, from 1 January 2026, price regulation of gas for heat generation and heat supply will be applied which may negatively contribute to that situation if the regulator was to limit it below the market level. The willingness of heat generators to stick with the existing technology and fuel is also supported by the existing operating aid scheme aimed at supporting electricity generation from high-efficiency cogeneration which supports electricity generation through an extra payment (surcharge), incentivizing the generators to produce as much electricity as possible, coupled with the need to place co-generated heat on the market. This leaves only limited space to place heat generated from other technology, including geothermal energy, on the market.

Solution:

We propose considering abolishing the crisis regulation as well as price regulation of gas for heat generation and supply. We also propose considering modifications of the conditions for support for high-efficiency cogeneration in order to incentivize the generators to place the capacity of the electricity generation installation on the ancillary services and regulatory services markets instead of maximizing the electricity generation supported by the surcharge or, alternatively, to allow the generators to choose a support scheme that subsidizes capacity instead of generation of electricity. Since this type of aid is not covered by block exemptions, any change to the scheme must be reported in accordance with the relevant legislation. The alternative is to abolish the existing operating aid scheme to the extent it applies to natural gas with regard to the principle of legal certainty.

Barrier:

The permitting process is **multi-stage** (geological exploration, territorial protection, EIA, mining license, water permit, construction permit) and covers in principle all types of geothermal wells. Differentiation according to the well depth exists only in EIA processes. Those procedures often run in sequence instead of in parallel which prolongs the period from intent to implementation by several years. Permitting procedures are lengthy and complicated, affecting the investors' motivation.

Solution:

Introduction of a so-called integrated procedure for geothermal resources which would combine geological exploration, environmental impact assessment and water permit into a coordinated process would contribute to improvement of conditions of development of geothermal projects in Slovakia. The Slovak Republic is also awaiting transposition of the Directive under which the Slovak Republic will be bound by a number of obligations related to simplification and shortening of the permitting processes including mapping of the geothermal energy potential and identification of areas where energy generation from RES can be accelerated. As part of the simplification and shortening of the permitting processes, we may propose automatic initiation of the permitting procedure for the use of a geothermal resource immediately after the final survey report. It would also be beneficial to legislate on periods for individual authorities and offices – e.g. to shorten the period for approval of the final report by the Ministry of Environment of the Slovak Republic (today it is up to 6 months) and set a period for drawing up a professional opinion within the procedure under Section 16a of the Water Act. In this case, inspiration may be generally drawn from Germany and Poland (see previous chapter 3). In Germany, for example, there is one "integrated" law that coordinates the construction and energy parts of new investment plans (Building and Energy Act). In Poland, the matter of mining and geology is integrated upon the assessment of new intentions (including new geothermal projects) into one Geological and Mining Act. Inspired by the new German Bureaucracy Reduction Act IV which entered into force in 01/2025, it is possible to start exploratory work, drilling and related testing even without a permit under the Mining and Water Act, provided that the geothermal project is carried out in the public interest or is important for development of new local businesses. In German practice, new geothermal projects are regarded in that way automatically, i.e. that tool is widely used to avoid lengthy and complicated public negotiations. However, that does not mean that the abovementioned permits are not necessary. Preparatory and

exploration works may start before the permits are issued provided that a sufficiently detailed plan for the future use of the geothermal resource and a risk management methodology are presented to avoid irreversible impacts on the soil fund and on both ground and surface waters. Geothermal wells (new wells up to a depth of 400 m – low-temperature, shallow wells) may be be carried out without a permit under the Mining Act. Other "accelerating" measures are the so-called monthly periods for statements by decision-making authorities in both the Water Act and Mining Act. For example, in the case of Water Act regarding large-scale heat pumps, if the permitting body does not respond within the prescribed period or does not request supplements to the application, etc., the application is deemed granted. Similarly, in the case of Mining Act, if the permitting authority does not comment on the submitted project application, for example on the performance of exploratory wells, within a specified period, the permitting authority is deemed to have no objections. In Poland, submitting a geological design documentation prepared by an authorized designer is required for identification and evaluation of new geothermal resources (geological surveys, exploratory boreholes and other related tests), however, no specific permit is required to carry out exploration works.

Given the complexity of all permitting processes, it is recommended to continue with a single methodology for individual permitting authorities – for example, to update and extend the current methodological guidelines to cover geothermal water. It is also important to retrain the relevant administrative bodies and their staff since geothermal projects are relatively rare and the officials do not have a routine in such procedures. State authorities (e.g. the Main Mining Authority, the Ministry of Economy of the Slovak Republic) may also issue comprehensible guidelines for investors explaining in detail the process of a geothermal well permitting. A simple "guide" for municipalities or entrepreneurs that/who contemplate a geothermal project would raise awareness.

Alternatively, **certain requirements could be simplified partially in the individual regulations in order to speed up the procedural processes**:

In practice, **the current system of mandatory designation of exploration areas** for all geothermal resources enables individual operators to acquire exclusive rights over large areas, often for the sole purpose of carrying out a single well, while the geological structure may have a much greater potential, reducing the efficiency and transparency of the land use. Given the special, in particular renewable nature of geothermal resources, the dynamics of the rock environment and the often low impact of extraction, a complete abolition of the institute of geothermal exploration area for geothermal resources should therefore be contemplated. Abolition of the institute of exploration area would significantly reduce the administrative and bureaucratic burden for investors, facilitate the entry into the geological exploration process – especially for smaller and regional players – and accelerate the development of geothermal projects in line with the objectives of public administration modernization, promoting competition and efficient use of renewable energy sources. Combined with market mechanisms, this model could bring a professional, efficient and transparent solution without the need for a formal designation of the exploration area.

An alternative approach would be **a voluntary regime of exploration area designation** for geothermal resources which means that it would not be mandatory to apply for an exploration area designation to carry out surveys – this step would be elected by investors only if the nature of the survey requires so.

If the state does not make changes in the form of abolishing mandatory exploration areas designation or making exploration areas designation voluntary for geothermal drilling, a progressive system of fees (tariffs) could be an effective solution where the amount of compensation would increase in proportion to the size of the designated exploration area. Such a set-up would motivate investors to apply for designation of only the area size that is necessary for the planned geological works.

The current legislation considers the use of geothermal energy to be **a special intervention in the Earth's crust** and thus a mining activity. However, from a technical point of view, it is questionable whether this form of geothermal energy should be regulated by mining administration and considered to be a mining activity. It is a renewable energy source and therefore it is not fully analogical with mineral extraction. That creates a number of uncertainties and administrative load, especially for small local installations that have to obtain mining license originally intended for industrial projects. Moreover, the legislation does not differentiate between different forms of geothermal energy (e.g. "dry rock heat" vs. geothermal water) and the duplication of oversight is further reinforced by divergent regulations (Mining Act, Water Act).

One of the solutions is to repeal the legislation under which the establishment of geothermal resources is a specific intervention in the Earth's crust (as was the case with the legislation before 2013). Drilling wells above 30 m would remain within the scope of the mining legislation as an activity carried out in a mining manner (Section 3(h) of the Mining Activity Act). Alternatively, it is also possible to supplement the Mining Act with a definition stipulating that the geothermal energy use for business or industrial purposes is a specific intervention in the Earth's crust, excluding the use of geothermal water or the thermal potential of ordinary water, or if the project exceeds the specified limits of drilling output or depth.

Barrier:

From the formal and legal perspective, the current **regulation of a protection area for special intervention in the Earth's crust** under the Mining Act for geothermal resources is insufficient and ambiguous. Although the legislator's intention to protect also geothermal resources from undesirable intervention is legitimate and understandable, the legislative technique chosen (reference to *appropriate use* of existing provisions of the Mining Act) raises **doubts as to its compliance with the principles of legal certainty and lawfulness**. A lack of specificity and clarity may, in extreme cases, cause that the entities concerned will not regard the imposed restrictions as binding or will legally challenge. The risk is that the **Constitutional Court of the Slovak Republic could** arrive at the conclusion that Section 34(3) in conjunction with Sections 18 and 19 is not in line with the Slovak Constitution. It is also questionable whether the current regulation of a protected area for special intervention in the Earth's crust fulfills the State's interest in developing the geothermal energy use at all. If a geological structure has a greater potential than that confirmed by a single well, it may not be in the interest of the State or other investors to block the entire area for various activities and further use of geothermal energy. According to the real data on the number of protected areas designated under the Mining Act, it is only a negligible part of the existing wells and only a few businesses have a protected area designated. It is necessary to emphasize also that designated protected areas are not supported by any professional opinion that would determine their extent as legitimate and necessary while such a professional basis is required as a standard for example upon determination of protection zones of water sources under the Water Act.

Solution:

The optimal solution would therefore be **a legislative clarification** that would leave some leeway to the professional administration, for example introduction of **a specific category of "geothermal resource protected area"** and at least an outline of the criteria determining the boundaries of such an area (e.g. based on geological survey results and estimates of heat or water use) and explicitly define restrictions (prohibited activities) in such an area.

If legislation on exclusion of use of geothermal energy from specific interventions in the Earth's crust is passed, it will be necessary to ensure geothermal resources protection otherwise, for example by amendment of the water legislation so that protection of hydrogeothermal resources is guaranteed without the need to use the concept of a protected area under the mining legislation. The aim is to ensure strict oversight of large-scale geothermal projects while facilitating administration and eliminating duplication of procedures for smaller, non-commercial installations.

4.2. Ad. B) Institutional area

Barrier:

The legislation in force grants the authorities concerned (e.g. nature conservation authorities and district mining offices) a *de facto* **right of veto in determination of exploration areas without the possibility of defense on the part of the investor**. That means that even if the investor meets all the technical and financial conditions, opposition of a single authority concerned can block the whole process. There is a proposal to **introduce a dispute resolution mechanism among** the authorities concerned, inspired for example by the provisions of the Construction Code. First, agreement among the authorities concerned should be sought. If no agreement is reached, opinions from superior authorities should be sought and if discrepancies persist, the final decision would be made by the administrative authority- the Ministry of Environment of the Slovak Republic. Such an approach would ensure that

the opinions of all the parties involved are taken into account in a balanced way, without a single disagreement being able to block the entire process of the exploration area designation.

A necessary precondition for the construction permitting procedure is that any new sustainable development activity that may affect bodies of surface water or groundwater undergoes an assessment according to the provisions of **Section 16a of the Water Act**. However, this two-step approach faces a number of challenges in practice, in particular with regard to a significant administrative and time burden involved in obtaining binding statements and opinions. The information available suggest that it may take several months to prepare a professional opinion – which is provided for by a single authorized institution, the Water Research Institute – which prolongs the permitting procedure and increases the financial costs due to the fee charged for such an opinion. Moreover, the procedure is in many respects ambiguous and duplicative with regard to the existing environmental assessment procedures, without taking into account the specific requirements of geothermal projects.

Solution:

The solution is to integrate the requirements of the Water Framework Directive into the environmental assessment procedures while integrating the assessment under Section 16a into the procedures under the EIA Act which would simplify and speed up the whole process, eliminate duplications and minimize administrative burden, without compromising the level of environmental protection. Speeding up the assessment process could also be achieved, for example, by setting an exact legal period for the Water Research Institute to draw up a professional opinion. A legislation redefining the conditions and criteria for exemptions granting specifically for geothermal projects, taking into account their social and strategic importance and optimizing the permit-granting process thereby, is it not excluded either.

4.3. Ad C) Socioeconomic area

Barrier:

Geothermal energy is an important renewable resource that can be used by municipalities to produce heat or electricity in a sustainable way. Despite the potential benefits (e.g. reduction of CO_2 emissions, stable heat prices for residents and use of local resources), the involvement of municipalities in geothermal projects is often minimal. Many municipalities are hesitant to invest in geothermal infrastructure due to high initial costs, long return on investment, the "not in my backyard" phenomenon and technological risks. The lack of incentives for municipalities results in unused geothermal energy potential in the regions. Another obstacle may be **insufficient financial incentive from the State**. If the available subsidies or other forms of support are too low (e.g. they cover only a small portion of the investment costs) or if it is administratively difficult to obtain them, municipalities do not have sufficient incentive to invest their own resources.

Solution:

Overcoming the current weak motivation of municipalities to participate in geothermal energy projects requires targeted measures of which the most important are **financial incentives**. The analysis shows that it is precisely the increase in the intensity and availability of State aid that can provide a decisive impetus. Slovakia has the possibility to make use of the existing EU mechanisms – in particular the GBER block exemptions – that allow a **significant support for small and community-based RES projects** (including geothermal projects) without complex permitting. The GBER gives municipalities and energy communities room to receive operating aid for geothermal energy and the State can set this support to the maximum limits allowed by the rules. At the same time, the new CEEAG 2022 offer a framework for granting even more generous forms of aid by notification of a specific State aid scheme – including potentially 100% covering of justified costs if the prescribed conditions are met (e.g. a competitive bidding process). Combining those instruments – from investment grants through partial coverage of operating costs to possible new aid schemes – can create an environment in which municipalities will not regard geothermal projects as a disproportionate risk but as a viable opportunity. More generous state support would reduce the financial risk, shorten the period of return on investment and increase the overall attractiveness of projects.

Complementary measures such as administrative simplification for energy communities and guarantees for risky drilling will further enhance this effect.

The next chapter continues with specific description of the actual financial barriers to geothermal energy use compared to selected countries, including proposals of possible solutions.

4.4. Ad. D) Financial area

Barrier:

Compared to Germany and Poland, the support for geothermal energy in Slovakia is designed inversely, i.e. the operating aid is preferred (but only in the context of high-efficiency cogeneration where operating aid is paid only for the electricity generated) over investment aid that is also available in Slovakia but to a relatively limited extent. In Germany and Poland, the situation is the opposite – investment aid is preferred (exploratory drilling and associated tests, followed by support for purchase of surface technological equipment – thermal and power plants and/or cogeneration units, related software, connection to electricity networks or heating systems, etc.).

Solution:

Extend existing investment support in Slovakia and increase the aid intensity for calls from the Modernization Fund. In particular, the Polish programmes (NFEPWM, RES – Heat Source for Heating Systems and FEnIKS) can be an inspiration in this case, allowing, in the form of grants and loans, for financing of exploration works (bores, tests), as well as construction, reconstruction or modernization of heating plants, power plants, cogeneration units, including the possibility of carrying out further boreholes or improving their operating parameters. Support is also possible for geothermal projects aimed solely at heat generation. By contrast, operating aid is not granted at all in Poland, whereas it is granted only to a very limited extent in Germany. In this context, it would be appropriate to combine investment support in Slovakia (in a similar regime as, for example, in Poland) with the existing operating aid that would be calculated not only on the basis of the volume of electricity generated but also on the basis of installed capacity and could also be granted for projects aimed exclusively at heat generation from geothermal sources. More detailed information on the specific parameters of individual financial instruments is given in Annex 3-3a, 3-3b.

Synergies **with European and other international programmes** can also be exploited when setting up new financial instruments or modifying existing ones in order to avoid duplication and inefficient use of funds. In particular, the following programmes:

- Horizon Europe
- Innovation Fund
- LIFE
- EUCF- European City Facility
- Connecting Europe Facility- CEF Energy
- European Investment Bank/EIB Advisory – ELENA, TARGET, JASPERS
- Modernization Fund
- Just Transition Mechanism
- Renewable Energy Financing Mechanism (RENEWFM)
- C4T Groundwork (Cohesion for Transition)
- EEA & Norway Grants

Further information on these programmes are available in Annex 4-1.

However, a key factor in development of geothermal energy in Slovakia lies with the introduction or non-introduction of price caps on the fixed component of natural gas prices from 1 January 2026 (see Part A). If implemented, it will have a negative impact not only on the geothermal energy development but also on the overall development of renewable energy in Slovakia.

EXECUTIVE SUMMARY

This last chapter briefly and transparently summarizes all the essential findings in the form of identified barriers and solutions proposed to remove them (based on chapter 4), divided into four key areas: legislative, institutional, socioeconomic and financial.

1. Legislative

- Inconsistency in terminology and definitions in the area of geothermal projects between Slovak laws and decrees (Geological Act, Mining Act, Water Act, EIA Act, etc.), making it difficult to find a thematic meeting point among their individual provisions which makes it very difficult to integrate permitting procedures across those laws and decrees.
- Several permitting processes (see the list of key Acts above) do not run in parallel under individual laws upon geothermal projects preparation and permitting, they run in sequences which significantly prolongs the process of permitting those projects.
- According to the above, integration of permitting processes shows up across three key laws – the Geological Act, Water Act and EIA Act similarly to other countries, for example in Germany (Integrated Construction Code and Energy Act) or Poland (Integrated Geological Act and Mining Act).
- In addition to integration of the permitting regulations, simplification of them is crucial. Inspiration may be driven from examples from Germany – exploratory wells for the purpose of geothermal heat supply may be carried out before the issue of permits under the Mining and Water Act while low-temperature shallow wells with a depth of up to 400 m do not need to be permitted under the Mining Act. There are also so-called monthly periods in place to speed up the work of decision-making bodies – for example, if they do not comment on a geothermal project application within a certain period, the application is deemed granted. In Poland, a geological design documentation prepared by an authorized designer is necessary for implementation of exploratory wells but no specific permit is required for the actual realisation of these wells.
- Simplification and possibly clarification of other aspects shows up, for instance introduction of voluntarism of the institute of exploration area (and/or introduction of tariffs for exploration areas holders according to the area size), reconsideration of geothermal projects as direct interventions in the Earth's crust that are currently subject to the Mining Act as well as more precision of the legal terminology relating to the protected area of direct intervention in the Earth's crust (the so-called geothermal resource protected area).

2. Institutional

- Permits for geothermal projects under the Water Act are granted exclusively by the Water Research Institute and the waiting times are very long – therefore introduction of a specific statutory period for comments is proposed and, if necessary, staff augmentation of the Institute.
- In the context of permitting procedures, the institutions involved can veto exploration area designations which may lead to a situation where a single veto of an institution stops a prospective geothermal project with both economic and environmental benefits. Arbitration in superior institutions therefore comes into consideration and if no solution is found with them, creation of an institution of last resort, a so-called supreme authority that would issue a final decision should be contemplated (the Ministry of Environment of the Slovak Republic is recommended to take that role).

3. Socioeconomic

- The mental barrier of public and private investors and civil society to geothermal energy – "not in my backyard" – i. e. approach of "not my property, I have no control over it."

- High level of risk associated with exploratory geothermal wells – low yield/efficiency potential of the geothermal resource, potentially complicated geological conditions for extraction of geothermal water for energy generation purposes from the technical perspective, etc.
- Since geothermal projects are investment demanding, the return on investment is very long.

4. Financial

- The current state of financial aid granting for geothermal energy in Slovakia is inverse compared to the situation in Germany and Poland – those countries favour investment aid over operating aid (in Poland, there is no operating aid at all, in Germany it is only symbolic). In Slovakia on the contrary, investment aid is very limited (see Chapter 1 – in particular the Modernization Fund of the Slovak Republic) and operating aid significantly predominates (but exclusively focusing on combined electricity and heat generation with aid paid only for generation of electricity, not heat).
- In Slovakia, the combination of investment and operating aid is not allowed, although the European legislation allows it.
- Operating aid in Slovakia favours combined generation of electricity and heat from less environmentally friendly energy sources because it is paid per volume of electricity generated in MWh and not per installed capacity in MW.
- In relation to the above, there is a proposal to use the possibility of combining the investment aid with operating aid to significantly extend the investment support following the Polish example (exploratory works/wells, surface technological equipment – heating stations – heat distribution – connection to district heating systems as well as heat exchanger stations/cogeneration units and connection to electricity distribution networks, possibility of subsequent investments in additional wells in the same geothermal sources and/or extension of existing wells – improvement of their operating parameters; see programmes NFEPWM, RES – Heat Source for Heating Systems and FEnIKS), grant operating aid also for heat generation not only for CHP and pay it not only per volume of generated energy (MWh) but also per installed capacity (MW).
- Reconsider the planned implementation of price regulation of fixed components of the natural gas price from 1 January 2026.

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Annexes

All annexes are numbered according to the relevant parts of the Analysis. The first digit refers to the number of the Part, the second digit follows the ordering. No annex is related to the Part 2.

Annex 1.1 – Slovak Funds

Annex 3.1 – Examples of good practice in Poland

Annex 3.2 – Examples of good practice in Germany

Annex 3.3a – Terms and conditions of the NFEPWM (Polish funding)

Annex 3.3b – NFEPWM evaluation criteria (Polish funding)

Annex 4.1a – Overview of EU funding: Horizon Europe

Annex 4.1b – Overview of EU funding: Innovation Fund

Annex 4.1c – Overview of EU funding: LIFE

Annex 4.1d – Overview of EU funding: EUCF – European City Facility

Annex 4.1e – Overview of EU funding: Connecting Europe Facility – CEF Energy

Annex 4.1f – Overview of EU funding: European Investment Bank/EIB Advisory – Elena

Annex 4.1g – Overview of EU funding: European Investment Bank/EIB Advisory – JASPERS

Annex 4.1h – Overview of EU funding: European Investment Bank/EIB Advisory – TARGET

Annex 4.1i – Overview of EU funding: Modernization Fund

Annex 4.1j – Overview of EU funding: Just Transition Mechanism (JTM)

Annex 4.1k – Overview of EU funding: Renewable Energy Financing Mechanism (RENEWFM)

Annex 4.1l – Overview of EU funding: C4T Groundwork (Cohesion for Transition)

Annex 4.1m – Overview of funding: EEA and Norway Grants