

Geothermal Energy Use, Country Update for Romania

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ABSTRACT

This country update regarding the geothermal energy use in Romania deals with both deep and shallow geothermal energy. The document presents the latest developments in this field, highlighting key advancements in both sectors. Over recent years, Romania has made significant progress in harnessing geothermal resources for heating, cooling, and energy production. In the deep geothermal sector, there have been notable initiatives such as the expansion of district heating systems in cities like Ștei and Salonta, which use geothermal wells and heat pumps to promote energy efficiency and reduce CO₂ emissions. In parallel, the shallow geothermal sector has seen increasing adoption of ground-source heat pumps (GSHP) in residential, commercial, and industrial buildings, providing sustainable solutions for heating and cooling. The integration of these technologies supports Romania's commitment to renewable energy, offering an environmentally friendly alternative to conventional energy sources. These developments reflect the country's growing role in the European geothermal energy landscape and its potential to lead in the renewable energy sector.

1. DEEP GEOTHERMAL ENERGY RESOURCES AND EXPLOITATION

1.1. Ștei Geothermal + GSHP - District heating

The geothermal heat pump system in the town of Ștei, Bihor County, is an innovative project that harnesses geothermal energy to provide heating and domestic hot water to both public and residential buildings. It operates in combination with a 400 MW_{el} photovoltaic installation. This integrated system helps reduce carbon emissions and enhances energy efficiency within the community.

The system relies on geothermal wells drilled to depths of approximately 700 meters, where the water temperature is around 50°C. Ground-water heat pumps extract thermal energy from wastewater, which is then transferred to the buildings' heating systems. The generated heat is distributed through a network of pipes to connected buildings, supplying both space heating and domestic hot water. The system has an installed thermal capacity of approximately 1.5 MW_{th}, which is sufficient to serve several public and residential buildings in the area, including the high school, gym, swimming pool, and student campus.

By utilizing geothermal energy, the system significantly reduces greenhouse gas emissions and supports efforts to combat climate change. It provides an efficient and sustainable heating solution with low long-term operational costs. Harnessing local geothermal energy resources reduces dependence on fossil fuels and external energy grids.

1.2. Salonta City

The city of Salonta, located in Bihor County, Romania, is on the verge of completing a forward-looking geothermal energy project designed to reduce heating costs for public infrastructure while significantly lowering environmental impact. This initiative reflects a growing trend within the region, where other municipalities such as Beiuș have already demonstrated the viability and benefits of geothermal-based district heating systems. This positions Salonta as a regional leader in renewable district heating, showcasing how mid-sized municipalities can tap into local geothermal resources for sustainable development.

At the core of the project lies a doublet geothermal well system. One well is designated for production, extracting geothermal water from the subsurface, while the second is intended for reinjection, returning the thermally depleted water back into the same geological layer from which it was drawn. Both wells are drilled to depths of approximately 1700 meters. The reinjection well complies with EU environmental

regulations that require returning the used thermal water to the same geothermal layer.

The thermal energy is distributed via a newly constructed, pre-insulated underground pipeline network with a total length of 6.4 kilometers - 3.2 km each for supply and return lines. This infrastructure minimizes heat loss during transportation and enhances the system's overall efficiency. A central thermal plant will be located within the Municipal Hospital campus. This facility will house key components such as heat exchangers, circulation pumps, and automated control systems to manage flow rates and temperature across multiple connected public buildings.

The geothermal installation is expected to deliver a thermal power output of approximately 2.3 MW_{th}, generating an estimated 7000 MWh_{th} of thermal energy annually. This energy will be used to provide space heating and domestic hot water to institutions such as schools, hospitals, administrative buildings, and social care facilities. In doing so, it will displace conventional energy sources such as natural gas and electricity, leading to an estimated annual reduction of 1400 to 1800 tons of CO₂ emissions.

Through this initiative, Salonta exemplifies how careful geological resource management, advanced engineering, and policy-driven environmental compliance can converge to build resilient, low-emission energy systems at the municipal level.

1.3. The Pannonian aquifer

Three new projects are planned to harness geothermal water from the Pannonian sandstone aquifer, as extensively described by Antics M. (1997). Each project follows a similar structure: drilling one production well and one reinjection well, constructing a geothermal heat plant, and developing a district heating network to supply space heating and domestic hot water to public buildings such as schools, hospitals, municipal offices, and social institutions. The most technically challenging aspect lies in designing and completing the reinjection wells, as high-rate injection in sandstone formations is significantly more complex than in fractured reservoirs. Given the chemical characteristics of the geothermal water—particularly the presence of phenolic compounds—reinjection is not only essential for reservoir sustainability but also legally required, since surface disposal is not permitted.

1.3.1. Grădina Termală Ioşia Oradea

The *Grădina Termală Ioşia* (Fig. 1) project in Oradea represents a major initiative to redevelop the existing Ioşia Thermal Bath Complex into a contemporary thermal garden complex. The project includes the construction of both indoor and outdoor thermal pools, a wellness and spa centre, fitness areas, and landscaped green zones. The developed area will cover approximately 32'405 square meters out of a total site of 45'084 square meters.



Figure 1: Grădina Termală Ioşia

This investment is supported through the North-West Regional Program 2021–2027, with a total funding allocation exceeding € 43 million. Implementation is scheduled over a two-year period and aims to enhance regional tourism infrastructure while promoting the integration of renewable thermal energy.

The geothermal system associated with the project is designed to supply not only the thermal garden but also neighbouring residential buildings, including apartment blocks and private homes. The total installed thermal capacity of the geothermal plant is estimated at approximately 67 MW_{th}, contributing to the sustainable heating of the wider urban area.

1.3.2. Geothermal plant Nufarul 1 Oradea

The *Nufărul 1* geothermal power plant in Oradea represents an innovative approach to harnessing geothermal energy for district heating and hot water supply in the Nufărul neighbourhood. This project utilizes geothermal resources through a system of four wells: two dedicated to extraction and two to reinjection. One of the extraction wells, already managed by Transgex, is situated on Depozitului Street, while the second will be drilled to a depth of 2300 meters on Meiului Street. The thermal waste water will be reinjected into the geothermal aquifer via wells located on Peneş Curcanul and Ciheiului streets.

In the first phase of the project, an installed capacity of 19 MW_{th} will be provided, with the expectation that the system will reach an installed capacity of up to 50 MW_{th}. This value accounts for the combined capacity of the geothermal source and the heat pumps, which will serve the entire thermal network in the Nufărul neighbourhood.

To support the geothermal heating infrastructure, a new thermal network of 11.2-km will be constructed. This network will transport the primary thermal agent to 277 thermal modules, which will replace the seven existing thermal points in the neighbourhood. This modernization aims to significantly reduce thermal losses and enhance the overall efficiency of the district heating system.

The project is designed to directly serve 13'625 residents of the Nufărul neighbourhood, encompassing 6217 apartments, as well as public institutions and commercial entities located on the ground floors of residential buildings. By utilizing renewable

geothermal energy, the system contributes to both the decarbonization of the local energy grid and the optimization of thermal energy distribution within the community.

1.3.3. Aquapark Sănnicolau Mare Timis County

In October 2024, the company responsible for designing the Nymphaea Aquapark in Oradea was awarded the tender to prepare the technical documentation for the new aquapark in Sănnicolau Mare (Fig. 2). The project is envisioned as a major regional attraction, intended to rival similar facilities in neighbouring countries, by utilizing the area's natural geothermal resources.

The City Hall of Sănnicolau Mare aims to complete the investment by the end of 2026. The planned aquapark will tap into a geothermal water source with an installed capacity of approximately 1.5 MW_{th}. The municipality has already secured an exploration license for drilling a new geothermal well at the aquapark site. Additionally, five deep geothermal boreholes located within the city perimeter will be tested and evaluated for potential use in the project.



Figure 2: Aquapark Sănnicolau Mare

This geothermal energy source will provide thermal water for various facilities within the aquapark, including indoor and outdoor pools, wellness and physiotherapy areas, and recreational zones. By leveraging geothermal energy, the project is expected to offer a sustainable and cost-effective heating solution, enhancing the aquapark's year-round appeal and contributing to its environmental and economic sustainability.

2. SHALLOW GEOTHERMAL ENERGY RESOURCES AND EXPLOITATION

2.1. Stihl Factory - Oradea

The new Stihl production facility in Oradea represents a significant investment in sustainable manufacturing infrastructure. Located in the *Eurobusiness I Industrial Park* on Borşului Street, the facility spans approximately 147'000 square meters, with a built area of nearly 47'000 square meters. Construction commenced in March 2024, with production expected to begin in September 2025. The facility is projected to employ around 700 people by 2028.

A key feature of the facility is its commitment to sustainability, notably through the integration of a

shallow geothermal energy system. This system comprises 83 vertical borehole heat exchangers (BHEs), each 100 meters deep, providing a heating capacity of 580 kW_{th} and a cooling capacity of 500 kW_{th}. The geothermal system, combined with photovoltaic installations, enables the facility to operate independently of fossil fuels, aligning with Stihl's environmental objectives. The building is designed to meet the standards of the German Sustainable Building Council (DGNB), reflecting a holistic approach to energy efficiency and environmental stewardship.

2.2. Students Dormitory - Marghita

In Marghita, a student dormitory (Fig. 3) was equipped with a shallow geothermal system designed to provide a comfortable indoor environment for residents while keeping long-term energy costs low. The system consists of 20 vertical boreholes drilled to 110 meters, providing a total thermal capacity of 150 kW_{th} for heating and 120 kW_{th} for cooling.



Figure 3: Students Dormitory - Marghita

The decision to install a ground-source heat pump (GSHP) system stemmed from the desire to modernize the heating infrastructure of the dormitory using renewable sources and to ensure consistent comfort for students throughout the year. The project showcases how even medium-sized buildings can benefit from decentralized geothermal systems that operate silently, require little maintenance, and have low operating costs. In addition, the system promotes environmental awareness among students, serving not just as infrastructure, but as a didactic example of sustainable development. The compactness of the borehole field also made the installation feasible within the existing campus, without major disruption.

2.3. School and Kindergarten - Aleşd

The educational complex in Aleşd, comprising a primary school and kindergarten, highlights how geothermal systems can be harnessed to provide safe, efficient, and quiet climate control for children and teaching staff. This installation is composed of 40 BHEs, each 110 meters deep, linked to a ground-source heat pump system that delivers 280 kW_{th} of heating and 250 kW_{th} of cooling.

One of the primary motivations behind this project was the need to ensure high indoor air quality and thermal

comfort in a setting where young children spend most of their day. By using geothermal energy, the building benefits from a stable and renewable heat source with zero local emissions. This is especially important in educational environments, where thermal stability contributes to concentration, health, and learning efficiency. Additionally, the system's low operational noise makes it particularly well-suited for use in classrooms and nursery spaces. The success of this installation underscores the potential for replicating similar systems in other rural or peri-urban public buildings across Romania.

2.4. Serenity Bucharest 2+3

Situated in a dense urban zone of Romania's capital, the Serenity residential development incorporates shallow geothermal energy as a sustainable response to growing cooling demands during the hot summer months. The two apartment blocks - Serenity 2 and 3 - rely on a field of 150 vertical boreholes, each 100 meters deep, to support a cooling-only geothermal system with a total output of 840 kW_{th}.

This solution demonstrates how shallow geothermal systems can be flexibly tailored to specific climatic needs, in this case providing efficient summer cooling to dozens of apartments without overloading the electrical grid. The geothermal system reduces dependency on conventional air-conditioning units, which are often inefficient and contribute to urban heat islands.

Serenity represents a new generation of climate-resilient, low-energy buildings in Bucharest, where geothermal systems are invisibly integrated into the building's energy concept, allowing maximum comfort with minimal environmental impact. It also reflects a growing market interest in green infrastructure in the real estate sector.

2.5. Sport Arena – Braşov

The Sport Arena in Braşov is one of the most ambitious shallow geothermal projects implemented in a public sports facility in Romania. The system utilizes 250 BHEs, each 50 meters deep, to support a ground-source heat pump system that delivers 700 kW_{th} for heating and an equal amount for cooling.

Given the high and dynamic energy demands of the facility - ranging from large spectator events to intensive athletic use - the geothermal installation was dimensioned to provide stable year-round climate control, independent of external weather fluctuations. The relatively shallow depth of the boreholes was offset by their high number and optimal layout, enabling efficient heat exchange with the subsurface.

This project serves as a reference case for applying geothermal solutions in buildings with fluctuating thermal loads and high occupancy rates. Moreover, the silent and emissions-free operation of the system enhances user comfort while contributing to the city's environmental goals. The Sport Arena also functions as

a visible and practical example of renewable energy deployment in public infrastructure, fostering broader acceptance among the population.

2.6. Ambulatory Hospital (Energy Piles) – Oradea

A particularly innovative application of shallow geothermal energy is found at the Ambulatory Hospital in Oradea (Fig. 4), where energy piles - foundation elements embedded with geothermal loops - serve as both structural supports and heat exchangers. A total of 240 such piles, each 14 meters deep, enable the supply of 190 kW_{th} for heating and 170 kW_{th} for cooling.

This dual-purpose solution allowed the system to be implemented without additional space requirements, making it ideal for urban areas where land availability is limited. The geothermal energy supports the hospital's heating and cooling needs year-round, providing a stable and comfortable environment essential for medical care.



Figure 4: Ambulatory Hospital (Energy Piles) – Oradea

This project showcases how geothermal systems can be integrated early in the structural design phase of buildings, enabling multifunctionality and energy savings without visual impact. The case also confirms the suitability of shallow geothermal solutions in critical infrastructure, where reliability and performance are paramount.

2.7. ONE Blockhouses ODT - Bucharest

The ONE Blockhouses project in Bucharest represents a forward-looking residential development that integrates shallow geothermal energy as part of its sustainable building strategy. The system features 100 vertical BHEs, each 100 meters deep, and delivers 600 kW_{th} of heating and 500 kW_{th} of cooling.

This initiative aligns with the developer's focus on green certification, energy efficiency, and high comfort standards. The geothermal installation not only reduces the building's dependency on centralized heating but also enhances thermal autonomy and indoor air quality for residents. The project reflects a growing trend in Bucharest toward low-energy residential design and demonstrates how shallow geothermal systems can be successfully adapted to high-density urban contexts.

The combination of architectural innovation and renewable energy in this project serves as a benchmark for future developments aiming for climate neutrality.

2.8. Shallow Geothermal Systems in Private Housing Developments

In 2024, shallow geothermal systems saw increased adoption among private homeowners in Romania, with an estimated 320 vertical borehole heat exchangers (BHEs) installed nationwide. Each BHE reached an average depth of 110 meters, totalling over 35'000 meters of drilled exchange length. The combined heating capacity reached 2400 kW_{th}, while the cooling capacity was approximately 1900 kW_{th}.

These systems typically employ closed-loop vertical ground heat exchangers connected to individual water-to-water ground source heat pumps (GSHPs), sized between 5 and 35 kW_{th} per household. The installations primarily serve low-temperature underfloor heating and provide cooling during summer via fan coil units or passive cooling loops, depending on the local design.

The systems operate autonomously, without the need for centralized heating infrastructure, and are often integrated into new residential constructions or energy retrofit projects. The high seasonal performance and reliability make these solutions attractive in both urban and rural areas.

This trend marks a significant step toward decentralized renewable heating and cooling in Romania, supporting the broader goals of building-sector decarbonization and energy independence for homeowners.

3. CONCLUSIONS

The geothermal energy has a great potential for development in Romania. This potential can be exploited only through a wise national strategy in investments and professional training.

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Tables A-G

Table A: Present and planned geothermal power plants, total numbers

	Geothermal Power Plants		Total Electric Power in the country		Share of geothermal in total electric power generation	
	Capacity (MW _e)	Production (GWh _e /yr)	Capacity (MW _e)	Production (GWh _e /yr)	Capacity (%)	Production (%)
In operation end of 2024	0.1	0.8	7069	61931	0.0014	0.0013
Under construction end of 2024						
Total projected by 2028						
Total expected by 2032						
In case information on geothermal licenses is available in your country, please specify here the number of licenses in force in 2024 (indicate exploration/exploitation if applicable):					Under development:	
					Under investigation:	

Table B: Existing geothermal power plants, individual sites

Locality	Plant Name	Year commissioned	No of units *	Status	Type	Total capacity installed (MW _e)	Total capacity running (MW _e)	2024 production * (GWh _e /y)
Oradea	CE Iosia Nord	2012	1	O	B-ORC	0.05	0.05	0.4
Beius	Beius	2014	1	O	B-ORC	0.05	0.05	0.4
total						0.10	0.10	0.8
Key for status:		Key for type:						
O	Operating	D	Dry Steam	B-ORC		Binary (ORC)		
N	Not operating (temporarily)	1F	Single Flash	B-Kal		Binary (Kalina)		
R	Retired / decommissioned	2F	Double Flash	O		Other		

* In case the plant applies re-injection, please indicate with (RI) in this column after number of power generation units

Table C: Present and planned deep geothermal district heating (DH) plants and other uses for heating and cooling, total numbers

	Geothermal DH plants		Geothermal heat in agriculture and industry		Geothermal heat for buildings		Geothermal heat in balneology and other *	
	Capacity (MW _{th})	Production (GWh _{th} /yr)	Capacity (MW _{th})	Production (GWh _{th} /yr)	Capacity (MW _{th})	Production (GWh _{th} /yr)	Capacity (MW _{th})	Production (GWh _{th} /yr)
In operation end of 2024	175	340	18	45	85	190	24	55
Under construction end 2024	120	250	0	0	25	57	40	87
Total projected by 2028								
Total expected by 2032								

* Note: spas and pools are difficult to estimate and are often over-estimated. For calculations of energy use in the pools, be sure to use the inflow and outflow temperature and not the spring or well temperature (unless it is the same as the inflow temperature) for calculating the energy parameters, as some pool need to have the geothermal water cooled before using it in the pools.

Table D1: Existing geothermal district heating (DH) plants, individual sites

Locality	Plant Name	Year commissioned	CHP **	Cooling ***	Geoth. capacity installed (MW _{th})	Total capacity installed (MW _{th})	2024 production * (GWh _{th} /y)	Geoth. share in total prod. (%)
Lovrin	Lovrin	1980's	No	No	1.44	1.44	2.16	100
Jimbolia	Jimbolia	1980's	No	No	1.44	1.44	2.85	100
Teremia	Teremia	1980's	No	No	1.88	1.88	3.45	100
Calimanesti	Calimanesti	1980's	No	No	10.73	10.73	18.7	100
Otopeni	Otopeni	1980's	No	No	0.0	0.0	0.0	0
Moara Vlasiei	Moara Vlasiei	1980's	No	No	29.9	29.9	33.5	100
Oradea	Nufarul	1992	No	No	5	5	10	100
Beius	Beius	2001	No	No	21	21	25.6	100
Oradea	Calea Aradului	2002	No	No	1.6	1.6	3.9	100
Oradea	Iosia Nord	2005	No	No	19	24.2	25	78.5
Oradea	AQUAPARK NYMPHAEA	2017	No		3.2 ¹⁾	2.2	4.8	100
1 Mai	Hotel&Wellness PERLA	2020	No		1.2 ²⁾	1.2	3.1	100
Oradea	Borehole University (Smart Campus)	2022	No	RI	4.5 ³⁾	4.5	9.2 (est. 2022)	100
Oradea	Borehole ONCEA (Municip. Hospital)	2022	No	RI	4.9 ⁴⁾	4.9	10 (est. 2022)	100
Satu Mare	Livada (North West)	2000	No		2.43	2.43	4	100
Săcueni	Săcueni (North West)	2010	No		13.4	13.4	22	100
Bihor	Borș (North West)	2013	No		8.37	8.37	14	100
Balotesti	Balotesti	2016	No		3	3	5.4	100

* If the geothermal heat used in the DH plant is also used for power production (either in parallel or as a first step with DH using the residual heat in the brine/water), please mark with Y (for yes) or N (for no) in this column.

** If cold for space cooling in buildings or process cooling is provided from geothermal heat (e.g. by absorption chillers), please mark with Y (for yes) or N (for no) in this column. In case the plant applies re-injection, please indicate with (RI) in this column after Y or N.

¹⁾ 2.2 MW_{th} deep geothermal water + 0.9 MW_{th} GSHP on heat recovery from the geothermal waste water

²⁾ 0.9 MW_{th} geothermal water + 0.3 MW_{th} GSHP on heat recovery from the geothermal waste water

³⁾ 3.4 MW_{th} deep geothermal water + 1.1 MW_{th} GSHP on heat recovery from the geothermal waste water

⁴⁾ 4.2 MW_{th} deep geothermal water + 0.7 MW_{th} GSHP on heat recovery from the geothermal waste water

Table D1 (continued): Existing geothermal district heating (DH) plants, individual sites

Locality	Plant Name	Year commissioned	CHP **	Cooling ***	Geoth. capacity installed (MW _{th})	Total capacity installed (MW _{th})	2024 production * (GWh _{th} /y)	Geoth. share in total prod. (%)
Oradea	Crișana region, North West - PT902	2016	No		2	2	4	100
Oradea	SALA SPORTURILOR	2023	No		7.2	7.2	14.2	100
Steii	Crișana region, North West	2024	No		1.5	1.5	2.8	100
Oradea	IMPRIMERIA DE VEST	2024	No		5	5	9.6	100
total								

* If the geothermal heat used in the DH plant is also used for power production (either in parallel or as a first step with DH using the residual heat in the brine/water), please mark with Y (for yes) or N (for no) in this column.

** If cold for space cooling in buildings or process cooling is provided from geothermal heat (e.g. by absorption chillers), please mark with Y (for yes) or N (for no) in this column. In case the plant applies re-injection, please indicate with (RI) in this column after Y or N.

Table D2: Existing geothermal large systems for heating and cooling uses other than DH, individual sites

Locality	Plant Name	Year commissioned	Cooling *	Geoth. capacity installed (MW _{th})	Total capacity installed (MW _{th})	2024 production (GWh _{th} /y)	Geoth. share in total prod. (%)	Operator
Tulcea	Hotel DELTA	2013	Y	0.42	0.42	1.02	100%	Termoline
Timisoara	HELLA FACTORY	2015	Y	0.3	1.7	3.5	18%	Termoline
Oradea	Business Center ROGERIUS	2015	Y	0.42	0.42	0.92	100%	Termoline
Bucuresti	VICTORIEI PLAZZA	2015	Y	0.11	0.75	1.5	15%	Termoline
Salonta	HIGHSCHOOL ARANY JANOS	2016	Y	0.15	0.8	1.6	19%	Termoline
Oradea	EMERGENCY UNIT HOSPITAL	2020	Y	0.35	0.35	0.85	100%	Termoline
Alimani Constanta	ALIRA Winery	2021	Y	0.16	0.4	0.85	40%	Termoline
Oradea	County Hospital	2021	Y	0.63	0.63	1.2	100%	Termoline
Giurgiu	Hotel GIURGIU	2021	Y	0.14	0.14	0.32	100%	Termoline
Satu Mare	Airport Satu Mare	2023	Y	0.35	1.4	2.05	25%	Termoline /Comporsa

* If cold for space cooling in buildings or process cooling is provided from geothermal heat (e.g. by absorption chillers), please mark with Y (for yes) or N (for no) in this column. In case the plant applies re-injection, please indicate with (RI) in this column after Y or N.

Table D2 (continued): Existing geothermal large systems for heating and cooling uses other than DH, individual sites

Locality	Plant Name	Year commissioned	Cooling *	Geoth. capacity installed (MW _{th})	Total capacity installed (MW _{th})	2024 production (GWh _{th} /y)	Geoth. share in total prod. (%)	Operator
Sibiu	Aerport Sibiu	2023	Y	0.84	2.33	3.5	36%	Termoline
Brasov	Hall Brasov	2023	Y	0.5	0.58	1.3	85%	Termoline
Bravov	Brasov Subcetate	2023	Y	0.63	0.7	1.45	90%	Termoline
Alesd	Medical center Alesd	2023	Y	0.2	0.2	0.51	100%	Termoline
Bucharest	Blockhouses Bucharest - ONE	2023	Y	0.85	0.85	1.82	100%	Termoline
Sibiu	Aerport Sibiu	2023	Y	0.84	2.33	3.5	36%	Comporsa
Brasov	Hall Brasov	2023	Y	0.5	0.58	1.3	85%	Comporsa
Bravov	Brasov Subcetate	2023	Y	0.63	0.7	1.45	90%	Comporsa
Alesd	Medical center Alesd	2023	Y	0.2	0.2	0.51	100%	Termoline /Comp.
Bucharest	Blockhouses Bucharest - ONE	2023	Y	0.85	0.85	1.82	100%	Nisal /Comp.
Sibiu	Aerport Sibiu	2023	Y	0.84	2.33	3.5	36%	Comporsa
Brasov	Hall Brasov	2023	Y	0.5	0.58	1.3	85%	Comporsa
Bravov	Brasov Subcetate	2023	Y	0.63	0.7	1.45	90%	Comporsa
Alesd	Medical center Alesd	2023	Y	0.2	0.2	0.51	100%	Termoline /Comp.
Bucharest	Blockhouses Bucharest - ONE	2023	Y	0.85	0.85	1.82	100%	Nisal /Comp.
total				12.15	25.47	44.69	12.15	25.47

* If cold for space cooling in buildings or process cooling is provided from geothermal heat (e.g. by absorption chillers), please mark with Y (for yes) or N (for no) in this column. In case the plant applies re-injection, please indicate with (RI) in this column after Y or N.

Table E1: Shallow geothermal energy, geothermal pumps (GSHP)

	Geothermal Heat Pumps (GSHP), total			New (additional) GSHP in the year 2024		
	Number	Capacity (MW _{th})	Production (GWh _{th} /yr)	Number	Capacity (MW _{th})	Share in new constr. (%)
In operation end of 2024	2750	230	530	N/A	N/A	N/A
Of which networks *	12	2.8	7.2	N/A	N/A	N/A
Projected total by 2028	10	3.5	10.2			

* Distribution networks from shallow geothermal sources supplying low-temperature water to heat pumps in individual buildings (“cold” DH, Geothermal DH 5.0 etc.)

Table G: Incentives, Information, Education

	Geothermal electricity	Deep Geothermal for heating and cooling	Shallow geothermal
Financial Incentives – R&D	N/A	Yes ¹⁾	Yes ¹⁾
Financial Incentives – Investment	N/A	Yes ²⁾	DIS ³⁾
Financial Incentives – Operation/Production	Green Certificates (not operational yet)	N/A	N/A
Information activities – promotion for the public	Media information (not on regular basis)	Media information	Website of the Romanian Geoexchange Society
Information activities – geological information	No	No	No
Education/Training – Academic	Yes ⁴⁾	Yes ⁴⁾	Yes ⁵⁾
Education/Training – Vocational	No	No	Yes ⁶⁾
Key for financial incentives:			
DIS Direct investment support	FIT Feed-in tariff	-A Add to FIT or FIP on case the amount is determined by auctioning	
LIL Low-interest loans	FIP Feed-in premium		
RC Risk coverage	REQ Renewable Energy Quota		
TC Tax credits	O Other (please explain)		

¹⁾ National Res. Plan II, by competition; Horizon Europe calls

²⁾ Operational Plan Large Investments (POIM), NRR (National Recovery and Resilience Plan); Future Cohesion Funds 2021–2027

³⁾ “Green House” Program (approx. 1350 €/application)

⁴⁾ BSc, MSc and PhD in Renewable Energies at the University of Oradea

⁵⁾ Courses on RES (including geothermal) in Master studies in all construction and polytechnic universities in the country

⁶⁾ The 2 involved specialties (GSHP installers and BHE installers) are included in the National Occupations Code (COR). The occupational standards are also in course of elaboration. The specialization courses are not recognized and endorsed by the Education Ministry if the respective specializations are not included in the National Occupations Code (COR).