

Complete energy efficiency solutions, from A to nZEB

2025



Summary:

1 Geothermal
Energy and
GeoExchange

2 Solutions for
Energy
Efficiency

3 Case
Studies

4 Specific
Information

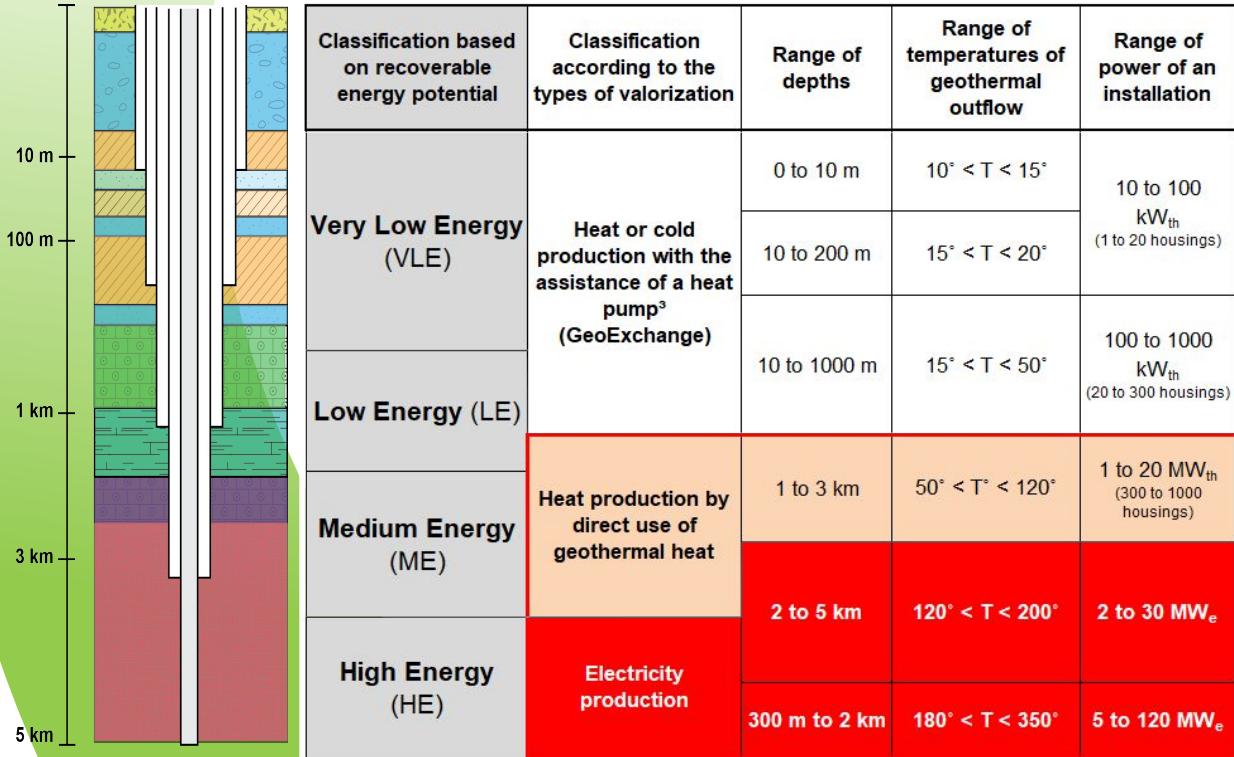
GEOHERMAL ENERGY AND

GEOEXCHANGE

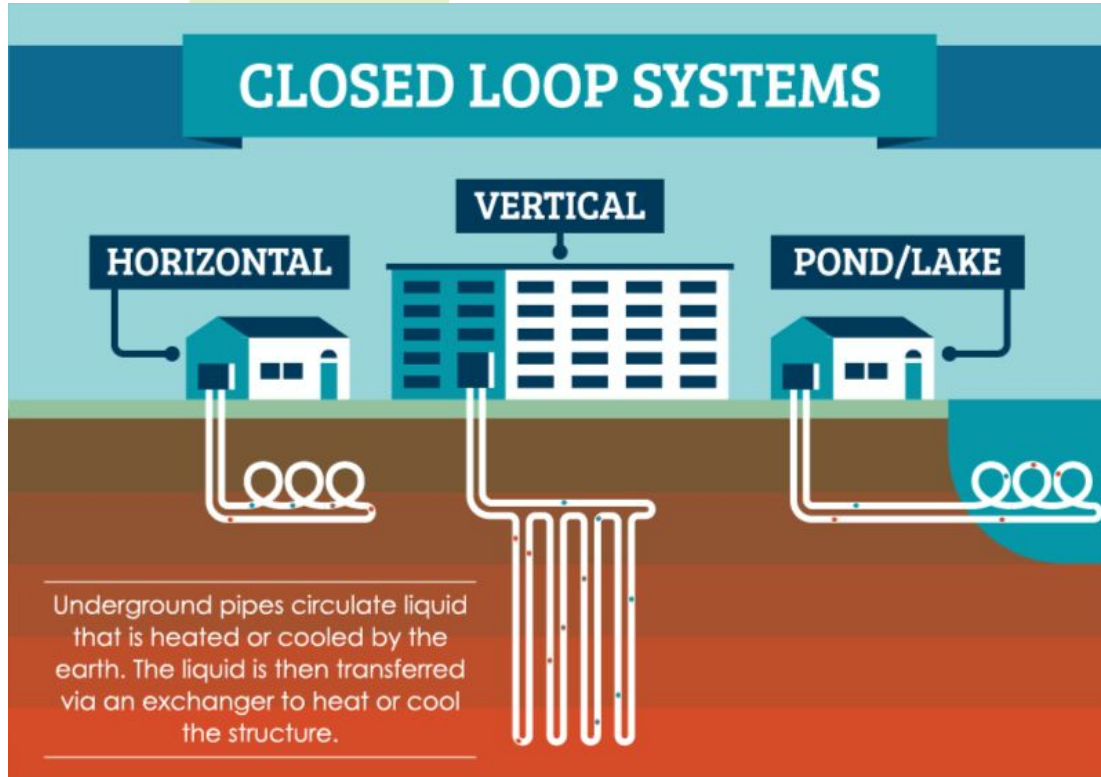
Integrated and competitive solution for
supplying heating, cooling, and domestic hot
water



Geothermal energy classification



Types of probes (closed loop systems)



Source:

<https://hollandheating.com/products-services/geothermal-heating-cooling/>

GeoExchange Operating Principles

Solar energy is stored in the ground, within rock layers, in the form of heat.



The soil temperature varies seasonally, reaching a constant value of approximately 12-13°C at depths ranging from 30m to 120m.



Unlike solar or wind energy, geothermal energy is a continuous source of renewable energy.

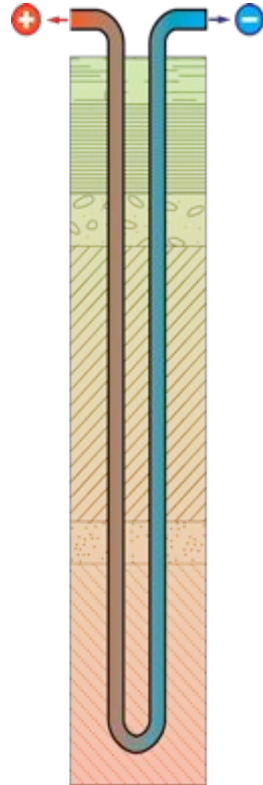
Heating mode:

The heat transfer fluid absorbs heat from the ground and transports it into the building.

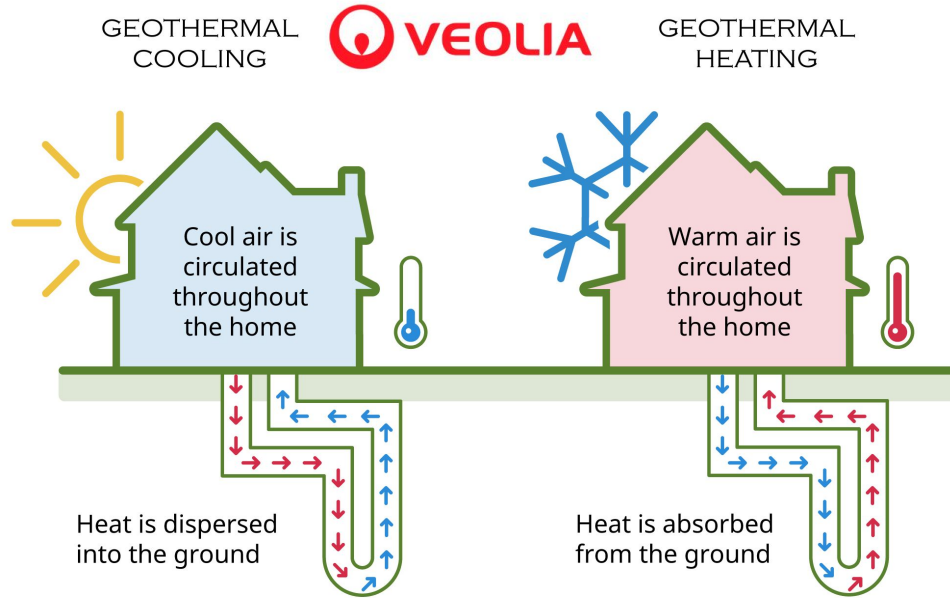
Cooling mode:

The heat is extracted from the building and dissipated into the ground.

The **borehole** includes a **U-shaped geothermal probe** made of high-density polyethylene, which functions as a heat exchanger, transferring energy between the heat transfer fluid in the closed loop and the ground.



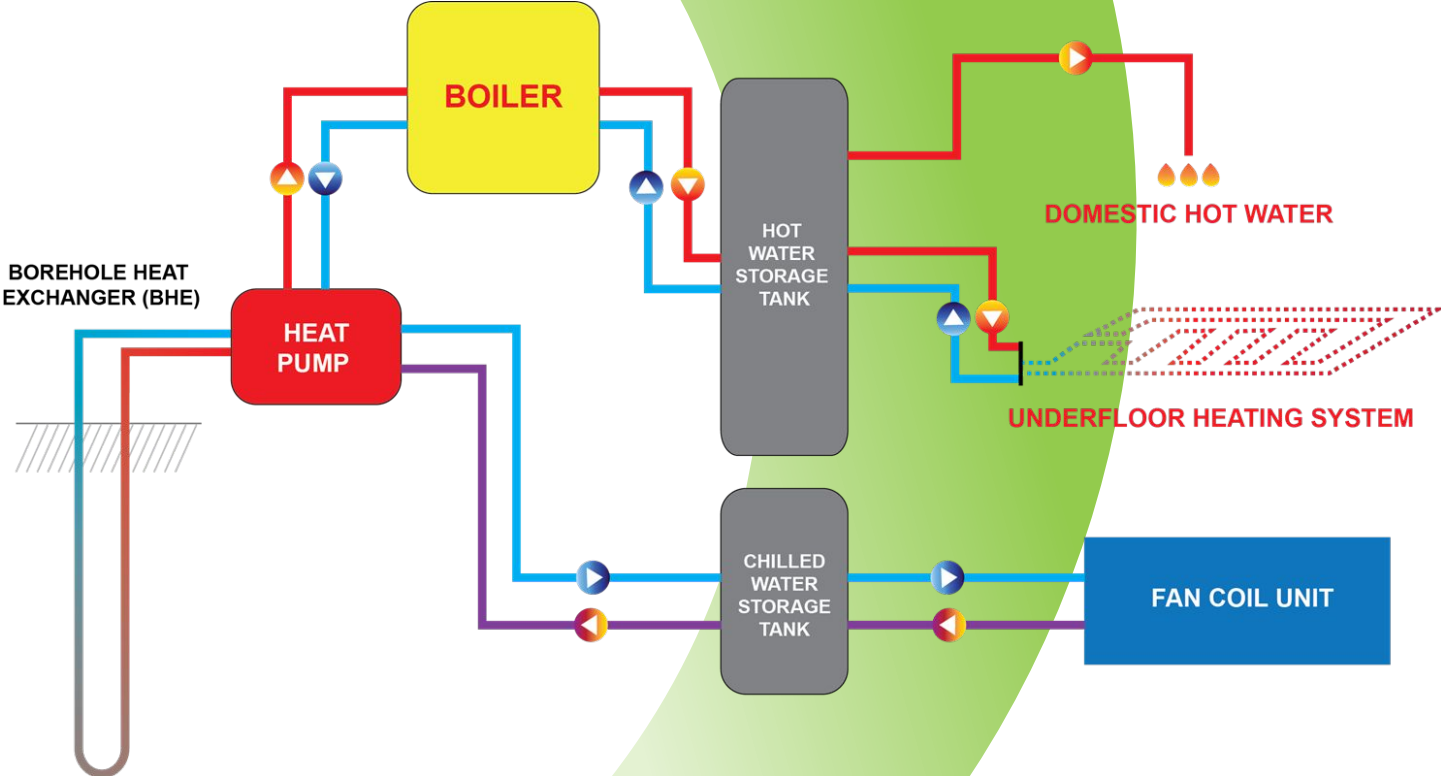
How it works



Source:

<https://www.cogeothermal.com/green-heat/>

Geo-exchange system



Thermal energy supply source




The thermal demand of a future building — whether for heating, domestic hot water, or cooling — can be met through an **individual system or an integrated solution** that combines heat pumps with natural gas boilers for hot water production.



The heat pump is the central component of the system, **facilitating thermal transfer between the geothermal boreholes and the indoor installation**. In cooling mode, the heat pumps extract heat from the building and dissipate it into the ground through the geothermal probes. In heating mode, the process is reversed: they absorb heat from the ground and transfer it into the building.



Optimization of the thermal energy source



During the cold season, boilers can fully cover the heating demand, ensuring constant thermal comfort indoors.

For maximum efficiency, domestic hot water production can be carried out in two stages:

1. The heat pump preheats the water up to 35°C;
2. The boiler then heats the water from 35°C to 60°C.

The hot water boilers can be sized to fully cover the heating demand during winter while also providing system redundancy.

GeoExchange Benefits

> 80%

renewable energy

- ✓ The most **stable** and **predictable** source of renewable energy
- ✓ **Flexible:** Provides heating, cooling, and domestic hot water; supports multiple simultaneous functions and allows for the integration of a redundant complementary source
- ✓ **Adaptable:** Suitable for both new and existing buildings

tend to 0

CO₂ emissions

- ✓ Compatible with **photovoltaic systems**
- ✓ Eligible for **multiple funding programs (nZEB)**
- ✓ **Comprehensive** end-to-end services

up to 50%

cost savings

- ✓ The **most efficient all-in-one solution** for heating, cooling, and domestic hot water production
- ✓ **Lower operating** and maintenance costs

SOLUTIONS FOR ENERGY EFFICIENCY

Solutions for Retail Buildings (1.4 MWt)

Heating and cooling solutions

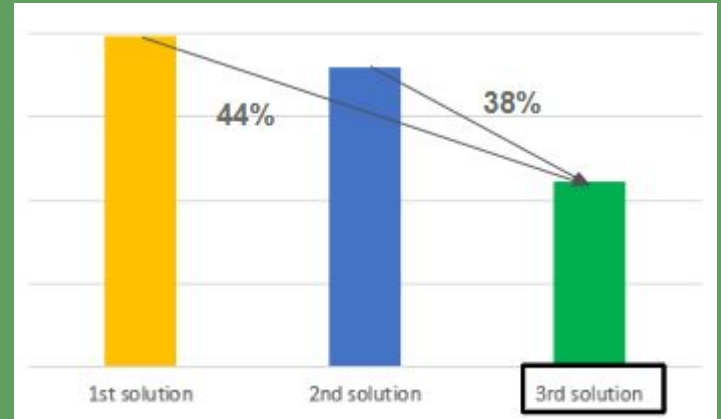
Objective: 100% gas-free

- ✓ No cooling towers
- ✓ Redundancy ensured
- ✓ Indoor installations: fan coil units and air handling units

Legend:

Solution 1: Gas plant and chillers
Solution 2: Air-to-water heat pump
Solution 3: GeoExchange

Comparative analysis of operating costs



ROI 3rd

~ 4.5 years vs. 1st
~ 3 years vs. 2nd

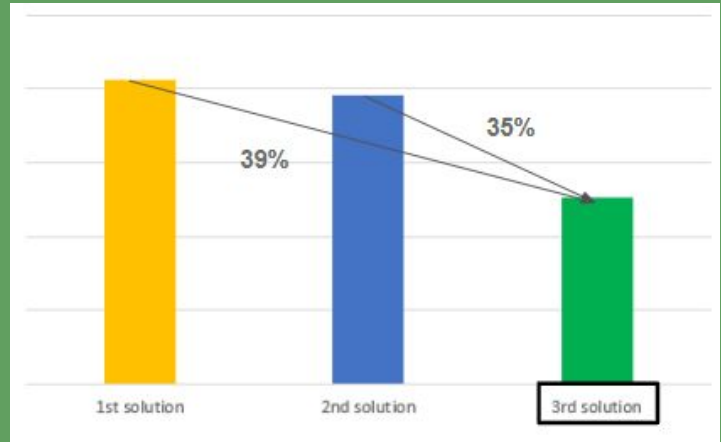
Solutions for Industrial Buildings (1Mwt)

Heating and cooling solutions

Objective: 100% gas-free

✓ **Indoor installations:** fan coil units

Comparative analysis of operating costs



Legend:

Solution 1: Gas plant and air heaters

Solution 2: Air-to-water heat pump

Solution 3: GeoExchange

ROI 3rd

~ 5 years vs. 1st

~ 2,5 years vs. 2nd

Solutions for Office Buildings (2MWt)

Heating and cooling solutions

Objective: 100% gas-free + redundancy

- ✓ Indoor installations: 4-pipe fan coil units
- ✓ Residual energy (simultaneous heating and cooling)

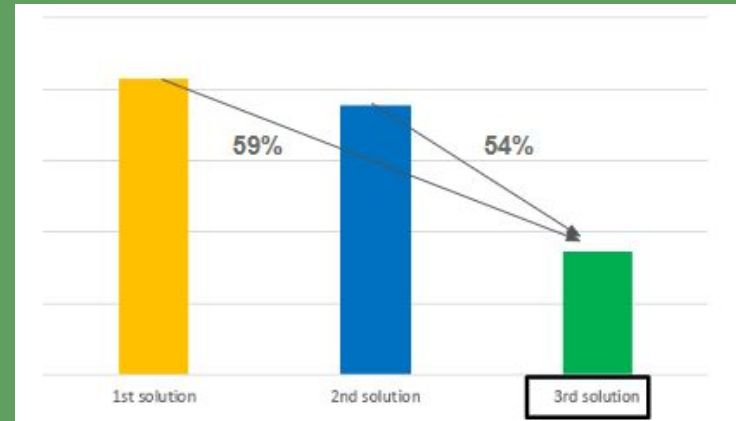
Legend:

Solution 1: VRF system

Solution 2: Chillers in an air-to-water heat pump

Solution 3: GeoExchange

Comparative analysis of operating costs



ROI

~ 2,8 years vs. 1st
~ 2,4 years vs. 2nd

Solutions for Residential Buildings (2.8MWt)

Heating and cooling solutions

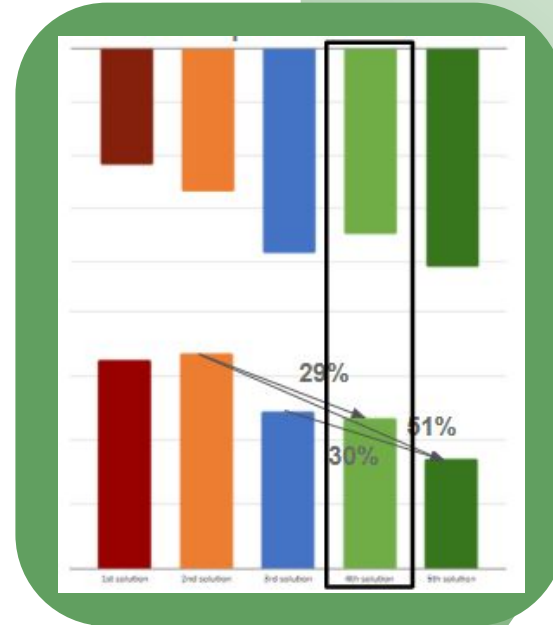
Objective: redundancy
+ achieving nZEB
standard

- ✓ Indoor installations:
underfloor heating and fan
coil units

Legend:

- Solution 1: Gas boilers and air conditioners (decentralized)
- Solution 2: Gas boilers and VRF system (centralized)
- Solution 3: Air-to-water heat pumps (decentralized)
- Solution 4: Ground-to-water heat pumps (GeoExchange) +
gas boiler for backup (centralized)
- Solution 5: Ground-to-water heat pumps (GeoExchange)
(centralized)

Comparative analysis of investment costs



ROI 4th
~ 4.5 years vs. 2nd

Comparative analysis of operating costs

CASE STUDIES

One Peninsula

Direct Benefits:

Innovation: the first residential project in Romania to use high-capacity ground-to-water heat pumps to simultaneously provide hot water, heating, and cooling.

Cost reduction: energy costs reduced by up to **50%** compared to traditional solutions (gas boilers and chillers).

Flexibility: the option to use gas boilers as a backup for heating and hot water.

CO₂ emissions: significant reduction in CO₂ emissions.

Solution:
Ground-to-water heat pumps

270 geothermal boreholes at 120 m + energy recovery from wastewater

3 x 450 MWh_t installed capacity

316 tons CO₂/year CO₂ emission reduction



One United Properties

Direct Benefits:

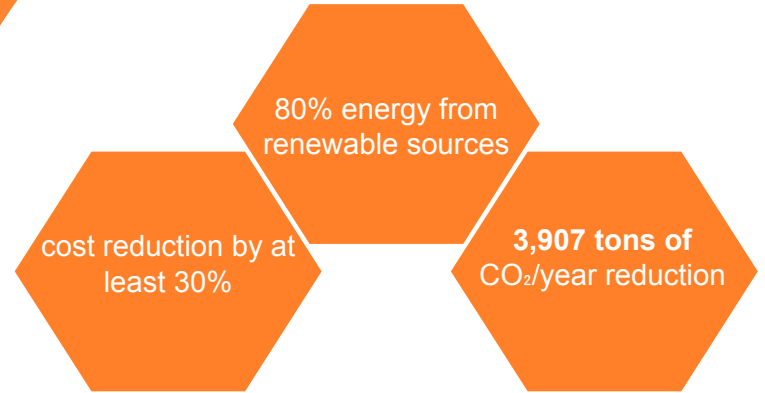
Cost reduction: optimizing energy expenses through an innovative solution that recovers heat from wastewater.

Flexibility: versatile energy supply, adaptable to specific needs.

CO₂ emissions: significant reduction of CO₂ emissions.

Energy supply diversity: reduces fossil fuel consumption by up to **80%**.

High redundancy: ensures **100%** backup for domestic hot water and heating through the use of hot water boilers.



ONE LAKE CLUB
586 apartments / 5
buildings
~ 60,000 m²



ONE LAKE DISTRICT
1,987 apartments / 10
buildings
~ 135,199 m²

ONE Technology District - Infineon

Direct Benefits:

Cost reduction: optimization of energy consumption through the use of a **100%** GHSP solution, harnessing residual energy for enhanced efficiency.

Flexibility: simultaneous heating and cooling capacity, while also ensuring redundancy for essential consumers.

CO₂ emissions: reduction of CO₂ emissions.

renewable
energy source
100% heat pumps

2.100 kW_{TC} &
1.864 kW_{TH}
thermal capacity

282
geothermal
probes,
120m depth



One high district (802 apartments)

Direct Benefits:

Innovation: one of the largest projects in Romania utilizing heat pumps to simultaneously provide domestic hot water, heating, and cooling.

All-in-one: a 30-year contract for the integrated supply of energy, potable water, wastewater services, facility management, and energy performance optimization.

Flexibility: Adaptable energy supply with backup hot water boilers for heating and domestic hot water.

CO₂ emissions: reduction of CO₂ emissions.



Solution: heat pumps

2,820 kWt thermal capacity

310 geothermal probes at 120m depth

6,622 MWh □ energy from renewable sources

995 tons of CO₂/year emission reduction

The residential home for elderly people in Alba Iulia

Direct Benefits:

Reduced operating costs: lower energy expenses through the use of an innovative technical solution.

Lower environmental footprint: Significant reduction of the carbon footprint.

Flexibility: **85%** reduction in energy sourced from fossil fuels.



Solution:
ground-water heat
pumps

240 kW_t heating
400 kW_t cooling
thermal capacity

80
geothermal probes
at 110m depth

1.174 MWh_t
energy from
renewable sources

173 tons
of **CO₂**/year
emission
reduction

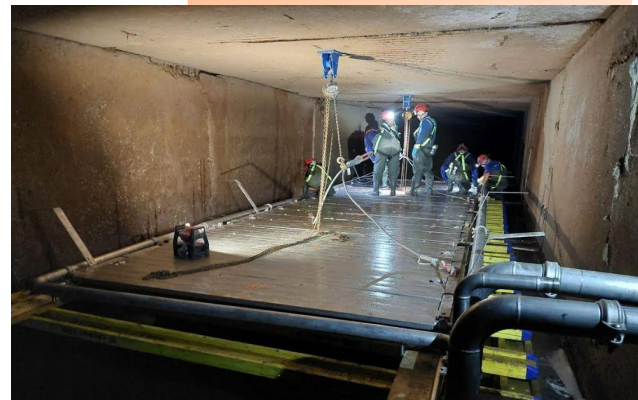
Apa Nova Vitan Building

Direct Benefits:

Innovation: the first project in Romania to use a heat exchanger to recover energy from the sewage system.

Cost reduction: up to **90%** lower costs compared to conventional urban heating solutions, achieved through optimal energy recovery and the integration of a photovoltaic system.

Flexibility: an adaptable and efficient energy supply, ensuring continuity and optimized consumption.



Solution:
ground-water
heat pumps and
photovoltaic
system

2 x 80 kW □
thermal capacity

167.50 kW □
PV (Photovoltaic) –
photovoltaic
system

42 tons of
CO₂/year
emission
reduction

Sibiu Airport

Direct Benefits:

Reduced operating costs: optimization of energy consumption through the use of ground-air heat pumps.

Flexibility: efficient heating and cooling supply with gas backup redundancy.

CO₂ emissions: reduction of CO₂ emissions.

Renewable
energy source,
heat pumps

550 kW_t
thermal capacity

150 geothermal
probes at
100m depth



Nuclear Physics (ELI-NP): Extreme Light Infrastructure – Măgurele

Location:
The largest research infrastructure in Romania and the host of the most powerful laser in Europe.

Solution:
GeoExchange system for energy efficiency and sustainability.

Infrastructure:
1,080 geothermal probes for heat exchange
360 - Nisal



SPECIFIC INFORMATION

Nisal - a Veolia company



Specific Information

□ Part of the Veolia Group since 2024, founded in 1996.

□ Turnover in 2024: €13.4 million

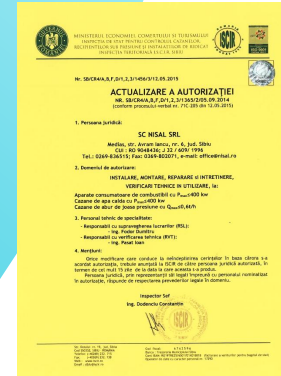
Team: 87 employees – design and execution engineers, ANRE & ISCIR (RSL RTS) certified specialists, installers, welders, sheet metal workers, and locksmiths.

Equipment: Beretta T44 GT, Comacchio MC404, WEI D10-C, bending, cutting, drilling, and pressing machines, backhoe loaders, mobile cranes, and power generators.

Authorizations and Certifications:

Quality Certificates: ISO 9001:2015, ISO 14001:2015, ISO 45001:2018

- **ANRE:** natural gas systems <6 bar
- **ISU:** Installation and maintenance of fire protection systems
- **ISCIR:** systems with $P_{max} \leq 400 \text{ kW}$; low-pressure steam boilers $Q_{max} \leq 0,6 \text{ t/h}$ & $P_{max} \geq 400 \text{ kW}$; low pressure steam boilers $Q_{max} \geq 0,6 \text{ t/h}$



Specific information

> 12 year

GeoExchange field

- ✓ **Design & build, operation & maintenance**, on-site long-term services
- ✓ **Optimized investment cost**
- ✓ **Reduction of operating costs** and CO₂ emissions
- ✓ **28 years in HVAC field**

A to Z

HVAC field

- ✓ **Total system warranty, fast intervention**, guaranteed supply parameters (flow rate, temperature, pressure)
- ✓ **All services** provided by a single contractor
- ✓ **Real-time monitoring, control**, and energy efficiency

3.000

Geothermal wells

- ✓ More than **15MW** thermal capacity installed
- ✓ More than **300km** of geothermal probes drilled

Contact details

Valentin ZAHARIA

*Development Director &
Technical and Performance Director*
Veolia Romania

e-mail: valentin.zaharia@veolia.com

tel: [+40 747 016 009](tel:+40747016009)

www.veolia.ro

www.vrsi.veolia.ro

