Сэргээгдэх эрчим хүчний дулаан болон хаягдал дулаан ашиглах технологийг
“Зенерал Хийтпамп Индастри” компаниас

ZENERAL HEATPUMP ゼネラルヒートポンプ工業株式会社

2026/2/27 Forum on Advancing Article 6 Implementation through Business Engagement and JCM Project Matchmaking in Mongolia

ZENERAL HEATPUMP INDUSTRY CO., LTD. Yoshiro Shiba(CEO)

Proposal for Introducing Ground-Source Heat Pump Heating Systems in Mongolia

Heating System Suited to Severe Cold Climates Integrating Ground Source and Solar Thermal Heat Pump System

Solar Collector

Arrows indicate heat flow

Solar Heat

5℃

10℃

0℃

1℃

-4℃

-5℃

Depth 120m

Pump

Buffer Tank

Underground Temperature: 2℃

Ground source heat exchanger

INTERNET

Electricity

Compressor

Evaporator

Condensor

Expansion

Refrigerant

Heat Pump and Control System

ZQ ZENERAL HEATPUMP Remote Surveillance Center

Receive the warning message and grasp the situation immediately. It's possible to operate it by remote control.

Fully inverter automatic controll

35～55℃ (Around 45 ℃)

Hot Water

30～50℃ (Around 40 ℃)

Heat Exchanger

Heating radiator

Winter: Utilizing both ground source and solar heat, stable heating by heat pumps can be supplied even in severe cold climates

Summer: Solar heat stores heat in the ground and restores underground temperatures

Demonstration Project in Collaboration with City of Ulaanbaatar: Implementation of Air Pollution Countermeasure & Greenhouse Gas Emissions Reduction at School No. 121

Ulaanbaatar City Hall

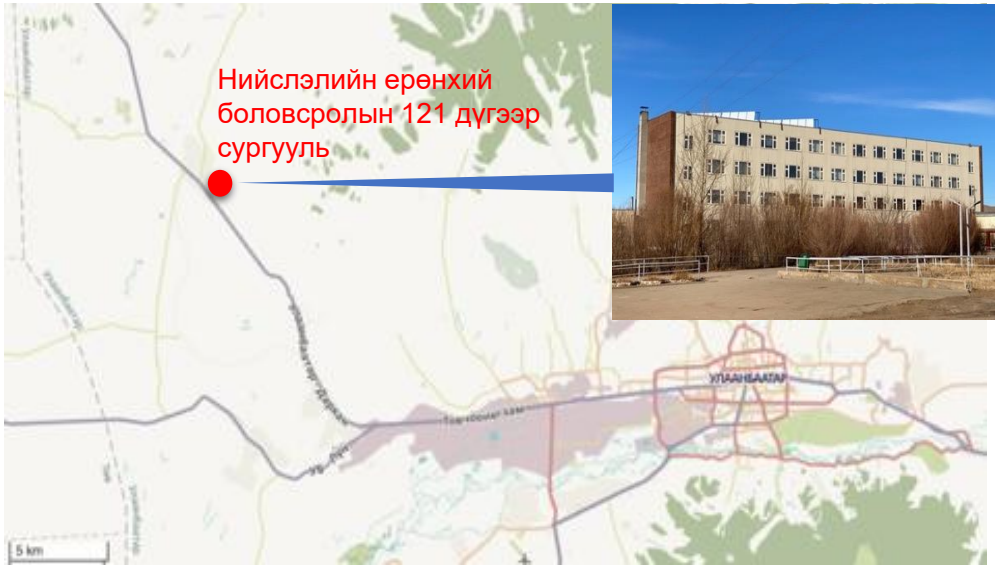
Ministry of the Environment Government of Japan
環境省

ZENERAL HEATPUMP

In charge of:
- Excavation work
- Ground source heat exchangers
- Pipelines

Total subsidy:
200 million JPY
(5 billion MNT)

In charge of:
- Pre-feasibility study
- Heat pump system
- Solar thermal collector
- Control system



Features

・Reduces emissions of air pollutants and greenhouse gases

・Electricity consumption is reduced by 20% using high-efficiency heat pump system with inverter control

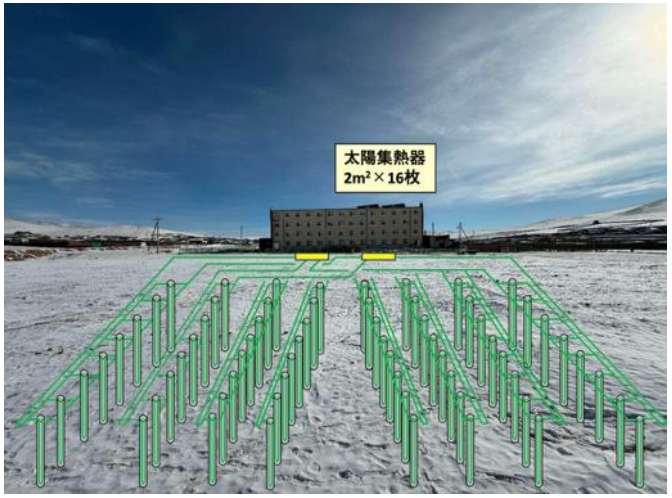
・The system automatically resumes operation even after a temporary power outage.

・Remote monitoring possible due to data transmission EMS (monitoring system)
→ Reduces labor cost for operations and management

・Visualizes energy use within the facility
→ Contributes to environmental education


Inverter Heat Pumps

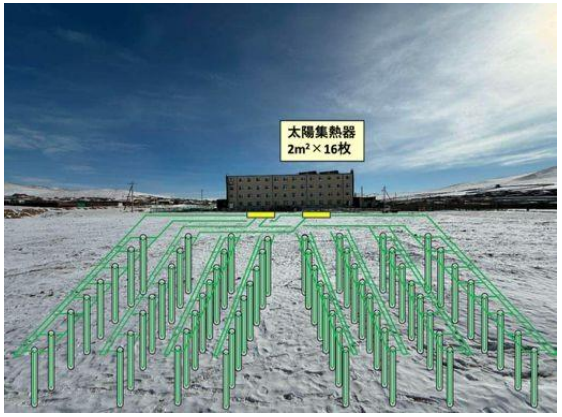

Inverter Control Panel



Ground Source Heat Exchangers

Construction and installation work for the ground-source heat pump system at School No.121

Mechanical room (the blue equipment is the heat pump)



Ground source heat exchangers beneath the football field at the School No.121

Borehole drilling

Ground source heat exchangers

Installation of the ground source heat exchanger

Installation of the horizontal pipe connected to the vertical ground heat-exchange borehole

Reduction of 4 t (89%) of Air Pollutant SO_2 Annually and 852 t (84%) CO_2 Annually by Updating Coal Boilers to Ground Source Heat Pumps(GSHP)

SO_2 ※ Cumulative total of 90 t SO_2 reduced over 25 years of operation

Coal boiler (Reference)

・Lignite (brown coal) with a sulfur content of 0.5%-2.0% is used in Mongolian HOBs

・The coal boiler in School No. 121 uses 478.9 t of coal annually

・Annual SO_2 emissions: 4.5 t (=478.9×(64/32)×0.5%)

GSHP (Project)

・Annual SO_2 emissions: 0.5 t

(=186, 379 kWh×0.002799 SO_2/MWh÷1000)

※SO_2 emission factor

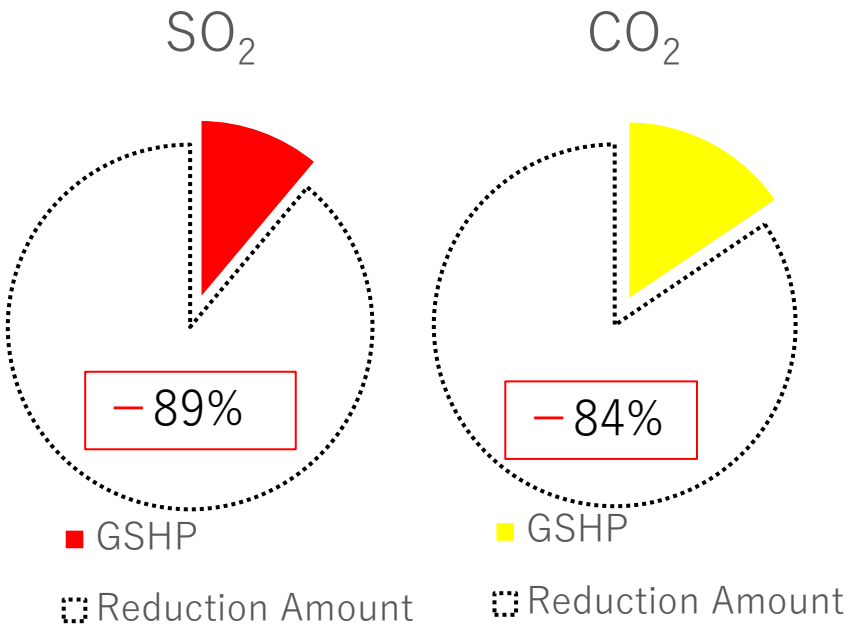
CO_2 ※Cumulative total of 21,300 t CO_2 reduced over 25 years of operation

Coal boiler (Reference)

・Annual CO_2 emissions: 1,009 t

GSHP (Project)

・Annual CO_2 emissions: 157 t



Monitoring(On sight)

Monitoring(Remote from Japan)

Key Message (Conclusion)

- We propose deploying heating systems for severe cold climates based on the proven **ground-source and solar thermal heat pump system** at Ulaanbaatar's School No. 121.
- The system **reduces air pollutants and greenhouse gas emissions by more than 80%** compared with conventional systems, significantly improving air quality and mitigating climate change.
- It delivers stable and reliable heating in winter, even under extremely cold conditions. In summer, solar thermal energy is stored in the ground to restore underground temperatures and enhance **long-term performance**.
- The system is fully automated, remotely monitored via the Internet, and supported through **remote troubleshooting** when necessary.