

Practical education of the use of thermal energy of the soil and the sun in China

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**Project
Overview**

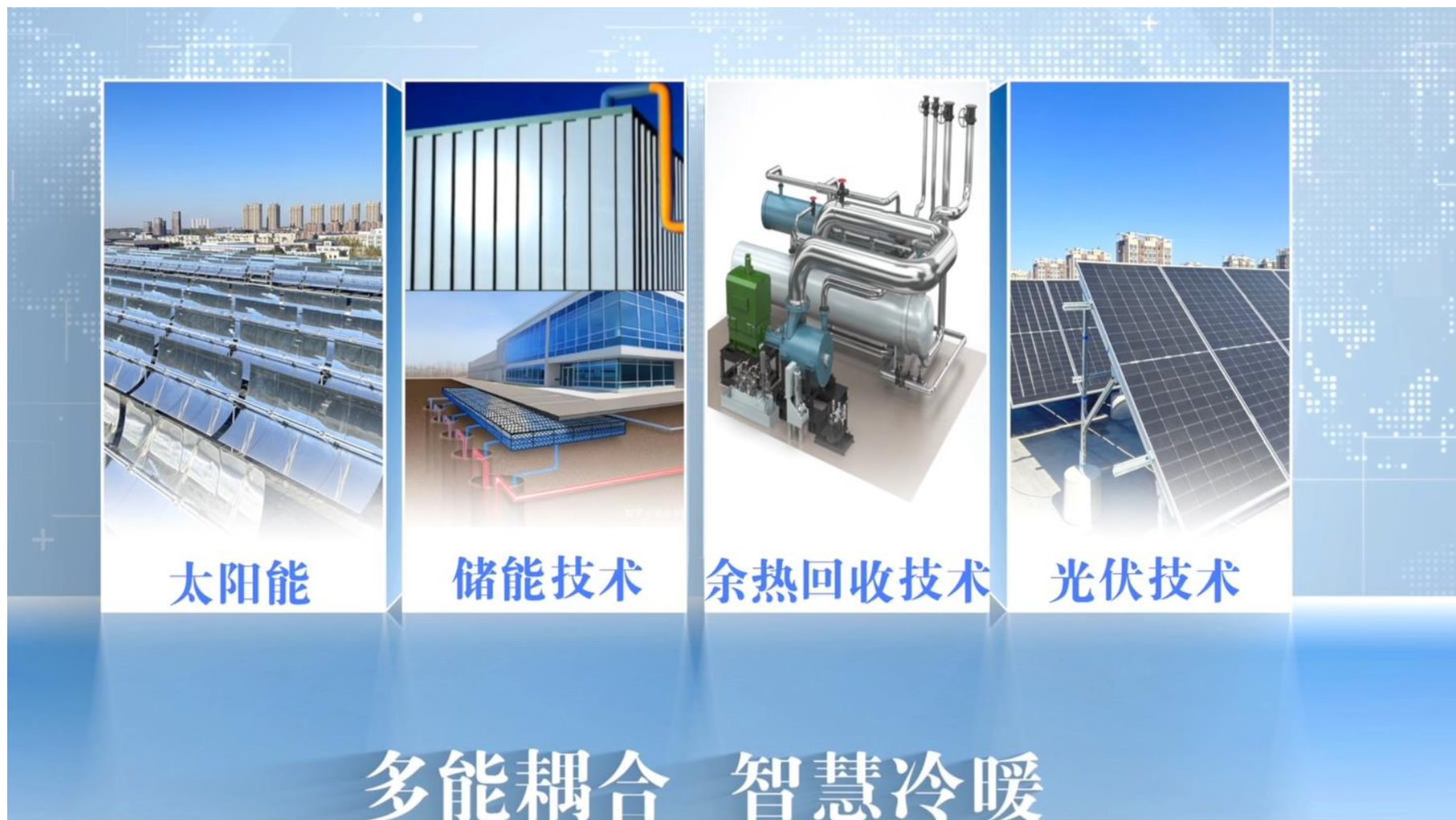
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**Major Results
and Impacts**

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**Smart Multi-
Energy
Coupling
Heating and
Cooling System**

1. Project Overview

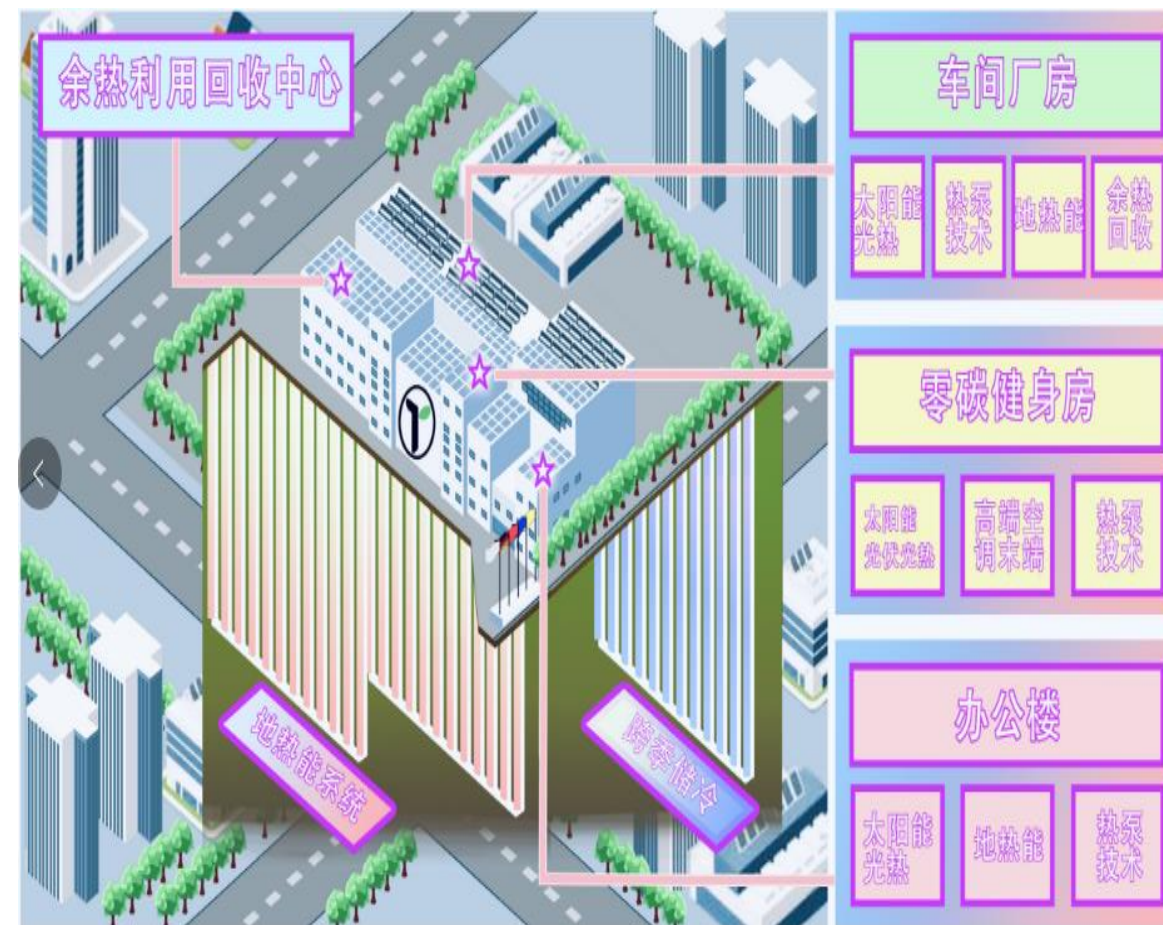


Practical Education on the Use of Soil and Solar Thermal Energy in China

2. Soil and Solar Thermal Energy in China

Multi-Energy Coupling Smart Heating and Cooling System

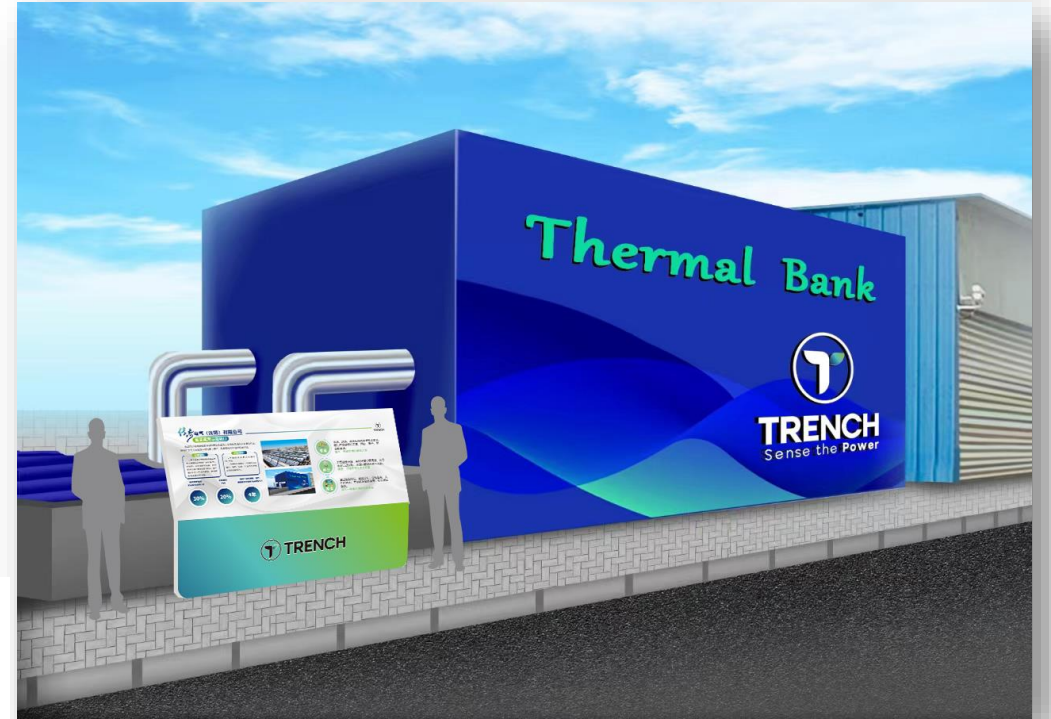
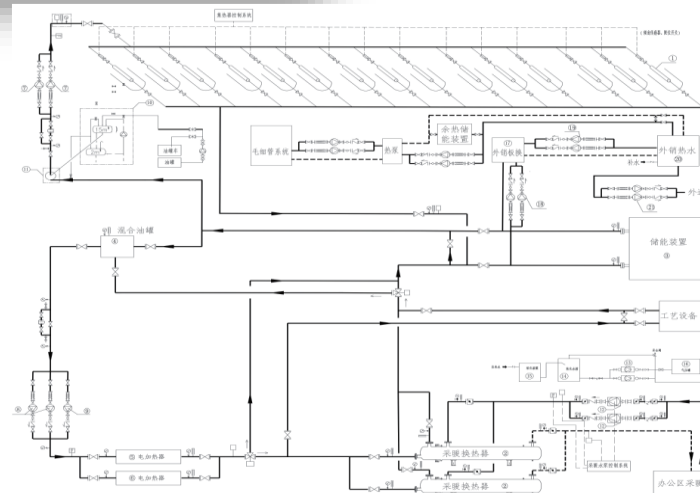
Building Types:	Industrial Plants and Office Buildings	
Energy Consumption Categories:	Space Heating and Process Heating and Cooling	
Space heating		3,000m ²
Annual Total Heat Consumption		31,052 GJ
Annual Total COOLING Consumption		7,472 GJ
Multi-Energy Coupling Smart Heating and Cooling System	Annual Total Heat Collection of Solar Thermal Systems	13,695 GJ
	Annual Total Heat Collection of Solar Thermal Systems	6,887 GJ
	Annual Heat Storage Capacity of Seasonal Thermal Energy Storage	2,000 GJ
	Annual Heat Storage Capacity of Seasonal Cooling Energy Storage	3,326 GJ
	Annual Heat Storage Capacity of Solid Thermal Storage Cube	2,311 GJ



2.1 Parabolic Trough Solar Thermal Technology and Short-Term Energy Storage Technology



Parabolic Trough
Solar Collector
System



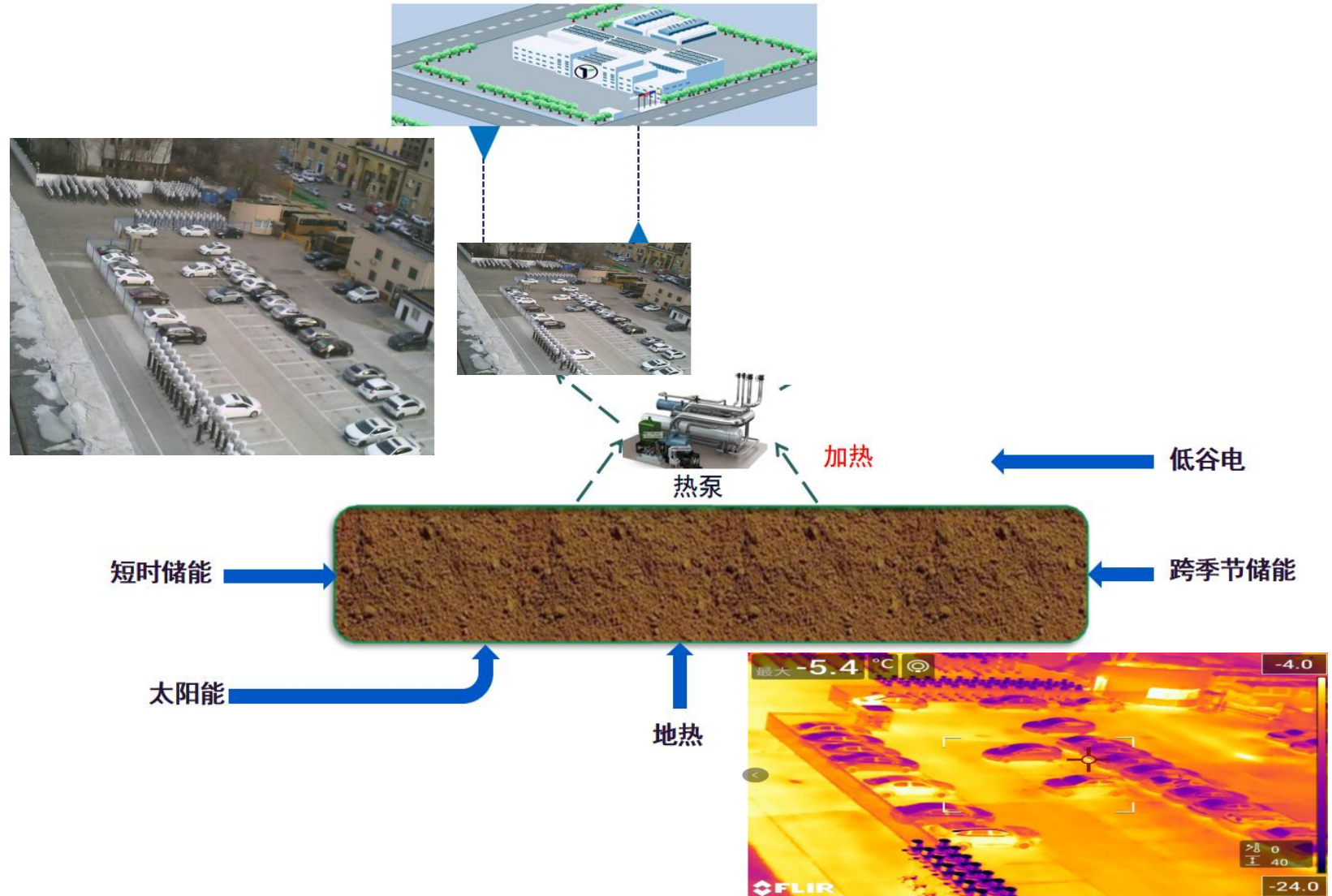
2.2 Waste Heat Recovery Technology

We have transformed the workshop's energy supply into a closed-loop green circulation system. During the cooling process of the high-temperature vacuum tanks, heat is recovered and directed to the waste heat energy center. Utilizing an innovative heat pump recovery technology, the waste heat is collected and upgraded from a low-grade to a high-grade heat source for reuse in production. Simultaneously, the generated chilled water is used for cooling the high-temperature vacuum autoclave.

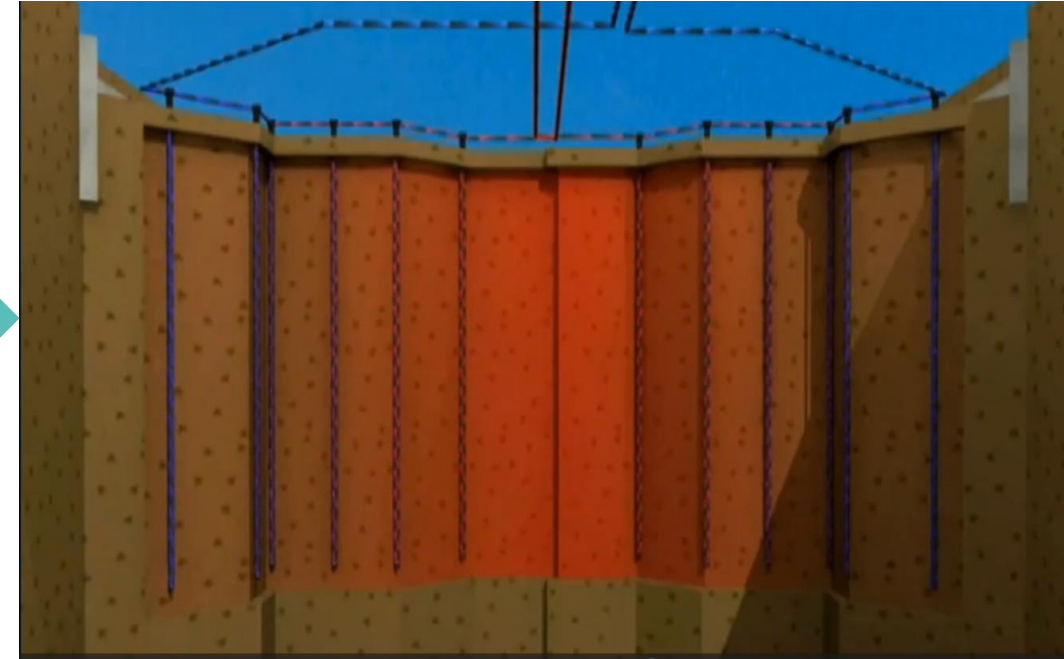


2.3 Cross Seasonal Long-Term Energy Storage – Geothermal Energy Technology

Beneath the parking lot, we have constructed a seasonal long-term soil heat storage system. Any surplus heat generated by solar energy during summer, which cannot be used immediately, is transferred deep underground for storage. In winter, the stored heat is retrieved from the ground to provide heating.



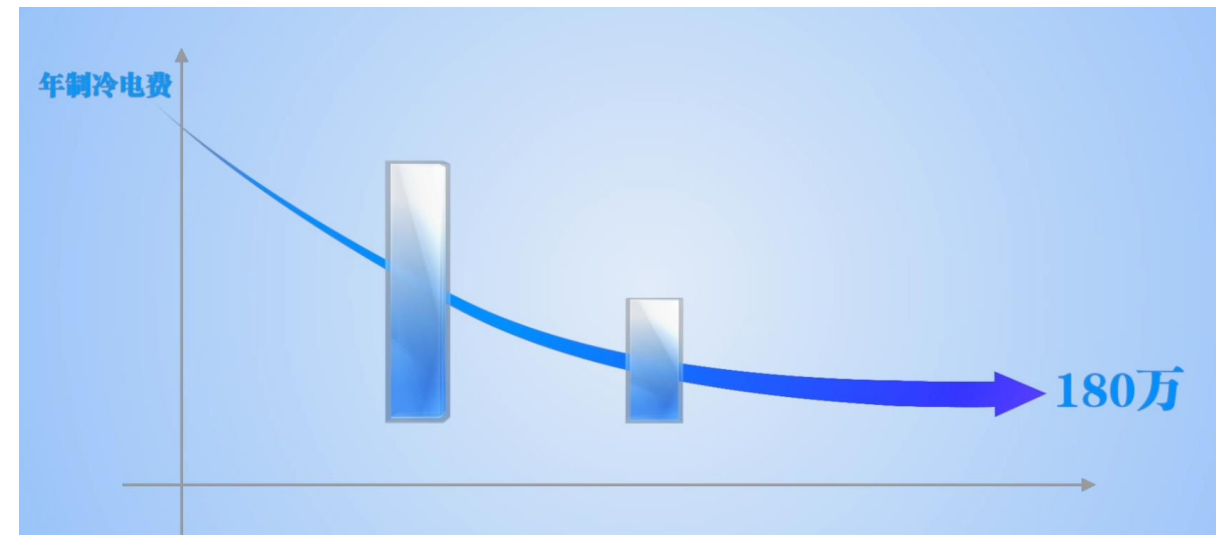
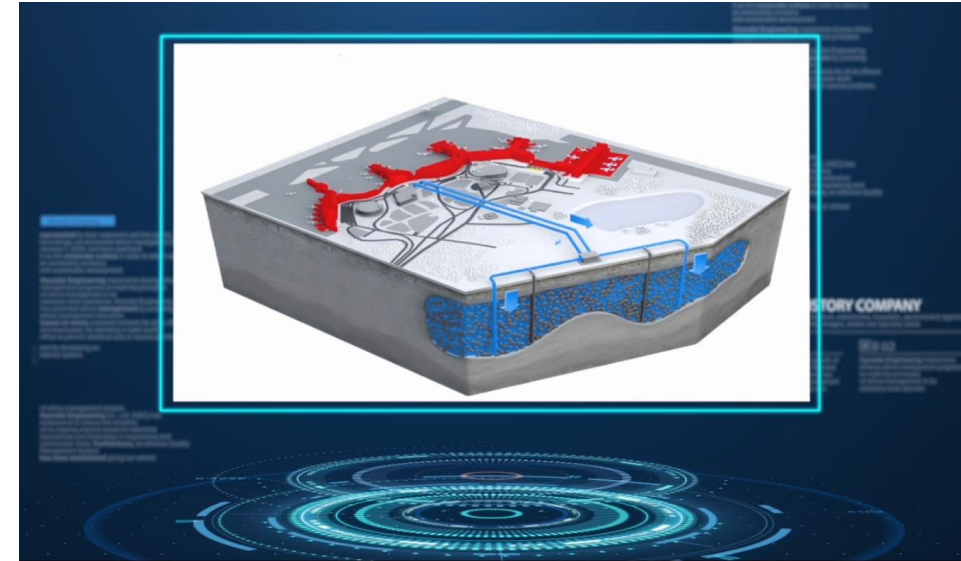
2.3 Cross Seasonal Long-Term Energy Storage – Geothermal Energy Technology



The seasonal thermal storage system has a scale of 25,000 cubic meters of soil, with a heat storage capacity of up to 20,000 GJ. The efficiency of heat storage reaches 70%, providing heating for a 30,000 square meter park.

2.4 Cross Seasonal Long-Term Cooling Storage Technology

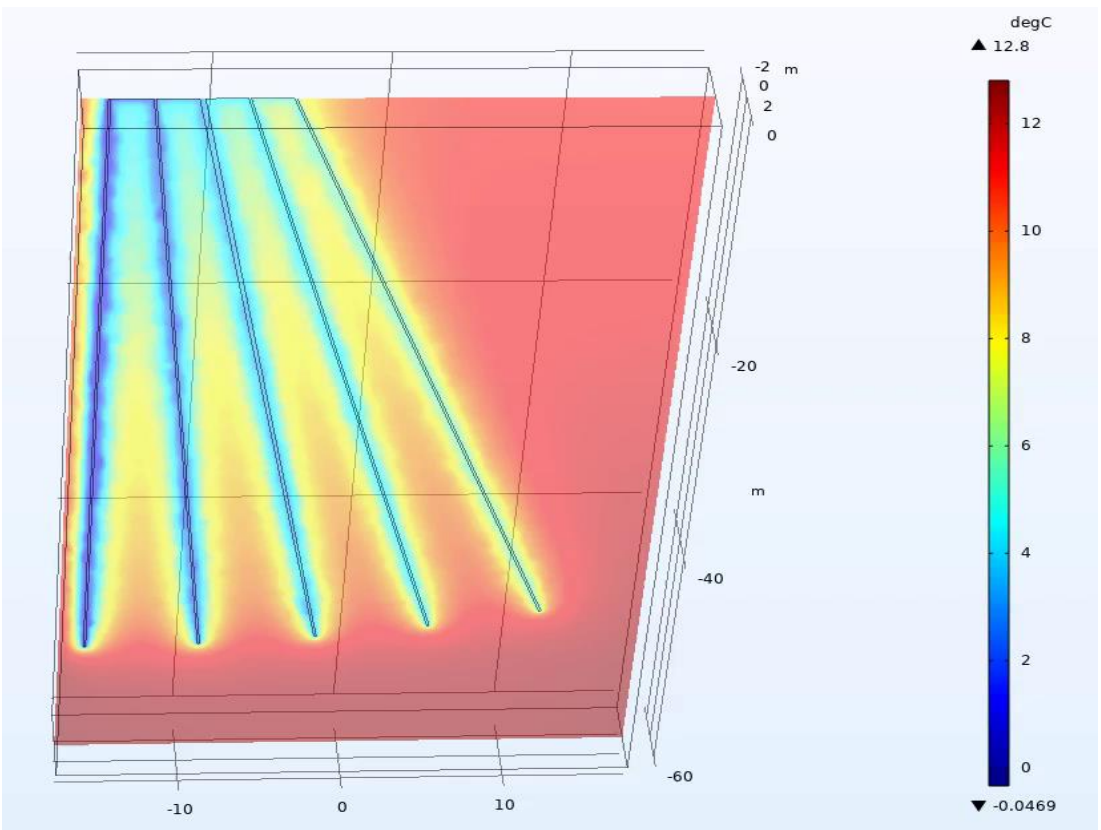
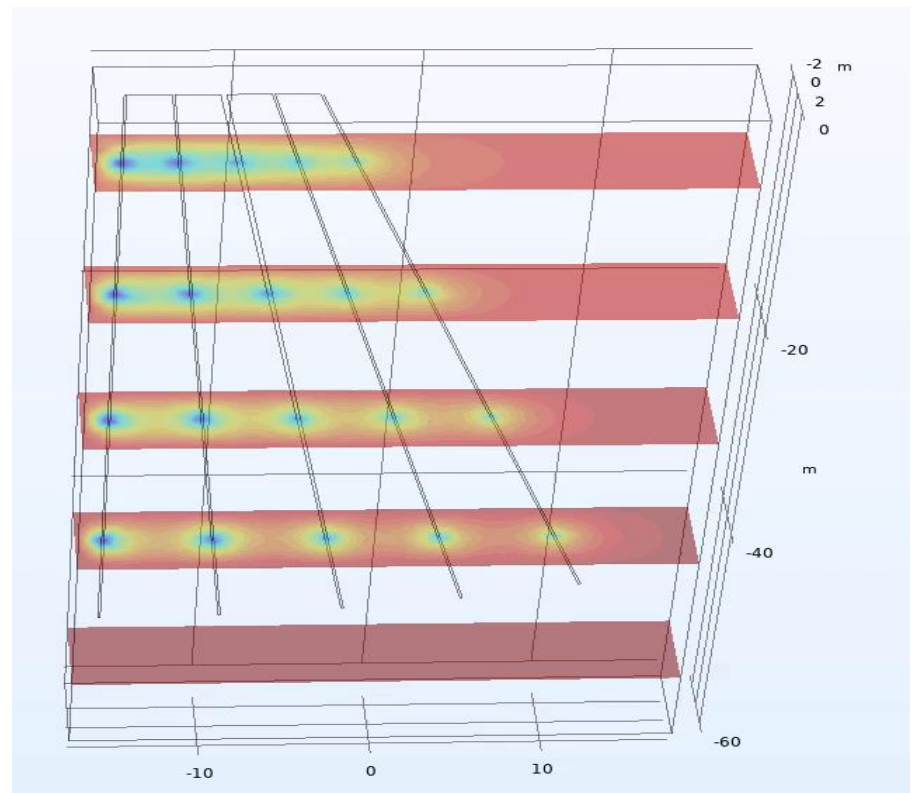
In winter, we use energy storage methods to store natural cooling energy underground, utilizing 120,000 cubic meters of soil for absorption. The stored cooling energy is then used for workshop cooling during the summer. This innovative seasonal cooling storage project effectively utilizes natural cooling energy from winter, replacing traditional air conditioning systems. It saves 1.8 million RMB in cooling electricity costs annually.



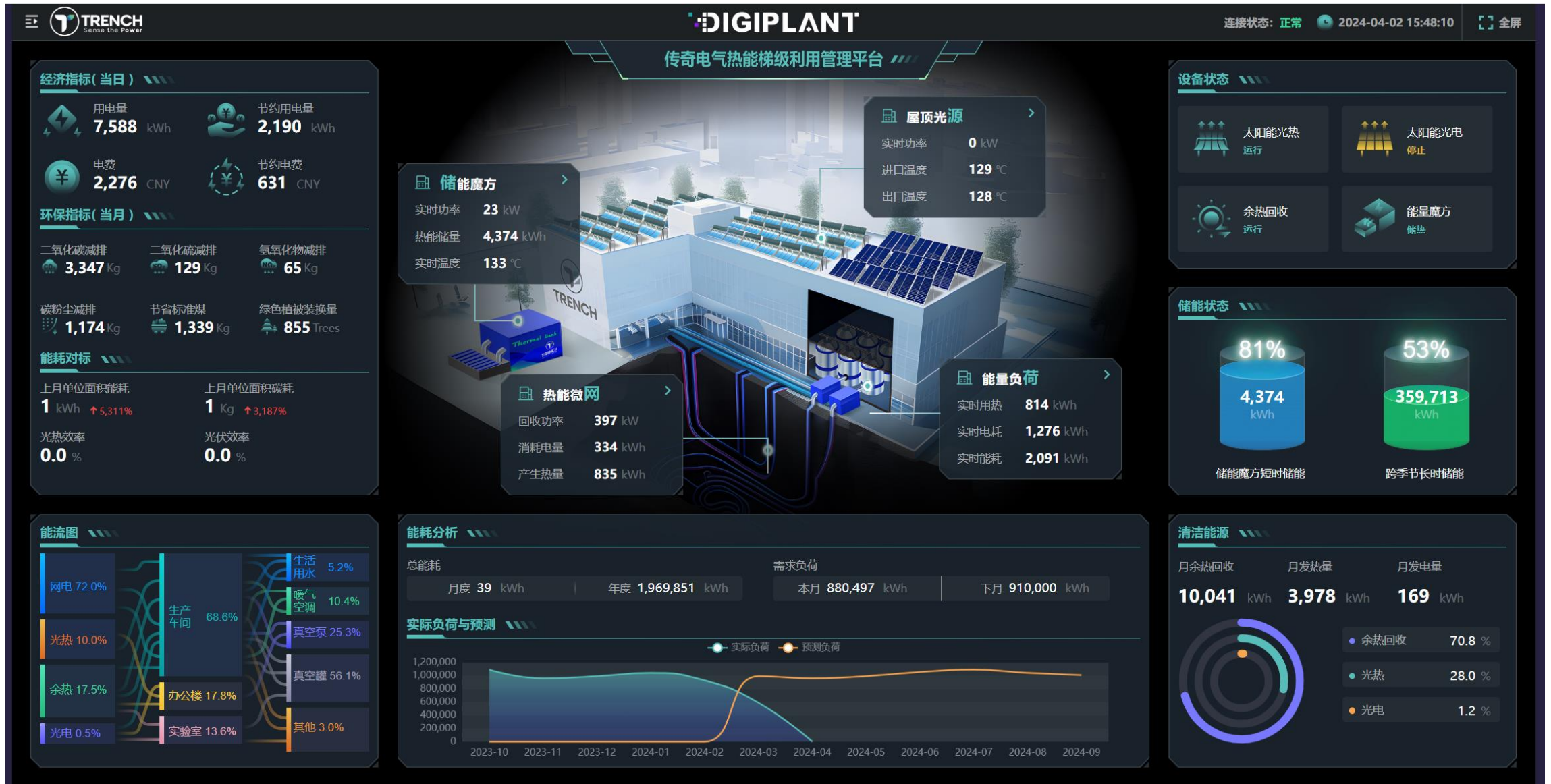
The goal of achieving an inlet temperature of 0° C and an outlet temperature of 5° C was achieved through simulation experiments. Detailed experimental design and data analysis revealed the high efficiency and controllability of the underground energy storage field for cooling energy storage.

In the simulation experiment, we used a carefully designed underground energy storage field and controlled the cold energy input with an inlet temperature of 0° C to simulate the actual cooling storage scenario. The underground pipeline system was designed to absorb heat from the soil and release cold energy during its journey.

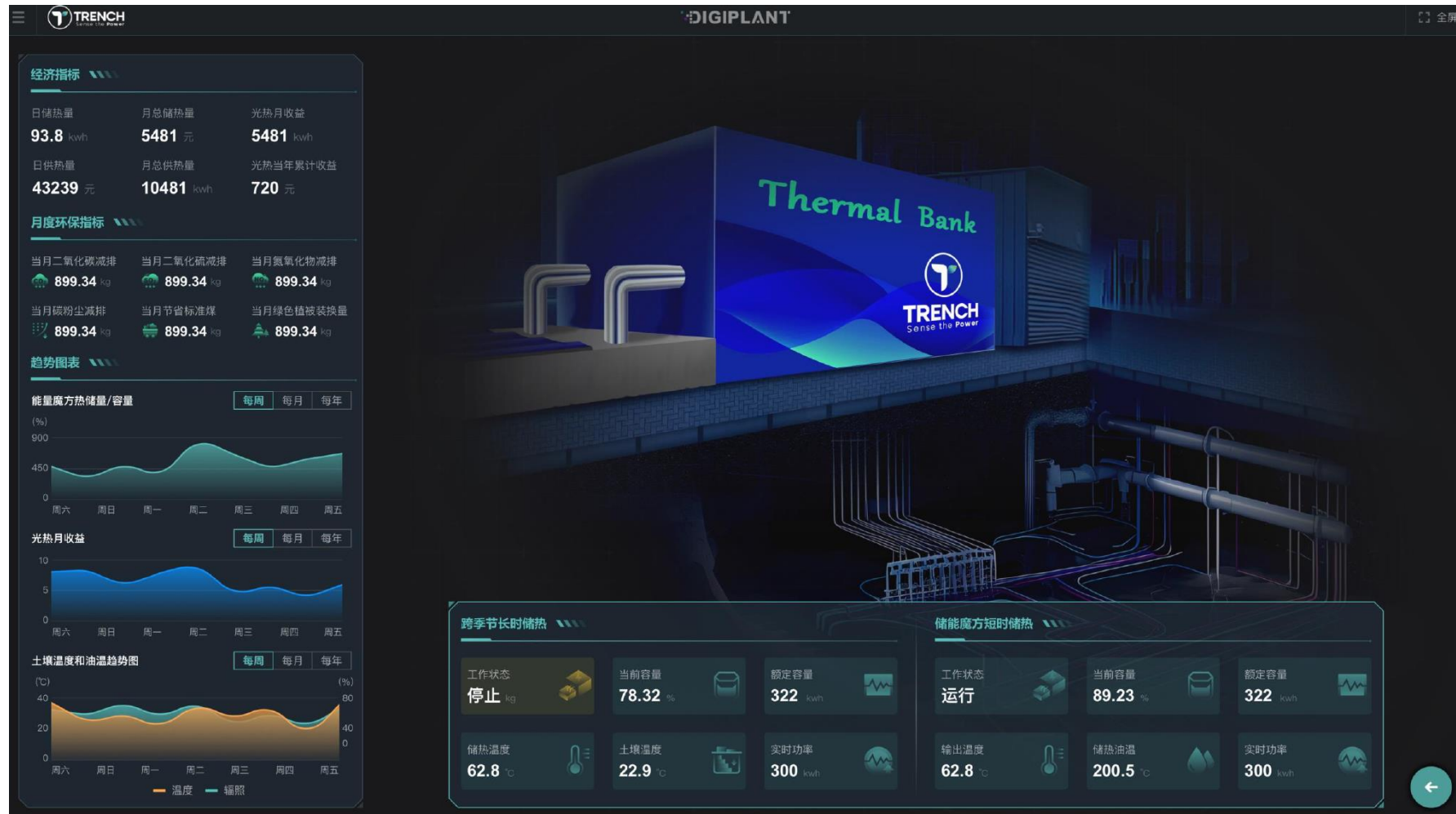
following two can be played:



3 Thermal Energy Cascade Utilization Control System



3 Thermal Energy Cascade Utilization Control System



3 Economic and Social Benefits of Smart Energy Systems



4. Outlook---Lucid waters and lush mountains are invaluable assets

The **multi-energy coupling smart heating and cooling system** integrates several green energy technologies, including parabolic solar thermal technology, waste heat recovery systems, ground pipe systems, and photovoltaic-thermal technologies. The application of these technologies not only improves energy efficiency, reduces waste heat emissions, and decreases dependence on traditional energy sources but also lowers energy costs and environmental burdens. This system combines various energy technologies and, through intelligent control and monitoring, optimizes the coordination of different energy sources, enabling efficient, safe, and sustainable energy utilization. It offers universality and application value.

The system is particularly suitable for progressive park projects, flexibly adapting to different energy demands and effectively reducing energy investment and operational costs. It serves as a key technology for promoting green economies and sustainable environmental development.

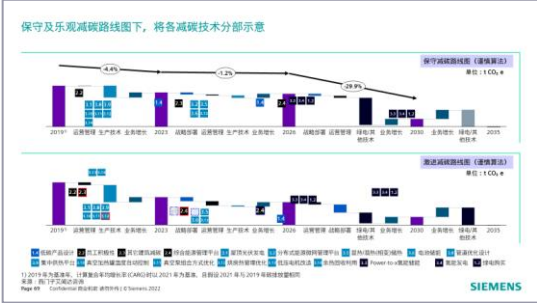
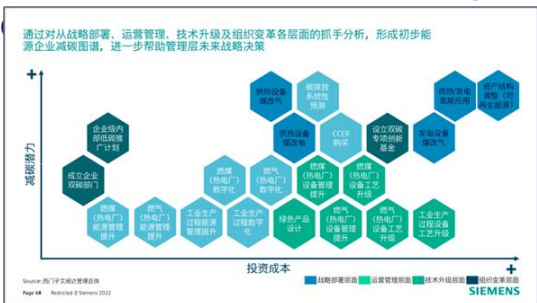
This system does not require large-scale, full-load energy investments, nor does it require complex supporting measures. As a significant reference for governments when formulating green economic policies and energy planning for industrial parks, this case injects new vitality into industrial parks through efficient and sustainable energy management.



Shenyang Trench's overarching decarbonization strategy promotes enterprise value from four dimensions, further supports its sustainable growth

Vision establishment

Establishing corporate's mid- and long-term vision of decarbonization based on its carbon footprint by identifying external trends and analyzing it's



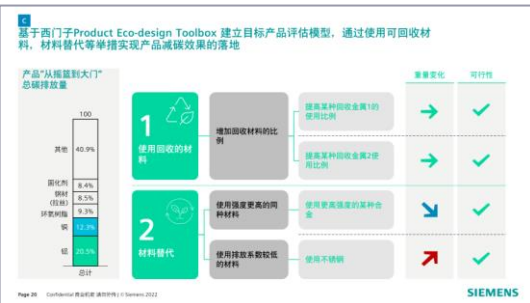
Brand promotion

Helping corporate enhance its brand image through various types of industry-influential certification



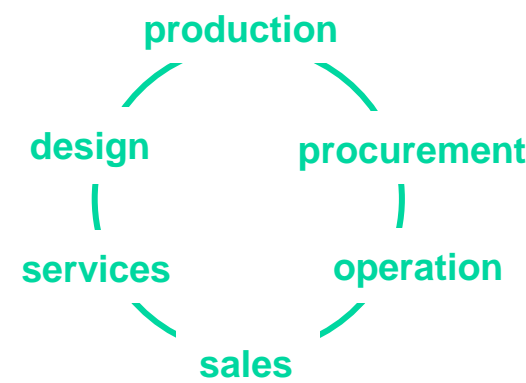
Product competitiveness enhancement

Forming a feasible product decarbonization roadmap to further enhance the competitiveness of the key product



"dual-carbon" talent cultivation

Empowering the team through close cooperation with external experts on decarbonization, forming a sustainable approach on cultivating talents and promoting decarbonization internally and externally



Thanks !