Kiev compressed air energy storage

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As the proportion of new energy installed capacity continues to expand in the global energy storage, there is a consensus on the need for large-capacity and long-term energy storage systems. This paper introduces compressed air energy storage, a promising energy storage method.

Compressed air energy storage refers to the energy storage method that uses electric energy to compress air during the low load period of the grid, and releases the compressed air to drive the steam turbine to generate electricity during the peak load period of the grid.

The main forms are traditional compressed air energy storage systems, compressed-air energy storage systems with heat storage devices, and liquid-gas compressed energy storage systems.

Compressed air energy storage system is an energy storage system developed based on gas turbine technology, one of the new energy storage technologies. The working principle of the gas turbine is that after the air is compressed by the compressor, it is burned together with the fuel in the combustion chamber to raise the temperature, and then the high-temperature and high-pressure gas enters the turbine to expand and do work.

The compressor of the gas turbine needs to consume about 2/3 of the turbine output work, so the net output work of the gas turbine is much smaller than the output work of the turbine.

The compressor turbines of the compressed air energy storage system do not work at the same time), during energy storage, the compressed-air energy storage system consumes electric energy to compress the air and store it in the air storage chamber; during energy release, the high-pressure air is released from the air storage chamber.

After entering the combustion chamber of the gas turbine and burning with the fuel, it drives the turbine to generate electricity. Due to the time-sharing work of energy storage and energy release, no compressor consumes the output work of the turbine during the process of energy release. Therefore, compared with a gas turbine system that consumes the same fuel, the compressed air energy storage system can generate more than twice as much electricity.

There are many problems in the current compressed air system, the most important of which is that it is too restricted by geographical conditions like pumped storage. The construction of a compressed air system requires special geographical conditions as a large gas storage room, such as highly airtight rock Caves, salt caves, abandoned mines, etc.

This limitation is one of the important factors affecting the promotion of this technology. In addition, the traditional air compression system has a system efficiency of only 40%-55%, which is lower than the 80% of

pumped storage.

The compressed-air energy storage system has the advantages of large battery capacity, long working hours, good economic performance, and many charge and discharge cycles, as follows.

Compressed air energy storage systems are more suitable for large-scale systems. Small-scale compressed-air energy storage systems are generally used in some special areas with low efficiency, while large-scale systems require specific geographical conditions to build large gas storage rooms, such as rock caves, salt caves, abandoned Mine, etc., greatly limit the application range of compressed-air energy storage system.

In short, compressed-air energy storage technology has forward-looking strategic significance under the background of high proportion of intermittent renewable energy power generation grid connection. The air adiabatic compression energy storage system with heat storage not only has a comprehensive energy storage efficiency of up to 70%, but also requires no heat source for heating.

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