Cryogenic Energy Storage

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Energy storage in liquid air. According to statistical research, based on an open data analysis, the average Thermal Power Electrical Station loses up to 40 per cent of generated energy, because of energy accumulation methods' inefficiency. The solution is to introduce the cryogenic energy storage system. In the engineering laboratory of a university we constructed a prototype of the cryo system.We compressed the air under the pressure of 8 bar in the volume of 3 l and temperature of 293 K. Maximal amount of gas that can be compressed isochorically is 1,02 M- that is 22,848 L of air (given conditions). Further, we gradually filled the air container with oil and pumped the gas out to turn Gas Generator turbine (average speed of gas was 1,95 m/s). The outcome energy was 1829,0232 J what is 51% of energy used to increase internal energy (3586,32 J).So, this method will be able to save 50% of accumulated energy. The next point, on which we focused, was Gas cooling system. First, the industrial compression process should be divided into stages. At each stage Gas should be first compressed and ,subsequently, cooled. It is known fact that isothermiccompression saves up to 30% of energy. Second, the system of throttles will able also to cool the Gas. Additionally, if throttle system is consists of vessels that transport cooling agent (Nitrogen phase of air can be used as cooling agent), the effect doubles. The cryogenic system in whole is more efficient and ecologically approved than any other accumulation methods.

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