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STORING ENERGY WITH CONCRETE BLOCKS

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The paper presents the existing solution to the conversion of excess electricity into potential energy capable of long-term storage and further supply to consumers in a form of electric power when peak demands occur.

Keywords: *renewable energy, capacity, accumulation, potential energy.*

АКУМУЛЮВАННЯ ЕНЕРГІЇ ЗА ДОПОМОГОЮ БЕТОННИХ БЛОКІВ

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Представлено існуюче рішення для перетворення надлишків електричної енергії в потенціальну енергію з можливістю тривалого її зберігання та подальшого її відпуску у формі електричної енергії до споживача при необхідності покриття пікових ділянок добового графіку електричного навантаження.

Ключові слова: *відновлювані джерела, ємність, акумулювання, потенціальна енергія.*

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Even if we take into account today's technological innovation there is a limit in the amount of electric energy that can be passed to the electrical network by wind and solar plants. Renewable energy is possible for implementation almost everywhere. However, the unpredictability of generation and dependence on the weather conditions mean that without cost-effective methods of energy storage renewables it will not be possible to fully replace fossil fuel generation.

The main task is to find the solution for energy storage from renewable sources to cover time periods with absence of generation and to supply consumers with electrical energy continuously.

The storing system, based on gravity and kinetic energy, allows renewables to deliver power at the price that is competitive with carbon-based sources. First, cranes use excess energy on the electric grid to stack concrete blocks. Then they get that power back by letting the blocks fall, which turns the generator to produce electricity. This is similar to hydroelectric power, where energy is stored by pumping water to an elevated reservoir and is recovered by allowing that water to fall and turn the turbines. This concrete battery setup is extremely basic, but uses nifty software to maximize efficiency. Swiss-based company "Energy Vault" is going to build 120-meter-tall cranes that would lift bricks weighting 35 tons each. Those would accumulate 20 megawatt-hours of potential energy, which is enough to power 2000 homes per day. It allows 90% efficiency during the thirty-year lifetime [2].



Figure 1. Energy Vault operation.

The working prototype of energy storing system already exists. It is one-tenth the size of a full-scale unit and fully demonstrates the working principle and control precision. The project received one hundred and ten million investments from SoftBank to develop their energy storing system and implement it [2].

To summarize, the research in the methods of effective low-cost energy accumulating are in demand because of the exponential growth of installed power carbon-free generation systems. Wind farms and photovoltaic plants cannot store electrical energy. In order to meet this requirement, the conversion of electrical energy into potential energy can be used [1].

References:

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