IMPLEMENTATION OF ENERGY SAVING TECHNOLOGIES

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Today, energy saving is one of the main priorities of human progress. The growing energy consumption, depletion of natural resources, and climate change are forcing countries to look for effective ways to use energy efficiently, and switch to clean technologies. Considering our current conditions with frequent power outages and constant damage to the energy system caused by massive attacks, this makes us think about how to optimize electricity use and ensure that, despite all the challenges, everyone still has light.

First of all, we need to start with the definition of energy-saving technologies. These are a set of technical, organizational, and scientific solutions aimed at reducing energy consumption without decreasing production efficiency or human comfort. In general, they cover all areas – from industry to everyday life.

The main ways of energy saving include:

- increasing energy efficiency by modernization of equipment, building insulation, use of LED lighting, and implementation of smart control systems;
- replacing traditional energy sources through the development of solar, wind, hydro, and geothermal energy;
- energy recovery with the reusing heat generated during industrial processes or transport operation;
- digitalization of energy systems via using Smart Grid systems that balance energy consumption and production (Cassano, 2025).

Recently, an interesting project has been proposed by an engineering student at one of the scientific competitions – a portable, compact power station based on standard solar panels. It had a built-in sunlight recognition system that automatically adjusted the panels to the most efficient position for generating electricity. But that wasn't the most impressive part of the project. Underneath the solar panel, there were

thermoplates that absorbed the heat from the panels and generated additional electricity from it. The main purpose of this station was to be used anywhere where people experience the lack of electricity, especially in trenches on the battlefield, or remote areas.

Furthermore, frequency-controlled drives, heat exchange units, and automated energy accounting systems are used in industry. Thanks to these technologies, companies can reduce electricity consumption by 20-40%. In general, the use of thermal insulation materials, energy-efficient windows, and ventilation systems with heat recovery can reduce heat energy consumption in buildings by almost half (Faraldo & Byrne, 2024; Bera et al., 2025).

Overall, the implementation of energy-saving technologies is only possible with government support, educational programs, and incentives for "green" investments. In Ukraine, there are programs such as *Energodim* and *Warm Loans*, as well as energy efficiency standards for buildings (Weser et al., 2024). These energy-saving technologies help reduce energy and financial costs, improve energy efficiency, and strengthen the country's energy independence. Of course, it is also worth mentioning that they have a positive impact on the environment and contribute to the reduction of harmful emissions released into the atmosphere.

In conclusion, the world is moving toward a "green transition", which means that smart power grids, zero-energy buildings, hydrogen energy development, and energy storage systems are the next steps toward creating a sustainable energy future

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