SWOT-ANALYSIS OF ENVIRONMENTAL SAFETY OF ENERGY FACILITIES

Prepared by 3rd year energy engineering students:

Bogoslavsky I., Gorbel O.O., Zelensky D.V.,

Odokienko A.O., Samelyuk V., Chekotun Ya.,

Shevtsov K., Shklyar I., Yakymenko Ya.,

Scientific supervisor – prof. Bogolyubov V.M.

SWOT

Environmental safety of renewable energy sources

Environmental security is:

- protection of the environment from harmful anthropogenic impacts,
- preservation of ecosystems and biodiversity,
- maintenance of acceptable conditions for human life.

Renewable energy sources (RES) are solar, wind, geothermal, bio- and hydropower.

In the context of environmental safety, RES use virtually inexhaustible and renewable natural resources.

STRENGTHS

The main advantages of renewable energy

- **Minimal greenhouse gas emissions.** According to the International Energy Agency (IEA), over the entire life cycle, solar and wind power plants generate 10–40 times less CO_2 emissions than coal or gas power plants. This allows you to significantly reduce the carbon footprint of the energy sector.
- **No emissions of harmful substances.** In addition to greenhouse gases, traditional thermal energy is a source of nitrogen oxides (NOx), sulfur (SO_2), particulate matter (PM2.5 and PM10), and heavy metals (mercury, lead).
- **Less interference with natural ecosystems.** Renewable sources are usually local in nature and do not require large transformation of the landscape.

STRENGTHS

- **The potential of renewable energy** is a large, practically inexhaustible resource of sun, wind, water and biomass for energy production.
- **Benefits for investors** - state support through investments and a tariff.
- **Energy security and independence** - reduced dependen on oil and gas imports.
- **Reduction in the cost of energy -** according to IRENA, the cost energy has decreased by almost 85%over the past 10 years, and energy - by more than 50%!

WEAKNESSES

- **High implementation costs –** almost all RES technologies still require significant investments;
- **Instability** – energy production is largely dependent on weather conditions (especially solar and wind power plants);
- **Infrastructure problems** – no or poorly developed infrastructure (especially hydrogen energy);
- **Social problems** – flooding of large areas requires their withdrawal from agriculture and the resettlement of people/

: OPPORTUNITIES

- **New jobs in the energy sector of the economy**
- Reducing the impact on the climate system byreducing greenhouse gas emissions
- Increasing energy security bydiversifying electricity generation sources
- Increasing the level of environmental security byminimizing the use of exhaustible natural resources

THREATS

- **Solar energy -** the installation of a large number of panels requires large areas, which leads to the fragmentation of natural landscapes, the destruction of vegetation cover, as well as the impact on species sensitive to microclimate changes**.**
- **Wind energy -** the installation of a large number of windmills leads to the transformation of natural landscapes and the destruction of mountain and steppe ecosystems**.**
- **Wind turbines -** can create noise pollution that affects people and animals, in particular birds and bats, which can be injured by turbine blades**.**

THREATS

- **Hydropower plants,** especially large dams, significantly change the hydrological regime of rivers, destroy floodplain ecosystems, and create obstacles to fish migration**.**
- **Bioenergy -** when burning biomass without appropriate treatment facilities, there is a risk of local air pollution.
- **Hydrogen energy -** when producing "gray" hydrogen by steam reforming of methane or gasification of coal, carbon dioxide emissions increase.
- **Hydrogen energy -** high explosion and fire hazard, and the high penetrating ability of hydrogen creates additional requirements for the density of pipelines and tanks through which it is transported.

CONCLUSIONS :

1. The strengths and great opportunities of renewable energy inspire their development, while threats and risks require increased attention to implementation

2. To eliminate threats, it is necessary to intensify the development of green technologies and strengthen environmental policies.

3. A comprehensive solution to the problems of environmental safety of the use of renewable energy creates opportunities for the transition to sustainable development.