ENVIRONMENTAL TECHNOLOGIES
Environmental technologies are technological solutions of environmental problems, and they mitigate the impact of production on the environment. Environmental technologies are used in such sectors as industry, agriculture, services and transport, as well as in everyday housework.

The impact of production on the environment is determined by the fact, that during the process of production, raw materials, water and energy are used, making products and waste.
Environmental technologies can be classified into three large groups:

- **clean production technologies**
- **end-of-pipe environmental pollution reduction technologies**
- **climate technologies**

Production can be made “clean” if the emissions and waste are used as resources for another plant.

Environmental pollution reduction facilities are installed in order to purify exhaust gases and wastewater and to ensure waste management.

Climate technologies include both above-mentioned environmental technology groups when they reduce the impact on climate change.
It is possible to make production more efficient with lesser input (materials, energy and water), producing the same output of the same or higher quality.

In order to implement clean production, technological processes in enterprises are changed or enhanced by other processes.
End-of-pipe environmental pollution reduction technologies

Environmental technologies of this group are purification technologies.

Pollutants are separated as soon as they have been formed, then they are treated before they are released into the environment.
Climate technologies

Those technological processes reduce greenhouse gas emissions in the atmosphere

Climate technologies include also clean production technologies and end-of-pipe environmental pollution reduction technologies when they reduce the impact on climate change, as well as those technological processes that reduce greenhouse gas emissions into the atmosphere.
Development of environmental technologies became quite fast only at the last 50 years. Before has been known mainly purification technologies and end-of-pipe environmental pollution reduction technologies.
Eco-efficiency

- Economy of raw materials and energy
- Environment-friendly products
- Reduction of negative impact on the environment and climate during the life cycle
- Improvement of the quality of water, air and soil
- Reduction of emissions and waste
Environmental pollution reduction measures can be ranked according to their priority. The first stage includes the identification and classification of environmental pollution types and their impact.
Cleaner production is a gradual approximation of the actual production to clean production.

The simplest way to implement cleaner production in an enterprise is to use the best available technology. The best technologies for almost all industry sectors are available to producers in the EU.

Products are called environment-friendly if the impact on the environment and natural resource consumption is minimal during the process of their production, use and discharge into the waste flow.
Clean production can be achieved by implementing the following conditions: minimal use of water, and no wastewater, minimal use of energy, or the use of energy generated during the production process for the production needs, economical use of raw materials, and no waste.

A zero-emission production is a technological process or a set of technological processes which uses up 100% of the raw materials, transforming them into 100% of the end products.
Environment-friendly products

Products are called environment-friendly if the impact on the environment and natural resource consumption is minimal during the process of their production, use and discharge into the waste flow.
ECO-DESIGN

The aims of eco-design are to reduce the consumption of resources, to use environment-friendly materials, to optimise the production, distribution and use of the product as well as to ensure proper management at the end of its life cycle, i.e. renewal, recycling or disposal.
Environmental pollution reduction technologies

It is not easy to decide what is better – either to prevent, eliminate or at least minimise the causes of pollution, or to fight the effects of pollution by purifying the flows of contaminated gas, water and solids already after they have passed the technological process.

Groups for the environmental pollution reduction technologies:

- Gas purification technologies
- Water treatment
- Solid waste management
Depending on the aggregative state of pollutants, gas purification technologies fall into three broad categories:

- purification of polluted gas and air from dust and aerosols
- separation of gaseous substances from technical gas, flue gas and air flows
- separation of liquid droplets from air

The choice of the polluted gas purification technology depends on production requirements, which determines the selection of engineering solutions based on the principle of cost optimisation.
GAS PURIFICATION TECHNOLOGIES

Purification of polluted air from dust and aerosols
a – cyclone; b – bag filter; c – wet scrubber;
d – electrostatic precipitator
Landfill Gas Purification System
Gas Purification - H₂S Removal & Purification for Pipelines

Diagram showing the process of H₂S removal and purification using iron media, Na₂CO₃ solution, and "Drip Water".
Car’s and track’s exhaust emissions

Three-way catalytic converter
“Three-way” catalytic converters

- Reduction of nitrogen oxides to nitrogen and oxygen:
  \[2\text{NO}_x \rightarrow x\text{O}_2 + \text{N}_2\]

- Oxidation of carbon monoxide to carbon dioxide:
  \[2\text{CO} + \text{O}_2 \rightarrow 2\text{CO}_2\]

- Oxidation of un-burnt hydrocarbons to carbon dioxide and water:
  \[\text{C}_x\text{H}_{2x+2} + [(3x+1)/2]\text{O}_2 \rightarrow x\text{CO}_2 + (x+1)\text{H}_2\text{O}\]
CO$_2$ storage
Thank You for attention!