# IMPACT ASSESSMENT OF THE BIOMASS POWER PLANT ON THE ENVIRONMENT

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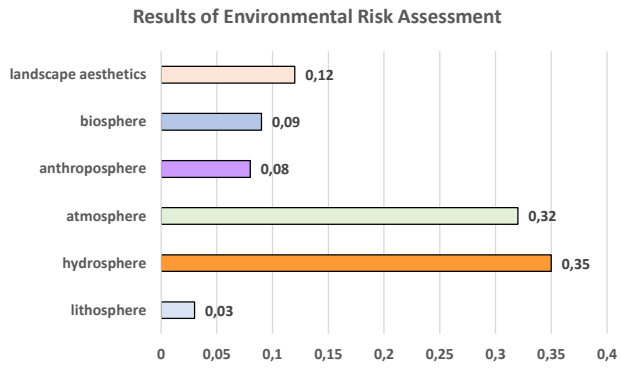
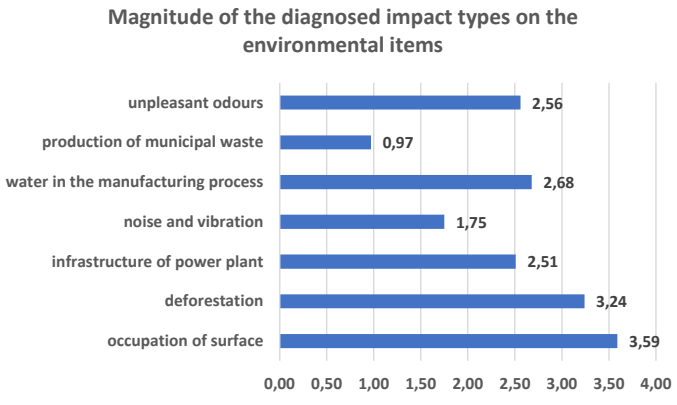
**ABSTRACT**
The Enea Połaniec Power Plant is one of the most modern power plants in Poland. It consists of seven power units fired with a mixture of coal and biomass (with a capacity of 225 to 240 MW) and a "Green Unit" (225 MW) fired 100% with biomass. The facility meets all applicable environmental standards and is adapted to the requirements of the Industrial Emissions Directive (IED).The aim of the study was to assess the intensity of the impact of the Połaniec Power Plant facility on the environment. The impact of the power plant's operation on the atmosphere, lithosphere, biosphere, hydrosphere and anthroposphere was presented, and the aesthetics of the surroundings were also assessed. The multi-criteria Analytic Hierarchy Process (AHP) method and Leopold's matrix were used to assess the impact. The impact assessment was carried out by competent experts. The Połaniec Power Plant is considered a leader in the use of biomass in the electricity production process. In the coming years, full use of the generation potential is assumed. Biomass and biofuels made from biomass are alternative energy sources to fossil fuels—coal, oil, and natural gas. Both fossil fuel and biomass combustion release the greenhouse gas carbon dioxide. However, plants capture almost the same amount of $CO_2$ and create biomass through photosynthesis. This makes biomass a carbon neutral energy source.




| *Leopold's Matrix* | | actions/operations on various elements of the environment | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | importance | occupation of surface | deforestation | infrastructure of power plant | noise and vibration | water in the manufacturing process | production of municipal waste | unpleasant odours | sum |
| elements of environment | lithosphere | 0,11 | 4 | 5 | 3 | 1 | 1 | 1 | 0 | 1,65 |
| | hydrosphere | 0,11 | 2 | 2 | 3 | 0 | 5 | 2 | 0 | 1,54 |
| | atmosphere | 0,19 | 3 | 4 | 1 | 1 | 3 | 0 | 3 | 2,85 |
| | anthroposphere | 0,27 | 4 | 1 | 2 | 3 | 3 | 0 | 5 | 4,86 |
| | biosphere | 0,16 | 3 | 5 | 4 | 4 | 2 | 1 | 4 | 3,68 |
| | landscape aesthetics | 0,16 | 5 | 4 | 3 | 0 | 2 | 3 | 0 | 2,72 |
| | sum | 1,00 | 3,59 | 3,24 | 2,51 | 1,75 | 2,68 | 0,97 | 2,56 | 17,30 |




**Conclusion.** The Leopold Matrix method (score 17,3) showed a medium, but significant environmental impact of the power plant operation.

**Occupation of Surface.** Because of its 0.7 km$^2$ area of surface occupation it has high impact on lithosphere. Moreover, it has impact on hydrosphere because it is located near to the river and it is using water as cooling system. Last but not least, it has high impact on atmosphere because chimney is tall.

**Deforestation.** It has high impact on lithosphere, atmosphere, biosphere and landscape aesthetics because of the cycle of water is affecting all those elements of the environment and because of the obvious consequences of deforestation such as smaller production of $O_2$ and smaller deduction of $CO_2$.

**Infrastructure of the power plant.** Additional infrastructure that has to be built for the power plant has impact on all elements of the environment and medium high on the lithosphere, hydrosphere, biosphere, and landscape aesthetics.

**Noise and vibration.** It should not have any vibration but the noise is making impact on biosphere and anthroposphere. The impact on biosphere is higher than on anthroposphere due to the fact that animals are more sensible to the sound than humans.

**Water in the manufacturing process.** Water has impact on hydrosphere because the plant needs a lot of water for the cooling system. If the warm water is put into the river it has high influence on the hydrosphere and biosphere (flora and fauna). Vapor in atmosphere is the consequence of the burning of the biomass and usage of water in the process which at the end makes clouds in the air and has impact on landscape aesthetics.

**Unpleasant odours.** Burning the biomass and movement of the biomass before the burning process makes high impact on atmosphere, anthroposphere, and biosphere. The odours can adversely affect the atmosphere because they are spread through the air. Consequentially, people can smell it and do not want to live close to power-plant that produces unpleasant odours. Ultimately, animals could also be affected by the unpleasant odours.

**In summary**, the plant poses significant environmental and social challenges. Balancing these benefits with mitigation strategies is key to achieving sustainable development in the region. By adopting comprehensive environmental management practices and actively engaging the local community, negative impacts can be significantly reduced.