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TEXTBOOK FOR THE COURSE
Engineering for natural resources and environment

Edited by
Janusz Szpytko

Engineering for natural resources and environment

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Table of content	Page
INTRODUCTION	
Foreword to the textbook on engineering for natural resources and environment, <i>Rafał Wiśniowski, Janusz Szpytko</i>	5
PART 01	
1. Climate changes and complex systems resilience, <i>Mohamed Eid</i>	7
2. Environment protection and industrial risks, <i>Mohamed Eid</i>	13
3. Health/ ecological balance in the assessment of pyrolysis technology of municipal solid waste, <i>Lech J. Sitnik</i>	19
4. Sustainable energy development in terms of reducing greenhouse-gas emissions, <i>Wojciech Nowak</i>	25
5. Life cycle assessment of biofuels, <i>Lech J. Sitnik</i>	29
6. Environmental aspects of the production and use of bio-fuels in transport, <i>Aleksander Śladkowski</i>	35
7. Safe and efficient storage and delivery of hydrogen, <i>Wojciech Nowak</i>	43
8. The effect of wind turbine on human, <i>Jerzy Wiciak</i>	47
9. Wind farm reliability analysis, <i>Joanna Soszyńska-Budny</i>	53
10. Thermal energy storage, <i>Wojciech Nowak</i>	59
11. Water desalination technologies and development, <i>Mohamed Eid</i>	65
12. Development of green logistics, <i>Aleksander Śladkowski</i>	71
13. Materials from renewable resources, <i>Elżbieta Pamuła</i>	75
14. Biomaterials – materials for medicine, <i>Elżbieta Pamuła</i>	81
15. Nanomedicine, <i>Elżbieta Pamuła</i>	87
PART 02	
16. Wooden churches of southern Małopolska of the UNESCO World Heritage List, <i>Magdalena Łanuszka</i>	93
17. Centennial Hall in Wrocław of the UNESCO World Heritage List, <i>Magdalena Łanuszka</i>	95
18. Białowieża National Park - UNESCO site (unique ambisonic sounds of the oldest forest in Europe), <i>Jerzy Wiciak</i>	99
19. History of the development of mining in the area of present-day Poland on the example of sites inscribed on the UNESCO World Heritage List, <i>Henryk Mercik</i>	105

DEVELOPMENT OF GREEN LOGISTICS

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Modern society in the 21st century faces many environmental problems. These include: global warming; lack of food and water resources in certain regions of the world; and pollution of soils and the oceans. Many other problems can be noted, the cause of which is mainly human activity, if it is interpreted broadly enough. Transport is one of the most significant environmental pollutants and a source of a number of emissions. On the other hand, humanity cannot do without transport. There is a division of labour between regions, and there must be regular deliveries of goods. Logistics is responsible for this process. This concept itself is quite broad, for example, there is transport, military, commercial and warehouse logistics, and many others. It is difficult to give one definition for this concept. At the same time, the concept of green or environmental logistics has recently appeared and is widely used.

Green logistics is a name that is easy to understand and remember for most of the population. It is one of the main components of sustainable development (Sustainable Development) in the system of interaction of components: society, economy and the environment. The main idea of sustainable development is to meet today's consumption needs in such a way that future generations have the opportunity to meet their needs. The topics presented for the attention of interested listeners are widely covered in the scientific literature, which is recommended for careful study [1-23]. Note that this is only a small part of the literature available on this topic.

Green logistics is a new scientific direction that involves the use of advanced logistics technologies and modern equipment in order to minimise pollution and increase the efficiency of the use of logistics resources.

The lecture deals with sustainable development problems of the global transport system and supply chains. Particular attention is paid to transport corridors that supply the European market with goods produced in Southeast Asia. At the same time, the negative impact of international transport corridors and supply chains on the environment is expressed in [13,16]:

- Consumption of natural resources (energy, water, atmospheric and lithosphere resources);
- Environmental pollution with harmful substances (gaseous, liquid and solid);
- energy and visual environmental pollution (noise, vibration, electromagnetic fields, heat emissions, light pollution);
- Alienation and land degradation;
- Injuries and deaths of people, animals, causing harm to health;
- Causing material damage as a result of traffic accidents, accidents, and traffic accidents.

A grouping of the impact of transport on the environment was carried out, highlighting purely environmental, economic and social aspects. The main goals and principles of the sustainable development concept were also considered.

In general, green logistics is turning into an element of the concept of sustainable development. It follows that green logistics must meet the following conditions:

- The consistency of logistics principles with the policies of the sustainable development concept;
- Achieving and maintaining the balance between economic, environmental and socio-cultural sustainability of the logistics system within the legal framework of international and national legislation;
- The development of systematic methods and instruments of green logistics based on the integration of best practices of environmental programs and projects, implemented in the activities of public and state institutions, business structures, research institutions and international associations.

A functional diagram of a green transport and logistics system is proposed. Analyses of the systematisation of green logistics methods and instruments were also carried out. As a result, the most significant and expedient logistics tools that are adapted to environmental solutions have been identified.

The lecture presents a new approach to achieving sustainable development goals in the operation of logistics and transport systems through the developed system of methods and tools of green logistics. Structural-functional and systemic approaches are used in the systematisation of methods that involve the allocation of (basic) functions for the main elements of logistics systems. The grouping of tools is carried out according to the purpose of each method in green logistics and takes into account the functions of passing and processing logistics flows.

The application of the proposed approach can be used in balanced programmes to improve the sustainability and efficiency of supply chains. Systematic implementation of green logistics methods and tools will ensure the achievement of sustainable development goals. In addition, the developed system of methods made it possible to assess the compliance of green supply chains and their elements with the principles of sustainable development, to identify gaps in the recommended methods. Further development of the presented approach is the development of a mathematical apparatus that allows the parameters of logistics flows to be globally optimised in order to ensure the sustainable development of supply chains through the coordinated selection and implementation of methods and tools of green logistics.

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