XXI International Scientific and Professional Meeting
"ECOLOGICAL TRUTH" ECO-IST'13
4 – 7 June 2013, Hotel "Jezero", Bor Lake, Bor, SERBIA

SUSTAINABLE TECHNOLOGY ANDNATURAL ENVIRONMENT

Vineta Srebrenkoska[1], E. Fidancevska[2], V. Jovanov[2],B. Angjusheva[2]

[1]Goce Delcev University, Faculty of Technology,
"KrsteMisirkov" b.b. P.O. Box 201, 2000 Stip, REPUBLIC OF MACEDONIA
[2]Sts.Cyril& Methodius University, Faculty of Technology and Metallurgy,
MK-1000 Skopje, REPUBLIC OF MACEDONIA

vojo@tmf.ukim.edu.mk

ABSTRACT

Sustainable technology is usually connected with the design and analysis of complex,integrated management systems and sustainable development and it is a central target in environmental scienceand growth of global economies. The minimization of waste and reductions in material and energy inputs are the most importantenvironmental aims. Sustainable technological development and innovations do not automatically lead to totalreduction of environmental burden of industrial production. However, technological innovation is an importantfactor and seems to play a central role in the long-term initiation of cleaner production. Environmental improvement of companies strategy by application the idea of cleanerproduction linked with sustainable technologies leads to produce environmentally friendly products and leadsto increas the position of company on the market.

Key words: sustainable technology; sustainable development, environmental effects.

INTRODUCTION

The rapid increase of human activities since the industrialrevolution caused that huge quantities of resources and energyhave been consumed in relatively short time. That massconsumption and the large production has significant influenceson the earth's ecology, exhausting non-renewable resources andcausing some environmental problems by polluting the air, waterand soil [1-3].Nevertheless, there are a lot of possibilities to reduce theenvironmental burden of industrial production exist. For example;optimization of the environmental performance through goodhousekeeping, total quality management, application of end-ofpipetechniques, recycling of wastes, non-renewable productssubstitution or adaptation clean technological innovations [4].

The industrial engineering consumes of materials and is dependent on a continuous supply of them. Increasing population and living standards cause the consumption rate to grow - something it cannot do forever. Finding ways to use materials more efficiently is a prerequisite for a sustainable future.Recent global attention to the issues and challenges of sustainable development is forcing industries to

conduct self-assessments to identify where they stand within the framework for sustainability, and more importantly, to identify opportunities, strategies and technologies that support achieving this goal. Design for environmental sustainability is the long-term view: that of adaptation to a lifestyle that meets present needs without compromising the needs of future generations.

The development of sustainable technology seems to be the main factor of company's strategy. Each companies, which want to reach the competitive position on the market and want to be environmental friendly should compile the strategy of technology.

The basic actions of preparation of technology's strategy contains a recognition of all using technologies in company and an identification of all components of technology, which are being with object of scientific investigations. Analyzing of all components of technology is very important. It helps in the selection of suitable techniques of production, which should guarantee established productivity, quality of realized processes and allows to manufacture ecological products.

Environmental context

In production industry the environmental questions are in the focus of attention. Several new strategies for incorporating these issues into design have been developed under designation eco-design or design for environment. The purpose of these strategies are to:

- minimise energy consumption,
- minimise use of material,
- exclude hazardous materials and substances,
- facilitate recycling.

Over the last decades, knowledge of complexity and extent of the environmental problems has increased. From being concentrated on local problems the focus has changed to global problems and resulted in a new viewpoint, sustainable development.The aim of this concept is to reach balance between resource use and environmental impact, so that the environment is able to withstand the burden within the ecological cycle. At the same time the resource distribution should be fair.

The extensive effect on the environment is connected to human activities and unrestrained exploitation of natural resources, which is illustrated in Figure 1.

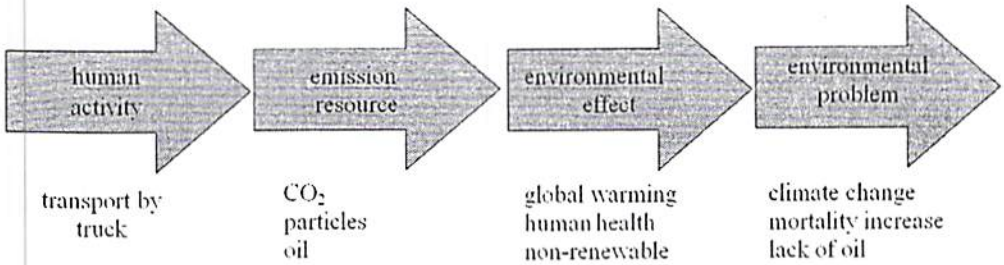

Figure 1. The chain of events resulting in environmental problems

Examples of such activities can be found through the whole life cycle of a product from raw material extraction, product manufacturing, use of the product to the waste disposal. Examples of emissions generated in transportation by trucks are carbon dioxide, CO_2, and particles, resulting in global warming anddeteriorating human health. Increasing use of resources as oil decreases non-renewable sources. The effects mentioned cause climate change and increased mortality. The increasing use of oil also may lead to shortage, due to insufficient supply.This exploitation has resulted in a high standard of living in the industrialised countries. With this high standard follows a high consumption of products leading to increased consumption of resources and energy[3].

CLEANER PRODUCTION AND SUSTAINABLE TECHNOLOGIES

In practice, a technology and realization of technologicalprocesses is in exact relationship from elements of working andnatural environments. Steering of technological processes can notbe realized without consideration of all settings in companyprocesses and external environment [5]. Because of the fact that the process technologies should becarried out from a cleaner production point of view, thedevelopment of sustainable technology should be based on thegeneral cleaner production aims. The technological process, which based on sustainable technology should tend to reducing orminimizing the amount of [5-6]:

- resources consumed;
- waste and emissions generated;
- the hazards of the waste and emissions generated (mainly by usage substitution of input materials);
- the risk of accident or malfunction.

The environmental consequences of the final phase of product life have many aspects or requirements which are summarized in the following guidelines:

- Toxicity - it means that avoiding toxic materials such as heavy metals and organometallic compounds is good because they in landfill, cause long term contamination of soil and groundwater.
- Potential of recycling - it means examination the using of materials that cannot be recycled, since recycling can save both material and energy and to minimize recycling of materials for which this is possible.
- Controlled combustion - when recycling is impractical the best way is to recover energy by controlled combustion.
- Biodegradability - it means the using of materials that are biodegradable or photo - degradable, although these are ineffectual in landfill because the anaerobic conditions within them inhibit rather than promote degradation.

Successful application of sustainable production in companies depends on property management, maintenance, adequate infrastructure and training of people. The transfer of sustainable production practices should be realized by:

- technological capacity (ability to adaptation clean technologies),

- training capacity (ability to training and education the ideas of cleaner production to various groups of people),
- institutional capacity (ability to network and co-operate among different stakeholders),
- government capacity (ability to prepare and implement policies in different policy fields).

Technological capacity is a one of the most important method to applicationthe idea of sustainable production. Environmental technology is usually connected with the design and analysis of complex, integrated management systems and sustainable development in the areas of:

- role of the design in the operations of environmental technology, control of integrated environmental systems,
- role of computer methods in the operation and control of environmental systems,
- education and training requirements to provide efficient operation and maintenance of complex environmental systems in range of clean technology.

The successful promotion of idea of sustainable production and environmentally sound technologies it is necessary to:

- built business strengths of company,
- connect the business and environmental advantages of sustainable technology,
- initiate long-term investments the technology transfer and development,
- exist government assistance and support mechanisms.

However, sustainable production and sustainable technologies will not be efficient without environmental management systems, which are the framework, set by top management of company.

CONCLUSION

The minimization of waste and emissions and reductions in material and energy inputs are the most important environmental aims. Sustainable technological development and innovations do not automatically lead to total reduction of environmental burden of industrial production. However, technological innovation is an important factor and seems to play a central role in the long-term initiation of sustainable production.

Sustainable technology is usually connected with the design and analysis of complex, integrated management systems and sustainable development and it is a central target in environmental science and growth of global economies.Design for environmental sustainability is the long-term view: that of adaptation to a lifestyle that meets present needs without compromising the needs of future generations.

REFERENCES

1. KaniaA., Spilka M., Optimization as an alternative in searchof sustainable technological processes, Journal ofAchievementsin Materials and Manufacturing Engineering17, 413-416(2006).
2. Getzner M., The quantitative and qualitative impacts ofclean technologies onEmployment, Journal of CleanerProduction 10, 305-319(2002).
3. Shramm W., Hackstock R., Cleaner technologies in theFourth Framework Programme of the UE, Journal ofCleaner Production 6, 129-134(1998).
4. Heusing D., Environmental assessment and waste management, Special issue, Journal of Cleaner Production, Vol 13, No 3(2005).
5. Keolean G.A., Kar K., Elucidating complex design and management tradeoffs through life cycle design: air intake manifold demonstration project, Journal of Cleaner Production 11, pp. 61-77(2003).
6. Callister W.D, Fundamentals of Materials Science and Engineering, John Wiley & Sons, New York, pp. 368-376(2001).