

SAFETY VERSUS MODERN ENVIRONMENTAL PROBLEMS

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Abstract

With the wide application of engineering technologies, environmental aspects increasingly focus attention on safety. Reducing environmental impacts also affects operational safety, and because of the adverse effect, there is a dual situation in the relationship of these two areas. On one hand, maintaining the acceptable environmental status is closely related to the secure operation of the technologies, on the other hand, by ensuring safety, the risks of the new environmental impacts shall be managed. Such risks prevent the development of a dynamically balanced environmental system. Based on the examination of both the environment uses and the operational conditions, we have reached the conclusion that we will analyse environmental risk management in the context of safety. In the first phase of the research we reviewed the relations between safety and the modern environmental problem.

Keywords: *safety, environment protection, environmental risk.*

1. Introduction

Modern environment pollution is based on the fact that individuals and societies consider the use of the environment by humans as a necessary part of life. As humans have reached a high level of material literacy in history, they have had to face the modern condition of social and economic development, namely environmental sustainability [1]. Emission reduction is supported by innovative technologies, and there have been results. New solutions, however, might trigger a counter effect, influencing multiple segments of safety. According to another experience, safety is achieved via the use of the environment, which reinforces the counter effect. The time has arrived when we should position the relationship between safety and the environment in the focus point of our research.

2. Safety and environment protection

Based on the results of environmental measurements, we have come to the conclusion that several earlier findings should be reconsidered within the research. The correlations necessary for achieving the objective were first investigated in

our study, but their interpretation raised a number of questions at the beginning of the research.

2.1. Safety

Safety is a complex definition, bearing specific meaning for certain areas, therefore its concept cannot be extended to all areas without further definition. When defining it, the best is to concentrate on the essential content, and assume that safety is the moment of damage-free and injury-free status [2]. Safety, however, due to its complexity, determines the relationship between the living organism and the environment, and affinity is an important element of it. The affinity to solve problems is accompanied by trust.

Development of trust is possible because of consciousness, which in a narrow meaning represents logic, abstract thinking and recognition of reality. In a broader sense perception and emotions belong to consciousness, too, influencing will, and the inspiration for action. Based on safety and consciousness, we specify the definition of consciousness safety. Consciousness safety: a series of actions controlled by intentional attention, based on the recognition of reality and perception, to ensure life conditions, to prevent dam-

age leading to an end of life, to sustain life and to prevent conflicts.

The sense of safety supports the assessment of safety. Sense of safety is a state of mind, when the inputs received from the environment generate relaxation; therefore no need emerges to the forced change of the living space and the recognized environment. The sense of safety is the measure of safety. Components of the sense of safety and their relations are illustrated in **Figure 1**.

The areas of safety are summarised in **Table 1**. as basic functions and life situations.

Based on the emission testing of different - including production, transport and energy production -, we have come to the conclusion that the use of the environment is a component of safety assessment, and has a direct impact on consciousness safety and thus on the sense of safety. Therefore, we must also look at the situation of environmental protection.

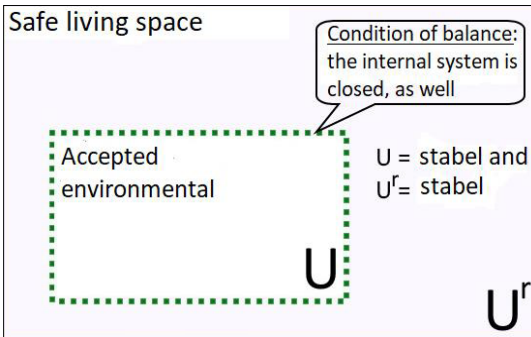


Figure 1. Components of the sense of safety and their relations

Table 1. Areas of safety by functions and life situations

legal safety economic safety safety of living	Priority groups	political safety
	environmental safety	
	supply safety	
	transport safety	
	operational safety	
	public works safety	
	nuclear safety	
	ecological safety	
	social safety	
	life & property safety	
	public safety	
	military safety	

2.2. Environment protection

The current situation of environmental protection has evolved because of the main reasons associated with energy needs and other uses of the environment, and also with safety.

Summary of the main reasons:

- the availability of fossil-based energy sources is limited;
- the use of fossil-based energy is measurable and has detectable adverse effect on the environment;
- the question of energy safety and energy dependence comes to the fore;
- the water consumption of the world has significantly increased, while the sources are reducing and areas with water scarcity are likely to emerge;
- fear related to water scarcity has appeared.

The best way to illustrate the current condition of the environment is to consider the amount of pollutants released in to the air.

The level of emission to the air of the Hungarian national economy is demonstrated in **Figure 2**.

Besides the drinking water supply to households and individuals, water plays a significant role in energy production too, and nowadays there are hardly any economic activities where water is not needed. The availability of fossil energy and the attempt to reduce adverse environmental impacts are related to renewable energy. **Figure 3**. shows the trend in the use of energy sources in respect of electricity generation.

Beside fuel sources, water has also become a critical element, representing business risk and also safety risk. For example the use of water in a fossil fuelled power station is approximately 10-70 million m³ annually, but the water used by iron-making and steel-making is also considerable.

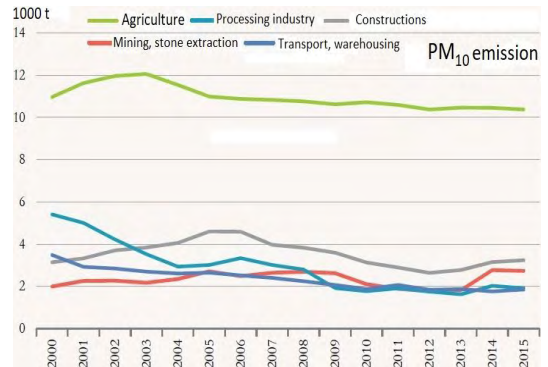


Figure 2. Particulate matter emission of the main sectors (source: KSH)

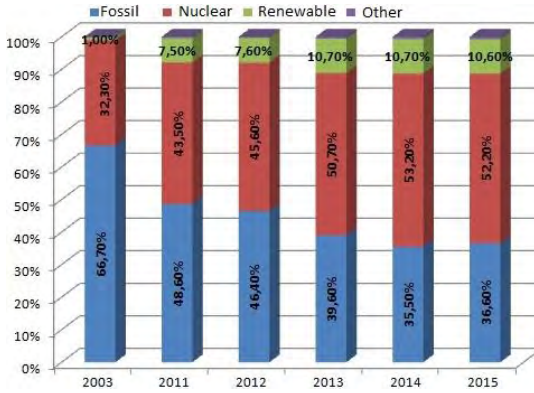


Figure 3. Distribution of energy sources in energy production (source: KSH)

3. Modern times and the environment

The necessary application of technical tools is one of the achievements of the modern era. Modern environment pollution has evolved, and via consciousness safety processes, a new requirement, namely safety has appeared in respect of environmental emissions.

3.1. Emissions of safety

In order to ensure that the consciousness of safety is a real series of actions, processes that meet the needs of the functions should be strengthened in all safety areas. Focussing on supply safety:

In a broader sense supply safety is connected to all safety areas, as well as being an important feature of the various industries, technologies, systems and applications. For this reason, it is organically related to environmental protection, as an inhibiting and assisting factor.

Human activities are essential in the area of supply safety. The maintenance of transport systems, the supply of energy, the production and provision of material goods all belong here. Maintenance is supplemented by development and construction, which form a coherent system of supply safety.

Data protection and IT security are a decisive aspect of modern times, as well as the technological and technical protection of collected data assets. Electronic data processing is now part of everyday life, and the operation of data carriers is closely related to it. However, it is easy to admit, that the "less paper, more tree" principle can only be enforced by creating a significant IT background.

The large server parks, and the coolers necessary for their operation due to the heat generated,

both require electricity. Electricity generation causes environmental impact, and thus safety, indirectly, as an active element of modern environment pollution, leads to environmental impacts. The function of the air pollution of a power station is shown in Figure 4.

3.2. Impacts of environment protection

To reduce environmental impacts, creating the conditions shall represent the primary task, again related to the consciousness of safety. Protection against damages, maintenance of life and conflict prevention are also a priority in this respect.

For safety it is necessary to construct and operate technologies and supporting systems. What kind of correlations do we consider? Environmental protection imposes requirements on safety facilities, and safety cannot lead to environmental conflicts. As an example, we could look at the protection of IT infrastructure, where the special design of server parks requires such degree of cooling that entails a significant noise emission. In such cases, environmental compatibility is fulfilled with noise reduction, shown by the example in Figure 5.

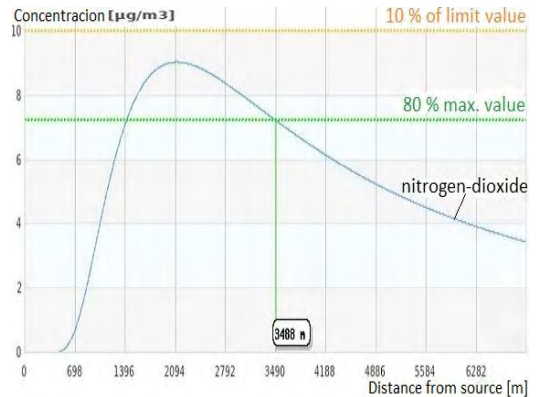


Figure 4. Air pollution in the surroundings of a power station

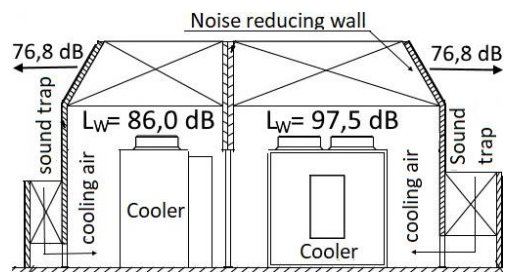


Figure 5. Reducing noise emission of a server park

4. Conclusions

As regards the human use of the environment, safety is considered as an ambivalent component of modern environment pollution. The degree of ambivalence is determined as a combination of the sense of safety (as the measure of safety) and environmental stress. Environmental solutions require the introduction of ambivalence in the technical field.

References

- [1] Bera J., Pokorádi L.: *Közlekedés a környezetvédelmi rendszerhatáron innen és túl*, Közlekedéstudományi Konferencia 2016 Kiadvány, Győr, 2016, 116-143.
- [2] Csutorás G.: *Biztonságtudomány*. In: *Környezetvédelmi Tudástár* (Ed. Domokos E.) vol. XXIX., Pannon University, Veszprém, Hungary, 2013. 12-14.