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THOUGHTS ON ENVIRONMENTAL MENTORING

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Abstract: This paper attempts to overview the possibilities of environmental mentoring. Nowadays, sustainability (or rather sustainable survival) has a decisive role. In essence, then, it is needed new knowledge and technologies. However, in addition to developing theoretical approaches, a full analysis of reality and practice is also challenge: it is necessary to think together about science and practice. There is no progress without it. It is also worth reflecting on how each discipline relates to all the others while discovering some complex problems. In the field of sustainability, with respect to (technological) innovation and environmental elements (and landscape issues), one of the key links is energetics, especially the challenges (environmental, technological and social) of renewable energy system. With a holistic view, but in a non-exhaustive may, we organized the relevant bits of thought on a "cognitive map" and designated the path to dynamic balance in the form of a few "actions", this way is pointing out the necessary symbiosis between humanity and nature. We have no absolute basis or an unquestioned principle, but we do have engineering work, saturated with the holistic approach mentioned above. Thus, this paper is primarily a thought-provoking, speculative writing, rather than an assertive one.
Keywords: sustainability, interdisciplinary, energy, innovation, environment, landscape, environmental mentoring

INTRODUCTION

We have chosen László Vekerdi's enduring words "Man is a thinking reed" to be the epitaph for this publication because it is man's marvelous ability – human thinking – that enables him to create (new) products, services and technologies which (may) facilitate so many people's everyday life in so many ways. In this manner of thinking, the role of universities as communities of teachers and disciples (or, to put it in a more "modern" way, places where the integration of RDIE (research-development-innovation-education) may occur), is indisputable. This also holds true for the role of engineers (especially those with a system- and process-oriented mindset), in as much they create balance between tradition and globalization.

The English word engineer is related to Latin ingenium, meaning "ability, inborn character", which suggests an innate ability for innovativeness. Just consider the Polish animated series Enchanted Pencil (Zaczarowany ołówek), the protagonist of which is a resourceful young boy, who solves every problem by using an enchanted pencil to draw objects which materialize in the episodes. It is his exceptional ability of thinking and observation that enables him to create new (technological) inventions, while it is his resourcefulness and creativity that allows proper utilization, hence amalgamating invention with innovation.

Doubtlessly, we now live in the era of Industry 4.0, but the philosophy of Industry 5.0 (the symbiosis of man and machine) is already around the corner, according to which a (more) efficient cooperation between humans and robots results in the culture of innovation. In other words, Industry 5.0 combines the benefits of human intelligence and cognitive IT to enhance efficiency (considering, of course, its impact on social aspects, as well (Davidson – Gross 2018)). Note here that social development is lagging (far) behind technological development, although, apart from system-oriented research, development and manufacturing, the support of society is also equally important as the 16th key task of sustainable development.

It is now also a fact that in addition to the communication differences between generations, the different values of the different generations are also more and more prominent, which manifests itself in different social expectations, created needs and accelerated lifestyles, requiring a constantly renewing, adaptive thinking, all of which directly or indirectly affect sustainability (including the measurable indicators of sustainability).

It would also have to manage demand to reasonable and sustainable levels, as has been extensively analysed and debated (Wynne 2011; Owen et al. 2013; Székács A. 2017). Therefore, this short publication attempts to demonstrate – enhancing the aspect the environment – the "actions and reactions" between energetics, the innovations of the energy industry and the surrounding environment on one hand, and the landscape on the other hand. The main roles of this paper are to help spreading the practice of environmental mentoring and to help softening energy transition challenges and worries, to shape the energy future, to raise creating action oriented innovative social, to promote common thinking. Because assessing past trends and future outlooks result responsible innovation.

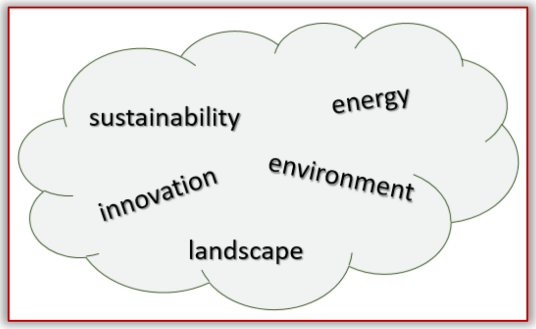

Figure 1: "Key words"

The Figure 1 presents the five most important words of this topic: sustainability, energy, innovation, environment, landscape. All five words can be found in 240,000 documents of Google Scholar system. This means that in an international context researchers/scientists (engineers, economists, managers, etc.) are dealing with social challenges extensively.

SUSTAINABILITY – THE CONCEPT OF HARMONY

The holistic approach of energetics and the multidimensional, interdisciplinary way of thinking has a great potential to promote sustainability in the symbiosis of human activity and nature. There is no absolute basis or principle, but there exists the aforementioned engineering activity inspired by the holistic approach, that is, the ability to explore and analyze "problems" that require a complex attitude (note here that this is a rather lengthy process).

A perfect example of this can be to solve a problem by generating another problem that (already) has a (technical) solution, or it is the indirect approach to the particular problem that may lead to a solution. Specifically, in the field of energetics, the reduction of the (economically exploitable) amount of carbon could be mentioned as an example, which can be partially eliminated by the direct burning of biomass, but this solution cannot be considered carbon neutral. However, by separating and utilizing the carbon dioxide content of the emitted flue gas, we may arrive at an innovative solution. Energy transfer depends on the acceleration of the technological development and open-minded and constructive social dialogue.

The above example well illustrates the importance of scientific creativity in the field of design, manufacturing, operation, use and application from the aspect of environmental sustainability. In this way technologies that are not mature enough or lack substantial social acceptance will never become long-term solutions and will function only temporarily.

In this context, the main goals and targets of sustainable development include:

- Ensure access to affordable, reliable, sustainable and modern energy for all (Goal 7)
- foster innovation (Goal 9), and
- sustainable use of terrestrial ecosystems (Goal 15),
- support inclusive societies as mentioned above (Goal 16) (Zlinszky – Balogh 2016).

Because natural resources are not replaceable key resources (in fact, they are ecological constraints in our lives), a complex analysis of a particular energetical (technical) innovation should be carried out to determine which of the pillars of sustainability (environmental, economic, social, "political") could temporarily be neglected or overlooked. However, it is unacceptable to contrast systems based on conventional and renewable energies.

In clarifying the direction of progress, as well as allocating and prioritizing resources, the introduction of indicators (may) help significantly (Gockler 2017; McBride et al. 2011).

Figure 2 illustrates a "cognitive map" of environmental mentoring (in terms of sustainability and energetical innovation). We have arranged bits of thoughts (facts, principles, theories and methods) concerning energetics (more precisely, technological innovation in the energy industry) and sustainability (impacts on the environment and landscape) on a "map", but we have also set up actions (if we create an inclusive environment for them), all of which is permeated by a holistic approach and interdisciplinarity.

HOLISTIC APPROACH | HOLISTIC APPROACH

"FACTS, PRINCIPLES, THEORIES AND METHODS"	"ACTIONS"
Increasing energy consumption	Thoughtful energy saving, moderation Energy rationalization
Increasing carbon dioxide emission	Technological potentials
Energy-related pollution	Modelling the energy systems
Overload on environment	Proper use of natural resources Disseminating information
Change in the character of the landscape	Development of energy model variants
Energy-intensive innovations	Rethinking motivations
Planned obsolescence	Life-cycle analysis
Growing number of vehicles	Integrated transport
Growing number of assets	Community use
Decline of arable land	Brownfield investments
⋮	⋮

HOLISTIC APPROACH | HOLISTIC APPROACH

Figure 2: Environmental mentoring (sustainability in relation to technological innovation (in energetics))

We have placed man at the center of sustainability, but we must constantly reassess and monitor the effects of human actions, and intervene at the appropriate level, if necessary. The cornerstone of harmony or the necessary symbiosis is constructive and cooperative action that must be coupled with self-discipline.

ADAPTIVE SYSTEMS

The basis for the environmental mentoring mentioned in the previous chapter relies on the "actions and reactions" between the system and its environment. A prerequisite for this is the ability to identify with the problems and challenges due to the internal value system. The technological challenges of a renewable energy system include redundancy, critical infrastructure (interconnection and interdependence of elements), and the impact of renewable energy systems (risk and opportunity analysis, or vulnerability) on environmental elements, and on the nature and quality of the landscape. Pasqualetti and Stremke wrote about energy landscape. The Collingridge dilemma also draws attention to the need for a comprehensive analysis of the effects of technology before a technical innovation (system) is introduced or embedded in order to obtain as much information as possible for its deployment, dissemination and long-term sustainability, as well as for working towards adaptability. There are open questions which still remain unanswered.

This interdisciplinarity, which is in the center of our study, allows for maximum scope for this "target research," since the most reliable determination of future effects can be made with a complex approach. Referring to some previous works (MacKay 2008; Liegey 2013; HTTP1; HTTP2; HTTP3), we can assume that the result is guaranteed by the linking and mutual thinking of several disciplines (risk management, environmental science, social sciences, etc.). Note here that the ever-increasing dissemination and use of computer programs in all areas of technology, as well as the constant growth of their worldwide distribution through the Internet, is a critical factor in technological innovation. It is also a fact that the problem-detecting and solving skills of society are diminishing (too), owing to the excessive use of 'smart' electronic devices. A typical example of the external and/or internal dominance of motivation is the relationship between created needs and self-discipline.

Dynamic balance (i.e. the ability to adapt to a constantly changing environment) means that the change induced by the changing environment results in a rebalance. If engineering respects the character of the landscape, it will entail creativity and innovation, because the production and use of energy results in a more intensive use of the landscape that adapts to natural conditions. The energy landscape is changing, driven by the need to reduce emissions (Deane 2017). The character of a landscape is defined by a pattern or system of a combination of natural and anthropogenic landscape-forming factors that makes a particular landscape distinct from other parts of the land (Landscape Strategy of Hungary 2017-2026). In the development of energy model variants that respect all of this, priority is given to the fulfillment of the main goals of sustainable development mentioned above (Zlinszky – Balogh 2016).

For instance, point 7.a of the 169 subgoals calls for a more advanced and cleaner fossil fuel technology, investment in energy infrastructure and the launch of clean technologies, energy transition. Also, we should mention here subgoal 9.4 as a guiding principle, which is linked to the activities of technical engineers because of a more efficient use of resources, as well as the development and use of clean and environmentally friendly technologies and industrial processes. Suitable methods may include energy life cycle analysis or risk analysis: evaluation assessments with differentiated thinking make the production processes transparent and thus realize energy savings and impacts on a smaller environment. These will, then, be accepted and adopted by the members of society (in the form of a firm conviction, readiness to act, etc.), thus getting closer to sustainability.

SUMMARY, FINAL THOUGHTS

Our publication highlighted the complex relationship between sustainability and the (technical) innovations of the energy industry, where deeper analysis of relationships presupposes interdisciplinary thinking. In most other publications, the emphasis falls on "novelty" (a possible solution to a specific problem in a different way) in relation to a particular technical development, and only a very limited number of written texts contain an analysis of the full mechanism of the impact of technical or technological developments. Consequently, the introduction and application of technologies that are not yet mature will require future research that explores the potential for permanent, stable and reliable application of systems, and identifies the necessary (further) developments. Note here that the role of universities in the dissemination of scientific results is of paramount importance.

Certainly, switching to low-carbon systems is essential for the protection of our environment, but at the same time, the transformation of already existing systems into higher systems can be a solution, as redundancy shouldn't be neglected. One should also consider the types of investments entailed by the potential "new" solutions (greenfield/brownfield) and what impacts would they have on the character of the landscape, etc.

Environmental mentoring is a series of interdisciplinary activities to help avoid burdening, polluting and damaging the environment in an unreasonable way. With environmental mentoring, therefore, we can see the (possible) environmental changes brought about by the dampening (or, ultimately, solving) of a particular problem.

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