

## THE NEED FOR DEVELOPMENT OF KNOWLEDGE FOR SUSTAINABILITY IN THE CZECH-POLISH BORDER INDUSTRIAL REGION

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**Abstract:** *The article deals with the need for development of knowledge for sustainability of the Czech and Polish border industrial region. In the introduction it briefly summarizes the history of industry in the region. At the same time it draws attention to future deeper need for development of knowledge of processes and their implications not only at the level of technology but in other areas as well. It discusses the need for involvement of the general public in problem solving, development of knowledge and motivation of the coming generation for sustainable development of the region.*

**Keywords:** *knowledge, knowledge society, low carbon, region, sustainability, trends.*

**JEL Classification:** *M10, M40*

### 1. INTRODUCTION

Currently, a knowledge society is an internationally recognized and promoted concept based on which further development and improvement of a society must be supported by continuous education of all people throughout their life. Daniel Bell, an American sociologist who in 1970s popularized the concept of post-industrial society the promotion of which started as early as in 1950s, can be considered as the theoretician of the first wave of a knowledge-based society. In 1980s, thanks to the unprecedented development in the area of information technology, Yoneji Masuda, a Japanese sociologist, formulated aspects of the information society. Knowledge is defined as a structured summary of inter-related findings and experience from a certain area or for a certain purpose obtained mainly through practice or study. It is a cognitive model of a particular subject, inter-relationships of entities and operations that can be performed with these entities. It allows to perform thought observations and experiments and to predict behavior of an actual subject or to create strategies allowing achieving of a defined target with the given subject. Knowledge is usually typically sorted in a hierarchical knowledge system. In the computer terminology, mechanized knowledge systems are called expert systems.

Practically all areas of current society are dependent on knowledge. It is typical for a knowledge society that it enables much faster, more extensive and more efficient global sharing of information and knowledge. We can see an increasing share of products that are relatively modest in terms of raw materials but require extensive know-how. The focus of interest consists in education as the decisive factor of quality. Schoolchildren and students should leave schools equipped with capabilities and motivation to assume responsibility for their further learning during their life and a set of knowledge, skills and attitudes that can be used for their personal fulfillment, social inclusion, active citizenship, and employability.

Sustainability is often defined as practical capability to satisfy the basic needs of the present day without compromising the capability of future generations to satisfy

their basic needs. A sustainable society must be built in such a way that its lifestyle and business activities are not in conflict with the inherent capability of nature to sustain life.

Note: The Iroquois Indians in the past admonished the people to take care of the well-being of the future seventh generation in the same way they take care of their own well-being (the Law of the Iroquois Confederacy: "In our every deliberation, we must consider the impact of our decisions on the next seven generations"). A man blessed with a very long life can live maximum to see its seventh generation. The vision of these generations is easier than a vision of generations far in the future and for this reason it can serve as a practical aid in the decision-making process.

The concept of sustainable development seeks harmony of the requirements for effective preservation of nature, the environment, and resources and economic development. There is a controversy whether it is possible globally to achieve such development on the planet with the limits of all resources and often quantitative, subjective evaluation criteria. However, this terminus technicus can also be understood as a qualitative contribution related to quality of life.

The environment of our border region of Krnov, Opava, Ostrava, Karviná, Český Těšín, Třinec can be understood as industrial region with a very long historical tradition. The society and its development were historically conditional upon a suitable location with global trading lines and important mineral resources. The significant textile industry stimulated development of mechanical engineering together with the development of methods of extraction of mineral resources and the energy industry. In 1957, the Mining College was moved from Příbram to Ostrava in order to support the development of industry. This important move enabled development of education, industrial development and research and further development of education in the form of Silesian University in Opava and the University of Ostrava in recent decades.

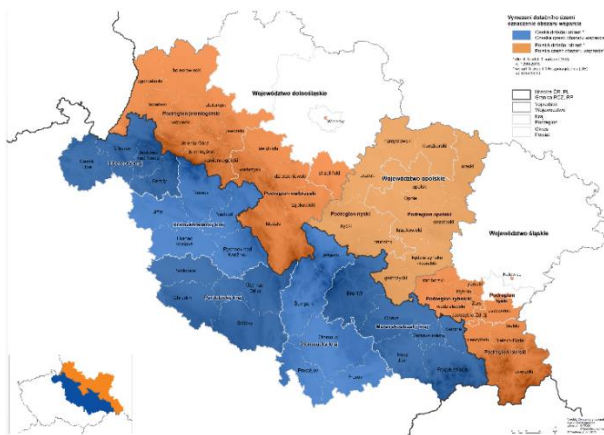
More than two-hundred-year-old tradition of industrial production left its marks on our environment; however, it obliges us to continue and develop the knowledge,

experience and practical skills of our predecessors in the form of new technology that will ensure that this region will be a suitable place for life for future generations.

## 2. THE PROGRAM OF DEVELOPMENT OF THE BORDER REGION

The INTERREG program enables financing of cross-border projects in the Czech and Polish border regions. It is controlled by the Ministry of Regional Development of the Czech Republic. The basic requirement of the program is cooperation of the partners on both sides of the border. Granting of the support is conditional upon fulfilling the criteria of joint preparation, implementation, human resources, and financing of the activities.

A joint project must generate impact on both sides of the border and it must provide benefits to the citizens of the supported region. The project should deal with a shared problem or develop a shared potential of the partners (not only their individual needs) and both partners should participate on the implementation of the project. The outputs of the project should be used by the target groups from the other side of the border even after the completion of the physical implementation of the project.



**Figure 1** The territory of the INTERREG V-A Czech Republic–Poland 2014-2020 program

The Interreg V-A Czech Republic–Poland program strategically supports activities in the following priority axes:

- Common Risk Management,
- Development of the Potential of Natural and Cultural Resources for Support of Employment,
- Education and Training,
- Cooperation of Institutions and Communities,

to which specific total amounts of grants from public resources are allocated. The priority axes are implemented through investment priorities, they have clearly defined targets and actions. The support is granted only to the projects that contribute to the fulfillment of the targets and which can be included into one of the priorities.

### The Education and Training priority axis

This axis includes activities in the area of education, job instruction and training aimed at acquisition of skills and life-long learning by preparing and fulfilling joint programs for education, job instruction and training. This axis supports activities for:

- Preparation and implementation of shared education

- Development of cooperation between educational institutions and institutions on the labor market
- Development of language education within the educational system

## 3. JOINT RESEARCH AND MONITORING CENTER TRIANON

Joint Research and Monitoring Center TRIANON and VŠB-Technical University of Ostrava (hereinafter the JRMCM) was established on the basis of a long-term cooperation between VŠB-Technical University of Ostrava and TRIANON. The shared interests and the need for activation and motivation of the public and mainly the students for further learning enabled to establish an institution the focus of which is to develop awareness on alternative sources of energy, environment protection and ecology in the Czech-Polish border region. The JRMCM center is located in the technology and process facilities of TRIANON in Český Těšín. The center is equipped with modern technology for demonstration of utilization of energy and water in modern houses. This technology ensures heating of the building for demonstration, electric power, water and transport needs between Ostrava and Český Těšín for the JRMCM organization team. The JRMCM facilities are used for afterschool activities of children and students from Český Těšín and neighboring municipalities.

The JRMCM is equipped with energy technology and for demonstration of use of technology in modern private homes. The technology is used for providing thermal and electric power for the building. Although the building is connected to the public utility grid, more than three quarters of the consumption is covered by the built-in technology.

Electric power is supplied from a photovoltaic solar system and if necessary from a cogeneration unit. The system enables interim accumulation of electric power into stationary batteries and into the traction battery of an electromobile when it is connected.

Heat is obtained from solar collectors and it is stored in hot water containers. When necessary water can be heated (when enough electric power is available) by a controlled hybrid heat pump or in an extreme case by a micro-generation unit. There is a plan to use the high potential heat from the exhaust pipe from the micro-generation unit in a heat storage container with latent transformation. Cooling air from the micro-generation unit is used for preheating of the primary circuit of the heat pump.

The JRMCM is controlled by a gradually built central control system. At the same time the operation of the technology is monitored and the measured data is stored in an archive and analyzed for further development of the control algorithms.

Flows of electric power are controlled by IDM modules (Intelligent Directional Module) and so it is possible based on the current needs to supply heat from the cogeneration unit together with supply of electric power for charging of the electromobile or direct this power to the heat pump. Or in another case to use the electric power from the electromobile (while maintaining the necessary operational radius of the vehicle) for lighting and powering of the common areas. The block diagram of the technology is shown in figure 2.

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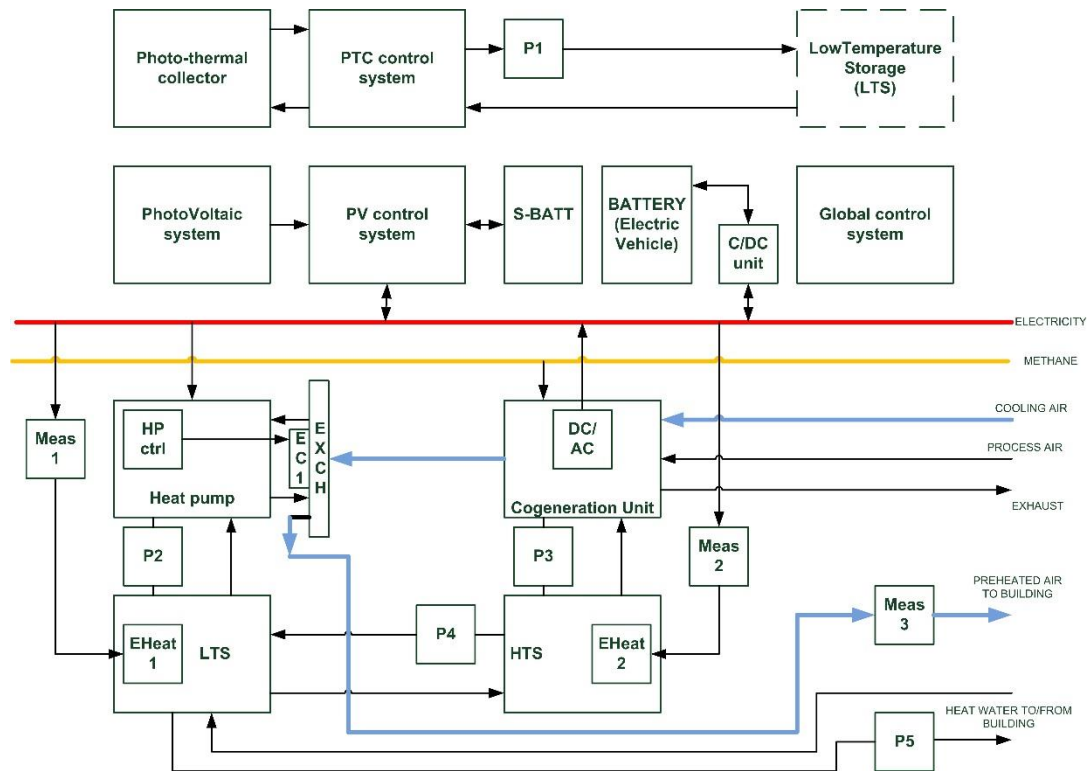


Figure 2 The block diagram of the topology of the energy units of the JRM C Trianon

The JRM C organizes club activities for children and students from Český Těšín and neighboring municipalities. In the technology and cybernetics clubs they learn about electro-mechanic technology (making of printed circuits, CNC machining and 3-D printing), computer technology and its use for control. They build robotic systems (a robotic arm, a robot following the guiding line, Sun Jumper) and they participate in activities organized by VŠB-Technical University of Ostrava aimed at support and motivation of students for further study (Solar Charging, Robotic League, Build Your Own Sun Collector, Build Your Own 3-D Printer, etc.). Besides these activities the JRM C in cooperation with TRIANON organizes seminars, workshops, and field trips that are open even to the general public (Build a Bumblebee Box, Been Exchange, etc.).

#### 4. SUMMARY

Within the last five years, the cooperation implemented within the JRM C was expanded by activities that motivate the commercial entities in the area, municipalities, and other university sites to engage in deeper and targeted cooperation. The JRM C approached the city authorities in Český Těšín, Cieszyn, and also Teplo Český Těšín, Cieszyn Power Plant, the School of Business Administration of the Silesian University in Karviná, WSB Dabrowa Gornicza with the agency in Cieszyn and more. This emerging consortium was gradually acquainted with the targets and ideas of the JRM C in numerous joint meetings.

The call for submission of proposals for financing of activities from the public funds for border regions in 2015 gave an impetus for a more intensive communication and contemplations on the possibilities for expansion, systemic anchoring of activities gratuitously implemented so far and for their financing.

Numerous negotiations and project preparations resulted in crystallization of a task force comprising WSB-Trianon-TUO under the leadership of VŠB-TUO dealing with the topic of a low-carbon economy from different points of view. This topic was also systematically included in the structure of the main promoter under the ENET Center (even though it is mainly solved by the personnel of the research and development group named Systems of Alternative Energy Sources of the Faculty of Electrical Engineering and Computer Science at the Cybernetics and BMI Department).

The negotiations enabled gradual inclusion of this topic to the form of activities focusing on development of education of the industrial region for all demographic layers of the region.

The project application "Practical Program for Education of Personnel Developing Low-Carbon Economy in the Border Region / in Polish - Praktyczny program kształcenia kadr rozwijających gospodarkę niskoemisyjną na pograniczu" was approved in 2016 for financing, and its first activities were planned and initiated. At the global level, the university sites deal with the topics of motivation, education and activities of the higher education students and secondary education students from the point of view of potential higher education students. The secondary education students and schoolchildren group is organized by Trianon while the university sites provide the necessary expertise for the activities of Trianon. The partnership of the Czech and Polish universities and the positioning of the third partner, i.e., Trianon immediately in the border zone in Český Těšín guarantees reciprocal activities for the Czech and Polish schoolchildren, students, and the general public. The expert view of the university sites regarding the development of a knowledge society, low-carbon economy, renewable and alternative sources of energy, protection of the environment, hydrogen technology or electromobility, from the point of

view of equipment, technology, and pilot systems is ensured by VŠB-TUO. The social, ecological, economic, and commercial aspects are guaranteed in the project by WSB.

The project has important relations with commercial entities and municipalities who are engaged in the activities in the theoretical area, learning area as well as the practical area. Through lectures, field trips and assignment of topics for end-of-year theses, school-leaving and diploma theses they enable students to get acquainted with the industrial and administration environment and to create the necessary

positive feeling of the need for their future activities within the region and for the region.

#### **ACKNOWLEDGEMENT**

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#### **REFERENCES**

- [1] HAMMER, M. 2002. *Agenda 21. Co musí každý podnik udělat pro úspěch v 21. století.* Prague: Management Press ISBN 80-7261-74-0.
- [2] HELUS, Z. 2008. *Teoretická východiska pojetí učitele v době měnících se nároků na školu a vzdělávání.* In Učitelská profese v měnících se požadavcích na vzdělávání. Prague: Charles University, Faculty of Education, p. 11–28. ISBN 978-80-7290-384-9.

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