

TRANSDISCIPLINARY CHALLENGES OF SUSTAINABLE CONSTRUCTION AND REAL ESTATE DEVELOPMENT IN VISEGRAD COUNTRIES

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Abstract:

The Visegrad countries – the EU members - are the most advanced transition countries, yet they face the serious problems, such as the dependence on the energy sources from abroad. Similarly as other European countries they are obliged to meet the goals of the European Union in the area of energy savings in future (document Europe 2020). The special measures have been undertaken by some of the countries but the overall results were to this moment quite controversial. The most important challenges are:

- High costs of the energy from the renewable sources in times of economic austerity,
- Lack of innovation capacities,
- inadequate funding of the research and development and the problems of transition to market economy,
- Low support for transformation of the energy sector towards the use of renewable resources by the society,
- Need for additional investments into the power grids,
- The growth of consumerism,
- Urban sprawl combined with very liberal approach to urban planning and development,
- The mainstream political attitudes concerned especially with growth of wealth but not with protection of the environment and energy savings,
- Difficulties of the implementation of the efficient energy savings measures in the housing sector because of low solvency of often aging population.

The aim of the paper is the identification of barriers and the suggestions of possible policy changes that would help to overcome the present problems.

Key Words: Renewable energy resources, real estate, Visegrad countries

Introduction

The economic dimension of sustainable development is based on the assumption that is impossible to maintain urban infrastructure and real estate fund in working order, to ensure prosperity and maintain at least minimal economic growth without an adequate level of economic activity. Economy where energy costs are rising (they are a growing source of environment pollution), while economic growth is based on the use of non-renewable resources, then such economy can not be regarded as sustainable. Sustainable development requires a transformation of the whole system in the direction of environmental and social compatibility. The economic, political, environmental and social aspect have to be taken in account.

Visegrad countries and energy security

Cooperation of the Czech Republic, Hungary, Poland and Slovakia within the Visegrad Group has its roots in the period of Soviet Union dissolution. These four countries after 1989 got into the geopolitical vacuum and mutual cooperation was the logical result of given situation. The official platform of cooperation formed on 15th February 1991 in Hungarian town of Visegrad. Czech and Slovak federal Republic, Hungary and Poland then signed there a declaration of mutual cooperation and created so-called Visegrad triangle. In 1993, after the split of the Czech and Slovak federal Republic, the group was renamed to Visegrad Four (V4) and it represent an informal grouping of four

central European countries that subscribe to the same values, have a common history, culture, geographic position and also have a number of common features in energetic sphere:

- high energetic usage,
- high dependence on import from Russia,
- high dependence on imported primary energy sources,
- low share of renewable sources of energy in the energetic mix,
- market liberalization,
- links between Eastern and Western Europe,
- efforts to increase the installed capacity of renewable energy sources (obligations towards EU) and the resulting problems.

Tab. 1 Energy dependence of Visegrad Countries

Visegrad countries	1990	2000	2010
Czech Republic	15.7%	23.4%	25.1%
Hungary	50.4%	56.1%	61.4%
Poland	2.2%	11.2%	25.5%
Slovak republic	76.7%	66.0%	67.0%

Source: SE, a. s., 2012

Energetics and strengthening energy security is one of the most important areas of cooperation of V4. This sector was developed primarily in the period in which the V4 was part of the socialist block. This period was characterized by the V4 guarantee of cheap imports of oil, natural gas and nuclear fuel from Russia, extremely energy-intensive economies, which were not forced to efficient and intensive use of resources and industry had a huge negative impact on the environment. Typical is also infrastructure, directed from east to west, parallel through the countries of V4. A serious problem of these countries is that they are heavily dependent on energy supplies from a single source, and lack of an integrated common market. Research shows that the situation in the V4 is better in terms of oil and liquid fuels, but worse in the supply of natural gas. Gas crisis in 2009 in Slovakia particularly showed that the resources invested in the development and modernization projects in the energy sector are ultimately more profitable than any energy supply disruptions. Natural gas is a major part of the total imports of energy resources, while 92% is imported from one country - Russia. The priority of the V4 countries should therefore be getting rid of this dependence. An important challenge that is sensed especially by Poland and the Czech Republic is the rising cost of greenhouse gas emissions, which may have a destabilizing effect on the economy dependent on coal. Access to alternative sources of supply reduces the risk of loss from one source and is a fundamental security principle of continuous flow of energy materials supply. Recently, renewable energy sources (RES) has become one of the key issues in the debates on energy whereas the impulse are the objectives of the European Union in 2020 and the share of renewable in the energetic mix.

Tab. 2 Share progress of renewable energy sources in V4

Country	Year 2010	Year 2011	Target 2020 according to Regulation 200/28/EC
Czech Republic	9.2%	10.4%	13%
Hungary	8.7%	8.2%	13%
Poland	9.6%	10.6%	15%
Slovak republic	9.8%	9.5%	14%

Source: SE, a. s., 2012

Sustainable development and eco-innovation in the construction industry

In the development of sustainability, construction sector plays an important role for several reasons:

- is a key sector in the economy of each country, the infrastructure and living conditions are essential in Determining the Quality of Life,
- providing employment opportunities in construction, operations and maintenance activities have a significant impact on poverty reduction.

Energetic efficiency is the key to a sustainable energetic policy and contributes mainly to:

- energetic security,

- environmental sustainability,
- increasing competitiveness.

The aim of the realization of energetic efficiency is mainly to ensure the availability of energy for all end users in real-time and cost effective basis (Petráš, D. and team 2009). The professional analysis show that the total energy consumption in Europe the construction sector accounts for at least 40% of total electricity consumption 11% and 50% of the consumption of raw materials. Construction and demolition activities in this sector produce 40 to 50% of total waste, though in a large extend recyclable. In the sustainable construction, participants should keep in mind environmental, socio-economic and cultural aspects such as design and management of buildings, materials selection, operations buildings, interaction with city and economic development (Baláž, I. 2009).

To reduce energy consumption, thus improving the energy efficiency of building operation can contribute significantly to traditional solutions aimed at balancing thermostats, insulation or modernizing heating and cooling, which ultimately leads to costs decrease. This applies to all buildings, whether residential, office or factory. On the other hand, investors should not rule out the possibility of connecting buildings to the existing centralized heat sources (CHS), which can by its flexibility prevent fuel base being dependent on a single media. In post-socialist countries after 1989 there was a disconnection of the centralized heat sources not only by the major consumers but also by apartments. Today, these systems are built at a disproportionately larger costs in Western EU countries. It allows operation of centralized heat source to solve many of the current challenges facing the energy industry. It is not possible to economically and ecologically realize RES without CHS. In Slovakia, in some cases, small towns and cities began to build a small network of district heating, which heats local schools, small apartment buildings and so on. Such a solution is also possible for individual construction when building a whole new neighborhood houses. Another option for older, as well as new individual construction, the elimination of gas by the financially and structurally more accessible heat pumps or using solar collectors.

Energy usage in the Visegrad countries in the period 2002-2008 is presented in fig. 1 from which it is clear that the largest percentage decline in energy usage among OECD countries of 33% is represented by Slovak Republic.

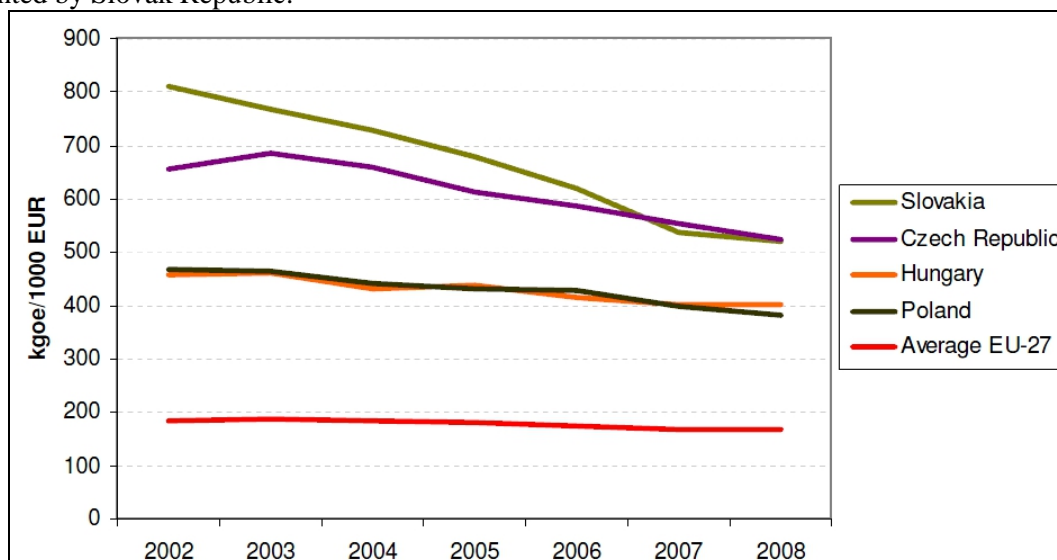


Fig. 1 Energy intensity in Visegrad countries (kgoe/1000 EUR)

Source: Žáková, A.: Energy Policy of the Slovak Republic, 2011

Report of the World Commission on Environment has defined sustainable development as a mechanism, through which it is possible to ensure the needs of current generations without limiting opportunities to meet the needs of future generations (Jeck, T., 2012). Strong emphasis is given to link economic growth and gradual environmental degradation. According to Carrillo-Hermosilla and team (2009) on the economic theories of the relationship between environmental sustainability on the

one hand and economic growth and competitiveness on the other hand, can be presented in two basic views:

traditional - neoclassical view understands the relationship of environmental sustainability and economic growth performance than the decision in favor of one over another. The environmental degradation is seen as a market failure resulting from the separation of ownership and negative externalities arising from production. Protection of the environment by policy measures in this sense are always additional costs for companies and reduction of their competitiveness.

On the other hand, so-called **revisionist view** is based on technological change and innovation. This approach open possibilities to internalize environmental issues into economic processes themselves. Under this approach, the application of environmental policy instruments is forcing companies to innovations, which reduce production costs and improve the competitiveness, but also have a significant impact on the economy of the country.

Within the EU economic policies, the new green technologies are seen as one of the tools which will increase the competitiveness of the economy. The Europe 2020 strategy formulated the issue of eco-innovation in the flagship initiative "Innovation in Union" at the european level. Eco-innovations are normally defined as innovations whose primary purpose is to reduce damage to the environment and the nature by various scientific disciplines, such as institutional and evolutionary economics, industrial economics, systems analysis and operations research, knowledge management, organizational change management and so on (Carrillo-Hermosillo, J. and team 2009). The attention of the European Commission is aimed to "complete the European Research Area, to develop a strategic research to solve major challenges such as energetic security, transport, climate change and resource efficiency, health and aging of population, environmentally-friendly production methods and land management and increased collaboration in joint programs between Member States and regions "(EC, 2010).

Development of urbanization

In terms of sustainable development in the urban development, the important role is played by housing as a basic component of the urban environment and social development. The statistics show that:

- 68% of the population of EU countries live in urban areas,
- 85% of EU GDP is generated in cities,
- urbanized areas represent about 70% of the total primary energy demand,
- energy consumption in urban areas is growing annually by 1.9% (compared to 1.6% globally),
- municipalities are part of the problem but also part of the solution.

According to the reference scenario of the International Energy Agency, "urban" energy consumption will grow twice as fast compared to the EU as a whole. Cities and regions have great potential for the realization of energy efficiency measures and using renewable energy sources with a positive impact on the local economy, employment, investment and innovation.

All V4 countries (at differentiated rates) confront negative effects due to trade liberalization, income disparities and the development of well-paid social class, as well as the growing number of cars during the transformation of urbanization development. This effect is most visible in the metropolitan areas of major cities (Budapest, Warsaw, Prague, Bratislava). The same trend occurred in the case of other major cities. At present, the suburbanization tendencies are constantly getting stronger. They are related to the migration of urban population to the surrounding "green" zones in the 90s of the 20th century. Installation of a so far free country still brings negative consequences. Creates inefficient and unregulated structures(sprawl)of land use, which will for a long time obstruct sustainable urban development.(Gremlica, 2002).

Uncontrolled spread of cities into the country, manifesting in all V4 countries, is disorganized and uncontrolled by definition. The situation is additionally complicated by the fact that land use planning have relatively weak instruments. Corrupt behavior is evident at the local level at issuing permits and making decision throughout the whole Visegrad region. Supported are investments in developing on new "green field" and large devastated or otherwise unused areas (brownfields) remain unnoticed. As a result, the built-up area extends about 1% per year, with a serious impact on local hydrological cycles, the structure of the country, local climate, landscape, biological or cultural diversity and many other things.

From the economic, social and environmental point of view, we can characterize "sprawl" (spread build-up in the country side) as undesirable form of suburbanization (Ouředníček, M. 2002). It is the uncontrolled and unconsidered placement of residential or commercial real estate in the country, which is typical of Visegrad Countries. The result is usually mosaic structure in newly developing urban areas. The main force of such development are efforts of individual landowners or developers to maximize their profits. Locations which are marked by sprawl, increase of economic costs and reduce quality of life in suburb. It is mainly caused by lack of territory connection, lack of roads and sidewalks, garbage collection, maintenance in winter, introduction and management of technical, social and transport infrastructure, and extreme dependence on the personal automobile.

Smart cities and smart urban Technologies

The requirement of the quality of life for people who live in cities causes big pressure on urban infrastructure and available natural resources. To determine the degree of influence of human activities on the environment is used so-called carbon footprint. That it could be reduced by cities, they must pay more attention to the factors that have a direct impact on the level of CO₂ emissions. For example, the quality of the grid, the energy efficiency of physical infrastructure such as buildings, and transport energy consumption. It is estimated that missed productivity and energy consumption due to traffic jams is 1 to 3 percent of world GDP. A significant contribution to the sustainable development of European cities may have Smart Urban Technologies. In EU, 68% population lives in urban areas, proportion which is growing as the urbanization trend continues in Europe and also worldwide. In 2050, nearly 70% of the population potentially will be living in cities. They consume 70% of energy in the EU and there are up to 75% of greenhouse gases emitted by the EU. Initiative on Smart Cities and Communities (SCC) was found in 2011. The Smart Cities and Communities, European Innovation Partnerships (EIP) are partnerships across the energetic areas, transport, information and communication with the objective to create progress in areas where transport, distribution, mobility, use, and production of energy, information and communication technologies (ICT) are closely linked and offer new interdisciplinary opportunities in service improvement while reducing resource consumption, energy and greenhouse gas (GHG) emissions and other emissions which pollute the environment (Fig 2).

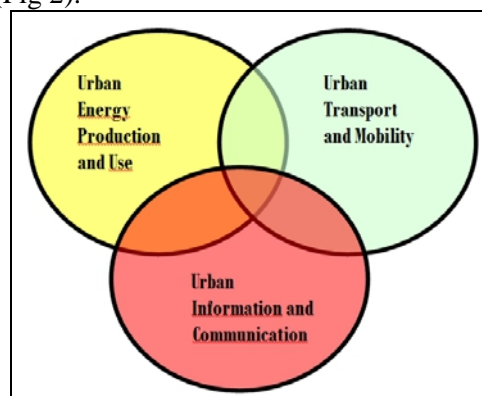


Fig. 2 The SCC focuses on the intersection between energy, transport and ICT
Source: Smart cities and communities -European Innovation Partnership, 2012

The next logical step is to scale up a comprehensive and integrated way the undertaken efforts are related to the urban energy efficiency components of the Strategic Energy Technology Plan in the year 2013. SCC Focuses on innovation led by industry as a key driver to achieve changes in economic and social aspects in urban areas and promotes actions across the cycle of innovation and across different sectors. It will support existing and future initiatives of EU for urban areas in the environmental field (resource efficiency, water, waste, pollution, green infrastructures) and climate policies (EC, 2012).

An important part of EU commitments for 2020 in the field of energetic efficiency and emissions is an innovative scheme for smart cities, where the European Commission supports the development of sustainable technology projects in cities and communities in the areas of energy, transport and information technology in the amount of EUR 365 million.

Conclusion

The current direction of Visegrad countries is unsustainable in many ways. For serious issues to be considered as widespread corruption, high degree of unemployment, a growing deficit of public budgets, lack of innovation capacity and so on. These facts present a serious challenges which politicians are facing in the Visegrad region. It must be said that similar problems are experienced by other European countries. In the field of urban development, management tools of suburban development are very limited at the regional level. The responsibility lies on the decisions of mayors and municipal councilors, developers, building offices, suburban communities and people who can influence the extent, location and impacts of new construction, but not always effectively and efficiently. Environmental pillar of the V4 region is far from the objectives of environmental sustainability. In other words, results and improvements made in this direction in the Visegrad countries are compared with the rest of the world in the context of global issues were disappointing. It also must actively deal with some global threats (climate change, biodiversity reduction, etc...) as well as regional and local issues (increasing pressure from individual motorized transport, municipal waste production, suburbanization,..). Finally, the introduction of new technologies in urban practice will take time, because of the "strong personal interest and reluctance to overcome barriers" in areas such as IKT, transport, energy, health care and waste management.

Many organizations produce estimates of the global energy situation, especially with regard to the demand for energy, efficient energy mix (use a combination of different sources of energy) and security of supply. Reports and analysis serve different economic and political targets, but also interests. They differ in focus and methodology, so it is quite difficult to compare.

European Union seeks to significantly promote "green projects" through financial programs and tools that are available to support activities in research, development and demonstration of smart grid projects, as well as direct investments in the necessary infrastructure.

On the other hand, the local private financial institutions are declaring an interest in funding "green projects", but conditions are scheduled for a specific project individually. Options for funding new technologies and innovative projects in the field of residential construction are associated with many obstacles, despite the fact that intelligent technological solutions are economic benefits for both the regeneration of buildings and new construction. These barriers relate to access the residential real estate sector to the public (support programs) or private finance (from banks, energy service companies, etc.) of those market participants who want to invest in measures to improve energy efficiency, but on the other hand, are unable to appropriately and adequately secure the loan. Increasing the price of the project are presented by the transaction costs associated with obtaining financial resources and banking institutions which include various disproportionately high fees, which go to the pockets of financial services providers.

In conclusion, the global investment in "green projects" in 2009 significantly increased (as the WEF report, based on data from Bloomberg New Energy Finance), which is considered to be a significant positive.

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