Transformation of Economy in Conditions of Industry 3.0 and 4.0: the EU experience

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Abstract

Energy security strategies are the core pillar for countries economic growth on the way to sustainable development. The Fourth Industrial Revolution brings new challenges and forms the basis for Industry 4.0. The European Union is constantly seeking for information, economic and technological transformations that would lead to formation of Energy 4.0 concept. Ongoing digitalization of industries causes the transition to renewable resources. It refers basically to "green" energy (solar, wind, geothermal heat, tidal energy).

Keywords: energy security, renewable energy, Industry 3.0, Industry 4.0, cyber-physical systems, digitalization.

Introduction

Current energy security issues are an urgent constituent part of countries sustainable development strategies. Reflecting on the way how societies and businesses change their modes of action in condition of Industry 4.0 is urgent especially nowadays when the EU is looking for energy security strategies. For Ukraine there is a strong need to develop its own Energy 4.0 sector.

Within the framework of the research we highlight the current energy security strategies in the European Union as well, as suggest directions for providing energy security strategies with the potential of energy renewables as well as measures for reduction negative impacts on energy security in Ukraine.

Methodology of Research

The Fourth Industrial Revolution is a logical continuation of the Third Industrial Revolution, in which a synergetic basis is the driving force of socio-economic systems development. The term "Industry 4.0" is a buzzword used widely in German speaking countries for the Fourth Industrial Revolution currently taking place. Other terms frequently used in this context are cyber-physical systems, internet of things (IoT), smart factory, smart product, big data, cloud, machine to machine (M2M) (Lang, 2016).

The Fourth Industrial Revolution concept has received great significant after the speech at the International Environment Forum in Davos (January 2016) of one of the main theorists of "Industry 4.0" phenomenon Swiss economist Klaus Schwab.

He described this phenomenon as the blurring between physical, digital and biologic areas (Schwab, 2016).

For the first time the concept of the Fourth Industrial Revolution has been formulated at the Hanover Fair in 2011. The phenomenon was defined as the introduction of cyber-physical systems in production processes. Currently it is Germany that is taking the leadership in the Fourth Industrial Revolution. A public-private program «Industrie 4.0» has developed. Large German corporations having research grant support from the Federal Government are to create a fully automated production lines (smart factories), in which products interact with each other and consumers within the concept Internet of things (Khel, 2016).

The Third Industrial Revolution led to new inodes of energy production and consumption. We cannot but mention that renewable energy sources such as solar and wind provide energy production with minimal labor costs at the use stage. American economist John Rifkin called this phenomenon as energy with "zero variable cost". In addition, in the process of renewable energy use costs materialized in the extraction and processing of raw energy are practically excluded compared to the carbon and nuclear energy. Modern energy sector is a quickly changing system. The basic directions for changes here are: intermittent renewables; additive materials and technology; nuclear phase-out; new transmission and distribution grids; new ways of storage.

Ongoing digitalization of industries causes the transition to renewable resources. "Green" energy (solar, wind, geothermal heat, tidal energy) allows doing without fuel and chemical processes of burning it. It means that from production cycles are eliminated entire industry links that ensure: the extraction of mineral resources, recultivation of ruined landscapes, transportation of raw materials (cars/dry cargo ships - in the case of charcoal or tanks/pipelines/tankers - in case of oil and gas), fuel combustion in power plants; manufacturing of purification equipment and waste management, as well as the processes of creation of engineering and construction companies, which generated power for the realization of all these processes.

Effective energy storage is one more issue that needs a particular attention. This direction for development of technological systems can eliminate the controversy between when to produce energy and when there is a need for its use. Thermal power plants operate most efficiently at a constant mode of operation.

Findings/Results

For the formation of a reliable Energy Security Strategy the so called stress tests were carried out by 28 European countries. The tests simulated.two disruption scenarios: a complete halt in Russian gas imports to the EU and a disruption of Russian gas imports along the Ukrainian transit route (Stress, 2014). The European Commission released its Energy Security Strategy in May 2014. The Strategy aims to ensure a stable and abundant supply of energy for European citizens and the

economy (Energy, 2016). To ensure secure, sustainable, competitive and affordable energy for European consumers the European Commission presented an ambitious Energy Union Strategy. It was launched on 25 February 2015 (The Energy, 2015). On 30 November 2016, the Commission published a proposal for a revised Renewable Energy Directive to make the EU a global leader in renewable energy and ensure that the target of at least 27% renewables in the final energy consumption in the EU by 2030 is met. The current 2020 framework sets a EU 20% target for energy consumption which relies on legally binding national targets until 2020 (Directive, 2017).

Conclusions

Ukraine with its strong potential for renewable energy sources is strongly trying to apply the EU energy efficiency experience. The best Renewable Energy Prospects for Ukraine is The REmap 2030. Ukrainian Government together with international organizations and civil society are on the road to develop a renewable-energy policy and form its future energy system. The progress in solving energy security issues is quite great. The introduction of a market-based process for granting operational or investment support to renewable energy producers will ensure not only compliance with the competition acquits and internal market principles, but also bring the country towards its trajectory to 2020 in a cost-effective way. "According to the new strategy, the new structure of energy needs is as follows: nuclear energy will give 50% of the country's electricity by 2035, renewable sources - 25%, hydropower - 13%, and the rest will be covered by thermal power plants" (The Government, 2017). Ukraine has to step up its efforts to create a comprehensive framework with the EU for the promotion of energy from renewable sources and to regain investor confidence, which was significantly affected in the last years due to the retroactive measures imposed.

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