Determination of energy efficiency drivers using the case method

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INTRODUCTION

Research issues

In today's conditions, the creation and implementation of energy-efficient innovations are crucial for energy balance formation in the achieving sustainable development context. It should be noted that world experience plays an important role in Ukraine's transition to energy-efficient innovations. There is a countries list that is identified as significant success in the innovative technologies development and implementation in the energy sector. It`s necessary to identificate and generalize of incentives, innovative activity tools, and methods in the ensuring energy efficiency context, which are used and can be applied in Ukraine. In this way, the the case-study method application is envisaged in order to form a conceptual model of stimulating innovative activity in the ensuring energy efficiency context.

Achievements of energy efficiency programs to date involve the use of energy efficiency as a way to reduce greenhouse gas emissions. Electricity consumers are a several sectors of the economy: households, commercial sector, production, and infrastructure. Large-scale energy efficiency projects can lead to significant reductions in greenhouse gas emissions in all three sectors. In addition, these projects are likely to provide various economic effects, such as through education and training of regional workers, operational improvements, enhanced technology transfer, local environmental improvements, increased competitiveness of regional industries, and overall improvement of regional economies. Therefore, the finding drivers problem for increasing energy efficiency based on the best cases of introducing energy efficiency policy and an innovative activity model forming in the energy sector is urgent.

The aim of the study: Incentives identification and generalization, tools and methods of innovative activity in the context of ensuring energy efficiency.
Objectives: Case-study method application in the context of the conceptual model formation for stimulating energy-efficient innovations.
Research methods: Literature review using the Scopus® database, VOSviewer (version 1.6.16), Google trends. The case-study method involves the study of innovative energy technologies and the briefcase development of it`s various tools aimed at taking into account the characteristics of the territories, the emissions level, R&D and other factors.

Theoretical background

Scopus®, VOSviewer (version 1.6.16), and Google trends software open the opportunity to determine the countries whose interest in stimulating innovative activity is quite high.

Thus, based on the use of the Scopus® database, the countries with the largest publications number in the stimulating innovative activity field in the context of ensuring energy efficiency were determined, fig. 1.

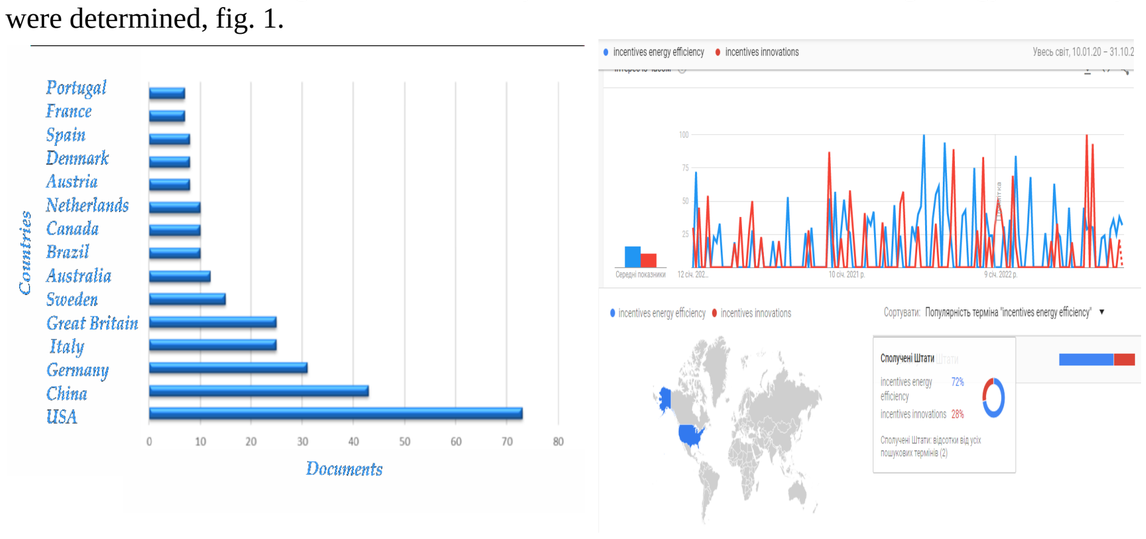

Figure 1 - The number of publications by country in the Scopus® database according to the filters TITLE-ABS-KEY "incentives" AND "innovations" AND "energy efficiency" and Google trends
(Source: built by the authors on the basis of data from the Scopus® database, https://www.scopus.com/)

The stimulating innovative activity research issues in the field of ensuring energy efficiency include the following most relevant aspects: decarbonization, energy transitions, technological introductions, pollution tax, green innovations, motivational factors, trading of carbon emissions, energy concepts, use of panel data, environmental protection, taxation, efficiency assessment, thermal energy, China's experience.

Syed Shuibul Qarnain, Sattanathan Muthuvel, and Bathrinath Sankaranarayanan, based on a survey of 125 households, identified 5 factors that make the most contribution to increasing energy efficiency in households: motivation, education and awareness, coercive factors, the behavior of residents, and energy-saving equipment in houses. Among the 15 sub-factors, three factors of energy saving are the first: financial motivation, psychological behavior, and inspiration to save energy in homes.

Rahul Sindhwani, Varinder Kumar Mittal, Punj Lata Singh, Vivek Kalsariya, and Faizan Salroo identified 17 drivers of energy efficiency. The main ones are insufficient energy availability, excess losses, energy audits, government promotional preferences, management commitments, research, and planning of future drivers.

Results

According to EPI, the world's greenest countries are those that best address the environmental changes that every nation faces. Let's consider the main cases of stimulating the improvement of energy efficiency.

Denmark. Electricity from renewable sources is promoted with the help of a premium tariff and network metering. The tariff for wind and solar photovoltaic installations is awarded in tenders. The construction of pilot windmills is supported through the state fund. This support is also provided via tenders. RES for heating purposes are exempt from tax obligations for the production, supply, and use of energy sources. A direct tariff supports the use of biogas for heating. In transport, the quota system is the main incentive for using RES. A direct tariff supports the sale of biogas for transport purposes.

Luxembourg. Renewable sources' electricity is promoted with the help of preferential and premium tariffs, as well as subsidies. Implementation and operation of new photovoltaic power plants are supported through a tender. Heat production from RES is supported by four different subsidy schemes. The only scheme to support renewable energy sources used in transport is the quota system.

Switzerland. The production of electricity produced from RES is stimulated with preferential tariff help. The access of renewable energy power plants to the network is regulated by the general legislation on energy. Electricity from renewable energy sources does not have a priority connection.

United Kingdom. RES is supported through a feed-in tariff, a contract-for-difference scheme, and a tax regulatory mechanism. Price-based mechanisms are available to support RES installations. In addition, there are a quota system for biofuels for transport, a training program for RES installers, as well as a certification program for RES installations.

France. The promotion of electricity from RES is carried out with the help of a preferential tariff, a premium tariff, as well as through tenders to determine the premium tariff level. Tax benefits are available. Several energy subsidies, tax regulatory mechanisms, and a zero-interest loan support the production of thermal energy at installations from renewable energy sources. The main scheme for supporting renewable energy sources used in transport is the quota system. In addition, biofuels are supported by fiscal regulation.

MAIN RESULTS AND CONCLUSIONS

The experience of the countries that are leaders in the effective incentives study and implementation for the innovative energy sector provides the prerequisites for the conceptual model formation, fig. 2

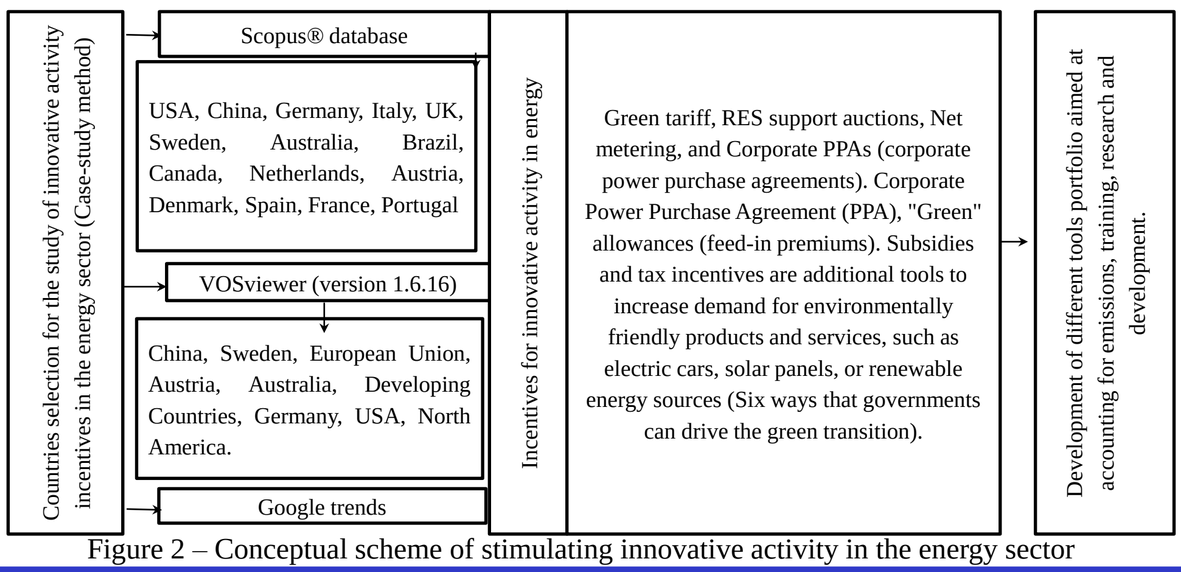

Figure 2 – Conceptual scheme of stimulating innovative activity in the energy sector

Modern innovations are important for the economy and the environment. Actual scientific and statistical information sources/reports systematically compare, analyze and evaluate the new methods' suitability of innovative energy technologies for their commercial implementation.

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