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With the support of the Erasmus+ Programme of the European Union

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International Scientific and Practical Online Conference

" *Imperatives of Economic Growth in Ukraine and in the EU in the Context of Sustainable Development*"

Materials
International scientific-practical conference
(Ukraine, Sumy, October 26 - 29, 2021)

Sumy
Sumy State University
2021

CONTENT

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APPROACHES TO THE BUDGET FUNDING DISTRIBUTION FOR THE REGIONAL RENEWABLE ENERGY DEVELOPMENT

Recently, renewable energy (RE) in Ukraine is characterized by rapid deployment (Sotnyk, 2021; Sotnyk et al., 2021). However, due to the shortcomings of state and regional management of RE technologies development, there are significant distortions in favor of increasing the solar energy capacities as feed-in tariff for them is the highest (Prokopenko et al., 2021; Sotnyk et al., 2021a; Sotnyk et al., 2021b). The advancement of other RE facilities is far behind; it does not allow the regional green energy potential to be fully implemented.

In the context of the outlined problem, the investment flows regulation is urgent to direct funds to green energy technologies, which are the priorities for the state and its regions. In our opinion, providing preferential funding for certain RE technologies and projects by state and local authorities can successfully serve for these purposes. For example, an interest-free loan share (IFLS) can be applied to the construction of facilities that involve the certain RE technologies use in regions.

Given that state and regional budgets allocated to support green energy are limited, it is necessary to make optimal distribution of their funds between RE projects. To solve this issue, it is advisable to follow the rule:

$$\sum_{n=1}^{N}(\mathrm{I}_{nt} \cdot \mathrm{IFLS}_{i,j,n}) \leq \mathrm{BF}_{ijt}, \qquad (1)$$

where BF_{ijt} is allocated budget funding to cover the IFLS for projects involving the i-th RE technology use in the j-th region in the t-th year, UAH; $\mathrm{IFLS}_{i,j,n}$ is IFLS in investment costs per 1 MW of installed capacity of the n-th energy generating facility, which provides for the i-th RE technology use in the j-th region; I_{nt} is investment in the n-th facility ($n = \overline{1, N}$), which involves the i-th RE technology use in the j-th region, in the t-th year, UAH; N is the number of projects selected for preferential financing.

Due to the rule (1), the selected projects are to receive budget funding in a given year. However, the rule limits the range of facilities to be funded. Therefore, the criterion to get budget funding for the n-th project is its higher indicators of $\mathrm{IFLS}_{i,j,n}$ ($\mathrm{IFLS}_{i,j,n} \to \max$) compared to competitors. After ranking projects based on $\mathrm{IFLS}_{i,j,n}$, the amount of funding for each project is calculated considering the investment I_{nt} and projects with lower indicators of $\mathrm{IFLS}_{i,j,n}$ are rejected if the rule (1) ceases to be fulfilled. To calculate BF_{ijt}, it is necessary to distribute budget funding allocated to the j-th region in the t-th year for the RE development between the RE technologies types. This procedure includes 2 stages.

1. Calculation of IFLS ($\text{IFLS}_{i,j}$) for each of the M RE technologies, which received financial support in the j-th region, and determination of weighting factors of the i-th RE technology in the j-th region (k_{ij}) according to the formula:

$$k_{ij} = \frac{\text{IFLS}_{i,j}}{\sum_{i=1}^{M} \text{IFLS}_{i,j}}. \tag{2}$$

2. Determination of BF_{ijt} for the i-th RE technologies type in the j-th region:

$$\text{BF}_{ijt} = k_{ij} \cdot \text{BF}_{jt}, \tag{3}$$

where BF_{jt} is allocated budget funding for the RE development in the j-th region in the t-th year, UAH.

The allocation and distribution of budget funding should be carried out separately for the industrial RE sector and households, as the conditions of operation and green energy capacity for these energy market segments differ significantly. The small scale of household renewable power plants causes a higher cost of electricity generation. Therefore, when competiting home projects with industrial ones, the first will always lose to more powerful business facilities. Overall, the separate application of the proposed methodological approach for households and business structures makes it possible to finance priority areas for the RE development in the regions and allows better green energy potential implementation of the territories.

The publication was prepared in the framework of the research project "Formation of economic mechanisms for sustainable development of renewable energy in the conditions of global and local threats to energy security of Ukraine" (No. 0120U104806) funded by the National Research Foundation of Ukraine.

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Report on research work "Formation of economic mechanisms for sustainable development of renewable energy in the conditions of global and local threats to energy security of Ukraine" (intermediate).

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CIRCULAR WATER MANAGEMENT SOLUTIONS FOR OPTIMISING IRRIGATED AGRICULTURAL PRODUCTION IN GHANA: THE RELEVANCE OF NANO TECHNOLOGY

The agricultural sector is the main source of employment, food and incomes in rural areas in most African countries like Ghana. However, due to several factors, including water scarcity, over reliance on rain-fed agriculture, the increasing climate change impacts and pollution of fresh water sources, the sector’s productivity lagged behind the high population growth rate and demand for food. Food and nutrition insecurity and lack of employment or job opportunities are the dire consequence of the poor quality of life, especially in the rural communities. This paper argues that deploying the Circular Water Management (CWM) approach in conjunction with nanotechnology applications will help to improve irrigation water provision to smallholder farmers and mitigate these intertwined socio-economic challenges. A mixed research design method guided the preparation of the paper. A comprehensive desk research was conducted and the findings informed the design of a semi-structured interview guide for collecting data from 50 purposively sampled agricultural scientists and experts of sustainable development, water resources management and nanotechnology in Accra, the