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**“STAFF TRAINING IN SOLAR ENERGY: TECHNOLOGIES,
METHODS AND INSTRUMENTS”**

PROGRAM



**Development of the targeted Educational program for Bachelors in
Solar Energy in Uzbekistan**

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DEVELOPMENT OF THE RESEARCH EXPERIENCE OF PARAMETERS OF SOLAR ENERGY SOURCES BASED ON TRAINING AND RESEARCH MATERIALS OF THE PROJECT DEBSEUz OF EUROPEAN UNION "ERASMUS+" PROGRAM

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Abstract. This article prepared on the basis of training and research materials, research experience of parameters of solar energy sources of national and foreign partners, participating in the international "Erasmus+" program of the EU: the data of Project Increasing the potential of higher education "101128871-DEBSEUz-

ERASMUS-EDU -2023-CBHE Development of the targeted educational program for Bachelors in Solar Energy in Uzbekistan”. In the article given the methods of study the materials of practical and theoretical values and parameters of energy system on the basis of solar, wind energy sources, accumulator battery and centralized power source. On the basis of modern technologies, stationary and mobile experimental solar panel devices, device for remote monitoring power systems, determining of the indicators of the isolated energy system, given materials of improving of methodology of organize educational processes.

Keywords. Solar energy, wind energy, power sources, battery, energy source, energy system, current, values, parameters, model.

Introduction

Large-scale scientific and methodical research works are being carried out on improving of solar energy sources and the control and monitoring devices and systems of their output parameters in order to provide high-quality and continuous energy to electricity consumers [1,2]. In this direction, special attention is paid to the improved types of information - measurement and testing methods, equipment and equipment, as well as creating and implementing them in educational process and methodological basis of their application in practice.

The Professors of “TIAME” NRU participated in the next Projects of EU:

1. T_JEP-10328-97 “Energy Management Training in Uzbekistan” (1997-2001). Project EC TASIC-TEMPUS, Participants: TEI-Athens (Athens, (Greece), TUB (Berlin, (Germany), TSTU (Tashkent, Uzbekistan).

2. T JEP – 10845-99 “Long distance Training in Uzbekistan” (1999-2004). Project EC TACIS-TEMPUS, Participants: TUHH (Hamburg, Germany), AAU (Aalborg, Denmark), TSTU (Tashkent, Uzbekistan).

3. Program EC ERASMUS+ Project “574049-EPP-1-2016-1-IT-EPPKA2-CBHE-JP “Modernization of the curricula in sphere of smart building engineering – green building – GREB. (2016-2019), Participants: UNIVAQ (L’Aquila, Italy), KTH

(Stockholm, Sweden), UPM (Madrid, Spain), TIUT (Tashkent), QDU (Nukus), UrSU (Urgench, Uzbekistan), MNU (Ulan Bator), MUST (Ulan Bator, Mongoliya) [3].

4. «Pilot project of Uzbekistan: Climate Change mitigation in rural areas of Uzbekistan - demonstration project at private farm Furqat of Pakhtakor district in the Mirzachul steppe», №VN 81182259, 2001-2003, (Ministry of Ecology of Germany).

5. Energy Efficient Communication and Data Flow in Smart City using CRN based IoT Framework (2021-2023), №UZB-IND-2021-94.

Above given data are important factors of the Project for the professors and scientists of the universities of RUz and EU countries to carry out scientific and scientific research work, to research, control and monitoring of solar energy source, improve research methods and equipment's of solar energy devices, and submit possible to combine educational, methodical and scientific research works in this scientific and educational area. Agreement of WP's of the DEBSEUz Project of EU "Erasmus+" Program oriented to create educational programs in 12 new directions and establish innovative scientific-educational research laboratories in 3 HEIs in Uzbekistan. Every academic year educational and scientific conferences are held, and professors and specialists conduct professional development, test-experimental work, and scientific-methodical research in European partner universities.

The scientific and methodological activity, which carried out at "TIAME" NRU under the Project "101128871-DEBSEUz-ERASMUS-EDU-2023-CBHE Development of the targeted educational program for Bachelors in Solar Energy in Uzbekistan" are research of solar power for production continuous and quality power of stationary and mobile solar energy sources, preparing high quality specialists for this direction. These problems decided by the fact that the issue of provisioning has been raised and resolved, the scientific and practical methodology, method, algorithms and software have been developed, taking into account the relevant

indicators of the power supply systems output parameters to ensure energy and resource saving [4].

Methods of modelling.

Scientific-methodical approach of Project activities requires from participants of “TIAME” NRU scientific-methodical experience in physical and mathematical modeling of the physical technical effects of the solar sand electrical energy transforming.

In the next figure presented the experimental physical stands and equipment’s of research of solar power transforming.



Fig.1 The Experimental physical stands and equipment’s of research of solar power transforming

Results. During design and research of solar power systems, research experience of parameters of solar energy sources based on training and research materials of the project DEBSEUZ of EU “Erasmus+” Program and monitoring used scientific-practical- methodical approach gave an improving possibilities process of study and research methodology, based on computer (IT) technologies.

Conclusion:

1. On the basis of formed physical and mathematical models solar power

transforming processes, scientific-practical method improved monitoring of solar power control of power production and consumption.

2. Analysis of processes of monitoring of outputs and parameters of solar power source of power supply systems and modelling gave possibilities study and research new approach of energy monitoring and transforming processes, create modern methods of study and research energy production and transmitting.

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