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Problems of aviation and astronautics in the programme "HORIZON 2020": Ukrainian vector

The article is devoted to participation of Ukraine in realization of projects in the field of aviation and astronautics within the framework of the European Union programme "Horizon 2020"

Horizon 2020 is the largest research programme in the history of the European Union with a total budget of about 80 billion euros for seven years (from 2014 to 2020). It replaced the 7th EU Research and Technological Development Framework Programme (FP7), which operated from 2007 to 2013 [1].

The Horizon 2020 programme aims to help increase the number of advanced technologies, discoveries and promising developments by promoting ideas from research laboratories to the market. Based on three key priorities for advanced science, industry leadership and social challenges, the programme supports a wide range of activities ranging from research to demonstration projects and innovations ready to enter the market.

On March 20, 2015, Ukraine signed an Agreement on Associated Participation in the Horizon 2020 programme, which will allow our country to enter a new level of partnership with the EU in the field of science and technology, and significantly increase the attractiveness of Ukrainian scholars, universities, research organizations and institutions to join European research, thus creating the basis for structural reforms in the scientific and innovation area of Ukraine. Ukrainian scientists, universities, research organizations and private companies have the opportunity to participate in joint research projects and apply for scholarships and mobility programmes provided by the European Research Council, as well as the Maria Sklodowska-Curie Programme.

Ukrainian institutions and organizations are increasingly involved in the Horizon 2020 programme every year. Since 2014 and until now, according to results of 446 competitions for 117 Ukrainian organizations participating in the Horizon 2020 programme, funding of 17,232 million euros is foreseen for 90 projects, 9 of which are coordinated by Ukrainian organizations. During this time, 1,990 Ukrainian institutions and organizations prepared and submitted 915 project proposals for consideration. The total cost of projects, involving 117 Ukrainian organizations, is EUR 465.851.011 [2].

Since the beginning of Ukraine's participation in Horizon 2020, in 2017 there are 69 victory projects in our country that have already received about 12 million euros. Most projects received funding from the Marie Skłodowska-Curie actions, environment, information, and communication technologies. The level of

success of Ukraine in the Horizon is 9%. In the EU, it reaches about 15% Every two years, the European Commission prepares and publishes Work Programmes for each individual direction. On October 27, 2017, the European Commission presented a new Horizon 2020 Work Programme, covering 2018, 2019 and 2020 fiscal years, and provides for funding at around 30 billion euros [3].

In order to support the European integration direction of Ukrainian research institutions and organizations and to maximize the opportunities provided by Ukraine's associated participation in the Horizon 2020 programme, since September 2015, a joint project with the Estonian Research Council and the Ministry of Education and Science of Ukraine has launched "Ukraine in the programme" Horizon 2020". The project partnerships are also provided by the Ministry of Education and Science of Estonia and the National Academy of Sciences of Ukraine. The project will be funded by the Ministry of Foreign Affairs of Estonia for two years.

The project primarily aims to strengthen the institutional capacity of target groups (representatives of national contact points, members of the Programme Committees, coordinators of research projects) and to assist Ukraine in its participation in the Horizon 2020 programme as an equal partner. The main task of the project is to: train future members of the Programme Committees of Horizon 2020 to succeed in advocating national interests; to increase the professional level of representatives of national and regional contact points, which will provide high-quality advisory support to Ukrainian participants and increase their chances of participation in the projects of the Horizon 2020 programme; share the knowledge and experience gained by Estonian participants, in particular, the construction of a functional information system in the field of research and innovation, lobbying for their own interests and promoting their research activities in European markets.

Within the framework of the Horizon 2020 programme, the problem of the development of aviation and astronautics is important. In particular, Ukraine takes part in the project AERO-UA – «Promote opportunities for aviation research collaboration between Ukraine and Europe». Horizon 2020 programme, one of the beneficiaries of which is the National Academy of Sciences of Ukraine, began in 2016 and has been lasting for 36 months. The project consortium consists of 9 partners, of which 5 represent Ukraine (the National Aerospace University named after M. Y. Zhukovskyi "Kharkiv Aviation Institute", NAS of Ukraine, Zaporizhzhia Engineering Design Bureau "Progress" named after an academician O.G. Ivchenko ("Ivchenko-Progress"), the Ukrainian Research Aviation Technology Institute" UkrNIAT "and the FED corporation), four industrial companies and universities of the EU. The main objective of the AERO-UA Project is to stimulate scientific cooperation in the aviation industry between Ukraine and the EU through strategic and targeted support [4].

The AERO-UA project is aimed exclusively at Ukraine, as it possesses huge aviation-space potential, but has insufficient level of international cooperation in this area. Since 2018, Ukraine has been involved in the implementation of the aviation research project under the Clean Sky 2 programme, which is being implemented within the EU Horizon 2020 programme. The AMBEC (Advanced Modeling Methodology for the Bearing Chamber in Hot Environment) project will

receive about 1.7 million euros. Work on the project is planned for 3 years. The Ukrainian team includes scientists from the National Aerospace University named after M. Zhukovskyi "KhAI", experts of SE "Ivchenko-Progress" and JSC "Motor Sich". By combining scientific knowledge and industry experience, they will explore the complex physical phenomena occurring in the chassis of the aircraft engine bearing. Project participants will work under the leadership of the European group of experts in the field of aircraft engineering and with the administrative support of the Ukrainian Science and Technology Center. The Clean Sky 2 programme is the largest European research programme in the field of aviation, which involves about 500 industrial and research organizations from 27 countries of the world. The programme promotes the development of innovations and technologies that help reduce the level of harmful emissions and noise in civil aviation [5].

The Clean Sky 2 programme is a mechanism for developing the latest technologies for the development of the next generation of planes by 2025. With it, European aerospace research is being conducted, the culmination of which will be the demonstration of new configurations of aviation vehicles. Clean Sky 2 will allow the aircraft industry to innovate in the shortest possible time, which will result in improved environmental conditions, improved transportation efficiency and additional work. With the Clean Sky 2 programme, it is possible to achieve the following goals:

– Creation of resource-saving transport environment, which preserves the environment. The Clean Sky 2 programme will contribute to achieving the goals set by 2020 by the European Advisory Board on Aeronautics Research (ACARE), on emission reductions and noise reduction. And this programme will also be an integral part of the achievement of the ACARE targets by 2050: reducing CO2 emissions by 75%, nitrogen oxides (NOx) by 90%, and reducing noise by 65%.

– Ensuring safe and efficient aviation mobility. New concepts can help the air traffic system (ATS) meet the changing needs of citizens: more efficient use of local airports, increased mobility, and reduced air traffic.

– Providing Leadership in Aviation. Developments and results obtained during the implementation of the Clean Sky 2 programme will allow countries, whose organizations directly participate in the programme, to create a sustainable industrial base, to provide the latest innovations and to gain competitive advantages in the field of aviation [5]..

Space research is supported in Horizon 2020 in the direction of "Leadership in Industry" in accordance with the main objective and objective of promoting cost-effective competitive and innovative space industry (including small and medium-sized enterprises) and the scientific community, to develop and use space infrastructure for satisfaction of future policy of association and public needs.

Building on the success of the Seventh Framework Programme (FP7), Horizon 2020 will enable the European research community to develop innovative space technologies and operational concepts from idea to space demonstration and use space information for scientific, public or commercial purposes. It will capture and structure space research and innovation at European level and draw attention to the key aspects mentioned in the appeal commission "EU Industrial Policy in the Space Industry: Release of Capacity for Growth in the Space Sector" [6]..

Actions will be carried out jointly with the research activities of the EU Member States and the European Space Agency (ESA). To this end, it is envisaged to strengthen coordination between the various parties. The proposal of the commission for Horizon 2020 sets the following motto for the EU space and research area for 2014-2020: "Get ready for the growing role of space in the future and take advantage of it now".

The work programme was designed to address these issues by:

- Identification of the priorities of the two existing space flagships of the EU - the European Global Navigation Satellite System (EGNSS) and Earth remote sensing, which will receive the benefits that they can generate in the coming years and ensure their high-tech level in the future;

– support for the third priority of the EU space policy: protection of space infrastructure and, in particular, the creation of a space tracking and surveillance system at European level;

– Ensure EU industry support to achieve the goals set out in the report of the Industrial Policy Commission in the space sector, in particular, to maintain and enhance the competitiveness of the industry and its production and supply chains on the world market;

– Ensuring that investment in Europe directed to space infrastructure is used in the interests of citizens and also supports European space science;

– enhancing the position of Europe as an attractive partner for international cooperation in the field of space science and research [6].

In November 2017, the National Academy of Sciences of Ukraine, dated 11.03.2017, supported the implementation of the ERA-PLANET project "Horizon 2020", decided to start the National Science Programme Research Programme "Aerospace Environmental Surveillance for Sustainable Development and Security as a National Horizontal Project Segment" –2020 ERA-PLANET» (ERA-PLANET / UA).

In addition to this project, Ukraine also participates in other space development projects under the Horizon 2020 programme. Thus, since 2005, according to the Decree of the President of Ukraine dated October 6, 2005, No. 1424/2005 "Issues of Ensuring the Implementation of the Twinning Programme in Ukraine" the National Security Service of Ukraine directs and co-ordinates the preparation and implementation of the Twinning programme "Strengthening the Institutional Capacity of the State Space Agency of Ukraine for the Implementation of European Space Applications in the Field of Satellite Navigation (EGNOS / Galileo) and Earth Remote Sensing (GMES)". In addition, the National Security Service is the coordinator of the TAIEX institutional development tool and the CIB programme in accordance with the relevant regulatory acts [6].

Notes

1. Угода між Україною та Європейським Союзом про участь України у програмі Європейського Союзу Горизонт 2020 – Рамкова програма досліджень та іновацій (2014-2020).URL: http://zakon3.rada.gov.ua/laws/show/984_018

2. Національний портал програми Горизонт 2020. URL: http://h2020.com.ua/uk/
3. Горизонт 2020.URL: https://mon.gov.ua/ua/tag/gorizont-2020
4. Налагодження наукової співпраці з ЄС в галузі авіації - цільове опитування проекту AERO-UA. URL: https://ncp.khai.edu/uk/news-121-14/
5. Українські науковці вперше виконуватимуть проект європейської ініціативи Clean Sky 2 в програмі Горизонт2020. URL: https://mon.gov.ua/ua/news/ukrayinski-naukovci-vpershe-vikonuvatimut-proekt-u-galuzi-aviaciyi-za-programoyu-yes-gorizont-2020
6. Державне космічне агентство України / Національний контаткний пункт «Космос» Програми ГОРИЗОНТ-2020 Загальна інформація про програму Горизонт 2020. URL: www.nkau.gov.ua.