EUROPEAN INTEGRATION ENVIRONMENTAL COMPONENTS IN THE CONTEXT OF ATMOSPHERIC AIR PROTECTION IN UKRAINE

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The European Green Course is already a top topic for Ukrainian politicians, mass media, experts, business, the public and their associations for discussions, large-scale plans for the future and risk assessment [1].

The priority is to bring certainty to the tense discourse about the high cost and probable unprofitability of business, in the case of ambitious climate goals; about the indisputability of the transition to renewable energy sources without the use of fossil fuels and the need to achieve, with the establishment of a specific term, climate neutrality directly by the state of Ukraine. Transparent answers to these painful questions can be found in the Conclusions of the European Economic and Social Committee dated October 28, 2020:

- measures to combat climate change should be implemented in such a way as to minimize costs and obtain economic benefits;
- achieving climate neutrality requires increasing carbon absorption and storage through, for example, sustainable management of forests and soils;
- achieving a climate-neutral EU by 2050 means that not every member state has to pursue climate neutrality individually: optimal distribution of efforts can be achieved at the EU level, taking into account relevant differences between member states.

The next, although far from the secondary, and extremely complex issue is the programming of the implementation with the ultimate goal of climate neutrality of the multi-vector European Green Course (providing clean, affordable and safe energy; construction and reconstruction in an energy resource-efficient way; mobilization of the industry for a clean and circular economy; from " farm to fork": the creation of a fair, healthy and ecologically clean food system; acceleration of the transition to sustainable and intelligent (smart) mobility; preservation and restoration of ecosystems and biodiversity; striving for zero pollution of the environment without toxic substances).

As a result of the full-scale invasion of Russia, 90% of wind power and 45-50% of solar power in Ukraine have been decommissioned [2].

Ukraine has great potential for the development of renewable energy, in particular wind energy. And Europe is interested in investing in this direction after the end of the war.

All energy facilities in Ukraine are subject to restoration, but some of them are more expedient to build anew.

Everything is subject to repair and restoration, the only question is timing. Some objects can be restored in a few days, some can be restored in weeks, and some - in months.

After the victory in the war, Ukraine faced serious work to restore critical infrastructure facilities.

Priority steps for communities after the end of hostilities:

1. Assess the damage caused, conduct an audit of negative impacts and engage in an urgent search for possible steps for recovery.

Communities need to understand the magnitude of the work, as it ranges from field mine problems to iron ore. All this affects the natural system and ecology and takes us several steps back. But due to such a negative impact, we will have to put more effort into this direction, it will be at the top next to exports.

Nevertheless, we observe that in regions where farmers are already making the transition to sustainable practices in agriculture, such as the use of minimal tillage, and the same organics, they continue to move in this direction and do not abandon such practices.

This is an important signal to our European colleagues that Ukraine has become a country that is ready to move within the framework of the European Green Course as a partner.

2. Create an effective development plan. Communities should already prepare and think about heating from renewable and independent energy sources, about other aspects of a sustainable regional economy.

The war will only accelerate the process of decentralization, that is, communities are already forced to make many decisions independently at the local level to ensure their functioning [3].

During martial law in Ukraine in the territories where martial law is imposed [4]:

- Land leases are extended automatically for 1 year without entering information into the relevant registers.
- The district military administrations are granted the right to lease for commercial agricultural production for a period of up to 1-year agricultural land plots of state and communal ownership, as well as land plots remaining in the collective ownership of a collective agricultural enterprise, agricultural cooperative, agricultural joint-stock company, unallocated and unclaimed land plots and land shares (shares). At the same time, the amount of rent cannot exceed 8% of the normative monetary value of land plots, and the average normative monetary value of a unit of arable land in the region will be used to determine the amount of rent.
- Strict restrictions are established regarding the intended use of agricultural land plots by tenants to whom the plots will be provided by the district military

administrations, including changes in the composition of the land, transfer of plots to sublease, construction, changes in the purpose of the land plot, etc.

- To quickly transfer land plots to the use of district military administrations, land lease contracts will be concluded only in electronic form, and the transfer of land plots for lease will take place without holding land auctions. Such a one-year land lease agreement cannot be renewed or concluded for a new term, and it will terminate with the expiration of the term for which it was concluded.

- Land lease contracts concluded by the military administration will be registered by the same administration in the Book of Registration of Lease Contracts, which is kept in paper and electronic form, and a copy of the land lease contract will be sent by e-mail to the village, settlement, city council, on the territory of which the land plot is located, and as well as the central body of executive power that implements state policy in the field of land relations.

Speaking about the European Green Course and the environmental tax on CO2 emissions, it should be noted that in the context of the implementation of the Paris Agreement to combat global warming by the Government of Ukraine, draft law No. 5600 provides for a threefold increase in the environmental tax on carbon dioxide (CO2) emissions, namely from UAH 10/ t up to UAH 30/t. Will this be a fiscally viable measure for the budget and climate goals? But how can the environmental tax on CO2 emissions be more effective in Ukraine?

The current tax on CO2 emissions requires improvement of the tax administration to ensure stable revenues to the budget, reduce the costs of fulfilling the tax obligation and effective compliance.

The problem is that, according to the Tax Code of Ukraine, the tax calculation must be based on actual CO2 emissions, and in practice, it is carried out according to a special methodology that is quite complex, based on the amount of resources consumed and the characteristics of the production process, at best. Sometimes enterprises determine their tax obligations "by eye" based on data from the emission permit, which is obtained even before the start of operations. Thus, the results of a comparison of the declared tax base and the amount of CO2 emissions according to the data of the State Statistics Service and the Cadastre of Greenhouse Gas Emissions using the example of ferrous metallurgy indicate that the share of untaxed emissions is 21% and 60%, respectively. That is, the approach to taxation that is currently used based on theory, although it should be the most effective, in practice does not ensure full coverage of carbon dioxide emissions by the tax.

Accordingly, the administration of this tax is characterized by time-consuming tax audits, and the need to involve specialists of nature protection authorities to determine the correctness of the calculation of the tax base. As a result, this leads to the insufficient effectiveness of the functioning of the tax and a decrease in the law-abidingness of taxpayers due to the existence of opportunities to avoid punishment for violation of tax legislation. In addition, this approach leads to the fact that CO2 emissions, which are generated during the burning of biomass, are also subject to taxation, which is contrary to global practice. Because this energy resource is a carbon-neutral fuel and is not subject to taxation.

Another disadvantage of the domestic practice of taxation of CO2 emissions is that the basis of taxation of the tax is the amount of CO2 emissions into the atmospheric air by stationary sources, reduced by 500 tons according to the results of the tax (reporting) year, and emissions in the transport sector, which make up from 15 to 19%, generally remain untaxed [5].

A tax on actual or measured CO2 emissions, which is used in Ukraine, has also been introduced in Estonia, Spain, Latvia, the Netherlands and Poland. Another approach to taxation of CO2 emissions, which is based on the carbon content of the fuel for all energy resources, is a tax on the consumption of energy resources.

Such a tax as a structural component of CO2 in the fuel excise rate has been introduced in Denmark, Ireland, Luxembourg, Norway, Portugal, Finland, France, and Sweden. A similar approach is used in Iceland, Liechtenstein, the Netherlands, Slovenia, and Switzerland, but the tax is established separately from the excise duty.

As you can see, out of nineteen European countries, the majority chose the approach of taxation of CO2 emissions, which is based on the amount of consumed energy resources. The reasons for this decision were the significant advantages of such a tax, among which it is worth highlighting the simplicity of calculating the tax liability, the smaller number of taxpayers due to the use of the tax agent institute, and the simplification of the process of checking tax returns.

Calculations based on data from the State Statistics Service of Ukraine for 2019 on the use of all types of fuel for all purposes except for use in technological processes proved that income from stationary sources can be doubled at an emission price of UAH 10/t of CO2. If the price of emissions would be UAH 30 per ton, as proposed in draft law No. 5600, revenues could be 6.3 times higher. Similar calculations based on the consumption of certain types of energy resources, such as coal, natural gas, gasoline, diesel fuel, fuel oil, and liquefied gas, made it possible to find out that at an emission price of UAH 10/t of CO2, the fiscal effectiveness of the tax can be increased by at least by 70% [5].

In addition, budget revenues for the transport sector will increase due to involvement in fuel taxation. For UAH 10 per ton of CO2, additional revenues will amount to UAH 1,151.7 million, or 0.06% of GDP. In case of a price increase to UAH 30 per ton of CO2, revenue is expected to increase by UAH 5,357.7 million, or 0.17% of GDP.

Under the proposed approach, CO2 emissions resulting from industrial technological processes will not be taxed. However, judging by the cadastre data, such emissions are not taxed even now.

It is necessary to provide for an exemption from paying the tax on the use of biomass since carbon dioxide emissions from burning wood are compensated by absorbed CO2 during the growth of a living tree and are not accounted for in the compilation of National inventories of anthropogenic emissions from sources and absorption by sinks of greenhouse gases. It is also necessary to provide for a zero tax rate or a compensation mechanism for the tax paid on fuel that will be used as a raw material for industrial technological processes, for example in the chemical industry. For this, a mechanism similar to the excise tax on light and heavy distillates used for the production of ethylene can be applied. In particular, such energy resources are taxed at a zero rate, and tax authorities control their intended use. Producers issue a tax invoice for the amount of excise tax calculated on the volume of petroleum products obtained based on the rate, which is defined as the difference between the base and zero excise tax rates. The tax bill is considered repaid in case of documentary confirmation of the purposeful use of light and heavy distillates exclusively as raw materials in the production of ethylene.

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Two years ago, the Cabinet of Ministers of Ukraine Resolution No. 827 of August 14, 2019, "Some Issues of State Monitoring in the Field of Atmospheric Air Protection", approved the Procedure for State Monitoring in the Field of Atmospheric Air Protection.

In addition to radical changes in the approach to atmospheric air monitoring, the Procedure provides that for the implementation of atmospheric air monitoring, a state monitoring program in the field of atmospheric air protection (hereinafter - the Program) is approved for each zone and agglomeration in the form established by the Ministry of Environment.

The program is developed for a period of five years and should include:

- information about air quality management bodies that developed the program;

- information about the network of atmospheric air quality monitoring and atmospheric air monitoring laboratories available in the relevant zone or agglomeration, in particular, the list of observation points, their addresses and geographical coordinates, maps with the layout of observation points, addresses of existing atmospheric air monitoring laboratories, information on the indicators analyzed by atmospheric air monitoring laboratories and applied analysis methods, information on atmospheric air monitoring entities that monitor atmospheric air quality at relevant observation points;
- the list of pollutants assessed at observation points in the relevant zone or agglomeration, the methods used to measure, calculate, forecast or estimate the level of pollutants at observation points and the established assessment regime (data based on which the assessment regime was established);
- information on planned measures to establish observation points and/or improve existing air quality monitoring networks, create and/or improve atmospheric air monitoring laboratories, in particular, a list of observation points planned for installation, their addresses and coordinates, maps with a location scheme observation points, information about atmospheric air monitoring entities planning to establish observation points and/or create atmospheric air monitoring laboratories;
- stages, mechanism and terms of implementation of the planned measures.

To fulfil the specified procedure, the Ministry of Environment has developed a form of the Program, the draft of which can be viewed on the website of the Ministry of Environment.

The specified form, in addition to the specified requirements, provides information on:

- sources of pollution, including emitting enterprises, the number of registered vehicles, the length of roads and the presence of other sources of pollution (airports, ports, MVV, OOUV);
- emissions of pollutants from stationary sources, mobile sources
- data on the certification of equipment, devices and their verification procedures of the network of observation points;
- laboratory-analytical complex in terms of laboratory affiliation, number of employees, list of equipment, analysis methods and data verification procedures;
- information disclosure systems;
- assessment of the spatial distribution of pollutant concentrations in terms of location, pollutant, and assessment methods;
- established assessment mode with a justification of its choice;
- observation points by type of station (background, industrial, transport, mixed), type of measurement, purpose of research (health protection, protection of vegetation), type of territory (urban, suburban, rural);
- mandatory appendices, including maps of the spatial distribution of pollutant concentrations, statistics of the distribution of pollutant concentrations

along roads, and maps with diagrams of observation points.

Monitoring in the field of atmospheric air protection is a component of the state system of environmental monitoring. The procedure for organizing and conducting monitoring in the field of atmospheric air protection is regulated by the Resolution of the Cabinet of Ministers of Ukraine "Some issues of state monitoring in the field of atmospheric air protection" dated August 14, 2019 No. 827.

Based on data and information obtained as a result of atmospheric air monitoring:

- determine the level of atmospheric air pollution in a certain area for a certain period and compliance of the state of atmospheric air with air quality requirements;

- carry out control and assessment of the impact on air quality of measures aimed at limiting emissions of pollutants into the atmospheric air, assessment of the impact of atmospheric air pollution on the surrounding natural environment, health and life of the population.

Atmospheric air monitoring is carried out according to quality indicators:

atmospheric air;

atmospheric precipitation.

Depending on the level of pollutants for all zones and agglomerations, the evaluation regime for each pollutant is established:

upper and lower assessment thresholds;

limit values of pollutants;

other levels of pollutants used to assess atmospheric air quality.

The assessment regime is established by the atmospheric air quality management body of the relevant zone or agglomeration in the state monitoring program in the field of atmospheric air protection, according to the following criteria:

mode of fixed measurements;

mode of combined assessment.

The fixed measurement regime is used when the level of the pollutant exceeds the upper assessment threshold or long-term targets for ozone. Fixed measurements are carried out at fixed points of observation of atmospheric air pollution permanently or by random sampling to determine the level of pollutants.

The mode of combined assessment is used if the level of pollutants is lower than the upper threshold of assessment. Combined assessment is performed by combining fixed measurements and a modelling method or indicative measurements according to data quality objectives.

The result of atmospheric air monitoring is:

- observation data received by subjects of atmospheric air monitoring;

- generalized data on the quality of atmospheric air, relating to a certain period and/or a certain territory;

- assessment of the state of atmospheric air and atmospheric precipitation;

- forecasts of the state of atmospheric air and its changes;
- information on the impact of the levels of pollutants in the atmospheric air on the life and health of the population.

In March 2022, PrJSC "Ukrgrafit" put into operation the first modern post in Zaporizhzhia for automatic monitoring of the level of pollutants in the atmospheric air [7].

Work on the selection of equipment, its purchase and adjustment was started back in 2021 and was planned to be completed in May 2022, since environmental issues are important for the city of Zaporizhia, and we made a decision, despite the military situation in the country, not to turn off the equipment monitoring, and on the contrary, to speed up the completion of all work and put the post into operation.

The monitoring post was installed near a residential high-rise building on the street. Yeniseiskaya, which is located in the western direction from the main production of the enterprise (according to the conclusion of the state sanitary-epidemiological examination on the justification of the size of the sanitary-protective zone of the enterprise).

The gas analytical equipment of the monitoring post is located in a metal container, which is equipped with a climate system to maintain optimal working conditions and does not require the presence of operative personnel in the room.

During the development of the monitoring station, gas analytical devices manufactured by the company Teledyne API, USA, which is one of the world leaders in the production of equipment for continuous stationary environmental monitoring with more than 30 years of experience, were used.

The equipment is certified in Ukraine and also meets the requirements of the US Environmental Protection Agency (EPA), the European Union (EU) and other global regulatory bodies for measuring pollutant criteria.

The T100 gas analyzer determines the content of sulfur dioxide in gases using the principle of UV fluorescence to provide easy, accurate and reliable measurements of low SO2 levels.

Exceptional stability is achieved using an optical shutter to compensate for drift and a reference detector to correct changes in the intensity of the UV lamp.

The T200 gas analyzer determines the content of nitrogen oxides in gases. The device uses the principle of chemiluminescence and provides accurate and reliable measurements of low-level substances for use as an environmental analyzer.

The unique AutoZero function provides stability through constant zero drift correction, and adaptive filtering allows the analyzer to optimize performance under changing conditions.

The T300 gas analyzer measures the low ranges of carbon monoxide by comparing the infrared energy absorbed by the sample with the energy absorbed by the reference gas according to the Beer-Lambert law.

Using a gas filter correlation wheel, a high-energy IR light source is alternately passed through a CO-filled chamber and a CO-free chamber. The light path then passes through the sample cell, which has a folded path of 14 meters. This design provides zero stability and a high signal-to-noise ratio for outstanding sensitivity.

The T640 gas analyzer measures the mass concentration of solid particles (PM) with a size of 2.5 and 10 microns in real-time, using the scattered light spectrometry method.

Every day, the results of the monitoring posts are analyzed and posted on the company's website in a mode that provides free access to them.

In Ukraine, monitoring of atmospheric air is regulated by the following documents: Law "On Atmospheric Air", Law "On Protection of the Natural Environment", Law "On Metrology and Metrological Activity", Law of the Russian Federation No. 391 "On Approval of the Regulation on the State Environmental Monitoring System". However, it should be noted that the latest changes in the field of atmospheric air monitoring in Ukraine are the resolution of the Cabinet of Ministers of Ukraine dated August 14, 2019 No. 827 "Some issues of state monitoring in the field of atmospheric air protection" [8]. According to this resolution, several shortcomings of the current monitoring system are revealed, namely:

- lack of monitoring of suspended substances, including PM2.5 and PM10;
- lack of data on pollution covering the entire territory of the city (agglomerations, according to the resolution), i.e. the available information is relevant only at a point;
- monitoring of atmospheric air pollution at stationary observation posts is carried out a maximum of 4 times a day;
- lack of a system for informing the population about the state of air in the city, especially PM2.5 and PM10 pollution;
- lack of automated air quality analysis systems, monitoring is carried out by sampling method.

The main task of creating a network of public monitoring of the state of atmospheric air pollution in the city is to conduct independent monitoring of air pollution, based on such regulations and guiding documents as Directive 2008/50/EU and the Procedure for State Monitoring in the Field of Air Protection. In contrast to state surveillance, public monitoring will ensure not only informing the population, of their involvement in monitoring, but also increase environmental awareness, and responsibility, and create an additional tool for controlling air pollution.

Atmospheric air monitoring is an integral part of the political development strategies of both individual cities and countries as a whole [9]. A significant part of the research conducted by scientists around the world contributes to the development of the protection of the atmospheric basin of cities, determining the impact of pollution and improving the quality of the surrounding environment [10]. However, it is impossible to achieve a quality result in the ecological field, if we are talking about an urban habitat, if the public is not involved. Conducting monitoring studies and informing the population about their results is important from the point of view of both scientists and the public [11].

The most widespread issue of atmospheric air monitoring is the use of geoinformation technologies and systems. These systems consist of a hardware complex, a software complex and an information block. However, it is quite justified to include the components of geoinformation technologies and people - developers and users, without whom the existence of the last components as a system is impossible. In this case, a system consisting of five components is formed. Most of the software products [12-13] developed for atmospheric air monitoring, which provide the possibility of visualizing the results of observations, require a large amount of input data. In addition to the exact parameters of emission sources, it is necessary to use a large array of meteorological data, which is not always possible to obtain. There is also a need to create a public information system that is easy and quick to administer, and convenient and understandable to the user. Thus, existing software products [14] are aimed at measuring pollution from certain sources or are unsuitable for fast data manipulation.

So, the following 4 key problems are the causal necessity of creating public monitoring of atmospheric air:

- at the state level – assistance in the implementation of the state monitoring program in the field of atmospheric air protection under the Resolution of the Cabinet of Ministers on the monitoring procedure;
- at the enterprise level – assistance in identifying the impact of emissions from "neighbouring" enterprises of the city;
- at the level of the public – assistance in the availability of affordable and independent monitoring of air quality in the city;
- at the level of science – assistance to scientists and other interested structures in obtaining up-to-date information on atmospheric pollution for further analysis, research and reporting.

For the effective functioning of the public monitoring network, it is necessary to develop rules for conducting public monitoring of the city's atmospheric air pollution with a description of the location of pollution sensors, their operation and basic requirements. Also, the development of a database on the conducted monitoring and the development of a website reflecting the results of public monitoring. Taking into account that if the database contains data on the indicators of the installed sensors (point measurements), then the site for informing the population is a visualization of the control results throughout the city, that is, it will act as a model of the distribution of pollutants in the atmospheric air of the city.

Public monitoring of atmospheric air pollution is a network of sensors for determining the concentration of pollutants in the air basin of cities. The location of pollution measurement points should be fixed, but at the same time, it can be quickly changed following the task of a certain study or analysis. The purpose of creating and implementing a public monitoring network is to conduct an independent assessment of the city's atmospheric air quality, followed by informing the population about its results. Conducting this type of monitoring is not only aimed at attracting the public and increasing their environmental awareness but also serves as a primary analysis of the state of air pollution to obtain data and provide recommendations on the establishment of additional state monitoring stations for atmospheric air quality in the conditions of the implementation of changes to the procedure for conducting monitoring, as well as operational control for certain tasks.

Considering that public monitoring, as mentioned above, is universal and can be used for different tasks, the requirements for installing surveillance sensors are flexible. To obtain general values of atmospheric air pollution in the city, taking into account industrial, residential, and park zones of the city, as well as suburban areas, the main recommendations for installing sensors are:

- installation in areas that ensure no stagnation of air flows,
- installation at a distance of 1.5, 4, or 6 meters from the ground,
- installation at a distance of 10 meters from a road with heavy traffic (or closer, if it is necessary to determine the impact of traffic on this area),
- in suburban areas to determine the anthropogenic impact of the urban environment.

At the beginning of the experiment of creating a network of public control for the city of Poltava, a grid was created for the further display of data with the size of 7x7 cells (Fig. 1).

Taking into account that each cell contained a significant area of the city's territory, and new sensors, entering the cell where research was already being conducted, would be inconvenient to display and incomprehensible to the target user, the dimensions of the 12x12 cell grid were changed (Fig. 2).

Such a solution allows you to preserve the grid in suburban areas, for further expansion of the public monitoring network and also divides the central territory of the city into smaller cells, which prevents the overlapping of indicators of different sensors. So, the grid consists of 144 cells. Each cell covers an area of 1.65 km2. The total area of the city is 103 km2, so 64 central cells completely cover the territory of the city, taking into account the climatic and architectural features of the city [15].

During the experiment, 9 sensors were installed, covering most of the city. The sensors work in an autonomous continuous mode, but to create a public information network, pollution indicators for the following hours were used: 00:00, 06:00, 12:00, 18:00.

The installed sensors (Fig. 3) measure the pollution of the city's atmospheric air with suspended particles PM2.5 and PM10. The main technical characteristics of the sensors for measuring these pollutants are:

– the principle of measurement is optical, which works according to the principle of scattered light;

– measurement range (PM2.5) – 0–500 μg/m3;

– working temperature range – (–10)…+60 °C;

– measurement accuracy – (±10) μg/m3 in the range of 0–100 μg/m3, ±10% in the range of 100–500 μg/m3;

- working range of humidity - 0-99%.

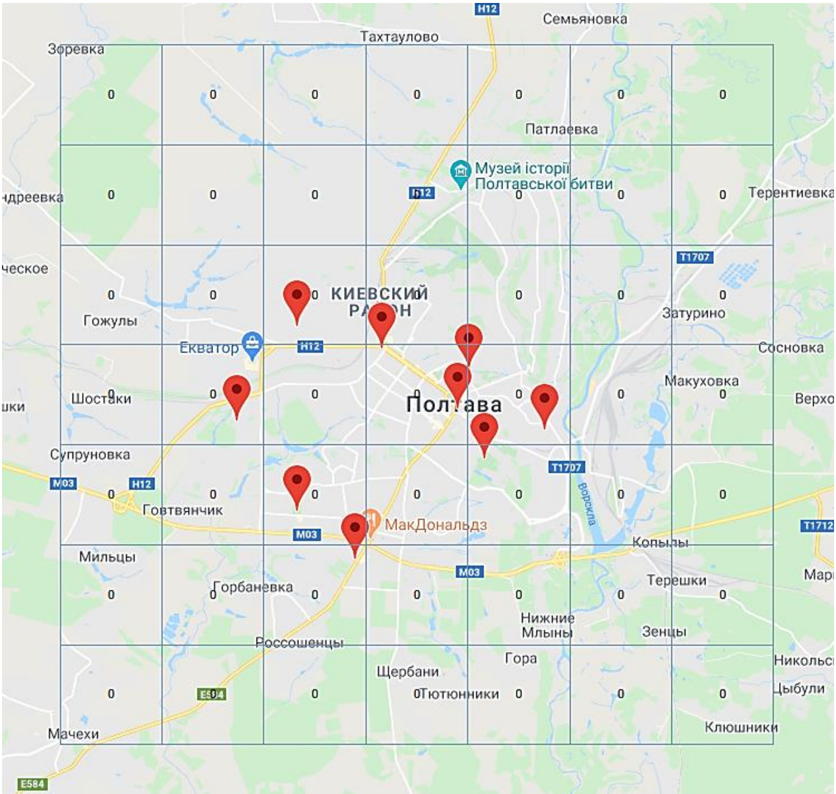

Fig. 1 – The initial view of the public monitoring grid

As a result of the measurements and analysis of the subject area, it was found that there is a need to create a system of visualization of data obtained with the help of an expanded network of public monitoring of the state of atmospheric air (on the example of the city of Poltava). Thus, several shortcomings of the existing information and technical capabilities have been identified, which do not allow displaying the data of the above-mentioned monitoring under the following requirements: the visualization of public monitoring data involves the availability of the results of measurements of the state of the atmospheric air, namely PM2.5 and PM10, from the point of view of breakdown the territory of the city into specific areas and indicating the concentration of dust in these areas. That is, there is a need to create a system of visualization of the received public monitoring data from the point of view of their planar distribution, and not a display of point measurement, which are currently available public information sites, which are also uninformative or inconvenient to use.

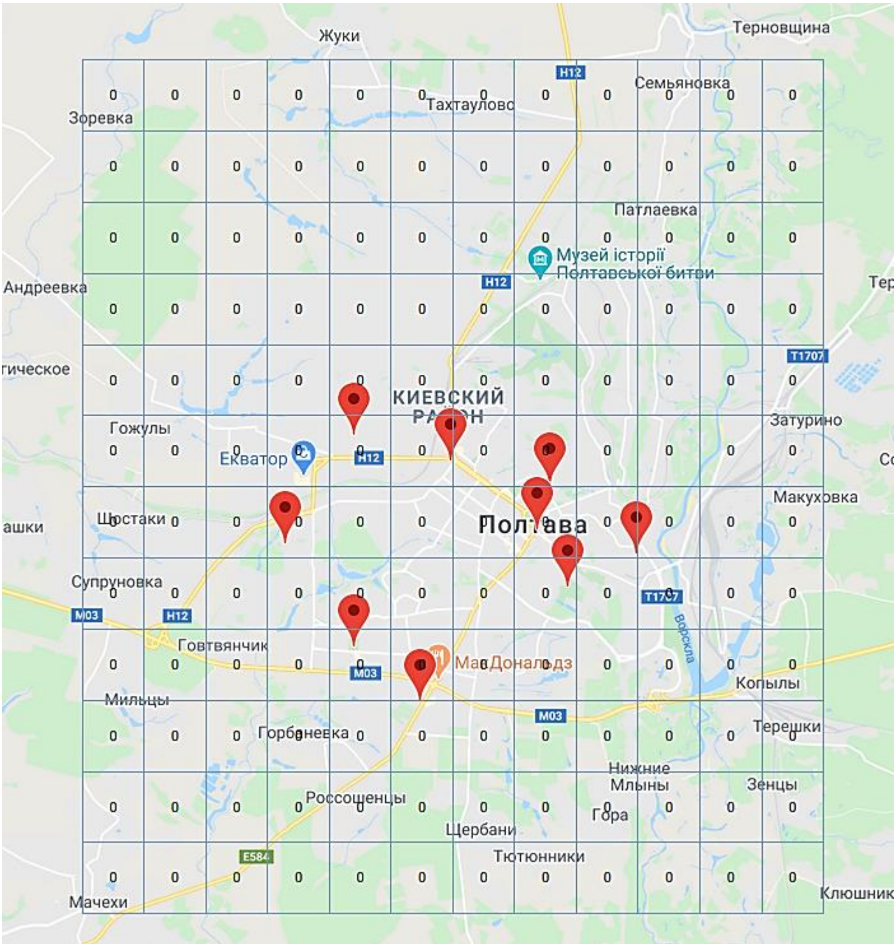

Fig. 2 – Improved view of the public monitoring grid

To implement the notification system for atmospheric air monitoring, the WordPress CMS tool was chosen, which is one of the most popular CMS (content management systems). A content management system is a set of various scripts for creating, editing and managing a site, in professional jargon such systems are called engines. These systems allow you to create publications and are responsible for displaying media elements and placing widgets.

Fig. 3 – Appearance of the sensor

Due to its popularity, this system has gained very good support in the form of an extensive community, and one of the richest databases of plugins for various types of tasks.

In addition, it is a free open-source platform with open-source code.

The most important advantage among frameworks and other CMS is the quick deployment of small projects. Clear and simple admin panel for the site editor. Easy project support. Usually, during development, this engine covers most of the functionality of typical projects, and the smallest part needs to be added to your tasks by modifying the theme or creating appropriate plugins. During the implementation of this project, the topic modification method was used.

The WordPress theme is a basic set of PHP, JS, and CSS files that are used to output information from the database in the form required for the design of the future project. In other engines and frameworks, what is called a theme in WordPress is usually considered a template. However, historically, for compatibility with previous versions of Wordpress, the typical MVC architecture is not used, and in the context of considering Wordpress, it is more correct to use the term "theme" instead of template.

The Joints WP theme was used to develop the site - and empty WordPress theme with a basic set of functions that includes the Foundation CSS framework.

To display the model of the distribution of pollutants in the atmospheric air of the city, the GMapsTable JavaScript library was used, which is based on superimposing an HTML object on Google Maps according to the given coordinates, usually by a similar method, SVG objects are superimposed on Google maps. In this library, this method is adapted for overlaying an HTML table for data visualization. With the help of this library, the output of grouped data on the city grid, rather than point data, is realized.

A website's interface is the set of ways and means by which a user interacts with any web page. The layout of the site is a scheme of pages on which graphic and text elements are located. In other words, the layout of the site is the frame on which the design is formed and the pages are filled.

The site itself is one page with data on the level of atmospheric air pollution for the day. The map is completely positioned to the full height and width of the screen. On the left is a floating sidebar, which is the main element for navigation. It has the following elements: tabs to switch between PM2.5 and PM10 sensors, which have switches for every 6 hours of data and a calendar to navigate by day. Toggling the tab and internal switch changes the data visualization on the map and the pollution scale image for this type of sensor.

Interface elements are implemented using meta boxes. Metaboxes are specific properties of the post, which are usually added to the site structure by plugins. These are panels that contain all the necessary elements that are necessary for editing post data. They are located on the editing screens of the admin panel, where such possibilities as grid control are implemented (2 grids have been created: 7x7 and 12x12 cells), and with the help of tabs, the user will be able to quickly switch between sensors and add information every 6 hours for each of them. By default, these fields will be mandatory.

It is the last publication that will be displayed on the main page (Fig. 4).

First of all, it is necessary to name the post in (dmy) format to generate a page link in the form http://city-air-dust.ho.ua/map/07-06-2020/. In the left sidebar of the post-publication, the date of publication is changed for the desired day, thus determining the day on which the post will be published, which is necessary for the correct determination by the engine of the very last post to which redirection will be made from the main page of the site. In the ACF widget of the CPT: Maps Data group, the desired grid size is selected to fill the data. In the lower part of the widget, the PM2.5 and PM10 tabs are available, which contain fields for filling in information about the sensors every 6 hours. Completion of both tabs is mandatory by default. If these fields are not filled in, when you click the publish button, the post will not be published, and the fields that must be filled in will be highlighted.

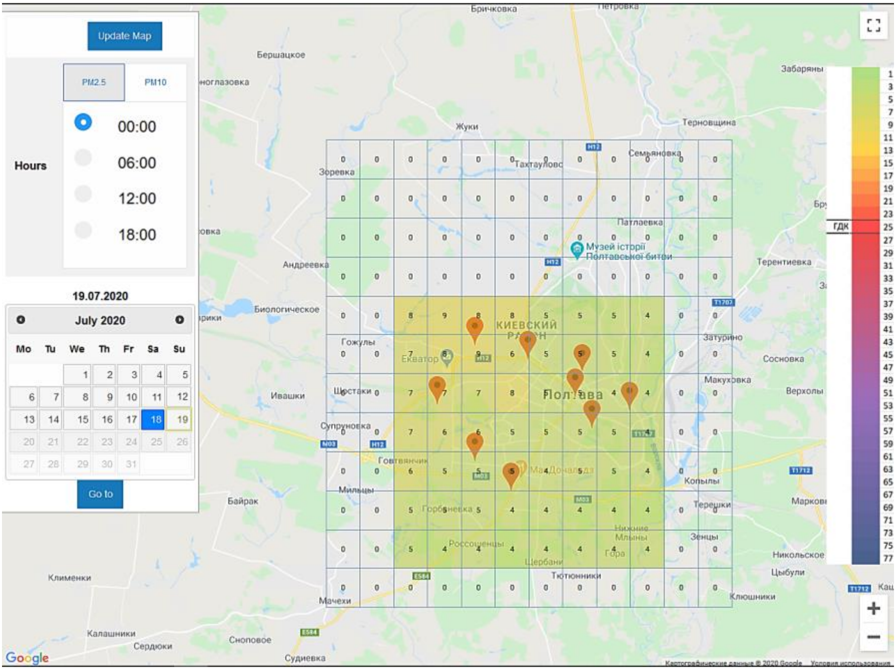

Fig. 4 – View of the main page of the public information system regarding the state of atmospheric air

After the publication of the post, by going to the main page of the site, there is a redirection to the last post with a visualization of the state of atmospheric air pollution in a convenient visual form on the map.

To go to the page, you need to select the desired date in the calendar and click the "go to" link, after selecting the date, the post link is generated automatically. The current date of the post is displayed in the upper part of the calendar so that the user understands the date for which the data is displayed.

After clicking the Go to link, a post for another day will be loaded. For the convenience of users, if there is no publication of observations for a certain day, this date cannot be selected in the calendar.

When switching between the PM2.5 and PM10 sensor tabs, the data on the map changes and the scale image for that sensor changes. Also, when switching tabs, the data is displayed exactly for the hour that was selected last.Therefore, a website was implemented for the publication of the results of measuring the level of atmospheric air pollution with the help of public monitoring. As a result, calculations and analytical studies are transformed into user-friendly thematic maps of PM2.5 and PM10 air pollution in the city. The possibility of implementation of the Procedure for state monitoring in the field of atmospheric air protection was considered, taking into account the results of the implementation of public monitoring of the city.

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