NATIONAL CONVENTION FOR THE EUROPEAN UNION IN THE REPUBLIC OF NORTH MACEDONIA (NCEU-MK)

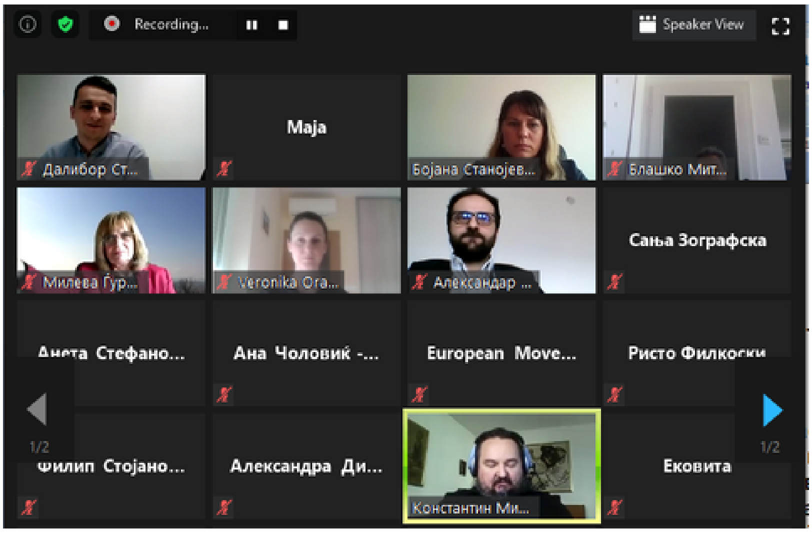
NEWSLETTER 2

WORKING GROUP 5 (WG5) - ENVIRONMENT (CHAPTER 27)

SFPA
Slovak Foreign Policy Association

SECOND SESSION OF WORKING GROUP 5, ENVIRONMENT

Topic of the session: Air pollution from the aspect of heating of households and public institutions

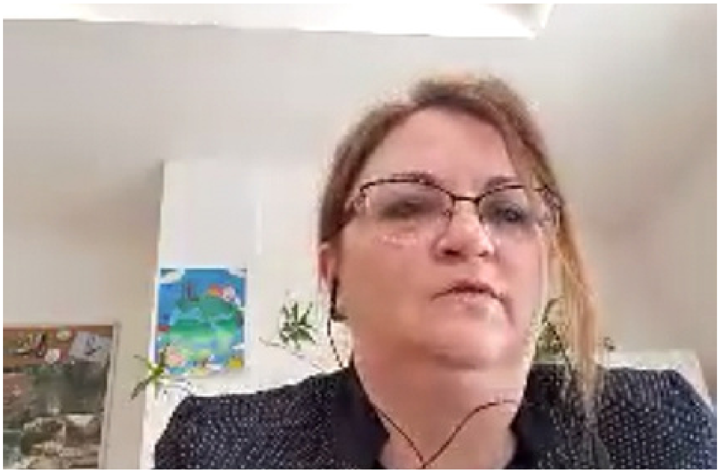


The second session of Working Group 5 (WG5) - Environment, was held on February 24, 2021 (Thursday) virtually on the Internet platform Zoom in the period between 10:00-13:30. The title of the topic of the session was: Air pollution from the aspect of heating of households and public institutions

The session was attended by more than 50 participants - members of the working group and representatives of all stakeholders in society: from the Parliament, the Government - representatives of the Ministry of Environment and Physical Planning, the Secretariat for European Affairs, civil society organizations whose activity is related to the topic and work of WG5, domestic experts, an expert from Slovakia, representatives of the academic community and representatives of diplomatic missions.

The Co-chair, **Bojana Stanojevska Pecurovska,** President of the Center for Climate Change, Skopje, opened the session by briefly introducing the participants to the work of WG5 and the topic of the session.

At the beginning of her speech, the Deputy Minister of the Ministry of Environment and Physical Planning (MoEPP) **Hristina Odzaklieska** expressed her concern about the air quality in Macedonia, especially in large urban areas. She noted that events such as these, where the knowledge and experience of foreign and domestic experts are shared, are extremely important, especially if they result in constructive solutions and recommendations that can be applied in practice.



Citing relevant studies by international organizations (such as the UN, UNDP, World Bank, etc.), Odzaklieska pointed to the significant contribution of fossil fuel combustion by individual households and public institutions to particulate air pollution. Furthermore, she stressed that based on the conducted analyses and reports within the Ministry, in the past few years, measures have been taken to reduce emissions of pollutants into the air.

In the period from 2019 to 2021, three programs for reduction of air pollution were adopted with annual budgets in the amount of 80 to 120 million denars. The focus of these programs is mainly to change the manner in which the buildings of the public administration are being heated. At the same time, in the Ministry of Economy, but also at the local level - in the city of Skopje, measures are taken to subsidize the improvement of energy efficiency of households (subsidies for the purchase of solar collectors and subsidies for the purchase of pellet stoves). The Ministry of Environment and Physical Planning is undertaking activities to improve the work of the inter-sectoral working group on air by including a number of relevant factors that would contribute to more efficiently dealing with increased concentrations of pollutants in the air. At the end of her speech, Odzaklieska stressed that better management of air pollution requires an interdisciplinary approach and coordinated action of all stakeholders, strengthening cooperation between the central and local government, and fulfilling the legal obligations of all relevant stakeholders in the system.

Mileva Gjurovska, the coordinator of NCEU-MK, began with an overview of the activities of the National Convention and Working Group 5 - Environment (Chapter 27) and pointed out that in the following period the Convention will focus on adapting to the new accession negotiations methodology and the way in which this chapter will be processed as part of the cluster. She pointed out that all contributions, especially the recomm-endations, stem from the commit-ment of the expert team and the activities of the WG5 members.

The outcome is more effective and comprehensive recommendations, which as a final product are later submitted to the relevant institutions. Given that this is a new working group, Gjurovska briefly outlined the functi-oning of the National Convention and its methodology, emphasizing the importance of including all relevant stakeholders (representatives of the Assembly, the Government, NGOs, the academic community, etc.), in the conversations about the serious problems we face in our society that are also relevant for the EU integration process.. Not only does the Convention offer concrete solutions to the problems in our society, hence contri-buting to improving living standards, but also contributes to bringing the European integration process closer to the citizens, which in turn leads to a greater democratization of the coun-try. According to Gjurovska, the existing analyses emphasize the need to build a heating system for homes (and public institutions) in accordance with energy and economic resources. It is also necessary to work on changing existing customs, i.e. the culture, as well as the policies of the state that express its readiness to invest in environmental protection. It would appear, the country is still not sufficiently prepared for adequate investments in environmental prote-ction. According to the sociological aspects of this problem, it can be said that the use of coal and firewood for heating is characteristic of the 19th century, but even today in the 21st century a large part of the world population still uses these natural resources, which contributes 40% in air pollution. Wood heating is part of our tradition given that Macedonia is a mountainous country and rich in forests.

However, the question arises, whether cities have enough forests and greenery that could absorb the harmful substances from the use of firewood to heat homes?

Tomas Strazay, director of the Slovak Association for Foreign Policy in Bratislava, said that despite all the difficulties we faced during the work of NCEU-MK, it should be underlined that the Convention is very successful. The goal of the Slovak partner in the activities of NCEU-MK is to help Macedonia in its European integration by providing Slovak expertise on selected topics. The problems faced by Macedonia and other countries in the EU integration process are very similar to those faced by Slovakia in its EU integration process, so that the transfer of lessons learned to Slovakia will be useful in advancing the European integration of the country. Strazaj also emphasized the political support that the Slovak Republic expressed during the visit of the Minister of Foreign Affairs, Mr. Ivan Korchak in the beginning of February 2021.

The support for the start of negotiations on the EU integration process was clearly expressed at the EU Summit late last year where the Slovak Republic and the Czech Republic refused to agree to the unfair terms imposed by some EU member states on the EU integration process of RN Macedonia in the EU. Regarding the topic for the session, he stressed that there are differences but also similarities between the two countries. For example, air pollution due to the use of firewood is also characteristic of Slovakia, but is more prevalent in rural areas than in large cities. However even though Slovakia has been a member of the EU since 2004, it still faces the problem of air pollution as a result of household warming. This is a problem that should be approached seriously in both countries, so sharing experiences and discussion would be beneficial for both countries.

Aleksandar Dedinec, research associate at the Research Center for Energy and Sustainable Development of the Macedonian Academy of Sciences and Arts (MANU), pointed out that several projects related to environmental pollution have been developed within the Macedonian Academy of Sciences and Arts, which were supported by UNDP and the city of Skopje. Dedinec reminded that Chapter 27, Environment, is quite complicated. It contains over 200 legal acts which within the negotiation process are divided into 75 subgroups of legal acts / groups of legal acts in the following chapters: horizontal, air quality, waste management, water quality, nature protection, industrial pollution control, chemicals, noise and climate change.

In his presentation, Dedinec presented data from the European Environment Agency on the air quality index measured the day before, around midnight, which show that air quality in Eastern Europe and the Balkans is of lower quality than in other parts of Europe. This shows that European countries have a problem with air quality, but it is far more pronounced in Eastern countries in Europe and the Balkans, than in Western countries. According to the results of a research, the sources of pollution with PM 2.5 are solid particles from household heating. There is still a culture of heating with solid fuels, but the reason is the financial power of households. In eastern Europe over 30% of air pollution with these particles is due to households (by the way of heating), while in western Europe it is about 15%. In Africa, which is very poor, over 40% of air pollution with PM 2.5 particles is due to household heating. Data from the European Environment Agency show that, at European level, over 50% of pollution with these particles comes from three sectors: commercial, industry and households. The situation is completely different with NOx (nitrogen oxides) particles where transport is most involved in their creation, and in the emissions, of Sox (sulphur oxides) particles, and the production of energy (electric and other types), is responsible for about 60% of the pollution. Polluted air is very harmful to human health, and According to the World Health Organization, 6.5 million people a year, or 18,000 people a day, die from air pollution. It is considered to be the fourth largest "killer" of people after blood pressure, poor diet and smoking. In Macedonia, the mortality due to PM2.5 particles is around 3000 people per year, while in the EU-28 for the same period is 380,000 people.

There are air quality standards prescribed by the World Health Organization, which according to the Air Quality Guidelines are quite high: the average annual concentration of

PM2.5 particles should not exceed 10 µg / m3, i.e. 24 hours concentration 25 µg / m3; while the average annual concentration for PM10 particles should not exceed 20 µg / m3, while the 24 hour concentration should not exceed 50 µg / m3.

According to Dedinec, citizens in the Skopje valley, but also in general all citizens in Macedonia, are constantly exposed to higher concentrations than allowed, which is shown by the devices for measuring air quality that are introduced in other cities, where measuring stations show high concentrations. Unlike a few years ago when the information on air quality was derived only from the measuring stations in the Skopje valley and measuring stations in Bitola, Tetovo and some other cities, today the number of measuring stations is increased and this is to be welcomed because it is one way to give further prominence to this issue.

The problem is not new, it dates back a long time, but in recent years there has been an improvement in the air quality situation shown by the data from the MoEPP. Thus, according to the data from their Annual Report on the quality of the environment in 2005, an average annual concentration of PM2.5 was registered in the municipality of Centar of 104.09 µg / m3, and in the municipality of Karpos of 92.01 µg / m3, while the average annual concentration of PM2.5 in 2019 in the municipality of Centar was around 31 µg / m3, and in the municipality of Karpos 35 µg / m3. Despite the reduction, the values still show that these harmful particles are at least three times higher than the permitted by the World Health Organization (WHO prescribes annual and twenty-four-hour concentrations, but not hourly concentrations of PM2.5 and PM10 particles).

The problem of air pollution will be present in the future, as indicated by the estimates of the European Environment Agency, according to which if we continue with the current way of heating households and the use of energy in industry, there will be an increase in mortality as a result of PM particle concentrations from the current 1.2 million premature deaths to around 3.5 million (2050) premature deaths worldwide.

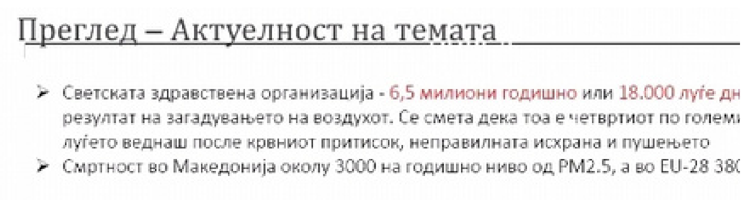
Not only does the data indicate that this will continue to be a pressing topic in the future, but also am increase in allocation of funds to take measures to mitigate the effects of air pollution.

A simple desktop research in order to see the popularity of this issue, Dedinec searched the internet portal time.mk for articles published in it in the period from 2006 to 2021 using the keywords "air pollution in January". The results showed that in the period from 2006 to 2012 there are almost no articles - information on air pollution in Macedonia, while there are some on pollution in Beijing (2013). It can be said that interest in the problem of air pollution starts in 2014, especially after the protests in Tetovo, organized by the civic associations, and the protests of 2015. Since 2015, air pollution has become part of the agenda of political parties and they are taking on the role of actualizing the problem, a role which was previously performed by civil society organizations. In 2016, political parties argued over the problem of air pollution, the same year a documentary was made about REK Bitola, and there was an attempt to actualize the even-odd measure to reduce the number of vehicles in the streets.

Dedinec points out that for the last three years the problem of air pollution is not only relevant for Skopje and Tetovo, but it is also starting to become relevant in other cities in Macedonia where measuring stations have been set up. In fact, according to him, the problem of air pollution has become topical in the last 4-5 years.

Dedinec explained that there are three basic solid particles: CO_2, NO_x and PM. According to the data from 2019, CO particles have a decrease in annual concentrations at only two measuring stations, NO_x particles almost do not exceed the allowed annual concentrations (sometimes there may be an increase in concentrations possibly at the measuring station Rectorate). However, that is not the case with PM2.5 and PM10 particles. Data show that the problem of air pollution is common to all cities in Macedonia. MANU, in cooperation with UNDP, has prepared several studies in the field of air pollution caused by transport, industry and households, which have been shown to be the largest source of PM pollution by households. This has been confirmed by other studies using different methodologies and yet similar results have been obtained. For example, they came to the conclusion that transport participates with 5% in the emission of PM particles on the territory of the Skopje valley, while UGD from Stip found that transport can participate up to 20% in the emission of PM particles depending on the region and the place where measuring stations are set up. Unlike PM particles, in the case of NOx particles, whose concentrations do not exceed the permissible limits, and transport for the most part is responsible for their formation.

Of the other studies conducted in Macedonia, Dedinec presented part of the survey conducted in 2017 by UNDP in Skopje. The results showed that 45% of households in Skopje are heated with firewood (30% in urban areas and 85% in rural areas), while 21% of households are connected to the central heating system. Despite the fact that the citizens in Skopje complain about the polluted air, the results of the survey showed that out of all surveyed households, only 1.3% answered that they choose the way of heating their home in accordance with environmental standards.



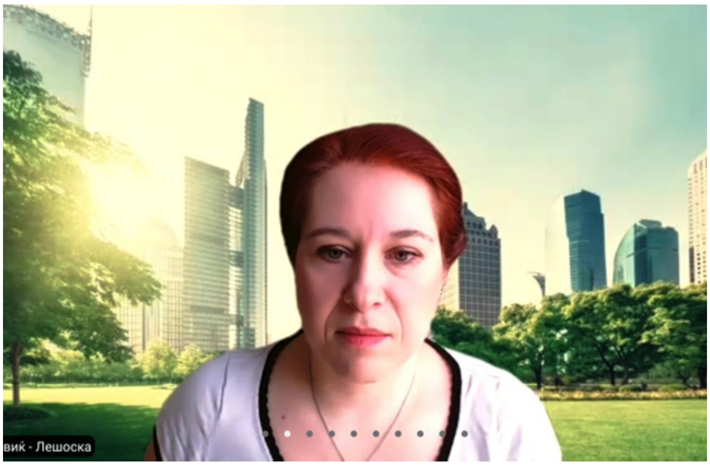
According to Dedinec, the problem with pollution of the city of Skopje cannot be solved in a short period of time. It is a process in which everyone, but above all the citizens as well as the institutions at both local and central level must work together to solve the issue of pollution. In addition, it is important to find a way to include the private sector in the process. This is a process in which the blame should not be shifted from one to another, but rather a process in which everyone should start from themselves, first to change their own behaviour, in order to have a legitimate right to seek change from other actors in society. In this context, Dedinec emphasizes that if we behaved as in 2020 (reference scenario "Skopje is suffocating"), then the emission of PM particles will increase to 30% in 2020 i.e. 2025. The idea was to take measures to reduce the emission of PM particles from households. Specific measures have been proposed as to how many households need to make changes in the area of energy efficiency, move away from firewood stoves to pellet stoves, heat pumps, natural gas and central heating. Targets were set for 2020 - 2025, and this year they will repeat the survey to see the results of what has been done. The idea is to reduce to zero the use of coal and oil for heating households (firewood reduction for 18.000 households -

share by 35.4%; pellet stoves increase by at least 8.500 households and they will participate in the total number by 6.1% electricity at the same level - increasing the number of heat pumps (most inverter air conditioners); although they are only 0.4% or about 650 households in 6 municipalities, there should be no household that will use coal by 2020; oil gradually to be reduced to 0).

By implementing the measures ("Skopje breathes" scenario) it is possible to reduce the emissions of household gases by 62% (PM10 and PM2.5 by 62%; CO and SOx by 50% and 54%, respectively; NOx by 22%). It is estimated that these measures would cost 378m euros, of which 325m euros would be set aside to improve insulation. This means that each household should set aside 50 denars per day until 2025.

Up until now (last four years), the Ministry of Economy, local authorities and other stakeholders have implemented the following measures: in 2019, a total of 2103 subsidies were provided for air conditioners, and according to the data of Market "Neptune" in the period from 2017-2019 year, a total of 17000 (A++) air conditioners were sold, of which about 11000 are intended for heating; air conditioning subsidies In 2020 include 10,000 inverters; subsidies for pellet stoves (3665 applied for subsidies); reduction of VAT on central heating (in the period 2017-2019, over 3000 new users). Dedinec concludes that if we start reducing the most important source, we can expect visible results from the very beginning.

Ana Cholovic - Leshoska, Director of "Eco Consciousness"- Skopje presented the recommendations, which her organization considered essential in order to improve the situation with air pollution. She stressed that the recommendations will be the basis for the discussion that follows and that they will serve as a basis for formulating the recommendations from this session of the working group 5.



According to Colovic-Leshoska, an important element in the activities for reducing air pollution is the collection of relevant data, i.e. regular monitoring of air pollution.

Over time, the situation with the collected data available to the public and NGOs is improving. With the increase in the number of monitoring stations, the number of available data also increases. It is also known that in case of lack of official data citizens and civic initiatives begin their own measurements, which although not certified or not the result of highly sophisticated devices, are still a good indication of the state of air pollution. However, what is necessary is for the state itself to establish and maintain a well-developed system for monitoring all pollutants harmful to human health, which means:

a.Expansion of the network with measuring stations for monitoring in the larger cities in the country;
b.Providing measuring of all highly polluting substances at all measuring points in the country (including nitrogen oxides, sulphur oxides, ozone, dioxins and furans);
c.To adequately and timely inform the citizens about the pollutants in the air, as well as about the measures taken to reduce them;
d.Regular alert for the health consequences of inhalation of pollutants, as well as measures to protect human health.

The Ministry of Environment and Physical Planning lacks active participation in informing and alerting citizens about air pollution as well as the measures which are planned for protection against pollution.

Regarding the problem related to the way households are heated in the winter, it is proposed 2. introduction of a legal ban on coal burning for households with delayed use for up to two years. At the same time, starting programs for planned and systematic elimination of coal and wood as energy sources in urban areas by subsidizing the replacement of the heating method. It is necessary to develop a long-term strategy that will help eliminate wood as an energy source for household heating in urban areas due to its high potential for air pollution during combustion.

Thus, Colovic-Lesoska pointed out the problem with the use of fuel oil for heating public institutions and other facilities under the jurisdiction of the Government and its institutions, which at the local level are major polluters. The state should take measures as soon as possible to replace the heating method, which would remove the fuel oil from use, and would eliminate public institutions and facilities as significant polluters in local areas.

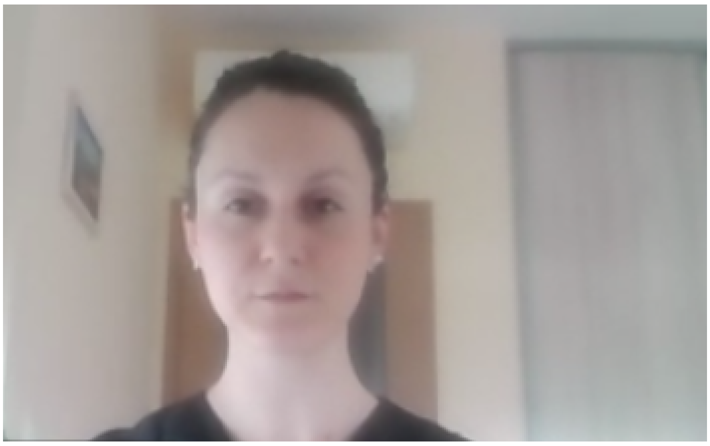
The next recommendation elaborated by Cholovic-Leshoska referred to the need to create clear standards and certificates for the manner and resources used to heat households. She pointed to the example of using pellets for heating households that do not have a quality certificate in our country, but they are imported and are being used. Neither the citizens nor the institutions know the quality of the pellets used. The World Health Organization has also been very critical of subsidizing pellets in urban areas, because in the long run pollution could not be reduced if such a way of heating was subsidized. Hence, it is necessary to establish in the City of Skopje a Plan for the way of heating of each zone of the city, and such a plan should be supported by appropriate rulebooks which will give directions for the appropriate ways of heating in the zones of the city, which should be met by new facilities before obtaining a building permit.

In addition, there is the problem with energy, i.e. the term energy poverty, which refers to the problem of citizens to provide energy for heating (or cooling) needs, and which may be faced by citizens with lower, but also those with higher, incomes. According to Colovic-Lesoska, the term energy poverty is not properly defined by the state and the state has not adopted appropriate measures to address this problem. Consequently, she proposed that energy poverty should be a priority issues to be articulated with the recommendations of the session. In this context, it would be appropriate to use solar energy, not only as a possible way to tackle air pollution, but also to contribute to community building by supporting households that want to install solar photovoltaic panels on their roofs and thus form energy cooperatives. This is something that is pioneering for the whole region, for which there is great interest among the citizens of Macedonia and would have good results.

Cholovic-Leshoska proposed another important recommendation that referred to the Energy Efficiency Fund, which exists but has no significant activity. She proposed to activate the Energy Efficiency Fund because it is most important to ensure energy efficiency of homes which would reduce energy consumption for heating (or cooling), and thus air pollution.

It is evident that the Ministry of Environment and Physical Planning does not have sufficient financial resources to solve major problems in the field of air pollution that are of intersectional nature, emphasizing the need to establish an Environmental Fund that will be put into operation for the implementation of plans and programs for dealing with air pollution, but also other serious problems in the field of environmental protection. Colovic-Lesoska mentioned several times that air pollution is an inter-sectional problem and there is an Intersectional working group for dealing with air pollution, which last met in May 2020. According to Colovic-Lesoska it would be good for the same group to reactivate to review the recommendations from WG5, to adopt and prepare a plan with measures for 2021, and to monitor their implementation. Finally, she stressed that this is the body where. these issues should be discussed.

Veronika Oravcova, PhD in Environmental Science - expert from the Slovak Association for Foreign Policy from Bratislava at the beginning of her address reiterated that Slovakia faces similar problems in terms of air pollution as Macedonia. Slovakia has the highest average value of PM 2.5 particles within of the EU, and the share of household heating in the emission of these particles in the period from 2005 to 2015 increased from 66% to 86%. Also, household heating is a major source for exceeding the daily allowable value of PM 10 particles.



The main sources of air pollution are the transport sector, the industrial complex and heating in individual households. Regarding the heating of individual households, there are differences in air quality in the different regions.

In general, there are two main problems: - inhabited mountain valleys, which also include larger cities that are surrounded by hills (hence reducing the efficiency of air ventilation with winds); and Cold winter conditions which create frequent periods of inversion with which the polluted air in the valleys is trapped, so the situation with air pollution is the worst during the winter, similar to Macedonia.

In the most affected areas (Zilina, Kosice and Ruzomberak) more than 5% of the total mortality can be attributed to air pollution. Slovakia, on the other hand, has a highly developed district heating system, which is one of the most developed in Europe and supplies heat to 1.8 million citizens (representing about one third of the total population). Natural gas is the main fuel used for heat production. In accordance with the EU Directive on energy efficiency (2012/27 / EU) a map of central heating has been prepared which shows the heating needs of the municipalities, the available places for production and distribution in the country. All cities and municipalities are obliged to present (prepare) plans for the development of thermal energy and also to report (display) these sources. The same applies to other sources of thermal energy production.

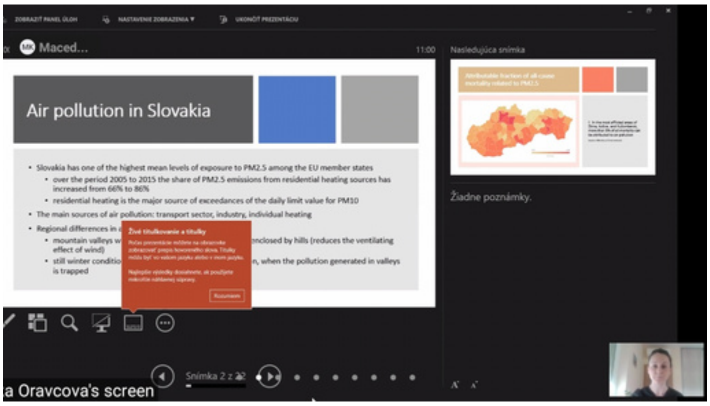
If you look at the heating of individual households, you will see that there is a lack of data.

The first available statistics on heating of individual households are from 2017 when data were collected from the Statistical Office of Slovakia in cooperation with the Hydrometeorological Office of Slovakia, which is responsible for monitoring and reporting on air pollution (smog alarm). If we compare the results from 2017 and 2019 when the second round of research on heating sources for individual households was realized, we can see an increase in boilers with low emission of pollutant particles, and it can also be seen that the use of most water heaters and high-emission heating furnaces are reduced. But there are still approximately 284,000 coal and wood stoves, selling 14,820 solid fuel stoves a year. The good news is that, unlike three years ago, the average age of heaters has dropped from 15 to 11 years. Most of the households - 90%, use wood as energy, but only 67% of the households store the wood properly, i.e. for more than a year or buy it dry.

Oravcova noted that the European Commission has filed a lawsuit against Slovakia for failing to implement an Air Pollution Protection Strategy. Clean air legislation was not enacted until 2010 (just a decade), and a major National Air Pollution Control Program is under way. The National Pollution Control Program is under the responsibility of the Ministry of Environment, but two other ministries are of special importance for its implementation, namely the Ministry of Economy, which is in charge of the work of the Slovak Energy and Innovation Agency, as and the Ministry of Transport and Construction, which is in charge of the State Agency for Housing Development, which takes care of the implementation of energy efficiency measures.

The main goal of the Slovak Energy and Innovation Agency is to monitor and evaluate energy efficiency measures. As a successful example of the activity of this Agency is the program called "Green Households". The first period of the program was from 2015-2018 when a total of 18.501 renewable energy installations, worth 45 million euros, were supported, and currently the second period (2019-2023) is underway and it is planned to invest 48 million euros which will support 25.000 installations with renewable energy source with a total capacity of 140MW.

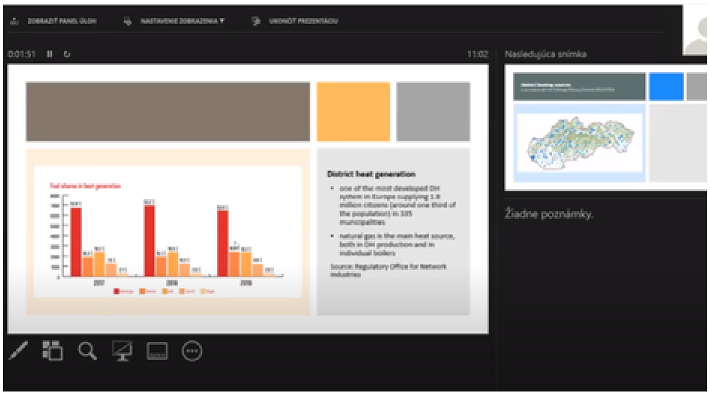
Heat pumps, solar collectors, photovoltaic panels with power up to 10KW are supported - because in Slovakia there is a limit, which means that not everyone can connect to the electricity distribution network. Some of the people from the Green Household program can connect to the distribution network, but they cannot sell electricity. Wind farms for electricity generation should also be supported, but the call for them has not been announced yet because the Slovak National Plan does not consider wind energy production for several reasons.



Furthermore, Oravtsova provided technical information on the procedure for obtaining support (under the first support scheme): registration is required to obtain an online voucher at the Agency, an agreement should be made with the supplier who will receive a refund from the Agency for energy and innovation of Slovakia. The whole procedure takes place online.

Solar collectors are supported up to a value of 1,400 euros per installation (family houses or residential buildings), while for heat pumps the basic support is 2,720 euros per family house, provided that the heat pump is not a direct competition to the central heating system, because it you cannot disconnect from the district heating network without the permission of the supplier, which in itself is a controversial topic in Slovakia. Some political parties consider this to be unconstitutional, but if half of the central heating users are disconnected, then the other users will find it difficult to pay their bills.

The second support scheme refers to the isolation of family houses and apartment buildings (through state loans). In the case of residential buildings, the program proved successful due to government loans and the program was under the jurisdiction of the Ministry of Transport and Construction, and government loans were very low or with 0% interest which was good for the users. Oravtsova referred to the successful energy efficiency measures. In the period from 2000 to 2016, the total energy intensity for heating per floor area of buildings was reduced by half. More than half of the apartment buildings have been renovated, but only a third of the family houses will be targeted as part of the next subsidies. Currently, the renovation of the family houses is subsidized with 9.000 euros.



Finally, Oravtsova noted that the National Air Pollution Control Program prepared by the Ministry of Environment, contains several incentives to improve air quality. The first incentive refers to the replacement of unsuitable boilers with the old-new scheme, which is a novelty in Slovakia. The second incentive refers to the introduction of differentiated registration fees for different categories of heating devices to promote more environmentally friendly heating devices. - Then the introduction of fuel standards that require the use of wood with a moisture content of less than 25%. The last stimulus concerned raising awareness and education campaigns that have already started informing citizens how to heat, which devices to buy and which not, and how to calculate energy efficiency.

Aneta Stefanovska, Head of the Air Quality Monitoring Unit at the Ministry of Environment and Physical Planning (MoEPP) presented the activities of the Ministry related to air quality management. She stressed that the primary goal is to establish national legislation on ambient air quality. The Law on Ambient Air Quality was adopted in 2004, according to which several bylaws were adopted (16 bylaws).

The Ambient air quality directive (2008/50/EC-Directive on ambient air quality and cleaner air in Europe • 2004/107 / EC - Directive on arsenic, cadmium, mercury and polycyclic aromatic hydrocarbons in ambient air) and the Heavy Metal Directive (• 2004/107 / EC - Directive on arsenic, cadmium, mercury and polycyclic aromatic hydrocarbons in ambient air) are completely implemented in the Law. The latest amendments to the directives (2015/1480/EC - Directive amending several annexes to Directives 2004/107/EC and 2008/50/EC) have not been implemented into national law (implementing of these amendments into our national legislation is expected to start at the end of the year with the beginning of the realization of a project that will revise the entire legislation). The Law on Ambient Air Quality is being amended in a parliamentary procedure which refers to the specification of the preparation of local ambient air quality plans which are under the competence of the local self-government, as well as the inclusion of several inspectorates that are competent in relation to of ambient air quality.

Different methods are used in the assessment of air quality in the Ministry: Air quality monitoring; Inventory of pollutant emissions; Dispersion air quality modelling; Receptor models for determining the share of pollution sources in measured PM10 concentrations.

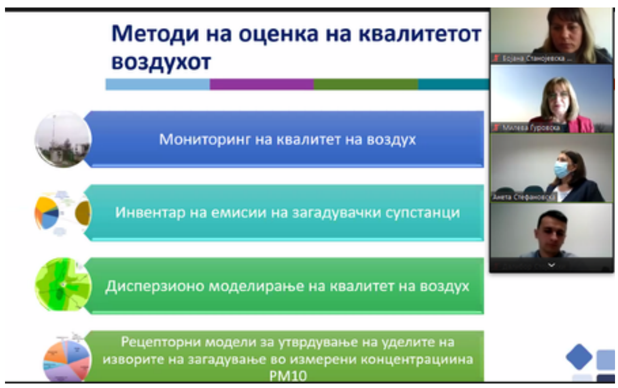
Regarding the air quality monitoring, the Ministry is responsible and manages the established State automatic monitoring system for ambient air quality. The system was established in 2004 and consists of 18 fixed mobile monitoring stations and 1 mobile monitoring station. This system measures all environmental parameters (SO_2, NO, NO_2, NO_X, CO, O_3, PM10, PM2.5).

At the beginning, SO2, NO, NO2, NOX, CO, O3 and PM10 particles were measured (these particles are measured at all measuring stations), while PM2.5 particles were measured from 2012, first only in Skopje at two measuring stations, and from 2017 in Kumanovo, Tetovo, and Bitola. Stefanovska pointed out that the number of measuring stations in the System meets the minimum criteria for measuring points in accordance with the national legislation, which is harmonized with the European legislation. In addition, in order to better inform the citizens, it is planned to further increase their number, especially in larger urban areas, while smaller urban areas would be covered by mobile measuring stations. Heavy metals and polycyclic aromatic hydrogen are not measured continuously, but indicatively, which is something which should be revised and improved upon.

A calibration laboratory has been operating within the Ministry since 2004 and aims to calibrate the instruments of the monitoring system. Although not yet accredited, it actively participates in various inter-laboratory comparative measurements together with laboratories from several countries within the European Union and thus far it has shown significantly good results.

Regarding the air quality assessment, Stefanovska pointed out that based on the long-term air quality assessment, it can be noticed that the concentrations of suspended particles (PM10 and PM2.5), often exceed the established limits for protection of human health, in almost all urban areas. In recent years, in some smaller cities such as Kocani, but also in some measuring points in Skopje, there is a reduction in air pollution, i.e. the average annual concentration of PM10 particles is less than the limit value, i.e. there is a downward trend in concentrations.

Stefanovska emphasized that it is rather rare that other pollutants exceed the prescribed values limit. especially the results for SO2, where there is a downward trend of measured concentrations, is connected with the successful implementation of state measures for protection of the air from this pollutant. In addition, the concentrations of PM10 particles in 2020 at several measuring points, their average annual concentration is below the prescribed limit value of 40 g / m3.



Nevertheless, the number of days in which the prescribed average daily limit value is exceeded, is above the allowed number of days, i.e., above 35 during a year. From the graph showing the average daily concentrations of PM10 particles in 2020, it can be seen that higher concentrations are more frequent in the winter period compared to the concentrations in the summer period. Stefanovska noted that the occurrence of winter episodes with extremely high concentrations of PM10 particles is related to meteorological conditions, i.e. several days of stable atmospheric conditions where emitted pollutants accumulate in valleys. In other words, reduced atmospheric flow, due to the prolonged period without wind and the occurrence of temperature inversion, leads to the accumulation of pollutants in the air in the valleys.

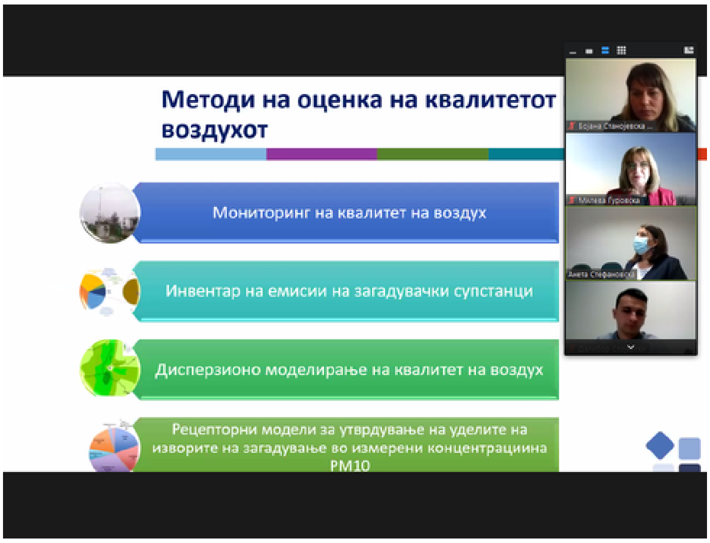
The Ministry of Environment and Physical Planning displays the data from the state ambient air quality monitoring in real time on the Air Quality Portal. This has greatly contributed to increased public interest and institutions in solving the problem of air pollution. Thus far, several air quality assessment reports prepared within the Ministry have been published on the Air Quality Portal.

The MoEPP has an obligation to prepare an Inventory of air emissions at the national level. Since 2005, the Inventory has been prepared according to the prescribed methodology (according to EMEP/EEA) and with it the share of pollutant emission sources for the period 1990- (n-2) is determined. In addition, the Ministry also prepares Inventory Information Reports. The Inventory and the Inventory the Center for Emissions and Projections (CEIP), audits these Reports on behalf of the European Environment Agency. From the data presented in the Inventory (for 2019) it can be seen that a large share in the emissions of PM10 and PM2.5 particles in the air derive from households and administrative buildings, but it is noted that many other sources have their share in the emissions of these particles. Moreover, from the trend of national emissions of PM10 particles, there is a trend of decreasing emissions of these particles (from 1990-2019) as a result of the reduction of the work of the industrial capacities.

The next method for air quality assessment is the modelling done in the framework of several implemented projects realized in partnership with the Finnish Meteorological Institute (FMI). Two local dispersion models and a regional dispersion model were established. In a study made with the dispersion model for the impact of traffic on air quality (CAR - FMI) in which a large number of inputs were used, it was shown that traffic is a significant source of air pollution, especially at more frequent inter-sections and larger roads in the city where the prescribed annual limit of NO2 is exceeded. The use of the other model for the impact of stationary sources (UDM - FMI) on the concentration of NO2 in the air in Skopje showed that there is no major impact of industrial facilities on the concentration of NO2 in the air.

Within the Twinning project, receptor modelling (PMF modelling) was done at one location in the municipality of Karpos (Skopje). Several measure-ments were performed during an eight months period (01.08.2015 - 31.03.2016 every three days), which found concentrations of PM10 particles, but also the concentration of more heavy metals, polycyclic aro-matic hydrocarbons, main ions, levoglucosan and ferrous carbon.

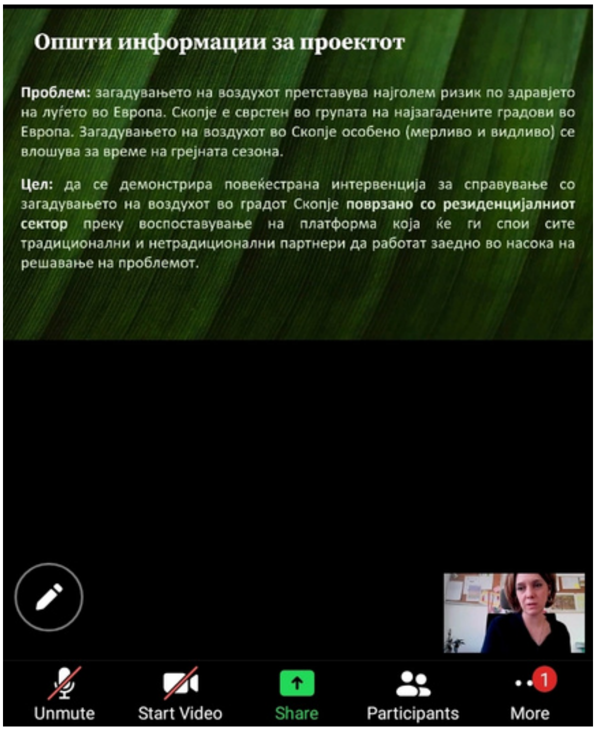
All of this data was the input to this modelling that identified biomass combustion as one of the largest sources of air pollution.



The next topic that Stefanovska addressed in her presentation referred to the measures, undertaken by the MoEPP, for improving air quality. According to the Law on Ambient Air, two national plans have been prepa-red and adopted by the Government in 2012: National Plan for Ambient Air Protection for the period 2013-2017 and National Program for Reduction of Emissions of Pollutants at the level of the Republic of Macedonia for the period 2012-2020. A new National Plan and a new National Program for Reduction of Pollutant Emissions are in the preparatory phase, which are planned to be developed within the project activities in the IPA 2 program that would start to be realized at the end of the year.

In this context, several local plans for air quality have been prepared, some of which have been prepared with the help of the MoEPP, such as the plan for Skopje, the municipality of Bitola and the municipality of Tetovo, which have been developed within the project activities of the Ministry, which also included experts from this field. Some of the municipalities have only started to develop local air quality plans such as the municipality of Veles, the municipality of Strumica and others. Furthermore, some of the municipalities have developed short-term action plans that are applied in case of exceeding the alert thresholds for those pollutants for which such thresholds are prescribed. The Municipality of Bitola is currently preparing a new Plan. It is being prepared as part of a project at the Ministry and is funded by the IPA-CBC program between Macedonia and Greece. Funds have been provided under the Environmental Investment Program for the preparation of Air Quality Improvement Plans for several municipalities.

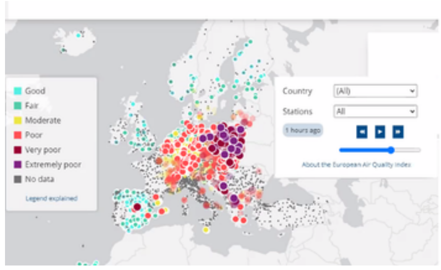
Regarding the Measures for improving the air quality from the household sector and administrative capacities that have been undertaken at the national level, Stefanovska pointed out that Programs for reduction of air pollution for the period 2019-2021 have been adopted with a budget of 80,000,000-120,000,000 denars, and most of the measures defined in the programs referred to the replacement of non-ecological ways of heating in administrative buildings. Within these programs, many of the administrative buildings within the local self-government have switched to a more environmentally friendly way of heating. The Ministry of Economy also implements Energy Efficiency Programs and provides subsidies for the purchase of pellet stoves. Within the thematic session of the Intersectoral Working Group (IRG), a measure was adopted to reduce the VAT from 18% to 5% for the delivery of thermal energy in order to encourage users to make greater use of the central heating system.



With the amendments to the Law on Air Quality, which are underway, local self-government units (LSGUs) and the central authorities will be in charge of providing financial means for the implementation of measures, and appropriate penalties will be prescribed for non-implementation of the measures, i.e. lack of Plans for air quality improvement, especially in those municipalities where there is a need for such plans and measures. Also, within the IPA3 program, a project task is under construction in which many of the activities are related to the replacement of fossil fuels with clean fuels, or the possibility of connecting public (administrative) facilities to the heating network or if the gas network was introduced.

The City of Skopje is pointed out as a good example for implementing measures to improve air quality in the household sector and administrative facilities. In the last few years, the City of Skopje has been granting subsidies for the supply of pellet stoves (2016-2019), as well as subsidies for the supply of modern heating appliances - inverter air conditioners (2020). The number of subsidized citizens is constantly growing, and in 2020, 4591 citizens were subsidized to buy an inverter air conditioner.

These data show an increase in awareness of the obligations of local self-government units, not only the City of Skopje, to implement measures to improve air quality in this sector by subsidizing certain households, as well as in other sectors such as subsidies for reduction of traffic emissions. In this context is the increased inspection supervision regarding the burning of prohibited materials.



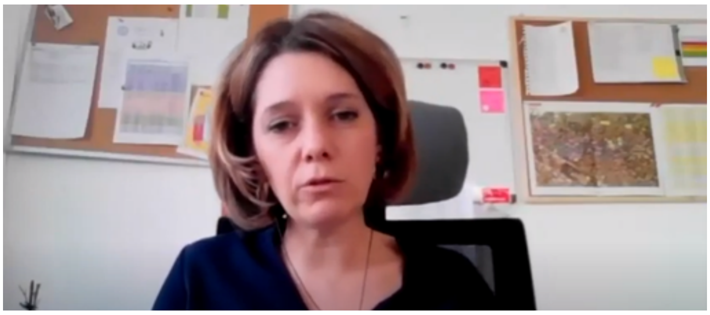
Stefanovska concluded that PM10 particles are the most critical pollutant in Macedonia, because the concentrations exceed the established limit values for protection of human health. Sufficient funding is needed to fully implement the measures at both national and local levels. It is also necessary to strengthen the administrative capacities at central and local level for the implementation of the defined measures for reduction of air pollution because they are insufficient. The number of authorized inspectors should be increased to strengthen oversight and establish a system for assessing the effectiveness of measures.

If any of the prescribed measures are found to be unsatisfactory and do not achieve the expected effect, they should be replaced with another measure that would be more effective. We are already working on the adoption of bylaws on quality of solid fuels and their implementation, because in our country there is only regulation on the quality of liquid fuels.

It is necessary to work on raising public awareness regarding the use of fossil fuels and burning of illicit materials where the non-governmental sector can provide great support, although the MoEPP has prepared several brochures, and materials are posted on its websites. Also, Stefanovska stressed the need for an integrated approach in the implementation of measures to protect and improve air quality and further strengthen coordination between central, local government and NGOs, because the Ministry cannot solve this problem alone. This is an issue that should be addressed by all different stakeholders in the country.

Aleksandra Dimova - Manchevska

Project Manager of "Tackling Air Pollution in the City of Skopje", which is conducted under the United Nations Development Program (UNDP), with financial support from the Swedish International Development Cooperation Agency (SIDA).



The project is implemented by UNDP in partnership with the MoEPP and the City of Skopje, in the period from December 2019 to December 2021, with a budget of 2,056,766.76 USD. The main problem addressed with this project is air pollution caused by residential buildings, as one of the biggest problems of the City of Skopje, especially during the heating season during the winter. The aim is to demonstrate a multifaceted intervention to address air pollution in the city of Skopje, related to the residential sector, by establishing a platform that will bring together all stakeholders to work together to solve the problem.

The project consists of several components:

•component 1 monitoring system (pilot zone) and coordination platform;

•component 2 regulatory changes: air and waste;

•component 3 demonstration of measures addressing the causes of pollution;

•component 4 strengthening public awareness.

In her presentation Dimova Manchevska mainly focused on components 1 and 3 in order to better present the research conducted within the project. Regarding component 2 of the project, the focus is on improving the legislation related to air and waste, while component 4 of the project refers to strengthening public awareness on the problem of air pollution.

Component 1 envisages the development of a monitoring system that is already located in the pilot zone (Lisiche) and the development of a coordination platform. The establishment of the monitoring system is done in cooperation with the University "Goce Delchev" in Stip (UGD). An internet platform has also been developed that has not yet been released to the public. Its promotion is planned for April, and it is planned to enable coordination, informing the general public, as well as engaging the public in these issues. A larger part of this component refers to the preparation of a Source Apportionment Study in order to obtain information on the individual sources of air pollution in the city of Skopje, as well as to determine the share of individual sources of pollution of the air, whether it is pollution coming from industry, biomass combustion, traffic, waste, etc., The study is prepared in collaboration with UGD and the team of prof. Dejan Mirakovski in accordance with the reference manual for Proportioning of air pollution sources and development of receptor models, which is published by the Research Center of the European Commission.

Furthermore, Dimova Manchevska emphasized that component 3 is the largest and most complex component of the project. In the pilot zone in Lisice, they prepared a model and announced a call for support of households for the introduction of energy efficiency measures in order to reduce air pollution. The purpose of this call was to cover several aspects such as the energy potential of the households, socio-economic and gender characteristics of the households (is there a disabled person in the household, is there a single parent in the household, is it a foster family, the number of members in the household, as well as the fact whether the woman is the owner of the property - all of that accumulated the point system that qualify a household under the project).

After the households were selected, energy control was performed and they are already in the phase of implementation of the proposed energy efficiency measures. Considering that this is a cooperation with families, some of which belong to the socially vulnerable categories, and it is about measures that are complex and include construction activities, preparation of reports and reconstruction projects, requesting permits from the municipality itself, and all these complex activities were realized for each individual object separately. Sixty facilities have been selected, and a second call is being prepared within which the remaining part of the households that will receive support will be selected. It is expected that more than one hundred household facilities will be supported by the project in the implementation of certain measures to improve energy efficiency, primarily to replace the heater with another that is more energy efficient.

The last activity in this component is the development of a model for subsidizing socio-economically vulnerable citizens. The proposed model has been developed and is expected to be presented to the institutions and the public in due course.

In addition to the aforementioned project activities, Dimova Manchevska gave an overview of the research and analysis done to target specific groups. On this occasion, she referred to the research that was conducted in Lisice - the settlement Lisice, the settlement Todor Changov and the settlement Gorno Lisice. A total of 300 citizens were interviewed face to face, with a 40 questions questionnaire. She presented the analysis of several of those issues, which mainly relate to the topic of the session. From the obtained results it can be concluded that most of the buildings (74.3%) were built in the period from 1963 to 1985, which means that they have great potential for improving their energy efficiency. It was confirmed that there is a close correlation between the level of income and the quality of insulation in household buildings. In these settlements there are mostly families who belong to a lower social category, over 50% of respondents have an income of up to 30,000 denars per month (two minimum wages). Analyses show that for the most part low-income families have very poor insulation of their living premises or the premises are not insulated at all. In contrast, those households where the monthly income is around 70,000 or over 70,000 denars, in 50% of cases stated that they have excellent insulation, and in 33% that they have good insulation.

Another measure under this project is the replacement of windows. When asked about the type of windows that are available in residential buildings, the results showed that 46% of respondents have wooden windows. Regarding the question "Do you think that air pollution is a problem?", It can be noted that the citizens of Lisice are aware of the problem of air pollution almost 100% of respondents answered that it is a very big problem, i.e. a big problem. The following question whose answers were presented refers to the sources of air pollution in the settlement. The obtained results were expected, given that in the immediate vicinity of the settlement Lisice is the landfill Vardariste, as well as larger and smaller industrial facilities, consequently most of the respondents recognize them as the biggest sources of air pollution, but also heating of households. It is evident that 25.9% of the respondents do not consider that household heating contributes to air pollution, and additional analyses found that there is a correlation with the level of education of the respondents: those respondents with a lower level of education do not recognize household heating as a serious source of air pollution. -

The results of the answers to the question "To what extent does each of the listed energy sources that could be used for heating households affect the air pollution in your neighbourhood?", showed that 60% of the respondents think that heating with firewood does not affect at all, that is, to some extent it affects, unlike those who use oil (0.3%), most of the respondents think that oil is one of the biggest air pollutants in the settlement. The analyses from 2021 show that 40% of the respondents use firewood as a primary energy source, unlike the study "Skopje is heating up" in 2017 when that percentage at the level of Skopje was 45%.

A comparison was done in terms of what it means in terms of household income and what kind of energy they use because in the next call the target group would be low-income households that are socio-economically most vulnerable. It can be noticed that 65% of the households that have a monthly income of up to 15000 denars are heated with wood, as opposed to those that are heated with electricity 33%. On the other hand, 83% of the respondents, who have a monthly income over 70,000 denars, are heated by electricity, and 17% of them are heated by firewood.

The respondents were asked an interesting question regarding whether the respondents noticed burning or heating of harmful waste or energy in the settlement of Lisice? And in that context, have they noticed their neighbours doing that? The answers received were similar to both questions. 65% of the respondents answered that they noticed burning or burning of harmful waste and 63% answered that they noticed the neighbours doing it, which leaves an opportunity for the respondents to be doing the same activities.

If they could choose how to heat their home, regardless of the cost of installing the equipment and the monthly cost, most of the respondents 37.7% chose central heating, 18% would choose inverter air conditioners, and 21% in general would not change the heating method. Of those respondents who heat with wood, the majority 39% chose central heating, 8% chose a gas boiler and inverter air conditioners, while 29% of respondents who heat with wood answered that they would not change the method of heating.

Cross-analyses showed that respondents belonging to lower social groups, who have lower incomes, were less willing to change, compared to those with higher incomes. Also, respondents who have a lower degree of education are less willing to change the way of heating, unlike those who have a higher degree of education. Based on the presented data, Dimova Manchevska concluded that the more vulnerable groups of citizens find it more difficult to agree to make changes in the way their homes are heated even if finances would not be a problem.

In continuation of her presentation, Dimova Manchevska presented several issues related to the readiness of the respondents to invest in improving the energy efficiency of their homes. Respondents who use firewood were asked if they could make three investments in their home to save more energy, what would those investments be? On several occasions, the results of the study show that the installation of solar systems 32% and wall insulation 34% would be of major interest to these respondents. Regarding the previous question, the respondents were asked how likely it is that in the next 12 months they would decide to make one of the investments they mentioned earlier?

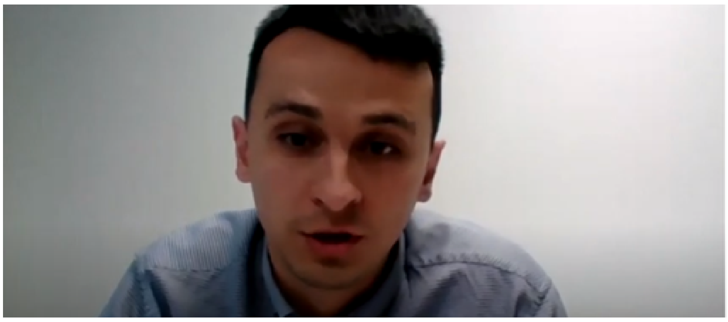
The results showed that only 16.6% of the respondents are likely to make investments, while 60.3% of the respondents do not have the opportunity to invest.

Dimova Manchevska pointed out that the subject of analysis in the research was also the subsidy for which a group of questions were asked. On this occasion, she presented the results of only one question regarding the motivation of the respondents to participate in a possible new call for subsidizing energy efficient devices. The results show that the respondents would be motivated to participate in a possible new call for subsidizing energy efficient devices if good conditions are offered (9%), if there is a higher return on funds (7%), if there is a call for solar systems (6%), if there is a call for inverter air conditioners (5%). However, 22% of the respondents answered that nothing would motivate them, which indicates that these are difficult groups for working with. Hence, public awareness should be strengthened, communication will be needed and education that was planned within the project, but according to her, joint work is needed, because without additional activities in this regard, the set goal cannot be achieved.

At the end of her presentation, Dimova Manchevska presented the conclusions and recommendations related to the topic of this session:

- Air pollution is a complex issue that requires engagement and close / intensive coordination between all stakeholders - institutions, experts, CSOs, private companies, academia, media, international community, public, etc.
- Implementation of scientific research projects whose results will be used to create realistic policies.
- Implementation of a series of measures to increase the energy efficiency of residential buildings that complement each other (change of heating system, installation of insulation, replacement of windows / doors, solar systems, etc.).
- Focus on the most socio-economically most vulnerable households (as one of the biggest air pollutants).
- Strengthening public awareness - sharing experiences and good practices by households.

Dalibor Stojevski, Commercial Director of TE-TO AD Skopje, a company that produces electricity and gas heat. In his presentation "Solving air pollution in the Skopje valley through ecological heating structure" he presented the company's plans to address air pollution in Skopje. He began by presenting the data on air pollution in Skopje, emphasizing that the city has a chronic problem with enormous air pollution, caused by high concentrations of PM10 and PM2.5 particles. The data from 1999 to 2019 show that this situation occurs and drastically exceeds the allowable limits during the heating season, unlike the summer period when it is possible to exceed the allowable average limits, but those spikes do not pose a serious danger to citizens.



Differences in the data, in different years, are possible due to different climatic conditions and influences, but if we compare the data from 2006 and 2019, the general picture is constant. In consequence, the air pollution in Skopje was among the most polluted cities in Europe and the world. This is systematized in two reports - one by the World Bank (WB) and the other by the World Health Organization (WHO). According to both reports, 1,400 people die prematurely as a result of air pollution in Skopje, according to a World Bank report, and according to the WHO report, this number is 3,800 people annually. According to the WB report, direct costs caused by air pollution in Skopje are estimated at 113,000,000 EUR, while according to the WHO report, indirect costs reach 20% of GDP (about 2 billion Euros).

He pointed out that the main reason for the emission of PM10 and PM2.5 particles is the use of firewood, which is widely used by households in Skopje from October to April, and he is convinced that it contributes much more to the concentration of PM10 and PM2.5 particles than is stated by previous speakers (30%). In addition to PM10 and PM2.5 particles, the burning of wood also releases those poisonous exotic particles such as dioxins, furans, etc. In addition, Stojevski presented a graph that he considers to be the monthly concentrations of dioxins (POH) in the municipality of Karpos, according to which it can be seen that the concentration of these particles increases during the winter period when wood burning is most intense.

According to the data from the State Statistical Office and the survey conducted by the City of Skopje, the use of wood for heating homes in Skopje has increased in recent years from 35% in 2002 to 40% in 2013, at the expense of the reduced use of the central system for heating. According to UNDP data, 90% of households in rural areas use wood for heating, while in urban areas only 30% use wood for heating. However, when it comes to individual housing facilities of 1.500 respondents 1.000 use wood for their heating, which indicates that even in the urban parts of Skopje where individual housing facilities dominate, wood is the main fuel for heating, and as the main reason for that he considers the old habits - because, according to his calculations, there is no financial profitability. He showed that KW/h energy from wood costs 3.9 denars, KW/h energy from BEG costs 3.4 denars, and KW/h energy from EVN Home for using inverter air conditioners is 1.9 denars, which means that compared to public opinion, wood is not a cheap fuel. Moreover, the calculations show that the use of wood as a fuel for heating is largely not ecological because it greatly contributes to air pollution (PM10 = 750 g / m3 and PM2.5 = 750 g / m3). On the other hand, data from the State Statistical Office show that wood consumption in the period from 2001 to 2019 is not decreasing. From the presented data, Stojevski points out that wood is a more expensive energy source than both central heating and electricity heating with inverter air conditioners, and pollutes the air far more.

Following, Stojevski focused on the position of the hot water systems in the world and the central hot water system in Skopje. He stressed that the development of central heating systems is a strategic commitment of the EU, the United States, Great Britain, Russia, etc., as well as Macedonia. The focus is on central heating systems because they are quite flexible in the use of energy sources for water heating: you can use gas, waste incinerators, heat pumps, solar energy, etc. If a gasification system is built, then only gas can be used.

Stojevski estimates that Skopje has a developed central heating system with a total capacity (production and hydraulic) of 900MW, but only slightly more than 50% is actually being used. There is a system that has been built for the past 50 years, but it is only partially being used. According to him, this partial use of the system is due to the soft regulation of the heating market, as well as poor management of the system and lack of investment by the previous operator. In this context, he presented the solutions offered by his company.

From the map of Skopje, it can be seen that the conjuncture of the Skopje valley inevitably requires a systemic solution for pollution. It is pointless to have heating in Aerodrom, Centar, Karpos, etc., when the environment uses firewood and pollutes the whole valley. In order to map the Skopje valley, the Faculty of Mechanical Engineering - Skopje and MACEF prepared "Study for defining techno-economically optimal and environmentally sustainable structure for heating and implementation of centralized supply of sanitary hot water to the city of Skopje." Within the study, cells of 300m2 to 150m2 were defined and the matrix shows depending on the number of objects in that cell and the density of heat consumption in that cell which system has economic justification in relation to others. According to this study, to solve the problem of air pollution, it is proposed to zone the city into zones with a precisely defined type of heating. In the urban part of Skopje, the use of the central heating system is the most profitable, while on the outskirts of the city (Volkovo, Dame Gruev, Madzari, etc.) where individual houses predominate, inverters have an advantage.

Furthermore, Stojevski pointed out that in a period of four months, they conducted a field and electronic inventory through the cadastre of all facilities in Skopje and the Skopje valley (how many houses there are, how many floors, how many square meters, for what purpose, etc.) based on which they prepared an investment program for environmentally friendly heating structure. The conclusions of the program indicate that: all disconnected users from the central heating system should be reconnected (these are 13,000 users for whom the obligation to pay a lump sum has been abolished); all collective and business facilities in the area of the central heating system should be connected to the central heating system; all individual residential buildings in the area of the central heating system and in the whole valley that use wood/thermal stoves should be connected to inverters (2 inverters on each floor). By connecting the disconnected users and the buildings to the central heating system, space for the inverters in the electricity distribution network will be freed. It is calculated that the total effect of reducing the load on the electricity distribution system is 70MW. The total investment for connection of all collective facilities, business facilities and individual facilities is 52.000.000 Euros (for comparison, the hot water pipe from REK Bitola to Bitola costs around 45.000.000 Euros). The required investment for installation of inverter air conditioners for heating of all individual houses in Skopje (5.600) which are in the central heating zone is 5.500.000 euros. The required investment for installation of inverter air conditioners in houses (57.000) outside the district heating zone is 47,000.000 euros. The total investment to replace wood heating with inverter air conditioners in all houses in the Skopje valley is about 55.000.000 euros. From such changes, the net effect of reducing the load on EVN would be 70MW. The EVN distribution system has been built in the past 80 years for devices with high power and electricity consumption, and modern devices are far more energy efficient so it can withstand the installation of inverter air conditioners in individual homes.

As for the central heating system, the consumption of the central heating system would increase by 400MW and its existing capacity would be fully filled, which means that the number of users would almost double, and thus the cost of the service would be reduced for 15% (because BEG fixed costs are 30% of the bill).

Stojovski also referred to the way the project was financed. He stressed that BEG is responsible for investments in the main lines, while the investments in connections, heating stations and internal installation are the responsibility of the users. BEG also developed a Business Plan for the realization of the program for installation and maintenance of inverters. It is necessary for the households to get a ban on the use of wood and in return they would receive 2 inverter air conditioners for each stove, with a total cost of 600 euros and the possibility of instalment-payments for 10 years.

The program would be implemented by the company BEG clean air solution. BEG would provide commercial credit for mass procurement of inverter air conditioners from commercial banks, they would be procured directly from manufacturers, and the Republic of Macedonia, which is the final beneficiary of the benefits of this primarily environmental, not economic project, should provide a guarantee to the creditor to repay loans, and the state should subsidize only disadvantaged users. The total investment for obtaining clean air in the Skopje valley through the ecological heating structure which costs 110.000.000 euros would be paid in the first year, only on the basis of the damages from the air pollution recorded in the reports of the World Bank and WHO and shown in the previous part of the presentation amounting to 113 million euros / 2 billion euros.

Regarding the sources of financing, based on data from the media and the SSO, Stojovski pointed out that a large number of non-essential costs that are made annually in Macedonia (for example, in 2019, 70 million euros were spent on mobile phones - only devices, and about € 300 million per bill; about € 180 million per year is spent on cigarettes; around € 300 million per year on oil and petrol). Focusing on social cases and vulnerable categories, according to him, is a dilution of the whole discussion, because according to official data from 2016 in Macedonia there were 30.000 households that qualify as social cases, which in times of the Covid crisis may have doubled. But, according to him, the data show that in general the population in Macedonia spends a lot of money on non-essential things, something that must change, i.e. the population must cut non-essential costs and invest in a healthy environment.

In the end, Stojovski stressed that in order to be able to implement the project, appropriate legislation is needed. It is necessary to adopt a Law on Heat Supply and Zoning of the City of Skopje to define a single type of heating within the defined zones (based on the results of advanced analyses of relevant institutions such as the Faculty of Mechanical Engineering in Skopje, MANU, which refer to which zone what type of heating should be used not only in Skopje, but in all of Macedonia). This practice has been established for a long time by many countries such as Denmark, Germany, Russia, Lithuania, Austria, Poland, Romania and others. It is only necessary to ban the use of wood for heating, to install inverter air conditioners which does not require a long period of time (according to their business plan 140.000 inverter air conditioners can be installed in 2-3 years depending on the teams). According to previous presentations, if wood is not banned, the population will continue to use it for heating because they believe it is not harmful, regardless of the fact that all statistics show that firewood is the main source of air pollution in the City of Skopje.

DISCUSSION

The discussion was led by the co-chair of the session Stanojevska Pecurovska. Issues related to the users who were disconnected from the central heating system were discussed, which contributed to the increase of pollution. There was discussion about the compatibility of measuring stations with web applications, regarding the gasification of individual households, regarding the proposed measures and their presentation before local and national authorities and what is their cooperation with them.

The answers emphasized that those who withdraw from the network do not participate in the air pollution, but it is necessary to reconnect them in the central heating system in order to release the capacity for electricity that can be used to install inverter air conditioners in individual homes.

The Ministry is not responsible for the quality of the sensors installed by NGOs, and various initiatives. The network of the Ministry is in accordance with the regulations. The measuring stations of the Ministry cost around 150.000 euros and are according to all standards.

The hourly concentration is one, and the 24-hour mean is compared to the limit values. There is no specific information regarding the gasification.

Nikola Jovanovski from the City of Skopje, Department of Environmental Protection provided information on the activities of the City of Skopje to reduce air pollution. The biggest problem with pollution is the emission of solid particles during the heating season. The analysis showed that the biggest problem is caused by heating private homes with biomass. The industry is controlled, but not enough. However, there is a lack of laws and bylaws that regulate the control of households: the method of heating, what energy they use, what are their types of stoves, etc. Since 2016, the City of Skopje has started with subsidies to the citizens for the purchase of pellet stoves, which, unlike the old heating systems, are much more efficient and more environmentally friendly. The pellets are made of wood, which is a renewable energy, although on our market there are pellets that are made of other materials, and their quality during import is not controlled, as indicated by the complaints of some citizens about the quality of the pellets.

The City of Skopje together with the twin city of Nirenberg received a grant from the project "Clean stoves for clean air in the City of Skopje" which was aimed at controlling households through the chimney sweep service as is the case in Germany. On the other hand, this project should result in bylaws in the future that will introduce standardization of the quality of solid heating material used by households, because there are standards only for liquid fuels. In the Official Gazette no. 28 are published certain standards for solid types of fuels for use, which are of safety character and are an addition to the standardization of wood for making pellets. So, the standards for the quality of solid heating material are expanded. Within the activities carried out by the city together with GTZ, they have hired the German expert Gerald Schnabel who helps them in the implementation of the project and will be present in the city of Skopje full time, to share his experience in dealing with the pollution of air as a consequence of private fireplaces. Chimney sweeps should be controllers and not inspection, controllers who would control how households are using firewood, by way of heating their homes, i.e. quality control of the wood, control of the pellets, control of the quality standards of stoves - whether they are correct or not.

Conversely, they would also be educators on how to properly use these stoves and educate citizens on how to heat their homes without emitting pollutants into the air.

Aleksandra Dimova Manchevska presented some new facts regarding the research that was presented above. 164 households responded to the first call; 60 households were selected in which energy control was performed. Energy control recommends which measures should be implemented in individual households. Within the call, they had determined a criterion depending on the personal income of the households, what will be the UNDP grant and what should be the co-financing by the households. For the most socially vulnerable households, the entire investment cost is covered by UNDP. That cost can be up to $10.000 per building according to the most priority measures of energy control (replacement of the heating body, insulation of the building, and roof, doors and windows replacement, etc.). Other households according to their personal income can participate in the co-financing with 30%, 50% or 70% of the investment. At the moment, they are in the phase of negotiations with the households, which from the proposed measures will be accepted for co-financing because the decision has to be made jointly. Once the decision is made on which measures will be financed, it will be possible to assess how much the energy potential of households has increased. Within the project, it was planned to make calculations for the emissions at the end to see if they have been reduced in the settlement of Lisice. Additional control is done by setting up three control stations that are placed and connected to the measuring station of the MoEPP and have five indoor devices that are given to households to measure the air quality in households before the interventional measures are made and after the measures for increasing the energy efficiency and the replacement of the heating body are applied.

Dalibor Stojevski also joined the discussion on gasification. He presented data on the number of users of the gas pipeline system in Skopje in 2010 there were 36, and in 2019 there were 57 users (in 25 years). In Kumanovo in 2015 there were 37 users, and in 2019 there were 86 users. Strumica gas in 2015 had 202 users in 2019 there were 294 users. According to him, the statistics show that soft measures do not achieve results for the replacement of wood as a heating material.

Sanja Zografska, Consul in Melbourne, Australia, shared her experience from her stay in there, and also asked questions related to pollution in the summer months. She asked questions regarding the UNDP Survey on the Skopje Heat Project and the Energy Efficiency Calculator and regarding the representativeness of the survey sample.

Dedinec joined the discussion and pointed out that PM particles change drastically in the summer versus the winter period. Through their work it became obvious that citizens in general do not know how to choose an efficient means of heating, hence they came up with the idea of making a calculator in which certain parameters for the household will be entered and the calculator calculates which is the most favourable way to heat the household. It also recommends available technologies in Macedonia that can be used to heat households at the lowest cost. The calculator calculates whether and how much the emission of harmful particles will be reduced.

As for the sample of the survey, according to Dedinec it is representative and was made in cooperation with the company that conducted the field survey, and a statistical distribution of the sample . was made for Skopje's municipalities and covered different parts of Skopje and this sample is representative of the city of Skopje and based on these results, policies can be created Dedinec clarified that there were 164 applicants in the first call, and the sample of the research is 300 households. He agrees that a communication strategy is needed. MANU in cooperation with other companies from Macedonia and England is working on updating the energy strategy and the development of a program for the implementation of the energy strategy. As part of that project there is also a development of a communication strategy because they realized that communicating results in a simpler manner, with different categories of citizens, is more than necessary in order to raise public awareness.

In terms of gasification, we are 30 years late. Europe is already giving up on gas. It is made for a different time. Regarding the web application for measuring pollution, he pointed out that the measurement of data is being manipulated. He also reiterated the position of changing energy inefficient devices with energy efficient devices as a systemic way of solving the existing problem.

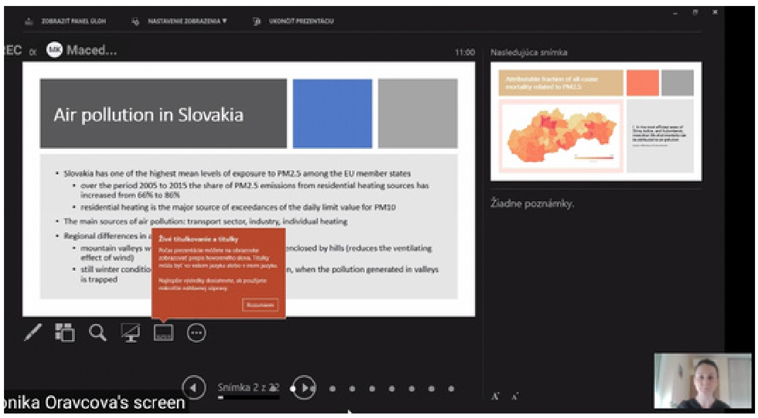
Spasko Todorov, President of Ekovita, also joined the discussion. He fully agrees that households are the main source of pollution. One problem, which is specific to Negotino, is the brewing of brandy, and this activity is carried out throughout the year. They are especially concerned about the planned gas plant, which would burn waste that would pollute the air. Unclassified waste, with technology where plastic will be burned at high temperatures.

He asked the MoEPP how they will give permission for the construction of gas power plants for waste incineration, expressing his position not to allow waste incineration (especially imported waste), but also pointed to a non-transparent procedure of the municipality and lack of cooperation with civil society, when it comes to issues of pollution and measures for protecting the environment. He stressed the need for primary waste selection to prevent the burning of plastic air pollution. He pointed out the Krivolak training ground as a potential source of pollution, where military exercise activities are expected to only increase in the future.

Darko Blinkov - former state inspector of environment, and now head of the department for support, analysis and international cooperation - also joined the discussion. He pointed out that the attitude towards waste incineration is unnecessarily weaponised in Macedonia. Burning certain fractions of municipal waste has proven to be a good practice and is allowed in some industries such as the cement industry. However, due to a bad situation in the field of environment, we have problems with how to portrayed it the public. This is exactly what the last two negative reports of the European Commission (July 2019 and October 2020) showed, which indicates that our institutions as participants in the process face a difficult and extensive process. It is the most expensive and extensive chapter. Blinkov noted that good practices depend primarily on the full implementation of the regulatory cycle. Different ideas, projects, etc. are discussed, but all this is possible if the system is functional. And it is shown, through the experiences of various institutions and reports from many projects and researches that the system is not functional. That means we need a better system. The Ministry was decentralized 15 years ago, with the Law on Environment from 2005. Considerable number of competencies related to environmental protection were transferred to the municipalities, including part of the competence of The Environmental Inspectorate. Papacy has been made regarding the administrative acts with the so-called environmental permits A, B, etc., and there is going to be a change that must take place in parallel with the reform of the inspection system and the reform of the regulation, because they cannot be realized without one another. In his opinion, the most efficient way is a centralized environmental inspection system, i.e. at the local level only the communal inspectors, tax inspectors and those for sports and tourism, because in the past 15 years the biggest problem is in the urban construction sphere and in the sphere of environment. Blinkov pointed out that in the previous week, in accordance with the Law on Product Safety, certain standards were adopted, and in article 49 an unintentional mistake was made in the Macedonian transcription instead of pellets, he writes pallets and refers to pellets. The Accreditation Institute made the error and was discussed with the relevant institutions to correct it. However, in conversation with colleagues from the State Market Inspectorate that control the quality of liquid fuels and in this part of the standards according to the Law on Product Safety, it was concluded that the standard is purchased, attached, and unfortunately in Macedonia there is no rulebook on solid energy, nor who should to perform quality control for example of coal, wood moisture, quality control of pellets, etc., all of this represents another challenge that is facing the country.

Blinkov stressed that entry into private property (households and apartments) is impossible, i.e. no inspectorate, either central or local can enter private property without an appropriate court order. If you have certain indication about undergoing illicit actions, then an order can be requested.

However, the inspector bears a responsibility if no it is concluded that no illicit activities were carried out and can he can be subject to further lawsuits by the owner of the property for causing shame, public damage and others. According to him, the pellets are far from being an alternative ecological energy source, and therefore they should not be subsidised.



The only relevant measuring stations are those of the MoEPP. Bilkov agrees that there is data manipulation from measuring stations. He supports the project and is open for cooperation. His department has an open front desk tool together with Inolab, working within the City of Skopje and experience has shown that 99.9% of the complaints are concerning local problems. Thus, the MoEPP, the Inspection Council, as a coordinator of the inspection services, and the municipalities united under ZELS, should make an effort in the complete reorganization. While municipalities were given decentralization, the political backgrounds also changed, and so did the competent services. Most municipalities have authorized communal inspectors who have not once entered the public utility companies to perform supervision. Only 40% of the municipalities have appointed inspectors, of which 20% are for transport, utilities, housing.

It is important to note that the working of the Environmental Inspectorate is based on 25 laws and 250 bylaws. Bilkov mentioned a case where a small municipality turned to them to appoint an environmental inspector. This shows the basic lack of knowledge regarding their own competencies in the field of environmental protection. It also indicates a lack of communication, despite the numerous strategies developed in this field. Probably a project should be made for all these strategies and projects developed within the MoEPP, which have been implemented in action at the central and local level, which he believes it would show disappointing statistics. Until the regulatory system is changed, things cannot be changed for the better. This topic can be a subject to discussion to no end, but there will not be any serious effects. Otherwise, the fight, as the previous speakers pointed out, is long-lasting and the citizens should be explained that everyone participates in the regulatory cycle. It is impossible to achieve visible results overnight, i.e. in a very short period of time, visible results require a longer time by investing all stakeholders.

Veronika Oravtsova addressed 2 problems. The first problem is related to gasification. She noted that Slovakia has a dense natural gas infrastructure with a total length of 2800 km. The use of gas was an effective tool in the 1990s, when it reduced emissions in a short period of time, but today even gas companies do not count on the use of natural gas in the long run in the future. They are considering two options for their future production of biogas or the use of hydrogen which is far from practical. Biogas seems to be a better option for Slovakia as it has a great potential in waste production 460 million m3 in one year, which is a huge amount of waste and can be procured very efficiently.

The second problem is public awareness and counselling. In Slovakia, the Slovak Innovation Agency has proven to be very effective in transforming itself into a consulting body. Any homeowner, individual, or legal entity, such as a school or hospital principal, can get consultations about energy efficiency measures, free of charge. They also provide a project for the best solutions for renewable energy and energy efficiency measures. The situation with the energy efficiency measures in the public service was very bad, but after the Agency started working with the municipalities, schools, hospitals, the situation improved more than expected (90%), which proved to be the best way to work.

Joining the discussion, **Konstantin Minoski** pointed out that insisting on strict - hard measures is the wrong approach in solving the problem of air pollution. Furthermore, he believes that there is great confusion about the solutions: gasification is not a solution, pellets are not a solution, and even invert air conditioners are not an appropriate solution (according to a statement by the Minister of MoEPP) because they also work on electricity. We are in a paradoxical situation today because consuming electricity is a luxury. We do not have a gasification network because the entire development of Macedonia since the time of the former Yugoslavia is based on electricity. When it comes to the problems of the city of Skopje, its "urbanization" is neglected. According to the design of the city after the earthquake, Skopje should have between 250.000-300.000 inhabitants. That is the capacity of the city. Skopje today has just over 500.000 inhabitants with a large daily inflow. We still have plans for intensive construction in the city, which would further prevent even the slightest movement of air. Or as some experts on the problem say, the wind rose has changed considerably as a result of intensive construction.

Furthermore, statistics are used to relativize the problem. If people did not smoke, they would save, if brandy was not made, the air would be clean. What is missing is an alternative that would attract people to change the way they heat their households. Buildings of public institutions are a separate category.

The poverty rate is far higher than what is presented in the present exposures (officially about 30% of the population belongs to the category of poverty, and unofficially this percentage is higher). Investments in energy efficiency (inverter air conditioners, heat pumps, insulation, roof change, window and door replacement) are actually far greater than assumed in previous presentations. There is no alternative to using energy that would attract people to accept it as a system. Electricity was accepted at one time because it was a sign of development to be achieved. In fact, the world today needs cheap electricity, not a reduction in consumption or deprivation of its use. You need to be careful with the statistics as it can be used to relativize the problem.

There is a problem with detecting the problem of pollution, but even more with finding solutions. Minoski also emphasized that the communication between the institutions and the non-governmental organizations dealing with this issue and the citizens is very small or non-existent. The comparison between Skopje and Melbourne is inappropriate. Our problems are far bigger and more difficult to solve because the whole development which is mainly based on the use of electricity which suddenly becomes too expensive and now, we have to give up using electricity.

We need to be more realistic, we need to ground this whole issue, which is one of the most expensive in the European integration process, to a real level, to those measures that can be achieved in a longer period of time. Communication with citizens should be more understandable, more accessible, and their real possibilities should be taken into account.

The discussion continued with Dedinec and Stojevski, returning to the already presented data and arguments for the proposed measures.

The co-chair of the Working Group 5 of NCEU-MK, **Bojana Stanojevska Pecurkovska,** also joined the discussion, presenting and explaining the recommendations of WG5. Based on the presentations and proposed recommendations of the experts, the discussions and interventions of the members of WG5, the session adopted the following:

Proposed Recommendations

1. Improving and enhancing the air quality monitoring system through:
- Although the state network for monitoring the quality of air is

sufficiently developed and in accordance with the European legislation, there is a need to cover more urban centers in the country

- Ensuring the measurement of all pollutants at measuring points where necessary in accordance with the assessment of air quality (including nitrogen oxides, sulphur oxides, ozone, dioxins and furans);
- To adequately and timely inform the citizens about the pollutants in the air, as well as about the measures taken to reduce them. (At the moment it is reported, but it is necessary to improve the communication in order to provide timely information to all citizens)
- Regular alerts for the health consequences of inhalation of pollutants, as well as for measures to protect human health. (At the moment it is reported, but it is necessary to improve the communication in order to provide timely information to all citizens)

2. Strengthening the capacities for implementation of the defined measures for reduction of the air pollution

3. Local authorities to show greater initiative in implementing the defined measures to reduce air pollution because they are currently insufficient;

4. Introduction of a legal ban on coal burning for households with delayed application for a period of up to two years.

5. Initiation of programs for planned and systematic elimination of coal and wood as energy sources in urban areas by subsidizing the replacement of the heating method;

6. Creating clear standards and certificates for the quality of resources used for household heating:

- Regulation on the quality of pellets and firewood
- Regulation for inspection of household fireplaces depending on the type of fuel

7. Initiating the creation of the necessary Plan for the manner of heating by zones in the City of Skopje;

8. Adopting rulebooks that will determine the heating standards that new facilities must meet before obtaining a building permit;

9. It is necessary to adopt a definition of energy poverty and to design special programs to support energy poor households;

10. Simplification of procedures and support for households interested in

installing photovoltaic panels on the roofs and yards of their homes and considering the possibilities for establishing energy cooperatives;

11. Establishment of an Environmental Fund through which the plans and programs for dealing with air pollution will be implemented;

12. Activation of the Energy Efficiency Fund.

13. Strengthening the intersectoral cooperation between the relevant institutions and restarting the work of the Intersectoral working group for dealing with air pollution with greater competencies and functional mechanisms for implementation of the adopted measures;

14. Increase the capacity for inspection