SHORT-TERM ACTION PLAN FOR PROTECTION OF THE AMBIENT AIR IN THE CITY OF SKOPJE AND MUNICIPALITIES IN THE CITY OF SKOPJE

8.12.2016

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1. INTRODUCTION

This short-term action plan for ambient air quality for the City of Skopje is prepared in accordance with article 27-a of the Law on ambient air quality (Official Gazette of RM No. 67/04, 92/07, 35/10, 47/11, 59/12, 100/12, 163/13, 10/15, 146/15). According to article 27-a the short-term action plan has to be prepared, if the monitoring or other data show that there is a risk of exceedance of air quality alert thresholds by one or more pollutants. The aim of the short-term action plan is to reduce the risk and the duration of exceedances.

Short-term action plan is prepared by the Mayor of the City of Skopje in cooperation with the administrative body responsible for the affairs of the environment and the administrative body responsible for the affairs of the health.

In the decree on limit values of the levels and types of pollutants in ambient air and alert thresholds, the alert thresholds are defined for sulfur dioxide (SO_2), nitrogen dioxide (NO_2), ozone (O_3) and particulate matter (PM_{10}).

With this short term action plan the City of Skopje in alert situations undertakes short-term measures aimed at reducing and eliminating the risk for exposure to harmful air pollutants and restricting the duration of such conditions, investigation and identification of causes and informing and warning the population of the possible health effects caused by air pollutants.

This short-term action plan is made according to the Rulebook on the detailed content and the methods of preparing the short-term action plans for protection of the ambient air (Official Gazette of Republic of Macedonia, No.148 from 10.10.2014). The rulebook describes the necessary content of the short-term action plan.

This short term action plan is based on the Air quality improvement plan made for the City of Skopje in 2016. The air quality monitoring data used in the improvement plan and in this action plan covers the period 2010-2015.

2. KEY FEATURES OF THE CITY OF SKOPJE

City of Skopje is the capital of the country and with significant business and industrial activities. The total population of the area is approximately 580 000 according to the last official census in 2002, while according to the assessment by State statistical office in June 2015 the total population is 619 279 (Table 1).Total number of dwellings in the area is approximately 165 000 (according to the 2002 statistics).The Skopje region is divided to 17 municipalities.

Table 1.The municipalities and their population in the City of Skopje data from 2002 census).

Municipality	Population (2002)	Number of households (2002)	Population (assessment 2015)
City of Skopje	506 926	146 566	544 086*
Suto Orizari	22 017	5 102	---------
Saraj	35 408	7 972	40 587
Butel	36 154	10 056	---------
Gjorce Petrov	41 634	11 886	42 379
Centar	45 412	15 355	---------
Kisela Voda	57 236	17 577	---------
Karpos	59 666	19 680	60 625
Chair	64 773	17 107	---------
Aerodrom	72 009	21 495	---------
Gazi Baba	72 617	20 336	76 636
Other municipalities			
Aracinovo	11 597	2 267	13 505
Cucer-Sandevo	8 493	3 925	9 891
Ilinden	15 894	4 298	16 836
Petrovec	8 255	2 087	9 018
Sopiste	5 656	1 510	---------
Studenicani	17 246	3 570	21 200
Zelenikovo	4 077	1 014	4 743
Total	578 144	165 237	619 279

* Data for the municipalities Aerodrom, Butel, Kisela Voda, Centar, Cair, Suto Orizari and Sopiste are included in City of Skopje

Total area of Skopje is 572 km^2 and 337 km^2 of this is urbanized area. Skopje agglomeration is located approximately 245 m above sea level in the center of the Balkan Peninsula. The City of Skopje is built in the Skopje valley, oriented on a west-east axis, along the course of the Vardar river. The valley is approximately 20 km wide and it is surrounded by several mountain ranges to the North and South. These ranges limit the urban expansion of Skopje, which spreads along the Vardar and the Serava, a small river which comes from the North.

The Skopje valley is bordered on the west by the Sar Mountains, on the south by the Jakupica range, on the east by the hills belonging to the Osogovo range, and on the north by the Skopska Crna Gora mountain. Mount Vodno, the highest point inside the city limits, is 1 066 m high and is part of the Jakupica range.

Although Skopje is built on the foot of Mount Vodno, the urban area is mostly flat. It comprises several minor hills, generally covered with woods and parks, such as Gazi Baba hill (325 m), Zajčev Rid (327 m), the foothills of Mount Vodno (the smallest are between 350 and 400 m high).

The Skopje city industry is dominated by production of food and beverages (bread, baked products, meat), textile industry, printing and metal processing. Most of the industrial areas are located in Gazi Baba municipality, on the major routes and rail lines to Belgrade and Thessaloniki. Notably, the Arcelor Mittal and Makstil steel plants are located there, and also the Skopje Brewery. Other industrial zones are located between Aerodrom and Kisela Voda, along the railway to Greece. These zones comprise Alkaloid Skopje (pharmaceuticals), Rade Koncar (electrical supplies), Imperial Tobacco and Ohis (fertilizers). Two special economic zones also exist, around the airport and the Okta refinery.

3. METEOROLOGICAL AND CLIMATE CONDITIONS

Climate of Skopje is usually classified as continental sub-Mediterranean or even hot continental climate, with a mean annual temperature of 13.5 °C. The summers are long, hot and humid, while the winters are short, relatively cold, and wet. Snowfalls are common in the winter period, but heavy snow accumulation is rare and the snow cover lasts only for a few days.

In summer, temperatures are usually above 30 °C and sometimes above 40 °C. The hottest months are July and August with average temperature over 20 degrees of Celsius. In spring and autumn, the temperatures range from 15 to 24 °C. In winter, the day temperatures are approximately 6 °C, but at nights they often fall below 0 °C and sometimes below −10 °C. The coldest months are December and January, when averaged temperature is only few degrees above zero.

Precipitation is relatively low (388 mm/year in 2012-2015) due to the rain shadow of the mountains to the northwest, being only a quarter of what is received on the Adriatic Sea coast at the same latitude. Occurrences of precipitation are evenly distributed throughout the year, being heaviest from October to December and from April to June. Driest months are August and July. Total duration of sunshine in The Skopje valley is about 2 100 h/year. According to the meteorological observations the most frequent wind directions are west and northwest.

4. AIR QUALITY MONITORING IN THE SKOPJE REGION

In the City of Skopje there are five air quality monitoring stations and two in the surrounding region in the municipality of Ilinden (Miladinovci and Mrsevci) (Table 2).

Table 2. Air quality monitoring stations in the Skopje region.

Station	O_3	NO_2	SO_2	CO	PM_{10}	$PM_{2.5}$	BTX
Karpos	✓	✓	✓	✓	✓	✓	✓
Centar	✓	✓	✓	✓	✓	✓	✓
Licise	✓	✓	✓	✓	✓		
Rektorat	✓	✓		✓	✓		✓
Gazi Baba		✓	✓	✓	✓		
Miladinovci	✓	✓	✓	✓	✓		✓
Mrsevci		✓	✓	✓	✓		

5. ALERT AND INFORMATION THRESHOLDS FOR POLLUTANTS

Alert and information thresholds for sulfur dioxide (SO_2), nitrogen dioxide (NO_2) and ozone (O_3) are defined in the Decree on limit values of the levels and types of pollutants in ambient air and alert thresholds. For particulate matter (PM_{10}) there are no information or alert thresholds at the moment, but a draft proposal exists (Table 3).

Table 3. Alert and information thresholds for different pollutants.

Pollutant	**Averaging period**	**Period**	**Alert threshold**	**Information threshold**
Sulfur dioxide (SO_2)	1 hour	3 consecutive hours	500 µg/m^3	
Nitrogen dioxide (NO_2)	1 hour	3 consecutive hours	400 µg/m^3	
Ozone (O_3)	1 hour	1 hour		180 µg/m^3
		3 consecutive hours	240 µg/m^3	
Particulate matter (PM_{10})	24 hours	2 consecutive days	200 µg/m^3 with margin of tolerance of 50 µg/m^3 (25%) from the day of enforcement, with equal annual percentage reduction each 12 months to reach 0 % by 1 January 2022 (*)	150 µg/m^3 (*)

(*) = draft proposal at the moment

The alert threshold for SO_2 and NO_2 is exceeded if the concentration is over the threshold for three consecutive hours at locations representative of air quality over at least 100 km^2 or on an entire zone or agglomeration whichever is smaller.

For O_3 the exceedance of the threshold is to be measured or predicted for three consecutive hours.

For PM_{10} the thresholds are exceeded if:

- Concentration of PM_{10} (24 h average) is over the threshold for two consecutive days and episode is expected to continue and a forecast for stable weather conditions is received for the following period
- Concentration of PM_{10} (24 h average) is over the threshold at two or more stations at the same time (i.e. at more than half of the monitoring stations, if there are more than one monitoring station in the region).

According to the Rulebook on the detailed content and the methods of preparing the short-term action plans for protection of the ambient air risk of alert threshold exceedances exists if:

- Measured concentrations of separate polluting substance is greater than 80% of alarm threshold value and;
- In the zones and agglomerations there is high density of traffic and large stationary sources, especially in the winter period with specific meteorological conditions.

However risk of alarm thresholds exceedances does not exist if:

- None of the values of measured concentrations of separate polluting substances for a period of at least five years does not exceed 80% of alarm threshold value, and;
- None of the values of measured concentrations of separate polluting substances is not greater than 65% of alarm threshold value, if there is available data for shorter period of time (from 1 to 4 years).

Risk of alarm thresholds exceedances in area larger than 100 km^2 does not exist if measured concentrations of separate polluting substance exceed 80% of alarm threshold value in single measuring point.

For ozone it has to be taken into account that there may be only limited potential at the local level to decrease the ozone concentrations because ozone is formed in the atmosphere by chemical reactions activated by sun light, and there are no direct emissions into the air.

6. EXCEEDANCES OF THRESHOLDS IN THE CITY OF SKOPJE

Air quality in the Skopje region is described in more detail in the Air quality improvement plan prepared in 2016. The conclusions presented here concerning the possible exceedances of the thresholds for the period 2010-2015 are based on that plan. When preparing the Air quality improvement plan it has been noticed that some of the data used in the air quality assessment may not be fully reliable, but in spite of that the main conclusions concerning the local air quality are relevant.

In the period 2010-2015 the alert thresholds for SO_2 and NO_2 have not been officially exceeded. However based on the 80% rule there is a risk that the alert threshold of NO_2 can be exceeded.

Concentrations of SO_2 have been so low that there have been no exceedances of alert threshold or risk of it.

Ozone concentrations have not exceeded the information or alert thresholds during the period 2010-2015. Based on the 80% rule, however there is a risk that both the alert and information thresholds of ozone would be exceeded.

The proposed information threshold for PM_{10} has been exceeded in Skopje 6-10 times during 2011-2015 and the proposed alert threshold has been exceeded 1-3 times during the same period.

Table 4. Summary of the exceedances of NO_2, SO_2, O_3 and PM_{10}.

Pollutant	**Alert threshold**	**Information threshold**
NO_2		
SO_2		
O_3		
PM_{10}		

no exceedance or risk of exceedance	
exceedance	
risk of exceedance	
not defined	

Assessment of risk of exceedance is based on the highest 1 hour values (for NO_2, O_3 and SO_2) measured instead of the consecutive 3 hours.

When assessing the possible risk for exceedance of alert or information thresholds it has not been taken into account in detail, how large the area of exceedance may be. This is because of the restrictions of the available data.

There is a risk that the alert threshold of NO_2 may be exceeded in a very wide area of Skopje city and even outside the city area.

For ozone there is a risk that even the alert threshold could be exceeded in the central parts of the City of Skopje and the information threshold almost everywhere in the Skopje region.

The PM_{10} and $PM_{2.5}$ concentrations exceed the proposed thresholds in all the region and the exceedances are very high.

7. IMPACT OF DIFFERENT EMISSION SOURCES AND CONDITIONS AND REASONS OF EXCEEDANCES OF THRESHOLDS

High concentrations of PM_{10} and $PM_{2.5}$ are caused by several emission sources, but the main ones are domestic heating (small-scale wood combustion) and traffic. Also secondary PM, formed from primary pollutants SO_2, NO_x, VOC and NH_3, may affect the concentrations.

NO_2 concentrations are mainly affected by traffic. Ozone is formed in the atmosphere by chemical reactions between nitrogen oxides and volatile organic compounds catalyzed by sunlight.

Atmospheric conditions and local topography usually have strong impact when the concentrations get high. Almost with no exception the highest PM_{10} and $PM_{2.5}$ concentrations occur in the cold and dry winter months from October to March. Only the ozone concentrations are higher during the summer months.

Occurrence of winter episodes with extremely high concentration episodes of PM_{10} and $PM_{2.5}$ is related to:

- Multi-day stable atmospheric conditions, where the emitted substances are accumulated into the valleys;
- Reduced circulation in the atmosphere, due to a prolonged period with no wind and occurrence of temperature inversion;
- Local sources of emission (traffic, households heating and industrial capacities).

Impact of different emission sources and local conditions and reasons are analyzed and described more thoroughly in the Air quality improvement plan for Skopje agglomeration made in 2016.

8. MEASURES AND RECOMMENDATIONS FOR REDUCING OF THE DURATION OF ALARM AND INFORMATION THRESHOLD EXCEEDANCES

8.1. General

Measures and recommendations presented later in this chapter focus on PM_{10}, O_3 and NO_2. However it must be noticed that especially during the most severe episodes it is likely that concentrations of all pollutants will increase. So the measures included in this short-term action plan are relevant also for most other pollutants.

When considering the health effects caused by high concentrations of air pollutants, $PM_{2.5}$ is considered to be one of the most important pollutant. The air quality assessment of the City of Skopje shows that the concentrations of $PM_{2.5}$ very closely follow the concentrations of PM_{10}. So the measures determined for PM_{10} are valid for $PM_{2.5}$ also.

Measures described here concern the whole territory of the City of Skopje, unless it is possible to limit the measures to some sub-regions. If the measures are not put into practice in the whole region, it must be explained in detail, why they cover only the regions mentioned.

The purpose of these measures is to decrease emissions during the air quality episodes and to prevent the situation to get worse.

In many cases during the episodes the concentrations gradually increase finally exceeding the alarm threshold. This is usually a result of the prevailing climate and geological conditions. In these cases it may take long time (several days), before the measures affect the air quality situation.

The measures must be put into practice very rapidly after the information or alarm threshold has officially been exceeded. After the exceedance the implementation of the measures can take only a day at most.

8.2. Information measures

8.2.1 Information to be provided to the population in case of exceedance of the information threshold for PM_{10}

Subjects involved: Ministry of Environment and Physical Planning (Air quality monitoring unit), Hydrometeorological Service, Institute of Public Health, Nature and Environment Protection Department of City of Skopje, Mayor of the City of Skopje, municipalities in the City of Skopje

Area of interest: City of Skopje and the municipalities in the City of Skopje

Conditions for measure adoption: Exceedance of information threshold for PM_{10} (150 µg/m^3) for more than two days consecutively. The threshold is officially exceeded if in 3 out of 5 air quality stations located in City of Skopje the threshold is exceeded.

Aim of the measure: Inform the population of the ongoing potentially critical PM_{10} situation, providing good practices to avoid possible adverse health effects and keeping the information updated in case of continuation of the episode.

Procedure:

1. Air Quality Monitoring Unit of MEPP checks daily (from Monday to Friday) the PM_{10} concentrations in Skopje.
2. If the information threshold is exceeded for two days consecutively the Air Quality Monitoring Unit of MEPP request from the Hydrometeorological Service a weather forecast for the next two days including an assessment of the pollution dispersion capacity of the atmosphere.
3. If the assessment of the pollution dispersion capacity of the atmosphere is good, no information is provided and the procedure is over.
4. If the assessment of the pollution dispersion capacity of the atmosphere is poor, the Air Quality Monitoring Unit of MEPP:
   - Insert a standard warning phrase to the air quality portal (http://airquality.moepp.gov.mk/) informing of the air quality situation and recommending actions in order to avoid the possible adverse effects of PM10.
   - Deliver an official communication to the Nature and Environment Protection Department of City of Skopje, Mayor of the City of Skopje, municipalities in the City of Skopje and Institute of Public Health including:
     - Maximum concentration reached during previous two days;
     - Meteorological assessment that support the continuation of the adverse air quality condition.

5. Nature and Environment Protection Department of City of Skopje and the municipalities in the City of Skopje:
   - Spread the information to the citizens, by means of using the municipal website, inserting a standard warning phrase in the homepage recommending safety tips in order to avoid the possible adverse effects of PM10;
   - Provide the information to the interested local structures, in particular: kinder gardens, primary schools, citizens' associations etc.
6. Institute of Public Health:
   - Provides the information to the public health centers and health care institutions.
7. Every 2 days after the first communication, the Air Quality Monitoring Unit of MEPP carries out the activity of the point 2, and if the situation is still poor, also the activities under points 4 and 5 are carried out.
8. At the end of the event of the exceedance, the Air Quality Monitoring Unit of MEPP and the Nature and Environment Protection Department of City of Skopje and municipalities in the City of Skopje provide an update to the respective sites with a communication of the end of the acute episode.

If necessary during the episode, the City of Skopje and the municipalities in the City of Skopje can make initiatives to MEPP to arrange mutual meetings to discuss about the situation and the possible measures to decrease the pollutant concentrations rapidly.

The flow chart concerning this procedure is included in Annex I.

8.2.2 Information to be provided to the population in case of exceedance of the information threshold for O_3

Subjects involved: Ministry of Environment and Physical Planning (Air Quality Monitoring Unit), Hydrometeorological Service, Institute of Public Health, Nature and Environment Protection Department of City of Skopje, Mayor of the City of Skopje, municipalities in the City of Skopje

Area of interest: City of Skopje and the municipalities in the City of Skopje

Conditions for measure adoption: Exceedance of information threshold for O_3 (180 µg/m^3).

Aim of the measure: Inform the population of the ongoing potentially critical situation, providing good practices to avoid possible adverse health effects especially for the most sensitive part of the population and keep the information updated in case of continuation of the episode.

Procedure:

1. Air Quality Monitoring Unit of MEPP checks daily (from Monday to Friday) the O_3 hourly concentrations in Skopje.
2. If the information threshold is exceeded the Air Quality Monitoring Unit of MEPP
   - Insert a standard warning phrase in the air quality portal (http://airquality.moepp.gov.mk/) informing of the air quality situation and recommending actions in order to avoid the possible adverse effects of O_3.
   - Request from the Hydrometeorological Service a weather forecast for the next two days including an assessment if the meteorological conditions are favorable for formation of ozone.

3. If the assessment of the meteorological conditions is not favorable for the formation of ozone, no further information is provided and the procedure is over.
4. If the assessment of the meteorological conditions is favorable for the formation of ozone, the Air Quality Monitoring Unit of MEPP deliver an official communication to the Nature and Environment Protection Department of City of Skopje, Mayor of the City of Skopje, municipalities in the City of Skopje and Institute of Public Health including:
   - Maximum concentration recorded;
   - Meteorological assessment that support the continuation of the adverse air quality conditions.
5. Nature and Environment Protection Department of City of Skopje and the municipalities in the City of Skopje:
   - Spread the information to the citizens, by means of using the municipal website, inserting a standard warning phrase in the homepage recommending safety tips in order to avoid the possible adverse effects of O_3;
   - Provide the information to the interested local structures, in particular: kinder gardens, primary schools, citizens' associations etc.
6. Institute of Public Health:
   - Provides the information to public health centers and health care institutions.
7. Every day after the first communication the Air Quality Monitoring Unit of MEPP carries out the activity of the point 2, and if the situation is still poor, also the activities under points 4 and 5 are carried out.
8. At the end of the event of exceedance, the Air Quality Monitoring Unit of MEPP, Nature and Environment Protection Department of City of Skopje and municipalities in the City of Skopje provide an update to the respective sites with a communication of the end of the acute episode.

If necessary during the episode, the City of Skopje and the municipalities of Skopje can make initiatives to MEPP to arrange mutual meetings to discuss about the situation and the possible measures to decrease the pollutant concentrations rapidly.

The flow chart concerning this procedure is included in Annex III.

8.2.3 Information to be provided to the population in case of exceedance of the alert threshold for PM_{10}

Subjects involved: Ministry of Environment and Physical Planning (Air quality monitoring unit), Hydrometeorological Service, Institute of Public Health, Nature and Environment Protection Department of City of Skopje, Mayor of the City of Skopje, municipalities in the City of Skopje.

Area of interest: City of Skopje and municipalities in the City of Skopje.

Conditions for measure adoption: Exceedance of alert threshold for PM_{10} (200 µg/m^3) for more than two days consecutively. The threshold is officially exceeded if in 2 out of 5 air quality stations located in City of Skopje the threshold is exceeded.

Aim of the measure: Inform the population of the ongoing extremely critical PM_{10} situation, providing good practices to avoid possible adverse health effects and keep the information updated in case of continuation of the episode.

Procedure:

1. Air Quality Monitoring Unit of MEPP checks daily (from Monday to Friday) the PM_{10} daily concentrations in Skopje.
2. If the alert threshold is exceeded the Air Quality Monitoring Unit of MEPP:
   - Insert a standard warning phrase in the air quality portal (http://airquality.moepp.gov.mk/) informing of the air quality situation and recommending actions in order to avoid the possible adverse effects of PM_{10}.
   - Request from the Hydrometeorological Service a weather forecast for the next two days including an assessment of the pollution dispersion capacity of the atmosphere.
   - Deliver an official communication to the Nature and Environment Protection Department of City of Skopje, Mayor of the City of Skopje, municipalities in the City of Skopje and Institute of Public Health including:
     - Maximum concentration reached during previous two days;
     - Meteorological assessment that support the continuation of the adverse air quality conditions.
3. If the meteorological assessment of the pollution dispersion capacity of the atmosphere is poor the Mayor of City of Skopje and the municipalities in the City of Skopje call a press conference to inform the media about:
   - Concentrations of PM_{10} recorded by the stations located in Skopje;
   - Forecasted duration of the episode;
   - Basic practices to be adopted by the population to reduce the harmful effects of particulate matter.
4. Nature and Environment Protection Department of City of Skopje and the municipalities in the City of Skopje:
   - Spread the information to the citizens, by means of using the municipal website, inserting a alert bulletin in the homepage recommending safety tips in order to reduce adverse effects of PM_{10};
   - Provide the information to the interested local structures, in particular: kinder gardens, primary schools, citizens' associations etc. recommending to avoid outdoor activities.
5. Institute of Public Health
   - Provides the information to public health centers and health care institutions
6. Every day after the first communication, the Air Quality Monitoring Unit of MEPP carries out the activity at the point 2, and if the situation is still poor, also the activities under points 2, 3 and 4 are carried out.
7. At the end of the event of exceedance, the Air Quality Monitoring Unit of MEPP and Nature and Environment Protection Department of City of Skopje and the municipalities in the City of Skopje provide an update to the respective sites with a communication of the end of the acute episode.

If necessary during the episode, the City of Skopje and the municipalities of Skopje can make initiatives to MEPP to arrange mutual meetings to discuss about the situation and the possible measures to decrease the pollutant concentrations rapidly.

The flow chart concerning this procedure is included in Annex II.

8.2.4 Information to be provided to the population in case of exceedance of the alert threshold for O_3 and NO_2

Subjects involved: Ministry of Environment and Physical Planning (Air Quality Monitoring Unit), Hydrometeorological Service, Institute of Public Health, Nature and Environment Protection Department of City of Skopje, Mayor of the City of Skopje, municipalities in the City of Skopje

Area of interest: City of Skopje, municipalities in the City of Skopje

Conditions for measure adoption: exceedance of hourly alert threshold for O_3 (240 µg/m^3) or NO_2 (500 µg/m^3).

Aim of the measure: inform the population about the extremely critical situation ongoing, providing some good practices to avoid possible adverse health effects and keeping the information updated in case of prosecution of the episode.

Procedure:

1. Air Quality Monitoring Unit of MEPP checks daily (from Monday to Friday) the hourly concentrations of NO_2 and O_3 in Skopje.
2. If the alert threshold is exceeded the Air quality Monitoring Unit of MEPP:
   - Insert a standard warning phrase in the air quality portal (http://airquality.moepp.gov.mk/) informing of the air quality situation and recommending actions in order to avoid the possible adverse effects of O_3 or NO_2;
   - Request from the Hydrometeorological Service a weather forecast for the next two days including a synthetic judgment to assess if the meteorological conditions are favorable for formation of pollution.
   - Deliver an official communication to the Nature and Environment Protection Department of City of Skopje, to Mayor of the City of Skopje, to municipalities in the City of Skopje and to Institute of Public Health including:
     - Maximum concentration reached during the previous two days;
     - Meteorological synthetic judgment that ratify the continuation of the adverse air quality conditions.
3. If the meteorological synthetic judgment is unfavorable Mayor of City of Skopje and the municipalities in the City of Skopje call a press conference to inform the media about:
   - Concentrations of O_3 or NO_2 recorded by the stations located in Skopje;
   - Forecasted duration of the episode;
   - Basic practices to be adopted by the population to reduce the harmful effect of particulate matter.
4. Nature and Environment Protection Department of City of Skopje and the municipalities in the City of Skopje:
   - Spread the information to the citizens, by means of using the municipal website, inserting a alert bulletin in the homepage recommending safety tips in order to reduce adverse effects of the pollutants;
   - Provide the information to the interested local structures, in particular: kinder gardens, primary schools, citizens' associations etc. recommending to avoid outdoor activities.

5. Institute of Public Health:
   - Provides the information to the public health centers and health care institutions.
6. Every day after the first communication the Air Quality Monitoring Unit of MEPP carries out the activity at the point 2, and if the situation is still poor, also the activities under points 2, 3 and 4 are carried out.
7. At the end of the event of exceedance, the Air Quality Monitoring Unit of MEPP and the Nature and Environment Protection Department of City of Skopje and the municipalities in the City of Skopje provide an update to the respective sites with a communication of the end of the acute episode.

If necessary during the episode, the City of Skopje and the municipalities of Skopje can make initiatives to MEPP to arrange mutual meetings to discuss about the situation and the possible measures to decrease the pollutant concentrations rapidly.

The flow chart concerning this procedure is included in Annex IV.

8.3. Emergency measures

Alert thresholds are set for the protection of the population from harmful exposures to elevated pollutant concentrations. Besides the information measures, included in the previous chapter, the exceedance of an alert threshold should also trigger other emergency measures to rapidly reduce the exposure to very high levels of pollutants.

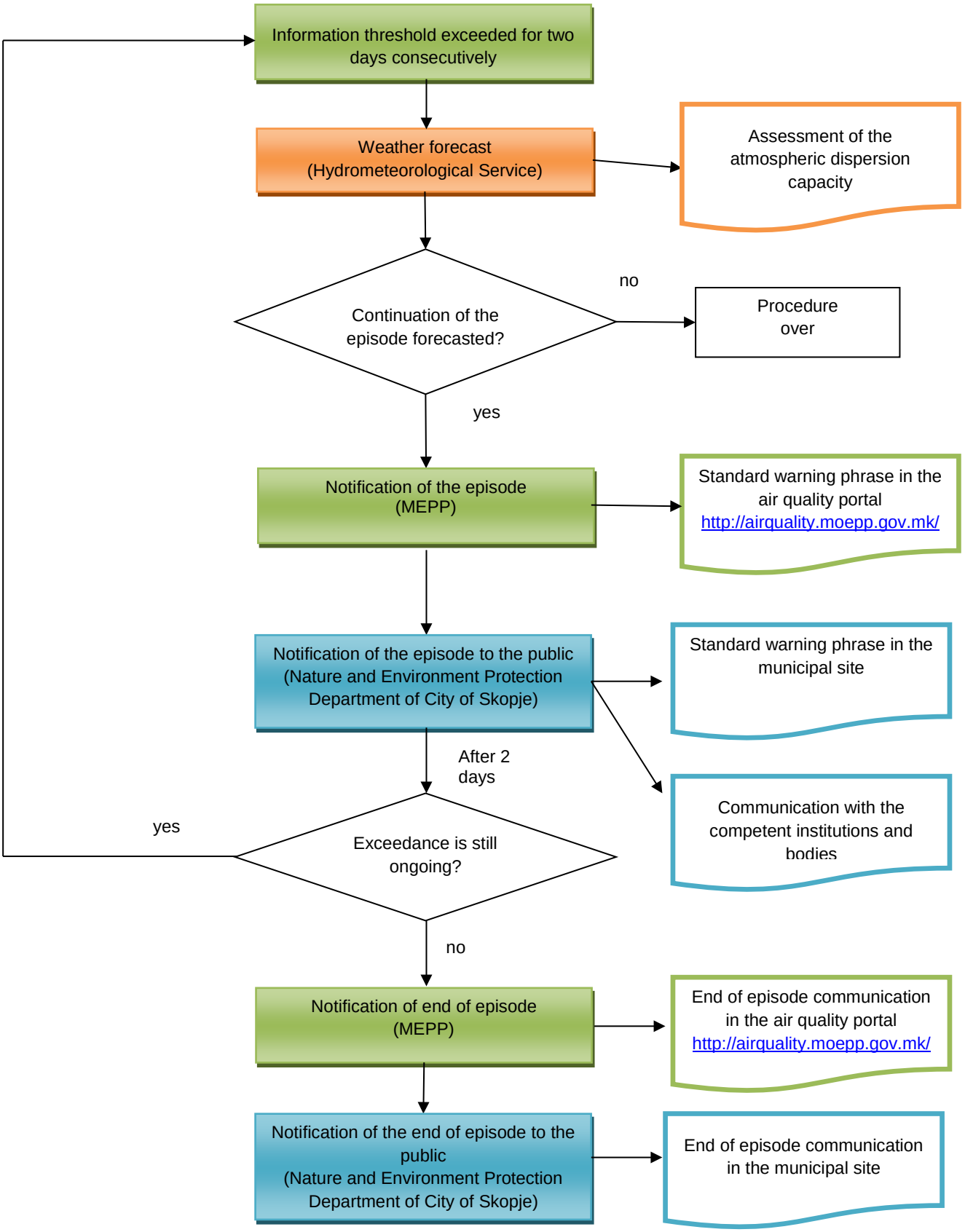
The possible emergency measures that could be put into force in the City of Skopje have not been able to identify in detail, because all of them require more detailed planning or changes in the national legislation. Also the effects of these measures have not been assessed, due to the need of further planning.

The effectiveness of the measures that have been put in force should be additionally evaluated to see, if some changes have to be made or if some new measures need to be implemented.

Annex VIII presents a list of examples of typical emergency measures that could be evaluated, if they are applicable in the City of Skopje.

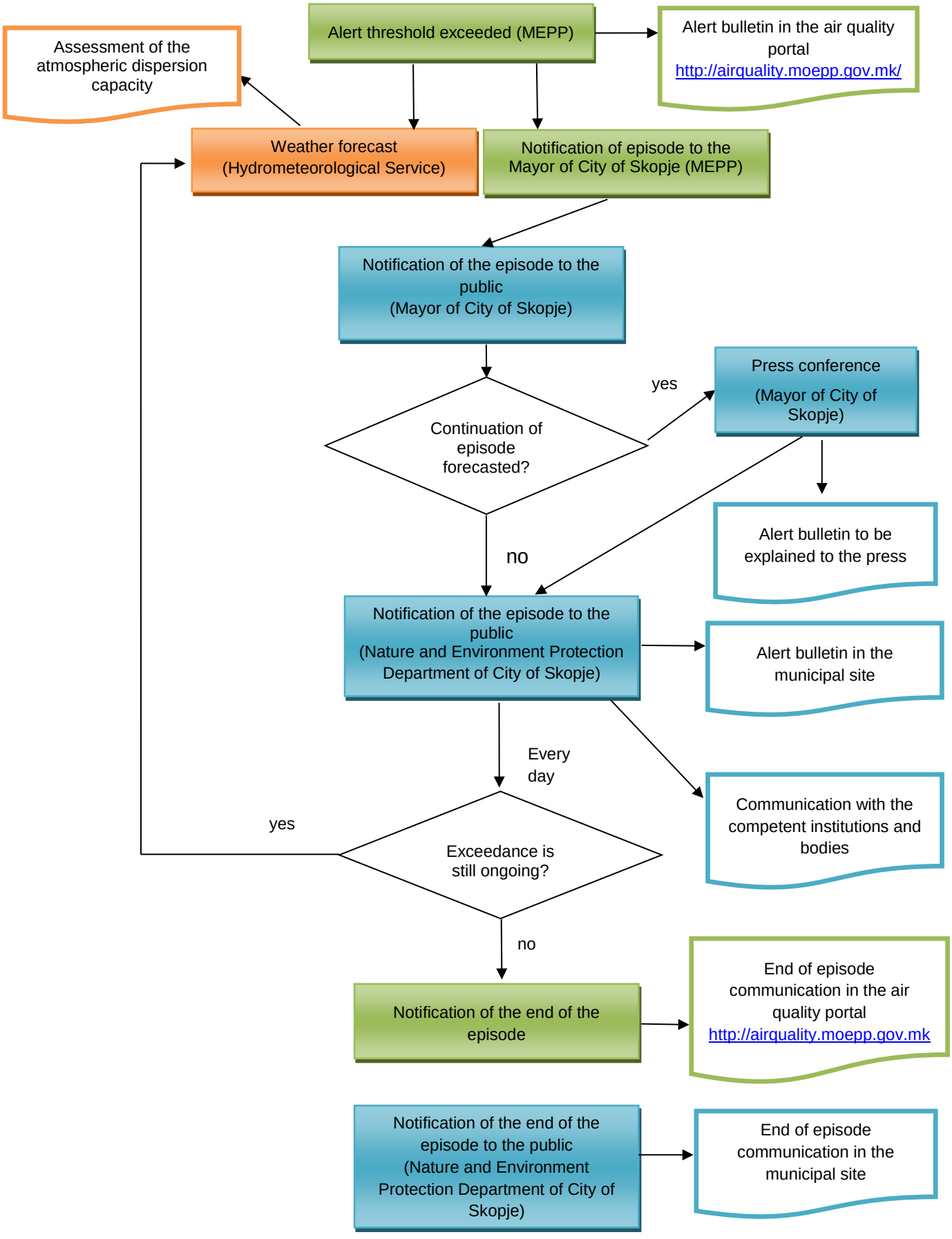
ANNEX I

Flow chart of the PM_{10} information threshold exceedance procedure



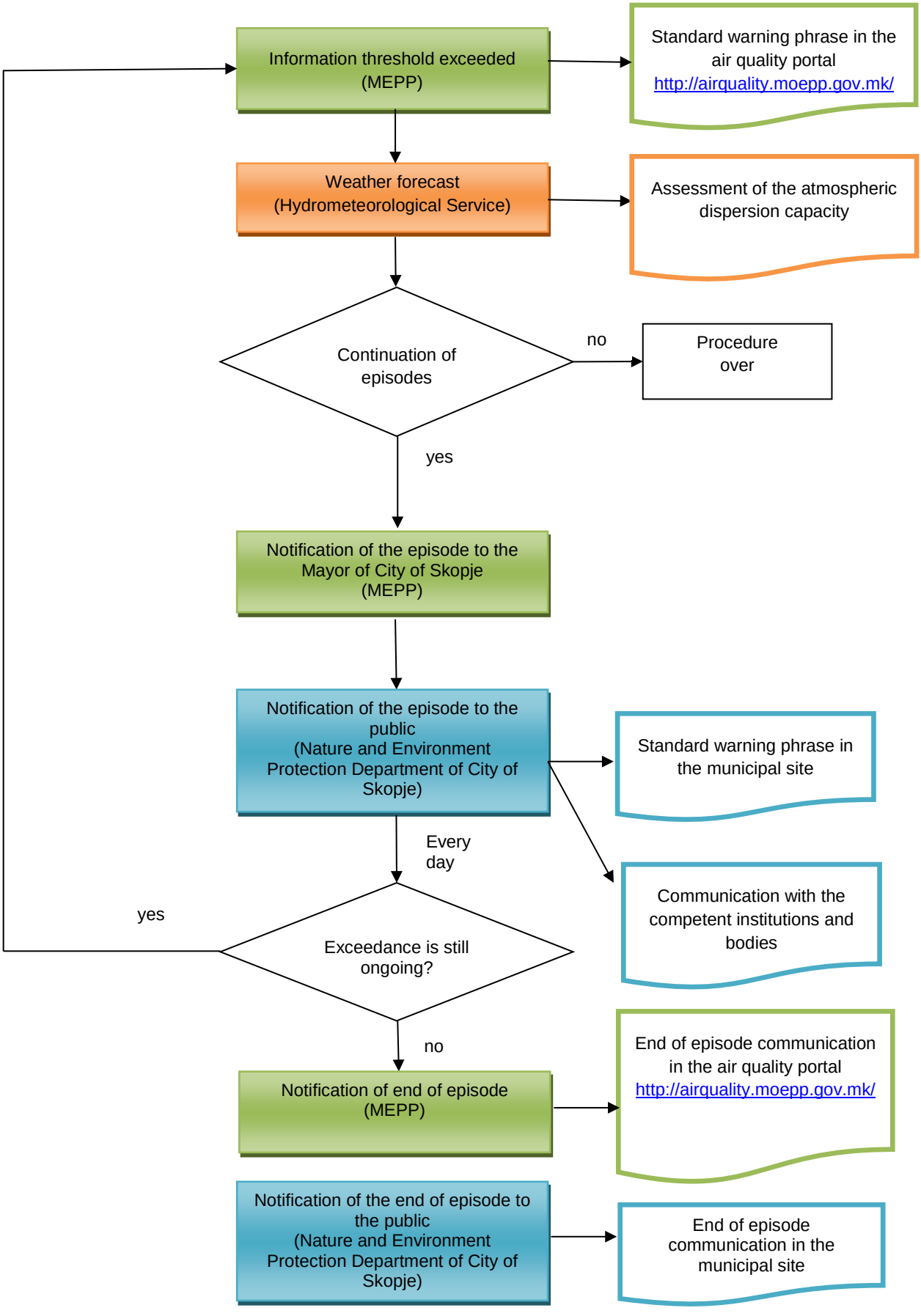
ANNEX II

Flow chart of the PM_{10} alert threshold exceedance procedure



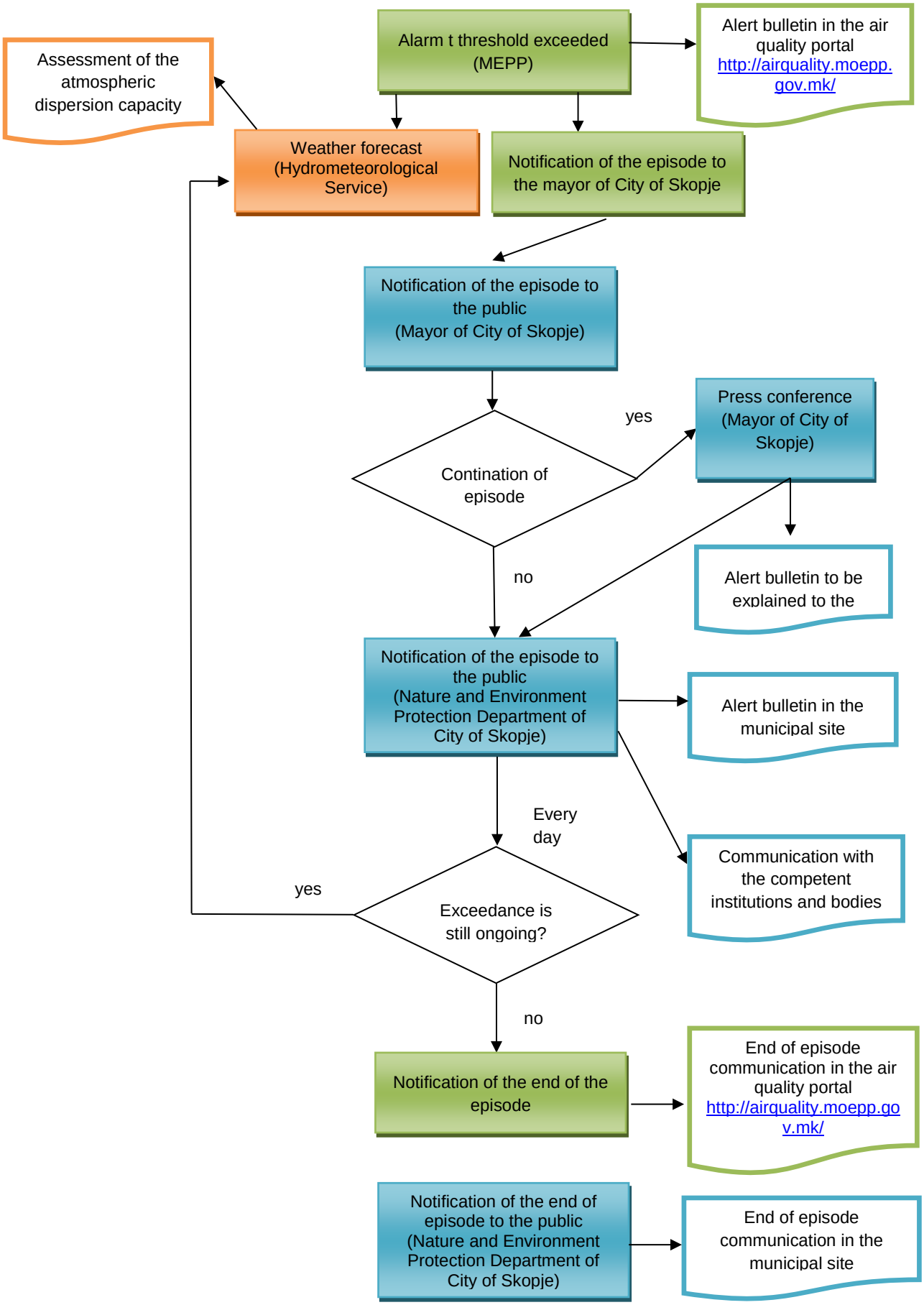
ANNEX III

Flow chart of the O_3 information threshold exceedance procedure



ANNEX IV

Flow chart of the O_3 or NO_2 alarm threshold exceedance procedure



ANNEX V

Example of press release for PM episode

City of Skopje
Tel: xxxxxxx
E-mail: xxxxx@skopje.gov.mk

ATMOSPHERIC POLLUTION TRIGGERING THE INFORMATION/ALERT THRESHOLD AND RECOMMENDATIONS

Date: _____
Delivery to: _____

There is currently a high concentration of particulate matter (PM_{10}) recorded in the air of the City of Skopje.

The information/alert threshold set at xxx micrograms per m^3 of air, averaged over 24 hours, has been exceeded _____ (when) and _____ (where).

Highest daily concentrations reached ___ micrograms per m^3 of air at the site _____ (where).

Based on these measurements by the Ministry of Environment, the Mayor of Skopje triggered the information/alert level for emergency measures in case of atmospheric pollution.

Pollutant	Averaging period	Alert threshold	Information threshold
Particulate matter (PM_{10})	24 hours	250 µg/m^3 (*)	150 µg/m^3 (*)

(*) = for 2 consecutive days

More information from: _____ (name)
_____ (tel.)
_____ (e-mail)

Health effects caused by particulate matter:

The health effects of inhalable PM are due to exposure over both the short term (hours, days) and long term (months, years). The main health effects are:

- respiratory and cardiovascular diseases, aggravation of asthma and respiratory symptoms
- raised mortality

Susceptible groups such as pregnant women, people with pre-existing lung or heart diseases, as well as elderly people and children, are particularly vulnerable.

An increased number of hospital visits and admissions is expected due to exposure to high PM concentrations.

Recommendations for human health protection:
During the severe pollution episodes concerning PM_{10} good practices in the daily behavior could preserve the citizens' health and contribute to the reduction of the pollution episode duration:

- Avoid to use the car and if possible, prefer the public transport, in order to reduce the PM_{10} emissions;
- Especially during the early morning and the late afternoon when the concentration of PM_{10} could raise to high levels is preferable to avoid long exposure outside.
- If people have more than one domestic heating system, it is preferable to avoid the use of the wood as fuel during the critical period for PM_{10}.
- All outdoor activities, which are not urgent, should be postponed.

ANNEX VI

Example of press release for NO_2 episode

City of Skopje
Tel: xxxxxxx
E-mail: xxxxx@skopje.gov.mk

ATMOSPHERIC POLLUTION TRIGGERING THE ALERT THRESHOLD AND RECOMMENDATIONS

Date: _____
Delivery to: _____

There is currently a high concentration of nitrogen dioxide (NO_2) recorded in the air of the City of Skopje.

The alert threshold set at 400 micrograms per m^3 of air, averaged over one hour, has been exceeded _____(when) and _____ (where).

Highest hourly concentrations reached ___ micrograms per m^3 of air at the site _____ (where).

Based on these measurements by the Ministry of Environment, the Mayor of Skopje triggered the information/alert level for emergency measures in case of atmospheric pollution.

Pollutant	Averaging period	Alert threshold
Nitrogen dioxide (NO_2)	1 hour	400 µg/m^3 (*)

(*) = for 3 consecutive hours

More information from: _____ (name)
_____ (tel.)
_____ (e-mail)

Health effects caused by nitrogen dioxide:

Scientific evidence links short-term NO_2 exposures with adverse respiratory effects including respiratory inflammation in healthy people and increased respiratory symptoms in people with asthma.

Studies also show a connection between short-term exposure and increased emergency room visits and hospital admissions for respiratory illnesses.

Recommendations for human health protection:

During the severe pollution episodes concerning NO_2, some good practices in the daily behavior could preserve the citizens' health and contribute to the reduction of the pollution episode duration:

- Avoid to use the car and if possible, prefer the public transport, in order to reduce the NO_2 emissions;
- Especially during the early morning and the late afternoon when the concentration of NO_2 could raise to high levels it is preferable to avoid long exposure outside.
- Especially during the acute episodes of NO_2 is preferable to avoid walking along the main streets and the traffic congested zones, where the NOx emission are higher.

ANNEX VII

Example of press release for O_3 episode

City of Skopje
Tel: xxxxxxx
E-mail: xxxxx@skopje.gov.mk

ATMOSPHERIC POLLUTION TRIGGERING THE ALERT THRESHOLD AND RECOMMENDATIONS

Date: _____
Delivery to: _____

There is currently a high concentration of ozone (O_3) recorded in the air of the City of Skopje.

The alert/information threshold set at xxx micrograms per m^3 of air, averaged over one hour, has been exceeded _____ (when) and _____ (where).

Highest hourly concentrations reached ___ micrograms per m^3 of air at the site _____ (where).

Based on these measurements by the Ministry of Environment, the Mayor of Skopje triggered the information/alert level for emergency measures in case of atmospheric pollution.

Pollutant	Averaging period	Alert threshold	Information threshold
Ozone (O_3)	1 hour	240 µg/m^3 (*)	180 µg/m^3 (*)

(*) = for 3 consecutive hours

More information from: _____ (name)
_____ (tel.)
_____ (e-mail)

Health effects caused by ozone:

The exposure to high concentration of ozone for few hours has adverse respiratory effects, including:

- shortness of breath,
- wheezing and coughing;
- asthma attacks;
- increased risk of respiratory infections;
- increased susceptibility to pulmonary inflammation; and
- increased need for people with lung diseases, like asthma or chronic obstructive pulmonary disease (COPD), to receive medical treatment and to go to the hospital.

Recommendations for human health protection:

During the acute and sub-acute pollution episodes concerning ozone, good practices in the daily behavior could preserve the citizens' health:

- Avoid tiring activities outdoor (yard work, sports, competitions) during the late morning and the afternoon when the concentration of the ozone can reach high levels.
- The adverse effects of ozone can be more severe for sensitive categories of people, like children, pregnant women, old people and those people that suffer from heart disease, asthma and other respiratory problems. These citizen should avoid any outdoor activity, remaining at home during the acute episodes. If possible, use the indoor air conditioning, which cools and dries the air during hot summer days when ozone concentration is very high.

ANNEX VIII

Examples of local emergency measures to decrease emissions in episode situations:

Traffic:

- lower speed limits on motorways and highways
- restrictions on traffic based on
    - type of vehicle (e.g. heavy duty vehicles, private cars)
    - vehicles with odd or even number plates
    - emissions of vehicles (e.g. EURO X, 2-stroke motorbikes and all diesel vehicle without particle filter)
    - geographical area (e.g. through traffic)
- low emission zones
- street tolls
- free public transport
- provision of parking for excluded vehicles
- road cleaning
- supply of goods with vehicles to be conducted before 7:30h and after 18:00h
- construction machinery (excavators, bulldozers, forklifts etc.) to be transported to the sites before 7:30h
- active implementation and control of the already introduced traffic regime for heavy-duty vehicles which final destination is not Skopje (use of the ring road)

Other measures (recommendations):

- restriction on emissions from stationary sources
- intensified inspection controls of the A and B installations and construction sites
- reduce temperature in public buildings
- water suppression of construction activities
- voluntary restrictions on wood burning
- voluntary restriction on heating
- canceling/postponing big outdoor public gatherings, sport and cultural events