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Environmental Legislation of Particulate Matter

One of the most dangerous air pollutants is the high concentration of particulate matter (PM). With regard to air particulates, Hungary is one of the most polluted countries in the European Union (EU); it regularly exceeds the limit values, which is mainly due to the aging vehicle fleet (especially diesel buses), emissions from motor vehicles (the wear and tear of vehicles, brakes, tyres etc.), domestic heating and uncovered red mud reservoirs. Public roads are also significant sources of pollution, due to the absence of dust removal from public roads and hard shoulders.¹ In 2008 the European Commission launched infringement proceedings against Hungary over the excessive PM10 concentrations in ambient air, which proceedings are still ongoing.²

1. Definition

According to the scientific definition, suspended particulate matter (PM) is tiny (less than 10 micrometres³ in diameter) pieces of solid or liquid matter associated with the atmosphere⁴. The clarification 'suspended' is used to distinguish it from deposited particles (particles greater than 10 micrometres in diameter tend to settle to the ground by gravity in a matter of hours).⁵

According to the Directive 2008/50/EC of the European Parliament and of the Council⁶ Article 2(18) "*PM10 shall mean particulate matter which passes through a size-selective inlet as defined in the reference method for the sampling and measurement of PM10, EN 12341, with a 50% efficiency cut-off at 10 µm aerodynamic diameter.*"⁷ As we see, PM is categorized – regardless of its chemical composition – on the basis of physical properties, namely the diameter of the particulates. Particle size is the main indicator of PM concerning its legislation as well. Particles less than 100 micrometres in diameter

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¹ http://nol.hu/lap/tudomany/20130207-a_szallo_por_a_halalunk (14.01.2014.).

² The European Commission has warned Bulgaria to comply with ceilings on emissions of sulphur-dioxide, nitrogen dioxide and dust from industrial plants. Forecasts for 2012 show Bulgaria again exceeding ceilings. Concluding that the continuing absence of structural measures to reach compliance indicates that this consistent pattern of violation is likely to continue, the Commission is sending a reasoned opinion (the second stage in EU infringement proceedings), giving Bulgaria two months to reply. In the absence of a satisfactory response, the Commission may refer it to the EU Court of Justice. In: http://ec.europa.eu/magyarorszag/press_room/press_releases/20130124_januari_ketelezetsegszegesi_eljarasok_hu.htm (24.01.2014.).

³ mikrométer= µm.

⁴ particulate matter, PM.

⁵ <http://hu.wikipedia.org/wiki/Sz%C3%A1ll%C3%B3por> (02.01.2014.).

⁶ Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe OJ L 152./1. p.

⁷ Government Decree 306/2010. (Dec. 23.) on air protection Article 2 (33).

are inhalable, but most of them will not penetrate deeply in the respiratory system. Particles less than 10 micrometres in diameter get over the pharynx; the ones under 4 micrometres get into the lungs. Particles less than 2.5 micrometres in diameter will never or hardly ever leave the lungs. From the health point of view the boundaries of 10 and 2.5 micrometres are significant. Legislation uses the notations PM10 and PM2.5⁸ respectively.

2. Main sources and effects

According to the latest PM10-report made for the Hungarian Commission on Sustainable Development⁹ of the main air pollutants three – ground-level ozone, nitrogen oxides and PM10 – cause lasting problems in Hungary. PM10 particulates may occur naturally, originating from volcanoes, forest and grassland fires. Of human activities, the main source of pollution is the soot particles originating in the burning of fossil fuels in vehicles with two-stroke and Diesel engines. Beside transportation and traffic, domestic heating can also produce fine particulate matter. With the rise in the price of natural gas more and more people are turning towards wood, coal and oil combustion, which also contributes to the rise in PM emissions. Thus the application of restrictive measures regulating transportation and traffic within settlements, and the regulation of domestic heating could serve as a long-term solution. Agricultural activities also produce significant dust emissions. There are technologies that contribute effectively to the reduction of PM10 emission in agricultural areas, for example the prohibition of ploughing, stubble stripping and other tillage activities in the case of certain wind-force, or the plantation of protective woodland belts.¹⁰

The burning of litter and garden waste makes a significant contribution to PM10 pollution, therefore the general prohibition in Hungary is justified, but the determination of the time and frequency of burning is the competence of local governments.

Particulates severely damage human health. The assessment of air pollution is conducted with the help of an index. On the basis of the adverse health effects of air pollutants, the chart of the *Országos Környezetegészségügyi Intézet* (National Institute of Environmental Health, NIEH) distinguishes four levels: blue (satisfactory), green (disapproved), orange (unhealthy) and red (hazardous). In the case of the orange and red code, local governments can order the information or alert level of smog

⁸ PM2,5 particulate matter. PM2,5 shall mean particulate matter which passes through a size-selective inlet as defined in the reference method for the sampling and measurement of PM2,5, EN 14907, with a 50 % efficiency cut-off at 2,5 µm aerodynamic diameter. Directive 2008/50/EC of the European Parliament and of the Council Article 1(19). Government Decree 306/2010. (Dec. 23.) on air protection Article 2 (34).

⁹ Account on the Government Decree 1330/2011 (Oct. 12) on the inter-sectorial programme of measures for reducing small-size particulate matter (PM10) for the Committee on Sustainable Development. In: <http://pm10.kormany.hu/download/1/cb/60000/2012%20%C3%A9vi%20besz%C3%A1mol%C3%B3%20jelent%C3%A9s.pdf> (02.01.2014.).

¹⁰ Government Decree 1330/2011 (Oct. 12) on the inter-sectorial programme of measures for reducing small-size particulate matter (PM10) Annex 1 Section II. C.

warnings.¹¹ WHO¹² data support, that more than 80% of the European population is exposed to PM pollution exceeding limit values. In a case the European Court (Second Chamber) ruled that where there is a risk that the emission limit values in respect of particulate matter PM10 or alert thresholds may be exceeded, persons directly concerned must be in a position to require the competent national authorities to draw up an action plan.¹³ Court proceedings have been initiated in a similar case, when a Budapest resident sued the Municipality of Budapest on the grounds of his allergic symptoms resulting from air pollution.

Suspended PM2.5 is the most hazardous to human health. In-city climate is affected by several human and natural factors. The pollution level of a city depends on the terrain, the size of the population, the level of industrialization, the amount of heat emitted by the population, population density and the size of green areas.¹⁴

3. Measurement and control

PM concentrations have been measured since 1987. Before 2008, PM10 was measured together with sulphur-dioxide and limit values were also set combined. At this time coal combustion (with high soot and SO₂ emission) was the main source of air pollution. Since then coal combustion has become of secondary importance, heating systems have been modernized, therefore sulphur-dioxide levels rarely exceeded the set combined limit values, and as there were no independent limit values for PM10, smog alerts could not be issued.

Member states are to assess air quality; they have to specify measurement systems to assess ambient air quality. According to the directive, member states are to install sampling points in cities and conurbations with a population in excess of 250.000 inhabitants, while the minimum number of rural background stations is one per 100.000 km². PM2.5 levels have been assessed since 1997. Up to 250.000 inhabitants 2 measuring stations, in the case of 1500.000-1999.000 inhabitants 7 measuring stations and on every 100.000 km² one sampling point are to be installed¹⁵. As regards the placement of measuring stations that assess load levels, the requirements are specified in the Ministry of Rural Development Decree 6/2011. (I.14.).¹⁶ Based on the location of the measuring station according to the source of emission, we can distinguish among regional, urban, industrial background and traffic stations. Urban stations are away from the influence of local emissions such as industry and traffic, industrial background

¹¹ <http://www.webradio.hu/index.php?option=content&task=view&id=294646> (20.01.2014.).

¹² WHO: World Health Organization.

¹³ In a case the European Court. Judgment of the Court (Second Chamber) of 25 July 2008 (reference for a preliminary ruling from the Bundesverwaltungsgericht - Germany) - Dieter Janecek v Freistaat Bayern C-237/07. (Case C-237/07 ECR 2008 Page I-06221.).

¹⁴ Bános Katalin: *A szálló por terbeltség környezeti hatásai és csökkentésének gazdasági alternatívái*. PhD értekezés, Gödöllő, Szent István Egyetem Gödöllő Gazdálkodás és Szervezéstudományok Doktori Iskola, 2012.

¹⁵ Directive 2008/50/EC of the European Parliament and of the Council Article 6 (5).

¹⁶ Ministry of Rural Development Decree No. 6/2011 (I.14.), on the rules of the examination control and evaluation of the load level of the air and the fixed air polluting sources.

stations are near certain industrial sites, while traffic related stations are near high traffic intensity areas.¹⁷

4. Smog situation

The new limit values set for suspended particulate matter has led to more frequent smog alerts.

Smog is a form of excessive air pollution. According to the geographical and climatic circumstances and the types of air pollutants two types of smog can be distinguished. London-type smog occurs in due to the burning of fossil fuels, mainly coal. In December 1952, London was covered in smog for five days. It is known to be the worst air-pollution event in history. For this type of smog, the circumstances are mainly given in winter. The other type of smog is the Los Angeles-type. Its typical prevalence areas have high traffic and dry, sunny summer periods. This type of smog was first detected in Hungary in 1985.¹⁸

In the case of air pollution that endangers the environment, emergency measures are to be taken. Exceptional and critical circumstances requiring immediate action may occur when in unfavourable weather conditions, for an extended period in wide areas the air pollutant emission from several sources leads to air pollution which reaches or exceeds the information or alert level of one or more air pollutants.¹⁹

5. Legislation of suspended particulate matter

Earlier, the Directive that regulated the concentration of PM10²⁰ did not include limit values for suspended particulate matter. None the EU members had a threshold in their national legislation; individual cities introduced rules and regulations in their local legislation.

Beside PM10 and PM2.5, the Directive 2008/50/EC²¹ on ambient air quality in force imposes regulations concerning sulphur dioxide, nitrogen dioxide, lead, benzene, carbon monoxide and the ozone-content of the troposphere. The Directive sets limit values and target dates for the reduction of suspended particulate matter. When the Directive came into force, PM10 got its own limit value in Hungary, first among EU members, following the Swiss model.

¹⁷ Uramné Lantai Katalin: Levegőminőség vizsgálata, szmoghelyzetek elemzése az Észak-magyarország régióban, *Anyagmérnöki Tudományok*, 2013, 38/1, 309-318. In: http://www.matarka.hu/koz/ISSN_2063-6784/38k_1_2013/ISSN_2063-6784_38k_1_2013_309-318.pdf (14.02.2014).

¹⁸ http://nol.hu/lap/tudomany/20130207-a_szallo_por_a_halalunk (10.01.2014).

¹⁹ Csák Csilla: *Környezetjog, Előadásvezetők az általános és különös részki környezetjogi gondolkodás köréből*, I. kötet, Miskolc, Novotni Alapítvány, 2008, 122-123. Lásd még Miklós László (edit.): *A környezetjog alapjai*, Szeged, JatePress, 2011, 83., 91.

²⁰ Council Directive 1999/30/EC of 22 April 1999 relating to limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air (OJ L 163, 29. 6.1999, p. 41).

²¹ Directive 2008/50/EC of the European Parliament and of the Council OJ L 152.

The new directive extends legislation to PM_{2.5}, although it does not set limit values as the member states found compliance too difficult. As a first step, target values have been set.²² From 2010, the target value to meet is 25 micrograms/m³ in a calendar year, from 2015, however, 25 microgram/m³ is the obligation value. 20 micrograms/m³ has been set as an indicative limit value, which is to be met by 1st of January, 2020.

Under the earlier directive, member states were required to meet the air quality requirements on their whole territories respectively. The directive in force, however, requires the member states to reduce pollution to the set levels in zones or agglomerations determined by the states themselves from a given deadline.²³ This means that the member states designate the areas where they have to measure the concentration of air pollutants.

The effect of suspended particulate matter is highly dependent on the exposure time, therefore EU legislation distinguishes between daily and annual limit values. According to the Directive 2008/50/EC²⁴ in one calendar year the threshold cannot be exceeded more than a given times, in the case of PM₁₀, for example, the 24-hour limit value cannot be exceeded more than 35 times in any calendar year.²⁵

Hungary exceeds this threshold every year, most frequently in and around Budapest, in the Sajó-valley,²⁶ in Nyíregyháza and Szeged, mainly in winter months. Annex XI. to the Directive includes the daily and annual limit values for different air pollutants (also for PM₁₀). Since 2005 the daily limit value set for PM₁₀ (24-hour average) is 50 micrograms/m³, the annual is 40 micrograms/m³. The margin of tolerance for the daily limit value is 50%, for the annual limit value 20%.

Suspended particulate matter is a significant environmental problem in Hungary and Europe. In 2003 in Hungary pollution significantly exceeded European averages (31,2 micrograms/m³ in the EU, 40,1 micrograms/m³ in Hungary). In Hungary the situation has significantly improved in the past few years, and pollution levels have been reduced to EU average levels (EU 26,8 micrograms/m³ in the EU, 27,1 micrograms/m³ in Hungary).²⁷

In comparison with USA regulations, the daily level value set by the US Environmental Protection Agency (EPA) is 150 micrograms/m³. In January 2013, in

²² 'Target value' shall mean a level fixed with the aim of avoiding, preventing or reducing harmful effects on human health and/or the environment as a whole, to be attained where possible over a given period.

²³ Directive 2008/50/EC Article 2(5) and COM (2005) 446. Communication from the Commission to the Council and the European Parliament: Thematic Strategy on air pollution. 21 September 2005.

²⁴ Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe OJ L 152./1. p Annex 9.

²⁵ Ministry of Rural Development Decree No. 4/2011. (I.14.), Account on the Government Decree 1330/2011 (Oct. 12) on the inter-sectorial programme of measures for reducing small-size particulate matter (PM₁₀) for the Committee on Sustainable Development, Annex 1 Section I. 2.

²⁶ In 2008 the Commission has initiated infringement proceedings against Hungary over the exceeding of PM₁₀ limit values, among others in the Sajó-valley zone.

²⁷ Bános, 2012, 16.

Beijing the concentration of PM_{2.5} exceeded 900 micrograms/m³. The level of 300 micrograms/m³ is considered hazardous, regular detection devices measure up to 500 micrograms/m³. Yet, Beijing is not among the ten most polluted cities of China. Air pollution is a frequent problem in China, too.

In 2008 the European Commission warned eight member states²⁸ – among them Hungary – for delays in meeting limit values for PM₁₀ in ambient air before the set deadline. In accordance with the Directive,²⁹ however, the member states are allowed to postpone the application of certain limit values in a given zone or agglomeration on condition that an air quality plan is established and it is demonstrated how conformity will be achieved with the limit values before the new deadline, so the member states had to demonstrate that they put the air quality plan into practice, which will result in the reduction in the concentration of suspended particulate matter in all air quality zones. The member states were exempt from the obligations to apply the limit values until 11 June 2011.³⁰ In 2008 Hungary applied for extensions, in the application claiming that conformity cannot be achieved because of site-specific dispersion characteristics and adverse climatic conditions, that is, the country's geographical situation in the Carpathian-basin enhances unfavourable climatic conditions.³¹ Beside The Netherlands, Austria and Germany, Hungary was also granted additional time³² (until 2011) to comply with limit values for particulate matter (PM₁₀) emissions.³³ Hungary is still trying to reduce the concentration of suspended particulate matter under the limit values. The Commission can refer the case to the Court of Justice, the procedure may lead to the imposition of a fine.

6. Anti-smog legislation

According to the Government Decree 306/2010 (XII.23.) on the protection of air, a short-term action plan and a smog alert-plan shall be drawn up and implemented in settlements where there is a risk of smog and the conditions of continuous measurements are met.³⁴ These plans determine the level of air pollution at which measures are to be taken. These measures have two degrees: information and the alert state, the latter accompanied with actual constraints. In case of smog, the population

²⁸ Hungary, Austria, Belgium, Denmark, Greece, France, Slovakia and Romania.

²⁹ Directive 2008/50/EC Article 22. on the postponement of attainment deadlines and exemption from the obligation to apply certain limit values.

³⁰ Ludwig Krämer: *Az Európai Unió környezeti joga*, Budapest-Pécs, Dialóg Campus, 2012, 288-289.

³¹ Tar Károly – Kircsi Andrea – Vágvölgyi Sándor: *Temporal changes of wind energy in Hungary in connection with the climate change*, University of Debrecen, Meteorological Department.

³² Brussels, 26.6.2008 COM(2008) 403, Communication from the Commission on notifications of postponements of attainment deadlines and exemptions from the obligation to apply certain limit values pursuant to Article 22 of Directive 2008/50/EC on ambient air quality and cleaner air for Europe.

³³ Belgium, Denmark, Greece, Spain, France, and Slovakia also applied for an exemption, but their application was rejected by the Commission. In: <http://www.euvonal.hu/index.php?op=hirek&id=6001> (30.01.2014.).

³⁴ Bándi Gyula: *Környezetjog*, Budapest, Osiris, 2002, 410.

has to be informed. Information state is declared when the short-term exposure to suspended particulate matter exceeding thresholds poses danger to especially sensitive groups of inhabitants, such as children, the elderly and the ones suffering from chronic diseases.

Municipalities are to inform the inhabitants if the concentration of suspended particulate matter exceeds 75 micrograms/m³ on two successive days, an alert is due if the concentration of suspended particulate matter exceeds 100 micrograms/m³ on two successive days and according to the weather forecast no improvement is expectable for the third day either.

Members of the public who may be affected are to be informed about exceedances of information thresholds and alert thresholds, and also about the improvement in these exceedances by means of radio, television, newspapers or the Internet, or in a locally conventional manner.³⁵

Pollution reduction is high priority public interest.³⁶ In case of alert, beside emission limitations, medical institutions, public safety, public order and road safety sections of police are put on alert.³⁷ Essential services of the public and the continuous flow of information are to be secured. The restrictions included in the smog-alert plan are to be imposed taking the characteristics and severity of the smog situation and meteorological forecast into account.³⁸ In official cases relating to matters of the implementation of the smog-alert plan the mayors exercise at first instance jurisdiction.³⁹

7. Emergency measures, sanctions

During smog alerts, there are numerous sanctions provided by the Hungarian environmental and misdemeanour law.⁴⁰ In the case of PM10 pollution, at the alert state of a smog⁴¹ alert the following measures can be taken:

- (a) Warning the operators of stationary sources emitting suspended particulate matter to reduce their activity, or enforcing them to reduce or suspend their activity;
- (b) Suspending dust-emitting (constructing work etc.);
- (c) Requesting the population and public institutions to reduce the use of oil and solid fuel heating appliances;
- (d) Taking measures that concern traffic and transportation, for example restricting or banning transit traffic, designating bypass(es), restricting traffic, “alternating traffic,” allowing only vehicles with either odd or even licence plate from 6 a.m. to 10 p.m., requesting the favouring of public transport;
- (e) Under appropriate circumstances cleaning public areas with water;

³⁵ Miklós László (edit.): *A környezetjog alapjai*, Szeged, JatePress, 2011, 91.

³⁶ Report of the Hungarian Parliamentary Commissioner for Future Generations, in: http://beszamolo.jno.hu/pdf/JNO_beszamolo_2008-2009.pdf (14.02.2014.).

³⁷ Fodor László: *Környezetvédelmi jog és igazgatás*, Debrecen, 2007. 133-134.

³⁸ Government Decree 306/2010. (23.Dec.) Article 20.

³⁹ Government Decree 306/2010. (23.Dec.) Article 36 (3).

⁴⁰ Report of the Hungarian Parliamentary Commissioner for Future Generations 2008-2009. http://beszamolo.jno.hu/pdf/JNO_beszamolo_2008-2009.pdf (14.02.2014.).

⁴¹ Annex 3 Section B to 306/2010. (XII.23.) Government Decree.

(f) Prohibition of the open-air burning of litter and garden waste.

Beyond these measures, the environmental authorities may impose a fine on those who infringe air protection requirements.⁴² Annex 9 to 306/2010. (XII.23.) Government Decree sets the fines. In the case of non-compliance with the requirements of the smog-alert plan a fine of 500 000 HUF may be imposed on a non-natural person pursuing economic activities, and a fine of 100 000 HUF may be imposed on a natural person.

Whoever violates traffic restrictions and measures concerning the use of mobile emission sources during a smog alert can be held liable for “Infringement of rules of smog alert with mobile sources.”⁴³

8. Conclusions

Although PM10 pollution is one of the greatest environmental problems in Hungary, since joining the EU there has been vast improvement. The source of more than a half of the Hungarian PM10 emission is the population, a quarter comes from traffic. At local level air pollution in settlements derives from traffic, in rural areas from residential combustion. Proportions are varied, in summer traffic, in winter heating is dominant.

Only Switzerland – which, unlike Hungary, has favourable climatic conditions – has a similarly strict legislation. Hungary has complied with its legislative obligations, air quality is continuously measured and assessed in a sufficient number of monitoring stations, the air protection action plan has been drawn up and implemented. These measures are also aimed at eliminating the already existing PM pollution.

Legislation concerns providing information and the measures which could be put in place at different levels of a smog situation. Exceedances of information thresholds and alert thresholds always occur in heating periods. In summer, the concentration of suspended particulate matter never exceeds thresholds in spite of the fact that traffic crossing urban areas is of the same size or bigger.⁴⁴

The National Environmental Programme⁴⁵ (NEP) includes the Action Programme of Urban Environmental Quality, of which sections about the protection of urban green areas, increasing their proportion and improving their status, tree plantations, the modernization of urban roads, dust removal from roads, the extension of the bicycle lane-network and the development of public transport could be highlighted.

In NEP, the 20% reduction of suspended particles less than 2.5 micrometres in diameter between 2010 and 2020 is one of the concrete objectives. Of the actions to meet those objectives it specifies the role of municipalities and the population concerning domestic heating. The responsibilities of municipalities include reaching the

⁴² Government Decree 306/2010. (23.Dec.), Article 34.

⁴³ Act No. II of 2012 on misdemeanours, misdemeanour procedure and registration system. Article 230.

⁴⁴ Uramné 2013, 317.

⁴⁵ Parliament Resolution No. 96/2009. (XII.9.) OGY on the National Environmental Programme for 2009-2014.

statutory air protection objectives; favouring non-polluting or least-polluting solutions when making decisions on transport and industrial development; the local legislation of burning litter and garden waste; making, revising and, if necessary, modifying smog-alert plans; taking necessary measures in the case of smog alert (for example restricting traffic) and giving the population continuous information. The NEP also specifies objectives to be reached by the population, for example the regular maintenance of domestic combustion plants (stoves, boilers and convectors) and chimneys, the use of cleaner fuels and the modernization of heating systems.⁴⁶

In order to avoid smog situation, increasing the share of less environmentally destructive alternative fuels and drive systems in transportation, and especially facilitating the widespread use of electric vehicles stand out as an important option to consider. In addition to reducing emissions, traffic regulations, by which the emission site can be changed, are necessary. Building bypasses reduces air pollution from transport emissions in populated areas. In addition to the development of infrastructure it is also important that bicycle use and cycling as a form of recreation is supported.

In order to reach the objectives of the National Renewable Energy Action Plan and the National Energy Strategy, it is important to improve the competitiveness of district heating systems. The different energy efficiency tenders are also aimed at the reduction of suspended particulate matter. With the rise in the price of natural gas, a significant proportion of the population has turned towards wood combustion. This transition does not help the reduction of emissions, wood and coal combustion also increases the amount of dust emitted. The competitiveness of district heating systems can be promoted with subsidies and heating system modernization programs.

The replacement of old boilers and the development of combustion plants should be promoted with green development programs. Significant emission reductions can be made with the modernization of present technologies.

It is necessary to regularly monitor the activities of industrial emitters and to oblige them to modernize obsolete equipment and use the best available technology (BAT).

Due to the prohibition of the open-air burning of litter and garden waste the spread of home composting should be promoted by developing support schemes.

The adoption and implementation of European Union measures to address emission at source contributes most efficiently to improving air quality. These measures, however, are not suitable on their own to guarantee compliance with limit values, further action is needed on regional or local level. No member state is able to tackle these problems alone, its efforts would fail because of another state's passivity. Everywhere in Hungary we have to strive to guarantee citizens the right to a clean and healthy environment.

⁴⁶ Report on the activities of the Hungarian Parliamentary Commissioner for Future Generations in 2011. In: http://beszamolo2011.jno.hu/JNO_beszamolo_2011.pdf (14.02.2014.).