Noise abatement strategy in Moscow

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Noise is an inevitable companion of a city residents' life which ranks second in the list of environmental concerns of Moscow residents (after air quality).

In order to tackle this problem a system is set up which includes monitoring and assessment of environmental noise, abatement measures (different for different sources) and monitoring of the results.

In 2004, a special acoustic laboratory was set up as a division of the State Environmental Protection Institution "Mosecomonitoring" (subordinate to the Department for Environmental Management and Protection of Moscow City Government) in order mainly to tackle complaints of residents about high noise levels.

In the Russian Federation, noise limit values are set up by the Federal Hygienic Rules for the areas around dwellings, hospitals, schools etc. as well for the living/bedrooms in flats, playgrounds and some other quarters. In most cases limit values include L_{eq} (measured during 30 min) and L_{max} for daytime and nighttime separately. For the areas around dwellings noise limit values are as follows: daytime – L_{eq}=55 dBA, L_{max}=70 dBA, nighttime – L_{eq}=45 dBA, L_{max}=60 dBA. It has been estimated that in 2007 noise limit levels were exceeded on up to 70% of the city territory.

Road traffic is the main source of noise pollution in Moscow. Other noise sources are common for cities: rail traffic (including several surface sections of the Moscow underground network), aircraft (3 largest airports are situated around Moscow), industrial enterprises (only local and occasional influence), construction sites (especially at nighttime), inbuilt equipment in buildings, neighborhood noise.

Noise monitoring results show that near the roads (around 5,5 m from the curb) noise levels L_{eq} vary from 61 to 82 dBA (road traffic intensity varying from 200 to 17 000 vehicles/hour). Exceedances of noise limit values near roadside dwellings reach in some cases (motorways of city significance) 20-25 dBA (daytime). Rail traffic noise levels L_{eq} (25 m from the railway line) vary from 71 to 82 dBA depending on the traffic composition (freight or passenger).

In 2012, the number of people exposed to daytime noise levels L_{eq} higher than 55 dBA was estimated based on calculation of noise levels from road and railroad traffic (initial data being road traffic intensity, velocity and composition). Its results showed that around 37% of population of Moscow are exposed to road and railroad traffic noise levels L_{eq} higher than 55 dBA, of which 2% are exposed to noise levels higher than 70 dBA.

Results also show that if construction sites working night shift do not take measures to reduce noise levels (do not comply with the requirements, listed below) noise limit values on the adjacent territories may be exceeded by up to 30 dBA.

Due to the fact that maximum capacity of the road traffic system was reached in most parts of the city around 5 years ago, noise levels change little if at all during daytime, but continue to grow during night time as more traffic shifts into the night hours (for example, in order to improve traffic freight vehicles (HDV with maximum weight more than 12 tons) were banned during daytime from the most part of the city (in boundaries of the Moscow circle automobile road), which led to the increase of the freight traffic during the night). Another contributor to the increase of noise levels during night hours and reduction of

difference between daytime and nighttime noise levels is an increase in mean vehicle speed during the night compared to daytime due to better traffic conditions.

Noticeable change in the acoustic environment in different parts of the city happens mostly due to construction or reconstruction of road transport infrastructure. Pre-existing high density of the infrastructure in many cases necessitated widening of roads and building of new roads and flyovers which either makes noise sources closer to the dwelling or creates new noise sources.

Federal Rules [1] require noise abatement measures to be implemented in cases when the forecasted noise levels after the construction of new objects are expected to exceed limit values. In order to mitigate negative impact of road construction on the residents different ways of noise abatement are used depending on specifics of the site in question: noise-protection screens are used mainly for flyovers or territories with low-rise buildings (in 2013 the total length of noise-protecting screens in Moscow was 64,211 m), noise-proof windows for blocks of flats (around 126,000 windows in 2007-2013) and health care facilities and schools. In some cases where enough space is available transportation infrastructure is divided from the protected territories by the uninhabitable buildings such as multistoried parkings, stores, industrial facilities etc.

For industrial enterprises and other stationary objects with noise sources Federal Rules [2] require calculation of noise levels at the nearest protected areas/objects. In order to guarantee safety for the residents Sanitary protection zones are set up around stationary noise sources. If dwellings happen to be in the Sanitary protection zone an enterprise is required to develop an action plan to reduce noise levels to the limit values. Otherwise an enterprise would have to organize settlement of the residents in some other place. Calculated noise levels have to be subsequently confirmed by the measurements.

Federal Rules [3] set up requirements for noise levels from automobile transport (engines) and tires (table.2). Since 2010 these requirements were tightened for the new and imported cars (while staying the same for the in-use cars, table.1). In order to ensure compliance to these requirements a procedure of measurement of engine noise levels is included into the mandatory technical testing of the in-use road transport and into the certification process for produced or imported vehicles. In-use road transport is also subject to testing of noise levels by the officers of the State Automobile Transport Inspection. Exceedance of noise limit values is one of the reasons why use of a vehicle can be temporarily banned by the State Automobile Transport Inspection.

Table 1. Federal Requirements for noise levels from engines of new and in-use vehicles in the Russian Federation

No	**Type of vehicle**	**Outside noise limit values, dBA**	
		For new vehicles (produced or imported)	**For in-use vehicles**
1	Passenger cars	74 (75 for diesel engines)	96
2	Buses	78, 80 (power up to 150 kW, more than 150 kW)	98, 100 (mass up to 5 tons, more than 5 tons)
3	LDV	76-77 (78 for diesel engines)	96
4	HDV	77-78-80 (power up to 75 kW, 75-150 kW, more than 150 kW)	98, 100 (mass up to 12 tons, more than 12 tons)
5	Motorcycles and mopeds	73-77 (depending on the power)	-
6	Three wheeled vehicles	82	-
7	Municipal/utility machinery (vehicles for	81 - 84* (power up to 75 kW, 75-150 kW, more than 150	98, 100 (mass up to 12 tons, more than 12 tons)

	street cleaning, garbage trucks etc. with mass more than 3,5 tons)	kW)	

* For machinery during operation of specialized equipment (washing, watering, sweeping, snow gathering, road sprinkling etc.), an increase of indicated noise levels by up to 2 dBA is allowed.

Table. 2. Federal Requirements for noise levels from tires while rolling in the Russian Federation

No	Type of vehicle	Noise limit values, dBA	
		Up to 31st December 2015	Since 1st January 2016
1	Passenger cars	72-76*	70-74*
2	LDV and buses with mass less than 3,5 tons	75-78**	72-74**
3	HDV and buses with mass more than 3,5 tons	76-79**	73-75**

* Depending on the nominal width of tire profile (in direct ratio). Value is 1 dBA higher for tires with increased load bearing capacity and by 2 dBA higher for “special function tires”.

** Minimal value – for common tires, medium – for winter and all-season tires, maximal – for “special function tires”.

Since it is almost impossible to guarantee low noise levels in a metropolis during daytime, Moscow City Government chose two priorities for its noise mitigation policy: 1) minimizing noise levels in the living rooms of the flats and in social objects (schools, hospitals etc.), 2) preventing or minimizing sleep disturbance. The first priority has been addressed for several years by including replacement of the old windows in the dwellings during renewal with noise-protection windows (around 356,000 windows during 2007-2010).

The second priority has been gradually becoming harder to address due to the abovementioned shift of transportation to the night hours. Except road transport the main concern is nighttime construction and loading – unloading of the goods as well as neighborhood noise. Nighttime activities are regulated by the Moscow Law from 12.07.2002 № 42 “On observance of peace and quiet during nighttime in Moscow”. This law sets the list of the protected territories and buildings as well as prohibited activities which might lead to sleep disturbance during the night time. The law is enforced by the city police and by administrative fines. The advantage of this kind of regulation is that no noise measurement is required in order to prove the infringement of the law. The fact of, for example, use of fireworks is enough to prove the violation and to impose a fine for a person of authority.

However, special regulation is set for the construction sites working night shifts. A special set of rules is set for them by the Government Decree [4], which allows them without fully stopping works for the night to avoid exceedances of limit values for the night time (L_{eq}=45 dBA, L_{max}=60 dBA): to jam motor vehicles while on the site; not to use loudspeakers; not to clog foundation piles and avoid other noisy works (welding etc.); jam all equipment with noise levels leading to exceedance of the limit values on nearby residential territories. Special regulations (including abatement measures) for the night shift have to be drawn up by the contractor and included into the project documentation. Otherwise contractor cannot be granted permission to start construction.

Enforcement of these regulations is organized by the abovementioned acoustical laboratory which organizes night measurements near construction sites without any warning. Measurements are scheduled according to plan or are based on the complaints of the residents. In order to facilitate appeals of the residents a round-the-clock telephone “hot line”

is organized. The “hot line” is advertised on the Internet, and the telephone number has to be displayed on an information board of a construction site. If an exceedance is proven by the measurements the protocol is forwarded to an Administrative inspection. Administrative fine for this kind of offence is much higher than for other kinds of night noise offences (12 000 Euro). This politics led to a considerable decrease in the percentage of exceedances uncovered during the monitoring over the last 5 years (% from the number of measurements).

Literature (in Russian):

1. Постановление Правительства Российской Федерации от 16 февраля 2008 г. № 87 «О составе разделов проектной документации и требованиях к их содержанию»;

2. СанПиН 2.2.1/2.1.1.1200-03 «Санитарно-защитные зоны и санитарная классификация предприятий, сооружений и иных объектов»;

3. Постановление Правительства Российской Федерации от 10 сентября 2009 г. № 720 «Об утверждении технического регламента о безопасности колесных транспортных средств»;

4. Постановление Правительства Москвы от 07.12.2004 № 857-ПП «Об утверждении правил подготовки и производства земляных работ, обустройства и содержания строительных площадок в городе Москве».