Ecological condition of Baku atmosphere and its improvement way

1. Introduction

Baku is one of the most polluted cities on our planet. In USSR period it was considered as one of the cities with the highest level of atmospheric contamination (Samedzadeh et al, 1982). Strong air pollution in Baku has noted been in recently carried out foreign researches and agencies data (fig.1.) (Kuliyev, 2004).

Major factors of Baku air pollution are overflow of urban population, placing of 60-65 % of the country industry here, lacks of the city planning structures, use of outdated equipment and technologies in manufacturing, popping of superfluous gas on offshore and coastal fields, car exhaust, etc.

For improvement of the city ecological situation and air purification it is necessary to provide a number of architecturally-planning and town-planning measures.

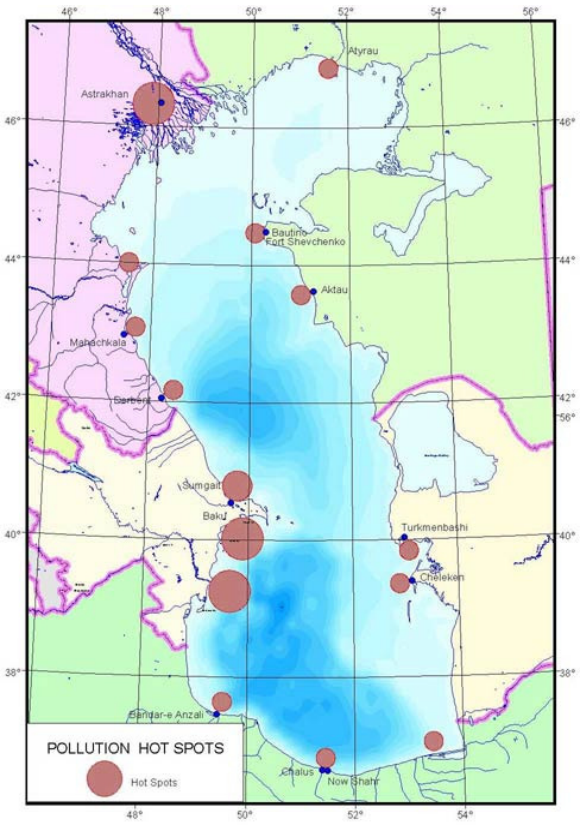


Figure 1. Polluted hot spots in Caspian region

2. Emission source of Baku atmosphere

First of all atmospheric air pollution in Baku is connected with an overflow of urban population (fig.2), and also placing of 60-65 % of the country industry on Absheron peninsula, in particular Baku and Sumgait.

Today according to official sources there are 3.5 million people in Baku. According to population census in 2007 nearby 8.5 million people live in Azerbaijan. In fact about 50 % of the country population and also other countries citizens who working in the foreign companies and have arrived with the various purposes lives in Baku. From these positions 4.5 million people is concentrated in Baku now. For example population of London make only 13 % of England population, population of Tokyo is 10 % of Japan population, inhabitants of Paris is 4 % of France population. Only Seul (South Korea) where lives 45 % of the all country population cans compete with Baku in it. It is necessary to note, that today the area of Baku is made 2.13 thousand km^2 against 86,5 thousand km^2 of Azerbaijan area. In the beginning of 1980 this value made 1,92 thousand $км^2$. According to carried out researches in 1980th 80 people lived on 1 km^2 of Azerbaijan capital, and now 600 (on official data) and 2112 people (actually) live here.

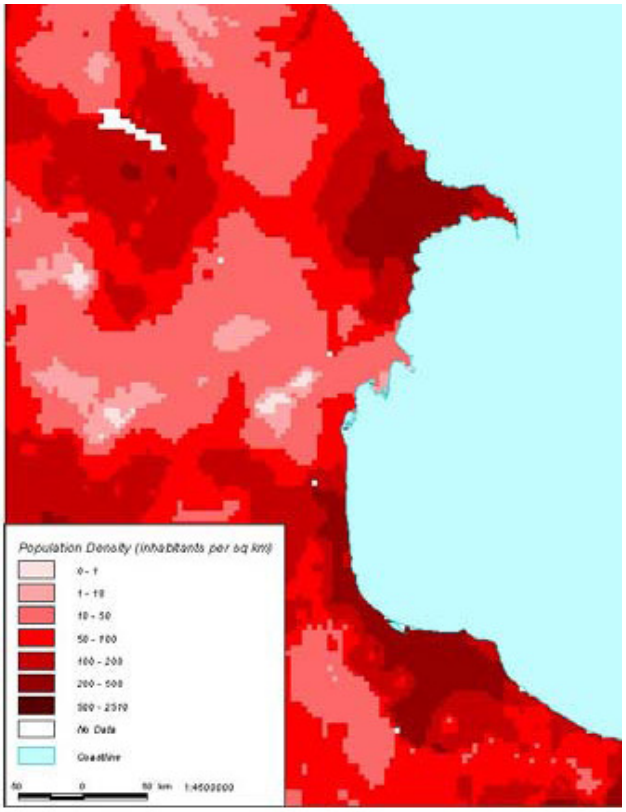


Figure 2. Population density in Azerbaijan

Pulling power of Baku capital center is that social and culture and industrial complexes, practically all higher and vocational educational institutions are concentrated here. Such position of the city and Absheron peninsula as a whole is nonrandom, it has developed historically. So, since the beginning of 19^{th} centuries the oil industry development has predetermined a heavy growth of the city and intensive migration here the population from all regions, and also from abroad. In 1920 – 1940 the development of productive resources in Azerbaijan was still determined by growth of petroleum-refining industry on Absheron (Akhundov et al, 1981). Therefore intensive developing Baku was opposite to disunited net of cities of other part of republic with a low production level. Only since 1940 as

a result of systematic town-planning and economic policy there is a significant outflow of Azerbaijan population into regions in connection with growth of such industrially developed cities as Mingechevir, Alli-Bayramli, Dashkesan, etc., and further expansion of historical cities function of Lankaran, Goychay, Agdam, Sheki, Nakhichevan, etc. Thus in 1920 specific density of Baku population in urban population of republic made 77,0, in 1939 - 68,4, in 1970 - 49,4, in 1981 - 48,1 %.

However, after USSR disintegration, Baku population began to increase sharply due to refugees from Nagorno-Karabakh and Armenia. Besides signing of the "Century contract», began to attract many foreign companies to Baku. The concentration of a significant part of the country industry on Absheron and underdevelopment of regions became the reason of the capital overpopulation.

During the Soviet period as a result of activity of the developed industrial complex the high content of contaminants, such as carbon, a dust, sulfurous gas, etc. was observed in the air of Baku (table 2).

Table 2

Atmospheric pollution of Baku in 1975 - 1981 (Samedzadeh et al, 1982)

Impurity	**1975**	**1976**	**1977**	**1978**	**1979**	**1980**	**1981**
Sulfur dioxide gas daily average concentration, mg/m^3	0,26	0,22	0,43	0,34	0,33	0,27	0,27
daily average maximum permissible concentration, mg/m^3	0,05	0,05	0,05	0,05	0,05	0,05	0,05
surplus maximum permissible concentration, time	4,2	3,4	7,6	5,8	5,6	4,4	4,4
Carbon oxide daily average concentration, mg/m^3	22	26	20	18	18	17	20
daily average maximum permissible concentration, mg/m^3	3,0	3,0	3,0	3,0	3,0	3,0	3,0
surplus maximum permissible concentration, time	6,3	7,7	5,6	5,0	5,0	4,6	5,6
Nitrogen dioxide daily average concentration, mg/m^3	0,10	0,11	0,13	0,10	0,07	0,08	0,07
daily average maximum permissible concentration, mg/m^3	0,04	0,04	0,04	0,04	0,04	0,04	0,04
surplus maximum permissible concentration, time	1,5	1,8	2,3	1,5	0,8	1,0	0,8
Dust daily average concentration, mg/m^3	22	26	20	18	13	17	20
daily average maximum permissible concentration, mg/m^3	0,15	0,15	0,15	0,15	0,15	0,15	0,15
surplus maximum permissible concentration, time	7,7	7,0	5,0	3,7	3,0	3,7	3,7

During the specified period periodic fluctuation of the daily average sulfurous gas contents have been connected with breakdown in technological regime of oil refining and treatment facilities. It is visible in the table 2, that daily average concentration on all components continues to exceed considerably daily average maximum permissible concentration which should not exceed for: sulfurous gas - 0,05 mg/m^3, carbon oxide - 3,0 mg/m^3, nitrogen dioxides - 0,04 mg/m^3, dust - 0,15 mg/m^3. Because of industrial emission influence the greatest atmosphere impurity was observed in the eastern, southern and southwestern parts of the city including Khatai, Nizami, Narimanov and Garadag municipal districts. During this period active polluter was Garadag cement mill. About 90 % of the city dust emitted into atmosphere here (Samedzadeh et al, 1982).

The maximum quantity of Absheron peninsula atmospheric emissions (2 million tons) is fixed in 1989 (Condition, 1997). In the beginning of 1990th years above 1590 thousand tosn of toxic pollutant emitted from stationary sources and motor transport. So, in 1990th 103,6 thousand ton of solid discharges, 16,6 thousand ton of sulfur dioxide, 24,3 thousand ton of nitrogen oxides, 202,3 thousand ton of carbon oxide, 1226,1 thousand ton of hydrocarbons discharged into Baku atmosphere. Cars contribution to total emission of toxic pollutant has made 12,4 %. In connection with reduction of production volume the atmospheric emission volume has also decreased and became 972,6 thousand ton in 1994 (Alekperov, 2001).

As results of the monitoring Baku air contamination continues to decrease the next years and in 1995 it reaches the level of 560,75 tons/km^2, but despite of it still considerably. From 60 toxic pollutants which emitting into the city atmosphere and its residential areas, it is possible to note a dust, carbon oxide, nitrogen oxide, ammonia oxide, chlorine oxide, fluoric hydrogen oxide, hard fluorides oxide, furfural oxide, sulfuric acid oxide. And, the contents of sulfurous anhydride, nitrogen oxides, carbon black, formaldehyde, mercury has reached on the average 2-3 maximum permissible concentration, however on separate zones the contents of carbon oxide - 6,2 MPC, nitrogen dioxides - 2,9 MPC, carbon black - 14,7 MPC, mercury - 4 MPC, furfural - 3 MPC, dust - 1,6 MPC has been noted (Abdullaeva, 2001).

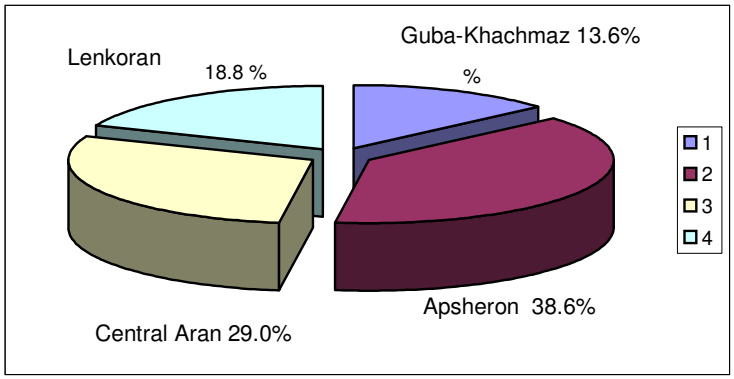
In 1995 in total amount of atmospheric emissions from 134 city enterprises 97,9 % is gaseous and liquid discharges, 2,1 % - solid ones. During this period major factor of Baku air pollution are outdated equipment and technology, combustion high-sulphur residual oil instead of scarce gas, systematic non-fulfilment of air protection measures, etc. The greatest pollution level in the city likewise in the beginning 1980th is observed in southern and eastern its parts of Baku that is connected with plants emissions placing in these city areas, and also in the central industrial zone of the city where the oil refining enterprises are concentrated. Division of city into three parts (two residential areas on flanks, and the industrial zone in the middle) was naturally enough in the beginning of the city territory development process. However, lacks of sanitary buffers between residential and industrial zones leads to spread of atmosphere pollution in residential areas. Northwest and extreme eastern parts of the city are polluted least of all. During this period the main polluters of Baku atmosphere are State oil company enterprises - 95,2 %, “Azerindustryconstructionmaterials” State concern - 2,01%, ‘’Azerigas” State company - 1.4 %. Atmospheric emissions containing toxic pollutant were discharged without purification from these enterprises (Abdullaeva, 2001).

Today the basic industrial enterprises of Azerbaijan are concentrated on Absheron peninsula (enterprises of fuel and energy, petrochemical, metallurgical, machine-building complexes and industries of construction materials), that is potential threat for ecology of this region, including atmosphere (Agazadeh, 2002). However, after disintegration of Soviet Union the most part of these enterprises do not operate or are liquidated, ecological threat in this region has decreased. On the other hand the oil-and-gas industry has developed as a new source of emission. Many offshore and coastal fields are operated, popping superfluous gas, and also new oil refining plants have been placed (Caspian ecological programme, 2001).

In this connection atmosphere of Absheron peninsula is subject to industrial pollution again. The proportion of air emissions in total loading of atmospheric losses on the coastal

area is shown on diagram 1. According to the diagram proportion of Absheron makes 38,6 % from the all coastal area (Ministry of ecology, 2002).

Diagram 1. The proportion of air emissions in the districts



Dynamics of air emissions and dynamics for air emissions discharged from fixed sources are resulted in the tables 3 and 4 (Ministry of ecology, 2002).

Table 3

Dynamics of air emissions (Ministry of ecology, 2002)

Economic-geographic districts	1990		1999	
	Amount of fixed sources	Total emissions (thousand tons)	Amount of fixed sources	Total emissions (thousand tons)
1. Guba-Khachmaz	98	26.6	53	1.17
2.Apsheron	10467	1503.1	7552	367.33
Including Baku	9227	1395.9	6494	326.65
Sumgait	1158	96.5	978	40.3
3. Central Aran	1122	106.9	871	82.93
Including Ali Bayramli	380	67.3	249	31.7
Lenkoran	163	26.3	40	0.06
Total in the coastal area	11850	1663.5	8516	451.49

Таблица 4

Dynamics for air emissions discharged from fixed sources (thousand ton) (Ministry of ecology, 2002)

Economic-geographic districts	Years	Total emissions	including						
			Solid substances	Gas and liquid	SO2	CO	NO	CH	VOC
Apsheron	1990	1503.7	123.1	1380.6	29.6	57.3	24,9	1236,0	24,2
	1999	367.33	12.68	354.65	7.07	20.1	10,42	307,36	9,2
Including Baku	1990	1395.9	103.6	1292.3	16.6	45.9	14,0	1195,9	16,0
	1999	326.6	10.7	315.9	3.9	17.5	8,1	279,4	6,6

Since 1999 atmospheric emissions in region are studied poorly enough. Available data are received from Caspian Environment Programmes. However these reports do not discover the general situation of air pollution in the region. Some data of the research(Caspian environment, 2002) (Caspian environment, 2002) by the method of carrying out the express analysis on JUNIDO system are resulted in table 5 .

Table 5

Air Emission Inventory for Absheron Peninsula including Baku and Sumgait (Caspian environment, 2002)

Industry	ISIC	SO_2	NO_2	CO	VOC	Fine Particulates	Total Suspended Particulates
		Kg/Year					
Meat Products	3111	5.1	52.6	13.2	0.3	0.2	1.5
Dairy Products	3112	1.3	1.8	0.3	0.1	0.00	0.7
Malt Liquors And Malt	3133	18.8	14.8	0.9	1.5	0.03	1.03
Industrial Chemicals Except Fertilizer	3511	10215.9	7588.2	5860.7	5929.4	346.3	1641.6
Synthetic Resins. Plastics Materials. & Manmade Fibres	3513	1397.4	3631.9	537	2657.8	1.13	213.5
Petroleum Refineries	3530	76067	43756	39516	40272.9	768.1	6710.8
Glass And Glass Products	3620	141.1	280.7	75.6	36	5.9	56.3
Structural Clay Products	3691	19.6	188.9	44.8	15.4	30.2	148.3
Cement, Lime, And Plaster	3692	11921	5535.2	673.7	31.5	9912.5	5765.6
Nonferrous Metals	3720	4514.7	147.1	2100.1	164.2	41.5	379.2
Structural Metal Products	3813	16.1	68	27.2	74.4	1.1	3.5
Special Industrial Machinery & Equipment	3824	124.5	106.6	18.9	80.6	0.3	24.7
Electrical Apparatus And Supplies. N.E.C.	3839	3.9	8.4	17.6	4.11	0.11	3.04
Shipbuilding And Repairing	3841	45.2	20.2	2.7	167.3	45.2	14.1
Aircraft	3845	12.4	10.1	25.8	38.3	0.4	1.9
TOTAL on Absheron		**104504**	**61411**	**48915**	**49473.8**	**11153**	**14965.9**

At this stage the basic sources of toxic emissions in Baku atmosphere cars which quantity has strongly increased on Baku roads last years. According to data of Azerbaijan Ministry of ecology, 60 % of environmental pollution incomes from transport agencies. In 1980 - 11,4%, in 1990 – 26%, in 1999 – 47% of all city atmosphere emissions discharged from motor transport (Babayeva, 2002). In 1981-1982 the quantity of cars was 100 thousand in Baku. According to Baku municipal data in some city streets intensity of car movement reached up 1200-2000 cars during "peak" hours (table 6).

Table 6

Intensity of transport movement of during "peak" hours on Baku main roads and streets in 1980 (Samedzadeh et al, 1982).

Main road, street (point of observation)	Total amount of automobiles	Including	
		trucks, %	cars, %
Mehti Huseyn str., 73	850	19	81
Mesheti str., 20	1200	22	78
Gagarin str., 8	980	38	62
Aga Neymatulla str.	2380	37	63
Tramvaynaya str., 5	800	50	50
Jerjinsky str., 41	1680	30	70
Azadlig prosp., 151	1730	25	75
Morozov str.	1300	25	75
Neftchilyar prosp., on the section «Azneft-Finikulyor»	1200	40	60
Krasin str.,9	660	20	80
Niyazi str., 5	600	30	70
Istiglaliyyat, on the section Niyazi – H.Hajiyev str.	200	20	80
Garayev str., on the section H.Hajiyev - Zargarpalan str.	600	25	75
Saratoves, on the section R.Rza –Mardanov str.	800	15	85
Khagani, on the section Karganov- S. Vurgun str.	600	35	65
R.Behbutov prosp., 18	690	12	88
R.Behbutov pros., on the section Sverdlov – Ketskhoveli str.	800	20	80
Shmidt str.	1200	15	85
S.Vurgun, on the section Mir-Kasimov – Bakikhanov str.	600	30	70
Bakikhanov str., on the section S,Vurgun – Jabiyev str.	1200	50	50
Tbilisi prosp, 74	1000	40	60
Inglab str., on the section S.Vurgun – Gogol str.	800	50	50

Today the number of cars grows rapidly in Baku. In Azerbaijan in 1950 each 1000 people have 10 motor vehicles, in 1980 – 34, in 2000 - 75, in 2006 – 165 motor vehicles. In the European countries each 1000 people have 500-800 cars, in USA - 700-1100 cars. This indicates that automobilization standard in the country is lower, than in the other developed countries (Garaisayev & Piriyev, 2007a). However, transport is unequal distributed in the country territory. According to statistical data, 60-65 % of all Azerbaijan transport is concentrated in Baku. Each 30 cars fit 100 families in Azerbaijan, This figure makes 51 cars for Baku. In other words each 2 families have 1 car here.

According to the official statistics (January, 01, 2007) the number of vehicles is 690 thousand; 4/5 of these vehicles – motorcars, 14,3 % - trucks, 3,6 % - buses, others – special-purpose. As it has been noted above, 60-65 % (nearby 450 thousand vehicles) is concentrated in Baku (Garaisyev & Piriyev, 2007a). By 01.06.2007 year this figure has grown up to 720 thousand vehicles in Azerbaijan, and in the beginning of 2008 the number of vehicles has made nearby 830 thousand in the country, from which 540 thousand (65 %) is concentrated in Baku.

At present the total roads length is equal 2013 km in Baku, from which 90 % are asphaltic concrete roads. The main roads length is 1053 km. However 80 % of these roads have become outdated morally, there are not capable to provide fast and comfortable circulation of traffic flows. Besides the city roads have become outdated in view of planning

too. There are no modern roads and highways, traffic intersections, underground parking, subways and tunnels.

From stipulated numerous highways and roads in Baku general construction plan only H.Aliev prospectus was reconstructed. The basic cause of excess loading of highways in Baku is the fact, that in comparison with European metropolises the building density in Baku is 2.5 times as high, the road network density is 7-15 times as low. Therefore for prevention of peak situations it is necessary to use surface and underground space for increase in transport territories.

The density of the city streets is 0,9 km/km^2. For comparison in European cities this parameter is equal 8-10 km/km^2, in America - 12-14 km/km^2. According to standards the density of main roads and streets net in the cities should be 3,2-3,5 km/km^2. At the same time, the density of public passenger transit ways net in the city planning structure be 1,5 2 km/km^2 (Kuliyev, 2004).

In many USA cities from 1/3 up to 1/2 of all city territory is usually site for road construction. In metropolises of the post-Soviet space it was sited about 20-25 % of city territory of city for this purpose. One more parameter is the road area per capita. Los-Angeles has 105 m^2 , New York - 32 m^2, Moscow - 12 m^2, St.-Petersburg - 10 m^2, Baku - nearby 8 m^2 of road area per person. In USA cities large transport territories are caused basically by small sizes of residential quarters and high density of street network (Garaisayev & Piriyev, 2007a).

For these reasons the majority of Baku main roads and streets function on the verge of network capacity, that promotes formation traffic congestions (fig.3). Besides Baku is rather complex city in a view of vehicular traffic organization. First of all, it is connected with the developed mixed ring-radial network inherent in the majority of old cities. Majority of traffic jams occurs near “Azizbekov” subway station, on Ziya Bunyadov street and Azadlig prospectus intersection, on Tbilisi prospectus, etc. According to official data traffic congestions are formed on 35 crossroads of the city. One of principal causes of traffic jams is more than 31 parking places have been demolished in the city, and high-rise buildings are constructed on their places. As a result the city sidewalks have turned into parking places that reduces main roads capacity and leads to increase in atmospheric emissions. If to consider, that each road strip is capable to let throw about 800 motor vehicles in the central part of the city, it is possible to understand the weight of the created situation.

Figure 3. Traffic congestions in Baku: left - in the 3 microdistrict It is visible, that the bridge does not makes created traffic jam easier); right - on highway near 8 kilometers (source: www.day.az).

There are 3000-3500 car/hour on R.Behbutov and 28th May streets during "peak" hours. However on the main city roads (H.Aliyev, Neftchilar, Tbilisi prospectus, etc). about 50

thousand motor vehicles daily moves in one side. So, 100 thousand vehicles move on each road to both sides. Considering the main communications condition, it is great loading enough. In addition many central streets of Baku have complex geometrical characteristics, a lot of intersections after each 100 m that affects car speed. During peak hours there are extensive traffic jams on Neftchilar prospectus, near Maiden tower and Azizov street.

Traffic congestions damage to human health. Idling is the most harmful from the view of air contamination. 70-75 % of the city motor-vehicle park are old cars (15 years of exploitation and more). According to statistical data 1 car emitted annually 1,3 - 1,5 tons of toxic pollutions into an atmosphere (Garaisayev & Piriyev, 2007b). By these calculations about 1000 thousand tons of toxic pollutions annually emit into atmosphere only by motor transport in Baku. 600 thousand tons (60%) from them is carbon oxide.

3. Modern methods of air pollution control in cities

It is necessary to carry out measures for atmosphere purification at several levels in Baku. General rules in sphere of environment for all levels is the special attention to development of measures connected with rational use of territory, functional zoning, mutual location of industrial and residential zones. Microterritorial level differs by concreteness of developed measure on improvement of urban environment (including town-planning means) - rational functional zoning and transport communications tracing, gardening, water supply and collecting systems, development of offers on effective measures on aeration and insolation of residential, public and industrial buildings and complexes, measures on acoustic, electromagnetic waves and other negative influences protection. Urban-ecological researches (as well as design offers) at this level are based mainly on town-planning, architectural-planning and hygienic and technological methods (Vladimirov, 1982).

Toxic industrial emissions polluting city atmosphere, not only affect human health, but also lead to reduction of city territories due to sanitary buffers arrangement. The analysis of cities general plans has shown, that the area of sanitary buffers considerably increases. It explains increase of sanitary-and-hygienic requirements. (Akhundov et al,1981). Progressive "know-how" application and increase of treatment facilities efficiency allows to considerably reduce sanitary buffers. Sanitary buffers between the city central industrial and residential zones is practically absent in Baku. In spite of the fact that as prevailing winds are considered southern and northern, in effect the winds often change the direction and consequently here and buffer zones absence complicates an ecological situation of residential areas.

Now great hopes in the field of air protection bind by maximal gasification of the industry and fuel and energy complex, however the effect of gasification should not be exaggerated. Transition from solid fuel on gas sharply reduces sulfurous emissions volumes, but it increases emissions of nitrogen oxides which recycling is technically problematic for the present. The similar situation develops at reduction of carbon oxide emissions, which is the uncomplete combustion product.

The methods of industrial emissions sanitation from a dust and some other harmful impurities received big development now. As a whole the problem of catching of a dust from effluent gases is successfully decided. However, incomplete emission sanitation (in particular from sulfurous gas) promotes acidation of atmospheric precipitation. It leads to soil impoverishment, increase of surface and ground waters acidity, therefore catching of sulfurous impurities represents especially important problem.

Fuel purification from sulfur which is the reason of sulfurous gas formation incapable to catching is rather perspective. The cost of fuel alkali treatment is quite competitive with the cost of modern filters application and can make 5-12 % of basic manufacture charges.

All the listed measures which are carried out in various combinations, are capable to considerably reduce harmful atmospheric emissions, but the final decision of this problem is probable only at transition of industries to closed technological cycles, at transition to non-waste technology. Such methods are especially actual for Baku.

From the point of view of modern science and technology the closed processes are quite realizable in any industry, but besides conditions of profitability of such manufactures it is required colossal energy for their realization (that leads to additional air pollution from thermal power plants).

Unlike stationary sources the air pollution by motor transport occurs at small height and practically always has local character.

As a whole of motor transport emissions are much more toxic, than stationary sources ones. Alongside with carbon oxide, nitrogen oxides and carbon black (in diesel motor vehicles) the working car emits in environment more than 200 toxic substances and compounds.

Undoubtedly, in the future air pollution by motor transport will the greatest dangerous in cities because there is no cardinal decision of this problem yet.

Perfecting of internal-combustion engine (technically quite real direction) can reduce specific consumption of fuel up to 10-15 %, and also reduce emission volume up to 15-20 %. It is necessary to consider that the real ecological effect of these measures is not high as, for example, reduction in volumes of carbon oxide emissions is substantially make up with increase in nitrogen oxides emissions.

Besides automobile perfection the planning measures, measures on perfection of car streams management and measures on rationalization of city inland traffic can make a serious contribution to reduction in cities atmosphere gas contamination. Architectural-planning measures include removal of transit car streams on the special high ways placing outside of city residential areas, isolation of foot ways from traffic streams, use of city underground space for traffic artery, parking and garages, application of rational planning and construction methods, in particular territory zoning, use of screening devices and noise rejecting gardening, etc.

Creation of the integrated automated control system of transporting in cities can sharply reduce kilometerage within the precincts of a city and accordingly reduce its air pollution. In this connection the project of «Intellectual control transporting system of Baku» recently presented to the Azerbaijan government inspires some optimism. Thought the instrumentality of this system the vehicles management, buses streams regulation on routs will be realized in Baku and Absheron peninsula. In control centre the quantity of operating buses, the distance between buses, schedules of stop and movement, number of passengers in buses, etc. will be daily controlled. Such system is already actively applied in Seoul where transport is managed by integrated intellectual movement control system.

In each country has an experience of traffic congestion control. There is only a entrance restriction in Fortress in Baku. Only residents and working personal in territory of Ichery Sheher can drive into Fortress. It is problematic to apply the similar method to other areas of Baku, as the basic roads from one capital periphery in another one run through the city centre (for example from Bailov to Zykh sett.).

Today during traffic congestion the most ecological method is public transport using, in particular a tram which allows to carry a lot of passengers on small distances. Now it is observed recurrence of this transport type in cities all over the world. The most economic and ecological transport - trams and trolley buses have been liquidated in Baku in 2000 (Kuliyev, 2004).

5. Conclusion

During drawing up of air improving measures in Baku it is necessary to provide the following:

- to realize full liquidation of the oil-field economy and oil reservoirs in territory of Baku;
- to relocate especially toxic manufactures (asphalt plants, factories, shops, to liquidate cast-iron shops) outside of city residential zone;
- to create and expand sanitary buffers around of the enterprises most actively polluting an atmosphere (oil refining, chemical industry, construction materials manufactures and etc.);

-to provide construction of r gas-treating and dust-collecting plants on the industrial enterprises, such as Garadag cement mill, Garadag gypseous plant, oil refinery and also full hermetization of all oil fields in the city territory;

For decision of ecological problems, connecting with Baku air contamination by vehicles, it is necessary to take a number of measures:

- to carry out all city roads for increasing of its capacity;
- to work out the modern roads projects adequating to the international and local standards;
- to create in all motor transport services the diagnostics points, equipped with devices for defining discharge gases and fuming toxicity;
- to speed up work pace on creation of urban motor-ways with “Green time” regime;
- to increase a proportion of electrotransport in passenger traffic (trolley buses, trams and the underground), gradually replacing buses by them. To separate out a special traffic lane for public transport;
- to create parking system, to forbid parking on waysides;
- to increase Baku traffic density in 1,5-2 times, to duplicate the basic city main roads;
- to prohibit entrance of personal transport to the city centre, to create foot zones here;
- to achieve transport outflow from the city centre by creation of district sub-centers.
- to forbid exploitation of old cars within the bounds of the city (over 10 years);
- to landscape the city by plants, typical for Absheron climate;
- to use overground and underground spaces for creation of pedestrian crosswalk, to use arch, passages, etc. in the city center for these purposes.

In residential areas and microdistricts it is necessary to provide:

- designing of residential and public buildings heating systems in the form of group or district boiler-houses with liquidation of individual and simple boiler-houses;
- increase in intraquarter gardening and green zones, cultivation of vertical gardening;
- asphalting of nonpaved road and square surfaces, especially on the city surburbs in northern and northwest part;
- admeasure of building sites for avtosilo, and also appropriate underground and ground floors of all new projected high-altitude residential buildings and offices for parking;

References

Abdullaeva E. (2001) Landscape and an atmosphere of urbanization centres. Baku, *Urbanism № 1*, pp.52-61

Agazadeh R. (2002) Problems of improvement of Baku residential areas environment. *Urbanizm*, №1, Baku, El-Aliance, 79-82 p.

Akhundov V.Y., Akhundov K.F., etc. (1981) *Baku by 2000 year (hygienic aspects of an environment)*. Baku, Azerneshr, 178 p.

Alekperov A.B. (2001) *Mechanism of hydro-geological processes in natural-technogenic systems and application of a method of artificial intellect for their forecasting and management (on example of Absheron agglomeration)*. Abstract of doctoral dissertation. Baku, 437 p.

Babayeva Sh.Sh. (2002) Transport and pedestrian communications in the residential quarters of Baku central zone. *Urbanizm*, №2 (3), Baku, El-Aliance, 55-58 p.

Caspian Environment Programme (2002). *Transboundary diagnostic analysis for the Caspian Sea. Volume 2.* Executive Summary and Environmental Quality Objectives. Baku, Azerbaijan, September, 139 p.

Condition of environmental control in the Azerbaijan Republics. (1997). Report. State Committee of Azerbaijan Republic on Ecology and Control over natural management. Baku, 95 p.

Garaisayev S, Piriyev Y. (2007) Baku transport problems: have any decision of the problem? *"525th newspaper"*. May, 2

Garaisayev S, Piriyev Y. (2007) Baku transport problems: traffic congestions. *"525th newspaper"*. April, 28

Kuliyev E. (2004) Car - the main atmosphere polluter*. Echo* №80 (818). April, 28

Ministry of ecology and natural resources of the Azerbaijan republic. (2002) N*ational Caspian Action plan of Azerbaijan republic*. Report. Baku, 72p.

Samed-zade Z.A., Akhundov V.E., Khanlarov E.N., etc. (1982) *Economic and social development of Baku (1981-1985).* Baku, Communist, 586 p.

Tacis. Caspian Ecological Programme (2000). Regional Center on Environmental pollution control. *An estimation of Measures for Environmental pollution control.* Azerbaijan. Baku, 101 p.

Tacis. Caspian Environment Programme, Phase 2. (2001) *Socio-Economic Situation Related to Desertification*, November, 61 p.

Vladimirov, V.V. (1982) *Settlement and an environment*, Moscow, Stroyizdat, 228 p.

Shahla Kahramanova, Musaddin Namazov. Ecological condition of Baku atmosphere and its improvement way, Azerbaijan