

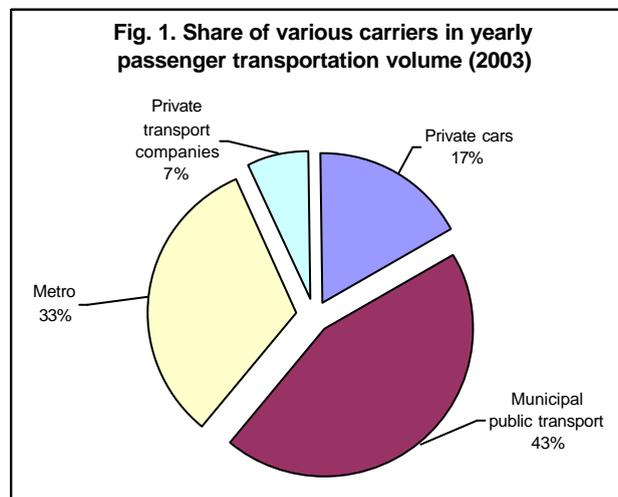
# A Case Study from Russian Federation

## Promotion of the Public Transport as a Base for Sustainable Urban Transport System in Moscow City\*

### 1. Background information

Being a center of the large-scale urban agglomeration, Moscow city occupies 1080 square kilometers and houses over 10.5 millions of the resident population. Moscow agglomeration includes a number of towns which, while not considered a part of Moscow city for administrative purposes, have long since merged with it. The agglomeration houses 13.5 million people. Urban transport system of Moscow is characterized by the following key features:

- **Radial planning scheme of the city's road network.** The road network of Moscow consists of twelve radial highways emerging from the city's centre and three main ring roads. As a consequence of such city planning scheme the central part of the city is predisposed to congestion as large number of transit vehicles passes through it.
- **Prevalent share of public transport in passenger transportation.** Despite the considerable recent growth of private car fleet, Moscow is still dependant on public transport (metro including) which provides about 76% of the yearly passenger transportation volume. Surface public transport's share is over 43% (Figure 1). As a result a reliable public transport system is an important factor of social stability.
- **Well-developed metro network.** Metro network today forms a base of Moscow's public transport system, providing more than 33% of the city's passenger transportation volume. Its attractiveness to the commuters is mainly explained by the high quality of the transport service it renders. Metro has high working speed (35 km/h), and low waiting time (1.5 – 3 minutes) as compared to the “congestion-choked” surface transport. This high quality has somewhat deteriorated due to surface traffic congestion which forces many car-owners to travel by metro causing regular “passenger overflows”.



### 2. Current trends and problems in urban transportation

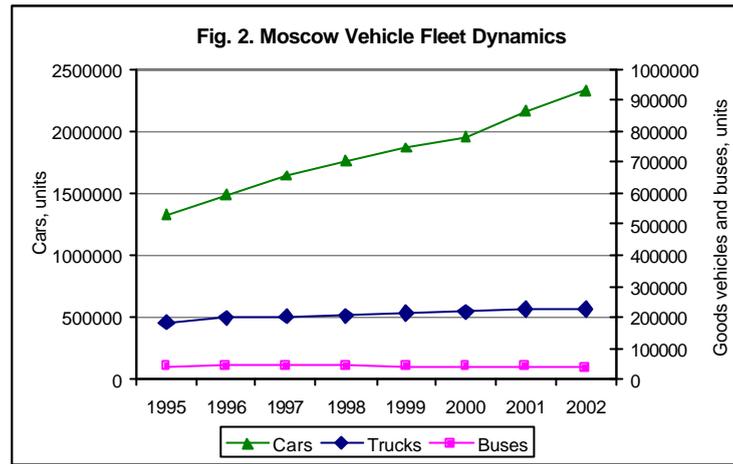
#### *Motorization and mobility trends*

In Moscow the rate of motorization is relatively high first of all due to growth of the private car fleet (7,3% on average for the last five years). The current motorization level is over 240 cars per thousand inhabitants.

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\* Report written by Vadim Donchenko, Yuliy Kunin and Dmitry Kazmin, State Scientific and Research Institute of Motor Transport, Moscow.

The immediate consequence of this and the insufficient capacity of the road network is the significant growth of the traffic congestion.



### *Traffic congestion*

During the peak periods (8.00 a.m. – 10.00 a.m., 6.00 p.m. – 8.00 p.m.) number of motor vehicles moving through the city's streets is estimated to be as high as 600 thousand. The city's center is constantly overloaded from 8.00 a.m. to 8.00 p.m. with the peak periods being ill-defined. The average speed of the traffic flow is about 30 km/h in the peripheral districts of the city and no greater than 15 km/h in the center. Congestion is further aggravated by the lack of off-street parking lots, as many car drivers park their vehicles along the roadside thus reducing the road network capacity.

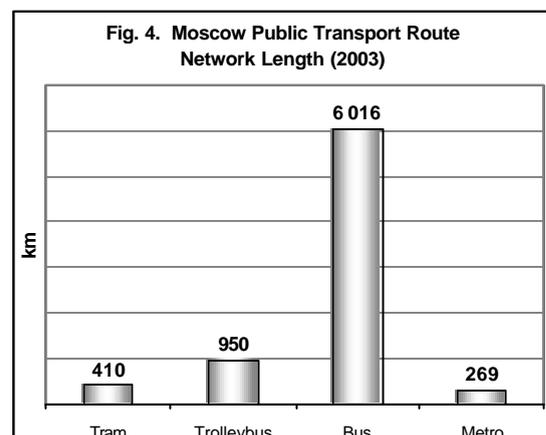
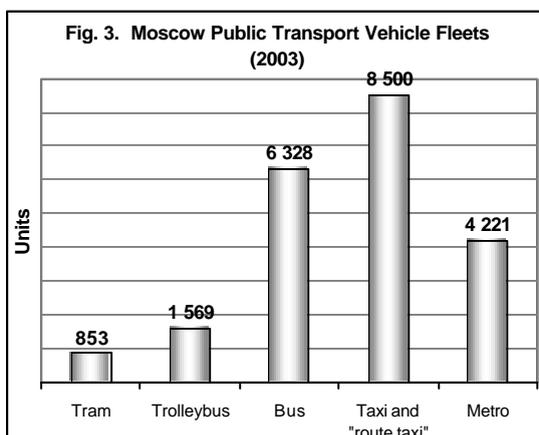
### *Environmental impact of the city's transport system*

Motor vehicle fleet remains the main source of air pollution, being responsible for more than 80% of the total pollutants emission in the city. The high motorization rate in Moscow is mainly achieved by increasing the car fleet with either new Russian-made vehicles or second-hand vehicles imported from Europe, many of which do not comply with the modern environmental standards. Besides the average age of Moscow's car fleet is about 9 years, so its environmental characteristics are deteriorated. As a consequence cars contribute 64% to the total motor transport emissions. The contribution of the car fleet to the emission of hydrocarbons, nitrogen dioxide and benzene exceeds 70%.

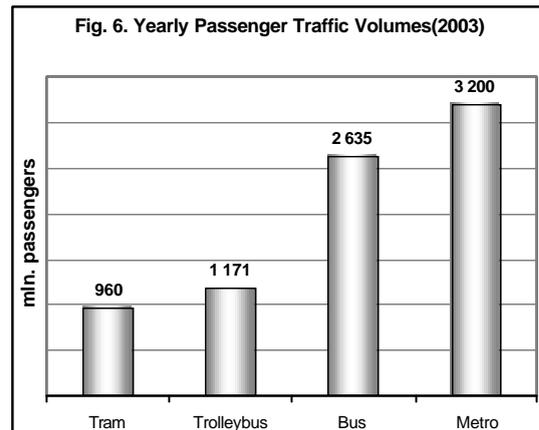
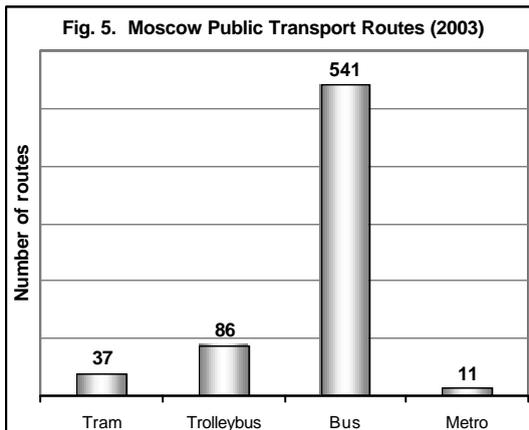
## 3. Public transport of Moscow City

### *Routes and vehicle fleets*

The public transport of Moscow is represented by bus, trolleybus, tram and metro lines as well as taxis. Their characteristics are briefly summarized in the Figures 3-6. Besides the new modes of transport are being introduced.



The very first 16 km monorail line is nearing completion, and the construction of the two light rail lines is underway. The light rail lines will connect “regular” metro stations with the large residential areas outside Moscow’s outer ring road.



### *Moscow City’s market of public transportation services*

The majority of passenger transport enterprises operating buses of medium to high carrying capacity, trams and trolleybuses are owned by the city. The income of such enterprises does not usually cover the operational costs (Table 1), and the losses are covered by the city budget. This is partly due to the ineffective management, but the main reason is the national policy of granting fare privileges as will be further described below.

Profitable privately owned transport companies as a rule operate taxis and so called “route taxis”\*. There are also a significant number of car owners which provide taxi services without a license.

Table 1. Share of operational costs covered by income (1999)

Mode of transport	Share of operational costs covered by income, %
Urban bus	58.2
Suburban bus	61.3
Trolleybus	49.8
Tram	43.3
Metro	69.3

Public transport companies in Moscow currently face the same problems as everywhere in the Russian cities. Being unprofitable they are unable to renovate their production assets on a regular basis. As a consequence, they experience a shortage of vehicles, and their fleets are considerably depreciated. Inability of the public transport companies to render quality services makes the more affluent commuters switch to car use, which further decreases the public carriers’ revenue, thus forming a vicious circle. As it was said above, this situation mainly stems from the national policy concerning public transport.

The economic reforms of the 1990s transferred responsibility for urban public transport from the state to the municipalities, but did not allocate sufficient funding. This resulted in the loss of quality and quantity of public transport services.

Besides, national government continues to resort to exempting certain categories of the commuters from paying for the public transport services. Granting reduced or privileged fares can be justified for social reasons, but in the current situation the state solves social problems at the expense of public transport companies. Currently there are fifty categories of the “privileged” commuters as compared to the nineteen some ten years ago. This and

\* Small buses with carrying capacity of about ten passengers, coursing on regular routes with no fixed stops.

inefficient methods of transport fare collecting resulted in only 38% share of passengers paying for their tickets in urban transport.

In an attempt to ease this burden upon the public transport, the Ministry of Transport of the Russian Federation stepped in with a legislative proposal which would replace privileged transport fares for monetary compensation for several categories of the commuters.

#### ***Promotion of the public transport***

The perspective plans for Moscow's transport system development drawn by the government provide for considerable investments into public transport. The funds will be allocated for the following purposes:

- Increasing and renovating of the vehicle fleet.
- Opening new public transport lines and developing its infrastructure.
- Introducing new transport modes (light rail and monorail).
- Improving fare collection efficiency by introducing turnstiles, magnetic transport card readers and similar devices.
- Improving environmental safety of the public transport by switching the buses to alternative fuels, etc. (more on this later).

## **4. Implementing sustainable urban transport policies**

### **4.1. Environmental policy**

Through the years the city's government has implemented different policy measures aimed to curbing air pollution by motor vehicles.

#### ***Fuel quality management***

The leaded petrol was prohibited for sale in the city's territory by the Mayor's decree in 1993. Three years later the standards for the so called "city fuels" (both petrol and diesel fuel) with improved environmental properties (namely lower benzene and sulfur content) were developed (Table 2). In 1997 another decree from the Mayor offered Moscow Oil Refinery a significant tax discount for producing the "city fuels". Simultaneously the fuels which didn't comply with the new standards were prohibited for sale. By the year 2000 the demand of Moscow's vehicle fleet was fully supplied with the "cleaner" fuels.

As a result a 15% reduction in pollutants emission from motor vehicles fleet was achieved. Besides, relatively low sulfur content (>500 ppm) of the "city fuels" allows the effective use of exhaust filters and catalytic converters.

Table 2. Improvement in the fuels' environmental characteristics.

Polluting agents content	AI-92 and AI-93 petrol (produced since 1977)	"City" petrol	"L", "Z", "A" type diesel fuel (produced since 1982)	"City" diesel fuel
Mass fraction of sulfur, ppm	=1000	=500	Type 1: =2000 Type 2: =5000	Type 1: =500 Type 2: =1000
Volume fraction of benzene, %	Not regulated	=5%	Not regulated	Not regulated

#### ***Switching to alternative fuels***

The Moscow Programme for conversion of motor transport for use of compressed natural gas was adopted in 1997. The Programme provides for the development of numerous requirements and standards, building a network of gas-filling works (23 to date) and allocating sufficient funds to the municipal transport enterprises. So far it has resulted in 120 thousand vehicles switched to compressed natural gas use. According to the recently adopted Medium-Term Environmental Programme for 2003-2005 dimethyl ether is to be introduced as an alternative fuel. To achieve this, the city's government plans to set going industrial production of dimethyl ether as well as the engines utilizing it.

### *Equipping vehicles in use with catalytic converters*

This programme, aimed at fitting public transport vehicles owned by the city with catalytic converters was adopted in 1996 and continues to the present. Currently about 25 thousand of the city-owned buses and trucks are equipped with the catalysts.

## **4.2. Traffic management and parking policy**

### *Traffic management*

One of the most significant achievements in this field was the introduction of the “START” – automatic centralized traffic monitoring and management system. The system’s main task is to increase the capacity of the city’s streets and reduce transport delays by coordinating the traffic lights. The central computer collects data from numerous traffic detectors installed at the important crossings, and performs multi-objective optimization of the traffic lights working regime for the entire road network. “START” also incorporates video cameras allowing the operator to closely monitor the traffic, and street indicator boards used to inform the drivers about the transport situation in the city.

At present on over 253 of Moscow’s traffic lights at 122 of the most important intersections are controlled by the “START” system. The estimated benefit is from 10 to 12% increase in the road network capacity.

Another important traffic management measure aimed both at improving environmental conditions and transport system sustainability was restricting the access of the trucks and lorries to the part of the city within the central ring road (“Sadovoe Koltso”). To drive into the Moscow’s centre on weekdays from 8.00 a.m. to 7.00 p.m., a truck must be issued with the special pass by the State Vehicle Inspectorate (GAI). The vehicles of the indispensable municipal services and federal agencies are exempt.

Currently the Moscow government is developing a legislative base for restricting the private cars’ access to the same central area.

At the same time the Traffic Management Center of Moscow’s government (CODD) is considering the viability of a major alteration to the traffic organization scheme within the city’s centre which includes switching the central ring road and several important highways to single-direction traffic. This is thought to help alleviate congestion and free significant space for car parking.

### *Parking policy*

Though there are a number of city-controlled roadside parking lots (requiring payment) in the center of Moscow, they play no significant part in alleviating traffic congestion. According to the current legislation the city’s government has no way to enforce the use of municipal parkings as the evacuation of the improperly parked vehicles has been prohibited. Therefore most of the vehicle owners prefer not to use the municipal parking lots so as not to pay the charge.

This may soon change however as Moscow Government proposed a new legislative act which prohibits on-street parking except on the specially allocated territories.

The plans of development of Moscow’s transport infrastructure include the introduction of the “Park & Ride” system. The very first element of this system was put into operation as a pilot project in March 2003. This is a parking lot able to accommodate up to 320 cars which is built nearby a metro station and is situated on the border of the most congested central part of the city. Its operation is controlled and subsidized by city’s authority. Currently the parking fee and equals about 1 euro per car during the period from 8.00 a.m. to 8.00 p.m. During the nighttime the fee is 0.3 euro for each hour the car remains parked.

It is important to note that no discount on public transport services is offered to the commuters who use this parking. Still, parking there allows the commuters traveling to the congested central part of the city to save sometimes as much as 30 minutes just by leaving their cars behind and using the metro.

Whether this pilot project is a success or failure is yet to be seen, but if met with enough demand from the commuters, Moscow's authorities plan to gradually introduce other such facilities. By the year 2020 their total capacity is supposed to reach about 150 thousand cars.

## 5. Conclusion

It should be admitted that the numerous environmental, traffic management and other programmes currently operating in Moscow fail to achieve their full potential at solving the city's transport problems. This is mainly due to the following flaws in the decision making and implementation process:

- To date all the attempts made by Moscow authorities at implementing sustainable urban transport policy measures, while many in number, have been poorly coordinated and lacking systematic approach. Urban planning, traffic and parking management, environmental policy are not linked to each other and do not form an integral whole.
- The key elements of the sustainable transport policy such as parking management currently lack the appropriate legislative base.
- Insufficient funding is allocated to programmes currently in operation.
- Little attention is paid to promotion of walking and cycling.
- No programme includes measures to facilitate urban transport use for the disabled people.

Recently a more integral transport strategy emerged, formulated in the "Reference direction of improvement of the traffic management in Moscow City for 2002-2020", adopted by the city authorities. This document provides a common framework for the coordinated implementation of the urban planning and sustainable transport policy measures. If, despite the general lack of political will and responsibility prevalent in the city's governing organizations this plan is seen through, it will form a solid base for the sustainable transport policy in Moscow.

Finally, it must be stressed that, as public transport forms the base of Moscow City's transport system, its development is the only way to achieve sustainability. Until a viable and competitive alternative to the private car is provided, no amount of traffic management measures, road building or car use restrictions will effectively combat environmental pollution and congestion.