

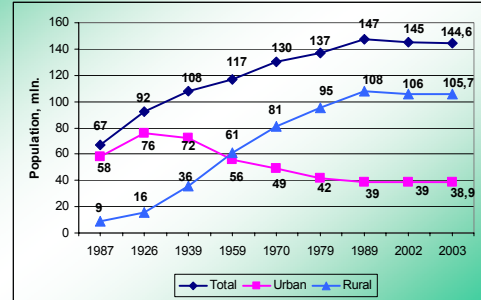


## PROBLEMS ACHIEVING SUSTAINABLE URBAN TRANSPORT IN RUSSIA

*Dr. Vadim V. Donchenko, Deputy Director General  
The State Scientific and Research Institute of Motor Transport (НИИАТ)*



### Change in urban population in Russia 1987 - 2003

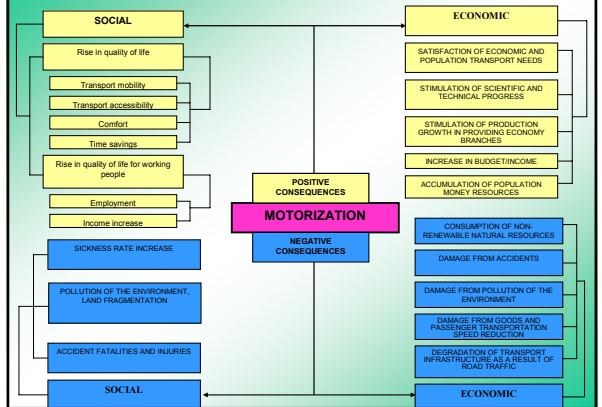


### Distribution of cities/towns by population (2002)

Population in cities or towns (thousands)	Number of cities or towns with this population	Average population in cities or towns of this category, (thousands) (% of country's population)
<b>Cities</b>		
over 1 млн.	13	27416 (18,9)
500,0-999,9	20	12404 (8,6)
250-499,9	42	14574 (10,1)
100-249,9	92	13817 (9,5)
50-99,9	163	11083 (7,7)
less 50	768	16622 (11,5)
<b>Total:</b>	<b>1098</b>	<b>95916 (66,3)</b>
<b>Towns</b>		
over 20	25	631 (0,4)
10-19,9	247	3231 (2,2)
5-9,9	582	4108 (2,8)
less 5	988	2543 (1,7)
<b>Total:</b>	<b>1842</b>	<b>10513 (7,1)</b>



### Social and economic consequences of motorization

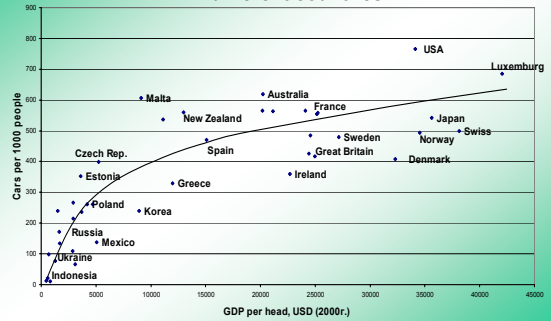


### Motorization level in different countries

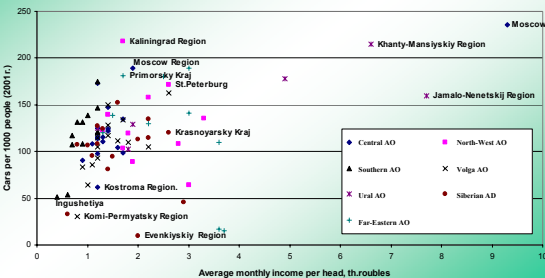
Country	Number of motor vehicles per 1000 people.		
	Cars	Trucks and lorries	Buses
Russia(2003 r.)	161	32	5,0
Belgium	470	51	1,0
Great Britain	430	49	4,0
Hungary	223	29	2,0
Germany	524	31	1,0
Italy	567	53	1,6
Canada	462	131	2,1
Netherlands	382	39	1,0
Poland	242	42	2,1
USA	812	31	3,0
France	477	88	1,6
Sweden	448	35	1,0
Japan	412	175	1,0

Sources: Transport and Communication in Russia

### Motorization relative to GDP per capita in different countries



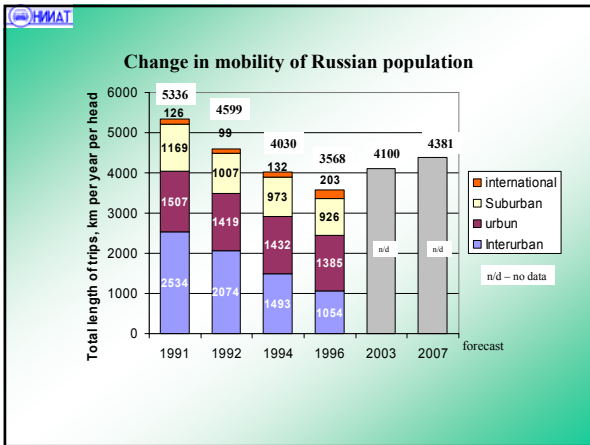
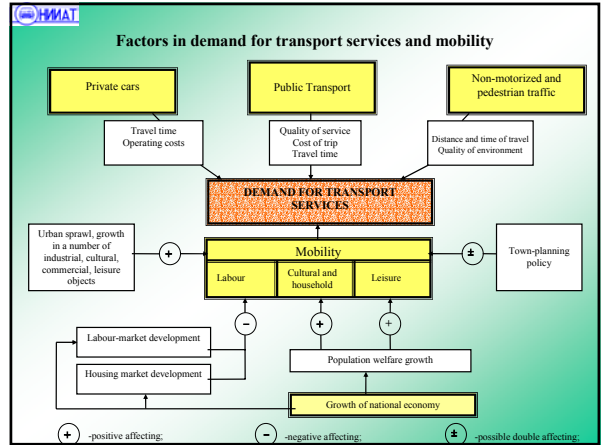
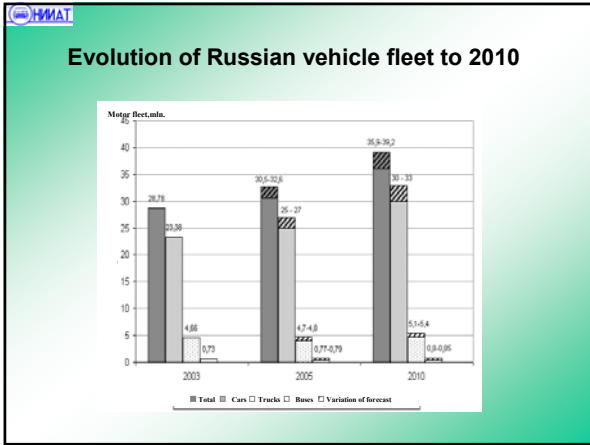
### Motorization relative to average per capita income in Russian regions (by administrative okrugs)



### Structure of Russian motor fleet

Motor vehicle type	Number of motor vehicles (thousands)								Average growth rate, % (1998-2003)
	1991	1995	1998	1999	2000	2001	2002	2003	
<b>Cars</b>	8964	14195	18820	19624	20247	21232	22468	23383	4,8
including: private cars	8677	13688	17761	18543	19097	19984	21135	22082	4,8
<b>Trucks and lorries</b>	2744	3860	4277	4387	4401	4482	4625	4668	1,8
including: private trucks and lorries	4	798	1249	1440	1568	1698	1920	1996	11,9
<b>Buses</b>	449	631	627	633	640	663	703	729	3,2
including: private buses	0,1	н/д	н/д	170	186	211	250	270	
<b>TOTAL</b>	<b>12157</b>	<b>18686</b>	<b>23724</b>	<b>24644</b>	<b>25315</b>	<b>26377</b>	<b>27796</b>	<b>28780</b>	<b>4,3</b>

Source: Российский статистический ежегодник ГИЦ/ДИ



### Average population mobility by mode of transport in the cities of ECMT/OECD countries

Transport mode	Average mobility, number of trips per head per year	
	Beginning of 90 <sup>th</sup>	End of 90 <sup>th</sup>
<b>OECD countries</b>		
Private cars and motorcycles	515	573 (+11,2%)
Public transport	321	299 (-6,7%)
Bicycles	157	157(-)
Pedestrian traffic	299	281 (-6%)
<b>Total</b>	<b>1292</b>	<b>1310 (+1,4%)</b>
<b>CEE and NIS countries</b>		
Private cars and motorcycles	657	606 (-7,8%)
Public transport <sup>1)</sup>	241	412 (+70%)
Bicycles	36	36
Pedestrian traffic <sup>2)</sup>	n/d	161
<b>Total</b>	<b>934</b>	<b>1215 (+30%)</b>

<sup>1)</sup> only new EU member countries  
<sup>2)</sup> only Polish cities

Source: CERTU/ECMT

**Main indices of the public transport system in Russia**

Indices	1980	1990	1995	1996	1997	1998	1999	2000	2001	2002	2003
1	2	3	4	5	6	7	8	9	10	11	12
Volume of passenger transportation by public transport modes in cities, mln., Total		39169	38763	39398	40043	39636	38143	38634	37682	38485	37216 <sup>1</sup>
Including:											
- buses	-	22869	18522	18926	19527	19091	18970	18345	17490	19093 <sup>1</sup>	19347 <sup>1</sup>
- trolley-buses	4739	6020	8476	8721	8848	8960	8241	8704	8604	8181,1	7319,3
- trams	5695	6000	7540	7527	7495	7506	6738	7369	7354	6982,3	6316,2
- metro	3036	3695	4150	4173	4128	4146	4162	4186	4205	4199,5	4204,7
- river boats	-	26,2	10,0	7,5	12,3	9,1	11,7	13,9	15,7	28,8	28,8
- taxi <sup>2</sup>	-	557	66	43	33	24	20	16	13	n/d	n/d
Passenger turnover by public transport modes in cities, mln pass.km, Total	-	223,0	207,6	205,4	206,8	203,4	197,9	194,2	190,4	n/d	n/d
Including:											
- buses	-	132,2	108,6	105,4	106,9	102,8	100,8	94,2	87,8	n/d	n/d
- trolley-buses	-	20,5	26,5	27,4	28,0	28,2	26,5	27,9	27,8	26,61	23,42
- trams	-	19,1	25,1	25,3	25,1	25,5	23,6	24,9	23,2	21,29	19,58
- metro	-	41,0	46,2	46,2	46,5	46,5	46,9	51,3	51,3	51,29	51,30
- river boats	-	0,3	0,07	0,08	0,08	0,06	0,08	0,09	0,1	n/d	n/d
- taxi <sup>2</sup>	-	8,9	1,0	0,6	0,6	0,3	0,3	0,2	0,2	n/d	n/d

n/d - no data  
<sup>1</sup> - including suburban transportation

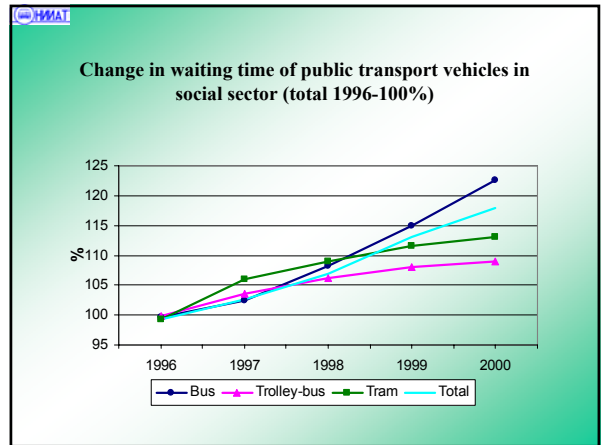
**Main indices of the public transport system in Russia (cont'd)**

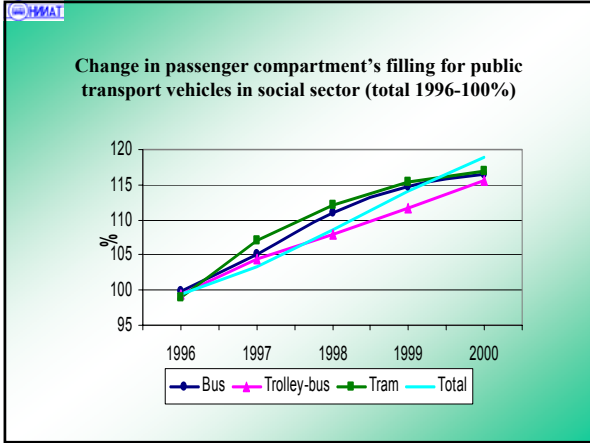
Indices	1980	1990	1995	1996	1997	1998	1999	2000	2003
Number of cities and towns with regular public transport services by transport mode:									
- bus	-	1378	1249	1266	1250	1289	1318	1295	1268
- trolley-bus	-	85	85	86	87	87	87	87	89
- tram	-	70	68	68	68	68	68	68	76
Incl high speed tram	-	4	-	4	4	4	4	4	4
- metro	-	5	6	6	6	6	6	6	6
Number of public transport fleet in cities, thousand									
- buses	-	60,3	56,8	56,7	58,4	57,9	55,3	53,9	n/d
- trolley-buses	-	13,8	13,2	12,7	12,5	12,3	12,2	12,2	11,9
- tram waggons	-	14,8	13,3	13,0	12,7	12,4	12,3	12,3	11,3
- metro waggons	-	5,2	5,7	5,8	5,8	5,8	5,8	5,8	5,91
Number of regular public transport routes:									
- buses	-	9893	9548	9572	9874	9785	9741	9668	9909
- trolley-buses	-	910	923	925	932	920	932	946	1626
- trams	-	703	677	681	664	649	657	658	1626
Number of metro stations	-	-	247	249	250	250	253	256	267

<sup>1</sup>) Without taking into account commercial motor transport

**Efficiency of public transport fleet use in Russia (1990-2000)**

	1990	1995	1996	1997	1998	1999	2000
<b>Rate of vehicle fleet use:</b>							
- buses	74,9	68,3	68,5	67,3	67,2	66,3	65,3
- trams	73,7	69,8	69,4	67,8	68,6	69,1	68,3
- trolley-buses	73,2	76,0	76,4	75,9	76,1	75,3	74,3
- metro waggons	74,3	81,4	81,7	74,7	75,2	75,4	75,2
<b>Number of trips, mln</b>							
- buses	254,8	201,6	200,7	193,2	193,7	198,3	172,4
- trams	-	35,6	34,8	33,2	32,8	33,0	33,5
- trolley-buses	-	57,9	56,4	53,7	52,7	50,4	50,4
- metro waggons	-	4,6	5,2	5,2	5,2	5,0	5,0





**Integral indices of public transport system functioning in Russian cities**

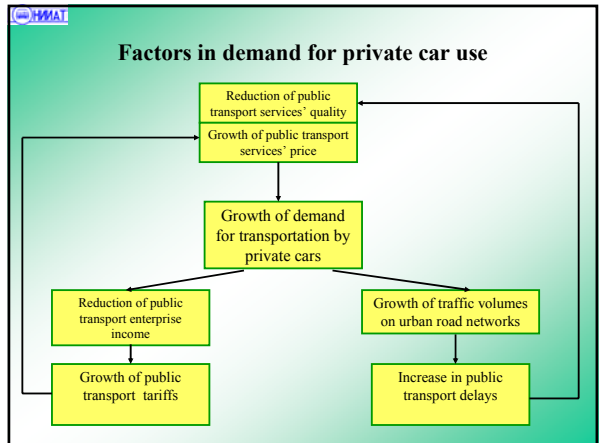
Index	Index value				
	1991	1996	2000	2001	2003
Number of urban population, thousand	109345	107607	106113	105081	105700
Number of public transport vehicles per 1000 urban population	0,86	0,82 (-4,7%)	0,79 (-8%)	0,80 (-7%)	0,77 (-10%)
Number of public transport trips per 1000 urban population per year	3517	2760 (-21,5%)	2462 (-30%)	2362 (-33%)	n/d

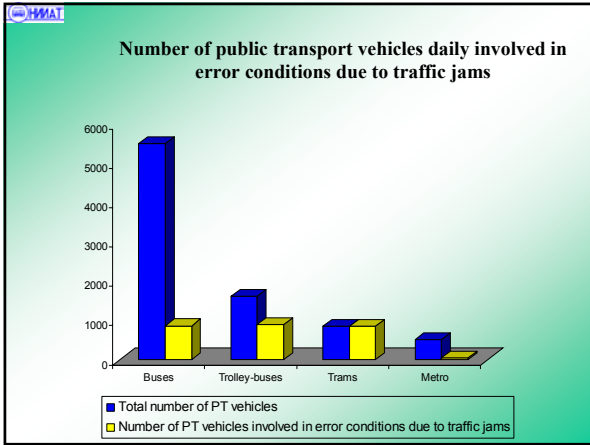
n/d – no data

**Indices of public transport services for Moscow surface public transport (2003) and for Russia on average (2000)**

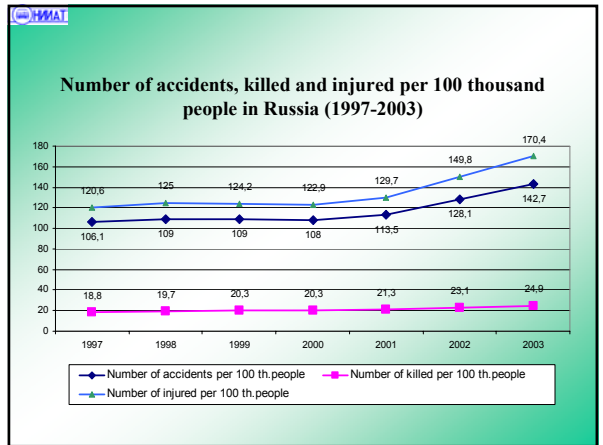
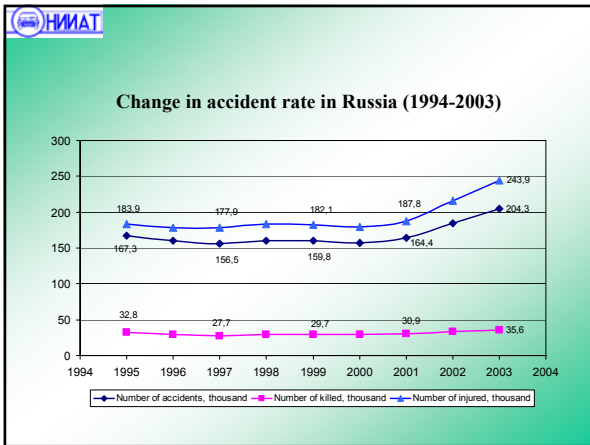
№№	Index	Index value		
		Moscow	Russia on average	
1	Average passenger compartment's filling in peak hours (persons per 1 m <sup>2</sup> of free floor space), including	buses	5,7	n/d
		trolley-buses	5,8	6,5
		trolley-buses	5,5	6,7
		tram	5,7	6,6
2	Average interval in peak hours, min	buses	10,7	12,2 (6,6*)
		trolley-buses	5,9	7,6
		trolley-buses	6,5	7,6
		tram	6,5	7,6
3	Average interval between peak hours, min	buses	12	n/d
		trolley-buses	9	n/d
		trolley-buses	7,9	n/d
		tram	7,9	n/d
4	Average time costs for labour travels by surface transport modes, min.	27	n/d	

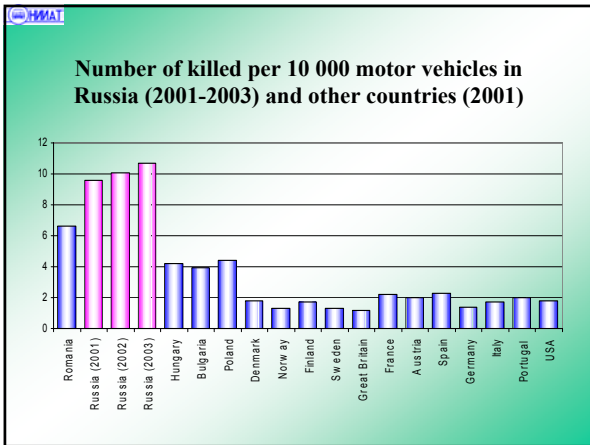
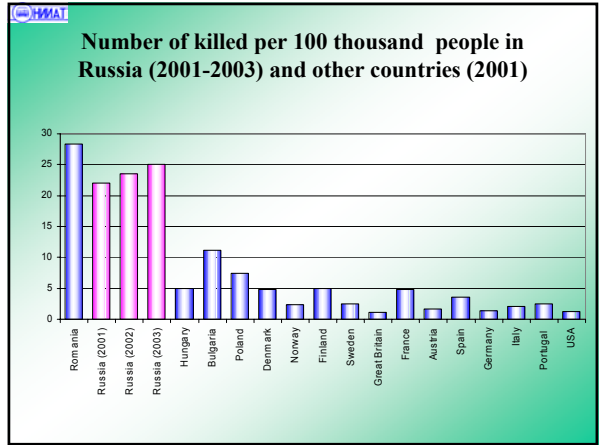
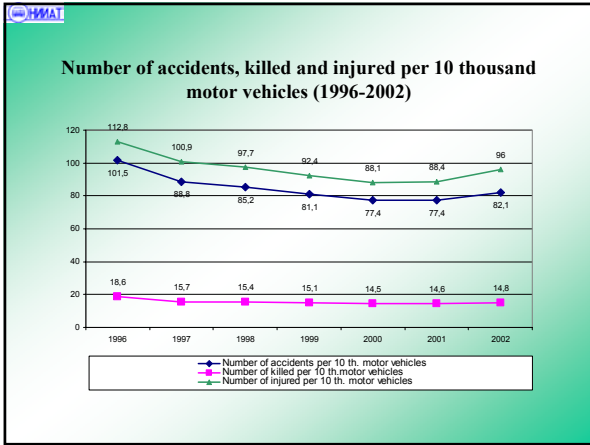
\* in commercial sector  
n/d – no data





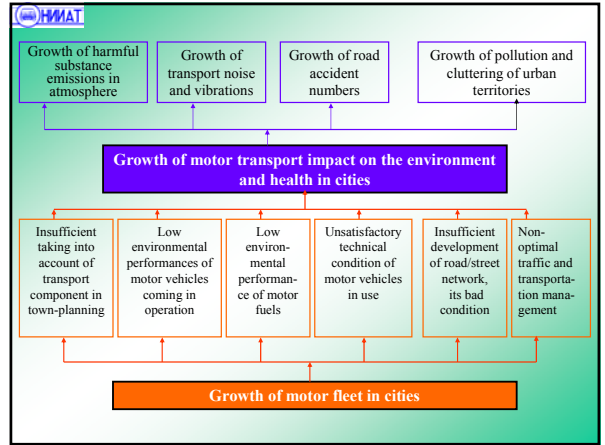
- 
- ### Main problems of public transport development in Russia
1. Lack of necessary legal base for effective public transport management.
  2. Lack of profitability of public transport enterprises in the social (non-commercial) sector.
  3. Ineffective system of basic asset reproduction for municipal public transport enterprises.
  4. Ineffective public transport management at city level.
  5. Need for consolidation of public transport operators in commercial sector.





**Influence of traffic conditions on severity of accidents**

Accident type	Share of accidents of certain type in total number of accidents, %			
	urban areas		rural areas	
	All accidents	Accidents involving victims	All accidents	Accidents involving victims
Pedestrian accidents	46,4	63,1	22,1	28,3
Motor vehicle collision	31,9	17,9	28,5	25,3
Motor vehicle turnover	6,1	5,2	31,0	28,7
Other accidents	26,6	13,8	18,4	17,7
Total	100%	100%	100%	100%



**Number of Russian citizens living with dangerous levels of atmospheric air pollution connected with motor transport emissions**

Harmful substance	Number of people, mln
Benz(a)pirene	13,9
Nitrogen dioxide	5,6
Formaldehyde	4,9
Carbon oxide	4,7
Lead	2,4
Nitrogen oxide	1,5

**Consequences of atmospheric air pollution for health in Austria, Switzerland and France (1996)**

Common mortality (people older than 30)	Number of deaths per year	Annual costs
Air pollution overall	40 000	49 700 mln.Euros
Air pollution from motor transport	22 000	26 000 mln.Euros

Source: Pan-European UN ECE/WHO Programme on transport, environment and health (THE PEP)

### Index of carcinogenic risk for population of Northwest Administrative Okrug of Moscow

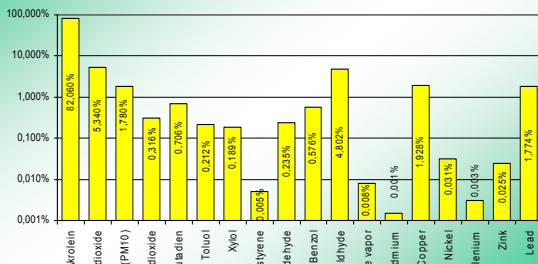
Municipal district	Average weighted risk	Population risk*	Additional cases of illness for 10 year	Number of population living in different zones of risk, thousand people		
				3,5-6 · 10 <sup>4</sup>	6-9 · 10 <sup>4</sup>	> 9 · 10 <sup>4</sup>
Khoroshevo-Mnevniki	4,5 · 10 <sup>-4</sup>	0,63	7,5	70	16	-
Schukino	5,3 · 10 <sup>-4</sup>	0,77	6,3	63,2	18,2	-
Pokrovskoe-Streshnevo	6,4 · 10 <sup>-4</sup>	0,92	3,8	16,8	29,5	1,5
Strogino	5,2 · 10 <sup>-4</sup>	0,71	8,0	94,6	16,4	-
Mitino	3,6 · 10 <sup>-4</sup>	0,51	6,1	32,3	12	-
Yuzhnoe Tushino	4,5 · 10 <sup>-4</sup>	0,68	5,2	77,1	-	-
Severnoe Tushino	4,7 · 10 <sup>-4</sup>	0,68	8,0	118,3	-	-

Note: \* - additional number of cancer cases per 10<sup>5</sup> people per year

### Indices of non-carcinogenic illness danger for population of Northwest Administrative Okrug of Moscow

Municipal district	Average weighted Index of danger H	Population living in different dangerous zones, thousands		
		H 5-15	H 15-20	H > 20
Khoroshevo-Mnevniki	14,4	52,8	61,3	4,9
Schukino	16,2	10,1	69,7	2,0
Pokrovskoe-Streshnevo	19,4	3,1	23,2	14,5
Strogino	16,5	33,5	75,2	3,9
Mitino	10,5	91,9	25,6	2,8
Yuzhnoe Tushino	15,4	12,5	61,3	3,3
Severnoe Tushino	15,3	13,3	105	-
<b>Total!</b>		<b>217,2</b>	<b>421,3</b>	<b>31,4</b>

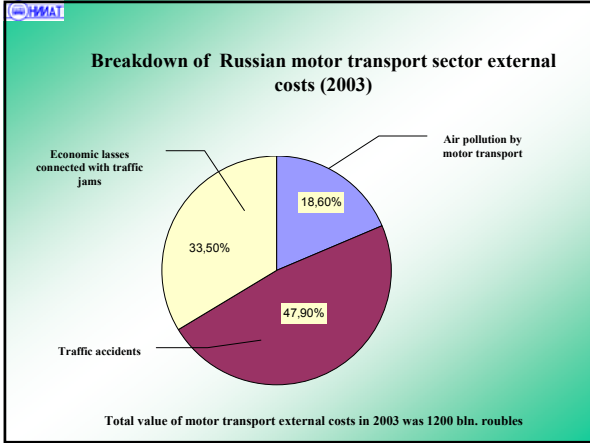
### Contribution to non-carcinogenic illness of substances in motor transport-related air pollution in NWAO of Moscow



### Estimation of economic loss linked to overload of Moscow road network

Elements of loss	Natural index	Monetary estimation, roubles (2003)	% GRP*
Time loss, man-hours per year	1 166 556 242	156 312 536 428	8,89%
Fuel over-consumption, tonne	28372	280882628,5	0,02%

\* Gross regional product



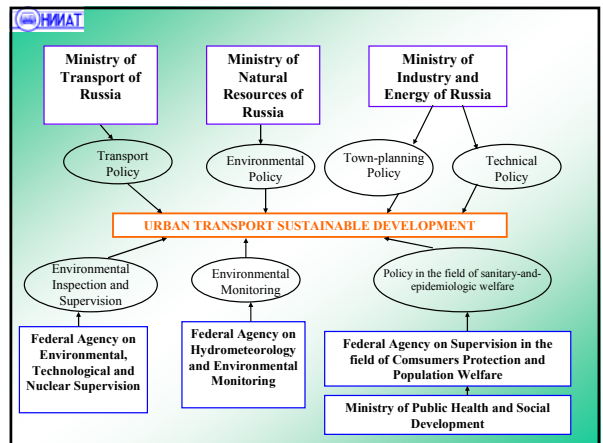
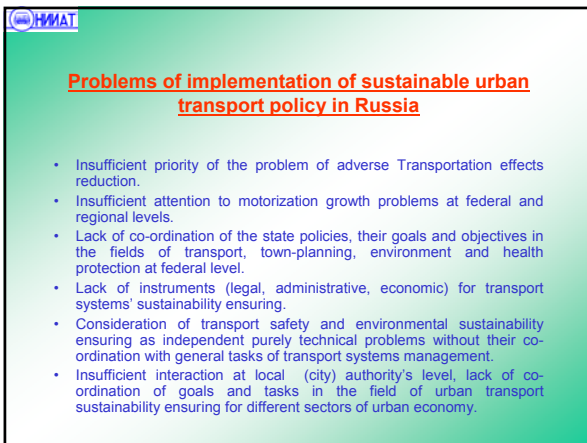
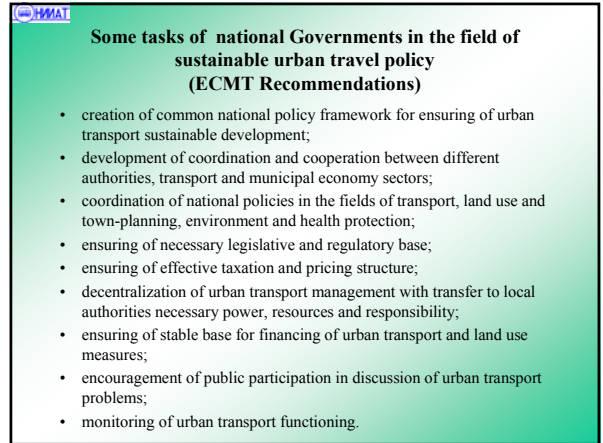
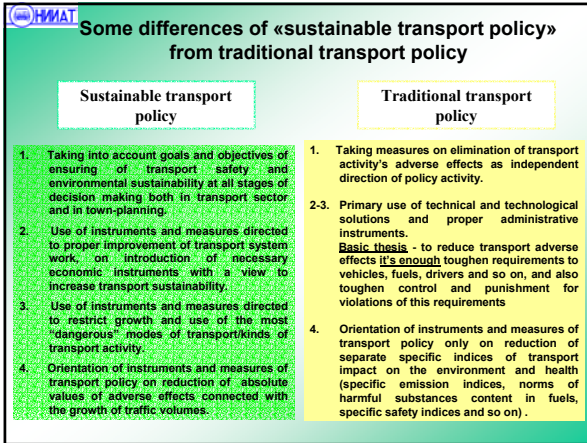
**Estimation of external costs connected with transport activity in Eastern European countries and NTS (EST project)**

Country	GDP, bln. USD per year	Population, mln.	GDP per head, USD	Total external costs, mln. Euro	External Costs compared to GDP, % of GDP
Albania, 1995	2,50	3,25	770	283,9	15%
Belarus, 1995	10,34	10,28	1006	1664,7	21%
Bulgaria, 1995	13,10	8,41	1558	1440,2	14%
Croatia, 1995	19,24	4,78	4029	984,9	7%
Czech Rep., 1995	52,04	10,33	5037	6996,1	18%
FJR Macedonia, 1995	3,11	1,97	1583	266,9	11%
Hungary, 1995	44,47	10,23	4367	4451,0	13%
Moldova, 1995	1,70	4,34	392	234,6	16%
Poland, 1995	127,30	38,59	3299	12608,7	13%
Romania, 1995	31,90	22,68	1406	3134,7	13%
Slovak Rep., 1995	17,38	5,36	3240	1696,5	13%
Slovenia, 1995	18,70	1,98	9431	1403,4	10%
Ukraine, 1995	25,33	51,28	494	4431,1	23%
<b>Total CEI</b>	<b>369,21</b>	<b>176,87</b>	<b>2087</b>	<b>39697,6</b>	<b>14%</b>
Russia, 2003	451,9	145,3	3110	33500	9.5%

**Distribution of average value of external costs by type of adverse effect (countries with economy in transition, 1995)**

Transport mode	Average external costs, Euro per 1000 tkm/pass.km				
	Accidents	Air pollution	Noise	Climate impact	Nature and landscape impact
Passenger motor vehicles	21 (78,0%)	3,2 (11,9%)	0,8 (3%)	1,2 (4,5%)	0,7 (2,6%)
Trucks	4 (9%)	34,5 (78%)	2,1 (4,8%)	1,7 (3,8%)	1,9 (4,4%)

- SUSTAINABLE TRANSPORT SYSTEM**
- ensures attainment of adopted goals in the field of environment quality and health protection;
  - doesn't cripple ecosystems;
  - doesn't lead to further worsening of global processes (climate change, ozone layer thinning and so on);



**STRATEGIC DOCUMENTS DEFINING THE NATIONAL POLICY IN THE FIELD OF TRANSPORT SUSTAINABLE DEVELOPMENT**

- Transport Strategy of the Russian Federation (draft is under revision).
- Federal Special Programme “Modernization of Transport System in Russia (2002-2010)”.
- Ecological Doctrine of the Russian Federation.
- Federal Special Programme “Ecology and Natural Resources (2002-2010)”.
- Action Plan in the field of environment protection and ensuring of efficient nature management in the Russian Federation in 2003-2005.

**Some specific features of Russian legislation which create problems for implementation of sustainable urban travel policies**

- Forming of legislation on the basis of sectoral principle (in the framework of separate sectors of economy/spheres socio-economic life of society)

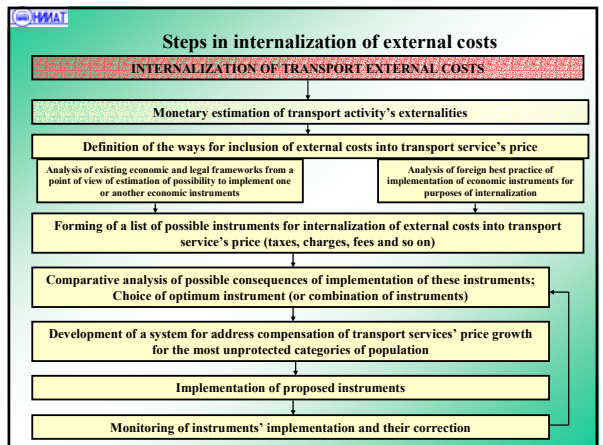
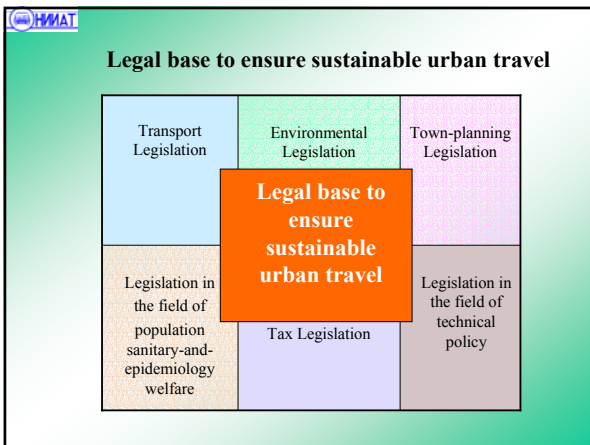
↓

**Lack of legal regulation in the field of important cross-sectoral relations/interactions**

- Multi-level nature of Russian legislation forming (Constitution, Constitutional and Federal Laws, Presidential Decrees, Governmental Regulations, Ministerial Regulations and so on)

↓

**Framework provisions of Federal Laws aren't reinforced by proper by-laws (Governmental and Ministerial Regulations)**



### Basic transport tax rates for motor vehicles in the Russian Federation

Object for taxation	Tax rate, roubles per 1 h.p.
<b>Cars with engine power:</b>	
to 100 h.p. inclusive	5
over 100 h.p. to 150 h.p. inclusive	7
over 150 h.p. to 200 h.p. inclusive	10
over 200 h.p. to 250 h.p. inclusive	15
over 250 h.p.	30
<b>Trucks with engine power:</b>	
to 100 h.p. inclusive	5
over 100 h.p. to 150 h.p. inclusive	8
over 150 h.p. to 200 h.p. inclusive	10
over 200 h.p. to 250 h.p. inclusive	13
over 250 h.p.	17
<b>Buses with engine power:</b>	
to 200 h.p. inclusive	10
over 200 h.p.	20

### Some excise rates in the Russian Federation

Excised goods	Excise rate, roubles per unit
<b>Cars</b>	
Cars with engine power to 90 h.p. inclusive	0 roub.per h.p.
Cars with engine power over 90 h.p. to 150 h.p. inclusive	14 roub.per h.p.
Cars with engine power over 150 h.p.	142 roub.per h.p.
<b>Motor fuels</b>	
Petrols with octane number to «80» inclusive	2460 roub.per 1 t
Petrols with other octane number	3360 roub.per 1 t
Diesel full	1000 roub.per 1 t
Virgin petrol	0 roub.per 1 t

### Rates of emission charges for transport

Kind of fuel	Unit	Charge rate, roubles per unit
Unleaded Petrol	Tonne	1,3
Diesel full	Tonne	2,5
Compressed natural gas	1000 m <sup>3</sup>	1,2
Liquefied oil gas	Tonne	1,2

### Structure of Russian motor fleet by motor vehicle's environmental performances

Motor vehicle's type	Average share (%) in motor fleet of motor vehicles which meet requirements:			
	EURO 0	EURO 1	EURO 2	EURO 3
Cars	90	5	4	1
Trucks (diesel engines)	85-90	5-8	4-6	< 0,1
Buses (diesel engines)	65-70	25-30	2-5	< 0,1

**Comparative analysis of economic instruments from a point of view of efficiency of their use for the purpose of external costs internalization**

Tax/Change	Advantages	Shortcoming
Fuel excises	- don't demand the introduction of additional technical devices	- don't take into account motor vehicle's environmental class; - don't connected with the territory where the fuel is used
Transport tax	- don't demand the introduction of additional technical devices; - possibility to differentiate tax rates depending on motor vehicle environmental class	Connected with the fact of motor vehicle's ownership and not intensity of its use
Environmental charges (e.g. atmospheric emission charge, water pollution charge and so on)	- directly connected with motor transport environmental impact; - possibility to create extrabudget mechanism for charge collection	Complexity of pollution monitoring
Parking fees	- creation of economic instruments for restriction of car-entrance to some city zones; - possibility to set fee at local level; - possibility to create extrabudget mechanism for fee collection	- не относится к автомобилям, проезжающим транзитом; - необходимость введения дополнительных технических устройств; - проблемы, связанные с нехваткой городских территорий
Congestion charge	- directly connected with motor transport environmental impact - may be differentiated depending on motor vehicles' environmental classification - possibility to set charge at local level - possibility to create extrabudget mechanism for charge collection	Technical difficulties of introduction

**Structure of car production in Russia by environmental performance**

Car models	Level of environmental			
	EURO 0	EURO I	EURO II	EUROIII
VAZ 1113 and modification	+	-	-	-
VAZ 2105 and modification	+	+	-	-
VAZ 2106 and modification	+	-	-	-
VAZ 2108 and modification	+	+	+	-
VAZ 2109 and modification	+	+	+	-
VAZ 2110 and modification	+	+	+	+
VAZ 21213 and modification	+	+	+	+
GAZ 3110 and modification	+	+	+	-
GAZ 3102 and modification	+	+	+	-
Moskvitch2141 and modification	+	-	-	-
IZH 2126 and modification	+	-	-	-
UAZ 31512 and modification	+	-	-	-
UAZ 3160 and modification	+	-	-	-

Note:  
 + -serial production;  
 ++ -production is stopped;  
 - -isn't in serial production.

