For more than 30 years the metro trains are racing under the avenues of Bucharest, answering the increasing demands for a modern public transport. The company continuously evolves adapting to the market request. Today, the Bucharest metro provides a comfortable and economical means of transport, maintaining its market share, the number of passengers which travel by metro is about 20% of the total number of those using the public transport means, while the length of the metro network covers about 4% of the total length of the public transport network of Bucharest city. Within the hierarchy of the European countries the Romanian metro is placed among the first half ranked metros, with a real tendency of climbing the chart.

The Company continuously improves the services range, with direct effect upon the growth of the passengers’ satisfaction degree. The efficient operating of the underground transport took into consideration commercial issues such as the ongoing extension of the metro network, correlated with the specific development of our metropolis – Bucharest.

Metrorex had been and still promoting programs that define ecological issues of the environment, as well as cultural and educational projects which associate the Bucharest artistic creation with this modern and generous space which thousands of workers serve for the use of the hundred thousands of daily passengers.

We give thanks to those 170,524,819 passengers which in 2011 have chosen to ride the metro and we assure them that Metrorex was, is and will remain their trusted partner which will define public transport through speed, comfort, safety and an sustained effort in adapting to the challenges of the future.
In 1977, it was set up “Intreprinderea de Exploatare a Metroului”, which turned in 1991 into “Regia de Exploatare a Metroului București” and, by reorganization, according to the Government Decision no. 482/1999, it became “Societatea Comercială de Transport cu Metroul București METROREX S.A.”, under the authority of the Ministry of Transports and Infrastructure having as scope of activity “the passengers transport with metro using the ground and underground railway network within specific safety traffic and comfort conditions”.

METROREX is a joint-stock company owned by the state which performs activities of public and strategic interest.

For these services, METROREX receives money transfers from the state budget to cover the differences between its own revenues resulted from the passengers transport activity and the total expenses, as subsidy to the related fare trip.

The infrastructure and technological installation operation, maintenance and repair are performed by the existing personnel of 4,251 employees, distributed in main sub-divisions, as follows: electro-energetic, electro-mechanic, automatic lines block signalling installation, automation and telecommunications, lines-tunnels, metro stations administration and maintenance, traffic control, commercial, depots.

Starting with July 1st, 2004, further the contract signature in November 2003, and approved by the Government Decision no. 47/22.01.2004, the rolling stock maintenance and repair activity was taken over by S.C. Transport ALSTOM S.A for a period of 15 years.

On July 1st, 2011, there were commissioned two new transport capacities on Metro Line IV, section from 1 Mai to Parc Bazilescu of 2,3 km length, double track, and two new stations: Jiului and Parc Bazilescu.

Built, equipped and put into operation in stages, on certain extensions, starting with 1979, the metro network is currently integrating 69,20 km double track, structured on 4 metro lines, 51 metro stations and 4 depots.

The metro transport system is continuously monitored and coordinated by a Central Traffic Control, which subordinates some other six branch dispatching centres: lines, tunnels, stations, passengers’ information, traffic control, electro-energetic, electro-mechanic and commercial.

**METROREX market share**

Although it covers only 4% of the Bucharest entire public transport network, by providing a high transport capacity due to its comfort, regularity and safety traffic conditions, Metrorex supplies transportation for about 20% of the total passengers using the Bucharest urban public transportation means.
### Chapter 2. Bucharest Metro Network

The operating metro network is structured as follows:

<table>
<thead>
<tr>
<th>Metro Line/Extension</th>
<th>Route</th>
<th>Km</th>
<th>Stations</th>
<th>Commissioned</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metro Line I</td>
<td>PANTELIMON - REPUBLICA- EROILOR - GARA DE NORD – DRISTOR 2</td>
<td>31.01</td>
<td>21 (out of which, 7 common stations with Metro Line III)</td>
<td>In stages 1979 - 1990</td>
</tr>
<tr>
<td>Extension</td>
<td>Petrache Poenaru - Timpuri Noi</td>
<td>8.63</td>
<td>6</td>
<td>November 1979</td>
</tr>
<tr>
<td>Extension</td>
<td>Timpuri Noi - Republica</td>
<td>10.10</td>
<td>6</td>
<td>December 1981</td>
</tr>
<tr>
<td>Extension</td>
<td>Petrache Poenaru - Crângăşi</td>
<td>0.97</td>
<td>1</td>
<td>December 1984</td>
</tr>
<tr>
<td>Extension</td>
<td>Crângăşi - Gara de Nord</td>
<td>2.83</td>
<td>2</td>
<td>December 1987</td>
</tr>
<tr>
<td>Extension</td>
<td>Gara de Nord - Dristor 2</td>
<td>7.8</td>
<td>6</td>
<td>December 1989</td>
</tr>
<tr>
<td>Extension</td>
<td>Republica – Pantelimon</td>
<td>0.68</td>
<td>1</td>
<td>January 1990</td>
</tr>
<tr>
<td>Metro Line II</td>
<td>BERCENI - PIPERA</td>
<td>18.68</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Extension</td>
<td>Berceni – Piaţa Unirii 2</td>
<td>9.96</td>
<td>8</td>
<td>January 1986</td>
</tr>
<tr>
<td>Extension</td>
<td>Piaţa Unirii 2 - Pipera</td>
<td>8.72</td>
<td>6</td>
<td>October 1987</td>
</tr>
<tr>
<td>Metro Line III</td>
<td>ANGHEL SALIGNY – N. GRIGORESCU - EROILOR - PRECIZIEI</td>
<td>22.2</td>
<td>15 (7 common stations with Metro Line I)</td>
<td></td>
</tr>
<tr>
<td>Extension</td>
<td>N. Grigorescu – Eroilor</td>
<td>8.67</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extension</td>
<td>Staţia Gorjului – Platform 2 – Platform 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extension</td>
<td>N. Grigorescu 2 – Anghel Saligny</td>
<td>4.7</td>
<td>4</td>
<td>November 2008</td>
</tr>
<tr>
<td>Metro Line IV</td>
<td>LAC STRÂULEŞTI - GARA DE NORD – GARA PROGRESU</td>
<td>5.54</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Extension</td>
<td>Gara de Nord – 1 Mai</td>
<td>3.24</td>
<td>4</td>
<td>March 2000</td>
</tr>
<tr>
<td>Extension</td>
<td>1 Mai – Parc Băzilescu</td>
<td>2.3</td>
<td>2</td>
<td>July 2011</td>
</tr>
</tbody>
</table>
3.1. Metro network extension, modernisations, upgrading

In compliance with the medium term modernisation and development strategy of Bucharest metro, in 2011, there were performed various actions related to the metro network extension and also continued the modernisation and technological upgrading works of the hereinafter fixed infrastructure installation, as here below:

- On July 1st, 2011 there were commissioned two new transport capacities on Metro Line IV, section from 1 Mai to Parc Bazilescu of 2.3 km length, double track, and two new stations: Jiului and Parc Bazilescu;
- Metrorex signed the contract for the procurement of consulting services and technical assistance related to the Metro Line 5 project, Drumul Taberei – Pantelimon, Section 2 Universitate – Pantelimon;
- It was signed the contract for the procurement of new metro trains;
- It was obtained a new loan from the European Investment Bank, in amount of Euro 465 million, destined to Metro Line 5, Section from Universitate to Pantelimon;
- It was renegotiated the contract concluded with ALSTOM, so that the contract price until completion (2019) was subsequently reduced with around 30 %;
- It was established the Bucharest Metropolitan Transport Authority by the Government Decision no. 21/31.08.2011, decision subsequently ratified by Law no. 8/06.01.2012. The Rules for organization and operation of the Bucharest Metropolitan Transport Authority was approved by the Government Decision no. 1204/06.12.2011;
- There were installed 24 indoor and outdoor elevators in 13 metro stations;
- There were modernised the low voltage electrical sub-stations and installations in 16 electric sub-stations;
- It was commissioned the traffic safety system – Interlocking on Metro Line 3, from Eroilor to Preciziei (Industriilor).

3.2. Traffic improvement

The rolling stock fleet on Metro Line 2 (Berceni – Pipera) was entirely replaced with new metro trains type Bombardier (24 metro trains). The automatic lines block signalling installation (BLA) was replaced with a Bombardier Transportation electronic interlocking which also incorporate the automatic train protection function (ATP) and the automatic train operation (ATO) function with SL4 safety level instead of SL2, as of the previous INDUSI installation.

Starting with 2010, due to the successful implementation of semi-automatic ATP/ATO operating mode of the new Bombardier metro trains and further the modernisation of traffic supervision and organization
installation on Metro Lines 1, 2 and 3, there were fulfilled the technical conditions for continuously use of a **simplified driving system** (with no supporting driver).

### 3.3 Trip and access conditions improvement

**Measures undertaken in 2011:**

- Completion of the project related to mounting of 81 new escalators in the metro stations;
- Reconfiguration of the access/exit passengers system (pay gates + one way gates + special gate) in Timpuri Noi and Grozăvești metro stations;
- Modernisation of the pedestrian access in Piața Muncii metro station;
- In 10 special cash desks destined to pupils and students, there were introduced BRD Points of Sale in order to facilitate the payment using a bank card;
- In the fares offer of Metrorex, it was introduced the weekly pass, as new trip title;
- During the second half of 2011, there were commissioned 37 AVCs (automatic vending machines) in the following metro stations: Gara de Nord 1, Basarab, Crângași, Grozăvești, Eroilor, Piața Unirii 1, Dristor 1, Dristor 2, Nicolae Grigorescu 1, Republica, Lujerului, Gorjului, Păcii, Preciziei, Piața Unirii 2, Universitate, Piața Română, Aviatorilor, Aurel Vlaicu, Pipera, Eroii Revoluției, Piața Sudului, Apărătorii Patriei, Berceni, Piața Victoriei 2, Ștefan cel Mare, Obor, Piața Iancului, 1 Decembrie, Anghel Saligny, 1 Mai, Jiului (2 units), Parc Bazilescu (2 units), Piața Muncii, Mihai Bravu;

### 3.4. International events participation

**Abroad trips:**

During the reporting period, based upon the supplying contracts signed by S.C. Metrorex S.A and received invitations, there were prepared the necessary arrangements for 14 abroad trips of the staff, both for training and/or acceptances at the suppliers’ plants, as well as participation to international events.

- 14.03.2011 – 17.03.2011 – Milan, Italy – „MetroRail 2011” Conference;
- 10.04.2011 – 14.04.2011 – Dubai, United Arab Emirates – The 59th UITP World Congress and „Mobility & City Transport” Exhibition;
- 08.11.2011 – 10.11.2011 – Berlin, Germany – „The 10th European Annual Summit on infrastructure issues and PPP”.

**Domestic trips:**

During the reporting period, there were prepared the necessary arrangements for 71 local trips of the Metrorex staff for training and/or technical inspections activities, as well as participation to urban public transport events.

Other events to which the representatives of S.C. METROREX S.A attended in 2011:
The organizational structures comply with the scope of the company’s activity and clearly define each position in the Organizational and Operating Rules.

Every position within the organization chart represents the scope of activity of each department and specialized division. They distinctly precise the company’s tasks necessary to be performed in the related areas of expertise: operation, revisions-repairs, commercial, informational, planning, accounting, economic-financial, human resources, traffic safety, labour protection and medical services for the employees etc.

The company’s organizational assembly is pyramidal built, so that every department and sub-division to have a single operational subordination.

Since the company’s organizational structure defines the hierarchical subordination and control levels, it continuously determines the operational relationship between the departments and sub-divisions to meet the final goal: the passengers’ satisfaction.

The organization structures which operated in 2011 followed the hereinafter main objectives:

- establishment the functional relationship between departments and sub-divisions;
- organizational structures with simple subordination, so that the information flow to be provided as directly and promptly possible;
- distribution of tasks and specific activities, in compliance with the department or sub-division scope of activity.

The number of staff at the end of 2011 was of 4.251 employees.

Table 1 - The average number of staff development during 2008 - 2011

<table>
<thead>
<tr>
<th>YEAR</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Medium Number</strong></td>
<td>4.157</td>
<td>4.146</td>
<td>4.110</td>
<td>4.117</td>
</tr>
</tbody>
</table>

Graphic 1
Average number of personnel development during 2008 - 2011

- 2008: 4.157
- 2009: 4.146
- 2010: 4.110
- 2011: 4.117

The number of staff at the end of 2011 was of 4.251 employees.
5.1. Infrastructure

5.1.1. Stations and inter-stations

When the site was chosen, there were taken into account the total number of urban conditions: the concentration of passengers’ flows, the peculiarity of public utilities of each area, as well as the real possibilities of execution, avoiding within the construction a major impact on ground traffic.

The inter-stations route generally follows the main streets in town, the tunnels and metro galleries were performed using the technologies known at the time of execution, since the most of the pierced soils could had been included in the category of the "weak" ones, the groundwater sheet being nearly close to the ground’s surface (between 2 and 5 m).

The rolling track levels are located at 12,00 m depth, on average, and may vary between 7,80 m and 19,60 m.

The main public areas and stations accesses were dimensioned in order to take over flows over 50,000 passengers per hour and direction.

In order to provide the passengers upright traffic, there are used fixed stairs and escalators with a difference level between 5,00 and 10,30m.

There were used a diversified range of solutions and finishing materials in accordance with the assembly conception concerning the ambient of each station.

Consequently, the floors are from natural stone (granite, marble), sandstone or mosaic with granite aggregates. There are constantly used the granite steps for the access stairs.

The walls and pillars are plated with travertine or marble and also with ceramic plywood, decorative mortars, enamelled sheet metal elements (alphatron), Trespa panels etc.

There are two ways of ceilings treating, correlated with the solutions for structure, lighting installation, ventilation, signalling etc.:

- suspended ceilings made of light panels, metal grates etc.
- apparent plastered ceilings.

Since these suspended ceilings are quite old, the company initiated and promoted a modernisation program of these systems in all metro stations.

On inter-stations operate, as technological endowments, ventilation and pumping stations. They permanently keep the necessary conditions for a normal metro operation, by evacuating the waters provided from infiltrations, polluted air and by replacing it with fresh air.

5.1.2. Installations

The normal and uninterrupted operation of the existing installation in the metro network provides the continuity, safety and traffic regularity of trains and, in the same time, provides the passengers full security and comfort. The specific conditions of the metro network generated complex technical problems of a great variety. In order to
It is also provided a ventilation system of the sub-platforms in order to prevent dust particles scattering lifted by the trains’ traffic and to take over the warmth cleared up when braking in stations. This system provides the air’s suction at the level of rolling track and its evacuation to the inter-stations in the trains’ operating direction.

The technical rooms are ventilated by specialized independent systems compared with the functional requirements of the various categories of equipment and devices. These ones also provide the smoke evacuation in case of fires.

5.1.2.3. Sanitary, water supply & sewage and fire extinction installations

The stations are provided with water installation necessary for specific consumption, ventilation air treating, extinction of certain fires and washing technical and public areas. The consumption is provided by two independent sources: the municipal network and own deep water wells, respectively.

In stations and inter-stations there were provided hydrants and fixed installation for extinction with pulverized water in some technical rooms of increased fire danger or difficult access, in order to be supplied the emergency fire-fighting equipments.

The collected waters, as well as the infiltration waters, are evacuated in the municipal sewerage network with a special pumping installation, both in stations and inter-stations.

5.1.2.4. Activity surveillance installations

Every station was equipped with a technical surveillance room, attended by permanent staff, making available a series of endowments providing a global image upon the operational status of installation and conditions in which the surveyed traffic is carried out, such as:

- surveillance desk of train’s traffic indicating the signals’ status and stations lines occupancy and from contiguous half inter-stations;
- telecommunications desk with operative telephony stations on selective calls, local phone lines, automatic telephony stations, transmitter – receiver station for radio communications with the operating trains and

solve them, there were involved technological engineering and scientific research institutes, technical education institutes and specialized companies of the electronic and mechanical engineering industries in Romania.

5.1.2.1. Installation in passengers’ service

Each station also has:

- general lighting system;
- escalators;
- sounding and remote sounding installation to warn the passengers in the stations and to make public announcements;
- electronic clocks (exact hour and recording the elapsed time from the last train’s operation);
- installations of passengers’ dynamic information (info-kiosks, TV monitors for passengers, S.O.S balises);
- installations for continuous surveillance and limiting to non dangerous values the electrical voltages of touch and step in the embarking areas;
- installations for warning, signalling and monitoring of fires & intrusions;
- installations for fare collection, passengers control access and automatic vending machines;
- buttons for traction power emergency disconnecting;
- closed circuit television;
- elevators and platforms for vertical transportation.

The access areas, escalators, entrances and stations’ platforms are supervised by the operating personnel, by a closed circuit television system.

5.1.2.2. Ventilation installations

For a normal traffic, the air discharge that has to be circulated on a station – inter-station assembly is of about 300,000 m3/h.

The ventilation of this assembly is in reverse mode. During the summer the cleaned conventional air is been introduced by the ventilation station from the station and is evacuated, by the inter-station ventilation. During winter, the entrance-exit circuit being inverted, the system’s heat clearings are used for warming up the public areas in stations.

During summer, there is provided air cooling installation by watering, in order to maintain a maximum temperature of +27oC in stations.
the stations sounding installation;
• local dispatching panel for surveillance and control
the main installation and equipment: ventilators, water
supply plants, pumping stations, escalators, general
lighting etc;
• displays of the closed television circuit in station;
• fire automatic warning station of incipient fires in
technical rooms;
• intrusion detection warning station in pay desks and
areas containing important values;
• S.O.S. balises on Metro Line 3 and the connecting
stations.
All these endowments facilitate taking the best decisions
and operative interventions in case of disturbances or
failures.

5.1.2.5. Power supply

The electro-energetic installation provides the power
supply both for traction and the entire operation activity of
metro.

The necessary power supply is provided by the
national energetic system, by feeders of 20 and/or (10) kV
voltage.

This installation was conceived taking into account
the system’s generally continuity condition, the traffic’s
stopping being admissible only when the municipal power
supply would totally fall down.

For the situations when the electro-energetically
system would become fully non operational, there were
provided independent power supply sources. They supply
some vital consumers: the stations and tunnels passengers’
evacuation lighting, information transmission between
Central Traffic Centre and stations, traffic dispatching
centre and trains, as well as control devices for the normal
activity’s resumption when voltage is restarted.

Due to the great territorial dispersion of installation,
the imperious need of operatively correlation with the
national energetic system when setting up the functional
regimes and avoiding the disturbance and damages, there
was necessary a centralized coordination and control
system. This system has a vital importance in providing the
continuity in supply.

For this reason, it operates the Central Traffic Centre,
which takes over all these functions on the entire metro
network and provides the here below endowments for
every line:
• a synoptic panel with automatic display of the
operational diagram and a control desk;
• telemechanics equipment and communication lines for
information taking over and automatic transmittal from
and into the process;
• automatic displays, control and fast recording,
brackets for the information exchange with the process
computer etc;
• internal telecommunications equipment providing the
connection with the national energetic traffic centre.

5.1.2.6. Traffic safety, control and automation

The complex system of equipment and safety &
automation installation was designed for a maximum speed
of 80 km/h.

The system consists of the following sub – systems,
according to the fulfilled functions:
• installation for automatic train protection (safety)
including the signalling automatic lines block
installation (BLA), electrodynamics centralizing
installation (CED), punctual auto–stop installation
(INDUSI) and speed continuous control installation by
repeating the signals on board;
• installation for automatic train operation, including the
traffic telemechanics installation, vehicle identification
and automatic display installation in the dispatching
centre of the train number (AVI), destination and the
trains’ routes;
• installation for automatic train operation incorporating
the optimised train control by process computers,
automatic stopping at platforms and, finally, trains
speed continuous control (automatic pilot);
• automatic train control system (ATC) including the
5.1.2.7. Telecommunications

The system provides rapid and safe communications channels, according to the specific operating requirements. It includes:

- own automatic telephone exchange located in the central traffic centre interconnected with the urban automatic telephone exchange in the area, and with the mobile telephony operators;
- telephony installation with selective call within vocal frequency including a station installed in the central traffic centre and secondary stations mounted in metro stations, parking lines and depots;
- a radio – communication system train - dispatcher operating in normal conditions or with selective call in order to provide the communications with the operating trains;
- transmissions are provided on assigned local frequencies;
- in parallel with the radio-communications system, to manage the traffic, it also operates the underground – ground communication system for emergency situations (this system provides the interconnection with entitled authorities such as the Emergency Situations Inspectorate, S.C. Metrorex S.A management, police station etc.).

5.1.3. Installations maintenance activity

5.1.3.1 Revisions and repairs activity

To normally maintain into operation these installations, it is provided a planned preventive maintenance system consisting of daily maintenance activities, periodic inspections, and daily repairs and overhauling. These works are performed based upon annual services programs, split into monthly working activities issued for each installation type.

These works are periodically performed, in strictly compliance with the manufacturer’s instructions mentioned in the equipments users’ guide.

In 2011, the installations divisions performed 100% the planned services activities and maintained the installations into normal and safety operation conditions at the technical designed parameters.

5.1.3.2 Failures

Within the analyzed period, the installation operation was troubled by certain failures occurrence or casual damages mainly incurred by technical reasons due to the reduced reliability of some subassemblies or components, many of these installation being produced with the technology of the 80’s.

No failures leading to metro trains safety operation incurred, the maintenance personnel promptly intervening in order to remedy the failures.

The completion of the installations modernisation and upgrading programs, and also the commissioning of new installations had led to decreasing of failures and also of the intervention periods of time.

5.1.4. Rolling track

For the first metro line “Petrange Poenaru – Timpuri Noi”, the rolling track was performed using the classical solution: rail type 49, with K type clip, on wooden sleepers, sited on gravel sand bed of 25 cm thickness and a 10 mm binder substratum.

Based on the studies performed for the following metro lines, it was generalized the concrete sleeper (biblock) sited on concrete bed.
5.1.6. Labour conditions improvement

In 2011, there were performed the following activities for labour conditions improvement, both in the technical rooms of the metro stations and depots:

- infiltrations cut off;
- simple and washable paintings;
- paintings on wooden and metal surfaces;
- floor cloths layout, PVC carpet, crockery & tiles mounting;
- rooms subdivisions using plasterboard;
- sanitation works;
- electric heaters repairs;
- furniture manufacture (office cupboards, desks, tables, chairs, hangers, flooring etc.).

5.2. Rolling stock

5.2.1. Rolling stock fleet - structure

The structure of the rolling stock fleet is as presented in Table 2 and the rolling stock fleet structure in 2011 is shown in graphic 2 and 3.
5.2.2. Metro trains constructive characteristics

5.2.2.1 IVA metro trains of old generation

- The IVA carbody is a self-supported structure made of highly alloy steel profiles provided with fixed and hinged windows and four doors on each side of the metro car.
- The metro unit is powered from the third rail, laterally mounted to the rolling track, via some catches mounted on bogie.
- For manoeuvres, in depots and parking areas, the metro car was provided with a pantograph on roof that allows running with a speed of 15 km/h.
- For the communication between the driver and passengers, it was provided an audio installation and for the communication between the driver, operator and traffic centre a radio transmitting/receiving station.
- The IVA type trains, operating on Metro Line 4 – Gara de Nord 2 – 1 Mai, were equipped with automatic protection and operation installation ATP/ATO Dimetronic.

In order to improve the transport conditions, Metrorex and the metro trains’ maintenance supplier (ALSTOM Transport) initiated during 2011 a major process to make reliable 90 cars – 15 IVA metro trains.

In 2011, there were finalized the reliability works for 12 cars – 2 metro trains. This process will also continue in 2012, and is scheduled to be completed in 2013.

5.2.2.2 BM2/BM21 metro trains of new generation

During 2003 - 2004, on Metro Line 2 were commissioned 18 new metro trains type BM2 (Bombardier) manufactured in compliance with the latest technical standards worldwide: traction in alternative current, recuperative brake, air conditioned in driving cabins, intercommunication between metro cars, communication system between driver, passengers and operator, local doors opening system to enter the car etc.

In June 2008, it was supplied the last metro train from a total of 26 new metro trains type BM21 (Bombardier). These trains were included within the scope of supply of the contract for the acquisition of 20 new metro trains, subsequently supplemented with 6 additional metro trains. 22 of these metro trains are in operation on Metro Line 1 + 3, replacing a part of the old rolling stock fleet.

The rest of 4 metro trains type BM21 supplemented the rolling stock fleet on Metro Line 2 with a view to decrease the involved headway.

From the technological point of view, the new metro train is characterized by the following:
- high reliability;
- decreasing the energy consumption up to 25%);
- decreased maintenance costs;
- increased safety and

### Table 3. Technical characteristics of the IVA type metro unit, manufactured by Astra Arad, Romania, (configuration of 2 metro cars)

<table>
<thead>
<tr>
<th>Technical characteristics of the IVA type metro unit, manufactured by Astra Arad, Romania, (configuration of 2 metro cars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of unit over couplers</td>
</tr>
<tr>
<td>Maximum width (with closed doors)</td>
</tr>
<tr>
<td>Maximum height from NSS (over pantograph in the lower position)</td>
</tr>
<tr>
<td>Floor height from NSS</td>
</tr>
<tr>
<td>Gauge</td>
</tr>
<tr>
<td>Tare Weight</td>
</tr>
<tr>
<td>Seating capacity</td>
</tr>
<tr>
<td>Standing capacity for 4 passengers/m²</td>
</tr>
<tr>
<td>Standing capacity for 8 passengers/ m²</td>
</tr>
<tr>
<td>Supply voltage</td>
</tr>
<tr>
<td>Traction power</td>
</tr>
<tr>
<td>Driving with starting series – parallel controller and braking with auto-compensatory separate excitation</td>
</tr>
<tr>
<td>Control voltage</td>
</tr>
<tr>
<td>Automatic control system for metro unit car starting and braking</td>
</tr>
<tr>
<td>Service braking</td>
</tr>
<tr>
<td>Braking when stopped</td>
</tr>
<tr>
<td>Emergency braking</td>
</tr>
<tr>
<td>Maximum speed</td>
</tr>
<tr>
<td>Commercial speed</td>
</tr>
</tbody>
</table>
comfort level for the 1,200 passengers of one metro train;
• the communication between the 6 metro cars is performed via intercommunication corridors (gangway);
• highly improved doors locking systems;
• the metro train can be operated by a single driver;
• latest protection systems: automatic train protection (ATP) and automatic train operation (ATO);
• forced ventilation in passengers’ compartment;
• the level of noise is much reduced, compared with the old metro trains level of noise.

Table 4. Technical characteristics of the new metro trains generation type BM2 and BM21 (configuration of 6 metro cars)

<table>
<thead>
<tr>
<th>Technical characteristics of the new metro trains generation type BM2 and BM21 (configuration of 6 metro cars)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of unit over couplers</td>
<td>112,610 mm</td>
</tr>
<tr>
<td>Maximum width</td>
<td>3,100 mm</td>
</tr>
<tr>
<td>Axle load max.</td>
<td>max. 14 t</td>
</tr>
<tr>
<td>Maximum height from NSS (over the roof)</td>
<td>3,460 mm</td>
</tr>
<tr>
<td>Floor height from NSS</td>
<td>1,120 mm</td>
</tr>
<tr>
<td>Gauge</td>
<td>1,432 mm</td>
</tr>
<tr>
<td>Tare Weight</td>
<td>173,5 t</td>
</tr>
<tr>
<td>Seating capacity</td>
<td>216</td>
</tr>
<tr>
<td>Standing capacity for 4 passengers/m²</td>
<td>984</td>
</tr>
<tr>
<td>Standing capacity for 8 passengers/m²</td>
<td>2,184</td>
</tr>
<tr>
<td>Supply voltage</td>
<td>750 Vcc 3rd rail in traffic and pantograph in depots</td>
</tr>
<tr>
<td>Traction motor rating</td>
<td>16 asynchronous motors 125 kW each</td>
</tr>
<tr>
<td>Maximum acceleration</td>
<td>1,25 m/s²</td>
</tr>
<tr>
<td>Service deceleration</td>
<td>1,2 m/s²</td>
</tr>
<tr>
<td>Emergency deceleration</td>
<td>1,3 m/s²</td>
</tr>
<tr>
<td>Braking system</td>
<td>Microprocessor controlled, tread brakes</td>
</tr>
<tr>
<td>Propulsion system</td>
<td>IGBT converters</td>
</tr>
<tr>
<td></td>
<td>One inverter for 2 parallel traction motors</td>
</tr>
<tr>
<td></td>
<td>MITRAC control system</td>
</tr>
<tr>
<td></td>
<td>3-phase asynchronous motors</td>
</tr>
<tr>
<td>Auxiliary systems</td>
<td>2 static converters with battery charger 400 V AC 50 Hz and 110 V DC</td>
</tr>
<tr>
<td></td>
<td>2 compressors, piston type</td>
</tr>
<tr>
<td>Maximum speed</td>
<td>80 km/h</td>
</tr>
</tbody>
</table>

5.2.2.3 Procurement of new generation metro trains

Since the number of transported passengers is increasing, Metrorex initiated during 2011 an open bidding procedure for the procurement of 16 new metro trains (96 cars), in order to satisfy the transport demand on Metro Lines 1, 2 and 3, to improve the transport conditions and to replace the old IVA rolling stock fleet. The bidding procedure having as scope the „procurement and commissioning of 16 new metro trains“ was successfully completed by signature of a commercial contract with the rolling stock supplier Construcciones y Auxiliar de Ferrocarriles (CAF) – S.A – Spain.

The contract will be carried out during 2011 – 2014 and the metro trains are about to be put into service starting with the second half of 2013.

By this procurement, Metrorex will finalize an important stage of the Bucharest metro modernisation project, providing 60 new metro trains of new generation for the passengers public urban transportation system.

In order to increase the safety into operation and the passengers’ comfort, the new metro trains will be equipped with automatic train protection and operation systems (ATP and ATO), compatible with the current new generation infrastructure systems, now into operation at Metrorex.
To provide the technical compatibility and fully operation, these systems were procured by Metrorex within 2011 from Bombardier Transportation – Rail Control Systems Divisions, further to a procurement procedure by direct negotiation, with no advertisement.

5.2.3 Timetables

The following aspects were taken into account when using the timetables in 2011:

- the increased number of transported passengers on the metro network;
- providing the best headway within certain hourly headways when increased passengers flows are recorded (named “peak hour headways”);
- the rolling stock fleet, technically and safety traffic made available by the maintenance supplier;
- the existing operating personnel (locomotive & metro driver and supporting driver) medically and psychologically capable.

Therefore, the here below timetables were used:

- For business days (Monday – Friday) were used timetables as described in Table 5
- For statutory days (including Saturdays, Sundays and legal holidays) were used timetables as described in Table 6

For 2012, we propose to attract a greater number of passengers by adapting the timetables in order to provide an adequate transport capacity, in compliance with the demand, and best comfort and safety conditions.

### Table 5. Timetables used for business days (Monday – Friday):

<table>
<thead>
<tr>
<th>No.</th>
<th>Metro Line 1: Republica – Dristor 2</th>
<th>Timetable</th>
<th>Applicable period</th>
<th>Metro trains headway</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Metro Line 1: Republica – Dristor 2</td>
<td>A 1338</td>
<td>01.01.2011–31.12.2011</td>
<td>6’ peak hours 8’-10’ off peak hours</td>
</tr>
<tr>
<td></td>
<td>Common section M1 – M3: Eroilor – Nicolae Grigorescu</td>
<td>A 1338</td>
<td>01.01.2011–31.01.2011</td>
<td>3’ peak hours 4’-5’ off peak hours</td>
</tr>
<tr>
<td>2</td>
<td>Metro Line 2: Berceni – Pipera</td>
<td>A 250</td>
<td>01.07.2011–11.09.2011</td>
<td>3’ – 4’ peak hours 6’-10’ off peak hours</td>
</tr>
<tr>
<td></td>
<td>A 249</td>
<td>01.01.2011–05.01.2011, 12.09.2011–26.12.2011</td>
<td>3’ peak hours 8’-10’ off peak hours</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A 251</td>
<td>02.05.2011–01.07.2011</td>
<td>3’ peak hours 5’-10’ off peak hours</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Metro Line 4: Gara de Nord 2 – Parc Bazilescu</td>
<td>A 406</td>
<td>10.01.2011–30.06.2011</td>
<td>7’ peak hours 10’-12’ off peak hours</td>
</tr>
<tr>
<td></td>
<td>C 407</td>
<td>01.07.2011–31.12.2011</td>
<td>8’ peak hours 10’-12’ off peak hours</td>
<td></td>
</tr>
</tbody>
</table>

### Table 6. Timetables used for statutory days (including Saturdays, Sundays and legal holidays):

<table>
<thead>
<tr>
<th>No.</th>
<th>Metro Line 1: Republica – Dristor 2</th>
<th>Timetable</th>
<th>Applicable period</th>
<th>Metro trains headway</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Metro Line 1: Republica – Dristor 2</td>
<td>C 1334</td>
<td>01.01.2011–present</td>
<td>8’ peak hours 10’ off peak hours</td>
</tr>
<tr>
<td></td>
<td>Metro Line 1: Republica – Pantelimon</td>
<td>C 1334</td>
<td>01.01.2011–present</td>
<td>20’ – all day long</td>
</tr>
<tr>
<td></td>
<td>Metro Line 3: Anghel Saligny – Preciziei</td>
<td>C 1334</td>
<td>01.01.2011–present</td>
<td>8’ peak hours 10’ off peak hours</td>
</tr>
<tr>
<td></td>
<td>Common section M1 – M3: Eroilor – Nicolae Grigorescu</td>
<td>C 1334</td>
<td>01.01.2011–present</td>
<td>4’ peak hours 5’ off peak hours</td>
</tr>
<tr>
<td>2</td>
<td>Metro Line 2: Berceni – Pipera</td>
<td>C 212</td>
<td>01.01.2011–present</td>
<td>7’ - 8’ peak hours 9’- 10’ off peak hours</td>
</tr>
<tr>
<td>3</td>
<td>Metro Line 4: Gara de Nord 2 – Parc Bazilescu</td>
<td>C 406</td>
<td>01.01.2011–30.07.2011</td>
<td>8’ peak hours 10’-12’ off peak hours</td>
</tr>
<tr>
<td></td>
<td>C 407</td>
<td>01.07.2011– present</td>
<td>8’ peak hours 10’-12’ off peak hours</td>
<td></td>
</tr>
</tbody>
</table>
5.2.4. Rolling stock fleet maintenance

The patrimony assets of S.C. METROREX S.A. consist of 48 IVA metro trains (288 cars), 44 BM new metro trains (264 new cars), 8 Diesel Hydraulic locomotives, 4 railway inspection trolleys, 11 cars for internal use, out of which 2 cars for rapid interventions. In 2002, Metrorex issued a strategy for the company’s reorganization, restructuring and upgrading, an important component of this strategy being the outsourcing of some services and activities.

One of the outsourced activities was the rolling stock maintenance, finalized by the signature with S.C. ALSTOM Transport S.A. of the contract related to the “Maintenance of railway rolling stock operating in tunnels”, for a period of 15 years, starting from 1st July 2004.

The outsourcing was imposed as an organizational measure within the frame of the development strategy for the metro operating activity and counted on a positive result in respect of increasing the technical and technological performances.

5.2.5. Rolling stock mileage

The rolling stock mileage within 2008 - 2011 is graphically represented in Graphic 4 and detailed in Table 7.

<table>
<thead>
<tr>
<th>YEAR</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rolling stock mileage (thousand Km)</td>
<td>6.112,6</td>
<td>6.739,4</td>
<td>8.169,2</td>
<td>8.387,05</td>
</tr>
</tbody>
</table>

5.2.6. Energy consumption

The energy consumption development within 2008 - 2011 is shown below:

<table>
<thead>
<tr>
<th>YEAR</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric power, from which:</td>
<td>145.912,8</td>
<td>158.194,5</td>
<td>174.790,5</td>
<td>170.939,8</td>
</tr>
<tr>
<td>- for traction</td>
<td>81.344,3</td>
<td>88.210,4</td>
<td>97.882,7</td>
<td>95.726,3</td>
</tr>
<tr>
<td>- for installation</td>
<td>64.568,5</td>
<td>69.984,1</td>
<td>76.907,8</td>
<td>75.213,5</td>
</tr>
</tbody>
</table>

Compared with 2010, the electric power consumption reduced in 2011 with around 2,85%, due to metro trains timetables adjustments, by decreasing the headway during peak hours and subsequent increasing during off peak hours.
6.1. Development transported passengers

Although it covers only 4% of the Bucharest entire public transport network, the metro supplies a higher transport capacity due to its comfort, regularity and safety traffic conditions and provides the transport for about 20% of the total passengers using the Bucharest urban public transportation.

The Bucharest metro is currently transporting over 600,000 passengers/business day, on average, and over 15 million passengers/month.

The number of transported passengers’ development within the last four years is shown below:

<table>
<thead>
<tr>
<th>Year</th>
<th>M1</th>
<th>M2</th>
<th>M3</th>
<th>M4</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>97,557</td>
<td>64,132</td>
<td>15,764</td>
<td>4,676</td>
</tr>
<tr>
<td>2009</td>
<td>87,199</td>
<td>60,416</td>
<td>18,995</td>
<td>4,278</td>
</tr>
<tr>
<td>2010</td>
<td>86,144</td>
<td>62,448</td>
<td>21,576</td>
<td>4,502</td>
</tr>
<tr>
<td>2011</td>
<td>82,643</td>
<td>60,897</td>
<td>22,000</td>
<td>4,985</td>
</tr>
</tbody>
</table>

Table 9 - The development of the number of transported passengers

The dynamic of transported passengers within the last four years, on each of the 4 metro lines, is shown below:

<table>
<thead>
<tr>
<th>YEAR</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>M1</td>
<td>97,557</td>
<td>87,199</td>
<td>86,144</td>
<td>82,643</td>
</tr>
<tr>
<td>M2</td>
<td>64,132</td>
<td>60,416</td>
<td>62,448</td>
<td>60,897</td>
</tr>
<tr>
<td>M3</td>
<td>15,764</td>
<td>18,995</td>
<td>21,576</td>
<td>22,000</td>
</tr>
<tr>
<td>M4</td>
<td>4,676</td>
<td>4,278</td>
<td>4,502</td>
<td>4,985</td>
</tr>
</tbody>
</table>
6.2. Trip titles

Types of tickets
• two trips ticket
• ten trips ticket
• daily pass
• monthly pass with unlimited trips:
  › fully paid
  › 50% discounted (pupils and students)
• monthly pass with limited trips (62 trips):
  › fully paid
  › 50% discounted (pupils and students)
• weekly pass (7 days) with unlimited trips
• pass for passengers under the protection of special laws:
  › with disabilities
  › war veterans, Revolution heroes
• common ticket METROREX - RATB, out of which:
  › monthly pass with unlimited trips
  › monthly pass with limited trips (62 trips)
  › weekly pass
  › electronic wallet

TRIP TITLES USED WITHIN THE METRO NETWORK

ACTIV Card
Common trip title RATB - METROREX

AVC magnetic ticket
Starting with July 2011, there were commissioned 37 automatic vending machines (AVC) to sell metro trip titles. The passengers were given the possibility to buy trip titles using coins, bank notes or bank card.
For 2011, the diagram of total sold tickets is shown below:

- 14.34% - 2 trips
- 28.46% - 10 trips
- 0.84% - Unlimited monthly pass
- 31.13% - Monthly pass 62 trips
- 0.18% - Daily pass
- 1.80% - 50% discounted pass for pupils and students (unlimited trips)
- 11.86% - 50% discounted pass for pupils and students (62 trips)
- 0.15% - Weekly pass
- 0.39% - Government Decision no. 448/2006
- 10.86% - Common ticket Metrorex - R.A.T.B.

**Graphic 8 - Number of transported passengers in 2011, split on trip titles**

- 26.00% - 2 trips
- 29.43% - 10 trips
- 0.60% - Unlimited monthly pass
- 26.84% - Monthly pass 62 trips
- 0.27% - Daily pass
- 0.65% - 50% discounted pass for pupils and students (unlimited trips)
- 5.14% - 50% discounted pass for pupils and students (62 trips)
- 0.18% - Weekly pass
- 0.28% - Government Decision no. 448/2006
- 10.60% - Common ticket Metrorex - R.A.T.B.

**Graphic 9 - Total sold tickets in 2011**

6.3. The development of average tariff for a metro trip

To adopt a more flexible tariff policy complying with the transport demand and offer, it was issued a new decision to enable the metro trip tariffs adjustments over the inflation index ceiling.

Consequently, the Romanian Government approved the Emergency Decision no.57/16.06.2011 to recall some items included in the annex to the Government Decision no. 36/2001, enabling the adjustments of the metro fares over the inflation index ceiling.

By the Order no.576/02.08.2011 of the Minister of Transports and Infrastructure, on August 6, 2011, the metro fares were adjusted with 24.7%.

The annual average tariff for a metro trip is the result of dividing the revenues obtained from the passengers transport activity and the number of transported passengers.
The investment program in 2011 was issued based upon the Bucharest metro development, upgrading and modernisation strategy, structured on the following main directions:

1. Ongoing activities with a view to complete the related investment works under different stages of designing and/or execution;
2. Preparations to initiate new investments objectives for the Bucharest metro network extension and modernisation.

The funds allocated for the investment activity in 2011, as per the budget of revenues and expenditures approved by Government Decision no. 176/2011 were at the beginning of the year of 407.787 thousand lei in total, structured as here below:

- **Budget allocation**
  - Investments of the state owned companies: 77.787 thousand lei
  - Expenditures related to reimbursable programs: 330.000 thousand lei

During 2011, the investments budget was re-allocated/rectified. Therefore, the structure of the approved funds at the end of 2011 became:

- **Budget allocation**
  - Investments of the state owned companies: 163.474 thousand lei
  - Expenditures related to reimbursable programs: 360.991 thousand lei

The investments program fulfilment, on total financing sources provided by the state budget and external loans, is shown below:

<table>
<thead>
<tr>
<th>Program (thousand lei)</th>
<th>Rectified (thousand lei)</th>
<th>Payments (thousand lei)</th>
<th>Percentage achieved compared with the program</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buget de stat</td>
<td>163.474</td>
<td>163.474</td>
<td>117.474</td>
</tr>
<tr>
<td>Cheltuieli aferente programelor cu finanţare rambursabilă</td>
<td>360.991</td>
<td>360.989</td>
<td>257.961</td>
</tr>
<tr>
<td>TOTAL</td>
<td>524.465</td>
<td>524.463</td>
<td>375.435</td>
</tr>
</tbody>
</table>

Further the delays incurred within the approval process of credit lines from the Ministry of Public Finances, the total payments at the end of the year were of 375.435 thousand lei, compared with the total achieved of 524.463 thousand lei; the invoices not paid until the end of 2011 were paid within Q1 2012.

The approved amounts for expenditures from the state budget and the expenditures related to reimbursable programs in 2011 were used for the here below investments objectives:

- **Metro Line 4, Extension 2: Section 1 Mai – Laminorului (LAROMET) – Lac Străulești**
  - Launching and Constanța TBM Shaft Launching.
  - Recast public utilities deviated during gallery execution works;
  - General installations: electric (medium voltage, low voltage, lighting technical rooms), sanitary, ventilation, finishing/technical rooms dividing.
  - Public area lighting installations, public area finishing works, signalling, entrances and entrances covers, elevators and escalators.
  - Fiber optics transmission network.
  - Phone and clock installations.

In July 2011, within the objective Metro Line 4 – Metro extensions, the section from 1 Mai to Parc Bazilescu metro stations were commissioned.

For this commissioning, there were executed and completed the necessary works, as here below:

- Rolling track and 3rd rail.
- Finishing related to technical rooms and ventilation, sanitary and electrical installations.
- Finishing related to public areas, lighting, elevators, escalators and entrances covers.
- Gallery execution between Buceri TBM Shaft Launching and Constanța TBM Shaft Launching.
- On March 14, 2011, in the presence of the Minister of transports and infrastructure – Mrs. Anca-Daniela Boagiu, it was signed the contract for works execution of the objective “Metro Line 5 – Drumul Taberei – Pantelimon. Section 1. Drumul Taberei – Universitate, Package L 1.1 – Extension Râul Doamnei – Haşdeu (Opera) – Structure of resistance”;
- On April 15, 2011, in the presence of Mr. Emil Boc and the Minister of transports and infrastructure – Mrs. Anca-Daniela Boagiu, it was signed the contract for works execution of the objective “Metro Line 5 - Drumul Taberei – Pantelimon. Section 1. Drumul Taberei – Universitate, Package L 1.2 – Romanierilor – Valea Ialomiţei station, including Depot and Connecting Gallery - Structure of resistance”;
- On November 4, 2011, there were started the works related to indoor moulded walls in stations;
- Current ongoing projects for:
  - structure works on the section Drumul Taberei - Universitate, extension Râul Doamnei - PSS Opera (Haşdeu)- Package 1.1 and Package 1.2 – gallery, station and Valea Ialomiţei depot;
  - consulting services and works supervision contracts.;
- There completed the land and real estates expropriation procedures necessary for the execution of the project related to “Metro Line 5, Drumul Taberei – Pantelimon. Section Drumul Taberei - Universitate”.
- Currently, all buildings necessary for this work were tabulated on behalf of the Romanian state, the involved amounts being secured in compliance with the legal provisions into force.
- It was continued the activity related to works designing, equipping and endowment, necessary for full commissioning of Metro Line 5.
- The works supervision activity consisted of site monitoring and cooperation with contractors to agree upon the detailed designs, locations take over, and structure works supervision.
- There were obtained all licences and authorizations necessary all works execution.

Feasibility Study related to Metro Line 4, Extensions project, as the line will further extend from Laminorului (Laromet) to Lac Străulești;
- Nearby Lac Străulești, it will be built a depot and also a high capacity Park & Ride facility for cars, buses, coaches;
- Inception of execution works to extend the line until Lac Străulești.
- It was launched the procurement procedure for the works related to: “M4 Extension 2 Parc Bazilescu – Străulești. Construction works for tunnel, gallery, stations, depot, multimodal terminal and involved installations for commissioning”.
- Proposals opening, evaluation, awarding, contract signature and works inception are scheduled to take place in 2012.
- Estimated deadline for commissioning: 2015.

On June 8, 2011 it was issued the Government Decision no. 598 approving the technical and financial indicators of the

CCTV installations, fire detection and radio-communications.
- Fare collection system. These works were completed subsequent to signature of acceptance minutes for commissioning.
- Ongoing works for:
  - automation and traffic safety installations, works that didn’t influence the full commissioning, since shuttle traffic was used on the section from 1 Mai to Bazilescu;
  - passengers dynamic information system.
- There were continued the legal actions and procedures related to land and real estates expropriation necessary to perform the objective.
INSTALLATIONS MODERNISATION ON CURRENT METRO LINES:

- There were continued the modernisation works of substations and low voltage installations on Metro Lines 1 and 3 – there were performed works in 25 metro stations, being completed and accepted 19 sub-stations;
- It was finalized the safety traffic system – Interlocking, on the section from Eroilor to Preciziei (Industriilor);
- It was completed the passengers information and travel guidance system in the metro stations located on the route from Anghel Saligny to Preciziei and in all corresponding stations.

PROCUREMENT OF NEW METRO TRAINS

Current ongoing contracts:

- “Consulting services for procurement and commissioning 37 new metro trains to be put into service on Bucharest Metro Line 5”;
- “Procurement and commissioning 16 new metro trains” to be supplied by Construcciones y Auxiliar De Ferrocarriles S.A. (CAF) Spain;
- “Procurement, assembly and commissioning 16 sets of onboard ATC equipments destined to 16 new metro trains” to be supplied by Bombardier Transportation S.p.A Italy.

FACILITIES FOR THE PASSENGERS WITH DISABILITIES

- There were completed the mounting works for 81 new escalators and entrances covering of stations equipped with new escalators;
- There were continued the mounting works for elevators. The works execution status is the following:
  - Locations delivered to the contractor – 27 stations (ground and underground);
  - Works to achieve the objective in 24 stations;
  - Until the end of the year, there were commissioned 24 elevators and 1 escalator in 14 stations.

METRO LINE 6: BUCHAREST INTERNATIONAL AIRPORT RAIL ACCESS LINK PROJECT

- On December 15, 2011, it was signed the consulting services contract for design, technical assistance and works supervision of Metro Line 6 Project: Bucharest International Airport Rail Access Link Project with the Joint Venture consisting of the here below companies:
  - Padeco Co. Ltd. Japan;
  - Oriental Consultants Co. Ltd. Japan;
  - Metroul S.A. Romania, having as designated subcontractors S.C. Seneca Group International SRL Bucharest & Systra France.

OTHER ACTIVITIES

- In 2011, there were initiated 22 public procurement procedures in order to buy related services to perform the investment objectives, out of which 20 were completed by contracts signature, 2 are ongoing, and scheduled to be completed in 2012, respectively:
  - “M4 Extension2 Parc Bazilescu – Străuleşti.
- Construction works for tunnel, galleries, stations, depot, multimodal terminal and related installations for commissioning”;
- Trolley to measure the geometric parameters of rolling track and metro switches.
CHAPTER 8. FINANCIAL DATA IN 2011

8.1 Revenues development

The revenues of S.C. METROREX S.A. have the following sources:

- Fare box revenues (passengers transport)
- Revenues from state budget subsidies for operating activity for turnover:
  - Total subsidies for passengers’ transport with metro, out of which:
    - Current operation activity;
    - Rolling stock maintenance, as per the contract concluded with ALSTOM;
    - Rolling stock maintenance (payments made in the current year for services performed within the previous year), as per the contract concluded with ALSTOM;
- Revenues from other activities, out of which:
  - Revenues from commercial activities, association contracts, room or land rentals, advertisement etc.

- Revenues from other sources, out of which:
  - Revenues from operating subsidies (50% discounts granted to pupils and students, 100% discount granted to Revolution heroes and war veterans);
  - Revenues from investments subsidies, constituted at the level of expenditures with depreciation for those investments objectives having as financing source budgetary allocations or loans guaranteed by the state, as per the Minister’s of Public Finances Order no. 3055/2009 and Law no. 259/2007 for modification and amendment of Accounting Law no. 82/1991;
  - Revenues from subsidies to be received in order to cover the expenditures related to the contract concluded with ALSTOM, as per the legislation into force:
    - Government Emergency Ordinance no. 34/2009 (Clause 13).
- Financial revenues
- Allocated amounts from the estate budget, including loans guaranteed by the government and reimbursed from budget allocations.

Table 12 The revenues pattern during 2008 - 2011

<table>
<thead>
<tr>
<th>Indicators</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total revenues and financial sources (I+II), from which:</td>
<td>625,763,10</td>
<td>495,849,36</td>
<td>552,904,49</td>
<td>577,192,79</td>
</tr>
<tr>
<td>I</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total revenues (1+2), from which:</td>
<td>592,452,29</td>
<td>469,249,18</td>
<td>549,781,08</td>
<td>577,192,79</td>
</tr>
<tr>
<td>a) Fare box revenues</td>
<td>119,679,13</td>
<td>113,788,17</td>
<td>117,712,20</td>
<td>125,189,38</td>
</tr>
<tr>
<td>b) Revenues from operating subsidies, as per the turnover (b1 + b2), from which:</td>
<td>237,571,00</td>
<td>269,298,06</td>
<td>349,293,00</td>
<td>358,999,96</td>
</tr>
<tr>
<td>b1) Subsidies for the current operation activity</td>
<td>158,851,00</td>
<td>223,894,57</td>
<td>225,615,75</td>
<td>213,236,49</td>
</tr>
<tr>
<td>b2) Subsidies for the rolling stock maintenance contract concluded with ALSTOM</td>
<td>78,720,00</td>
<td>45,403,49</td>
<td>123,677,25</td>
<td>145,763,47</td>
</tr>
<tr>
<td>b3) Subsidies for the rolling stock maintenance contract concluded with ALSTOM (services performed in 2009 and paid in 2010)</td>
<td>89,772,00</td>
<td>55,044,94</td>
<td>42,534,00</td>
<td>-</td>
</tr>
<tr>
<td>c) Other revenues from operation, from which:</td>
<td>22,380,46</td>
<td>24,542,41</td>
<td>22,639,58</td>
<td>28,557,96</td>
</tr>
<tr>
<td>d) Total revenues from other sources, from which:</td>
<td>108,757,46</td>
<td>56,017,84</td>
<td>58,734,75</td>
<td>62,157,05</td>
</tr>
<tr>
<td>d1) Revenues from operating subsidies (50% discounts granted to pupils and students, 100% discount granted to Revolution heroes and war veterans)</td>
<td>7,949,29</td>
<td>4,444,25</td>
<td>5,001,00</td>
<td>10,002,83</td>
</tr>
<tr>
<td>d2) Revenues from investments subsidies, constituted at the level of expenditures with depreciation for those investments objectives having as financing source budgetary allocations or loans guaranteed by the state, as per the Minister’s of Public Finances Order no. 3055/2009 and Law no. 259/2007 for modification and amendment of Accounting Law no. 82/1991</td>
<td>45,763,23</td>
<td>51,573,59</td>
<td>53,733,75</td>
<td>52,154,22</td>
</tr>
<tr>
<td>d3) Revenues from subsidies to be received in order to cover the expenditures related to the contract concluded with ALSTOM, as per the legislation into force:</td>
<td>55,044,94</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2 Financial revenues</td>
<td>104,064,24</td>
<td>5,602,70</td>
<td>1,401,55</td>
<td>2,288,44</td>
</tr>
<tr>
<td>II Subsidies for loans reimbursement</td>
<td>33,310,81</td>
<td>26,600,18</td>
<td>3,123,41</td>
<td>-</td>
</tr>
</tbody>
</table>
21,69% Fare box revenues
62,20% State budget subsidies
4,95% Revenues from other activities
1,73% Compensated discounts for pupils and students
9,04% Revenues constituted at the level of depreciation expenditures
0,40% Financial revenues

Graphic 11 - Revenues percentage development in 2011, on financing sources

8.2 Expenditures development

The expenditures pattern is the following:

- Material expenditures
- Expenditures with power supply, heating and water
- Expenditures with personnel, out of which:
  - Gross wages
  - Other staff expenditures
- Expenditures related to the third parties services, out of which:
  - Rolling stock repairs, as per the maintenance services contract signed with Alstom
- Other expenditures (depreciation, social-cultural, protocol etc.)
- Financial expenditures.

Table 13 The expenditures pattern during 2008 - 2011

<table>
<thead>
<tr>
<th>Indicators 0</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>625,705.36</td>
<td>617,639.09</td>
<td>603,444.66</td>
<td>577,192.79</td>
</tr>
<tr>
<td>I Total</td>
<td>592,394.55</td>
<td>591,038.91</td>
<td>600,321.25</td>
<td>577,192.79</td>
</tr>
<tr>
<td>I Operation</td>
<td>493,296.94</td>
<td>589,381.65</td>
<td>599,146.00</td>
<td>572,551.41</td>
</tr>
<tr>
<td>a) Material</td>
<td>9,431.55</td>
<td>9,539.17</td>
<td>9,987.40</td>
<td>9,698.03</td>
</tr>
<tr>
<td>b) Expenditure</td>
<td>42,529.02</td>
<td>49,029.59</td>
<td>47,480.34</td>
<td>50,026.07</td>
</tr>
<tr>
<td>c) Expenditure</td>
<td>222,011.55</td>
<td>259,482.17</td>
<td>257,872.24</td>
<td>267,143.54</td>
</tr>
<tr>
<td>c1) Gross</td>
<td>161,483.60</td>
<td>189,858.26</td>
<td>188,327.28</td>
<td>195,054.96</td>
</tr>
<tr>
<td>c2) Other</td>
<td>60,527.95</td>
<td>69,623.91</td>
<td>69,544.96</td>
<td>72,088.58</td>
</tr>
<tr>
<td>d) Expenditure</td>
<td>160,887.90</td>
<td>206,825.26</td>
<td>217,872.42</td>
<td>180,290.98</td>
</tr>
<tr>
<td>d1) Rolling</td>
<td>130,547.04</td>
<td>161,890.50</td>
<td>185,575.67</td>
<td>145,958.63</td>
</tr>
<tr>
<td>e) Other</td>
<td>58,436.92</td>
<td>64,505.46</td>
<td>65,933.60</td>
<td>65,392.79</td>
</tr>
<tr>
<td>2 Financial</td>
<td>99,097.61</td>
<td>1,657.26</td>
<td>1,175.25</td>
<td>4,641.38</td>
</tr>
<tr>
<td>II Funds</td>
<td>33,310.81</td>
<td>26,600.18</td>
<td>3,123.41</td>
<td>-</td>
</tr>
</tbody>
</table>

Graphic 12 - Total expenditures development in 2011

1,68% Material expenditures
33,79% Gross wages
11,33% Other operating expenditures
0,8% Financial expenditures
31,24% Expenditures related to third parties services (ALSTOM)
12,49% Other staff expenditures
8,67% Electric power expenditures

To issue the metro development and modernization strategy, it was started from the identification of certain modalities of increasing the metro transport system contribution in Bucharest taking into account the expenditures diminishing and the performances increasing within the involved public transport specific conditions.

The transports strategy envisages the public transport prioritization, simultaneously with its development and modernisation components.

Therefore, the strategy to be followed for Bucharest metro network modernisation and development envisage the here below main directions:

- Improvement of the organizational system;
- Enacting of certain institutional measures with a view to co-ordinate the underground and ground public transport under all aspects;
- Development of certain investments programs to allow the Bucharest metro network development and modernisation.

9.1. Organization system improvement

Improvement of the entire organizational system, especially by:

- Increasing the underground public transport attractiveness;
- Quality increasing and underground public transport services diversification;
- Maintenance services improvement.

9.2. Institutional measures

The Bucharest metro global development, modernization and reliable strategy were based upon organizational measures at the company’s level and measures adopted at governmental level.

One of the most important institutional measures seeks to better co-ordinate the public transport in Bucharest and the contiguous areas.

Under these circumstances, by the Government Ordinance no. 21/31.08.2011, it was created and established the Bucharest Metropolitan Transport Authority, ordinance subsequently approved by Law no. 8 / 06.01.2012. The Government Decision no. 1204 / 06.12.2011 approved the rules of organization and operation of the Bucharest Metropolitan Transport Authority so that to co-ordinate all aspects of the urban ground and underground public transport in Bucharest and contiguous area.

The advantages of establishing and operating such a decisional body are multiple and are mainly referred to:

- Co-ordination of development programs and providing the involved complementarities of the urban and sub-
urban transport systems;
• Allocation of public funds for investments in order to avoid parallel operation at an unsatisfactory productivity level of all different transport modes and/or services for transport;
• Fare collection integration and attractive tariff policy application with a view to increase the public transport efficiency;
• Coherent administration of the existing endowments based upon an integrated transport master plan including the transport offer in line with the passengers transport demand (proper routes, common stations, and easy links to reach all the city’s main interest points).

The International Bank for Reconstruction and Development (I.B.R.D.) financed the Transport Restructuring Project consisting of the herein below components:

• Component A – Roads Sub-sector
• Component B – Railway Sub-sector
• Component C – Urban transport Sub-sector, consisting of the following sub-components:
  > Technical assistance related to the establishment of the Bucharest Metropolitan Transport Authority. Until 31st December 2007 there were finalized and submitted the Reports related to the functions and geographic coverage, funding and governance the Authority, as well as the organization and personnel structure. A study tour was conducted at the Metropolitan Transport Authorities in Barcelona (Spain) and Lyon (France). The Government Decision draft was finalized in November 2008 and subsequently submitted to the Ministry of Transports for being signed and promoted. Public consultations are currently ongoing; therefore, within the second half of 2011, the Romanian Government will approve a decision to regulate the establishment and entering into force the Bucharest Metropolitan Transport Authority.
  > Technical assistance for short term measures to improve efficiency and effectiveness of Metrorex. This project was completed in the second half of 2007 when the Consultant submitted the Final Report. A series of recommendations were included in the Global Development Strategy of Metrorex.
  > Technical Assistance for the Extension of Metrorex Services within a Metropolitan Bucharest Public Transport Strategy and Investment Program. The Project was financed by the World Bank and completed in July 2009.

Due to all hereinabove and correlated with the attention granted to the local public transport by all factors involved both at local and governmental level, it is appreciated that in the future the results will appear, too. Therefore, there will be met requirements to increase the public transport efficiency, by metro, tram, trolley or bus and to improve the quality standard for the passengers’ service.

9.3. Investment programs

The Bucharest metro global development and modernisation strategy was issued starting from the identification of certain modalities to increase the contribution of the metro transportation to the Bucharest public transport modernisation.

The main objectives, on short, medium and long term are structured, as detailed below:

- Metro network development

| 1 | Metro Line: | Metro Line 5 |
| 1 | Route: | Drumul Taberei - Pantelimon |
| 1 | Extension: | 1 Drumul Taberei – Universitate |
| 1 | Implementation period: | 2010 - 2015 |
| 1 | Total length: | 9,035 km |
| 1 | Number of stations: | 13 |
| 1 | Estimated value: | 623,5 mil Euro + VAT |

This metro line will serve Drumul Taberei district which is defective on public transport services. The number of people is of 300,000 inhabitants and the buses, trolleybuses and tramway networks do not cover the traffic demand at peak hours.
Metro Line: Metro Line 5  
Route: Drumul Taberei - Pantelimon  
Extension: 2 Universitate – Pantelimon  
Implementation period: 2013 - 2018  
Total length: 8,074 km  
Number of stations: 9  
Estimated value: 828,33 mil Euro + VAT  

It will provide the connection between Pantelimon district which is of over 250,000 inhabitants, the downtown and the south-western of Bucharest, Drumul Taberei district.

Metro Line: Metro Line 6  
Route: Bucharest International Airport Rail Access Link Project  
Extension: Aeroportul Henri Coandă – Otopeni  
Execution period: 7 years  
Estimated commissioning: 2018  
Total length: 14 km  
Number of stations: 12 (according Ministry of Transports and Infrastructure agreement)  
Estimated value: 1,055 mil Euro + VAT  

It will provide the connection of the metro network with the Bucharest International Airport. This metro line will serve important areas of interest such exhibitions, business centres, leisure & supermarkets, residential real estates that create a corridor between the downtown of Bucharest and the Airports surrounding the city, revitalizing the activities and stimulating development of the north and residential areas between Baneasa and Otopeni. By the construction of this metro line, it will be created a rapid railway link between other two, vital for the economy, transport modes: railway and air flight. By the extension of the Metro Line 4, from Gara de Nord to Gara Progresu, it will be created the biggest and the most important metro line on the city’s north to south diameter, in order to make the connection between the two main airports: Bucharest International Airport and Băneasa Airport with Băneasa, Basarab, Gara de Nord and Gara Progresu railway stations, and subsequently, the interconnection with the ground transportation

Metro Line: Metro Line 7  
Route: Voluntari – Bragadiru  
Implementation period: 2012 - 2018  
Total length: around 25 km  
Number of stations: 30  
Depot: 1  
Estimated value: 1,008 mil Euro + VAT  

This metro line will be executed in order to increase the passengers’ mobility, currently using the SV – NE route. It will interconnect two of the most crowded and populated districts, crossing the downtown. The metro line will be in the service of the south-western Bucharest residential districts and the markets on the Ring road Alexandriei, as well as for Rahova and Ferentari districts, connecting the downtown with the north-south, Colentina – Voluntari. This metro line is scheduled to be executed under Public Private Partnership (PPP).
Chapter 9. Bucharest Metro

Global Development and Modernization Strategy

7

Metro Line: Metro Line 3
Route: Anghel Saligny - Preciziei
Extension: Păcii – Western Ring road
Implementation period: 2017 - 2020
Total length: 3.8 km
Number of stations: 4
Estimated value: 189 mil Euro + VAT

This metro line will be considered as the extension of the Metro Line 3, from Păcii metro station towards the hypermarkets area, residential real estates and A1 highway. There will be provided conditions for a Park & Ride facility at the Bucharest city exit from A1 highway.

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Metro Line: Metro Line 2
Route: Berceni – Pipera
Extension: Pipera – “Pipera - Tunari” Services and housing area
Implementation period: 2017 - 2020
Total length: 8.20 km
Number of stations: 9
Estimated value: 650 mil Euro + VAT

The rapid development of Pipera – Tunari area, due to new residential districts building and near location to future highway towards Ploieşti, will increase the transport demand that justify until 2020 the extension of Metro Line 2 Berceni – Pipera, from Pipera to Tunari.

- Increase the metro network attractiveness by:
  - Increasing the metro stations number (construction of 10 new metro stations) and new accesses opening of the existing metro stations. In stages, within 6 years from the financing source providing.
  - Modernisation of the existing installation on metro lines in service, by:
    - Modernisation of obsolete fixed installation on the existing metro network whose life span was reached:
      - Ventilation installations, correlated with the involved electric installations. In stages, within 3 years from the financing source providing;
      - Sanitary installations. In stages, within 3 years from the financing source providing;
      - Telecoms installation. In stages, within 2 years from the financing source providing;
      - Rolling track modernisation by extension of the resilient fastening system. In stages, within 2 years from the financing source providing.
  - Metro stations modernisation:
    - Replacing the suspended ceilings. In stages, within 2 years from the financing source providing;
    - Construction of sanitary rooms destined to passengers. In stages, within 2 years from the financing source providing. In 2008, there were executed and commissioned sanitary rooms in Piaţa Unirii and Piaţa Victoriei metro stations;
    - New finishing in the metro stations. In stages, within 2 years from the financing source providing.

- Rolling stock procurement

Within the strategy of S.C. Metrorex S.A is included the policy of providing the necessary rolling stock for operation, by replacing the old rolling stock fleet type IVA and subsequent procurement of new rolling stock for the envisaged new metro lines.

The following criteria were taken into consideration:

- Increasing the metro attractiveness by:
  - Improvement the comfort conditions for passengers and increasing the safety operation by purchasing metro trains of latest generation in order to replace the obsolete fleet;
  - Decreasing the headways between trains, once the transport demand will increase, and purchasing additional rolling stock;
  - Decreasing the operating expenditures percentage, optimising the energy consumption and the expenditures to purchase new rolling stock having improved technical and energetic parameters, more reliable in order to replace the obsolete rolling stock.

- Providing rolling stock for the new metro lines or for the extension of the existing ones correlated with the needs to cover the transport demand under safety traffic conditions.

- During 2011 – 2014, 37 new metro trains of 6 cars each will to be procured. 16 of these new metro trains will replace the old rolling stock fleet, now in service on Metro Line 3, and 21 new metro trains will provide the transport capacity on Metro Line 5 Drumul Taberei – Universitate.