Investment challenges of main Polish cities – the 2035 perspective

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Table of contents

Summary 2

1. Introduction 4

2. Overall investment challenges facing Polish cities 5
   2.1. Polish cities included in the study 5
   2.2. Polish cities in 2035 5
   2.3. Infrastructural needs of Polish cities: starting point 6
   2.4. Infrastructural needs of Polish cities: investment challenges 7
   2.5. Estimation of investment challenges facing Polish cities 8
   2.6. Estimation of investment challenges facing city finances 10
   2.7. Investment challenges: problems to solve 12

3. Information on methodology applied in the study 13
   3.1. Definition of “investment needs” 13
   3.2. Benchmark system 14
   3.3. Manner of calculating the size of investment needs 16
   3.4. Division of investments into general ones and those for which main responsibility is borne by the cities 16

4. Investment needs in particular areas of urban infrastructure 17
   4.1. Housing infrastructure 17
   4.2. Transport and road infrastructure 20
   4.3. Internet infrastructure 24
   4.4. Social infrastructure 25
   4.5. Environmental infrastructure 29

5. Investment financing 32
   5.1. Looking for a new way of fulfilling tasks 33
   5.2. Alternative financing methods 34
   5.3. Support for financing through optimisation 36

Contact 37
For this reason, we calculated the present distance between Polish cities and a model European city in five infrastructural areas: housing infrastructure, transport infrastructure, Internet infrastructure, social infrastructure and environmental protection. Basing on those data, we calculated the value of necessary investments for each area.

The size of investment needs depends, obviously, on expected changes in population and in the level of economic activity. According to demographic forecasts, if no significant migration shifts which are now difficult to foresee occur, by 2035 the population of 12 Polish cities presented in the report will decrease by 5.2% and will be subject to a quick aging process. Nevertheless, if the optimistic scenario of Poland’s development proves true, a very clear increase in economic development of the examined cities will occur. In 2035, GDP per capita will reach the level of from 101% of the 2035 EU average in Rzeszów to 251% of that average in Warsaw.

The results of our research show that if in the 12 examined cities urban infrastructure comparable to that currently existing in well-developed cities of Western Europe is to be built, then, taking into account the expected size of those cities, during the whole quarter of the century, i.e. from 2011 to 2035, overall investments amounting to approx. PLN 1,130 billion (assuming constant prices as in 2011) need to be made.

The most money needs to be invested in housing infrastructure – approx. PLN 757 billion (two thirds of overall investment needs of the Polish cities). Investment needs relating to transport infrastructure are second in terms of scale (PLN 271 billion, which makes almost a quarter of overall investment needs). Development and modernisation of social infrastructure require investments estimated at PLN 82 billion, whereas development of infrastructure for environmental protection – PLN 21 billion. As compared to those areas, needs of ICT infrastructure are very low but now it is difficult to estimate them accurately (due to the rapid technological progress it is not easy to predict what kinds of infrastructure will be needed in 25 years).

From the perspective of the distribution of investment needs to particular cities, the largest challenges – in terms of global expenditures – will face those cities whose population in 2035 will be the largest (Warsaw, Krakow and Wrocław).

If we take into account investment costs per capita, it turns out that highest expenses will also be incurred by Warsaw, Krakow and Wrocław, whereas Łódź will have to deal with the lowest expenses, mainly due to the quickest population decrease.

As the cities are directly responsible only for a part of necessary investment expenditures relating to the development and modernisation of infrastructure, we made an attempt to estimate the potential burden for city finances resulting from them. After separating investment expenditures for which main responsibility is borne by the cities, it turns out that from 2011 to 2035 expenditures estimated at PLN 342 million are possible. The distribution of those burdens to particular cities will not be, however, subject to significant changes as compared to the allocation of overall investment costs (only the relative burden of Poznań will clearly increase, those of Łódź and Wrocław – to a smaller extent, whereas those of Katowice and Białystok – will decrease).

Nevertheless, a question may be asked, whether Polish cities pursue an investment policy which aims to satisfy their long-term needs.

Due to the diverse income basis of city finances, an appropriate point of reference for assessing challenges is a comparison of investment expenditures incurred mainly by cities with actual expenditures. A comparison of average annual investment expenditures of cities incurred from 2007 to 2010 with hypothetical expenditures incurred in 2011 (according to needs calculated by us) shows that in the case of three cities (Warsaw, Wrocław and Poznań) actual investment expenditures turned out to be 35–45% higher than expected, and in the case of Białystok – even 80% higher.
At the same time, they were much lower (20-30%) than expected in Łódź, Krakow and Szczecin. In the remaining cities, they were close to expectations. Therefore, the situation may be regarded as diversified—so far, some cities have managed to make investment efforts compliant with their long term development needs for the period until 2035, whereas in the case of other cities such efforts should be considered insufficient.

Nevertheless, it should be noted that financing necessary investments in the years 2011-2035 will not be an easy task for the cities in question as a result of more limited investment financing capabilities than in the period 2007-2010, increased indebtedness and lower inflow of cash from EU funds. Currently, the possibility of continuing or increasing investment efforts will depend mainly on the cities’ ability to raise and use more private capital in financing: either in the form of public-private partnership or by privatising certain city functions.

The report presents a range of solutions which may facilitate financing investments which are necessary for development (solutions making it possible to achieve savings in other fields, alternative ways of financing the same investment projects). Attention should also be paid to the fact that the largest scale of financial needs resulting from investment challenges is associated with development of traditional infrastructure, including in particular housing, transport and social infrastructure. On the other hand, much lower outlays are needed to achieve e.g. a huge progress in the field of modern ICT infrastructure which is of much greater importance to economic competitiveness of the cities. In other words, it is possible to develop an investment and development strategy as a consequence of which the Polish cities in question may become European leaders in certain, particularly important areas, possibly at the cost of delayed development of traditional infrastructure. Nevertheless, the possibility of choosing such a strategy is doubtlessly worth considering.
For over 20 years, Poland has been on the path of economic development enabling it to reduce the development gap that separates it from Western Europe. When measuring that distance by the level of GDP per capita, it turns out that Poland achieved considerable success: GDP per capita in Poland, measured by purchasing power parity, increased from 32% of the Western European level in 1991 to 58% of the Western European level in 2011. This does not mean, however, that differences in living standards were decreasing at a comparable speed. The standard of living is affected not only by the current income of inhabitants reflected in GDP but also by assets accumulated in the past, general living conditions, natural environment, as well as efficiency of public and private institutions. From this perspective, the distance between Poland and Western Europe is still huge. In spite of that, if the positive scenario of development of Poland proves true, throughout the nearest quarter of the century it will be possible to considerably decrease that distance, until Poland’s GDP per capita reaches the EU average level.

A similar comment may be made on the main Polish cities described in this report. PwC has been observing their development for a number of years and has published regular reports regarding development challenges which face them\(^1\). So far, we have been concentrating on an analysis leading to highlighting the strengths and weaknesses of Polish cities as well as the directions of desired changes. We have not compared the level of development of Polish and Western European cities because, in our opinion, it had been too early for such a comparison.

In the present report, however, we decided to go one step further. Clearly, there is a huge development gap between Polish cities and their Western European counterparts. It can be observed in a number of areas – in the strength of economy, efficiency of work and income of inhabitants, as well as in the quantity and quality of housing resources, transport and public utility infrastructure, in the state of the natural environment, availability and quality of public services, and in the development of the ICT network. Nevertheless, we reckon that already today it is possible to try to estimate the scale of investments which need to be made so that the Polish cities could achieve the saturation level in all those fields similar to that currently observable in cities of Western Europe and provide their inhabitants with similar living standards. In other words, these are investments which need to be made in order to put into practice an optimistic scenario of Poland’s development. For this reason, we have assumed the long-term perspective, which is rarely encountered in the debate concerning cities’ finances. The value of this report consists in referring to real models and detaching from current issues and discussions which, although important to completing the investments, should hide the strategic target – the cities’ real aspirations.

If the Polish cities are to provide their inhabitants with living and business conditions comparable to those in Western Europe by 2035, such investments need to be made during the nearest twenty five years. The year 2035 was selected symbolically – after 23 years of Poland’s economic transformation (started in 1989); it means another 23 years of chasing Western Europe in terms of economy. It should be noted, however, that calculations presented in the report are based on estimations and on a number of simplified assumptions.

\(^1\) PwC’s reports published so far include two editions of the “PwC Report on major Polish cities” of 2006 and 2010 (www.pwc.pl > Publications > Reports on major Polish cities).
Investment challenges of main Polish cities – the 2035 perspective

2. Overall investment challenges facing Polish cities

2.1. Polish cities included in the study

The study covered 12 Polish cities: Warsaw, Łódź, Krakow, Wrocław, Poznań, Szczecin, Bydgoszcz, Lublin, Katowice, Białystok, Rzeszów and Gdańsk (order according to Urban Audit).

The examined cities are currently inhabited by over 7 million people, constituting 18% of Poland’s population (the entire metropolitan areas surrounding those cities are inhabited by 16 million people, i.e. 42% of the country’s population).

Total GDP generated by those cities in 2011 was estimated at PLN 508 billion (42% of Poland’s GDP), and by the whole metropolitan areas – PLN 840 billion (69% of Poland’s GDP). Therefore, it can be easily stated that they play a crucial role in Poland’s economy.

GDP per capita in the 12 examined cities was 2.3 times higher than average GDP per capita in Poland (in the entire metropolitan areas it was 1.6 times higher) and equalled 132% of the EU average (95% in the entire metropolitan areas).

2.2. Polish cities in 2035

How can Polish cities change in the nearest quarter of the century? First of all, the demographic structure of their inhabitants will be subject to significant changes.

Second of all, if the positive scenario of Poland’s development proves true, the efficiency of work will significantly grow and people’s income will increase. Finally, such changes will need to be accompanied by appropriate development and improvement of the state of urban infrastructure. If the latter condition is not met, the chances to put the optimistic scenario into practice will be much lower.

According to demographic forecasts of the Central Statistical Office, if no large-scale migrations (e.g. a significant inflow of immigrants to Poland) which are now hardly foreseeable occur, the population of the 12 Polish cities will decrease by 5.1% by 2035. A significant increase in the number of inhabitants will be observed only in Warsaw, whereas a smaller increase – in Krakow (cf. Table 1).

By 2035, the overall population of the cities in question will decrease by 5.1%. Warsaw’s and Krakow’s populations will grow, whereas Łódź, Bydgoszcz and Katowice will face the biggest depopulation.

In the remaining cities, the number of inhabitants will fall: the largest decrease, by almost 22%, will be observed in Łódź, and by approx. 20% — in Bydgoszcz and Katowice. At the same time, population of metropolitan areas will not change to a significant extent. In view of the forecast decrease in Poland’s population to 36 million inhabitants by 2035 (as compared to current 38.2 million), the percentage of people living both in the 12 cities and in the entire metropolitan areas will increase.

Table 1. Population and demographic structure of the Polish cities, 2009-2035

<table>
<thead>
<tr>
<th>City</th>
<th>Population 2009</th>
<th>Population 2035</th>
<th>Percentage change</th>
<th>Percentage of people aged over 65 2009</th>
<th>Percentage of people aged over 65 2035</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warsaw</td>
<td>1.71</td>
<td>1.88</td>
<td>9.7%</td>
<td>17%</td>
<td>21%</td>
</tr>
<tr>
<td>Łódź</td>
<td>0.74</td>
<td>0.58</td>
<td>-22.2%</td>
<td>17%</td>
<td>27%</td>
</tr>
<tr>
<td>Krakow</td>
<td>0.76</td>
<td>0.77</td>
<td>1.9%</td>
<td>15%</td>
<td>22%</td>
</tr>
<tr>
<td>Wrocław</td>
<td>0.63</td>
<td>0.61</td>
<td>-3.5%</td>
<td>16%</td>
<td>22%</td>
</tr>
<tr>
<td>Poznań</td>
<td>0.55</td>
<td>0.49</td>
<td>-11.7%</td>
<td>15%</td>
<td>22%</td>
</tr>
<tr>
<td>Gdańsk</td>
<td>0.45</td>
<td>0.42</td>
<td>-7.5%</td>
<td>16%</td>
<td>24%</td>
</tr>
<tr>
<td>Szczecin</td>
<td>0.41</td>
<td>0.38</td>
<td>-5.5%</td>
<td>15%</td>
<td>23%</td>
</tr>
<tr>
<td>Bydgoszcz</td>
<td>0.36</td>
<td>0.28</td>
<td>-20.5%</td>
<td>15%</td>
<td>26%</td>
</tr>
<tr>
<td>Lublin</td>
<td>0.35</td>
<td>0.31</td>
<td>-12.7%</td>
<td>14%</td>
<td>24%</td>
</tr>
<tr>
<td>Katowice</td>
<td>0.31</td>
<td>0.25</td>
<td>-19.5%</td>
<td>17%</td>
<td>26%</td>
</tr>
<tr>
<td>Białystok</td>
<td>0.29</td>
<td>0.29</td>
<td>-2.3%</td>
<td>13%</td>
<td>23%</td>
</tr>
<tr>
<td>Rzeszów</td>
<td>0.17</td>
<td>0.16</td>
<td>-5.8%</td>
<td>13%</td>
<td>22%</td>
</tr>
</tbody>
</table>

Source: GUS, PwC’s estimations
At the same time, the demographic structure of the 12 examined cities will be subject to significant changes. Their population will be exposed to a rather quick aging process. By 2035, the share of persons aged over 65 will considerably increase – by from 4 percentage points in Warsaw to 10 percentage points in Łódź, Bydgoszcz, Lublin and Białystok. Simultaneously, both the percentage of children and young people (except for Warsaw and Wrocław) and the percentage of people under 20 years of age will decrease (from 1 to 3 percentage points). The percentage of working-age people will also decrease (from 5 percentage points in Warsaw to almost 9 percentage points in Łódź).

In 2035, the most difficult demographic situation will be encountered in Łódź (15% – children and young people, 27% – elderly people), whereas the most beneficial one – in Warsaw, Krakow, Poznań and Rzeszów (17–18% – children and young people, 21–22% – elderly people). Generally, there will be fewer children and young people than today, whereas the number of the elderly will be much bigger.

In the entire metropolitan areas, those changes will be lower, but with a similar direction.

At the same time, if the optimistic scenario of Poland’s development proves true, a very clear increase in the level of economic development of the examined cities will be observed. In the optimistic scenario, we assume that Poland’s GDP per capita will increase from the current level of 64% of the EU average to 94% of the EU average observable in 2035. This means that Polish GDP will increase at an average annual rate of 3.3% (as compared to 1.6% of the whole EU).

Simultaneously, GDP of Polish cities will grow at an average annual rate of from 2.9% in Warsaw to 3.7% in Białystok (cf. Table 2). This means that GDP will be over two times higher in 2035. As a result, in 2035 GDP per capita in all cities included in the study will exceed the EU average level and will reach from 101% of the EU average in Rzeszów to 251% of the EU average in Warsaw.

### Table 2. GDP per capita in Polish cities, 2011-2035 (measured by purchasing power parity)

<table>
<thead>
<tr>
<th>City</th>
<th>GDP per capita (EU=100)</th>
<th>Growth rate 2011-2035</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warsaw</td>
<td>188</td>
<td>251</td>
</tr>
<tr>
<td>Łódź</td>
<td>77</td>
<td>121</td>
</tr>
<tr>
<td>Krakow</td>
<td>95</td>
<td>143</td>
</tr>
<tr>
<td>Wrocław</td>
<td>96</td>
<td>141</td>
</tr>
<tr>
<td>Poznań</td>
<td>126</td>
<td>178</td>
</tr>
<tr>
<td>Gdańsk</td>
<td>89</td>
<td>133</td>
</tr>
<tr>
<td>Szczecin</td>
<td>79</td>
<td>113</td>
</tr>
<tr>
<td>Bydgoszcz</td>
<td>79</td>
<td>116</td>
</tr>
<tr>
<td>Lublin</td>
<td>71</td>
<td>109</td>
</tr>
<tr>
<td>Katowice</td>
<td>124</td>
<td>171</td>
</tr>
<tr>
<td>Białystok</td>
<td>64</td>
<td>104</td>
</tr>
<tr>
<td>Rzeszów</td>
<td>65</td>
<td>101</td>
</tr>
</tbody>
</table>

Source: PwC

2.3. Infrastructural needs of Polish cities: starting point

As a result of implementing the above mentioned development scenario, the GDP level of Polish cities in 2035 will be close to the level which is currently observable in well-developed Western European cities. It should be noted, of course, that by 2035 European cities will also develop and the gap between living standards in Polish cities in 2035 and in metropolises of Western Europe at that time will still be significant. Nevertheless, if the positive development scenario proves true and living standards in 2035 are close to those currently enjoyed by inhabitants of Western European cities, also the saturation of Polish cities with broadly defined urban infrastructure should get closer to the level currently observed in countries of Western Europe.

For the purposes of this report, the following areas are included in the definition of “urban infrastructure”:

- housing infrastructure,
- public transport and road infrastructure,
- Internet infrastructure,
- social infrastructure (education, healthcare, culture),
- environmental infrastructure.

It should be noted that currently in those areas there are huge gaps to the disadvantage of Polish cities. For example, while the usable floor area of flats per one inhabitant of a typical Western European city equals approx. 40 sq. m today, in Polish cities it varies between 22 sq. m in Bydgoszcz and 27 sq. m in Warsaw. Large Western European cities have much more efficient and better developed systems of mass, quick urban transport (the underground, quick tram or urban railway). Rolling stocks and fleets of public transport are much more numerous (in relation to the population and the area of cities) and less worn out (for example, the average age of buses is 7 years, whereas in Polish cities – from 7 to 13 years).
Investment challenges faced by the Polish cities in question, i.e. the scale of investments needed in order to make the level of saturation with urban infrastructure in the examined cities in 2035 reach the current average level typical of well-developed cities of Western Europe, were estimated in several steps:

- First of all, we compared the present state of infrastructure development in the 12 cities with a model city – a benchmark, that is the state of saturation with urban infrastructure which is currently characteristic of Western European cities\(^2\) (cf. part of the report on the methodology of research). That state is considered desirable.

- Secondly, based on demographic forecasts and economic development forecasts, we established the desirable level of development of urban infrastructure in the examined cities in 2035 (e.g. the desirable size of housing resources, various elements of the transport system, various elements of the system of environmental protection, etc.).

- Thirdly, by making relevant assumptions regarding the desirable changes in the state of saturation with infrastructure as well as reconstruction and modernisation needs during next 25 years, we estimated overall investment needs of the 12 cities in particular areas, i.e. total investments needed in order to achieve the desirable state and quality of urban infrastructure in 2035.

- Forth of all, based on those assumptions, we estimated for which part of those investments the city alone bears main responsibility.

Finally, we compared the scale of annual investments of the cities observed in the period from 2008 to 2010 (the latest data available in the LDB) with the hypothetical level of urban investments necessary in 2011 in order to implement the urban infrastructure development projects which meet the actual needs (in the calculations, we assumed that the scale of such investments should increase annually along with the increase in GDP generated in the cities). In our calculations, we used the three-year mean in order to eliminate potential impacts of singular large investment projects. By doing so, we wanted to establish whether investment efforts made under the circumstances of a considerable inflow of EU structural funds were sufficient from the perspective of long-term investment challenges.

In that way, we estimated investment needs of Polish cities in the next quarter of the century and generally evaluated the present investment efforts, as well as provided conclusions regarding general issues relating to financing those investments in the future.

Additional information on the assumed methodology of research and detailed calculations of the desired state of saturation with urban infrastructure in various areas, general investment needs and investment needs in the case of which main responsibility is borne by the cities alone is presented in subsequent parts of the report.

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\(^2\) Cities used to calculate the benchmark – the “model city” – included: Antwerp, Bradford, Dublin, Edinburgh, Essen, Frankfurt, Glasgow, Gothenburg, Helsinki, Copenhagen, Liverpool, Lisbon, Manchester, Oslo, Rotterdam, Stuttgart, Toulouse, Turku and Vienna.
2.5. Estimation of investment challenges facing Polish cities

If in the 12 examined cities urban infrastructure comparable to that existing in well-developed cities of Western Europe is to be built by 2035, then – taking into account the expected size of those cities – during the whole period from 2011 to 2035, investments totalling approx. PLN 1,100 billion (assuming constant 2011 prices) need to be made. This amount is comparable to the whole GDP generated in Poland in 2011 (PLN 1,520 billion) and almost four times higher than the total value of investments made in the whole Polish economy in 2011 (PLN 309 billion). That amount covers construction of new urban infrastructure, as well as renovation, modernisation and reconstruction of presently existing infrastructure.

Distribution of the estimated investment needs to particular cities and particular areas is presented in Chart 1.

The largest investment challenge consists in bringing housing infrastructure to the Western European standard. Investments aimed at reaching that level of development would amount to PLN 737 billion in the period from 2011 to 2035, which makes two thirds of all investment needs of Polish cities. Investment needs in the area of transport infrastructure are second in terms of scale (PLN 264 billion, making almost three fourths of all investment needs of Polish cities). Development and modernisation of social infrastructure require investments estimated at PLN 76 billion (11% of all investments), whereas development of environmental protection infrastructure – PLN 20 billion (3% of all investments). In the case of development of ICT infrastructure, we included in our estimations only costs of development of free access to wireless Internet networks in city centres and of development of minimum, backbone fibre-optic networks (due to the rapid technological progress, it is obviously difficult to assume what kind of infrastructure will be needed in 25 years). It should be noted, however, that costs of development of ICT infrastructure seem to be very low as compared to costs of development of traditional (e.g. road and bridge) infrastructure.

From the point of view of distribution of investment needs to particular cities, the largest challenges – in terms of global expenditures – will be confronted of course by those cities whose population in 2035 will be the largest (Warsaw followed by Krakow and Wrocław).

Nevertheless, the evaluation of investment needs of the cities is different if instead of global amounts we assume investment amounts per capita (in accordance with 2009 population figures). Again, the largest expenditures may be expected by Warsaw, Krakow and Wrocław. The lowest investment expenditures per capita would be incurred by Łódź, mainly due to the fastest depopulation.

Overall investments to be made by cities by 2035 are estimated at the level of PLN 1,100 billion. It is almost four times more than the total value of all last year's investments in Poland.

Chart 1. Overall investment challenges by 2035 (PLN billion)

<table>
<thead>
<tr>
<th>City</th>
<th>Housing</th>
<th>Transport</th>
<th>Social</th>
<th>Environmental</th>
<th>Internet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warsaw</td>
<td>209.9</td>
<td>75.7</td>
<td>21.8</td>
<td>5.6</td>
<td>0.013</td>
</tr>
<tr>
<td>Łódź</td>
<td>209.9</td>
<td>75.7</td>
<td>21.8</td>
<td>5.6</td>
<td>0.013</td>
</tr>
<tr>
<td>Krakow</td>
<td>209.9</td>
<td>75.7</td>
<td>21.8</td>
<td>5.6</td>
<td>0.013</td>
</tr>
<tr>
<td>Wrocław</td>
<td>209.9</td>
<td>75.7</td>
<td>21.8</td>
<td>5.6</td>
<td>0.013</td>
</tr>
<tr>
<td>Poznań</td>
<td>209.9</td>
<td>75.7</td>
<td>21.8</td>
<td>5.6</td>
<td>0.013</td>
</tr>
<tr>
<td>Gdańsk</td>
<td>209.9</td>
<td>75.7</td>
<td>21.8</td>
<td>5.6</td>
<td>0.013</td>
</tr>
<tr>
<td>Szczecin</td>
<td>209.9</td>
<td>75.7</td>
<td>21.8</td>
<td>5.6</td>
<td>0.013</td>
</tr>
<tr>
<td>Bydgoszcz</td>
<td>209.9</td>
<td>75.7</td>
<td>21.8</td>
<td>5.6</td>
<td>0.013</td>
</tr>
<tr>
<td>Lublin</td>
<td>209.9</td>
<td>75.7</td>
<td>21.8</td>
<td>5.6</td>
<td>0.013</td>
</tr>
<tr>
<td>Katowice</td>
<td>209.9</td>
<td>75.7</td>
<td>21.8</td>
<td>5.6</td>
<td>0.013</td>
</tr>
<tr>
<td>Białystok</td>
<td>209.9</td>
<td>75.7</td>
<td>21.8</td>
<td>5.6</td>
<td>0.013</td>
</tr>
<tr>
<td>Rzeszów</td>
<td>209.9</td>
<td>75.7</td>
<td>21.8</td>
<td>5.6</td>
<td>0.013</td>
</tr>
</tbody>
</table>

Average: 91.5 billion

Source: PwC’s estimations, GUS, EUROSTAT
We arrive at another evaluation perspective if we take the value of GDP generated in a given city as a reference point for evaluating the scale of expected investment efforts. It is all the more reasonable as a huge part of investment expenditures estimated in that way (approximately two thirds, including in particular the vast majority of investments in development and modernisation of housing infrastructure) should be covered by the private sector whose investing activity is clearly dependent on the level of general economic activity in the city. When comparing the scale of expected investment efforts to GDP recorded in 2011, it turns out that the largest investment efforts must be expected by Białystok and Rzeszów.

On the other hand, necessary investments will be easiest to finance in cities with a relatively high current GDP level (Warsaw, Poznań and Katowice).
2.6. Estimation of investment challenges facing city finances

As cities alone are directly responsible only for a part of necessary investment expenditures relating to development and modernisation of infrastructure, we made an attempt of estimating the burden resulting from that fact to city finances.

For this purpose, we arbitrarily divided investment expenditures into two groups:

- A group of investment expenditures for which the city is mainly responsible (e.g. primary and secondary educational infrastructure, waste management system). Direct responsibility does not mean that all such expenditures must be covered by the city budget but it is the city that is responsible for procuring that such investments are made (e.g. by way of public-private partnership).

- A group of investment expenditures for which main responsibility is borne by the private sector (e.g. major part of housing construction) or public and private entities acting on the national level (e.g. railway stations, motorway ring roads of cities). In that case, the task of cities consists mainly in ensuring relevant conditions and incentives aiming at completing such investments.

After marking off investment expenditures for which main responsibility is borne by cities, it turns out that in the period from 2011 to 2035 expenditures with the estimated value of PLN 342 billion are possible. The distribution of resulting burdens to particular cities is not, however, subject to any significant changes as compared to the distribution of overall investment costs (only relative burden of Poznań significantly increases, of Łódź and Wrocław — to a lower extent, whereas in the case of Katowice and Białystok — it falls – cf. Chart 4).

**Chart 4. Overall investment challenges financed by the city by 2035 (PLN per capita)**

Source: Estimations of PwC
Due to the differentiated income basis of city finances, a proper reference point for evaluating challenges which the cities are confronted with is the comparison of the scale of investment expenditures for which main responsibility is borne by the cities with real investment expenditures made from 2008 to 2010.

For this purpose, we calculated the hypothetical (expected) value of investments for which main responsibility in 2011 was borne by the cities, assuming that those expenditures will grow in the period from 2011 to 2035 at the rate similar to the growth of the cities’ GDP. The resulting value of expected investments (congruent with the cities’ long-term development perspective) was compared by us to real average investments made by the cities annually from 2008 to 2010. That calculation was made both with respect to particular investment areas and to the aggregate amount.

It turns out that in the case of three cities (Warsaw, Wrocław and Poznań) real investment expenditures from 2008 to 2010 were 35-45% higher than expected, whereas in the case of Białystok – 80% higher. At the same time, they were significantly lower than expected (20-30% lower) in Łódź, Krakow and Szczecin. In the remaining cities they were close to those expected. Therefore, the situation can be considered differentiated – while so far some cities have managed to make investment efforts which may be assessed as compliant with long-term development needs in the 2035 perspective, efforts of other cities must be considered insufficient. This means that in order to achieve the assumed target state of saturation with infrastructure, the value of infrastructural investments carried out in those cities would need to be higher than the 2008-2010 average.
2.7. Investment challenges: problems to solve

Nevertheless, it should be noted that the financing of necessary investments by Polish cities in the period from 2011 to 2035 will not be an easy task for them. It is so for three fundamental reasons:

• Relatively limited sources of income of Polish cities and lack of perspectives of a considerable increase in tax inflows mean that city budgets will have only moderate funds for investments at their disposal and investment tasks will need to compete against current (consumer) expenditures.

• The relatively high level of indebtedness of the largest Polish cities against the background of the saving programme imposed by the government and encompassing all public finances means that cities will probably have only very limited possibilities of financing necessary investments with the use of debt instruments and loans.

• It should also be taken into account that the financial crisis will force the limitation – probably much below the initial proposals of the European Commission – of EU funds available for financing investments in development of urban infrastructure already in the 2014-2020 prospective budget. Moreover, some of the available funds will no longer be of the nature of a non-refundable subsidy and access to them may also be limited due to the necessity of vast co-financing. In later prospective budgets, the situation may be worse as other regions of Poland will exceed the threshold of 75% of the EU’s GDP, which can mean lower availability of funds.

Summarising, it should be stated that the examined cities benefited to a considerable extent from relatively easy ways of financing urban investments available from 2008 to 2010. Currently, the possibility of continuing or increasing the investment effort will mainly depend on the capabilities of the cities to mobilise and use more private capital in financing – either in the form of public-private partnership, or by privatising certain urban functions.

It should be noted that already today certain Polish cities are looking for such possibilities, but still in a limited scale.

Apart from that, attention should be paid to the fact that the largest scale of financing needs resulting from investment challenges is related to development of traditional infrastructure, in particular housing and transport (and in the case of investments for which main responsibility is borne by cities alone – transport and social infrastructure). With much lower funds and easier inclusion of the private sector to financing, it is possible to achieve e.g. a great progress in the field of modern ICT infrastructure which is of greater importance to the cities’ economic competitiveness. In other words, it is possible to prepare an investment and development strategy thanks to which Polish cities may become European leaders by 2035, maybe at the cost of delaying the development of traditional infrastructure. Nevertheless, choosing such a development path is doubtlessly worth considering.

Hence, the vision of Polish cities which in 2035 will offer their inhabitants living conditions similar to those observed in Western European cities is very bold, but imaginable. It requires, however, that cities prepare and implement action plans which will enable them to make vast investments necessary for the development of appropriate urban infrastructure.

In areas of key importance to development, Polish cities have a chance to take over the role of European leaders. This means, however, a need to choose appropriate investment priorities.
3. Information on methodology applied in the study

3.1. Definition of “investment needs”

In our report, investment needs (or investment challenges) mean estimated amounts of money which should be invested within the area of a city in order for it to achieve by 2035, the level of “saturation” with infrastructure similar to that currently observed in selected cities of a comparable size in Western Europe.

When looking at investment needs of Polish cities, it should be borne in mind that not all challenges can and should be fulfilled only by urban authorities. Some of them, such as investments in airports or railway stations, can be implemented entirely by other entities (e.g. flats – for which city authorities are responsible only in a small part).

They were, however, taken into account while calculating the scale of challenges as significant factors influencing the comfort and quality of living of the cities’ inhabitants. In our calculations, we clearly separate those investment fields for which city authorities bear full or major responsibility.

The scale of investment challenges in this report results from calculations which show the distance Polish cities need to overcome in order to reach the level of infrastructure development of Western European cities. In the report, we try to compare challenges calculated by us with the present level of investments in similar areas. In order to do that, we collated average investment expenditures from the period of 2008-2010 with expected 2011 expenditures estimated by us. Nevertheless, one should be aware of a number of differences between “investment needs” as they are understood in the report and “investment expenditures” planned in cities’ budgets. For instance, the report treats the necessity of renovating and modernising already existing streets, school buildings, hospitals, etc., as investment needs, whereas that type of costs in the applicable budgetary classification is treated as current expenditures. For these reasons, comparisons of investment needs and expenditures are provided exclusively for illustrative purposes and do not constitute a recommendation regarding cities’ budgetary plans.
3.2. Benchmark system

The target level which Polish cities strive to reach is determined by a benchmark – a model city which displays the level of “saturation” of the given city with particular types of infrastructure. In order to determine the gap between the situation of particular Polish cities and the benchmark, we assumed a set of quantifiable indices for each of compared areas (cf. Table 3).

Cities of Western Europe on which we created the model city include, in alphabetical order, the following: Antwerp, Bradford, Dublin, Edinburgh, Essen, Frankfurt, Glasgow, Gothenburg, Helsinki, Copenhagen, Liverpool, Lisbon, Manchester, Oslo, Rotterdam, Stuttgart, Toulouse, Turku and Vienna.

The main criterion for selecting the above cities was that their size (population) was similar to the average size of the Polish cities. Also the availability of particular comparable data for each metropolis affected the selection. In order to maintain the comparability of the cities, regardless of their size, all calculations are presented per capita, in relation to the city’s area or as a combination of these factors (in such cases, the benchmark was calculated with the use of econometric techniques).

Data for particular types of infrastructure were derived from the “Urban Audit” base prepared by EUROSTAT (the EU’s statistical office). In the case of data concerning Polish cities, we also took into consideration data from the LDB (Local Data Bank) base created by GUS. As regards external data, each time we used the latest available data for all cities included in the study. Certain pieces of information such as the number of bridges over rivers, the length of the underground line or the number of Wi-Fi access points were collected in our own surveys.

Although statistical data are usually delayed as compared to the present state, the assumption of the long perspective of 25 years for which we estimated investment needs reduces the impact of that fact on the calculations. It should be noted that achieving full comparability of data is always an uneasy task. Moreover, often we had to cope with interpretation problems which were impossible to be solved in an unambiguous way (e.g. interpretation of a lot of data concerning Katowice, which is a part of the Upper Silesian urban area, where urban infrastructure may be used simultaneously by a number of cities, differs from interpretation of data concerning other metropolises; a similar situation can be observed in the case of Gdańsk, whose close connection with Gdynia and Sopot makes the division and isolation of metropolitan functions difficult).
Table 3. Indices and benchmarks applied to calculate the scale of investment challenges for Polish cities in particular areas

<table>
<thead>
<tr>
<th>Infrastructural area</th>
<th>Benchmark</th>
<th>Result – gap to be covered</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Housing</strong></td>
<td>Number of square metres per capita.</td>
<td>Overall number of square metres to be built or renovated.</td>
</tr>
<tr>
<td><strong>Transport</strong></td>
<td>Number of buses and equivalent means of public transport in relation to the number of inhabitants and square kilometres of area.</td>
<td>Overall number of buses and equivalent means of public transport to be purchased in order to reach the assumed average age of vehicles.</td>
</tr>
<tr>
<td></td>
<td>Length of underground lines (or equivalent lines in kilometres) in relation to the number of inhabitants and the city's area.</td>
<td>Length of underground lines (or equivalent lines) to be built.</td>
</tr>
<tr>
<td></td>
<td>Number of railway stations in relation to the number of inhabitants.</td>
<td>Number of railway stations to be built or renovated.</td>
</tr>
<tr>
<td></td>
<td>Airports in relation to the number of inhabitants, vicinity of another large airport and role which the given airport could play.</td>
<td>Number and size of airports to be built.</td>
</tr>
<tr>
<td></td>
<td>Current length of city roads (streets) in kilometres.</td>
<td>Length of city roads (streets) to be renovated (modernised) in kilometres.</td>
</tr>
<tr>
<td></td>
<td>Length of bicycle paths in kilometres in relation to the area and the number of inhabitants</td>
<td>Length of bicycle paths in kilometres to be built.</td>
</tr>
<tr>
<td></td>
<td>Number of bridges in relation to the number of inhabitants and the number of large rivers.</td>
<td>Number of bridges to be built and renovated.</td>
</tr>
<tr>
<td></td>
<td>Length of ring roads and cross city motorways in kilometres in relation to the city's area.</td>
<td>Length of ring roads and/or motorways in kilometres to be built.</td>
</tr>
<tr>
<td><strong>Internet infrastructure</strong></td>
<td>Number of access points in relation to the city's area</td>
<td>Number of access points to be built.</td>
</tr>
<tr>
<td></td>
<td>Length of the backbone fibre optic network in kilometres in relation to the number of inhabitants.</td>
<td>Length of the network in kilometres to be built.</td>
</tr>
<tr>
<td><strong>Social infrastructure</strong></td>
<td>Number of places in kindergartens and crèches in relation to the number of children.</td>
<td>Number of places in kindergartens to be built (refurbished).</td>
</tr>
<tr>
<td></td>
<td>Number of places in schools equalling the number of children.</td>
<td>Number of schools to be refurbished or modernised.</td>
</tr>
<tr>
<td></td>
<td>Number of hospital beds per capita.</td>
<td>Number of hospital beds to be modernised, refurbished, etc.</td>
</tr>
<tr>
<td></td>
<td>Number of seats in cinemas and theatres per capita.</td>
<td>Number of seats in cinemas and theatres to be built.</td>
</tr>
<tr>
<td></td>
<td>Number of museums per capita + the city's tourist role.</td>
<td>Number of museums to be built.</td>
</tr>
<tr>
<td><strong>Environmental protection infrastructure</strong></td>
<td>Percentage of municipal waste incinerated or recycled against the assumed number of tonnes of solid waste per capita.</td>
<td>Value of additional incinerators and recycling plants necessary to achieve a particular waste management capacity.</td>
</tr>
<tr>
<td></td>
<td>Number of flats connected to the sewage system.</td>
<td>Kilometres of the wastewater system to be renovated or built.</td>
</tr>
<tr>
<td></td>
<td>Percentage of treated sewage.</td>
<td>Additional sewage treatment capacity (building and modernising sewage treatment plants).</td>
</tr>
</tbody>
</table>
3.3. Manner of calculating the size of investment needs

The calculated gap between the Polish cities and the model city was translated into investment needs to be met by 2035. Financial expenditures needed to carry out particular investment tasks, e.g. to build or renovate an appropriate number of square metres of flats, number of hospital beds or kilometres of underground lines, were calculated based on available information on prices of similar investments made in recent years in Poland and worldwide.

When calculating the size of challenges, we took into consideration forecasts of GUS regarding the number of inhabitants in particular cities and their age structure by 2035. This significantly affected the calculations relating to housing, education and healthcare. We assumed that the areas of the cities are constant.

When speaking about investment challenges in infrastructure, it is necessary to take into account, apart from building new facilities, renovations or modernisations of presently existing infrastructure. Therefore, although most Polish cities meet or even exceed the calculated benchmark, they are still an investment challenge. It is clear that during the next 25 years it will be necessary to renovate and modernise practically all existing schools, not to mention hospitals or streets.

The total value of challenges for the period from 2011 to 2035 was expressed in PLN billion, assuming constant prices of 2011. Next, that amount was divided by particular years, assuming that the investment effort in particular years should increase along with the increase of real Gross Domestic Product in cities. This means that although required investment efforts expressed in PLN increase year by year, they are constant in relation to GDP forecasts.

3.4. Division of investments into general ones and those for which main responsibility is borne by the cities

In our calculations, we also divided investments into those for which main responsibility is borne by the cities and those which can be financed mainly from other public or private sources. Due to the assumed methodology, mainly due to the necessity of maintaining comparability between the cities, the division assumed by us is the same for all cities.

Taking into account the very long time perspective of our calculations and legal, technological, organisational, etc. changes which may occur during that period, as well as strategic differences already existing between particular cities (e.g. with respect to the scope of responsibility for healthcare), our calculations are obviously only approximate.

We assumed that the cities bear major responsibility for investments in: the public transport network, the state of roads, bicycle paths, schools, kindergartens and crèches, Internet infrastructure, municipal waste management and sewage systems, as well as for sewage treatment. We also assumed that on average, the cities bear one third of responsibility for investments related to the construction and modernisation of hospitals, as well as minor responsibility of 3% for housing infrastructure. In line with our assumptions, the remaining part of infrastructure discussed in our report can be financed from other sources.

Such an assumption was adopted due to the necessity of maintaining the largest possible level of comparability between the cities. At the same time, we are aware that certain cities – including Gdańsk, Wrocław, Lublin and Szczecin – are not responsible for hospitals at all.
4. Investment needs in particular areas of urban infrastructure

4.1. Housing infrastructure

Investment needs in the area of housing infrastructure were measured on the basis of the average number of square metres of floor area per capita. In 2010, in the Polish cities it varied between 22 sq. m in Bydgoszcz to 26.9 sq. m in Warsaw – the average area in the Polish cities was 24.1 sq. m per person. In a similar period (2009), in the model city, one person had as many as 39.8 sq. m at his or her disposal (cf. Chart 6).

The calculations, taking into account forecast demographic changes, clearly show that in order to reach the level of the model city in 2035, the total floor area of flats should be much larger than presently in all cities. Differences to be made up for amount to from 26% of the overall floor area of flats in Katowice, where considerable depopulation is expected and the distance to the benchmark is small, to 74% in Krakow, whose population will grow and where the current average floor area of flats is small (cf. Chart 7).

The average floor area of a flat in the examined cities equals **24.1 sq. m** per person, while in our reference cities it is **39.8 sq. m**.

Chart 6. Average floor area per person in the Polish metropolises against the benchmark of 39.8 sq. m (in sq. m per person)

Source: PwC’s own calculations
Additionally, it should be assumed that most (75%) buildings built until 1999 will need modernisation or complete refurbishment by 2035, as a result of which the size of the calculated investment challenge will increase.

The calculations show that the total value of necessary investments in housing infrastructure in the Polish metropolises from 2011 to 2035 amounts to PLN 737 billion. The largest challenges, due to its size, will be faced by Warsaw (PLN 209.9 billion), and the smallest – by Rzeszów (PLN 19.4 billion). As per capita, the largest expenditures can be expected also by Warsaw (PLN 122.4 thousand), whereas the smallest – by Łódź (PLN 91 thousand – which is attributable to the expected strong depopulation of that city). Those investments are covered by the city’s budget only to a small extent, but the city has to fulfil a very important supporting function relating above all to spatial planning.

City authorities are responsible above all for municipal and social buildings which at present constitute approx. 3% of the whole floor area of flats put into use. Therefore, we assumed that the city’s expenditures relating to the extension and modernisation of municipal housing infrastructure would equal approx. 3% of all expected expenses, which makes PLN 22.1 billion. This means expenditures of PLN 3,700 per current inhabitant of Warsaw and PLN 2,700 per current inhabitant of Łódź (cf. Chart 8).

**The total value of required investments (both public and private) in housing infrastructure is estimated at PLN 737 billion, which makes 67% of all needs.**
From 2008 to 2010, Polish metropolises spent on investments in housing infrastructure the aggregate amount of PLN 573 million a year (according to data from the LDB). In accordance with our 2011 calculations, investment expenditures in this area resulting from investment challenges should reach PLN 574 million, i.e. be approx. 0.1% higher.

Taking into consideration differences between definitions and the approximate nature of our calculations, it is a very slight difference. The situation in particular cities is differentiated, which may be a consequence of differences in the investment schedules of particular cities or differences in the cities’ social construction policies.

According to our approximate comparisons, during the past five years, expenditures on social housing infrastructure in Wrocław were much higher (by 138%) than expected based on investment challenges, whereas in Krakow and Bydgoszcz – much lower (by 67% and 60%, respectively) (cf. Chart 9).
4.2. Transport and road infrastructure

The scale of investment challenges which Polish cities face in the area of transport was measured with the use of eight indices: the length of public transport lines and the number of vehicles supporting them, the length of underground lines (or an alternative system of quick mass urban transport), the length of bicycle paths, the aggregate length of ring roads and cross-city motorways, the air traffic expressed in millions of passengers at airports, the number of railway stations, as well as the number of bridges over large rivers (the last criterion does not apply to all cities).

The length of the urban transport network and the number of vehicles supporting it (additionally at an appropriate age; cf. Chart 10) constituted an area in which all examined cities were in considerable arrears. Although certain Polish metropolises do not have much to make up for (e.g. according to our calculations, Warsaw should increase the number of urban transport vehicles only by 3.4% as compared to the present state), the situation in other cities is much worse. Bydgoszcz, where the number of urban transport vehicles should increase by over 433%, Katowice (308%) and Rzeszów (240%) are record holders in terms of the distance which needs to be overcome.

Nevertheless, efforts made by the cities in order to develop urban transport should be appreciated. For instance, from 2008 to 2011 Wrocław purchased 105 buses and 51 trams for the total amount of PLN 414 million.

Definitely the largest differences between the model city and the present state of infrastructure in the Polish cities are observed in the case of bicycle paths (cf. Chart 11). In most Polish cities, the length of bicycle paths should increase by almost five times (the example Rzeszów, where 80 kilometres of paths exist, should be followed). This does not mean, however, that this element entails the greatest investment challenges.

Chart 10. Present number of urban transport vehicles in Polish cities in relation to the number of vehicles in the model city (% of the benchmark)

Source: PwC’s own calculations
Investment challenges of main Polish cities – the 2035 perspective

Chart 11. Length of bicycle paths in Polish cities as compared to the expected length resulting from the benchmark (% of the benchmark)

Source: PwC’s own calculations

Catching up in other areas of transport infrastructure to which we paid attention when calculating investment challenges does not have to be financed from the city budget (airports, ring roads or railway stations) or does not apply to all cities (underground, bridges over large rivers).

According to the benchmark calculated by us in an econometric manner, building an underground (or an alternative mass transport system) could be reasonable in Łódź, Krakow, Wrocław and Poznań (its length would vary from 29 to 44 kilometres). Nevertheless, we would like to stress that in many cases, both for purely technical reasons and due to the economic efficiency of the investment, a good solution which, to a certain extent, substitutes underground lines would consist in building other surface quick urban transport means, for example the Poznań Fast Tram (informally “pestka”), which already exists and is being expanded. Only in the capital city, the length of the underground network should increase 4.5 times. As a result of the ongoing construction of the 2nd underground line, the length of the underground network in its final shape will increase by only slightly over 2 times.

In the area of airports, the expansion of Bydgoszcz Ignacy Jan Paderewski Airport could potentially be the largest, taking into consideration its current size. As compared to the standard of the model European city, passenger traffic in that airport could be over 5 times larger than now and equal 1.6 million passengers annually, but this does not mean that such an expansion of that airport is economically reasonable. According to the benchmarks calculated by us, traffic at Warsaw airports could reach 24.2 million passengers a year, which means that it would be almost 3 times larger than the current traffic at Warsaw Chopin Airport. In our calculations, we also paid attention to the possibility of building shared airports for Warsaw and Łódź and/or for Krakow and Katowice. If they were to meet current standards of model European airports located in similar places, traffic at them would equal 29 million and 24 million passengers a year, respectively.

According to the benchmark, the Warsaw underground could be extended 4.5 times. Current plans contribute to fulfilling half of that challenge.

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1 The econometric manner of calculating the benchmark for the underground implied that for each city we obtained a model length of metro lines, other than zero. We assumed, however, that building an underground would be sensible only if the result was higher than 20 km.
Chart 12 depicts the scale of investment challenges to be accomplished by 2035 for particular areas per current inhabitant of the cities. It should be stressed, however, that they include both investments which should be financed by the city and those which can be financed from other sources.

The largest investment challenges can be expected by those metropolises in which (according to the calculated benchmark) an underground could be built. In those cities, expenditures per capita should exceed PLN 40,000 during the nearest 25 years. An exception is Łódź where expenditures, in spite of the assumed construction of the underground, are much lower. This results above all from the fact that due to the lack of rivers in Łódź, it is not necessary to build any bridges. Secondly, in Łódź it is not necessary to expand the airport in order to reach the level of the model city.

On the one hand, it is a consequence of the vicinity of Warsaw Chopin Airport, on the other – of the potential construction of a shared airport.

In all cities, renovations and modernisations of public roads constitute large expenditures, making up on average 35% of all investment challenges in the area of transport.

It should be noted that expenditures on bicycle paths where the differences between the indices and the model city are the largest constitute only a slight portion of overall challenges – approximately less than 1% of total expenditures in all cities. It is of course attributable to the relatively low unitary cost of accomplishing such investments.

As we mentioned before, not all investments in the area of transport infrastructure have to be financed from the city budget. Some of them, especially the construction of airports, railway stations and ring roads, will probably be financed by other entities (e.g. the Warsaw Southern Ring Road or the cross-city S8 road are financed by the General Directorate for National Roads and Motorways; the construction of the recently opened Maria Skłodowska-Curie Bridge was financed by the city authorities using significant contributions from EU funds; the example of the Roundabout of Katyn Victims (Rondo Ofiar Katyńskich) in Krakow shows how the city’s own financing, EU funds and funds from the state budget can be effectively connected). We assume that on average, cities are accountable for approx. 80% of investment challenges relating to transport and road infrastructure.

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Chart 12. Overall investment challenges of cities in the area of transport by 2035 (PLN as in 2011 per capita also in 2011)

<table>
<thead>
<tr>
<th>City</th>
<th>Ring roads and cross-city</th>
<th>Airports</th>
<th>Railway stations</th>
<th>Bridges</th>
<th>Underground</th>
<th>Buses and their equivalents</th>
<th>City roads</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warsaw</td>
<td>PLN 3,371</td>
<td>PLN 1,641</td>
<td>PLN 3,485</td>
<td>PLN 1,548</td>
<td>PLN 0</td>
<td>PLN 0</td>
<td>PLN 0</td>
</tr>
<tr>
<td>Łódź</td>
<td>PLN 7,058</td>
<td>PLN 0</td>
<td>PLN 4,514</td>
<td>PLN 4,261</td>
<td>PLN 6,660</td>
<td>PLN 0</td>
<td>PLN 0</td>
</tr>
<tr>
<td>Krakow</td>
<td>PLN 2,613</td>
<td>PLN 0</td>
<td>PLN 2,856</td>
<td>PLN 3,164</td>
<td>PLN 6,009</td>
<td>PLN 0</td>
<td>PLN 0</td>
</tr>
<tr>
<td>Wrocław</td>
<td>PLN 3,268</td>
<td>PLN 0</td>
<td>PLN 2,811</td>
<td>PLN 4,552</td>
<td>PLN 0</td>
<td>PLN 0</td>
<td>PLN 0</td>
</tr>
<tr>
<td>Poznań</td>
<td>PLN 6,684</td>
<td>PLN 0</td>
<td>PLN 2,821</td>
<td>PLN 4,92</td>
<td>PLN 0</td>
<td>PLN 0</td>
<td>PLN 0</td>
</tr>
<tr>
<td>Gdansk</td>
<td>PLN 1,548</td>
<td>PLN 0</td>
<td>PLN 1,237</td>
<td>PLN 1,237</td>
<td>PLN 1,326</td>
<td>PLN 0</td>
<td>PLN 0</td>
</tr>
<tr>
<td>Szczecin</td>
<td>PLN 3,857</td>
<td>PLN 0</td>
<td>PLN 0</td>
<td>PLN 0</td>
<td>PLN 0</td>
<td>PLN 0</td>
<td>PLN 0</td>
</tr>
<tr>
<td>Bydgoszcz</td>
<td>PLN 18,000</td>
<td>PLN 0</td>
<td>PLN 0</td>
<td>PLN 0</td>
<td>PLN 0</td>
<td>PLN 0</td>
<td>PLN 0</td>
</tr>
<tr>
<td>Lublin</td>
<td>PLN 2,856</td>
<td>PLN 0</td>
<td>PLN 0</td>
<td>PLN 0</td>
<td>PLN 0</td>
<td>PLN 0</td>
<td>PLN 0</td>
</tr>
<tr>
<td>Katowice</td>
<td>PLN 2,625</td>
<td>PLN 0</td>
<td>PLN 0</td>
<td>PLN 0</td>
<td>PLN 0</td>
<td>PLN 0</td>
<td>PLN 0</td>
</tr>
<tr>
<td>Białystok</td>
<td>PLN 14,257</td>
<td>PLN 0</td>
<td>PLN 0</td>
<td>PLN 0</td>
<td>PLN 0</td>
<td>PLN 0</td>
<td>PLN 0</td>
</tr>
<tr>
<td>Rzeszów</td>
<td>PLN 10,210</td>
<td>PLN 0</td>
<td>PLN 0</td>
<td>PLN 0</td>
<td>PLN 0</td>
<td>PLN 0</td>
<td>PLN 0</td>
</tr>
</tbody>
</table>

Source: PwC’s estimations

Caution: in the case of Warsaw, the expenditure marked as allotted for the construction of the underground is related to the modernisation of the already existing fast urban railway.
The current preparations of certain cities to the organisation of the 2012 UEFA European Football Championship surely accelerate the pace of investments. Nevertheless, this fact is not of key importance in long-term analyses. When comparing the current investment expenditures of the cities on transport infrastructure and roads with challenges resulting from our calculations, we arrive at a conclusion that most cities are above the path leading to reaching the assumed benchmarks in 2035 (cf. Chart 13). In the period from 2008 to 2011, only three cities spent less on pursuing those goals than it results from the expected path – they were Krakow, Łódź and Szczecin.

On average, Polish cities invest in transport infrastructure more than expected in the calculated investment path.
4.3. Internet infrastructure

In the analysis of challenges relating to the development of Internet infrastructure, only one city – Turku in Finland – was taken as the model city because it was a pioneer of the construction of an unpaid public Wi-Fi network and its network belongs currently to the best-developed ones in Europe. More than 1200 access points installed in that city covers 95% of the city’s area. In order to reach the model wireless network coverage level, there number of required access points in Rzeszów would have to be 448, whereas in Warsaw – 2533 §

Currently, it is extremely difficult to estimate the number of access points because of the dynamic development of those areas. We estimate that on average, the benchmark is achieved in 5-10%. It should be borne in mind, however, that the rapidly growing demand and quality-related requirements will force the cities to constantly invest in the modernisation and expansion of their Wi-Fi networks (and only in a short perspective which makes it possible to determine the applied technology).

The second index used by us is the coverage of the city by the so-called backbone fibre-optic network. In this case, exceptionally, we adopted Opole, another Polish city, as the reference point due to the target length of the fibre-optic network in the project which is being currently implemented there. Based on the available information on that network and on the differences in the size of the cities, we estimated the length and value of similar installations in Polish metropolises included in our study (cf. Chart 14).

Although the distances to the model relating to Internet infrastructure are very big, costs of completing such investments are slight as compared to other elements of infrastructure. In order to reach the 95% Wi-Fi coverage and to implement the project of fibre-optic networks, the Polish metropolises would need to spend an aggregate PLN 880 million, which means that an average cost would amount to PLN 125 per capita.

Challenges relating to Internet infrastructure constitute only 0.02% of overall investment needs estimated by us. It should be noted, however, that the time horizon during which they should be satisfied is much shorter than in the case of other infrastructural areas, mainly due to the fact that in several or more than a dozen years technologies used today are likely to be obsolete. Unfortunately, it is not possible to exactly predict what and how expensive challenges will appear in that area by 2035.

**Chart 14. Expected number of Wi-Fi access points and expected length of the backbone fibre-optic network**

- **Warsaw**: 350 expected Wi-Fi access points, expected length of fibre-optic network in km: 3,000
- **Łódź**: 300 expected Wi-Fi access points, expected length of fibre-optic network in km: 2,500
- **Krakow**: 250 expected Wi-Fi access points, expected length of fibre-optic network in km: 2,000
- **Wrocław**: 200 expected Wi-Fi access points, expected length of fibre-optic network in km: 1,500
- **Poznań**: 150 expected Wi-Fi access points, expected length of fibre-optic network in km: 1,000
- **Gdańsk**: 100 expected Wi-Fi access points, expected length of fibre-optic network in km: 500
- **Szczecin**: 50 expected Wi-Fi access points, expected length of fibre-optic network in km: 150
- **Bydgoszcz**: 50 expected Wi-Fi access points, expected length of fibre-optic network in km: 150
- **Lublin**: 50 expected Wi-Fi access points, expected length of fibre-optic network in km: 100
- **Katowice**: 50 expected Wi-Fi access points, expected length of fibre-optic network in km: 50
- **Białystok**: 50 expected Wi-Fi access points, expected length of fibre-optic network in km: 50
- **Rzeszów**: 50 expected Wi-Fi access points, expected length of fibre-optic network in km: 50

**Source:** PwC’s own research

**Covering 95% of the area of the cities with a wireless Internet network would cost PLN 125 per capita.**
4.4. Social infrastructure

An analysis of challenges which the cities are confronted with in the area of social infrastructure includes a wide range of issues from education through health to cultural and art institutions.

In the first two cases – educational institutions and healthcare – the size of investment challenges calculated by us results mainly from the necessity of improving the quality of, modernising and renovating infrastructure which already exists. In most Polish cities, maintaining the present size of educational infrastructure will suffice to have an even excessive number of places in schools in 2035. Providing that the same condition is met for hospitals, the offered number of hospital beds will also be sufficient. In both cases, Warsaw constitutes an exception.

Contrary to the common belief, the above also applies to pre-school care and education. It is true that in all Polish cities, considering the present number of children, the number of available places in kindergartens is too low – currently, the shortages range from 12% in Rzeszów to 47% in Gdańsk. Nevertheless, in 2035, due to the demographic trends, the number of currently available places will be more than sufficient. The only exception is Gdańsk, where – provided that the current number of places in kindergartens and crèches is maintained – there will not be enough places for 19% of children (cf. Chart 15).

This does not mean, however, that we consider remediying the present place shortages in kindergartens and, above all, in crèches unnecessary. Nevertheless, as a result of remediying the present shortages, in 2035 needs in this area will be satisfied to a larger extent than in the present model European city.

The size of investment challenges relating to education and healthcare is mainly attributable to the necessity of modernising and refurbishing existing resources, as well as ensuring an appropriate number of places and quality of services between now and 2035. We assume that in 25 years, 75% of the existing crèches, kindergartens, schools and hospitals should be modernised.

Chart 15. Current number of places in crèches, kindergartens, primary schools and middle schools, as well as the current number of hospital beds as a percentage of the benchmark calculated for 2035

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Source: PwC’s own calculations
A rather different situation may be observed in the case of cultural infrastructure – cinemas, theatres and museums. In most Polish cities, there are considerably less of them than in their Western European counterparts. When it comes to cinemas and theatres, Katowice is an exception, whereas in the case of the number of museums, exceptions include Krakow, Gdansk and Poznan (see: Chart 16). It should be noted, however, that cities are investing in that area (and sometimes they open extraordinary objects, like the underground Historical Museum of Krakow) and measurable results will become more and more visible.

In the case of educational infrastructure, as well as care and healthcare infrastructure, a major part of expenses will have to be financed by cities. Those expenditures vary from PLN 3,000 per capita in Lodz to PLN 5,900 per capita in Warsaw (cf. Chart 17).

Hospitals and schools contribute to the scale of those investment needs to an equal extent – investment needs per capita vary from PLN 2,500 in Lodz to PLN 4,700 in Warsaw. The differences between the cities result above all from other demographic outlooks.

Slightly smaller challenges are related to the modernisation and refurbishment of kindergartens and creches. It is a consequence of, first of all, a quite low benchmark equalling 47% – this is the percentage of children at the age of up to 5 years who presently attend creches and kindergartens in the model European city. Second of all, it is a result of the above mentioned fact that current shortages and the necessity of overcoming them were not included in the calculations (for methodological reasons – calculating benchmarks for the year 2035).
Although cultural infrastructure shortages in most Polish cities are rather serious and investment challenges relating to them are significant (they constitute from 22% to even 63% of overall investment needs in the social area by 2035; see: Chart 17), overcoming them will not necessarily have to burden city budgets. Such investments (mainly museums) are very often financed by cities, but we assume that in a longer perspective they can be completed mainly by other public institutions or private investors.

An example of such actions can be the commercialisation of the Spodek arena planned by Katowice and creation of the International Congress Centre or the modernisation of the Old Printing House (Stara Drukarnia) in Poznań, which – under a new name – currently plays the role of a business incubator and a thriving cultural centre.

Participation of particular sources of financing in activities of museums in Europe is very diverse. For example, the Museum of London is financed by one fourth from public funds, whereas the British Museum in London – by half.

**Chart 17. Investment challenges of cities in the area of social infrastructure by 2035 in PLN per capita**

Caution: It was assumed that all cities are responsible for one third of expenditures relating to the modernisation of hospitals. Such an assumption was made due to the necessity of maintaining the highest possible extent of comparability between the cities. At the same time, we are aware that some cities, e.g. Gdańsk, Wrocław, Lublin and Szczecin, are not responsible for financing hospitals at all.
When we compare expenditures resulting from challenges described above, expected in 2011, with the cities’ current investment expenditures (average value for years 2008-2010) relating to healthcare, education, culture and art, it turns out that in seven Polish metropolises such expenditures are below the path resulting from our calculations (see: Chart 18).

Like in the case of other areas, it should be stressed that our calculations are only of an approximate nature and also encompass costs of modernisations and refurbishments which are not regarded as investment expenditures in the cities’ budgetary classification.
4.5. Environmental infrastructure

In our study, satisfying infrastructural needs relating to environmental protection means the capability of the cities to process an appropriate amount of municipal waste and sewage generated by them. This means that challenges which the Polish cities will face result – on the one hand – from the increase in the “production” of waste and sewage per capita, parallel to the growing level of economic development, and – on the other hand – from the growing ecological requirements according to which an increasing amount of “produced” waste and sewage should be managed and/or treated.

First of all, in all Polish cities, the number of tonnes of municipal waste per capita is currently (data from 2010) lower than in Western Europe, so we assumed that it will grow correspondingly by 2035.

Whereas an average inhabitant of the model city produces approx. 530 kg of waste a year, in Poland it is 380 kg. A similar situation can be observed in the case of sewage. An average inhabitant of Western Europe produces on average 106 cubic metres of wastewater annually, whereas a Pole – only 66 cubic metres.

Second of all, currently in Poland only a minor number of tonnes of municipal waste are managed, as compared to the western countries. Katowice is the only city which presently manages over 60% of municipal waste (approx. half of their weight is currently composted), whereas in other cities that percentage is lower than 30%.

Apart from that, in some cities not all sewage is treated, but here the scale of the problem is much smaller (cf. Chart 19).

Chart 19. Percentage of managed municipal waste and treated sewage in Polish cities in 2010

Source: PwC’s own calculations
We assume that by 2035 it will be necessary to manage or treat almost 100% of municipal waste and wastewater. This means serious financial challenges for Polish cities – financing them only from the cities’ own means will be difficult, thus using alternative financing sources may be a good solution. Plans of extending the incineration plant in the Targówek district in Warsaw are a good illustration – here, acquiring private financing of the investment bases on the assumption of profitability of that installation.

The cities will receive support in the form of the amendment to the Act on maintaining cleanliness and order in communes, entering into force soon, which stipulates introducing the so-called rubbish fee; nevertheless, such a fee will have to be appropriately calculated.

The last element of environmental infrastructure to which we paid attention was the percentage of flats connected to the sewage system. Now, in cities of Western Europe, this figure equals 99.5% of inhabitants on average. The average for Polish cities is 90% – where the largest percentage of flats not connected to the sewage system was recorded in Łódź (14.7%), and the lowest – in Białystok (4.6%). This means that the distance to overcome is not large. Costs relating to that are not high, either (cf. Chart 20).

A major part of investments in this area is likely to be financed from city budgets. If we assume that in 2035, 50% of the weight of all recyclable waste will be recycled, the value of all investments relating to that process will equal only 7.5% of overall challenges – 92.5% of expenditures will probably remain within the framework of the municipal waste management system.

As presented in Chart 20, the largest investment challenge which the cities will need to face is the construction of an appropriate number of sewage treatment plants (and the modernisation of existing ones). Such costs total 48% of investment needs in the area of environmental protection. The second item in most cities, except for Katowice, is the construction of incineration plants. On average, they will constitute 42% of overall challenges. All cities – except for Katowice, where such expenditures can be much lower – should spend from PLN 2,500 to PLN 3,500 per capita by 2035.

In the field of municipal sewage treatment, the distance to overcome is not great. In the model city, almost all inhabitants are connected to the sewage system, whereas in the Polish cities covered by the study – 90%.
By 2035, all cities should have spent from PLN 2,500 to PLN 3,500 per capita on environmental infrastructure. In Katowice that burden will be lower.

The budgetary category of investment expenditures on so-called waste management infrastructure is closest to environmental challenges. In 7 of 12 cities, they are above the path determined in our calculations. In the period from 2008 to 2010, the Polish metropolises invested in waste management infrastructure the total of PLN 777 million a year, as compared to PLN 510 million which, in accordance with our calculations, they should spend in 2011. Such cities as: Białystok, Wrocław, Łódź, Lublin and Rzeszów are much above the path; whereas Gdańsk, Bydgoszcz, Białystok, Warsaw and Szczecin should expect a significant increase in expenditures on those objectives soon (cf. Chart 21).
In order to address the investment challenges described in this report, the cities should have an appropriate capital – either their own or external – in the form of bank facilities, loans, bond issues and non-returnable funds such as e.g. EU grants.

Nevertheless, taking into consideration the fact that many self-governments are now under strong budgetary pressure, the role of the private sector in financing infrastructure becomes more important than ever before. The scale of required investments shows clearly that ensuring budgetary financing at an appropriate level is hardly likely and surely will not satisfy all investment challenges. Therefore, there is a strong need that self-governments cooperate with the private sector and use the capital market as a source of financing of city undertakings.

If self-governments aim to reach a stable level of investments, methods which make it possible to determine exact capital expenditures and to effectively complete investments – such as PPP – should be seriously considered and analysed. They are methods which not only distribute risks and financial limitations, but also determine infrastructure maintenance costs in the long run, which is especially important under the circumstances of limiting public expenditures.

Also from the perspective of long-term development, it is important that such a fiscal environment and financial stability with access to private capital exist where financing of a given investment is regarded as a tool for generating growth and development, not a target as such.

Creating favourable conditions for development of companies and new workplaces in the private sector also constitute an important role to be played by self-governments in order to reduce poverty and social inequalities. This is what investments in infrastructure, unrestricted competition and protection of intellectual capital supporting innovations are needed for.

Apart from that, a long-term look makes it possible to create appropriate incentives for business development in the form of decreasing tax burdens or giving grants or guarantees. All such mechanisms must be stable and must also enable the private party to take decisions on a long-term involvement. Creating such conditions should translate into lower costs of implementing and exploiting investments in their whole life cycle.

Now, the basic business risk, i.e. the unstable economic situation, is closely linked to the challenge which governments and self-governments all over the world are confronted with, i.e. stabilising economies by reducing the scale of public debt and, at the same time, avoiding tax increases.

Therefore, an important question is still, which way of involving private parties in financing and development of infrastructure is the best. On the one hand, there are huge investment needs, on the other – budgetary limitations, and at the same time the scale of required investments makes self-governments hardly able to handle the burden relating to financing existing needs.
5.1. Looking for a new way of fulfilling tasks

The role of governments and self-governments consists in enabling business to act, including in particular through the development of infrastructure and stable capital markets, as well as through enabling access to cheaper capital. In this approach, not increasing the deficit and taking reasonable and well-founded own actions are of key importance. In this field, self-governments should change the scope of their activities and organisation, as well as reconstruct the cost base. A good example to follow is the private sector which, during the global financial crisis, reduced and optimised costs and properly managed the risk. For the public sector, however, these are not the only actions which can be taken in the present economic situation. It is also very important to maintain the appropriate level of investment both in innovations and in proper employees, as well as to be ready to involve in structures which make it possible to fulfil public tasks at a cheaper cost, such as PPP.

Obviously, it is not easy to change the way of fulfilling tasks. This requires developing a new model of providing public services, an innovative approach to reforming staff, standardisation, streamlining and dividing supporting services, as well as seeking alternative sources of financing, together with considering the introduction of fees for services which have been free of charge. This requires, of course, an appropriate approach to regulations and investing in real partnership.

The society expects that public money is spent more effectively so that the highest possible level of services under the existing budgets is achieved. Especially where there is a risk of decreasing the level of investments resulting from the level of indebtedness and deficit, the aim should be to find such ways of fulfilling tasks which would make it possible to achieve savings and reduce the cost base, and which can be maintained on a medium-term and long-term basis.

Therefore, an important matter for self-governments – especially now, when there is a necessity of thoroughly inspecting the level of indebtedness of the public sector – may be the question whether they really should engage their own capitals in undertakings which have been and will be implemented regardless of the form of ownership and where the role of the self-government is limited to ensuring quality and not to directly ordering services (e.g. building airports). Funds saved in that way can be allotted for implementing tasks which are less attractive or less acceptable for the market.

Apart from that, new technologies may result in introducing innovations in the approach to the manner of offering services. For example, a question may be asked whether the extent of providing public services with the use of the Internet and e-platforms can increase. The number of people using banking services or on-line shopping is growing, therefore it should not be difficult to limit costs and increase effectiveness in that way and to allocate acquired funds to areas where they are needed and which are more socially sensitive.

Moreover, the cities take a number of actions which are identical for many of them. Tasks where personal involvement of employees is not necessary and “paperwork” may be reduced can be outsourced to shared service centres which can be created for several or even more than dozen cities. Areas should be identified which will make it possible to provide additional cash and to allocate additional funds to long-term objectives linked to the city’s vision and strategy.

Tasks in the case of which personal involvement of employees is not necessary can be outsourced to shared service centres – and funds saved in that way can be allocated to investments.
5.2. Alternative financing methods

In the case of completing investment challenges with the use of alternative financing methods – where the self-government shares the risk with a private partner – the model must be appropriately matched to the conditions of the individual project, as well as to objectives assumed by the given self-government with respect to the given infrastructural investment. Investments must be implemented in order for the public party to fulfil its obligations to inhabitants and to deliver public services. In the face of limited public means, it is of course necessary to set priorities and use financing structures which will maximise the public investment leverage and make it possible to finance a greater number of projects.

A model for a particular investment should be selected based on an analysis of feasibility and profitability of that investment. In the initial evaluation of particular models, it can be assumed that the cities should have three basic objectives:

1. Providing projects which entail most economic, social and environmental benefits – investments in infrastructure should stimulate economic development and have a multiplier effect by generating broader economic, social and environmental benefits (e.g. decreasing travel times, limiting costs relating to large traffic congestion or limiting CO₂ emissions).

2. Minimising the impact of the project on the city budget – not only by not increasing capital expenditures, but also by increasing the certainty of future budgetary forecasts and maintaining the appropriate debt level.

3. Reusing public capital – traditional capital involvement of the public party means making an own contribution, mainly in the form of a plot of land for the future infrastructure which does not generate a return on investment. In the case of engaging in a profitable undertaking, capital contributed by the public party could generate a return and be invested in new infrastructural projects and, as a result, make it possible to maximise benefits from using public funds.

A challenge for self-governments consists in the fact that their objectives can compete against each other. For example, an infrastructural project which yields economic benefits does not necessarily need to be profitable in financial terms. This means that the implementation of this project will fulfil the first objective, but not the third one. Then, a decision must be taken based on the relative significance (weights) of particular objectives.

By suggesting not only limiting costs, but also the use of innovative models of financing, we would like to draw your attention to those models of implementing infrastructural investments which entail financial involvement of the city only to a limited extent or in a limited period of time. This does not mean, however, total exclusion of the city from participating in costs of implementing the investment, because it may be clearly stated that the era of complicated financial engineering is gone, at least for some time, and the level of own contribution expected by financing institutions is now higher than it used to be before the global financial crisis, and models where demand risk is transferred to the private partner are currently quite rare.

Below, we present selected examples of alternative financing which, depending on the cities’ objectives and their financial capabilities, can be used in the long-term development planning of urban infrastructure:

1. Minimum income guarantees from cities for a certain period of time

   – such a guarantee functions only in the starting phase of a project, when income is less certain, but it only ensures debt repayment, not return on invested capital. Such an approach makes it possible to gain economic benefits in the form of infrastructure which self-governments cannot afford. The private party is requested to finance and maintain infrastructure and, in return, it offers cost-effectiveness of the project and assumes the risk. The structure of that instrument should also enable the public party to gain benefits if the real level of income is higher than forecast. It is, of course, not certain whether such a guarantee will be activated. Nevertheless, limiting it to the short period of the actual start of the project, i.e. up to 3-4 years, should ensure comfort to the public party and, finally, lead to taking over the given infrastructural facility. On the other hand, it is important that the construction of infrastructure is entirely privately-financed and the involvement of the self-government is limited to conditional support.

   If assumptions regarding the level of income are met, then the guarantee is cancelled and may be used in another project. Such a solution is attractive also for the private sector as it secures debt capitals and, at the same time, motivates the private party to effectively manage and maintain the long-term durability of the project as a result of the lack of security of the return on own capitals.

2. PPP based on an availability fee

   – the most classical way of fulfilling public tasks with the participation of a private partner. In this case, the private sector designs, builds, finances, maintains and manages infrastructure in return for fees for the availability of the facility after it is put into use. The demand risk is borne by the public party, thus the public partner can receive income from third parties. Moreover, it is possible to apply various modifications of that model so that a certain portion of demand risk is transferred to the private party. An advantage of that model is the fact that it encompasses the whole life cycle of the project and, at the same time, the public party maintains control over the level of income and the right to introduce changes to the fee policy. If income is higher than the level of availability fees, it may be used to implement other projects. Nevertheless, in this case, European guidelines concerning presenting such projects in the balance sheet of the public party may be a limitation.

3. Infrastructural bonds

   – an instrument of a similar nature was known before the financial crisis but now it is not likely to return onto the market in its previous form. Presently, the European Commission and the European Investment Bank have prepared an instrument called the Project Bond Initiative, aiming at engaging additional sources of private capital by involving such institutions as insurance firms and pension funds in infrastructural projects. In order to make a project attractive for such institutions, the rating of special purpose vehicles needs to be increased, as a result of which they will be able to issue bonds to institutional investors. The role of the EC and the EIB will consist in taking over a part of the risk entailed by the project, as a consequence of which the credit rating of the whole project will increase. In response to the lack of so-called monoline insurers, the EIB proposes a mechanism which will be limited in terms of the amount, will not aim to improve the credit rating of the project to the maximum AAA level, will be based
on the EIB’s ability to grant subordinate long-term loans and will be focused only on the basic activities of the EIB, i.e. financing infrastructure. That instrument will be used to finance well-prepared projects in which the EIB’s involvement, after due diligence, will provide an additional argument for other lenders.

4. Hybrid/mixed financing
– fusing PPP with EU funds – the hybrid project consists in connecting the public-private partnership structure with EU funds in order to finance one piece of infrastructure. Those funds can be connected under one agreement (where the public partner of the private company which is a party to the PPP agreement will be the beneficiary), or the part built by the public sector can be financed from EU funds while the private partner finances the construction of the rest of the investment and then exploits it as a whole. In each case, the financial stability and economic profitability of the whole project have to be proven to institutions which verify the application for EU funds. It should be noted that it is practically not possible to change the PPP agreement once it has been concluded due to the regulations of the Public Procurement Law, whereas a modification of the project co-financed with EU funds is possible only upon obtaining consent of institutions competent for the given programme. Therefore, it is recommended to establish the manner of implementation of the project which is acceptable from the perspective of acquiring EU funds and then to choose a private partner and sign the PPP agreement. In the new 2014-2020 prospective budget, the European Commission heralds new EU fund instruments directed at PPP projects, as well as greater insistence on refundable financing which is better adapted to the conditions of PPP projects than to purely public projects.

5. Privatisation of city companies through stock exchange – currently, public offering of shares is not used by Polish communes as a source of financing. Nevertheless, it may be attractive because it constitutes not only a one-off way of acquiring financing but also it ensures long-term access to the capital share market. The status of a public company facilitates both the issue of shares and acquisition of loans and bonds. Such features enable comprehensive and balanced acquisition of funds which can be used to finance selected, economically justified public tasks. The debt of a company listed on the stock exchange will not be added to the city debt. Public offering as a source of financing city companies also enables the city to profitably invest its capital as the city becomes the beneficiary of the public company’s value increase. Owing to the high liquidity of the company’s shares, it is possible to sell a block of shares almost at any time, which considerably increases the financial safety of the city budget.

In the short run, a disadvantage of the issue consists in the necessity of applying a discount when selling shares; on the contrary, when selling them to a strategic investor, a bonus can be expected. Nevertheless, the possibility of controlling the company and benefits from the increase in the value of its shares should be a sufficient argument for using that method of financing city investments.

The task of self-governments consists in investing in infrastructure which is necessary to fulfil basic public functions. Investments in e.g. transport, healthcare, schools or sport facilities must be made in order to generate appropriate economic growth and stimulate the development of the society. In order to ensure success of the implementation of particular projects, the financing model should be adapted to individual conditions of the project and to the most important objectives of the self-government relating to the given investment. The financing methods suggested above are broadly used in the case of various investments, including urban ones, and they make it possible to finance capital-consuming tasks in accordance with the needs of the public sector.

Obviously, the indicated tools should be used in accordance with the needs and the specific type of investments. Apart from that, each time, optimal financial engineering should be looked for. It should be also borne in mind that the tools affect the level of indebtedness of the cities in various ways. Nevertheless, factors of a legal and statistical nature (e.g. adding certain items to public debt or not) should never be the basis for selecting the way of financing of a particular project – instead, an analysis of economic and financial effectiveness of a given solution should be applied.
5.3. Support for financing through optimisation

Regardless of seeking additional external sources of financing, attention should be paid to the possibility of supporting the financing of investments through optimising activities which may contribute to increasing the available own funds or to reducing the cost of single investment projects.

Increasing available own funds of self-governments is possible as a result of precisely planned saving plans. This solution has been successfully used for a number of years in the Polish private sector, but also in the self-governmental sector in Western Europe (e.g. in Great Britain and Germany). Such programmes consist in the identification of the possibilities and subsequent implementation of rationalising activities in all cost areas (e.g. external services, procurement, staff costs, IT costs, as well as property and infrastructure maintenance costs).

They make it possible to permanently reduce the level of operational expenses of self-governments and release own funds for financing strategic investments.

Decreasing the cost of single investment projects is possible as a consequence of implementing a set of actions compliant with the regulations of the Public Procurement Law which support the self-government in proper planning of the operational way of implementing the investment. Such actions should be related to, for example, the scope of works entrusted to the general contractor (e.g. in the case of repeatable investments, applying the so-called investor deliveries – materials or equipment purchased directly by the self-government, as a result of which the margin of the general contractor is avoided – may be advantageous). Soon, one of the ways of decreasing the costs of an investment may be the so-called technical dialogue – a procedure which makes it possible to select the optimum technique of implementing the investment before announcing procurement proceedings (legislative works on introducing this solution, which is already known in Western Europe, to the Public Procurement Law Act are pending).

Both alternative financing methods and possible tools aiming at releasing a greater amount of own funds show that the cities can use a wide range of available solutions. The scale and importance of challenges which Polish metropolises will face make it absolutely necessary to apply an appropriate combination of an array of such tools. PwC’s global experience shows that some of the above mentioned methods require additional work and professional use of experience gained in already finished projects. In the long run, this effort will certainly prove profitable – and will improve the living standards in Polish metropolises.
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