White Paper

SIEMENS

Sustainable Cities
Trends, Investment Challenges & Financing Solutions

A Research Report from
Siemens Financial Services
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1. Abstract

Cities cover only 1 percent of the Earth's surface but are home to more than half of humanity, consume 75 percent of the available energy and emit around 80 percent of all harmful greenhouse gases. It is estimated that roughly 70 percent of the world's population will live in urban centers by 2050.[1] With urban economic output and energy needs set to soar, cities will have to massively invest in modernizing and expanding their infrastructure, and increasingly tap sustainable and eco-friendly solutions in order to reach their own climate goals and those of their respective country.

The focus on sustainable cities has, therefore, grown tremendously. As a concept, it includes a number of fundamental objectives – minimizing the use of non-renewable resources, achieving the sustainable use of renewable resources and staying within the absorptive capacity of local and global waste absorption limits.[2]

With products and solutions from the world's largest environmental portfolio, Siemens makes a major contribution to greater environmental sustainability in cities. Supporting it in this endeavor is Siemens Financial Services (SFS). This paper evaluates the investment challenges cities face in building appropriate infrastructure, pronounced by the recent economic crisis, and presents a way forward for finding efficient financing solutions.

2. Overview

2.1 Megacities

Megacities, or the cities with at least 10 million residents, are inhabited by over 324 million people around the globe today.[3] These cities are the financial centers of their countries, accounting for a major share of the national gross domestic product (GDP). Already, one-fifth of the world's GDP is generated in the 10 economically most important cities. According to a Munich Re study, Tokyo accounts for 28 percent of the Japanese population, but 40 percent of the country's GDP. Paris is home to 16 percent of the French population, but is responsible for 30 percent of its GDP. In the developing world, Lagos is home to 8 percent of Nigeria's population but contributes 30 percent of the country's output.

These megacities are growing at a scorching pace, with those in emerging countries growing the fastest. According to projections by the United Nations, China and India will account for 36 percent of the total increase in global urban population between 2009 and 2025.[4] Nine other countries, all developing countries with the exception of one – the United States –,will account for an additional 26 percent.

This burgeoning pace of growth creates a new set of socio-economic developmental challenges and fuels the demand for modern and efficient infrastructure. According to an analysis by consultants Booz Allen Hamilton, cities worldwide will need to invest around $41 trillion in expanding their water, power and transportation systems over the period 2005 – 2030.[5]

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[1] World Urbanization Prospects: The 2009 Revision, United Nations, Department of Economic and Social Affairs, Population Division

[2] Planning Sustainable Cities: Policy Directions, Global Report on Human Settlements 2009, UN-Habitat

[3] World Urbanization Prospects: The 2009 Revision, United Nations, Department of Economic and Social Affairs, Population Division

[4] World Urbanization Prospects: The 2009 Revision, United Nations, Department of Economic and Social Affairs, Population Division

[5] "Lights! Water! Motion!", strategy+business magazine (Booz & Company), Spring 2007, Issue 46

2.2 Transportation: The mobility challenge

Transport is the most important of all infrastructure concerns and is the one area that stakeholders believe has the biggest impact on a city's competitiveness.[6]

As the backbone of a city, the transport network needs to keep pace with the needs of the growing urban populace. When it fails to do so, the economy bears the brunt. For instance, the Confederation of British Industry (CBI) estimates that the cost of congestion in many cities in the United Kingdom, including London, is about £20 billion ($38 billion) a year.[7] Similarly, the U.S. Department of Transportation estimated in 2006 that freight bottlenecks and delayed deliveries due to congested highways and inefficient rail and deep-water transportation systems cost the country $200 billion annually.

Therefore, there is a growing focus on finding and deploying new ways of funding advanced transport infrastructure. For instance, most states in the United States are exploring alternative financing options to maintain the nation's existing transportation systems and to increase capacity for the future as they realize that raising fuel taxes is politically difficult and the future revenue yield from existing funding sources is inadequate.[8]

[6] Megacity Challenges: A stakeholder perspective, January 2007, Economist Intelligence Unit

[7] "Running out of Road", The Economist, December 2, 2006

[8] Transportation & Infrastructure Finance, a csg national report by Sean Sloane

2.3 Power: Lighting up the megacities

According to projections by the International Energy Agency (IEA), worldwide demand for electricity will grow by 76 percent between 2007 and 2030.[9] Non-OECD (Organisation for Economic Co-operation and Development) countries will account for 93 percent of the increase in global demand, driven largely by India and China.

The acceleration of demand is already evident in the developing world. In 2002, the three geographic locales with the fastest-growing rate of electricity use, between 4 percent and 5 percent per year, were China, India, and Latin America (including Mexico and the Caribbean). Together, they consumed about 4,500 terawatt-hours (TWh) of electricity. The United States and Canada, with about one-tenth the population, used about the same amount. But by 2020, according to International Energy Agency projections, the combined electricity consumption of these three areas is expected to reach more than 12,000 TWh — double or triple the expected demand of North America, which itself is growing at 2 percent annually.

As economic hubs, cities consume the largest share of energy, even though the nature of energy challenges at various stages of the city's growth is different. The main challenge for transitional cities (e.g., Shanghai and Beijing) and mature cities (e.g., New York, Tokyo, London) is old or obsolete infrastructure, followed by efficiency and lack of capacity. In emerging cities (e.g., Mumbai, Lagos, Jakarta), the lack of sufficient generation capacity is by far the most pressing concern. Whatever the cause, energy demand is outstripping supply in cities across the world.

2.4 Energy emissions: Limiting the environmental impact of growth

The IEA forecasts that in the absence of major regulatory changes, CO_2 emissions globally are likely to increase nearly 40 percent by 2030 compared with 2007 levels.[10]

According to a study conducted for Siemens by the Wuppertal Institute for Climate, Environment and Energy, large cities such as Munich could reduce their greenhouse gas emissions by as much as 90 percent without any noticeable compromises in the quality of life for their residents.[11] Cities need to take a leading role in protecting the climate since they are responsible for 80 percent of CO_2 emissions. The most effective approaches to reducing emissions, the study pointed out, are improved insulation of buildings, use of renewable and low-CO_2 energy sources, cogeneration of heat and power, and the use of economical electrical appliances and lighting.

2.5 Water: Basic necessity, scarce resource

According to the United Nations statement on World Water Day 2010, 1.1 billion people currently have no access to fresh drinking water and 2.6 billion have no sanitary facilities.

The Intergovernmental Panel on Climate Change (IPCC) predicts that by 2050, around 60 percent of the world's population will experience severe water shortages, with 33 percent estimated to be already under water stress. Lack of access to water will have profound socio-economic implications, especially in large cities where the growing population is already causing an excessive strain on resources.

[9] World Energy Outlook 2009, International Energy Agency

[10] World Energy Outlook 2009, International Energy Agency

[11] Sustainable Urban Infrastructure: Munich – Paths toward a Carbon-Free Future, a Wuppertal Institute for Climate, Environment and Energy study commissioned by Siemens, March 2009

While emerging countries face a bigger challenge of providing clean drinking water to their citizens, most developed nations are also facing a water crisis. In some of the largest U.S. cities, water mains and feeder pipes date back to the 1860s, and it is not unusual for a metropolitan area to have as many as 1,000 water main breaks a year. In Detroit, where 35 billion gallons of water leak from the water supply each year, residents pay about $23 million annually for water that never reaches their homes or businesses.[12]

For this reason, there is increasing emphasis on investments in improving access to water and conserving water resources. Each dollar invested in improved access to safe water and sanitation is estimated to produce a return of $3-34. On the other hand, where investment is weak, GDP could be constrained by as much as 10 percent. On the African continent, the overall economic loss due to lack of access to safe water and basic sanitation is estimated to be about $28.4 billion a year, or around 5 percent of GDP.[13]

Investing in sanitation infrastructure also has benefits for the environment. Over 80 percent of sewage in developing countries is discharged today without being treated, thereby polluting rivers, lakes and coastal areas. It is estimated that the total cost in industrial countries of replacing aging water supply and sanitation infrastructure may be as high as $200 billion per year.[14]

[12] "Lights! Water! Motion!", strategy+business magazine (Booz & Company), Spring 2007, Issue 46

[13] The 3rd United Nations World Water Development Report: Water in a Changing World, 2009

[14] Ibid

3. Financing sustainable cities: Challenges and opportunities

Infrastructure projects across the world bore the brunt of the global financial crisis. Global project financing loans fell to $50 billion in the first half of 2009 from over $125 billion in the corresponding period of 2008.[15]

In a survey sponsored by Siemens for the U.S. Conference of Mayors, a majority of mayors (77 percent) reported that the infrastructure budget of their cities for 2009 was adversely affected by the global economic crisis.[16] Just over half the respondents said they believe their infrastructure budget will increase by less than 5 percent over the next five years from stimulus funding. On another note, most mayors (62 percent) agree that climate-friendly technologies represent "an enormous economic opportunity" for their city.

While investments in infrastructure projects slowed down in the wake of the financial crisis, Standard & Poor's Ratings Services said it expects the demand for well-structured, creditworthy project-finance transactions globally to spur such projects in the future.[17]

The public private partnership model is also gaining ground as governments around the world rope in the private sector to fund critical infrastructure development in several areas – energy, environment, transport and social infrastructure. In fact, private lending in infrastructure has increased almost fivefold in the last 10 years.[18]

The OECD estimates that the required investment in road, rail, telecoms, electricity and water infrastructure will reach $71 trillion, or about 3.5 percent of global GDP, by 2030, without even taking into account seaports, airports and social infrastructure.[19] While investments in developed countries such as the United States and the United Kingdom are centered on upgrading or replacing aging infrastructure, emerging economies such as India and China are investing in the construction of new infrastructure to facilitate economic growth. In the developing markets, new growth opportunities are coming to the fore in the areas of public utilities, transportation and power, especially with the re-emergence of interest in nuclear power as a solution to the world's soaring energy needs and as an alternative to fossil fuels.

Cities need to devise new financing programs for infrastructure development and to address the challenges posed by growing urbanization. In addition to fostering public private partnerships in this area, countries, both developed and developing, need to ensure their regulatory and legislative framework is conducive to attracting foreign investments. As they vie with each other to attract investors, cities will also have to demonstrate their capability of implementing good governance, as both a city's attractiveness for investors and its creditworthiness assessed by private capital markets depend on it.

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[15] The Future of Project Finance Globally, a presentation by Nick Rouse, MD, Frontier Markets Fund Managers

[16] Metropolitan Infrastructure Sustainability Study, a research project prepared by GlobeScan and sponsored by Siemens for The U.S. Conference of Mayors, June 2009

[17] Industry Report Card: Global Project Finance Sector Starting To Edge Beyond The Economic Slump, Standard & Poor's, November 2009

[18] Infrastructure finance – surviving the credit crunch, PricewaterhouseCoopers

[19] OECD, "Infrastructure to 2030" report, 2007

4. BRIC markets: Opportunities in the emerging economies

4.1 China

China is estimated to have 221 cities with more than 1 million inhabitants and 23 cities with more than 5 million by 2025. Its urban population is expected to touch the 1 billion mark by 2030.[20] Managing the growing population, building adequate public infrastructure and limiting the impact of this growth on natural resources are both big challenges for the country and investment opportunities.

The fast pace of urbanization in China translates into large investment requirements. For instance, the country plans to invest at least 700 billion yuan ($102.49 billion) per year in railway construction from 2010 through 2012.[21] Building water-supply, waste-treatment, heating and other public utilities in Chinese cities presents another investment opportunity worth 1 trillion yuan.[22]

China also has ambitious plans in the area of green buildings. The country aims to cut energy use of buildings in all cities by 65 percent by 2020, using the average energy efficiency of Chinese buildings in 1980 as the base point. Beijing, Shanghai, Tianjin and Chongqing – the four largest cities in China – are working to cut building energy use by 65 percent by the end of this year.[23] In addition, the Chinese government estimates the total cost of retrofitting existing buildings, to be completed by 2020, with energy saving systems will be $193 billion.[24]

That is not all. China has also earmarked large investments to accelerate its power grid development and to promote innovation within the automotive industry via the production of electric vehicles.

Financial institutions and the Chinese government remain the key backers of project financed-infrastructure projects, and this trend has grown in the wake of the global economic slowdown with the government infusing funds into the economy. The country still holds out some scope for the private sector and multilateral institutions' involvement in its infrastructure development.[25]

4.2 India

As a result of growing urbanization, the share of the urban population is likely to increase to about 40 percent of India's total population by the year 2030.[26] Under the country's Eleventh Five-Year Plan (2007-12), $514 billion has been earmarked for infrastructure investments, including investments in electricity, roads and bridges and railways. According to government projections, the share of the private sector was put at about 30 percent.[27] The government support will, meanwhile, provide support to urban infrastructure.

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[20] Preparing for China's urban billion, McKinsey & Company, February 2009

[21] China Daily - http://www.chinadaily.com.cn/bizchina/2009-08/11/content_8555827.htm

[22] People's Daily Online- http://english.people.com.cn/90001/90776/90882/6740527.html

[23] ClimateChangeCorp.com , the future of green building in China;

http://www.climatechangecorp.com/content_print.asp?ContentID=6023

[24] Ibid

[25] The Future of Project Finance Globally, a presentation by Nick Rouse, MD, Frontier Markets Fund Managers

[26] World Population Prospects: The 2009 Revision, United Nations, Department of Economic and Social Affairs, Population Division

[27] Projections of Investment in Infrastructure during the Eleventh Plan, The Secretariat for the Committee on Infrastructure, August 2008

In September 2009, Goldman Sachs announced that it believes that India's infrastructure sector will require $1.7 trillion in financing over the next decade to 2020. The investment banking firm noted that the country needs to more than double its electricity capacity, increase the length of its roads by half, expand railways and boost the number of ports and airports in order to keep up with its anticipated economic growth.

India withstood the global economic slowdown very well, witnessing five of the 10 largest project financing deals in 2009.[28] The country is seeing a proliferation of domestic and offshore funds targeting its infrastructure market, driven by strong demand from the transportation, power, urban infrastructure and irrigation segments. In addition, the government is eager to encourage and facilitate the participation of the private sector in infrastructure development. For instance, Indian Railways plans to invest $46.7 billion in the modernization, capacity expansion and completion of new projects during the Eleventh Five Year Plan, with plans to attract $24.63 billion through public private partnership.[29]

The infrastructure sector provides a large opportunity for financial sector players, with potential revenues of $10-12 billion between the financial years 2010 and 2014[30] and a revenue pool of $25-29 billion beyond 2014. In addition, ongoing revenue streams beyond 2014 could range between $25 billion and $29 billion. The power, roads and ports sectors will account for the lion's share of this opportunity since these make up about 57 percent of the planned spend and 66 percent of the potential revenue opportunity.

4.3 Brazil

The urban transformation of Brazil has been gaining momentum and will result in about 91 percent of the country's population living in cities by 2030.[31]

In February 2010, Brazil's government-controlled bank Banco do Brasil stated that about $85 billion in financing would be required over the decade for infrastructure projects, driven by investments in preparation for the 2014 World Cup.

According to projections by the Brazilian Development Bank (BNDES), the country is expected to invest $152 billion in various infrastructure projects between 2010 and 2013. The government has announced the second phase of its Accelerated Growth Program (Programa de Aceleração de Crescimento, or PAC) with an estimated public and private investment of $526 billion between 2011 and 2014. Under the first phase of PAC, the government had earlier earmarked an investment of $170 billion between 2008 and 2010. The program focuses on three key areas of investment – logistical infrastructure, involving the construction and expansion of highways, railways, ports, airports and waterways; energy infrastructure, involving the generation and transmission of electricity as well as the production, exploration and shipping of petroleum, natural gas and renewable fuels; and social and urban infrastructure, covering sanitation, housing, subways and urban trains.

The Brazilian government recently made headway with two flagship projects. In January 2010, the utilities sector saw the 11 gigawatt (GW) Belo Monte hydropower project receive environmental approval. With a number of companies expressing interest, the Banco do Brasil is looking into arranging financing for the project, which is estimated to cost about $17 billion. The government also announced the bidding rules for its $19 billion high-speed rail project linking Rio de Janeiro, São Paulo and Campinas. The auction is expected to take place in May 2010. In addition, plans are afoot to expand the road network, upgrade the ports and introduce new trains in major cities of the country.

[28] Thomson Reuters

[29] Background paper, Indian Infrastructure Summit 2009; Deloitte, government of India and FICCI

[30] Building India: Financing and Investing in Infrastructure, McKinsey & Company

[31] World Population Prospects: The 2009 Revision, United Nations, Department of Economic and Social Affairs, Population Division

4.4 Russia

According to United Nations projections, the share of the urban population in Russia is expected to increase to 77 percent by 2030.[32]

The Russian government estimates that the country needs to invest about $1 trillion by 2020 to upgrade its infrastructure to modern international standards. The country requires investments across various sectors: $195 billion is needed for roads, $204 billion for railways, $380 billion for the health system and $462 billion for power generation.[33]

It is expected that the private sector will contribute most of the financing through public private partnership (PPP) though such a model is yet to take off in the country. The Russian PPP market is seen to have enormous potential, and the government understands the benefits PPPs can bring. The Russian government is now seeking new areas for implementing PPPs, moving away from huge PPP projects in the transport sector to more feasible projects in the healthcare and waste treatment subsectors.[34]

In addition, there is a concerted focus on developing cities through initiatives such as the investment program of the Moscow City Government. This program's objectives include construction of engineering and communications networks, roads and other objects of the urban infrastructure; re-structuring of the industrial complex of the capital by transferring polluting industrial enterprises outside the city; modernization of the transport infrastructure of the capital; development of the modern tourist industry; and promotion of small and medium-size businesses. It is estimated that these goals require an investment of about $70 billion by 2020.[35]

In addition, there are several other projects, including construction of freeways, rapid transport systems, seaport terminals and airport expansion, across several other cities of the country.

5. Opportunities in mature markets

5.1 The United States

According to U.N. projections, the proportion of urban population in the United States will increase to 87 percent of the country's total population by 2030.[36] The country's infrastructure has already been bearing the brunt of growing urbanization. Therefore, one of the key aims of the American Reinvestment and Recovery Act (ARRA), enacted in 2009 as an economic stimulus program, is to rebuild the country's road, rail, and water infrastructure.

The program envisages an investment of $27.5 billion in highway construction, $8 billion in the development of high-speed rail and improvement of intercity passenger rail service, and $1.5 billion in discretionary grants for highways, bridges, mass transit, rail, and port infrastructure.[37]

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[32] World Population Prospects: The 2009 Revision, United Nations, Department of Economic and Social Affairs, Population Division

[33] Public – Private Partnerships In Russia: Overview, Feb 2009, Allen & Overy

[34] PSD Blog – The World Bank Group; http://psdblog.worldbank.org/psdblog/2009/09/despite-crisis-positive-outlook-for-ppps-in-russia.html

[35] Integrated Body for Urban Design Policy and Development of Moscow, http://www.stroi.ru/eng/default.aspx?m=75&d=65

[36] World Urbanization Prospects: The 2009 Revision, United Nations, Department of Economic and Social Affairs, Population Division

[37] Website of Nancy Pelosi, Speaker of the U.S. House of Representatives http://www.speaker.gov/newsroom/legislation?id=0273#roads

In order to encourage the adoption of alternative fuel vehicles, the act provides a tax credit of up to $7,500 to families who purchase plug-in hybrid and all-electric vehicles. It also earmarks investments to make federal buildings and public housing more energy efficient.

The act includes state and local energy programs to help state and local governments invest in innovative best practices to achieve greater energy efficiency and reduce energy usage. In addition, it covers the modernization of the American water systems to strengthen the safety and cleanliness of water.

While there is large private-sector participation in infrastructure projects in the United States, it is expected in the medium term that there will be more emphasis on projects involving some form of government support than on purely private-sector-led projects.[38] In addition to private-sector companies, the involvement of private-equity groups engaged in the infrastructure sector (e.g., in the power sector) to develop new projects is also likely to remain significant.

[38] The Future of Project Finance Globally, a presentation by Nick Rouse, MD, Frontier Markets Fund Managers

5.2 Germany

The urban population in Germany is expected to cross 78 percent of the country's total population by 2030.[39]

In order to support the anticipated urban growth, the German government has earmarked investments in several areas, including railways, buildings and electric vehicles. For instance, federal investments in railways between 2009 and 2013 amount to €2.5 billion.[40] Railway firms will spend another €1 billion to €1.25 billion on maintenance. With freight volumes expected to increase by 50 percent by 2050, the government is expecting the additional volumes to be borne by the railways.[41]

Similarly, the government provided €2.2 billion for building renovation projects in 2009.[42] It now plans to invest €1.1 billion and €1.2 billion in such projects in 2010 and 2011 respectively. In a bid to advance research and development, market preparation for and introduction of electric vehicles in Germany, the government has also rolled out an ambitious project called the National Development Plan for Electric Mobility, with the target of having 1 million electric vehicles on German roads by 2020.[43] According to a study by Oliver Wyman[44], the German government needs to provide a subsidy of €15 billion over 10 years to achieve this aim.

The German Institute of Urban Affairs (Difu) has estimated that the overall municipal financing requirements in the country amount to €704 billion in the period from 2006 to 2020.[45] This corresponds to an annual investment volume of €47 billion.

The government is banking on public private partnerships to meet some of these requirements, having tasted success in some of its projects, including the HGV toll, carried out in collaboration with private-sector companies.

6. Answering urban technology and financing needs with Siemens

While building infrastructure, cities must reconcile three goals – ensure high quality of life for their residents; maintain and increase their economic competitiveness; and adopt a sustainable development path. While technology is the key to making cities fit for the future, cities also need the right financing model for infrastructure development to effectively tackle their growth pangs.

At the Siemens Group, we bring together the technology solutions and the financing expertise to help cities address tomorrow's challenges today. With our extensive range of products, solutions and services, we provide answers to urban requirements in the areas of transportation, buildings, lighting, energy supply, healthcare, water, waste, and safety and security. Many of our technologies not only help protect the urban environment, but also pay for themselves from an economic point of view, largely by reducing energy costs.

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[39] World Urbanization Prospects: The 2009 Revision, United Nations, Department of Economic and Social Affairs, Population Division

[40] Federal Ministry of Transport, Building and Urban Affairs, German Association of the Railway Industry, 2009

[41] Interview with Federal Minister of Transport, Building and Urban Affairs, December 2009

http://www.bmvbs.de/en/dokumente/-,1872.1124550/Reden/dokument.htm

[42] Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

[43] Ibid

[44] E-Mobility 2025, Oliver Wyman

[45] German Institute of Urban Affairs, June 2008

Through Siemens Financial Services, we provide finance for infrastructure, equipment and working-capital investments to help cities adopt modern technologies and move toward a more sustainable infrastructure.

For instance, Siemens not only offered financial assistance to the new international airport in Bengaluru, India, but also equipped it with electrical, IT and communications systems, airfield lighting, passenger boarding bridges, escalators and elevators, baggage handling system, power supply equipment, building security and automation systems.

7. SFS: Financial solutions for sustainable cities

SFS leverages its knowledge of key Siemens markets and related industries to enable investments in innovative technology and sustainable infrastructure through efficient financial solutions. The company has extensive expertise in the area of environmental solutions. For instance, SFS is currently structuring financial solutions for over 60 energy projects with a project volume of €11.2 billion to be financed.

In October 2009, Siemens entered into a strategic partnership with Beijing Chaoyang district government to promote energy saving and emission reduction in public buildings and other areas in the district. Siemens Finance and Leasing, an arm of SFS, will provide the district government with an equipment leasing solution for five-and-a-half years, enabling project costs to be met wholly from the savings achieved through reduced energy consumption and better operational efficiencies. Siemens Building Technologies will diagnose, retrofit and upgrade selected government buildings for improved energy efficiency, resulting in an estimated annual savings rate of at least 12 percent.

SFS also enabled the rapid expansion of drinking water facilities in Colorado City in the state of Colorado, United States, in 2009. In a bid to avoid delays and costs associated with obtaining funding from the state revolving fund, the city was seeking a water-treatment solution provider who could bundle third-party engineering, construction, and equipment costs into one financing structure. SFS provided Colorado City with pre-approved tax-exempt financing covering the water-treatment equipment, third-party engineering and construction costs, thus accelerating the project and helping it save taxpayer dollars.

When the Russian state railway aimed to modernize its fleet, Siemens offered it an innovative solution comprising project planning, delivery and a 30-year maintenance contract for eight Velaro high-speed trains. SFS designed a customized financial solution for this project, enabling RZD to obtain long-term bank financing at very attractive conditions for the acquisition of the vehicles. The financing, covering the entire project volume of €318 million, includes Euler Hermes covered and uncovered bank loans. In July 2009, the maiden trip of the Velaro Rus took place on the route between Moscow and St. Petersburg, and the two cities were connected by regular train service at the end of 2009. The transaction received Trade Finance Magazine's "Deal of the Year" award.

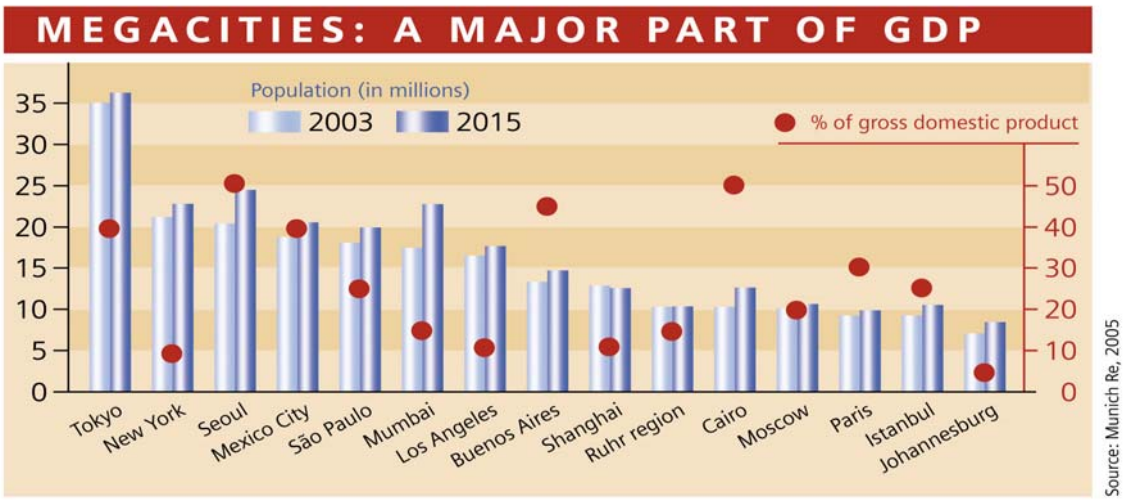
Jiang Mei road, which connects Northwest and Southwest China, witnessed heavy truck traffic throughout the year, with traffic jams sometimes lasting up to 24 hours. The government and the Taibai police were constrained by inadequate traffic-management facilities as well as tight budgets. In 2008, Siemens Finance and Leasing provided finance leasing support to the authorities, enabling the purchase of an intelligent traffic system from Siemens ITS comprising CCTV systems, speed monitor systems and central control during the first phase and other modules such as wireless and urban traffic signal in the second phase. The integrated solution facilitates better traffic management and has reduced the workload of the traffic police.

SFS also offered an attractive financing solution to the Neue Messe Stuttgart, or the New Stuttgart Trade Fair Center, which was the largest construction project in Germany when it opened in October 2007. In order to meet the center's financing requirements to build a traffic management center, Siemens Finance and Leasing provided a tailored solution based on the hire-purchase model, which allowed the trade-fair operator to pay as usage grew. Siemens Industry Sector supplied a dynamic parking-lot routing system, traffic computers, signal system and static sign systems for the center. The integrated solution

optimized the traffic infrastructure, leading to reduction in the CO_2 emissions as well as congestion near the center.

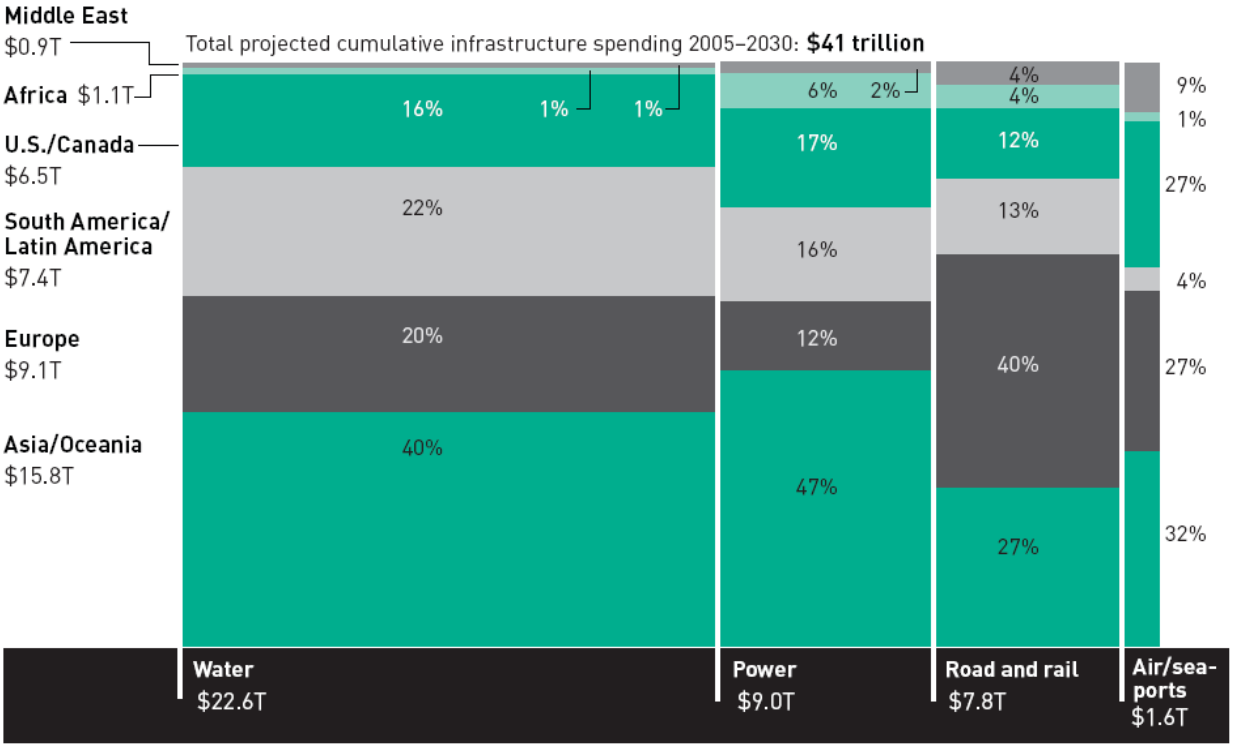
8. Key charts

8.1 Megacities' contribution to GDP



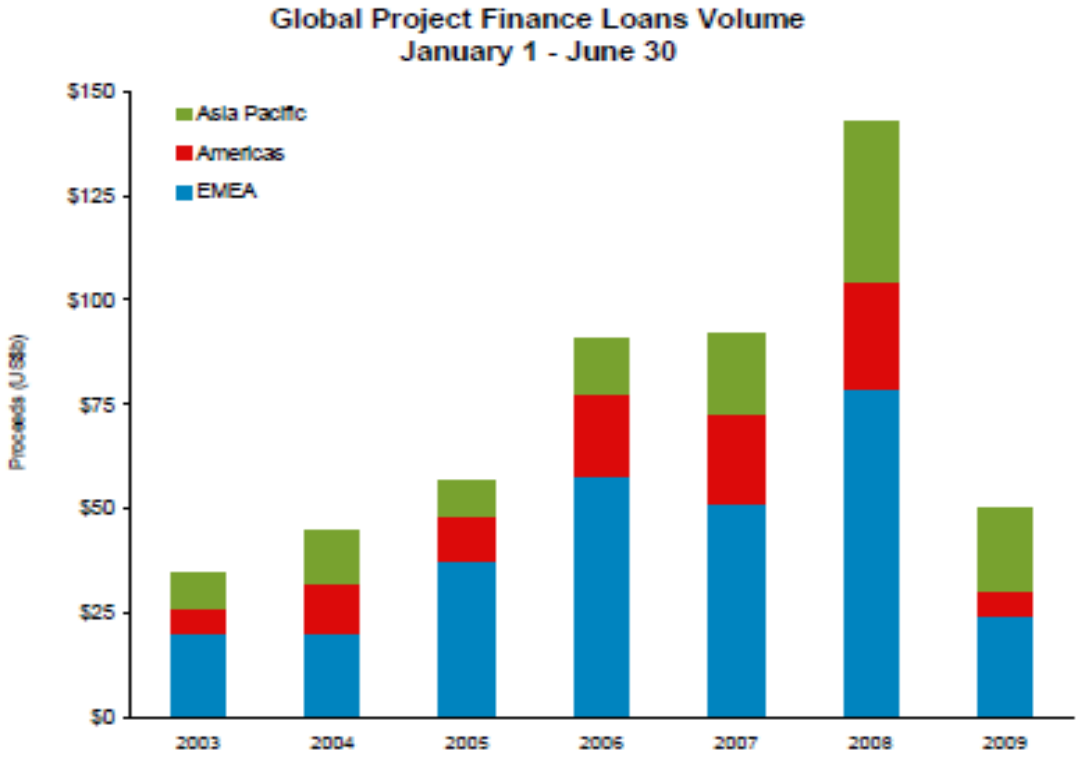
Source: Munich Re, 2005

8.2 Percentages of total projected cumulative infrastructure investment needed during the next 25 years to modernize obsolescent systems and meet expanding demand, broken down by region and sector



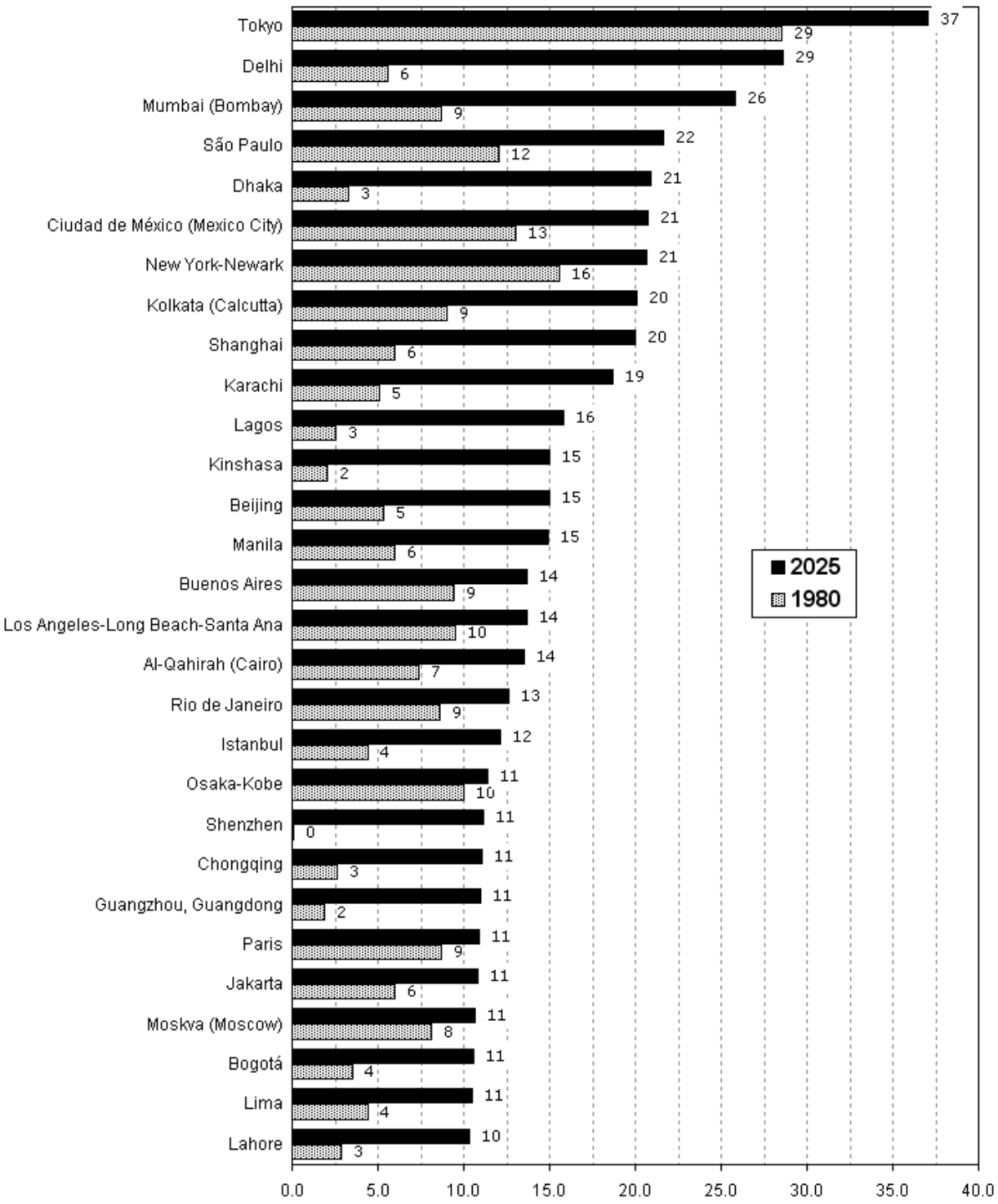
Source: Booz Allen Hamilton, Global Infrastructure Partners, World Energy Outlook, Organisation for Economic Co-operation and Development (OECD), Boeing, Drewry Shipping Consultants, U.S. Department of Transportation

8.3 Global Project Finance Loans Volume



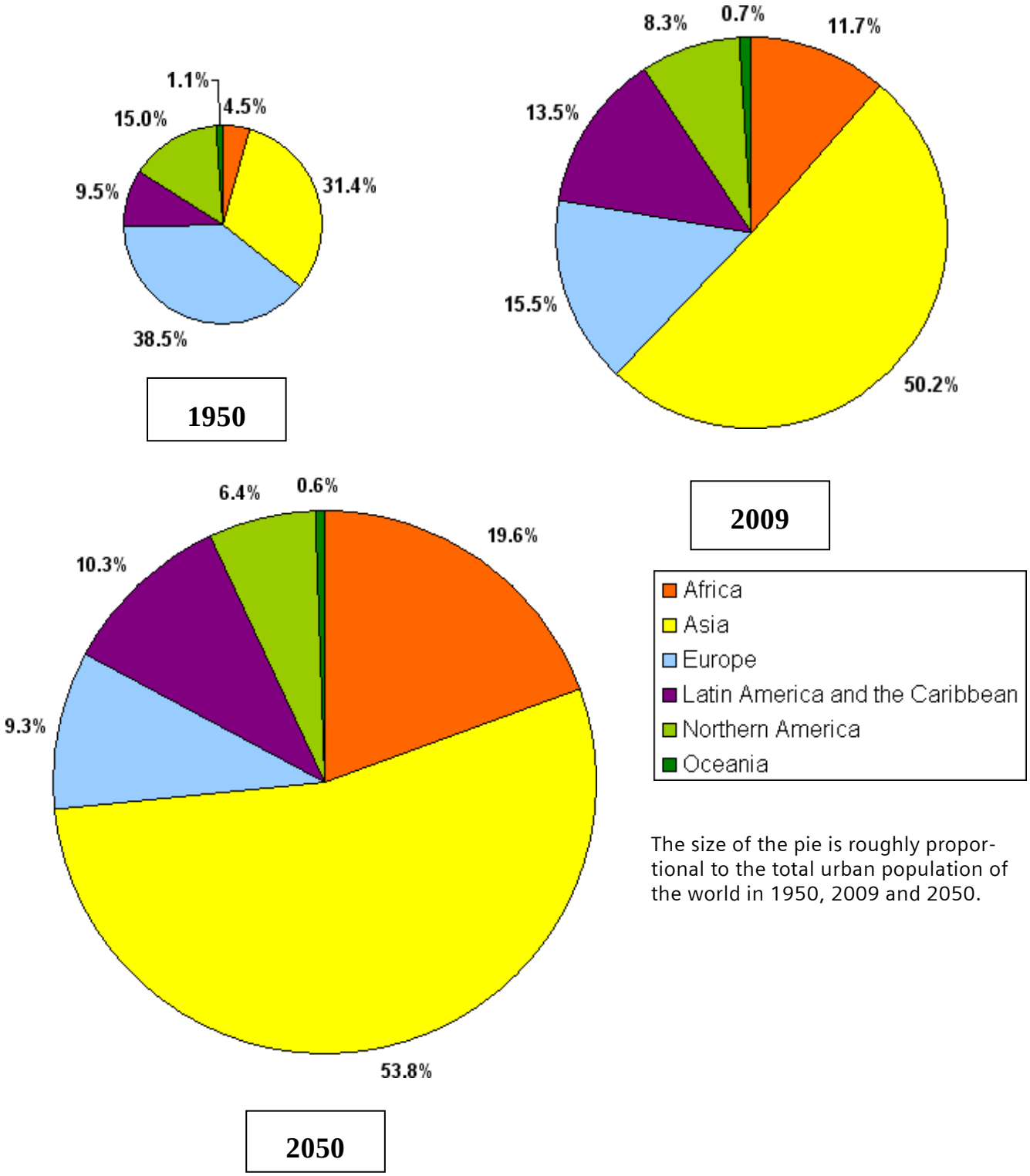
Source: Thomson Reuters

8.4 Population of the 29 urban agglomerations that are expected to become mega-cities in 2025



Source: United Nations,
Department of Economic and Social Affairs, Population Division:
World Urbanization Prospects, the 2009 Revision. New York, 2010

8.5 Urban Population by major regions in percent of total urban population



The size of the pie is roughly proportional to the total urban population of the world in 1950, 2009 and 2050.

Source: United Nations, Department of Economic and Social Affairs, Population Division: *World Urbanization Prospects, the 2009 Revision*. New York, 2010