An Integrated Approach to Infrastructure Provision in Africa

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# Abbreviations

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<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
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<tbody>
<tr>
<td>ADF</td>
<td>African Development Fund</td>
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<td>AFD</td>
<td>Agence française de développement</td>
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<td>AfDB</td>
<td>African Development Bank</td>
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<td>AICD</td>
<td>Africa Infrastructure Country Diagnostic</td>
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<td>AU</td>
<td>African Union</td>
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<td>AUC</td>
<td>African Union Commission</td>
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<td>CAPP</td>
<td>Central African Power Pool</td>
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<td>CED</td>
<td>Compagnie Éolienne du Détroit</td>
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<td>CEMAC</td>
<td>Economic and Monetary Community of Central Africa</td>
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<td>COMESA</td>
<td>Common Market for Eastern and Southern Africa</td>
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<td>DFI</td>
<td>Development Finance Institution</td>
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<td>DFID</td>
<td>Department for International Development (UK)</td>
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<td>ECOWAS</td>
<td>Economic Community of West Africa States</td>
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<td>EET</td>
<td>Énergie Électrique de Tahaddart</td>
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<td>ETN</td>
<td>exchange traded notes</td>
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<td>FAO</td>
<td>Food and Agriculture Organization</td>
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<td>FDI</td>
<td>Foreign Direct Investment</td>
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<td>FLPG</td>
<td>First Loss Investment Portfolio Guarantee</td>
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<td>GDP</td>
<td>Gross Domestic Product</td>
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<tr>
<td>GTZ</td>
<td>Gesellschaft für Technische Zusammenarbeit</td>
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<tr>
<td>GW</td>
<td>gigawatt</td>
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<td>ICA</td>
<td>Infrastructure Consortium for Africa</td>
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<td>ICT</td>
<td>Information and Communications Technology</td>
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<td>IDA</td>
<td>International Development Association</td>
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<td>IEA</td>
<td>International Energy Agency</td>
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<td>IFI</td>
<td>International Financial Institution</td>
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<td>IPPF</td>
<td>Infrastructure Project Preparation Fund</td>
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<td>ITU</td>
<td>International Telecommunications Union</td>
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<td>KOBWA</td>
<td>Komati Basin Water Authority</td>
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<td>LAC</td>
<td>Latin America and Caribbean</td>
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<td>LDC</td>
<td>Low Development Country</td>
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<td>LIC</td>
<td>Low-Income Country</td>
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<td>LPI</td>
<td>Logistics Performance Index</td>
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<td>MDG</td>
<td>Millennium Development Goal</td>
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<tr>
<td>MENA</td>
<td>Middle East and North Africa</td>
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<td>MIC</td>
<td>Middle-Income Country</td>
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<td>MIGA</td>
<td>Multilateral Investment Guarantee Agency</td>
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<td>MLTSF</td>
<td>Medium-to-Long-Term Strategic Framework</td>
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<td>MRU</td>
<td>Mano River Union</td>
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<td>MW</td>
<td>megawatt</td>
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<td>NBA</td>
<td>Niger Basin Authority</td>
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<td>NBI</td>
<td>Nile Basin Initiative</td>
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<td>NEPAD</td>
<td>New Partnership for Africa's Development</td>
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<td>ODA</td>
<td>Official Development Assistance</td>
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<tr>
<td>OECD</td>
<td>Organization for Economic Co-operation and Development</td>
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<tr>
<td>OMVG</td>
<td>Gambia River Basin Development Organization</td>
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<td>OMVS</td>
<td>Senegal River Basin Development Organization</td>
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<td>OSBP</td>
<td>One-Stop Border Post</td>
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<td>PEF</td>
<td>Private Equity Fund</td>
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<td>PIDA</td>
<td>Program for Infrastructure Development in Africa</td>
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<td>SA</td>
<td>South Asia</td>
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<tr>
<td>SADC</td>
<td>Southern Africa Development Community</td>
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<td>SAPP</td>
<td>Southern African Power Pool</td>
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<td>SIDA</td>
<td>Swedish International Development Cooperation Agency</td>
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<td>SMEs</td>
<td>Small And Medium-Size Enterprises</td>
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<td>SPV</td>
<td>Special Purpose Vehicle</td>
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<td>SSA</td>
<td>Sub-Saharan Africa</td>
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<td>STAP</td>
<td>Short-Term Action Plan</td>
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<td>SWF</td>
<td>Sovereign Wealth Fund</td>
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<td>TCX</td>
<td>Currency Exchange Fund</td>
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<td>US$</td>
<td>United States Dollar</td>
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<tr>
<td>VAT</td>
<td>Value Added Tax</td>
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<td>VSAT</td>
<td>Very Small Aperture Terminal</td>
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<td>WDR</td>
<td>World Development Report</td>
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Executive Summary

1. Challenges facing the region: the need for a strategic vision for the infrastructure agenda

The recognition that Africa’s infrastructure gap is enormous and poses a severe threat to development has reached a consensus among the international development community and African governments alike. Not only is Africa’s level of endowment low, but the continent also faces higher access costs for all infrastructure services compared with other developing regions. Of all the infrastructure subsectors, that of energy registers the largest deficit. Although total road density and access to clean water compare relatively well, they still lag other global developing regions. In the area of information and communications technology (ICT), even the top five African countries are only ranked 66th to 109th on a global index.

Investment requirements for infrastructure in Africa are huge. According to the AICD (2009), annual infrastructure investment needs in Africa total approximately US$ 93 billion, one-third of which is needed to cover operations and maintenance. With current spending of US$ 45 billion a year, the financial gap is sizable and requires appropriate management to maximize the value of local and foreign investments.

Funding the infrastructure gap is not the sole problem – the core issues are institutional in nature. Pouring additional funding into sectors characterized by high levels of inefficiency makes little sense. The region needs to improve the capacity and efficiency of those institutions responsible for developing and managing infrastructure. The goal is not to reinvent existing institutions but to reform them and support their evolution.

While the scale of the challenge varies greatly across African countries, three general strategies could help to foster institutional advancements, namely: (i) more efficient spending; (ii) an enlarged regional approach to infrastructure investment; and (iii) an improved regulatory framework.

i. More efficient spending: At the outset, when choosing infrastructure projects, adherence to a set of criteria will help to achieve efficient spending, by identifying those with the highest returns. When improving or expanding current infrastructure endowments, investment should make the most of the resources at hand, since any wastage will affect the development of other projects. Finally, the service providers should ensure that they are charging cost recovery tariffs and utilizing cost-saving technologies, in order to provide a reliable and sustainable service.

ii. An enlarged regional approach to infrastructure: The challenging economic geography of Africa calls for a regional infrastructure perspective, able to promote cross-country synergies and exploit economies of scale. “Thinking regionally” means focusing on three key areas: (i) international transportation corridors to provide maritime access for Africa’s 16 landlocked countries; (ii) regional fiberoptic networks to provide access to the internet and build the competitiveness of African industries and services; and (iii) strong regional hubs for air and sea transportation to bolster the export potential, trade, and tourism sectors of a large number of countries. A regional approach is especially relevant for investments in energy and water.

iii. An improved regulatory framework: The regulatory environment is a vital part of the business-enabling environment. In the African context, regulatory frameworks for setting tariffs and governing competition among service providers need to be modernized. With respect to the energy sector, the regulatory frameworks should bolster the efficiency of investments and of service delivery. In the transportation sector, the areas to be addressed include: a non-competitive trucking system that keeps transportation tariffs high; poor service; disconnected linkages across different transportation modes; and significant safety gaps. Seaports too are badly in need of investment and regulatory reforms to remove the bottlenecks and chronic congestion problems. Furthermore, there is the specific challenge of the 16 landlocked countries that are handicapped not only by poor logistics to the hinterland, but also by cumbersome and lengthy customs regulations and delays at borders. Turning to ICT, the Africa region has witnessed dramatic progress in mobile telephony coverage. This needs to be supported by deregulation and reforms to promote intensified competition among service providers. This will reduce end-user prices and extend signal coverage further. To tackle low internet penetration rates and high tariffs, reforms should promote private sector investment in fiberoptic backbones and competitive access to submarine cables.

These then are some of the key challenges facing the continent. This report makes the case that what is needed is a strategic vision and a regionally integrated approach to confront these challenges.
Two main pillars of the infrastructure agenda
Investment in infrastructure should be allocated to components that will maximize the positive transformation that the region needs. Sustainable economic growth, as a means of lifting the continent out of poverty, is the principal objective of Africa’s infrastructure agenda. The two main pillars of the infrastructure agenda are: (i) to strengthen the foundations for higher productivity in the main cities and (ii) to ensure a more even distribution of basic living standards.

The first pillar for growth refers to securing an appropriate level of investment in urban infrastructure. Firms concentrate in cities in order to lower production costs by leveraging economies of scale and network efficiencies (World Bank, 2009a). By clustering, firms increase the demand for infrastructure, thereby reaping cost savings from agglomeration.

The second pillar for growth refers to a more even distribution of basic living conditions in both rural and urban areas. This entails framing not only a coherent urban agenda, but also a commensurate rural agenda, to counter the incentives for rural–urban migration. Cities that are experiencing a growing but unmet demand for basic services from unskilled immigrants also face a long-term trend of economic deterioration, given the relatively lower contribution from those immigrants’ productivity. What is needed is a broader vision of the technologies that can be deployed for service provision; the bundling of services wherever possible to increase effectiveness in peri-urban and rural areas; making use of land planning instruments and policies to align urban expansion with service provision; and a complementary rural development strategy.

An infrastructure agenda for Africa has to fully address the challenges of the twenty-first century by: (i) making cities more productive and better places to live (“more livable”); (ii) integrating rural areas through the spillovers of urban growth; and finally, (iii) linking major population centers across the region. These three dimensions are taken up in Chapters 2, 3, and 4 of the report, as summarized below.

2. Infrastructure for more livable and productive cities
Cities represent the engine of a nation’s growth. Their productivity is at least three times greater than that of rural areas. Rural areas contribute less than 20 percent of Africa’s GDP while accounting for more than 60 percent of its population (World Bank, 2008b). There is though a synergistic relationship between rural and urban areas, as urban centers consume rural products and provide inputs for rural production, while rural areas serve as markets for goods and services produced in urban areas. The expansion of urban markets is a key factor in raising the rural incomes in the hinterland. In addition, cities create growth spillovers in their hinterlands.

Despite these dynamics, rural–urban links are hampered by inadequate transportation networks between products and markets, unreliable and costly sources of electricity and water provision, and limited coverage of ICT. Weak institutions exacerbate these constraints. Further, the wide disparities in living standards across subregions, countries, and urban and rural areas, encourage migration toward urban settlements. This results in a high concentration of people in large cities, urban sprawl, and “informal” or slum settlements, which are the three main features of Africa’s urbanization.

The policy challenge is to harness market forces that will encourage concentration and promote convergence in living standards between villages, towns, and cities. Policy decisions are more effective when they are strategized according to broad economic areas that integrate towns and cities with their surrounding rural hinterland.

Ensuring access to basic services for households in both urban and rural areas can improve sustainable urbanization and social equity, enhance living conditions, and prevent disproportionate flows of rural people to cities. It should be acknowledged, however, that labor mobility can be a positive force when it responds to the needs of market forces, rather than to a lack of security and/or basic services. Moreover, labor mobility can prompt convergence in living standards, as migration to denser and more productive areas balances income levels and exploits the benefits of knowledge clusters in both rural and urban locations. As rural and urban development are mutually dependent, the economic integration of rural and urban areas is the best way to produce growth and inclusive development.

The Africa Infrastructure Country Diagnostic (AICD) report of 2009 proposed a shift in emphasis from urban to rural investments, assigning 34 percent to the productive infrastructure underpinning the national economy, 32 percent to urban areas, and 34 percent to rural areas. As outlined above, there are significant externalities and complementarities between urban and rural investments, so rebalancing investment from urban to rural areas should not mean a reduction in urban spending.

Improving living conditions in cities implies a strong focus on institutions. A combination of land policy and planning, housing policies, and basic services coverage is key for a more equitable and inclusive urban expansion. Local authorities should invest not only more, but more wisely. This is critical given the small size of municipal budgets in relation to the total infrastructure requirements occasioned by rapid urban growth and increased responsibilities arising from decentralization.
Box 1: Key components of the urban infrastructure agenda

» Adopt a solid analytical framework to define priorities and sequencing. Frameworks should integrate both urban and rural needs, specific to each area. In mostly rural areas, sound land policies and the universal provision of basic services are critical goals. In areas where urbanization has accelerated, the emphasis should be on investments in connectivity. In heavily urbanized areas, targeted assistance to slum areas may be needed.

» Recognize that the political economy influences the urban transition. Local authorities do not have sufficient power to develop their cities because their budgets and responsibilities are restricted to basic services. Resources and decisions on other components that are crucial to the productivity of cities depend on the central government.

» Be pragmatic. While the long-term goal should be the achievement of well-defined property rights and land titling, some interim measures may be necessary.

» Focus on cities and areas important to the regional economy.

» Improve land policies so that markets are more flexible and can respond to the increase in demand.

» Improve the fiscal soundness of cities.

3. Benefits accruing to rural areas from urban and regional infrastructure development

Rural activities remain highly relevant to the overall development process of Africa, since its population is mainly located in rural areas. Two-thirds of the labor force is engaged in agriculture-related activities, which make up a very significant share of GDP in all subregions. The intersection of these two processes – high rural population and high agricultural activity – results in agriculture serving as the main source of income for 90 percent of the rural population in Africa (UNECA, 2005).

However, rural productivity in Africa ranks among the lowest in the developing world, while the overall logistics costs are among the highest. Farm sizes in many of the more densely populated areas are unsustainably small, land is severely degraded, investment in irrigation is negligible, and poor health and education limit productivity and restrict access to better options. Access to basic services is very low for those living in the country; indeed, coverage rates in urban areas are five to ten times higher than in rural areas. Electricity and improved water supply (such as piped connections or stand posts) extend to the majority of the urban population, but to less than one-fifth of the rural population, with minimal differences across subregions. Rural access to ICT services remains insignificant (AfDB, 2011).

Isolation perpetuated by poor transportation linkages restrains economic progress and traps rural people in poverty. Further, poor transportation restricts trade even within local markets. It raises the costs of production and distribution, reduces the profit margin on produce sales, and limits production yields to levels below their potential, impeding the transition from subsistence to income-producing agriculture. The economic effects of better access to, from, and within rural areas can be cumulative and far reaching. Indeed, the positive impact that good rural road networks can have on rural productivity is well documented in the African subregions. The logistics chain for buying inputs and selling produce determines the adoption of high-yield agricultural practices.

Decisions on infrastructure investment are often linked to the personal economics of land ownership. People with decision-making powers at various government levels may have a vested interest in driving investment resources in their favor (i.e. toward their own land holdings, thereby increasing their value). This may result in a conflict of interests, for example when investments that they have selected do not align to the criteria of the investment agenda viewed from a broader perspective. A second consideration is that changes in land use may arise from investment in roads, and this can sometimes hinder rural productivity due to weak land regulations.

Property rights also represent a macro mechanism that drives migration and the efficient localization of population. Given continued restrictions on land ownership and unclear regulations on land tenure, labor mobility may be hindered. Many government controls in relation to property rights have been relaxed, which in some cases has released agricultural capital and labor for non-agricultural activities. Access to land and security of tenure are the principal means by which food security and sustainable development can be realized.
Box 2: Key components of the rural infrastructure agenda

- **Recognize the territorial limitations.** The challenge of providing extensive rural infrastructure across the whole region is not financially viable, given current funding constraints. The challenging economic geography of Africa makes it difficult to invest in rural roads throughout. Given the low population density, improving rural accessibility for all would imply doubling or tripling the length of the existing network in most countries, which entails an unrealistic level of investment (Gwilliam et al., 2008).

- **Sequence cost-effective investments in areas that have low population density and little commercial activity.** One approach to tackle the deficit is to focus investments geographically to foster the development of growth poles (World Bank, 2009b).

- **Choose investment areas that will have complementary benefits for urban areas and regional integration.** The impact of infrastructure improvements to promote industrial development and accelerate national economic performance is greatest in areas where a large market is present (Lall, Schroeder, and Schmidt, 2009).

- **Look for complementarities between on- and off-farm activities.** Poor road access in many cases is linked to other bottlenecks, such as poor agro-ecology, low population density, and inadequate household services. A well-targeted program should take account of geographic, community, and household characteristics and consider complementary investments to ease the above-mentioned constraints and maximize the impacts of road construction and rehabilitation for market efficiency and household welfare.

- **Improve and maintain the level of current service rather than increasing the size of the network.**

- **Promote community-based maintenance contracts and labor-intensive roads maintenance, which will provide an opportunity for employment creation and improved logistics.**

According to the World Development Report (WDR) 2009, the countries of Central, East, and West Africa face the triple challenge of internal division or thick economic borders; large distances from world markets; and low economic density due to small local economies. In order to overcome such constraints, these countries need a combination of three policy instruments: (i) strengthening regional institutions; (ii) investing in regional infrastructure to improve connectivity between countries; and (iii) providing "incentives such as preferential access to world markets, perhaps on the condition that all countries strengthen regional cooperation" (World Bank, 2009b).

Focus on energy, transportation and ICT

An infrastructure agenda for regional integration and connectivity should focus on the energy, transportation, and telecommunications sectors. At a fundamental level, the low degree of intra-regional trade is partly due to a lack of product diversification and poor trade complementarity among African countries. These structural constraints are compounded by inadequate and inefficient infrastructure, both hard
(such as roads and transportation networks, ICT networks, and energy) and soft (such as the regulatory environment and customs systems). All these act as impediments to the diversification of production, therefore improvements in these areas will increase scale and competitiveness at regional and global levels.

**Electricity** is Africa’s greatest infrastructural challenge, characterized by low access rates, high costs, and low-quality provision. In 2009, only 42 percent of Africans had access to electricity compared to an average of 73 percent for all developing countries, 78 percent for developing Asia, and 93 percent for Latin America. The figure is even lower for Sub-Saharan Africa, where it currently stands at 31 percent (International Energy Agency, 2010). Furthermore, the most recent data show that African countries endure on average 8.6 power outages per month (Enterprise Survey data, 2012). Power outages are due largely to the lack of regional interconnectivity of the electricity grids and shortages in affected countries (AfDB, 2010c). The costs of power outages to the continent are significant, with Africa losing almost 12.5 percent of production time compared to 7 percent for South Asia, which is the next worst case.

The study *Regional Energy Integration in Africa* (World Energy Council, 2005) confirms four major benefits associated with regional energy integration: improved security of supply; higher economic efficiency; enhanced environmental quality; and a wider deployment of renewable energy resources.

**Roads** constitute the main infrastructure serving regional connectivity, carrying at least 80 percent of goods and 90 percent of passengers. The Trans-African Highway, currently the heart of regional connectivity for the continent, has a total length of 54,120 km distributed along nine corridors. However, it is characterized by missing links and poor maintenance in key segments. To provide a meaningful level of continental connectivity, between 60,000 and 100,000 km of regional roads are required.

Design standards are also important in estimating the costs of completing the system. Although each country is responsible for the standards applied within its territory, there are important benefits to be gained from applying common standards, such as avoiding operational and administrative complications at border crossings.

**ICT**: There are two priorities for providing or improving ICT in the continent: (i) to improve access to high-capacity submarine fiber optic for low-price international voice services and higher-speed internet access; (ii) to lay high-bandwidth backbone networks to connect towns and cities within countries, across borders, and to the international submarine fiber optic cable networks. It is estimated that one-time investment needs range from US$ 229 million for a minimum set of links to US$ 515 million for an extensive interregional network connecting all African capitals to one another with fiber optic cables.

**Institutional strengthening**

Beyond the critical need to invest in physical regional infrastructure, there are two other aspects to be considered, namely (i) strengthening the governance scheme for infrastructure service provision and (ii) streamlining the institutional system to maintain an effective level of service provision.

Across the continent’s subregions, infrastructure endowments differ substantially, as do institutional schemes for services provision. In this respect, the Economic Community of Central African States (ECCAS) underperforms in all sectors, whereas the Southern African Development Community (SADC) consistently outperforms the other subregions. Though East and West African countries also face the challenge of poor connectivity, they benefit from larger local markets, bigger cities, and potential complementarities. Tailoring an agenda for regional integration and connectivity means taking account of such differences, while acknowledging that investment priorities may pull in opposite directions, making it difficult to set common goals.

5. **Financing Africa’s infrastructure in a two-tier market**

Africa’s substantial infrastructure needs demand a combination of traditional and innovative financing mechanisms alongside greater efficiency in public spending. According to the AICD estimates, Africa’s total infrastructure financing needs amounted to US$ 93 billion a year in 2008, with only US$ 45 billion being financed (AICD, 2009). Even if all the inefficiencies were eliminated, including low-quality management and poorly targeted subsidies or tariffs, a deficit of US$ 31 per year would remain. Other estimations situate the financing requirements at US$ 153 billion annually until 2020 (AfDB, 2010c).

These financing requirements, even at the lower estimations, represent a huge challenge. African governments therefore need to come up with a wide range of financing options, including new funding sources, to complement traditional financing alternatives. Up until now, traditional partners and the public sector have been the main financing sources for Africa’s infrastructure. Among the various sectors, public financing was most prominent in water, sanitation, and transportation. On the other hand, most private investment has been channelled to information and communications technologies, which in 2008 attracted 87 percent of private commitments (OECD, 2010).

Innovative financing for infrastructure is a promising segment to emerge across Africa, and includes local and foreign
currency bonds, private equity, and sovereign wealth funds. Africa has also seen a shift in trade patterns away from overreliance on OECD countries toward emerging South partners such as China, Brazil, and India. Taking a broader view of sustainable growth (i.e. one encompassing social and environmental aspects) also implies a move to “clean energy financing,” given the threat that climate change poses to the continent. Moreover, Africa needs to harness its abundant natural resources to the fullest extent possible. The AfDB is setting up the Africa Green Fund to receive and manage resources for climate change adaptation and mitigation. African countries could also do more to attract private and innovative funds on favorable terms. For example, public–private partnerships (PPPs) could be made more effective and remittances better utilized for development purposes.

Public spending efficiency has been identified as a separate source of financing in this report because current inefficiencies in implementing infrastructure projects account for US$ 17 billion annually. Improving the capacity of African countries to manage their finances more efficiently will therefore help to close the financing gap. Also, there is a role to be played by the public sector through strengthening domestic resources and catalyzing private investments. One example of this approach is to provide partial credit guarantee schemes with concessional resources, which helps to mitigate the impact of risk perception on costs.

Despite all these alternative options for funding the infrastructure agenda, public financing coupled with private investment niches have so far failed to bridge the infrastructure gap in Africa’s low-income countries (LICs). In these countries, official aid is not projected to increase in line with public investment spending (Redifer, 2010). Middle-income countries (MICs), on the other hand, have better chances of securing their financing needs. This is due to their greater financial market development, milder capacity constraints, and lower perception of risk on the part of private investors – which limits private sector participation in LICs (Shah and Batley, 2009).

The fact of the matter is that there is a two-tier financing market at work, whereby different countries can expect to achieve better results through disparate financing mechanisms. Innovative financing instruments are not suitable for most LICs, whereas they are able to tap resources from donors as they improve public spending efficiency. On the other hand, MICs will encounter more difficulties in accessing certain pockets of international aid but can deploy innovative financing instruments. While traditional sources of financing infrastructure development remain important, private investment is critical in closing the current gaps and meeting future infrastructure demand in Africa.

Both tiers must pay attention to the regulatory environment. Africa’s infrastructure sector is still dominated by monopolistic incumbents who resist market reforms. While progress has been made in this regard, more has to be done. As an illustration, in South Africa entry is still regarded as highly restricted in the telecommunications, rail freight, and electricity subsectors compared to OECD countries. More generally, 20 out of 26 countries continent-wide score less than 5 out of a maximum of 10 in the services market liberalization index (OECD, 2010).

6. The role of the African Development Bank in infrastructure

Infrastructure financing continues to be accorded a very high priority by the African Development Bank (AfDB). This approach resonates with the institution’s objective of supporting high-impact projects and programs that will create an enabling environment for private sector investment, improve competitiveness and productivity in its regional member countries, enhance employment opportunities, and support sustainable and inclusive economic growth.

The Bank’s financial support to the sector, 2008–2012

For the period 2008–2012, the Bank’s cumulative financing for infrastructure projects and programs amounted to UA 11.3 billion (US$ 17.4 billion), which represents about half of its commitments to all sectors. The two principal beneficiary sub-sectors for the period were transportation (42.5 percent) and energy (44.1 percent) following by water and sanitation (12.3 percent) and ICT (1.1 percent). For the year 2012, UA 1.8 billion (US$ 2.8 billion) was allocated to the infrastructure sector, which is almost half of the Bank Group approvals to all sectors. Of this, energy received about half of the financing.

A strategic focal area for the Bank during the period 2008–2012 was road transportation networks across the continent. Consequently, financing to the subsector increasing from UA 641.1 million (US$ 987.5 million) in 2008 to over UA 1 billion for each of the years 2009, 2010, and 2011, although this decreased to UA 604.2 million (US$ 928.6 million) in 2012. In addition to major highway corridors linking different countries and thereby boosting trade and economic growth, the Bank also targets rural and feeder roads at the national level, in order to link rural areas to urban markets, lower the cost of agricultural inputs, and scale up food productivity and income levels.

During 2012, to support regional transportation networks, the AfDB approved
a number of projects, including UA 175.7 million (US$ 270.0 million) for rehabilitation of 303 km of the Lolé–Cinkané–Ouagadougou CU9 Corridor, which runs from Togo to Burkina Faso. The Bank’s contribution represents 70 percent of the total project cost and should help to boost trade and integration in the WAEMU sub-region. To improve connectivity in the SADC region, the Bank also approved in 2012 UA 38.7 million (US$ 59.4 million) for the Nacala Road Corridor Phase III in Mozambique.

In the energy sector, the AfDB approved cumulatively UA 5.0 billion (US$ 7.7 billion) in the period 2008–2012. Two key projects approved in 2011 were for the Eskom Renewable Energy Project (US$ 345.7 million) in South Africa and the Menengai Geothermal Development Project (US$ 147.5 million) in Kenya. These projects are notably for addressing their countries’ growing energy needs in an environmentally friendly way.

In 2012 the Bank continued to approve a number of green energy projects, including two in Morocco, namely UA 207.8 million (US$ 319.4 million) for a solar power plant and UA 377.3 million (US$ 580.5 million) to an integrated wind/hydro and rural electrification program. Another key energy project approved in 2012 was the Ethiopia–Kenya Electricity Highway, which was allocated UA 225.0 million (US$ 345.8 million) by the AfDB. This will allow the provision of substantial hydropower generated in Ethiopia through to Kenya, with a regional energy trade of about 12,000 GWh by 2025, connecting 870,000 new households and 550,000 small businesses to a reliable energy supply in Kenya alone.

For Information and Communications Technology (ICT), the Bank approved cumulatively a total of UA 124.3 million (US$ 191.7 million) for the period 2008–2012. One notable project designed to improve regional integration supported the Seychelles Submarine Cable, which will link the island state to other East African systems and the rest of the continent. Other key ICT programs cofinanced by the Bank during this period include the Satellite O3B multinational project for the construction and operation of eight middle earth orbit satellites over Africa. This attracted UA 32.1 million (US$ 49.4 million) of Bank funding in 2010.

In addition to supporting specific projects and programs to develop the region’s infrastructure, the Bank also extends long-term debt financing to infrastructure-oriented private equity funds. In this respect, the Bank approved US$ 30.0 million in 2008 for the Africa Energy Infrastructure Fund (AEIF), US$ 31.25 million in 2009 plus a second loan of US$ 45.0 million in 2011 for the Emerging Africa Infrastructure Fund (EAIF); and US$ 12.4 million in 2011 for the Evolution One Fund in South Africa, which targets clean technology/energy investments.

Turning to the AfDB’s support to the water and sanitation sector, this amounted to UA 1.4 billion (US$ 2.2 billion) for the period 2008–2012, including allocations from Special Funds. The interventions cover drinking water supply (including urban programs), water resources management, sanitation and hygiene, capacity building, and policy reform programs. In 2012, approvals to the water & sanitation subsector totaled UA 269.7 million (US$ 414.5 million).

The Bank continues to host three complementary initiatives, namely the Rural Water Supply and Sanitation Initiative (RWSSI), the African Water Facility (AWF), and the Multi-Donor Water Partnership Program (MDWPP).
1. Challenges facing the region: 
the need for a strategic vision for the infrastructure agenda

THE BELIEF THAT Africa’s infrastructure gap is enormous and poses a severe threat to development has reached a consensus among the international development community and African governments alike. Less than 40 percent of the continent’s population has access to electricity; only 33 percent of the rural population has access to roads; while only 5 percent of agriculture is under irrigation (AfDB, 2010c). According to the MDGs Progress Report for Africa 2011, in 2008 only 41 percent of the continent’s population had access to improved sanitation, and about 65 percent to safe water (AfDB et al., 2011).

With respect to Information and Communications Technology (ICT), the situation is characterized by huge differences across specific services. In 2009, 37.6 percent of Africans had access to cellular mobile phones, with penetration rates growing faster than in the rest of the world. However, the use of the internet has recorded a slower take-up. The internet user penetration in Africa is expected to reach 9.6 percent by the end of 2010, compared to just 5.9 percent in 2008. However, this is well below the world average of 30 percent and the developing country average of 21 percent. Further efforts are also needed to improve the broadband speeds. In terms of fixed telephone lines, there was little change in the number between 2000 and 2009. There were an estimated 1.6 telephone lines per 100 population in 2010, compared to 1.5 in 2008 and 2009 (AfDB et al., 2011).

Furthermore, Africa faces higher access costs for all infrastructure services compared with other developing countries. For example, the continent’s road freight is about four times more expensive, power costs 14 US cents per kilowatt-hour (kWh) against 5 to 10 US cents elsewhere, and mobile telephony costs US$ 12 per month compared with US$ 8 in other developing regions.

In addition to low institutional capacity and high investment requirements, Africa’s infrastructure agenda is impeded by the region’s economic geography. Specifically, (i) Africa is home to more landlocked countries (16 in total) than any other continent; (ii) Africa has more countries with low population densities than other developing regions; (iii) most African countries are far from major markets of high GDP concentration like Europe and the USA; (iv) African countries differ greatly in their geographical situation and demographics: 32 are coastal, 16 are landlocked and 6 (Cape Verde, Comoros, Madagascar, Mauritius, São Tomé & Príncipe and Seychelles) are islands. The average population density is 70 people per km², which is somewhat lower than that of other low and lower-middle income countries in the world (at 125 and 91 per km² respectively). Within the continent, population density varies widely. While some countries are very densely populated (e.g. Cape Verde, Ghana, Malawi, Nigeria, Rwanda, and Uganda), others have a sparse population spread over a relatively large geographical area (e.g. Botswana, Cameroon, Chad, Namibia, Niger, Sudan, and Zambia).

A more cohesive approach is therefore needed to leverage the region’s endowments, to integrate all these different dimensions, and improve connectivity between countries, subregions, and urban/rural areas. Any strategy must therefore take account of: (i) rapid urbanization and the role of main urban areas; (ii) the linkages between major cities and the benefits from regional integration; and (iii) the spillover effects on rural productivity from regional corridors.

1.1 Infrastructure deficits and the need for a proportionate allocation of resources

Despite some notable achievements in recent years, Africa’s level of infrastructure development still lags behind other low-income regions (Figure 1). The energy subsector records the largest comparative deficit, while total road density and access to clean water compare relatively well, though still lagging. For ICT, even the top five African countries are ranked only 66th to 109th on a global index (Table 1). Sectoral regulatory reforms undertaken in many African countries, however, have opened up investment opportunities for the private sector as well as the donor community. These reforms have improved the business environment and enhanced efficiency in implementing and managing infrastructure investments.

A comparison on the basis of countries’ income levels starkly illustrates Africa’s infrastructure deficit (Figure 1). For example, despite the higher total road density on the continent, most roads are in a poor state and remain unusable. Africa’s
infrastructure endowments compared to other developing regions is encouraging only in terms of access to clean water for its population.

The region's infrastructure deficit is more acute among its low-income countries (LICs) than middle-income countries (MICs). For example, African LICs are 4 times worse off compared to LICs elsewhere in the world in terms of paved-road density, whereas its MICs are only 2 times worse off compared to MICs in other developing regions for this indicator. In terms of power generation, the figures are no better, with African LICs 8 times worse-off than their counterparts elsewhere (39 MW per million people compared to 326 MW), while its MICs are 3 times worse-off. For internet access, the MIC/LIC divide is the reverse, with African MICs almost 30 times worse off compared to their counterparts elsewhere and LICs only 14 times worse off. To sum up, the deficits in Africa’s infrastructure development are most severe in the areas of paved roads, fixed telephones and internet access, and power generation (Figure 1).

The huge initial capital outlays needed for infrastructure provision largely account for Africa’s significant deficit in this area (Table 1). This is compounded by the extent of regulatory constraints in some African countries, which are perceived by potential private investors as increasing the level of risk. Yet we must acknowledge that significant changes are taking place across Africa, including in LICs and postconflict countries; for example, Rwanda was ranked as the best reformer in the 2010 Doing Business report (World Bank, 2009c).
Table 1. Sub-Saharan Africa’s infrastructure deficit

<table>
<thead>
<tr>
<th></th>
<th>SSA</th>
<th>South Asia</th>
<th>East Asia</th>
<th>SSA Oil Exporters</th>
<th>SSA Oil Importers</th>
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<tr>
<td><strong>Transportation</strong></td>
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<tr>
<td>Density of paved road network*</td>
<td>49</td>
<td>149</td>
<td>59</td>
<td>14</td>
<td>57</td>
</tr>
<tr>
<td>Density of total road network *</td>
<td>152</td>
<td>306</td>
<td>237</td>
<td>70</td>
<td>173</td>
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<tr>
<td><strong>ICT</strong></td>
<td></td>
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<tr>
<td>Density of fixed phone line**</td>
<td>33</td>
<td>39</td>
<td>90</td>
<td>16</td>
<td>38</td>
</tr>
<tr>
<td>Density of mobile phone line**</td>
<td>101</td>
<td>86</td>
<td>208</td>
<td>118</td>
<td>97</td>
</tr>
<tr>
<td>Density of internet connections **</td>
<td>2.8</td>
<td>1.7</td>
<td>6.6</td>
<td>1.7</td>
<td>3.1</td>
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<tr>
<td><strong>Energy</strong></td>
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<tr>
<td>Electrical generating capacity †</td>
<td>70</td>
<td>154</td>
<td>231</td>
<td>66</td>
<td>71</td>
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<tr>
<td>Access to electricity ‡</td>
<td>18</td>
<td>44</td>
<td>57</td>
<td>26</td>
<td>16</td>
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<tr>
<td><strong>Water and sanitation</strong></td>
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<tr>
<td>Water ‡</td>
<td>63</td>
<td>72</td>
<td>75</td>
<td>59</td>
<td>64</td>
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<tr>
<td>Sanitation‡/</td>
<td>35</td>
<td>48</td>
<td>60</td>
<td>34</td>
<td>35</td>
</tr>
</tbody>
</table>

Source: Yepes, Pierce and Foster (2008).
Notes:
* km/1000 km² (2001).
** subscribers per 1000 people (2004).
† MW per 1 million people (2003).
‡ % of households with access (2002-2004).

Table 1 demonstrates clearly that the African market is still underserved in terms of its infrastructure. However, evidence suggests that the returns to investors are potentially high. Private investors that have entered the telecommunications and finance subsectors, following regulatory reforms and improvements to the business environment in a number of African countries, have realized higher returns than in any other global region.

1.1.1 Challenges and opportunities in the energy subsector

In 2009, only 42 percent of Africans had access to electricity compared to an average of 73 percent for all developing countries, 78 percent for developing Asia, and 93 percent for Latin America. The figure is even lower for SSA, where it currently stands at 31 percent (International Energy Agency, 2010). Furthermore, about 30 African countries endured on average 11.5 power outages in 2007 (AfDB, 2010c). The power outages were due largely to under-investment in maintenance and in capacity expansion to meet the growing demand, as well as to a lack of regional interconnectivity of the electricity grids and shortages in affected countries. During this period, regional surpluses in generation capacity were noted in four of the five subregions. The exception was East Africa, which suffered intermittent shortages (Figure 2). Some of the surplus countries like South Africa now have deficits due to increased demand. The cost of power outages is significant, with Africa losing almost 12.5 percent of production time compared to 7 percent for South Asia, which is the next worst case (Figure 3). Therefore potential productivity gains from electricity supply, together with the associated income effect, point to a market with significant growth potential.

Indeed, the emergence of independent power producers (IPPs) signals sweeping changes that are taking place in the energy subsector. For instance, the National Energy Regulator of South Africa has established a regulatory environment that would allow upward adjustments in tariffs and thus improve
the viability of private sector suppliers. In Morocco, nearly two-thirds of electricity production is undertaken by private producers, namely the JorfLasfar Energy Company (presently Africa’s largest IPP), Compagnie Eolienne de Detroit (CED), and Énergie Électrique de Tahaddart (EET). More importantly, the majority of project financing for these companies was sourced from local Moroccan banks and the sector is now diversifying into clean energy and other more efficient and cheaper forms of energy (Malgas, Gratwick, and Eberhard, 2008). These developments clearly show opportunities for private suppliers, in a sector that is characterized by shortages.

1.1.2 Challenges and opportunities in the transportation subsector

**Roads.** SSA’s total road network coverage is only 204 km per 1,000 km² of land area (with only about 25 percent paved), compared to the world average of 944 km per 1,000 km² of land area (AICD, 2009). This translates into 3.6 km of road per 1,000 persons for the region, compared to a world average of about 7 km per 1,000 persons. Behind these numbers, however, lie huge intra-African disparities, with the availability of rural roads ranging from 0.5 km per 1,000 persons in Malawi to 35.5 km per 1,000 persons in Namibia (AfDB, 2010). To help supplement scarce public funds for road infrastructure development, Africa is moving quickly into toll roads. While the region was something of a late starter, nonetheless it has rapidly increased private sector participation in this area. Between 1990 and 1999, Africa’s private investments in roads was only US$ 1.4 billion but this increased by more than US$ 21 billion between 2000 and 2005 (Rouse, 2009). The US$ 385 million Lekki–Epe toll road in Lagos is a recent example. Such investments are expected to increase further in the near future. For example, the Maghreb Highway in North Africa is expected to cost US$ 11.5 billion over a ten-year period to 2018.

**Rail.** Of all the transportation modes, rail networks are the least developed in Africa, with very few additions since colonial times. The 1,067-km long Tazara rail line, which was built in the 1970s, is a notable exception. Since the 1990s, the lengths of rails have remained unchanged in many countries. In 2007, Africa counted 69,000 km of rail track, of which 55,000 km was operational, most of it in Southern and Northern Africa. Thirteen SSA countries have no operational rail networks, while...
100 to 1,000 km per million people.

It is also notable that African exports are largely bulky primary commodities, which could be transported more efficiently and at lower cost by rail than by road. Rail development therefore holds some opportunities for investors. Investments in associated activities like locomotive building, logistics, and communications also exist.

**Ports.** Whereas Africa operates 64 ports, huge problems exist with respect to under-capacity and performance in existing facilities, as well as handling costs. Over-the-quay container-handling performance is below 20 moves per hour in the Africa region, compared to 25–30 in modern terminals worldwide. In addition, handling costs average 50 percent more there than in other parts of the world. With about half of the coastal countries that operate port facilities introducing sectoral legislation and regulatory reforms, new investment opportunities will present themselves. Currently, private investment in ports is low, yet there is a great need for transshipment facilities. Four regional hubs exist and these include Durban in Southern Africa, Mombasa and Dar-es-Salaam in East Africa, with Djibouti also emerging as a new hub. In West Africa, Abidjan used to play this role but as a consequence of the civil war, its role has been supplanted by the port of Malaga in Spain.

**Intermodal linkage deficit.** The challenge with regard to transportation infrastructure also stems from a lack of linkages between roads and rail lines, and poor connectivity to ports. This has resulted in Africa being rated the world’s worst global region in the Logistics Performance Index (LPI) of 2009, even though there exists considerable variation across countries. As Africa looks at scaling up infrastructure investments in the transportation sector, the trade impact of such investments will spur growth and development. This, in turn, will have spillover effects in all other sectors, opening further opportunities for private sector investments. Within the transportation subsector, there are considerable opportunities to develop systems that will improve intermodal efficiency.

### 1.1.4 Challenges and opportunities in the ICT subsector

Access to fixed-line telephones stands at 1.6 percent in SSA, compared to 19 percent in Latin America and the Caribbean, and 16 percent in the Middle East and North Africa. Mobile phone access in Africa (40 percent) is higher than in South Asia (33 percent) but trails East Asia and the Pacific (53 percent) and Latin America and the Caribbean (80 percent) (AfDB, 2010c).

The picture is similar for internet usage at the continental level, though North Africa is way ahead of all other African subregions. However, the ICT sector witnessed investments estimated at about US$ 21 billion in the period 2007–2009. Expectations are that ICT investments could top US$ 70 billion by 2012. The International Telecommunications Union (ITU) also notes that 45 countries have implemented appropriate regulatory frameworks that are supportive of private investment in the sector (AfDB, 2010c).

### 1.2 Urbanization as the driving force for infrastructure provision

The population of Africa is growing faster than that of any other region in the world. By November 2009 it had exceeded the 1 billion mark and is projected to double by 2050 (UNFPA, 2009). Africa’s urban population is also expanding rapidly at 3.3 percent per year, which is the highest rate in the world. If current trends continue, by 2050 more than half of the continent’s population will be living in urban areas (see Figure 4). This means that African towns and cities will host 1.2 billion people – nearly a quarter of the world’s urban population. Sub-Saharan Africa in particular is experiencing an unprecedented rate of urban growth, bringing with it both opportunities and challenges for municipalities and central governments alike.

During the past 50 years, Africa’s centers of economic activity have shifted markedly
from agrarian to urban areas. The pull of better employment opportunities has been a significant driver of the migration, often at the cost of rural economic decline. Conflicts and civil wars in a number of African countries have accentuated this trend, as populations flee to towns in search of refuge. Each year an additional 14 million people join the urban population in Sub-Saharan Africa (UN-HABITAT, 2010), with the vast majority (70 percent) living in “informal settlements” and slums. Indeed, according to UN-HABITAT, it is estimated that Sub-Saharan Africa has the largest slum population in the world, recorded at 199.5 million. These slum areas are characterized by shelter deprivations, overcrowding, little or no access to safe water and sanitation, lack of personal security, and inadequate basic social, education, and health facilities. This represents a massive challenge for municipalities and central governments alike, in their endeavors to meet the Millennium Development Goals.

Despite the growth in slums on the continent, reports continue to highlight the positive links between economic development and urbanization. Indeed, cities have played a pivotal role in sustaining economic growth in the continent in recent years, contributing about 55 percent to total GDP. If managed properly, towns and cities in Africa could generate as much economic output as cities in other regions of the world (about 90 percent of GDP in the developed countries).

The expansion of cities and towns offers unique opportunities to leverage economies of scale and agglomeration effects. These include a larger manpower pool, a bigger local market, easier access to suppliers and specialized services, lower transaction costs, and an environment that encourages innovation. This means that goods can be produced more cheaply, public spending on infrastructure and services becomes cheaper per capita, and the construction of urban ICT networks becomes more financially viable. Due to these agglomeration effects, a city like Nairobi, hosting a little over 5 percent of the national population, produces over 20 percent of Kenya’s GDP. Similarly, other cities and towns in Africa are more productive than rural areas. Urban centers are potential engines of growth and development that need to be harnessed.

Yet access to basic services in urban areas is still low, particularly for the very poor. The UN-HABITAT recommends that building standards in urban areas should be reviewed to take into account income differentials, if affordable housing is to be provided by the private sector. In this context, urban development frameworks are being revamped jointly with regulatory reforms at national levels. This will allow greater private sector investments in housing and commercial property, including associated infrastructure and conservation of the environment. Improvements in the urban environment would positively impact investment flows and generate the economic dynamism that supports growth.

1.3 The consequences of structural changes imposed by climate change

The consequences of climate change will fall disproportionately on developing regions, especially Sub-Saharan Africa. Warming of 2°C could result in a 4 to 5 percent permanent reduction in annual income per capita for the continent as a whole. Sub-Saharan Africa suffers from natural fragility (with two-thirds of its surface area comprising desert or dry land) and high exposure to droughts and floods. Such extreme weather patterns are forecast to increase with climate change. In addition, the region’s economies are highly dependent on natural resources. Evidence from Sub-Saharan Africa indicates that rainfall variability, projected to increase substantially, also reduces GDP and increases poverty. The prospects for crops and livestock in rainfed, semi-arid lands in SSA are bleak, even before warming reaches 2–2.5°C above pre-industrial levels (World Bank, 2010).
Climate change-related events will severely impact the productivity of Africa’s agriculture, increasing the region’s vulnerability (World Bank, 2010). One study projects that by 2080, land with severe climate or soil constraints in Sub-Saharan Africa will increase by 26 million hectares, to reach 61 million hectares. That represents 9 to 20 percent of the region’s arable land. Greater rainfall variability and more severe droughts in semi-arid parts of Africa are expected. For instance, Southern Africa will suffer particularly severe drops in yields by 2030, unless adaptation measures are successfully implemented (World Bank, 2009).

In the shorter term, the food crisis witnessed in Africa during 2011 was caused not by a supply shock but by the price shock of 2006–2008, therefore the required policy response should have been a supply stimulus. But African countries had few reserves and inadequate budgetary means to procure food at high prices (FAO, 2011). Moreover, countries in Sub-Saharan Africa are particularly vulnerable to international shocks because 45 percent of rice and 85 percent of wheat are imported (World Bank, 2011a). There is a strong need to stimulate agricultural productivity through government programs, in order to reduce vulnerability to price volatility. Over the longer term, the best way to lower food prices is to invest in agriculture. This will sustainably increase yields, reduce input costs, increase productivity, and reduce food losses and waste. It is therefore essential to encourage farmers to invest in technologies that will raise their productivity and incomes (FAO, 2011).

1.4 Addressing Africa’s principal infrastructure challenge: low institutional capacity

There can be no doubt that substantial investments are needed for the infrastructure agenda in Africa; however, the core issues are institutional in nature. Pouring additional funding into sectors characterized by high levels of inefficiency and low institutional capacity makes little sense. In order to promote a level of productivity among firms that is conducive to higher and sustainable economic growth, Africa needs to improve the capacity and efficiency of those institutions responsible for developing and managing infrastructure. The goal is not to reinvent existing institutions but to reform them and support their evolution.

While the challenge varies greatly across African countries, there are three general directions in which to foster institutional advancements, namely: (i) more efficient spending; (ii) an enlarged regional approach to infrastructure investment; and (iii) an improved regulatory framework.

1.4.1 More efficient spending

Efficient spending is crucial to maximize the resources available for infrastructure and should inform every step of service provision. The selection of new infrastructure projects needs to be guided by a set of criteria that will secure the highest returns. When improving or expanding current infrastructure endowments, investment should make the most of the resources at hand, since any wastage will affect the development of other projects. At the other end of the process, the enterprises should charge cost recovery tariffs and employ cost-saving technologies in order to provide a reliable and sustainable service.

One indicator of the efficiency problems in Africa is the high tariffs paid by consumers. Whether for power, water, road freight, mobile telephones, or internet services, the tariffs paid in Africa are several multiples of those paid in other developing regions. These higher prices are sometimes the result of genuinely higher costs, but sometimes stem from a demand for high profits. The lack of cost recovery has major detrimental effects on the sustainability and profitability of services. Under-priced infrastructure services are estimated to cost Africa US$ 4.7 billion a year in forgone revenues.
1.4.2 Adopting an integrated regional approach for cost savings

The challenging economic geography of Africa calls for a regional infrastructure perspective able to promote cross-country synergies and exploit economies of scale. In 2010, there were 18 African countries with fewer than five million inhabitants each; moreover, in 2009, 19 African economies recorded a GDP of less than US$ 5 billion. In addition, the region counts 60 international river basins and 16 landlocked countries. Therefore, what is required is a strategy that works at a regional level rather than solely within the borders of individual countries. For example, most African countries are too small to individually generate power efficiently and only a handful possess major hydropower resources. This underscores the urgency for regional transboundary planning to expand markets and reap cross-country synergies. This should help to reduce costs, improve institutional efficiency, and ensure more reliable service provision.

“Thinking regionally” means an integrated approach focusing on the following three areas: (i) international transportation corridors that provide maritime access for landlocked countries; (ii) regional fiberoptic networks that provide access to the internet and build the competitiveness of African industries and services; and (iii) strong regional hubs for air and sea transportation that can bolster the export potential, trade, and tourism of a large number of countries.

Regional economic communities (RECs) and pan-African institutions such as the New Partnership for Africa’s Development (NEPAD) continue to play a vital role in this context. For example, the newly established Program for Infrastructure Development in Africa (PIDA), which is led by the African Union Commission (AUC), NEPAD Secretariat, and the African Development Bank (AfDB), is fully supported at national, regional, and international levels. Its aim is to develop a vision and strategic framework for the development of regional and continental infrastructure (energy, transportation, ICT, and transboundary water resources) to promote Africa’s socioeconomic development and integration into the global economy. It also provides a framework for engagement with Africa’s development partners willing to support continental infrastructure. A regional approach is especially relevant for investments in energy and water.

Energy. About 30 African countries face chronic blackouts and high premiums for emergency power. This represents a major obstacle to doing business, curtails the continent’s competitiveness, and has a negative impact on foreign direct investment flows. In some countries in the continent, power losses last approximately 12 hours. As a consequence, firms in Africa lose power, on average, for 13 percent of their working hours (World Bank et al., 2009b). The 48 SSA countries, which together total 800 million in population, generate roughly the same amount of power as Spain, which has a population of just 45 million. Power consumption in Africa, at 124 kw/hr per capita annually and falling, is only 10 percent of that found elsewhere in the developing world. Recent estimates suggest that given the current pace of investment, it would take Africa more than 50 years to gain universal access to a reliable source of power (AICD, 2009).

For a major turnaround in the sector, the pace of investment in Sub-Saharan Africa has to expand from about 1 to 7 GW of capacity per annum. Developing cheaper energy through regional trade is one path to accelerate progress in the energy sector. Also, inefficiencies within numerous institutions have to be addressed. The direction for institutional reform should consider the international experience and a broad range of instruments including incentives, contracts, deregulation, and private sector participation. Nowadays there is substantial knowledge about what has and has not worked in the past, and this empirical knowledge should help governments to emulate successful policies, while avoiding known mistakes.

Water. In the water sector, a regional and multipurpose approach constitutes a promising way forward. Despite the fact that Africa enjoys plentiful water resources of about 5.4 trillion cubic meters a year, it is failing to harness water for development. Just 3.8 percent of this figure has so far been developed and 300 million Africans still lack access to safe drinking water. In addition, less than 5 percent of agricultural land is irrigated and less than 10 percent of hydropower potential is captured.

Sixty of Africa’s rivers cross national boundaries, making international cooperation on water resources management essential. One example of successful transboundary cooperation for water management is the Senegal River Basin Development Organization (OMVS), established in 1972. It serves as a transboundary land–water management organization, covering the Senegal River basin in Mali, Mauritania, and Senegal. Its aims include: managing water for agriculture; promoting self-sufficiency in food; improving the incomes of local populations (35 million in total, of whom 12 million live in the river basin); and preserving the natural ecosystems, inter alia. Similar organizations include the Gambia River Basin Development Organization (OMVG), the Komati Basin Water Authority (KOBWA), the Niger Basin Authority (NBA), Nile Basin Initiative (NBI), the Kagera Basin Authority (KBO), and the Mano River Union (MRU), among others.

1.4.3 Improved regulatory frameworks for cost recovery

The regulatory environment is a vital part of the business-enabling environment. Clear and transparent rules and regulations can help to attract private investment and aid. On the other hand, when
rules and regulations become unwieldy and unpredictable, they can represent an obstacle and even an opportunity cost for market participants. In the African context, regulatory frameworks for setting tariffs and governing competition among service providers need to be modernized.

**Energy.** With respect to the energy sector, the existing regulatory frameworks need to be reformed to provide an enabling environment for increasing efficiency in investments and service delivery. In addition to a regional and coordinated investment strategy, what is required is a redesigned subsidy scheme for the energy sector, to tackle important institutional inefficiencies. Current programs use substantial resources but are ineffective in serving the poor. Another pressing requirement is to address flagrant deficiencies in the maintenance of assets.

**Transportation.** The regulatory frameworks governing the transportation sector in Africa are also sorely in need of reform. The focus should be on improving the quality of transportation networks and services rather than increasing physical quantities. For instance, trade facilitation measures such as one-stop border posts (OSBPs) are as important as good-quality roads for increasing transit speed and supporting the productivity of firms. The main quality concerns in Africa include: a non-competitive trucking system that keeps transportation tariffs at too high a level; poor service; lack of linkages across different transportation modes; and significant safety gaps. Seaports too – which are vital for Africa’s international trade in high-volume, low-cost commodities – are badly in need of investment and regulatory reforms to remove the bottlenecks and chronic congestion problems. Ports in Africa experience institutional and regulatory constraints that create inefficiencies, hinder competition, and raise transaction costs. Furthermore, there is the specific challenge of the 16 landlocked countries that are not only handicapped by poor logistics to the hinterland, but also by cumbersome and lengthy customs regulations and delays at borders. For these countries, median transportation costs are almost 50 percent higher than the equivalent costs for coastal economies (AfDB, 2010a).

**ICT.** Mobile telephony has witnessed dramatic progress in population coverage, from 5 to over 60 percent between 1999 and 2008, with 180 million new (prepaid) subscribers and US$ 28 billion in mobilized private investment. Such positive developments need to be supported by deregulation and reforms to promote intensified competition among service providers. The aim is to bring down end-user prices and extend signal coverage still further.

However, the significant progress in mobile telephony has come at the expense of fixed-line telephony, which registered only modest growth between 1990 and 2007 in the vast majority of African countries. This is attributable in part to the high service charges (AfDB et al., 2010c).

The continent also has low internet penetration rates and high tariffs, stemming mainly from a lack of high-capacity international networks. Africa relies on satellites and Very Small Aperture Terminal (VSAT) earth stations for most of its connectivity to the World Wide Web, which results in high access costs (AfDB, OECD, and UNECA, 2009). Reforms should seek to promote private sector investment in fiber-optic backbones and competitive access to submarine cables.

**1.5 How to set a strategic vision for infrastructure provision**

Investments in infrastructure should be allocated to components that will maximize the positive transformation that the region needs in terms of economic growth and improved living standards for its populations, both rural and urban. In addition to sound macroeconomic management, policies need to be synergistically aligned. This will allow firms to benefit from external cost savings derived from increased interaction and access to buyers and input markets.

To sum up, sustainable economic growth, as a means of lifting the continent out of poverty, is the principal objective of Africa’s infrastructure agenda. The achievement of this goal relies on the productivity of firms and on ensuring better living conditions for individuals across the continent. Accordingly, strengthening the foundations for higher productivity in the main cities and ensuring a more even distribution of basic living standards are the two key pillars of the infrastructure agenda.

Firms concentrate in cities in order to benefit from agglomeration economies, namely lower production costs through leveraging economies of scale and network efficiencies (World Bank, 2009). By clustering, firms increase the demand for infrastructure and reap cost savings. Roads, amenities, and services (ICT, energy, and water and sanitation) are available in greater quantity and quality in cities compared with rural locations. Consequently, securing an appropriate level of investment in infrastructure will enhance the gains to be made from urban agglomeration.

The second pillar for growth refers to a more even and equitable distribution of basic living conditions across Africa, in both rural and urban areas. A strategy to enhance living conditions in cities entails framing not only a coherent urban agenda, but also a commensurate rural agenda, able to buffer the incentives for rural–urban migration. Cities that are experiencing a growing but unmet demand for basic services from unskilled immigrants also face a long-term trend of economic deterioration, given the relatively lower contribution from those immigrants’ productivity. Therefore, providing universal access to basic services
across the whole urban system and its hinterland represents a macro mechanism for a healthy urbanization, as it helps to reduce the number of migrants who are in search simply of better basic services. What is needed is a broader vision of the type of technologies that can be utilized for service provision; the bundling of services wherever possible to increase effectiveness in peri-urban and rural areas; making use of land planning instruments and policies to align urban expansion with service provision; and establishing a complementary rural development strategy.

Framing an infrastructure agenda for Africa to address the challenges of the twenty-first century encompasses three dimensions of geographical aggregation: (i) making cities more productive and better places to live (“more livable”); (ii) integrating rural areas through the spillovers of urban growth; and (iii) linking major population centers across the region.

The next three sections of this report analyze the dynamics of these three dimensions. Section 5 then discusses the resources and tools available to finance investment in infrastructure in Africa. Section 6 concludes by highlighting the role of the African Development Bank in advancing the infrastructure agenda.
2. Infrastructure for more livable and productive cities

AFRICAN CITIES ARE growing fast. However, owing to insufficient infrastructure and poorly performing institutions, most new settlements are informal and lack access to basic services. This situation has severe consequences for health, education, incomes, market integration, and ultimately economic growth. In order to improve living conditions across Africa, it is important to develop a coherent urban agenda that provides the right incentives for migration and suitable conditions for livable and productive cities.

Improving living conditions in cities implies a strong focus on institutions. A combination of land policy and planning, housing policies, and basic services coverage is key for a more equitable and inclusive urban expansion. The policy challenge is to harness market forces that encourage concentration and promote convergence in living standards between villages, towns, and cities. Policy decisions will be more effective if based on strategies for broad economic areas that integrate towns and cities with their surrounding rural hinterland.

2.1 The pull of the city, urban sprawl, and informal settlements

Africa is characterized by wide disparities in living standards across subregions, countries, and particularly between urban and rural areas. For household services, coverage rates in urban centers are five to ten times higher than those in rural areas. Electricity and improved water supply (such as piped connections or standpipes) extend to the majority of the urban population, but to less than one-fifth of the rural dwellers. In addition, fewer than 40 percent of urban households enjoy a private water connection, a septic tank, or an improved latrine – and this proportion falls to just 5 percent in rural areas. Rural access to ICT services remains negligible. In almost half of African countries, energy coverage barely reaches 50 percent of the urban population and 5 percent of the rural (AICD, 2009).

Such disparities boost migration toward urban settlements, where people can find better living conditions and benefit from proximity and access to bigger markets, including job markets. Between 1960 and 2006, the share of the continent’s urban population increased from 15 to 35 percent, and this is expected to rise to around 60 percent by 2020. Rural migration accounts for one-fourth of that growth, with the remainder attributable to urban demographic expansion and administrative reclassifications (World Bank, 2008b). In several fragile states, civil war has contributed to urban expansion as people from the affected regions seek refuge and employment in cities.

The three main features of Africa’s urbanization – a high concentration of people in large cities, urban sprawl, and informality – are examined in the sections that follow.

2.1.1 High population density in large cities

One-third (132.7 million) of Africa’s urban population is concentrated in 49 megacities (i.e., cities with more than 1 million inhabitants) (see Annex A.3). Much of the remainder is spread across 232 intermediate cities of 100,000 to 1 million inhabitants and in peri-urban areas. The largest cities are growing fast, suggesting an even more concentrated urban population. However, because of insufficient infrastructure and poor institutions, most new settlements are informal and without basic services.

Ensuring access to basic services for households in both urban and rural areas can improve sustainable urbanization and social equity, enhance living conditions, and prevent disproportionate flows of rural people to cities. It should be acknowledged that labor mobility can have positive effects when it responds to the needs of market forces, rather than to a lack of security and/or basic services. Moreover, labor mobility can prompt convergence in living standards, as migration to denser and more productive areas can help to rebalance income levels and exploit the benefits of knowledge clusters. As rural and urban development are mutually dependent, economic integration is the best way to produce growth and inclusive development.

2.1.2 Urban sprawl

The pattern of urbanization in Africa reveals strong growth and sprawl. This is typified by moderate and patchy densification within the inner-city core, as residential areas give way to commercial users and peripheral growth occurs in an unplanned, ad-hoc manner and at low density. Built-up areas of urban sprawl are growing faster than urban populations in seven African cities, suggesting falling densities that, in turn, increase per capita infrastructure costs (Angel, Sheppard, and Civco, 2005).

2.1.3 Increase in slum-dwellers in Sub-Saharan Africa

In addition to sprawl, slums are growing faster than cities. Slums, as defined by UN-HABITAT, feature: a lack of access to safe water and sanitation; lack of durable housing; lack of sufficient living area; and lack of security of tenure. Globally, Sub-Saharan Africa has the largest slum population, counting 211.3 million people, or 74 percent of its urban population (AfDB et al., 2011). In North Africa the proportion is much lower, with 13.3 percent of its population living in slums (UN-HABITAT, 2010).
Progress on reducing slums across the continent has been highly uneven. Cities in North Africa reduced their share of slum dwellers from 20 to 13 percent over the decade 2000–2010, whereas in Sub-Saharan Africa, the proportion of slum dwellers decreased by only 5 percent (or about 17 million). The strong performance in North Africa has been largely due to a shift in policy approach to housing strategies. Ineffective top-down housing authorities have been replaced by public–private partnerships (PPPs) to provide a greater number of both low-income and market-rate housing units to meet demand (UN-HABITAT, 2010).

2.2 Cities are the future of Africa
Cities represent the engines of growth. Their productivity is at least three times greater than that of rural areas. Rural areas contribute less than 20 percent of Africa's GDP, while accounting for more than 60 percent of its population (World Bank, 2008b). There is, though, a synergistic relationship between rural and urban areas, in that urban centers consume rural products and offer inputs for rural production, while rural areas serve as markets for goods and services produced in urban areas. The expansion of urban markets is therefore a key factor in raising rural incomes in the hinterland.

In addition, cities create growth spillovers in their hinterlands. Areas within 2 hours’ travel time of cities of at least 100,000 people tend to diversify into nonagricultural activities (Dorosh et al., 2008). Rural areas that are located between 2 and 8 hours’ travel time from such cities account for more than 62 percent of the agricultural supply and generate a surplus that is sold to urban areas. In areas farther than 8 hours from these cities, agriculture is largely undertaken for subsistence, and less than 15 percent of the land's potential is realized. Similarly, farmers closer to cities tend to use more and higher-quality fertilizers and pesticides and better equipment, resulting in clear improvements in productivity.

Despite these dynamics, rural–urban links are constrained by inadequate transportation networks between products and markets, unreliable and costly sources of electricity and water provision, and limited coverage of ICT. Weak institutions exacerbate the impact of these constraints.

2.3 Resources allocation across urban and rural spaces
The African urban agenda demands a coherent resource distribution across urban and rural areas. Improving the quality and quantity of spending will maximize the complementarities between urban and rural development, counteract the failures of decentralization, and improve local authorities' revenues.

Historically, Africa has been investing around US$ 26 billion per annum in infrastructure. Nearly 30 percent of these resources have gone to productive infrastructure (energy, ports, highways, etc.) that underpins the national economy, while 50 and 20 percent have been used to serve urban and rural areas, respectively (Figure 6). Most of this investment has been targeted at the energy sector to boost industrial production and transmission. Additional spending is required to expand productive infrastructure at the national level, and to improve roads and distribution networks for basic services in rural and urban areas.

The Africa Infrastructure Country Diagnostic (AICD) report of 2009 proposed a change in emphasis from urban to rural investments. To raise Africa's infrastructure endowment to a reasonable level would cost US$ 93 billion, split two to one between investment and maintenance. Spatially, the spending distribution would see 34 percent going to the productive infrastructure that underpins the national economy, 32 percent to urban areas, and 34 percent to rural areas. As presented in Figure 6 below, rebalancing the current investment from urban to rural areas does not imply a reduction in urban spending. As discussed before, there are significant externalities and complementarities between urban and rural investments. For example, growth in urban and rural coverage of network infrastructure tends to be positively correlated. It is important to maintain such connectivity to foster sustainable and balanced

![Figure 6. Spatial split of current spending vs. investment needs](chart.png)

growth. In Figure 6, "National" refers to productive infrastructure underpinning the whole national economy, rather than specifically to urban or rural space (for example, the inter-urban trunk network, the national power interconnected system, major seaports, and airports). "Urban" and "Rural" refer to infrastructure that is primarily oriented toward servicing the needs of urban or rural inhabitants, respectively (for example, urban or rural household services, and urban or rural roads).

2.4 The role of local government in local development

Local authorities should invest not only more, but more wisely. Municipal budgets are very small in relation to the total infrastructure requirements spurred by rapid urban growth. The purported benefits of decentralization have not been fully realized because policies have given cities more responsibilities (notably in social sectors), but without the additional resources needed to fund them. Accordingly, municipalities do not have sufficient funds to promote growth.

Tax revenues, hampered by undeclared informal trade and the lack of clear property titles, are insufficient to cover investment needs. In big cities where the economic base is larger, tax receipts are often sent to central agencies, creating delays and inefficiencies in the process. Political factors often hinder the use of property taxes. Although African cities generate 80 percent of the national tax revenues, they receive less than 20 percent of the resources. Consequently, they are reliant on central government for around 80 percent of their operating revenues. In sum, local governments lack the power and incentives to raise (and retain) their own revenue streams.

It has become clear that cities need predictable streams of revenue; they also require the flexibility to raise additional resources in order to safeguard service provision to their populations. In addition, they should try to improve their technical and managerial capacity to deal with evolving priorities in new investments, operations and maintenance, and to guide inevitable expansion. In order to achieve this, they need to attract private partners and gain a better understanding of the constituency of their neighborhoods, so that they can exploit potential synergies.

Improved and sustained revenue schemes in cities will translate into better household service coverage, which is currently quite low (as discussed in section 2.2) and uncoordinated. Infrastructure investment continues to focus on sector-specific interventions rather than spatially synchronizing and concentrating the provision of different infrastructure services in larger “bundles.” Access to multiple services leads to higher returns for beneficiary households compared with scenarios where services are provided individually.

2.5 The need for stronger institutions in main cities

In many parts of Africa, formal land institutions and related legal and regulatory frameworks are still nascent. Landownership is made more problematic by the centralization of procedures, the high costs and complexity of registering land, and ineffective land-use policies and urban planning. These and other factors have encouraged the development of spontaneous, informal settlements. Many governments have subsidized plots, but available supply is well below demand. Governments have tried to help residents excluded from land-ownership and have expanded infrastructure to new settlements, but the results have been disappointing.

The limited size of the land market and the monopoly of traditional landowners have led to shortages of urban land and high prices. The lack of land titles impedes business development and the establishment of new firms. With no access to land and living in underserved and peripheral areas, the poor suffer from low connectivity and inadequate access to labor markets. The resistance of landowners and the lack of registries also prevent local authorities from raising revenues through taxes on urban land.

Lack of affordability and an insufficiency of titled land make housing developments a solution restricted mostly to the middle classes. Construction costs are very high, especially in landlocked countries. Cement, iron, and other materials are imported and costly to transport, making housing unaffordable. According to estimates, only one out of every five new housing units is allocated to a needy household.

Land-use authorization procedures are characterized by long delays and high transaction costs. For example, land acquisition delays are considerable in Ethiopia and Zambia. In Mozambique, businesses pay on average US$ 18,000 in processing fees for land, and in Nigeria, they must register land to use it as collateral, a process that can take up to two years and cost 15 percent of the land value (Kessides, 2006). To rectify the situation, land management institutions should ensure a comprehensive land registry, credible mechanisms for the enforcement of land transactions and conflict resolution, and flexible zoning laws. What is needed is a versatile regulation of spatial subdivisions that help rather than hinder changes in land use according to the urban dynamics. Legislation that boosts land prices and excludes the poor should be revised. Lack of affordable serviced plots and zoning policies have often excluded the poor from integration within the urban development.

Gender equality should also be mainstreamed into any reforms relating to land ownership, as traditionally women have been excluded in many African
countries. Land rights tend to be held by men or by kinship groups controlled by men. Women’s access – if at all – is mainly through a male relative, usually a father or husband. Such access is tenuous and can be lost if, for example, the husband dies, leaving the widow landless and without a means of subsistence. In response, there is a need to introduce or strengthen laws to give women more secure access to land.

In respect to urban planning, this is needed to guide urban expansion and the associated infrastructure needs. When implemented properly and in an integrated manner, urban planning can prevent sprawl, deter development in precarious environmental areas, and ensure optimal delivery of affordable serviced land and infrastructure. Too often though, urban planning is not separately costed in the budgetary process, and master plans are rarely implemented. Because of a top-down approach and weak implementation, urban planning instruments have lost their relevance in many African cities. Urban dynamics are seldom foreseen, and in most cases, decisions regarding the location of infrastructure and major developments are based on the political economy rather than coherent urban planning.

To yield optimal socially inclusive benefits, planning needs to be flexible, participatory, and indicative (with a 10 to 15 year horizon). Urban reference maps should lay out the major roads and city services, the areas for urban expansion, and the reserves for amenities. Ideally, planning should be rooted in participatory strategies and linked to local and central budgets. Without realistic projections for resource availability, urban plans often fall into disreput. The cases of Dakar, Lagos, and Maputo are recent positive examples of city development strategies as frameworks to encourage participation from the community when discussing challenges and opportunities.

Institutional development pays off substantially, even when resources for investment are lacking. A strong “city effect” also exists. Thanks to leadership, land security, ownership, and civic participation, the inhabitants of Dakar’s slums have living standards far superior to those in Nairobi, even though the latter have higher incomes and education levels (Gulyani, Talukda, and Darby, 2008). Successful slum-upgrading programs should be emulated in order to improve living standards. The Accra District Rehabilitation Project in Ghana is an example of successful upgrading, as are several programs in Ethiopia, Kenya, and Uganda.

2.6 Components for a successful urban agenda

» Adopt a solid analytical framework to help define priorities and sequencing. Frameworks should integrate both urban and rural needs, specific to each area. In mostly rural areas, sound land policies and the universal provision of basic services are critical goals. In areas where urbanization has accelerated, the emphasis should be on investments in connectivity. In heavily urbanized areas, targeted assistance to slum areas may be needed.

» Recognize that the political economy influences the urban transition. Local authorities do not have sufficient power to develop their cities because their budgets and responsibilities are restricted to basic services. Resources and decisions on other components crucial to the productivity of cities depend on the central government.

» Be pragmatic. While the long-term goal should be the achievement of well-defined property rights and land titling, some interim measures may be necessary. For example, cities need to be proactive in making land titling effective in the medium term, possibly by using occupancy as a basis for land registration and taxation.

» Focus on cities and areas important to the subregional economy. Subregional approaches can increase the impact of individual country efforts. To maximize the benefit of such approaches, national improvement and expenditure plans should focus first on primary economic drivers and related infrastructure, which will lead to overall growth for the subregion.

» Improve land policies so that markets become more flexible and responsive to the increase in demand. A lack of clarity in land-use regulation and in investment decisions across the urban space creates major uncertainties for landowners. This deters them from integrating their land into land markets, while stimulating rent-seeking behavior from those who are more influential. The aggregate effect is a market characterized by supply constraints, informality, and vacant land in the middle of dense areas.

» Improve the fiscal environment of cities. Improve transparency and the predictability of transfers; strengthen and simplify local taxation; change the focus of property taxes from ownership to occupancy; take advantage of cost recovery from revenue-producing services, such as markets and bus stations, as these can amount to 70 percent of medium-size city revenues; use municipal contracts (between central and local governments) and establish street addresses to help local governments manage their resources.
3. Benefits accruing to rural areas from urban and regional infrastructure

**RURAL ACTIVITIES REMAIN** highly relevant to the overall development process of Africa. The African population is still mainly located in rural areas, ranging from 80 percent of the population of the East African Community (EAC) to 51 percent in the Economic Community of Central African States (ECCAS) (based on WDI, 2011). Two-thirds of the labor force are engaged in agriculture-related activities, which make up a very significant share of GDP in all subregions, ranging from 30 percent in the Economic Community of West African States (ECOWAS) to 16 percent in the Southern African Development Community (SADC). Indeed, agriculture is the main source of income for 90 percent of the rural population in Africa (UNECA, 2005).

Rural populations face extreme poverty and a lack of access to services. In total, more than half a billion people inhabit Sub-Saharan Africa, of whom 49 percent live on less than US$ 1 a day and 68 percent inhabit rural areas (World Bank, 2008). In terms of household services, coverage rates for those living in urban areas are five to ten times higher than for those in rural areas. Electricity and improved water supply (such as piped connections or standposts) extend to the majority of the urban population, but to less than one-fifth of the rural population, with minimal differences across subregions. Rural access to ICT services remains negligible (AfDB, 2011).

A vicious circle characterizes the relationship between agriculture and rural poverty. A high reliance on agriculture is not the cause of rural poverty. However, in order to fight poverty, it is essential to improve agricultural productivity. Low productivity and poverty feed each other, creating a vicious circle; this situation is known as the “Sahel-Syndrome.” More accurately, this mechanism forces poor peasants on to agriculturally marginal lands for non-capital intensive exploitation. On marginal sites, an intensification of agricultural land use further degrades the environment, damages the natural production basis, and decreases yields, leading to greater impoverishment (Roehrig and Menz, 2005). Case studies analyzing agro-ecosystems in poor countries indicate that many people are caught in this vicious circle. However, breaking the circle is complex because some of the conventional solutions for rural development may in fact exacerbate the problem. For example, improving rural accessibility in some deprived areas may lead to gentrification, thereby boosting land and house prices and forcing out the poorest segments of the population.

**3.1 Low productivity in Africa’s rural activities**

Nowhere in the world is the lack of assets greater than in Africa, where farm sizes in many of the more densely populated areas are unsustainably small and falling, land is severely degraded, investment in irrigation is negligible, and poor health and education limit productivity and access to better options.

Rural productivity in Africa ranks among the lowest in the developing world. The agriculture sector remains largely traditional and concentrated in the hands of smallholders and pastoralists (UNECA, 2009). More than 85 percent of the rural poor live on land that has medium to high potential for increased productivity.
3.2 Logistics costs and rural infrastructure

The overall logistics costs in Africa are among the highest in the world. Cross-regional analysis of the World Bank Doing Business data indicates that on average, exports from Sub-Saharan African countries are subject to the greatest time, cost, and documentation constraints compared to other regions of the world (Christ and Ferrantino, 2009). The World Bank’s Logistics Performance Index of 2010 reveals the extent of the problem for SSA, compared with other developing regions (see Figure 9). For example, exporting a 40-ft dry container from point of origin to the port costs 40 percent more in Sub-Saharan Africa than anywhere else in the world, while the inland costs are up to four times greater than those in East Asia and the Pacific region (World Bank, 2010b).

However, proximity to ports does not guarantee better logistical performance. For instance, in West Africa there are shorter distances and a larger number of countries with ports compared to the Southern African subregion. Nonetheless, the Southern African subregion enjoys better regional transportation integration (Christ and Ferrantino, 2009). One apparel producer near Nairobi, Kenya, estimated that improvements in all aspects of the transportation process (including ports, roads and customs procedures) could lower his total costs by 10 to 40 percent and significantly improve his firm’s competitiveness (quoted by Christ and Ferrantino, 2009).

High logistics costs are not only due to the lack of investment in physical infrastructure – they also stem from unwieldy and lengthy regulations, delays, and unofficial payments. The costs that service providers face are not excessively high in Sub-Saharan Africa compared with other regions of the world, however transportation prices or costs to the shipper (i.e. end-user) are high, particularly in Central Africa. This mainly results from official and unofficial market regulation and structure in the trucking services, which is most noticeable in West and Central Africa. Raballand and Macchi (2008) conclude that investment in infrastructure is unlikely to reduce logistics costs unless institutional issues are also

Landlocked countries face the greatest logistical hurdles. Surface transportation costs and time delays represent a much larger share of their total export costs, and these vary substantially between the different geographic corridors within Sub-Saharan Africa. In SSA, the inland transportation cost for the median landlocked country exceeds that of the median coastal country by 328 percent. The landlocked countries in Central Africa (Chad and the Central African Republic) face, by far, the most costly and lengthy constraints for their exports (Christ and Ferrantino, 2009).
addressed. Since the 1970s, the World Bank has actively supported the improvement of transportation corridors in Africa. However, this has had no clear impact on transportation prices, despite lower costs for cargo trucks on the corridors. Thus, the end-users of road transportation services have not fully benefited from the lower costs and better service quality that the improved infrastructure has created.

In the SADC region, Mauritius has the best road conditions: by 2005, 100 percent of its road network had been paved and 95 percent is in good condition. Botswana ranks second best with 94 percent of its roads in good condition, although only 36 percent had been paved by 2004. At the other end of the scale, Tanzania has the lowest percentage of paved roads. In some countries, despite the low percentage of paved roads, the networks are regarded as being in good condition, for example in Namibia, South Africa, Swaziland, and Zambia.

3.3 Rural infrastructure and rural productivity

Isolation perpetuated by poor transportation constrains economic progress and traps rural people in poverty. Poor transportation restricts opportunities to trade, even within local markets. It raises the costs of production and distribution, reduces the profit margin on produce sales, and limits production yields to sub-optimal levels. All this impedes the transition from subsistence to income-producing agriculture. The economic effects of better access to, from, and within rural areas can be cumulative and far-reaching. Enhanced access to markets cost-justifies the modernization of agricultural processes through mechanization, fertilizers, and the planting of high-yielding crop varieties. Such improvements increase the demand for agricultural inputs and for credit. When new roads reach remote rural areas, the economic effect can be dramatic.

Given the poor quality of the road network, it is not surprising that rural productivity in Sub-Saharan Africa is low. Poor logistics affect agriculture more than all the other sectors. Only 20 percent of the rural roads in Sub-Saharan Africa are in good condition and 20 percent in fair condition (Carruthers, Krishnamani, and Murray, 2008). The remaining 60 percent of rural roads require either rehabilitation or reconstruction, which represents both a financial and institutional challenge.

Productivity is greater in areas closer to urban centers, while better road connectivity determines higher crop production. Agricultural production and proximity (as measured by travel time) to urban markets are highly correlated in Sub-Saharan Africa, even after taking agro-ecology into account (Dorosh et al., 2010). Total crop production relative to potential production is approximately 45 percent for areas within 4 hours’ travel time from a city of 100,000 people. In contrast, it is only about 5 percent for areas more than 8 hours’ travel time from a city of 100,000 people.

The impact that good rural road networks can have on rural productivity is supported by research cited in Dorosh et al. (2010). This reveals that reducing travel time through road investments can significant increase the adoption of high-input/high-yield technology by farmers, thereby increasing productivity. This shift toward high-input production systems is driven by both direct and indirect channels. In the direct channel, roads increase crop production by shifting outward both the crop demand curve (through access to a larger market) and the crop supply curve (through better access to intermediate inputs and new technology). In the indirect channel, roads facilitate the adoption of high-input/high-yield crop production and therefore increase crop production by replacing low-input/low-yield crop production (Dorosh et al., 2010).
The logistics chain for buying inputs and selling produce determines the adoption of high-yield agricultural practices. Typically, costs per kilometer are higher on dirt roads than on tarmac roads. The overall impact on input prices and marketing costs for farmers located in areas with poor accessibility is substantial. Road projects, such as those funded by the AfDB, lead to higher agricultural production and land productivity, increased use of agricultural inputs and extension services, and a shift towards high-value crops and off-farm employment opportunities.

3.4 Land regulations and property rights as determinants of resource allocation in rural areas

Key among the drivers of rural productivity is the issue of land regulations and property rights. This is often linked to the personal economics of land ownership. People with decision-making powers at various levels of government may have a vested interest in steering investment resources in their favor (i.e., toward their own land holdings, thereby increasing their value). This may result in a conflict of interests, for example when investments that they favor do not align to the objectives of the investment agenda viewed from a broader perspective. One example is when roads are built in areas that are known to represent a challenge environmentally and which likely to give a poor social return.

A second consideration regarding the role of land regulations in infrastructure provision is that investment in roads may lead to changes in land use. Moreover, investment in roads can sometimes reduce rural productivity due to weak land regulations. The main justifications for investing in rural roads is to improve accessibility and to reduce travel times and trade costs. However, poor land regulations setting the limits between urban and rural areas can result in gentrification and land speculation, which can reduce rural productivity.

Land regulation should therefore enforce a limit for urban expansion, in order to safeguard the use of surrounding rural areas for agriculture.

When land regulations are nonexistent or weak, poor landowners may seek a change in land use from agriculture toward urban activities that offer greater returns. The result will be higher land prices that are generally inconsistent with rural productivity. The resulting landscape is of vacant rural land where road improvement has been made. Furthermore, the improved accessibility incentivizes poor households to sell their land or vacate when renting, and move further into the hinterland. In these cases, the policy instrument of road improvement works against rural productivity and strengthens the mechanisms that fuel rural poverty.

Property rights also represent a macro mechanism that drives migration and the efficient localization of population. The rural poor barely have access to land titles due to weak institutionalization, low levels of education, the recent expansion of the rural frontier, and weak government capacity. Land tenure laws remain vague and vary from one subregion to another. Given continued restrictions on land ownership and unclear regulations on land tenure, labor mobility may be hindered. Many government controls in relation to property rights have been relaxed, which in some cases has released agricultural capital and labor for non-agricultural activities.

Land is central to promoting rural livelihoods in Africa because access to land and security of tenure are the main means through which food security and sustainable development can be realized. Issues surrounding land tenure and property rights have been on the increase in Africa over the past decade. The result has been growing poverty, landlessness, homelessness, and social distress. The last few years have witnessed increased politicization of land issues and attempts to gain land rights by some communities. Although the land question in Africa varies across the subregions, there are common tendencies and empirically based data that demonstrate the strong linkages between land tenure issues on the one hand, and food security and sustainable livelihoods on the other.

Subregional differences are substantial. In West Africa, land problems focus on the insecurity of tenure and its effect on the effective exploitation of land. Under customary law, traditional leaders (chiefs) remain the dominant and de facto landowners. It is through them that community members obtain access to land resources. Once allocated, the land comes under the control of the community member’s family in most cases. In some parts of Central Africa, there is another major problem. Here the scarcity of productive land is the source of conflicts and in countries like Rwanda and Burundi, it lies at the root of much civil unrest. With a total population of 10.9 million in 2011 (AfDB, 2012b), Rwanda is the most densely populated country in Africa and its population growth rate remains very high, at 3.6 percent, therefore land scarcity will continue to be a critical issue for the future.

Unequal land access and low absolute levels of land per household are shown to impede poverty reduction and economic growth. This is the result of the strong linkage between access to land and household income, particularly for farm sizes below 1 hectare per capita. In Africa, households in the highest per capita quartile on average control between five and fifteen times more land than the lowest quartile (FAO, 2010). Landless households or those that own less than 0.1 hectares constitute 25 percent of rural agricultural households. Restricted access to land prevents the rural population escaping poverty through agricultural productivity growth (Jayne, 2005 quoted in FAO, 2010). All too often, insufficient
attention is paid to the implications of land inequality in relation to agricultural productivity and food security.

Weak or lack of land ownership restricts location choices and locks people into poverty. They might be better off financially if they were able to sell and move elsewhere, but this option may not be open to them if they have weak property rights. This situation is exacerbated in peri-urban areas, where land plots tend to be subdivided among family members as housing solutions. In these areas, residents still face long travel times to urban centers; further, the potential exploitation of scale in agricultural production becomes fragmented. Clearer property rights could have the macro effect of allowing family members with better skills to move into urban areas, while leaving behind those more suited to rural activities.

3.5 The need for a strategic and integrated agenda for rural infrastructure

The challenge is how to sequence cost-effective investments in areas that have low population density and little commercial activity. One option is to focus investments geographically to foster the development of growth poles (World Bank, 2008a). The rural agenda needs to improve smallholder competitiveness in areas with high investment returns, while safeguarding the livelihoods and food security of subsistence farmers.

Improving rural productivity should not be viewed separately from the urbanization or regional integration agenda—what is needed is a holistic approach. The maximum investment returns can be obtained when the three dimensions of spatial development are considered simultaneously, given the functional relationships and synergies that exist among them. In fact, rural productivity improves when it is linked to the growth and success of neighboring cities that represent its major market, rather than relying on isolated rural areas which aim to produce, like extractive economies, for distant markets.

The best areas for rural investments are those that bring complementary benefits to urban areas and regional integration. The impact of infrastructure improvements to promote industrial development and accelerate national economic performance is greater in areas where a large market is present (Lall, Schroeder, and Smith, 2009). Improving infrastructure in these places provides the highest return for public investment. Consequently, the best option for improving rural productivity is in nearby areas that will benefit from the same investment in infrastructure. For example, in Uganda the urban areas between Kampala and Jinja are most likely to boost the country’s industrial development. Consequently, rural investment activities along that corridor should be prioritized in the rural productivity agenda.

It is also important to look for complementarities between on- and off-farm activities in order to reduce poverty. Poor road access in many cases coincides with other constraints, such as poor agro-ecology, low population density, and poor access to amenities. So, a well-targeted program needs to also take into account the geographic, community, and household characteristics and consider complementary investments to maximize the impacts of road construction and rehabilitation for market efficiency and social welfare. As the package required is more comprehensive than simply investing in roads, it is necessary to consider the feasibility of providing funding and implementation capacity. Otherwise, investing in road infrastructure in locations where those other components are missing will not deliver the highest returns.

Successful diversification also appears to be associated with infrastructure variables. Households that can reach fertilizer sellers, have access to motorable roads, or piped water are more likely to diversify (World Bank, 2011b). Better access to fertilizers enables farmers to produce crops more efficiently and, therefore, to spend more time off-farm. Poor road infrastructure, particularly rural roads, raises input prices and marketing costs and creates disincentives for farmers to diversify. Advisory services can encourage farmers to introduce new technologies and raise overall farm productivity through increased commercialization. In general, the condition of roads determines the success of households in diversifying income sources, as better accessibility allows them to participate in off-farm activities.

The concept of providing rural infrastructure across the whole of Africa is not a realistic option from a financial viewpoint; moreover it would not represent the best use of scarce resources. The challenging economic geography of Africa makes it difficult to invest in rural roads universally. Less than 40 percent of rural Africans live within 2 km of an all-season road—this is the lowest level of rural accessibility in the developing world. Given Africa’s low population density, improving rural accessibility for all would imply doubling or tripling the length of the existing network in most countries, which is financially unsustainable (Gwilliam et al., 2008).

The rural infrastructure agenda for Africa should therefore focus on improving the poor-quality roads and maintaining the current service in good order, rather than extending the size of the network. Increasing the road network would result in even greater maintenance liabilities in the future. Funding and institutional arrangements need to be put in place to ensure the sustainability of road investments and maximize their long-term impact.

Community-based maintenance contracts and labor-intensive road maintenance
projects can boost job creation. In addition, the cost of infrastructure provision can be reduced if labor-intensive technologies are selected instead of equipment-intensive alternatives. For example, Devereux and Solomon (2006) report that some labor-intensive programs have provided up to 30 percent cost savings. Other researchers have even identified savings of 50 percent. However, focusing solely on reducing the overall investment amount is probably not the best criterion to adopt when considering labor-intensive technologies. Their cost structure differs from equipment-intensive provision because it needs to include components like training and/or the development of institutional capacities. Therefore any attempt to draw comparisons by days of labor versus non-labor costs may be misleading.

According to the AICD report of 2009, annual infrastructure investment needs in Africa are approximately US$ 93 billion, one-third of which should cover operations and maintenance. With current spending of US$ 45 billion a year, the financial gap is sizable and requires appropriate management to maximize the value of local and foreign investments.

Meeting the rural accessibility standard articulated in the base scenario (75 percent of the rural population living within 2 km of an all-weather road) would require a road network of more than 1.1 million km. Only a fraction of that length is currently provided by the regional and national road networks. Eleven of the 23 countries (rising to 15 under the pragmatic scenario) would not need to add any new roads to their present official road network to reach the rural accessibility standard – they would simply have to maintain their roads in good condition. In the remaining 12 countries (or 8 under the pragmatic scenario), some or all of the unclassified road network would have to be upgraded to all-weather roads and maintained in good condition, while some new roads would be needed for the rural accessibility standard to be met (Carruthers, Krishnamani, and Murray, 2008).

Rural roads would absorb more than 53 percent of the requisite spending. A little more than half of that would be used to improve the existing official road network, while the remainder would be used for upgrades to the non-official network. This would add connectivity to areas that were not already connected, and would represent 20 percent of agricultural output potential. For Sub-Saharan Africa as a whole, the additional cost of adding the potential output would not be excessive (Carruthers, Krishnamani, and Murray, 2008).

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4 Carruthers, Krishnamani, and Murray (2008) consider an ideal scenario and a pragmatic scenario to estimate investment needs in roads. The pragmatic scenario aims to meet a similar degree of regional and national connectivity as the ideal scenario but at a lower cost, essentially by reducing the standards of infrastructure (for example, by substituting a single-surface-treatment road for an asphalt road) and by lowering the target condition (for example, maintaining infrastructure to at least fair condition rather than to good condition). The pragmatic scenario also reduces the level of ambition for rural and urban connectivity.
4. Connecting the dots: a regional integration approach for infrastructure provision

**Regional integration and connectivity** are vital to Africa because the prosperity of most of its population depends not only on their own efforts but also on those of their neighbors. Forty percent of Africa's population live in countries without access to the sea, compared to a global figure of about 4 percent. By comparison, Austria and Switzerland are also landlocked countries; however, their borders are thin, people and goods pass through with little or no checks, and their ties with neighboring countries are strong. In contrast, Africa consists of 54 separate countries, each with its own borders and barriers to the movement of goods, capital, and people. The greatest barriers for accessing seaports are in Central Africa, where weak regulations for the trucking industry, low investment in roads, and poor maintenance result in the highest logistics costs and longest transit times.

According to the World Development Report (WDR) of 2009, the countries of Central, East, and West Africa face the triple challenges of internal division or thick economic borders; large distances from world markets; and low economic density due to small local economies. In order to overcome such a situation, those countries need a combination of three policy instruments conceptualized by the WDR 2009: (i) strengthening regional institutions in countries that have thick borders; (ii) investing in regional infrastructure to improve the connectivity between countries; and (iii) providing “incentives such as preferential access to world markets, and other ECCAS states.

Monetary Community of Central Africa (ECCAS) and subregions is presented in Annex A1, highlighting the differences in infrastructure endowments across the subregions. A more detailed presentation of challenges and opportunities at the intersection of sectors and subregions is presented in Annex A1, which draws on the AICD analysis.

4.1 Subregional specifics

Infrastructure endowments differ substantially across subregions, as do institutional schemes for services provision. Tailoring an agenda for regional integration and connectivity should consider those differences to preempt and address conflicting investment priorities. The discussion below on Regional Economic Communities (RECs) highlights the differences in infrastructure endowments across the subregions. A more detailed presentation of challenges and opportunities at the intersection of sectors and subregions is presented in Annex A1, which draws on the AICD analysis.

4.1.1 Economic Community of Central African States (ECCAS)

ECCAS's economic geography is complex due to the fact that economic activity takes place in isolated pockets separated by vast distances and environmentally sensitive areas. As a result, the subregion has the poorest performing infrastructure in the continent, based on most indicators.

One third of ECCAS's regional road network is unpaved and a substantial amount is in poor condition. Coastal countries in the subregion do not devote sufficient attention to the sea corridors; Furthermore, surface transportation is the most expensive in Sub-Saharan Africa due to cartelization and restrictive regulations for the trucking industry. As a result, it also moves at a slower pace than in most other parts of Africa because of the poor road conditions, border delays, and time-consuming administrative processes. The time taken to move freight from ports to landlocked countries ranges from 26 to 71 days – the slowest in the continent. The overall cost of moving goods along Central Africa's key trade routes is in the order of US$ 230–US$ 650 per tonne.

Central African railroad systems do not form a network and existing lines are lightly used. Two ports in Central Africa – Douala and Pointe Noire – serve as transshipment hubs for the region but their performance significantly falls short of global standards. The air transportation sector in ECCAS is striking for the absence of an existing hub and the lack of connectivity between the CEMAC subregion (Economic and Monetary Community of Central Africa) and other ECCAS states.

Despite major hydropower potential, Central Africa has the least developed power sector on the continent. Regional power trade through the Central African Power Pool (CAPP) could substantially reduce power sector costs and the long-run marginal cost of energy in the subregion but currently those opportunities are not
being tapped. Compared with the other subregions, ECCAS's ICT infrastructure is still in its incipient stages, performs poorly on access, and has the highest prices.

4.1.2 Southern Africa Development Community (SADC)
The SADC includes small and isolated economies, but also some of the continent’s largest economies (South Africa, Angola, and DRC). Its varied territory is characterized by a mixture of island states and low- and middle-income countries. The economic geography of SADC reinforces the importance of adopting a regional approach to infrastructure development. However, SADC ranks consistently above other subregions on a range of infrastructure indicators.

SADC has a well-developed regional road network which is in relatively good condition, while almost all of the corridors (with the exception of Nacala and Lobito) are paved. Surface transportation in SADC is the cheapest in Africa (though still more expensive than in other developing countries). The overall times and costs of moving goods along Southern Africa's key trade routes are onerous. Southern Africa has an extensive railroad system centered on Durban, which offers direct competition to road transportation.

In the ports sector, SADC has a very effective transshipment network, with Durban followed by Dar-es-Salaam as the key ports. The air transportation market in SADC is the largest in Africa, with Johannesburg at its center.

The power transmission network in Southern Africa is reasonably well developed, leading the rest of the continent in generation capacity and enjoying relatively low costs. The Southern African Power Pool (SAPP) has already established regional trade.

SADC has the best record in terms of access to ICT services compared with the other subregions but faces very high prices.

4.1.3 East Africa Community (EAC)
East Africa’s infrastructure ranks consistently behind that of the Southern and West African subregions. Its road network is in relatively good condition, but with poor-quality roads along some corridors and significant stretches of unpaved road. Surface transportation in East Africa is challenged by difficult border crossings and low performance logistics but faces fewer obstacles from the trucking industry, which is comparatively mature and more competitive than in some other subregions. However, it is still very slow when compared with SADC and global standards. Widespread delays occur in ports, at border crossings, and in other processes. The overall cost of moving a tonne of freight along East Africa’s key trade routes is in the order of US$ 175–370 and takes between 200 and 800 hours. Apart from the TAZARA railroad between Zambia and Tanzania, there are no real regional rail networks within EAC, and what does exist is very lightly used, which impedes regional integration.

East Africa has two maritime hubs that anchor the regional transshipment network but its ports are in need of significant improvements. With respect to air transportation, East Africa has a strong hub-and-spoke structure that centers on two regional hubs, but the region has made little progress toward market liberalization.

The power situation in EAC is constrained compared with other subregions. It already practices regional power trade, albeit much less actively than West and Southern Africa; however scaling up this trade could bring substantial benefits.

4.1.4 Economic Community of West Africa States (ECOWAS)
Infrastructure in the 15 countries of the Economic Community of West Africa States (ECOWAS) ranks consistently behind Southern Africa across a range of indicators. ECOWAS has a relatively well-developed regional road network based on seven main arteries, but coastal countries are not devoting enough attention to sea corridors. Surface transportation in West Africa is very expensive compared to the rest of Africa and the developing world. The causes are cartelization and restrictive regulation of the trucking industry. It is also very slow owing to the frequent delays associated with administrative processes. The overall times and costs of moving goods along West Africa’s key trade routes are excessive, requiring in the order of 400–1,000 hours and costing between US$ 175 and US$ 310 per tonne.

There is no real regional rail network in the ECOWAS area. Existing lines are lightly used and the presence of three different rail gauges complicates integration. In the ports sector, West Africa lacks a clear maritime hub as the center for a more effective transshipment network and needs to improve performance across the board. In terms of air transportation, ECOWAS has made great strides on market liberalization, but safety remains a concern, and the region lacks a strong hub-and-spoke structure.

Power supply in the ECOWAS region is the most expensive and least reliable in Africa. West Africa already practices regional power trade. Deepening such trade could bring substantial benefits, but much depends on Guinea’s ability to become a hydropower exporter.

Compared with other regional economic communities in Africa, ECOWAS performs reasonably well on access to ICT but faces relatively high prices for critical services.
4.2 Gains from scaling up regional integration

Transforming the current low level of collaboration among African countries would mean promoting and realizing the benefits of collective action. Among others, there are two primary sources of common benefit: (i) the additional outcomes expected from improved accessibility to larger markets by the producers in each national market; and (ii) the efficiency gains from the joint provision of infrastructure.

4.2.1 Additional outcomes of improved accessibility to larger markets

Successful regional trade integration could help African countries to reap economies of scale and collectively exploit their resources, thereby expanding markets and raising their competitiveness in the global economy. A larger market is an important driver of product diversification and enables small producers to realize cost savings from larger scales of production.

The first-order objective is to make it easier for firms within Africa to reach African markets. Currently they face disadvantages compared to firms outside Africa. Ironically, firms abroad often can trade more cheaply with local African markets than can home-grown firms. For instance, there are onerous trading costs for businesses seeking to trade between East and West Africa.

Notably, infrastructure plays a central role in improving regional competitiveness, facilitating domestic and international trade, and enhancing integration into the global economy. For firms, infrastructure development is critical for creating wealth as it can reduce costs and enlarge markets. Firms are more willing to invest in intra-firm productive assets when the complementary investment in extra-firm assets is in place and quality services are available at low cost. Without reliable and competitively priced freight transportation facilitated by sturdy infrastructure, nations have little hope of trading goods on advantageous terms. Alongside these benefits for all participants, cooperation with neighbors is vital for the landlocked economies that have limited access to ports and markets.

Investment in physical infrastructure (e.g. roads, power plants, and ICT) is likely to generate the largest impacts on regional trade. In addition, political commitment to enhancing critical regional integration has been demonstrated in recent times through fuller implementation of tariff liberalization schedules, concerted efforts to tackle non-tariff barriers, and the development of longer-term strategies to address export supply capacity constraints at the national level. These are all welcome initiatives but investment in regional infrastructure needs to take precedence over all other efforts, as its benefits will be greater in terms of productivity than any other collective action by African governments.

Studies prepared for the World Development Report of 1994 estimated that, on average, a 1 percent increase in infrastructure stock is associated with a 1 percent increase in GDP. More recent studies (e.g. Esfahani and Ramirez, 2003) show that the contribution of infrastructure services to growth is substantial and in general exceeds the cost of the provision of those services. Easterly and Rebelo (1993) found that public expenditure on transportation and communications has a positive effect on growth. A more recent study by Calderon (2009) demonstrated that the growth payoff of achieving the infrastructure development of the African leader (Mauritius) is 1.1 percent per year in North Africa and 2.3 percent in Sub-Saharan Africa, with most of the contribution coming from larger stocks. The same study also found that across Africa, infrastructure contributed 99 basis points to per capita economic growth, compared with 68 basis points for other structural policies.

Investments in regional infrastructure are expected to deliver high rates of return, with intraregional trade potentially tripling and international trade doubling. For example, it is estimated that upgrading the major corridors linking the 16 landlocked countries to the major seaports serving the region’s international trade would cost US$ 1.5 billion, with a further US$ 1.0 billion annually for maintenance (Teravaninthorn and Raballand, 2008). However, the East Africa northern corridor alone could yield an internal rate of return of 20–60 percent. Another example is the Trans-African Highway, which requires a total investment of US$ 20 billion and an ongoing maintenance cost of US$ 1 billion a year. However, these huge costs need to be set against the ensuing benefits, with intraregional trade alone expected to triple to US$ 30 billion per year, not to mention the gains to international trade, which currently stands at US$ 200 billion per year (Buys, Deichmann, and Wheeler, 2006).

4.2.2 Efficiency gains of shared provision/linking of infrastructure

The benefits of regional integration are visible across all aspects of infrastructure networks. For ICT and energy, regional infrastructure provides scale economies that substantially reduce the costs of production. For example, big hydropower projects that would not be economically viable for a single country make sense when neighbors can share the benefits. And in the area of ICT, linking to continental fiberoptic submarine cables could reduce internet and international call charges by one-half. Similarly, regional power pools that allow countries to share the most cost-effective energy resources can reduce electricity costs substantially. Infrastructure sharing has many benefits: it addresses the problems of small scale and adverse location; it permits a scaling-up of infrastructure construction, operation, and maintenance; it reduces costs; it pools scarce technical and managerial capacity; and creates a
larger market (Lederman, Maloney, and Servén, 2005).

There are significant economic and environmental benefits to the linking of electricity generation systems of different countries and encouraging energy trade. Regional integration proves very cost-effective, not only because economies of scale can be realized but also because power pools can make extensive use of trading possibilities. The DRC, for example, emerges as a huge exporter of electricity. Its net exports are almost four times larger than its domestic consumption, and it supplies hydropower through Zambia, Zimbabwe, and Botswana into South Africa. South Africa becomes an importer of 10 percent of its domestic consumption, trading with all neighboring countries: Namibia, Botswana, Zimbabwe, Mozambique, and Lesotho.

Regional collaboration also allows optimal management and the development of cross-border public goods. Road and rail corridors linking landlocked countries to the sea are an example of such a regional public good, as are regional airport and seaport hubs.

4.3 Focus on energy, transportation, and ICT

Cross-border infrastructure such as transportation, energy, and telecommunications is essential to move goods, services, people, and information between countries. Such linkages expand market access, reduce economic distance, and facilitate trade, investment, and labor mobility. In Africa, poor transportation and communications infrastructure and unreliable power supplies raise trade costs and undermine competitiveness and the continent’s ability to integrate regionally as well as globally. At a fundamental level, the low degree of intra-African trade is due to a lack of product diversification and poor trade complementarity among African countries. These structural constraints are compounded by inadequate and inefficient infrastructure, both hard (such as roads, transportation, and energy) and soft (such as customs systems). All this erodes the opportunities for the diversification of production, which should lead to increased scale and competitiveness at regional and global levels. An infrastructure agenda for regional integration and connectivity should therefore focus on addressing the needs of the transportation, energy, and telecommunications sectors.

Achieving functional connectivity at the regional level means focusing on a number of areas: smooth land corridor transportation between landlocked countries and ports, as well as between major cities for internal trade; the development of power supply options harnessing cost-effective generation technologies at efficient scale in the context of a well-functioning regional trading pool; and a robust communications network linking capital cities through fiber-optic access to submarine cables.

4.3.1 Energy

Electricity is by far Africa’s largest infrastructure challenge, with investment needs estimated at US$ 40.6 billion per year (Rosnes and Vennemo, 2009). In 2008, only 38 percent of Africans had access to electricity compared to an average of 68 percent for all developing countries, 53 percent for South Asia, and 80–90 percent for Latin America. The figure is even lower for SSA, at 26 percent. Annual per capita electricity consumption in Africa is 518 kWh, equal to 25 days of electricity consumption in the OECD (International Energy Agency, 2008). Furthermore in 2007, about 30 African countries endured on average 11.5 power outages due largely to the lack of regional interconnectivity of the electricity grids and shortages in affected countries. During this period, regional surpluses in generation capacity were noted for all of the subregions, with the exception of East Africa, which had intermittent shortages. Some of the countries with surplus supplies like South Africa now have deficits due to increased local demand.

As an example, Sub-Saharan Africa has the world’s lowest per capita consumption of electricity and the lowest rate of electricity access. Two-thirds of its population (500 million) are without access to electricity. SSA currently has inadequate generation capacity, limited electrification, low power consumption, unreliable services, and high and rising costs. But in order to develop economically and resolve the untenable access situation, massive amounts of electricity are required. For instance, from 2001 to 2005, half of the countries in Sub-Saharan Africa achieved solid GDP growth rates in excess of 4.5 percent. Their demand for power grew at a similar pace, yet generation capacity expanded only 1.2 percent annually. Refurbishing 44.3 gigawatts (GW) and building an additional 7,000 megawatts (MW) of new generation capacity each year to meet demand, keep pace with projected economic growth, and provide additional capacity to support the rollout of electrification, would amount to US$ 40.6 billion a year. Even lowering the original projected growth rates of 5.1 percent to half their levels would reduce estimated power sector spending needs by only about 20 percent in absolute terms, lowering the required new generation capacity from just over 7,000 MW to just under 6,000 MW.

Overall, the costs of power outages to the continent are significant, with Africa losing almost 12.5 percent of production time compared to 7 percent for South Asia, which is the next worst case. Electricity supply is also a serious infrastructure problem in terms of driving up exporters’ costs. More than 30 countries experience power shortages and regular outages, which, among other things, disrupt economic activity and drive up operating costs. African firms report that frequent power cuts cause them to lose 5 percent of their sales. For firms in the informal sector that
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Dealing with high electricity costs and the unreliability of supply is a priority issue in most African countries. In the majority of cases, addressing the problem will require significant investments in capacity that has lagged behind due to rapid growth in Africa’s demand in recent years or, in the case of postconflict states, due to civil unrest. The potential productivity gains from increasing electricity supply, together with the associated income effect, point to a market with significant growth potential.

Notwithstanding the size of the challenge, the development of energy markets on a regional basis offers significant benefits. Linking national petroleum and electricity industries can help mobilize private and domestic investments by expanding market size. Furthermore, regional interconnectivity can create export opportunities for countries with a comparative advantage in resource endowments. Secondary benefits, such as increased and cheaper energy supply alternatives, also become available to smaller markets and countries.

The study Regional Energy Integration in Africa (World Energy Council, 2005) confirms four major benefits associated with regional energy integration: improved security of supply; higher economic efficiency; enhanced environmental quality; and a wider deployment of renewable energy resources. For instance, large hydropower projects that would not be economically viable for a single country make sense when neighbors share the benefits and costs. Inadequate investment in such projects is mainly a cost problem because: (i) investment in the electricity sector is a large undertaking for a poor country – to develop a hydropower plant is for instance, extremely capital intensive; and (ii) hydropower reserves are often located far from population centers, adding further to the cost.

4.3.2 Transportation
4.3.2.1 Roads
For many African countries, distance from their primary markets and high transportation costs inhibit their participation in global trade. Poor infrastructure is the main cause of high transportation costs and, arguably, the greatest constraint to intra-African trade. Currently the cost of transporting goods in Africa is the highest in the world (Teravaninhtorn and Raballand, 2008). It is estimated that poor infrastructure accounts for 40 percent of transportation costs for coastal countries, and up to 60 percent for landlocked countries (Limão and Venables, 2001). The burden of poor infrastructure on trade increases with geographic and sovereign fragmentation, as Sub-Saharan Africa is highly fragmented.

Several empirical studies document that the returns to investment in infrastructure (for example, upgrading of roads), measured in terms of trade growth, are particularly high in Africa. The real issue is improving (and preserving) the quality of that infrastructure. This can mean both improving the condition of existing infrastructure and upgrading its level of service (Carruthers, Krishnamani, and Murray, 2008).

In addition, regional collaboration is needed for effective infrastructure development because moving goods and people through regional borders and overseas requires corridors linking national capitals to each other, to other big cities, to international borders, and to deep-water ports. Corridors in Africa currently do not carry enough goods or people to reap benefits from more than one type of transport (i.e., multimodal transportation), therefore improving services within modes and along the corridor is key.

Roads constitute the main infrastructure serving regional connectivity, carrying at least 80 percent of goods and 90 percent of passengers. The concept of an intraregional trunk network has existed for some time. In 1970 the Trans-African Highway was conceived as a network of all-weather roads that would provide direct routes between the capital cities. It was envisioned that it would contribute to political, economic, and social integration and cohesion in Africa, and ensure road transportation facilities between important areas of production and consumption (AfDB, 2000). The total length of the nine corridors is 54,120 km. However, the Trans-African Highway is characterized by missing links and poor maintenance in key segments. About half of the network is in the 24 SSA (Sub-Saharan Africa) countries. Of that half, 68 percent is paved, 6 percent has a gravel surface, and 26 percent has a dirt surface or no formed road. Only 27 percent of the network is in good condition, with a similar percentage in fair condition. This means that 46 percent of the network is in poor condition. Two segments of the system that remain unconnected by any sort of road are in Central Africa. There is a 200-km gap between Salo in the Central African Republic and Ouésso in the Republic of Congo, and a 370-km gap in Niger running from the Algerian border. As such, its potential to serve as the heart of regional connectivity remains unrealized. To provide a meaningful level of connectivity, between 60,000 and 100,000 km of regional roads are required.

Design standards are important in estimating the costs of completing the system. Because international road links support high-speed traffic and heavy loads, high minimum standards for road widths are desirable. At present, the highways comprise a wide range of standards: the load limit for single axles in the countries

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5 Except for mineral lines, which are usually privately handled and are not included in the estimations.
through which the Trans-African Highway passes varies between 8.2 and 13 tonnes. This is a substantial variation, which delays border crossings; moreover, the separation of freight from truck deteriorates the quality of service in the logistics chain (AfDB, 2000). Although each country is responsible for the standards applied within its territory, there are important benefits to be gained from the application of common standards, such as avoiding operational and administrative complications at border crossings.

4.3.2.2 Railroads, air transportation, and seaports

Railroads provide significant internal links in some countries and particularly for some landlocked countries: for example, the corridors between Dakar and Bamako, Abidjan and Ouagadougou, or Maputo and East African countries.

In the SSA, rail coverage measured in terms of land area, population, and GDP per capita compares favorably with other regions of the world. However, rail density by land area in the low-income countries of SSA is somewhat lower than in LICs globally. The total rail network in SSA is around 70,000 km, of which about 55,000 km are currently being operated.

Air transportation is particularly important for sparsely populated and landlocked countries, and for future development of the region’s significant tourism potential. Air freight is playing a growing role in the competitiveness of African goods in world markets for high-value, time-sensitive cargo (such as horticultural and floricultural products).

In shipping, the major ports in Africa still need to meet international standards and amplify their capacity in order to increase international trade and reap other benefits of better connectivity. While Sub-Saharan Africa has a proliferation of ports, few are large by world standards and most are not capable of handling the current generation of supersize container ships. Most are poorly equipped and operate at low levels of productivity. Generally, they are unprepared for the dramatic changes in trade and shipping patterns that have occurred since 1995. While they are moving slowly from publicly owned service ports to so-called landlord port structures, often with embedded container-terminal concessions, they still lag behind other global regions in the development of modern port-management structures. Additional momentum for modernization is coming from the growing presence of global shipping lines and international terminal operators in African ports.

4.3.3 ICT

Due to the size of investment requirements, the costs can outweigh the benefits for the private sector from the expansion of ICT services in Sub-Saharan Africa. Governments should, therefore, help to bridge costs and promote public–private partnerships. This will serve to expand opportunities for private investment in a subsector that has proved fundamental in recent years to the region’s development.

The ICT revolution, especially in mobile telecommunications, has had enormous positive impacts on economic growth and social cohesiveness. Mobile phones have revolutionized the way people interact all over the world. The increasing use of ICT in Africa has had positive results both for economic growth and social advancement, such as education (e.g. remote learning through the establishment of virtual universities). The ICT revolution in Africa is responsible for about 1 percentage point of the improvement in Africa’s per capita economic growth rate between the mid-1990s and the mid-2000s. Moreover, it has proven to have multiplier effects, adding to employment growth and income generation. In East Africa alone, the cellphone industry provides direct and indirect employment for close to 500,000 people.

However, climbing the next step toward higher-speed, mass-market broadband access in Africa at affordable prices would involve major investments in backbone infrastructure. The revenue generated from customers would be insufficient to make this investment commercially attractive for the private sector alone. If governments wish to improve broadband internet access and higher speeds, significant levels of public subsidy are required. This underscores the need for a regional approach, by undertaking a strategic sequence of investments in fiberoptic links and backbones. This would pave the road toward leveraging further private sector investment.

The problem results from poor intraregional connectivity, as well as insufficient undersea cables to connect Africa to the rest of the world and to the rich information resources of the internet. Ideally, the submarine cables surrounding the continent should ensure that all coastal countries have access to the intercontinental network. At present, West and Southern Africa have submarine cables, although they do not yet provide full access to all countries. However, there is no submarine infrastructure on the eastern side of the continent; this has led to exceptionally high costs for international communication. In addition, intraregional backbones are needed both to ensure that landlocked countries secure access to submarine infrastructure and to facilitate communications across Africa’s main economic regions.

Therefore there are two priorities for improving ICT in the continent: (i) improve access to high-capacity, submarine fiberoptic cables for low-price international voice services and higher-speed internet access; and (ii) lay high-bandwidth backbone networks to connect towns and cities within countries, across borders and to the international submarine fiberoptic cable networks. It is estimated one-time investment needs range from US$ 229 million for a minimum set of links to US$
515 million for an extensive interregional network connecting all African capitals to one another with fiber optic cables.

4.4 Strengthening regional institutional governance

Beyond the critical need to invest in regional physical infrastructure, there are two further aspects to be considered: (i) strengthening the governance scheme for infrastructure service provision and (ii) enhancing the institutional setup to maintain an effective level of service provision.

The impact of poor governance and weak institutions can be observed in the transportation industry. In this sector, inadequate transit procedures, overregulation, bribes, multiple controls, and poor border service increase transportation times as well as the costs. The lack of standardized procedures at the borders also causes timing to be very variable and unpredictable, creating bottlenecks and making it difficult to meet schedules and international standards. The trucking sector in much of Africa is dominated by cartels that operate through a system of queuing for loads at fixed fares, in contrast to competitive best-offer practices and prices. In Central and West Africa, higher transportation costs are mainly explained by an oligopolized trucking industry with exceptionally high profit margins. While policy responses to these problems have included transit system reforms\textsuperscript{6} and joint border posts or warehouses at ports for landlocked countries,\textsuperscript{7} these practices have not reached all countries in the Sub-Saharan region.

For example, along the Central and Western African corridors, transportation costs are no greater than in other developing countries. However, transportation prices charged to the end-user are much higher. The difference is explained by the set of informal payments and profits earned by trucking companies. The source of these high-profit margins is the set of regulations in many African countries that restrict entry by new companies. When Rwanda, a landlocked country, deregulated its transportation sector, it saw a dramatic drop in transportation prices almost overnight (Teravaninthorn and Raballand, 2008).

Ensuring that maintenance of assets receives its fair share in any investment plan is critical – to give it short shrift is to squander any benefits from previous investments. This means strengthening the planning and budgetary capacity of the local political economy, so that the issue of maintenance is accorded its rightful importance. Planning and resourcing regional infrastructure also pose a challenge for Africa’s integration.

\textsuperscript{6} In Cameroon, Chad, and the Central African Republic.
\textsuperscript{7} Between Kenya and Uganda at Malaba; between Zambia and Zimbabwe at Chirundu; between Zimbabwe and Mozambique at Forbes/Machipanda; along the Trans-Kalahari Corridor; and in West Africa on selective borders of Burkina Faso, Ghana, Mali, and Togo.
5. Financing Africa’s infrastructure in a two-tier market

5.1 Funding sources in a segmented market

AFRICA’S SUBSTANTIAL INVESTMENT needs for infrastructure require a combination of traditional and innovative financing mechanisms, along with greater efficiency in public spending. According to the AICD estimates, Africa’s total infrastructure financing needs amounted to US$ 93 billion a year in 2008, with only US$ 45 billion being financed. Even if all inefficiencies such as poor management and badly targeted subsidies or tariffs were eliminated, an annual gap of US$ 31 billion would remain. Other estimations situate the financing requirements even higher, at US$ 153 billion annually until 2020 (AfDB, 2010c). These financing requirements, even at the lower estimations, represent a huge challenge. African governments need to tap new sources to complement traditional financing alternatives. There is evidence that those countries that have invested strategically in infrastructure are reaping the benefits.8

Traditional partners and the public sector have to date been the main financing sources for Africa’s infrastructure. Public financing has been most prominent in the water, sanitation, and transportation sub-sectors. For instance, in 2007 these sectors accounted for about 90 percent of public investments (Biau, Dahou, and Homma, 2008). Most private investment has targeted the ICT sector, which attracted 87 percent of private commitments in 2008 (OECD, 2010b). There are also opportunities for traditional private investors to share in Africa’s growth, provided that financing arrangements meet debt sustainability criteria. These include risk mitigation instruments, given the relatively high risk perception associated with infrastructure investment in Africa.

Innovative financing mechanisms for infrastructure are a promising trend to emerge across Africa. Such mechanisms include local and foreign currency bonds, private equity, sovereign wealth funds, and emerging South partners such as China. In a broader view of sustainable growth (i.e. one encompassing social and environmental aspects), it is also important that Africa shift as much as possible to “clean energy financing,” given its abundant natural resources. The African Development Bank is setting up the Africa Green Fund to receive and manage resources for climate change adaptation and mitigation. African countries can also do more to attract private and innovative funds on favorable terms. For example, public–private partnerships can be made more effective and remittances better utilized for development purposes.

Public spending efficiency has been identified as a source of financing because current inefficiencies in implementing infrastructure projects account for US$ 17 billion annually (Briceño-Garmendia, Smits, and Foster, 2008). Therefore, improving the capacity of African countries will help to minimize these costs and to bridge the financing gap. Also there is a role to be played by the public sector through strengthening domestic resources and catalyzing private investments. One such avenue is to provide partial credit guarantee with concessional resources, to mitigate the impact of risk perception on availability and costs.

Despite all these alternative options to finance the infrastructure agenda, public financing coupled with private investment niches has left a substantial infrastructure deficit in African low-income countries (LICs). In LICs, official aid is not projected to increase in line with public investment spending (Redifer, 2010). Middle-income countries (MICs), on the other end, have better prospects for securing their financing needs, due to their greater financial market development, lower capacity constraints, and lower perception of risk than that associated with LICs (Shah and Batley, 2009).

The fact of the matter is that there is a two-tier financing market at work, where specific countries can expect to attain better results through tailored financing mechanisms. For example, LICs will have difficulty in trying to deploy innovative financing instruments, whereas they are able to tap resources from donors as they improve public spending efficiency. By contrast, MICs will have more difficulty in accessing certain pockets of international aid but can utilize innovative financing instruments. The donor community should play a greater role in African LICs, while innovative financing mechanisms should be the focus in MICs. Notably, traditional funding sources for infrastructure development remain important but private investment is critical in closing the current gaps.

Both tiers must pay attention to the regulatory environment. Africa’s infrastructure sector is still dominated by monopolistic incumbents who resist market reforms. While progress has been made in this regard, more has to be done. As an illustration, in South Africa, entry is still regarded as highly restricted in the telecommunications, rail freight, and electricity subsectors compared with OECD countries. More generally, 20 out of 26 countries continent-wide score less than
5 out of a maximum of 10 in the services trade liberalization index (OECD, 2010).

5.2 Traditional funding

Private investors and the donor community have increased financing for infrastructure projects in recent years, a trend that continued even through the 2008 global financial and economic crisis. According to the latest estimations, in 2010, more than US$ 55 billion was invested in new infrastructure investments across the continent. Investments by the Infrastructure Consortium for Africa (ICA) members alone rose by 45 percent over the 2008–2009 time span, from about US$ 14 billion to almost US$ 20 billion (AfDB, 2010b). In addition, the share of aid for infrastructure increased from 8 percent in 2006 to 18 percent in 2008 (see Figure 10); yet there is high dependency on aid in some countries, as detailed in Annex A2. It is also noteworthy that Africa currently meets about two-thirds of its infrastructure spending from domestic sources. In addition, the improved policy and business environment is attracting increasing levels of private sector participation through public-private partnerships (PPPs).

The scaling up of private sector engagement in Africa’s infrastructure agenda has been accompanied by changes in the lending and policy facilities of International Financial Institutions (IFIs). The African Development Bank, for example, adapted its lending facilities to LICs to reflect these new developments. The new framework allows for non-concessional borrowing by countries with solid debt indicators and debt management capacity, provided such borrowing does not jeopardize fiscal and external debt sustainability.

Nonetheless, the public sector remains important, both as a direct financier and as a catalyst for private investment. It is also instrumental in addressing inefficiencies and ensuring maintenance of infrastructure assets. African policymakers are increasingly turning their attention to domestic resource mobilization amid concerns over potential decreases in official development assistance (ODA), given the global economic downturn. Hence increasing tax revenues and stimulating private and public savings are crucial measures for meeting Africa’s infrastructure challenge, together with finding new and innovative financing sources.

Low tax-to-GDP ratios (below 15 percent) persist in many African countries, including lower-middle-income economies such as Ghana. Instead of raising tax rates across the board, countries can increase revenues by removing exemptions and strengthening tax administration. In LICs, where the large informal sectors impede effective taxation collection, recourse should be made to excises, VAT and other indirect taxes, provided that they are designed with consideration for poor households.

Public resource mobilization is particularly challenging in postconflict countries, which utilize trade taxes and other simplified direct structures, to reach a balance between indirect and direct taxes. Liberia is a good example of a postconflict country that has managed to achieve high tax revenues in ratio to its GDP.

To increase public savings, government spending – including infrastructure expenditure – needs to be more efficient. Areas to be addressed include: timely delivery of projects to avoid costly emergency measures; maintenance of existing infrastructure to limit expensive rehabilitation; improving efficiency of utilities; and strengthening medium-term expenditure frameworks, accounting frameworks, and auditing procedures.

African countries, especially SSA’s oil importers, need to strengthen and further develop their banking sectors, mobilize untapped private savings, and channel them into productive use. Formal financial institutions could offer long-term saving...
instruments, and incentivize their take-up through tax benefits. African governments could also unlock regulatory barriers that discourage institutional investors, such as pension funds, from utilizing long-term savings instruments. They could also help to diversify capital markets by developing institutional frameworks that foster the participation of, for example, Islamic finance institutions and private equity funds.

5.2.1 Risk mitigation

In the aftermath of the 2008 financial crisis, private investors have become more risk averse. Nevertheless, the shift in investors’ interests from highly leveraged products in advanced economies to real growth possibilities in selected emerging and developing countries presents an opportunity for the continent. African countries can attract private investors by promoting infrastructure projects as growth investment opportunities.

Through risk mitigation instruments, the public sector can catalyze additional private investments in infrastructure, raising the total available finance sources. These instruments need to be accompanied by reforms and institutional changes to eliminate the underlying sources of risk. The key risks are outlined below, together with possible risk mitigation instruments to address them:

» Commercial and political risk premiums can be covered by both debt and equity insurance and guarantee instruments. While commercial instruments exist, concessional ones such as partial risk guarantees offered by the International Development Association (IDA) and African Development Fund (ADF) and political risk insurance offered by the Multilateral Investment Guarantee Agency (MIGA) are more suitable for LICs. Political risk management instruments incentivize governments to implement reforms that address performance risk. For middle income countries, commercial risk management instruments help to develop capital markets and enable enterprises and countries to borrow externally on more competitive terms.

» Country risk premiums can be covered by first loss guarantees for a portfolio of transactions. For example, the First Loss Investment Portfolio Guarantee (FLPG), currently being developed by the AfDB, will facilitate the scaling-up of private sector investments in infrastructure in African LICs, by mitigating their country risk premium. The FLPG is an innovative instrument that would guarantee a portion (up to 10 percent) of the first loss of a defined portfolio of non-sovereign projects financed by the AfDB in LICs. This option allows African LICs to leverage at least five times the value of the guarantee in additional financing from the non-sovereign pool of lending resources.

» Foreign exchange volatility (prevalent in some LICs) can be addressed through currency hedging, government exchange rate guarantees, and devaluation liquidity schemes, among others. However, much greater attention needs to be paid to the affordability of these instruments in the African context.

» Financial risks can be mitigated through viability gap financing (e.g., public subsidies in the form of partial capital cost financing for up-front investment needs). This method allows for private sector implementation of critical infrastructure projects with high economic benefits but low financial returns. By leveraging the limited public funding to attract greater private participation, governments can fast-track key infrastructure developments. Competition in the bidding process and, hence competitive pricing of the viability gap, are key to the success of this approach. In addition to subsidies, lowering financing costs for the private sector can also improve the bankability of projects.

The African Development Bank supports its regional member countries (RMCs) in their efforts to access long-term financing for infrastructure, including through risk-mitigating instruments. For example, the innovative Currency Exchange Fund (TCX) helps investors to hedge interest rate risks associated with infrastructure financing in local currencies, mainly through pooling market risks from different investors with geographically diversified business. Through local currency financing, TCX reduces foreign exchange rate risk. The Bank also supports the development of local currency bond markets in RMCs through the issuance of bonds in local currencies. Finally, the AfDB supports private sector-financed infrastructure through the African Legal Support Facility, which strives to improve contractual terms and the legal environment for the private sector by building countries’ capacity to negotiate complex commercial contracts.

5.2.2 Public–Private Partnerships

In the past decade, public–private partnerships (PPPs) have emerged as key instruments for infrastructure investments in Africa. PPPs are contractual arrangements that allow for private sector involvement in the supply of infrastructure assets and services. PPP modalities include management contract, leasing, investment concessions, divestiture, de-monopolization and new entry and build-operate-transfer (AfDB, 1999). While not innovative per se, PPPs bring innovative private funds to infrastructure. At their best, they ease budgetary constraints and raise efficiency by leveraging private sector management expertise and innovation.

PPPs are not yet common across the continent, even though in recent years African governments have increasingly used them for financing infrastructure. For example, the largest ongoing South African transport
project – the Gautrain – was structured as a PPP (Deloitte, 2010). Examples of good practices emerged also at the municipal level. The Nelspruit Water and Sanitation Concession in South Africa helped raise access to water for households in Mmobela Municipality from 55 percent in 1999 to 94 percent in 2010 (Bender and Gibson, 2010).

Country experiences point to several preconditions for successful financing or executing of PPP projects, such as an adequate institutional framework (e.g., political commitment and effective governance) and a transparent legislative and regulatory framework. The financial viability of a project depends on the stability of the regulatory regime responsible for its implementation. Instability acts as a deterrent to high-quality investment. Adequate risk and reward sharing between the government and the private sector is also critical for establishing effective PPPs. In particular, the pricing of infrastructure services requires careful attention, given its impact on the affordability of new services on the one hand, and the bankability of new investments on the other. In addition, the need for imported technology requires the development of local technical production sites and service centers, alongside secure and affordable supply of operating inputs.

Many African governments still lack the skills needed for the successful implementation of PPPs. In particular, sector ministries and sub-sovereign entities often lack adequate investment, financial planning, and coordination capacity. The experiences of countries that have established well-functioning PPP units in their Ministries of Finance (e.g., Senegal, Kenya, and South Africa) point to the positive impacts of such units. Developing a comprehensive and transparent list of contingent liabilities, such as implicit and explicit government debt guarantees, is also key for a realistic assessment of fiscal risks stemming from PPPs.

5.2.3 Reserves from "excess-savings" countries
Many African countries, especially oil importers, have low savings rates (see Figure 11). Overall rates are notably below the average of emerging market and developing economies, hence capital flows, especially private ones, constitute an indispensable source of financing. Key policy issues in this context are: (i) how to attract additional capital flows to Africa’s infrastructure from developing Asia (e.g., countries with high savings and investment rates), and (ii) how to utilize savings in African resource-rich countries, where savings rates are high but investment rates remain low. Emerging partners, especially China, have been particularly active in Africa since the mid-2000s, providing FDI in addition to official aid and non-concessional loans (see below).

South–South partnerships in infrastructure financing are gaining traction. Developing economies’ share in Africa’s annual FDI inflows increased from around 17.7 percent in 1999 to around 21 percent in 2008. South–South investment flows into Africa have been estimated at more than US$ 60 billion since 2003 (Freemantle and Stevens, 2010). Sovereign wealth funds (SWFs) are an important source of investment; for example, the Libyan Arab African Investment Company made investments worth US$ 800 million in 13 African countries in 2008 alone (Gijón, 2008). A total of 35 African countries have benefited from such inflows, with about 16 percent of the resources channeled into infrastructure. Over the 2001–2007 period, the electricity and transportation subsectors were the prime beneficiary subsectors (Figure 12).

According to the Infrastructure Consortium for Africa (ICA), China’s total commitments to Africa’s infrastructure in 2009 amounted to US$ 5 billion. Chinese infrastructure financing in SSA is highly concentrated in resource-rich countries such as Nigeria, Angola, and Sudan, which attracted over 72 percent of these investments over 2001–2007. The development benefits for African nations could be enhanced by ensuring that governments negotiate equitable deals,
where the appropriate economic values for resources are assigned, environmental externalities accurately valued, and the share of royalties and dividends are robust to price fluctuations. Moreover, the developed infrastructure should not be captive to the resource extraction operations. On a more positive note, only part of Chinese-financed infrastructure investments is directly linked to natural resource extraction (see Figure 12).

Other emerging markets have also shown interest in Africa’s infrastructure projects. India has scaled up finance for infrastructure projects in the region, with committed funding averaging US$ 0.5 billion a year during 2003–2007. Arab and Islamic funding institutions invested US$ 2.4 billion in 2008 and US$ 1.7 billion in 2009. Their coverage of recipient countries is wide (31 African countries benefiting in 2009) but there is a tendency to concentrate in the subregions of North Africa (60 percent in 2009) followed by East Africa (13 percent). Arab partners’ finance has also been concentrated in specific sectors: 34 percent to road construction, 24 percent to the power sector, and 6 percent to dam construction (Investment Consortium for Africa, 2009).

### 5.3 Innovative financing

Several African emerging and frontier markets (e.g., Kenya, South Africa) have successfully adopted innovative methods utilizing domestic resources such as infrastructure and municipal bonds, pension funds, and syndicated loans. Still, given the underdeveloped local capital markets in most African LICs and some small MICs (e.g., Swaziland), access to international capital markets remains key for securing stable and longer-term financing.

#### 5.3.1 Local currency bonds

Kenya’s issuance of government infrastructure bonds (i.e., longer-term bonds funding infrastructure projects in roads, water and energy) during the 2008–2009 global financial crisis is an example that other governments with sufficiently developed domestic bond markets could emulate. Besides supporting aggregate demand during the crisis, the issuance aimed at removing supply-side bottlenecks to growth. Since February 2009, Kenya has successfully issued three infrastructure bonds with a total value of US$ 1 billion. This paved the way for the issuance of corporate bonds by private or state-owned enterprises, for example, by the electricity utility KenGen and the mobile phone company Safaricom.

Kenya’s success with infrastructure bonds is partly attributed to the use of incentives. Holders can use the bonds as collateral to acquire bank loans, while the banks can pledge them as collateral for their repo operations. To boost corporate issuance in local currency, various incentives were given, including an exemption from tax on interest for bond investors. On the
innovative side, the issuance of government bonds with a sukuk (Sharia-compliant) portion facilitated participation by investors adhering to Islamic banking, such as the Gulf African Bank.

5.3.2 Commodity-linked bonds
Commodity-linked bonds have yet to develop in Africa. With some of the continent’s export commodities being traded on the futures market, such bonds could be used to boost infrastructure investments. These bonds could help commodity-exporters raise funds and hedge against unexpectedly large price decreases. They are “capital-protected,” i.e. at maturity the investors are returned at least the nominal principal invested in the bond.

Commodity-linked debt instruments recently emerged in South Africa, where in August 2010 the Standard Bank Group offered investors Rand-denominated commodity-linked exchange traded notes (ETNs). ETNs are listed on the Johannesburg Stock Exchange, with a specific redemption date and returns linked to the performance of precious metals.

5.3.3 Sovereign external bonds
Ghana’s issuance of an external sovereign bond of US$ 750 million in late 2007 was another innovative infrastructure financing instrument. It also set the benchmark for sovereign and private sector borrowing on the international capital market by other frontier market countries. Due to the tight credit conditions stemming from the global financial crisis, most sovereign debt issuances by SSA governments were deferred in 2009 and 2010. However, given the region’s resilience during the crisis, demand for Africa’s bonds is expected to rise. Ghana’s experience highlights the importance of structural reforms, macroeconomic stability, credit rating and preparation before accessing international capital markets. Its debt accumulation shows the challenges to debt sustainability that may arise. Another lesson for African governments is that macro-economic frameworks need to be robust to swings in capital flows.

5.3.4 Diaspora bonds
While the utilization of diaspora remittances for development has yet to be undertaken in Africa, several governments (e.g., Ghana and Sierra Leone) have been exploring this option. Of particular interest is the possibility of tapping into the foreign exchange component of remittances, without interrupting the actual transfer. Under securitization, inflows from foreign banks (in foreign currency) are matched with corresponding payments of the domestic banks in local currency. For remittance securitization to be feasible in Africa, several preconditions would need to be met, including supportive legislation and skills.

When it issued its Millennium Corporate Bond, Ethiopia became a pioneer in this area. The Bond, which targeted both Ethiopians at home and abroad, sought to raise capital for the state-owned Ethiopian Electric Power Corporation. Across the continent, diaspora bonds present an untapped opportunity to mobilize resources in frontier markets with a large diaspora population (e.g., Ethiopia). The World Bank estimates that SSA countries could raise up to US$ 5–10 billion per year through such bonds. They are thus a potential source of longer-term financial resources for infrastructure, complementing remittance flows that are typically used for consumption or social expenditures.

5.3.5 Private equity funds (PEFs)
Private sector participation in Africa’s infrastructure has also risen as a result of private equity funds (PEFs). Both multi-sector and specialized infrastructure funds have participated in green- and brown-field infrastructure projects, the latter being more recent and still small in number. Specialized infrastructure funds were pioneered by established infrastructure development firms such as the Macquarie Group, which sponsored the South Africa Infrastructure Fund as early as 1996. To date, at least ten specialized infrastructure funds have reached financial closure on the continent, mobilizing almost US$ 3 billion in direct financing. (The African Development Bank’s support to such funds is outlined in section 6.2.5.) PEFs invest in various infrastructure sectors including upstream industries, with national, regional or pan-African geographic reach. A mixture of financing instruments – equity, senior debt, subordinated debt or mezzanine finance – is employed. Amounts range from US$ 5 million to US$ 120 million per project. Besides foreign currency financing, PEFs have also provided longer tenors (e.g., 15 years in the SSA Emerging Africa Infrastructure Fund). Infrastructure PEFs mobilize financing from both private institutional investors (e.g., pension funds and insurance firms) and traditional financiers (e.g., DFIs).

5.3.6 Sovereign wealth funds (SWFs)
When well designed and implemented, SWFs can be an important source of finance for resource-rich countries. Accordingly, Nigeria has announced plans to establish a SWF of about US$ 1 billion (AfDB, 2011b). The investment resources will be owned and managed by the government. An infrastructure fund will be one of the three components of the SWF, which is expected to manage (i.e. save and invest) the country’s volatile oil revenues, and will replace the currently existing excess crude fund.

5.4 Efficiency gains from improved spending
Scaling up the current allocation of resources to infrastructure could help achieve substantial gains in the efficiency of infrastructure investments. However, in order to leverage the benefits of these...
and future inflows of resources, efficiency considerations must be observed when developing policies for infrastructure.

According to the AICD report of 2009, annual infrastructure investment needs in Africa amount to approximately US$ 93 billion, one-third of which should be allocated to operations and maintenance. African governments, infrastructure users, the private sector, and external sources together contribute about US$ 45 billion a year to infrastructure. The financial gap is therefore sizable and requires appropriate management to maximize the value of local and foreign investments.9

Spending leakages associated with poor allocation decisions amount to nearly US$ 17 billion. Such losses could be reversed by improving financial management and accountability. About US$ 7.5 billion could be saved by enhancing operational efficiency, while US$ 4.7 billion could be recovered by improved tariff setting aiming at cost recovery. Similarly, US$ 3.3 billion could be recovered through improved prioritization of public projects, and about US$ 1.9 billion through actual spending of resources that are regularly budgeted but not executed.

While private finance tends to be limited to certain infrastructure niches, there are significant gains to be made from more efficient management, to which the private sector could contribute. Between 2001 and 2006, Africa received substantial private investments targeted to ICT (US$ 28 billion), thermal power generation (US$ 3 billion), and ports (US$ 3 billion). Such preferences reflect sectors where institutions are more developed and private management has made a difference with improved, more efficient services and higher-quality delivery.

Private management without complementary investment has also helped to narrow the efficiency gap in railroads, power, and water utilities. Further private investment is needed in sectors such as alternative power technologies, water utilities, railroads, and highways, which often attract some portion of private financing in other regions of the world.

One of the most flagrant inefficiencies curbing sustainable economic growth is the failure to maintain infrastructure assets. Maintenance needs to be understood as an investment in asset preservation, which otherwise becomes more expensive to rebuild. Failure to maintain assets (e.g. roads) deteriorates the quality of the service, deterring users from benefiting as they should. In aggregate, where infrastructure is not maintained, the expected social and economic returns from investment are severely eroded.

Institutional reform should also go beyond utilities to strengthen relevant ministries’ planning functions and address serious deficiencies in the budgetary process. As underscored in the flagship AICD report of 2009, better sector planning is needed in ministries responsible for infrastructure, to ensure that the construction of critical new assets begins early enough to come on line when needed.

5.5 Efficiency gains from the strategic selection of supply technologies

One of the main issues in public resources allocation is setting the correct size and quality of the supply response to the demand for utilities. Given the topography of Africa, it is clear that piped water cannot be provided to all citizens across every African country, not even in the most developed. While the alternative of providing water via standposts for a few hours each day might be considered an inadequate response to a pressing need, nonetheless it is a compromise solution where budgets are constrained.

Just as economies of scale reduce production costs, greater population concentrations facilitate increased access to basic services at lower prices. Furthermore, urban networks ease expansion toward rural areas. Evidence shows that the cost of expanding infrastructure networks in Africa is highly sensitive to population density, supporting the argument in favor of cities. For the highest-density cities, the cost of a bundle of high-quality services per capita is US$ 325; for medium-density cities, it increases to US$ 665; for the rural hinterland US$ 2,837; and for isolated areas US$ 4,879 (see Table 2). Countries with a faster expansion of urban coverage of water and electricity also tend to have a faster expansion of rural coverage. This suggests that urban customers cross-subsidize rural water networks and electrification.

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9 Current local investments come from taxes and tariffs and account for nearly one-third of the current annual spend.
Table 2. Capital cost of infrastructure provision by density (US$ per capita, unless otherwise noted)

<table>
<thead>
<tr>
<th>Infrastructure type</th>
<th>Large cities</th>
<th>Secondary cities</th>
<th>Rural hinterland</th>
<th>Deep rural</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Density (pop./km²)</td>
<td>30,000</td>
<td>20,000</td>
<td>10,000</td>
</tr>
<tr>
<td><strong>Water</strong></td>
<td></td>
<td></td>
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<td></td>
</tr>
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<td>Private tap</td>
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<td>104.2</td>
<td>124.0</td>
<td>168.7</td>
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<td>Standpost</td>
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<td>31.0</td>
<td>36.3</td>
<td>48.5</td>
</tr>
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<td>Hand pump</td>
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<td>8.3</td>
<td>8.3</td>
<td>8.3</td>
</tr>
<tr>
<td><strong>Sanitation</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Septic tank</td>
<td></td>
<td>125.0</td>
<td>125.0</td>
<td>125.0</td>
</tr>
<tr>
<td>Improved latrine</td>
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<td>57.0</td>
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<td>57.0</td>
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<tr>
<td>Unimproved latrine</td>
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<td>39.0</td>
</tr>
<tr>
<td><strong>Power</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grid</td>
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<td>71.2</td>
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<td>95.2</td>
<td>112.5</td>
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<td></td>
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<tr>
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<td>47.4</td>
<td>94.7</td>
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<tr>
<td>Low quality</td>
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<td>23.6</td>
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<td>70.7</td>
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<td></td>
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<tr>
<td>Constant capacity</td>
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<td>1.1</td>
<td>1.7</td>
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<tr>
<td>Actual capacity</td>
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<td>1.7</td>
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<tr>
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<tr>
<td>Variable quality†</td>
<td></td>
<td>325</td>
<td>369</td>
<td>480</td>
</tr>
<tr>
<td>Constant (high) quality††</td>
<td></td>
<td>325</td>
<td>369</td>
<td>480</td>
</tr>
</tbody>
</table>

Notes:
† For variable quality at Total, technology differs by density and location as follows: (a) water: private tap in large cities, standposts in small cities, boreholes in secondary urban cities, hand pump in rural areas; (b) sanitation: septic tanks in large cities, improved latrines in small and secondary urban cities, traditional latrines in rural areas; (c) power: grid in urban areas, mini-grid in rural hinterland, solar in deep rural areas; (d) roads: high-quality scenario; (e) ICT: constant capacity in urban and rural areas.
†† For constant (high) quality, the same technology – the most expensive – applies at any density except for power (grid at any level of density).
Sources: AfDB Data Portal; World Bank.
Increasing infrastructure coverage in rural areas should entail the building of complementarities across sectors. Bundling infrastructure services will increase the return of the investments and secure larger welfare gains for both rural and urban households. Such bundling maximizes the economic and social effect of services provision with improved access to economic opportunities, reducing the gap between the poor and non-poor. A bundling strategy would also serve to maximize coordination and complementarities across sectors beyond the infrastructure field.

Improving the quality and quantity of infrastructure spending will assist countries toward achieving the Millennium Development Goals (MDGs). Sub-Saharan Africa as a whole is unlikely to meet the MDGs for water supply and sanitation by the target date of 2015. Progress has been modest, with access to water increasing by only 9 percentage points between 1990 and 2008, or less than 1 percentage point per year. Sanitation has recorded even worse progress, with only a 5 percentage point increase in coverage over the past 16 years. The urban–rural divide in access to an improved water source continues to be a policy challenge. Access to an improved water source in rural areas increased from 40 percent in 1990 to 53 percent in 2008, while access in urban areas stagnated between 1990 and 2008 at 86 percent (AfDB et al., 2010). Inadequate access is exacerbated by rapid urbanization, linked to the growth of informal settlements. The level of spending needed to meet the MDG target for water will require roughly 2.6 percent of Africa’s annual GDP, while sanitation will require 0.9 percent of GDP per year.

For many countries, such spending levels are unaffordable, and current inefficiencies make them even more challenging. Spending in the water sector today totals about US$ 3.6 billion, one-fourth of the amount required to meet the water MDG. Despite such levels, nearly US$ 2.7 billion available to the sector is currently wasted in labor inefficiencies, under-collection of revenues, and distribution losses.

Regarding sanitation, few countries in Africa are investing in new sanitation facilities at the recommended level. Additionally, their spending on the operation and maintenance of existing facilities is inadequate.

5.6 Special challenges for infrastructure financing

Due to additional risks or externalities, the financing of regional and sustainable infrastructure projects encounters special challenges, which typically require investments by both the private and public sectors.

5.6.1 Regional infrastructure: innovative institutional arrangements needed

Cross-border infrastructure projects promote regional integration and spur regional trade and growth. Such projects pose special challenges though, such as markedly higher transaction costs and complex risk factors for the private investor. Financing regional infrastructure requires effective cooperation and coordination among countries. Innovative institutional arrangements are needed, either through an expanded role for multilateral development banks (i.e. taking a greater share of regional infrastructure projects), as is already the case for the AfDB, or through establishing specialized subregional banks/ funds. The latter would allow drawing on the high reserves that some of the resource-rich African countries have accumulated.

To overcome the high risks and transaction costs of private investment in regional infrastructure projects, some regional economic communities (e.g., ECOWAS and SADC) are establishing bilateral or multilateral special purpose vehicles (SPVs). The SPVs are mandated to identify, prepare, and manage regional infrastructure projects and negotiate with private investors. A prioritized subregional PPP project list, as proposed by the COMESA, could help RECs to engage potential investors and leverage their efforts to mobilize infrastructure funding.

Subregional PPP units (as advisory centers) could be set up, especially in countries with a shallow pool of skills. The scaling-up of technical assistance to governments for project preparation activities would also help “right-size” the now disproportionately high upfront risk borne by private investors. Coordinating PPP regulatory frameworks across subregions would facilitate the implementation of regional infrastructure projects. The African Development Bank and other institutions with capacity to extend technical assistance could help in this area.

5.6.2 Clean technology for sustainable infrastructure

Africa, and especially SSA, is the most vulnerable region worldwide to the effects of climate change, even though it has contributed the least to carbon emissions. Nevertheless, a key challenge for the continent is to finance investment in low-carbon, climate-proof infrastructure, i.e. infrastructure that would both mitigate and adapt to climate change. Given the other vast development challenges that the continent faces, resources for sustainable infrastructure financing need to be mobilized outside of national budgets. This calls for innovative forms of financing that would be additional to the existing mechanisms.

Given its abundant natural resources and the innovative financing instruments available, Africa should embark on a low-carbon, clean growth path. Carbon finance can contribute to the cofinancing of sustainable infrastructure. As a market-based (and legally enforceable) mechanism, it is more predictable than budget aid and can help generate efficiency gains and bring
down the cost of renewable energy and other forms of sustainable infrastructure. So far though, access to carbon credits by Clean Energy projects in emerging markets and developing countries has met with mixed results across regions, with Africa lagging substantially behind the others.

With investments in clean energy solutions, Africa can tap into concessional financing sources and thus reduce the costs and risks of such investments. For example, the Clean Technology Fund projects will leverage at least five times their value in clean energy solutions, including energy efficiency, renewable energy, and sustainable transport investments. Private sources will play a greater role in financing clean energy projects, but low returns to private sector investors so far imply that a majority of expenditures will need to be covered from public sources (AfDB, 2010d).

Africa’s perspectives must be taken into account when decisions on disbursements of global funds for climate change adaptation and mitigation are made. To help facilitate access to these funds, the AfDB is setting up the Africa Green Fund to receive and manage resources to address climate change on the continent.
6. The role of the African Development Bank in infrastructure

6.1 Infrastructure financing by the African Development Bank over the period 2008–2012

Infrastructure financing continues to be accorded a very high priority by the African Development Bank. The aim is to target high-impact projects and programs that will create an enabling environment for private sector investment, improve competitiveness and productivity in regional member countries, enhance employment opportunities, and support sustainable economic growth.

Over the period, 2008–2012, the Bank’s cumulative financing for infrastructure projects and programs amounted to UA 11.3 billion (US$ 17.5 billion)\(^{10}\) (see Table 3 below). This represents 51 percent of the Bank Group’s total loan and grant approvals during the period, which totaled UA 22.1 billion (US$ 34.1 billion) for all sectors.

The amount of loans and grants approved in 2012 reached UA 1.8 billion (US$ 2.7 billion), a rise of around 10 percent from the 2011 level, though still far below the peak reached in 2009 and 2010.

With respect to the subsectoral split over the period 2008–2012, energy (44.1 percent) received the highest share, slightly more than the allocation to transportation (42.5 percent). Water supply and sanitation and ICT received smaller tranches at 12.3 percent and 1.1 percent respectively. The allocations for ICT and water & sanitation remained at a lower level throughout the period, but transportation and energy recorded some variation. Transportation received the largest share in 2008 (45.4 percent), 2010 (47.6 percent), and 2011 (63.9 percent), while energy received the largest share of 57.2 percent in 2009. Some of the key subsector projects and programs approved during the period are summarized below.

6.1.1 Regional transportation support
A focal area for the Bank during the period 2008–2012 was road transportation networks across the continent, with financing to the subsector increasing from UA 641.1 million (US$ 987.5 million) in 2008 to over UA 1 billion for each of the years 2009, 2010, and 2011. However, this decreased to UA 604.2 million (US$ 928.6 million) in 2012 (see Table 3).

Table 3. Bank Group loan and grant approvals to infrastructure by subsector, 2008–2012 (UA millions)

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<tr>
<td>loans &amp; grants</td>
<td>3,170.2</td>
<td>7,505.7</td>
<td>3,674.5</td>
<td>4,127.9</td>
<td>3,602.8</td>
<td>22,081.1</td>
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<tr>
<td>Financing</td>
<td>1,411.5</td>
<td>3,907.9</td>
<td>2,603.5</td>
<td>1,572.3</td>
<td>1,763.5</td>
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<tr>
<td>Water &amp; Sanitation</td>
<td>236.8 (16.8%)</td>
<td>297.4 (7.6%)</td>
<td>444.1 (17.1%)</td>
<td>139.2 (8.9%)</td>
<td>269.7 (15.3%)</td>
<td>1,387.2 (12.3%)</td>
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<td>Energy</td>
<td>533.5 (37.8%)</td>
<td>2,233.5 (57.2%)</td>
<td>887.6 (34.1%)</td>
<td>420.1 (26.7%)</td>
<td>889.7 (50.5%)</td>
<td>4,964.4 (44.1%)</td>
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<td>Communication</td>
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<td>84.3 (2.2%)</td>
<td>32.4 (1.2%)</td>
<td>7.6 (0.5%)</td>
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<td>124.3 (1.1%)</td>
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<tr>
<td>Transportation</td>
<td>641.1 (45.4%)</td>
<td>1,292.7 (33.1%)</td>
<td>1,239.4 (47.6%)</td>
<td>1,005.4 (63.9%)</td>
<td>604.2 (34.3%)</td>
<td>4,782.8 (42.5%)</td>
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<td>Infrastructure Share</td>
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<td>in Bank Group Total</td>
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<tr>
<td>Financing</td>
<td>44.5%</td>
<td>52.1%</td>
<td>70.9%</td>
<td>38.1%</td>
<td>48.9%</td>
<td>51.0%</td>
</tr>
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</table>

Source: AfDB Statistics Department, Economic and Social Statistics Division
During 2012, to support regional networks, the AfDB approved a number of projects, including UA 175.7 million (US$ 270.0 million) for rehabilitation of 303 km of the Lomé–Cinkanse–Ouagadougou CU9 Corridor, from Togo to Burkina Faso. The Bank’s contribution represents 70 percent of the total project cost and should help to boost trade and integration in the WAEMU subregion. To improve connectivity in the SADC subregion, the Bank also approved in 2012, UA 38.7 million (US$ 59.4 million) for the Nacala Road Corridor Phase III in Mozambique.

Among the key transportation projects approved in 2011 were the Mombasa–Nairobi Regional Corridor Phase III and the Rehabilitation of the Lomé–Cotonou Road & Transport Facilitation on the Abidjan–Lagos Corridor – Phase I. The Bank also approved the financing of two major bridges to serve as regional links. These are the Kazungula Bridge linking Botswana and Zambia in Southern Africa and the Gambia Bridge linking The Gambia and Senegal in Western Africa. In addition, the Bank approved a regional highway project between Tunis and Libya.

Looking back to 2010, eight road projects were approved, five of which targeted rural and feeder roads. The objective for such projects is to link rural areas to urban markets, lower the cost of agricultural inputs, reduce transportation costs, and scale up food productivity and income levels.

One key approval for the rail network in 2010 was for the South Africa Transnet project, linking rail networks, ports, and pipelines (UA 271.3 million/US$ 417.8 million). Another major project was the Moroccan Tangiers–Marrakech Railroad Capacity Increase Project to improve the freight transportation market between Tangiers and Marrakech, in partnership with Morocco’s National Railway Company (ONCF).

### Box 3: The Three Water Initiatives

1. **The Rural Water Supply and Sanitation Initiative (RWSSI)**
   The RWSSI seeks to accelerate access to safe drinking water and improved sanitation in rural Africa, in compliance with the African Water Vision of 2025 and the MDG targets for 2015. Since the RWSSI was launched in 2003, the AfDB has invested UA 0.8 billion in financing 37 programs in 26 countries. The Initiative has leveraged over UA 2.7 billion from other donors, governments and communities while the RWSSI Trust Fund (TF) has contributed UA 97 million. This funding has so far provided water supply and sanitation access to 54 million and 31 million people, respectively. In 2012, six new RWSSI projects (worth about UA 50 million or US$ 76.8 million) were approved by the Bank for the Central African Republic, Chad, Djibouti, The Gambia, Liberia, and Mauritania.

2. **The African Water Facility (AWF)**
   The AWF, an initiative of the African Ministers’ Council on Water (AMCOW), administered by the Bank, was established in 2004 to help achieve the objectives of the Africa Water Vision 2025. A total of 74 projects have been approved since operations began in 2006, amounting to UA 77 million (US$ 118.9 million). By the end of 2012, the AWF’s active portfolio comprised 48 ongoing operations worth around UA 60 million (US$ 92.2 million).

   In 2012 the Canadian International Development Agency (CIDA) and the Australian Government Overseas Aid Program (AusAID) gave a further UA 12.5 million (CAN$ 19 million) and UA 2.3 million (AUS$ 3.4 million) respectively, triggered by the adoption of the Facility’s new Strategic Plan 2012-2016. Six African countries, namely Burkina Faso, Côte d’Ivoire, Republic of Congo, Chad, Niger and Nigeria, also pledged new contributions totaling UA 13.0 million (US$ 18.4 million).

3. **The Multi-Donor Water Partnership Program (MDWPP)**
   The MDWPP is the core facility for developing African countries’ capacity in Integrated Water Resources Management (IWRM), as well as promoting learning and innovation in a range of water sector issues. In 2012, the following activities were completed: (i) dissemination of the outputs of the study on Development Aid and Access to Water and Sanitation in Sub-Saharan Africa, (ii) a study that will inform the Bank’s operational framework for Urban Water Supply and Sanitation interventions, (iii) support to the RWSSI donor conference held in Marseilles, which culminated in pledges of over US$ 115 million, and (iv) an independent evaluation of MDWPP.

### 6.1.2 Water and sanitation support

During the period 2008–2012, total loans and grant approvals for this sector, together with allocations from Special Funds, cumulatively amounted to UA 1.4 billion (US$ 2.2 billion), reaching a high of UA 444.1 million (US$ 683.9 million) in 2010, then decreasing to UA 139.2 million (US$ 213.7 million) in 2011 before picking up to UA 269.7 million (US$ 414.5 million) in 2012.
The interventions cover drinking water supply, water resources management, sanitation and hygiene, capacity building, and policy reform programs.

Urban water supply and sanitation are targeted by the Bank through such interventions as rehabilitation and service expansion, reduction of high levels of unaccounted-for-water (UFW), and promoting private sector activities to address the growing needs of the urban sector. In 2011, three new urban and peri-urban water supply and sanitation programs/projects were approved for Uganda, Egypt, and Zimbabwe for total financing of UA 38.0 million (US$ 58.3 million). The level of approvals was higher in 2010, when six new urban and peri-urban water supply and sanitation programs/projects were approved for Côte d’Ivoire, Kenya, Liberia, Mauritania, Morocco, and Sierra Leone in addition to one multinational project, for total financing of UA 371.3 million (US$ 571.8 million).

Besides the projects and programs noted above, the Bank continues to host three complementary initiatives: namely, the Rural Water Supply and Sanitation Initiative (RWSSI), the African Water Facility (AWF), and the Multi-Donor Water Partnership Program (MDWPP). These initiatives jointly enhance the effectiveness of the Bank’s activities and provide vital resources for scaling up access to safe water and sanitation, promoting innovative technologies, and supporting knowledge management activities (see Box 3).

6.1.3 Energy support

During the period 2008-2012, the Bank approved cumulatively UA 5.0 billion (US$ 7.7 billion) for the energy subsector. Approvals increased significantly from UA 533.5 million (US$ 821.7 million) in 2008 to a high of UA 2.2 billion (US$ 3.5 billion) in 2009, dropping to UA 887.6 million (US$ 1.4 billion) in 2010 and UA 420.1 million (US$ 645.0 million) in 2011 before rebounding to UA 889.7 million (US$ 1.4 billion) in 2012.

In 2012 the Bank continued to support a number of green energy projects, including two in Morocco, namely UA 207.8 million (US$ 319.4 million) for a solar power plant and UA 377.3 million (US$ 580.5 million) for an integrated wind/hydro and rural electrification program. Another key energy project approved in 2012 was the Ethiopia–Kenya Electricity Highway, which was allocated UA 225.0 million (US$ 345.8 million) by the AfDB. This will allow the provision of substantial hydropower generated in Ethiopia through to Kenya, with a regional energy trade of about 12,000 GWh by 2025, connecting 870,000 new households and 550,000 small businesses in Kenya alone.

Looking back to 2011, two principal energy projects were: (i) the Eskom Renewable Energy Project (US$ 345.7 million) in South Africa and (ii) the Menengai Geothermal Development project (US$ 147.5 million) in Kenya. These projects seek to address those countries’ growing energy needs and power deficits in an environmentally friendly way. Other approvals during the year included the Lom Pangar Hydroelectric Project in Cameroon to transmit electricity to an additional 150 communities; and the Rural Electrification Project in Guinea, to bring energy to 31 more communities and 60,000 households.

During 2010, 14 new projects were approved. Eleven of these were public sector operations, for a total funding of UA 753.5 million (US$ 1,160.4 million). The remaining three were private sector projects – the Dibamba Power Project in Cameroon, the Tunisia Hasdrubal Oil and Gas Field Development Project, and the Cabeolica Wind Power Project in Cape Verde – which jointly amounted to UA 134.1 million (US$ 206.5 million).

### 6.1.4 ICT support

The Bank approved a total of UA 124.3 million (US$ 192.0 million) to the ICT subsector over the period 2008–2012. Allocations decreased from UA 84.3 million (US$ 132.2 million) in 2009 (there was no allocation in 2008), to UA 32.4 million (US$ 49.9 million) in 2010, UA 7.6 million (US$ 11.7 million) in 2011 but with no allocations in 2012. The allocation for 2011 covers the Seychelles Submarine Cable Project, which is a public–private sector project for the construction and operation of a submarine cable linking the Seychelles with other East African systems. This will help to improve communications between this island state and the rest of the continent. Previous key ICT programs cofinanced by the Bank include the Satellite O3B multinational project for the construction and operation of a constellation of eight middle earth orbit (MEO) satellites over Africa, which attracted UA 32.1 million (US$ 49.4 million) from the Bank in 2010. Other major ICT projects supported by the Bank in earlier years include the RASCOM Telecommunications Satellite Project and the East African Submarine Cable System (EASSy) Project (both approved in 2007).

### 6.1.5 Support to private equity infrastructure funds

The Bank has for several years extended long-term debt financing to private equity funds that target infrastructure development on the continent. These have included the Africa Energy Infrastructure Fund (AEIF), approved for US$ 30 million of funding in 2008; the Emerging Africa Infrastructure Fund (EAIF) which received a Bank loan of US$ 31.25 million in 2009 and a second loan of US$ 45 million in 2011; while US$ 12.4 million was allocated to the Evolution One Fund in South Africa, which targets clean technology/energy investments; and the Helios Investors II Fund, which includes infrastructure as one of its key areas.
6.2 The AfDB’s partnerships for infrastructure development

Given the criticality of infrastructure development to the continent’s economic growth and social advancement, the Bank has for many years positioned this sector at the top of its operational agenda, as articulated in its Medium-Term Strategy 2008-2012. However, the sector’s massive financing requirements cannot be met by any one development finance institution alone. It is vital for all governments, DFIs, UN agencies, Regional Economic Communities, international donor agencies, as well as the private sector to work together to maximize resources, catalyze additional funds, and leverage synergies. In this respect, the Bank has long been supportive of strong partnerships with global and regional institutions.

The AfDB has been actively involved in a number of partnerships that specifically target infrastructure development. These include the NEPAD Short-Term Action Plan (STAP), the NEPAD Medium-to-Long-Term Strategic Framework (MLTSF), the African Union Infrastructure Master Plan Initiative, the NEPAD Infrastructure Project Preparation Fund (IPPF), the Infrastructure Consortium for Africa (ICA), the EU–Africa Infrastructure Trust Fund, the Program for Infrastructure Development in Africa (PIDA), and most recently the African Infrastructure Knowledge Program (AIKP). The Bank also hosts three water initiatives for the continent that involve multiple stakeholders: namely, the Rural Water Supply and Sanitation Initiative (RWSSI), the African Water Facility (AWF), and the Multi-Donor Water Partnership Program (MDWPP) (see Box 3 in section 6.1.2).

6.2.1 NEPAD Infrastructure Project Preparation Fund (NEPAD-IPPF)
The NEPAD Infrastructure Project Preparation Facility (NEPAD-IPPF) Special Fund provides grant resources for: (i) preparing high-quality and viable regional/continental infrastructure projects with a view to requesting financing from public and private sources; (ii) developing a consensus and partnership for project implementation; and (iii) promoting infrastructure projects and programs aimed at enhancing regional integration and trade.

The NEPAD-IPPF supports regional infrastructure development projects in the following sectors: transportation, energy, ICT, and water resources management. The activities eligible for financing under the Fund are: (i) prefeasibility studies; (ii) feasibility studies; (iii) project structuring; (iv) capacity building for infrastructure development; and (v) facilitation and creation of an enabling environment for regional infrastructure development.

At the end of May 2010, IPPF had an active portfolio of 41 projects (53 in the pipeline until 2015) and had initiated regional infrastructure projects worth around US$ 4.7 billion, representing a huge leveraging potential. An Africa Action Plan priority projects list, worth about US$ 32 billion, has also been drawn up, with energy the dominant subsector. The major projects in this list include the US$ 20 billion Nigeria–Algeria gas connection project, and the Sambangalou Kaleta Hydropower and Kenya–Ethiopia Interconnection, both of which are worth more than US$ 1 billion.

Key achievements of the IPPF to date include work on the: (i) Benin–Togo–Ghana Electricity Interconnection Project, (ii) Kenya–Uganda Oil Pipeline Project, (iii) Zambia–Tanzania–Kenya Power Interconnection Project, (iv) East African Submarine Cable (EASSy) Project, (v) OMVG Electricity Project, and (vi) Ghana–Burkina power interconnection project, etc.

Due to this success, new donors have joined the Fund which now counts among its members Canada, Denmark, Norway, UK (DFID), Germany and Spain in addition to AfDB. The total capital of the Fund has reached US$ 46 million. The NEPAD IPPF is hosted by the African Development Bank.

6.2.2 Infrastructure Consortium for Africa (ICA)
The ICA was launched at the G8 Summit in Gleneagles in 2005. It is not a financing agency as such but acts as a catalyst to accelerate the development of Africa’s infrastructure. ICA also works to help remove some of the technical and policy challenges and barriers to building more infrastructure facilities and to better coordinate the activities of its members and other significant sources of infrastructure finance, such as China, India and Arab partners.

ICA members include, in addition to the African Development Bank, the G8 countries, the World Bank Group, the European Commission, the European Investment Bank, and the Development Bank of Southern Africa. ICA is supported by a small secretariat that is hosted by the African Development Bank in Tunis, Tunisia.

The Bank committed more than US$ 4 billion to the ICA over two years (2007–08), representing about 24 percent of total contributions to the initiative.

6.2.3 EU–Africa Infrastructure Trust Fund
The EU–Africa Infrastructure Trust Fund was launched in 2007 to catalyze financing for infrastructure programs that facilitate interconnectivity and regional integration on the African continent. It supports synergies between European development agencies for the benefit of Africa, leveraging additional funds by blending grants from the European Commission and EU Member-States with long-term loan finance made available by eligible financiers.

It counts among its major stakeholders the African Development Bank (AfDB),
the African Union (AU), the European Investment Bank (EIB), the European Union (EU), the European Commission (EC), the New Partnership on Africa’s Development (NEPAD), Infrastructure Consortium for Africa, Regional Economic Communities and World Bank’s Public–Private Infrastructure Advisory Facility (PPIAF).

6.2.4 Program for Infrastructure Development in Africa (PIDA)
The AfDB is the Executing Agency for the Program for Infrastructure Development in Africa (PIDA), which was launched in July 2010 as successor to the NEPAD Medium to Long Term Strategic Framework (MLTSF). PIDA’s objective is to develop a vision and strategic framework for the development of regional and continental infrastructure, including transboundary water resources. The PIDA initiative is led by the African Union Commission, the NEPAD Secretariat, and the AfDB. The Bank’s role as Executing Agency covers the responsibility for contractual, financial, technical and administrative management of the program.

6.2.5 The Africa Infrastructure Knowledge Program (AIKP)
The Africa Infrastructure Knowledge Program (AIKP) is a recent initiative, launched as a successor program to the Africa Infrastructure Country Diagnostic (AICD) which grew out of the pledge by the G8 Summit of 2005 at Gleneagles to scale up ODA assistance to Africa, particularly the infrastructure sector. The AIKP builds on the AICD Flagship Report commissioned by the World Bank, *Africa’s Infrastructure: A Time for Transformation* (AICD, 2009) which produced a wealth of analytical products hosted through the AICD web portal.

The AIKP adopts a longer-term perspective than the AICD and provides a framework for generating knowledge on infrastructure on a more sustainable basis. The AfDB is the central actor in the AIKP process but works in close partnership with the World Bank. It takes the lead in the regular collection and assessment of infrastructure indicators; the management of the dissemination of infrastructure data via its Data Portal (including AICD data which have now been transferred to its database); the production of knowledge products such as the newly launched *Handbook on Infrastructure Statistics*; and the timely policy analysis of emerging infrastructure trends on the continent to guide future policy and funding decisions. The Bank also assists through the AIKP and in partnership with organizations such as the World Bank, in the training of personnel at African National Statistical Agencies to help boost statistical capacity at the national level and ensure the quality of the infrastructure data that are collected.

6.3 The AfDB’s Urban Development Strategy
In 2011 the AfDB adopted a new Urban Development Strategy, with the vision of making African cities and towns: (i) healthy environments for citizens to work and live in; (ii) competitive and bankable with a strong development base; and (iii) well governed. The three pillars of the AfDB’s Urban Development Strategy are founded on the institution’s strengths and established track record in providing support in the following areas:

» Infrastructure delivery and maintenance. This involves a twin-track approach. The first targets improvements to the physical infrastructure, viz. water supply and sanitation; transportation systems; energy supplies; broadband connectivity and ICT; social infrastructure, including education establishments and health centers/hospitals. The second approach is to build capacity in the development and management of infrastructure, by helping municipal authorities to: implement sound urban planning schemes; maintain municipal physical infrastructure assets; tap financial markets, facilitate public–private partnerships in financing urban projects; and build appropriate regulatory institutions at national and municipal levels to improve services and scale up social protection programs.

» Urban governance. The objective in this area is building good governance systems and strengthening the capacity of municipal authorities to promote a culture of transparency, instigate anti-corruption strategies and systems, and implement reforms targeted at fiscal decentralization, self-sufficiency, and the sustainability of public investment. The Bank also provides assistance to municipalities to improve their systems of revenue collection and tax administration to supplement their budgets.

» Private sector development. The Bank supports private enterprises and public–private partnerships (PPPs) to help finance urban development programs. One way is by enhancing the business-enabling environment through improvements to infrastructure (e.g. improving ICT networks; more reliable electricity supply; better transportation linkages). Helping municipalities and local authorities reform their legal and regulatory frameworks may also spur new investments.

In order to scale up its support for urban development, the Bank Group engages in partnerships with other major players (e.g. World Bank, Cities Alliance, UN–HABITAT, and the Millennium Challenge Corporation), financial development banks, and bilateral donor partners (e.g. AFD, GTZ, DFID, and SIDA). The objective is not only to leverage additional resources, but also to promote coordination and harmonization of activities, programs, and projects.
References


Presentation at the G8 Africa Infrastructure Investment Conference, 2009.


### Table A1. Infrastructural deficits in low-income countries (LICs) in Sub-Saharan Africa and elsewhere

<table>
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<td>Density of paved road network* /</td>
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<td>Density of mobile phone line**</td>
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Source: Yepes et al. (2008).

Notes:
* km/1000km2 (2001).
** subscribers per 1000 people (2004).
† MW per 1 million people (2003).
‡ Percent of households with access (2002-2004).
### Table A2. Total aid, aid to infrastructure, and aid dependency in African countries, 2008

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<tr>
<th>Country</th>
<th>Total Aid (USD mn)</th>
<th>Infrastructure Aid (USD mn)</th>
<th>Aid Dependency (%)</th>
<th>Share of infrastructure in Aid (%)</th>
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*Source: OECD, Creditor Reporting System Database and AfDB Statistics Department*
Table A.3: African urban agglomerations of more than 1 million population in 2010

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<th>Country</th>
<th>Urban Agglomeration</th>
<th>2010 (millions)</th>
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Source: UN Population Division 2009 Revision