



## **Smart Cities Funding and Financing in Developing Economies**

Assisting developing cities to finance their infrastructure gap through private sector participation approaches



# About



## Michael Flynn

Michael Flynn is the Global Financial Advisory Public Sector Leader for Deloitte. He also leads the Deloitte EMEA Infrastructure & Capital Projects practice and focuses on advising public, private and banking team clients on finance raising, restructuring and refinancing of both project finance and corporate debt transactions including the development of government and infrastructure assets, real estate, energy, and renewable energy assets. This advice has included the incorporation of 'smart' into traditional infrastructure and considering value capture opportunities including asset recycling for government clients.

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# About



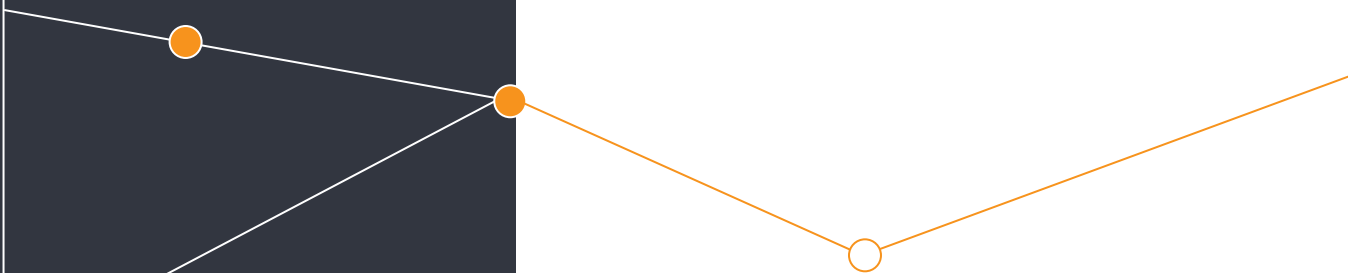
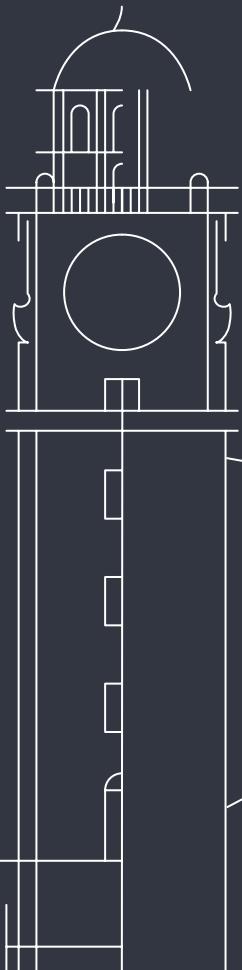
## James Horner

James is the global leader for the International Donor Organizations sector of Deloitte Consulting LLP. For many years, he served as global lead client service partner (LCSP) for the United States Agency for International Development (USAID) client. James is currently leading the design and implementation of a revised global platform and operating model for Deloitte to best serve international donor and multilateral clients. James has worked in the international development arena for more than 20 years. Previous to this, he served for 15 years as a banking supervision and regulatory policy specialist for the Office of the Comptroller of Currency (US Treasury).



## Drilon S. Gashi

Drilon Gashi is a Senior Consultant in Deloitte's Infrastructure and Capital Projects practice with 9 years of international experience leading projects and producing policy analyses for government and multilateral agencies. Drilon's areas of focus are urban development, infrastructure finance, smart cities, economic development strategy, and energy infrastructure. Drilon has advised city governments in over 10 countries to design economic development strategies and finance new infrastructure projects. Drilon previously served as an Urban Development Consultant for the World Bank Group's urban development global practice from 2014-2017, as well as external consultant to the Office of the Prime Minister of Kosovo from 2008-2010. He holds a Master of International Affairs (Economic and Political Development) from Columbia University and a Bachelor of Economics from Ramapo College of New Jersey.



# Introduction

Governments around the world today spend about \$2.5 trillion each year on building and repairing crucial infrastructure.<sup>1</sup> Developing countries require an additional \$1.3 trillion of public infrastructure investment.<sup>2</sup> These amounts are not nearly enough to meet current demand for transportation, water, power, sanitation, energy, telecommunications, and other infrastructure, especially in developing countries. Certainly, it will not be enough to meet those needs in the future. While government budgets are traditionally the major source of infrastructure finance, they will not alone be able to finance these infrastructure needs. The volume of private participation in financing developing economies' infrastructure projects remains low,<sup>3</sup> and thus governments, particularly in cities, may likely need to achieve a pipeline of privately financed or "bankable" infrastructure projects to meet future demands.

International development organizations (IDOs) can help cities through providing lower-than-market-rate concessional finance, technical assistance to structure private investment projects, and additional capacity to mobilize private financing. Yet ultimately, city governments themselves should evaluate and understand at the outset the private financing approaches available, identify the financing structure for their high-impact infrastructure projects, and choose the adequate procurement model for implementation.

**Figure 1. The landscape for new infrastructure needs<sup>4</sup>**



Larger, more crowded cities will need investment in transportation, water, power, sanitation, energy, and telecom



OECD: World should **spend 3.5% of GDP on infrastructure** to meet current needs



UN: **60% of the world will live in cities** by 2030

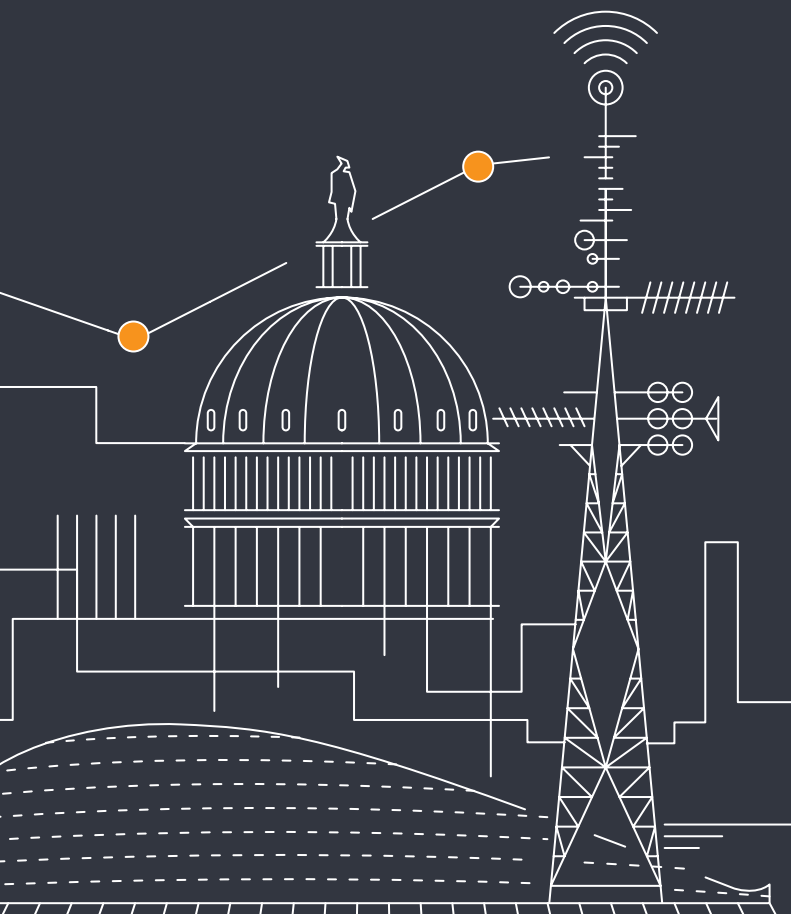
# Forces that drive infrastructure spending

Several global trends drive the need for greater infrastructure spending, and unlocking private financing is a way to address this need. These trends include:

## 1. Increasing urbanization

In developing regions, the gap between infrastructure needs and investment is growing at an even more alarming rate, thanks to a massive shift of population from rural areas to cities. According to the United Nations, by 2030, 60 percent of the world's population will live in cities, and one in three individuals will live in a city with a population of half a million or more.<sup>5</sup> By 2050, city dwellers are expected to outnumber their rural counterparts by a ratio of two to one. Ninety percent of urban expansion today takes place in developing countries. At the same time, urban sprawl will expand the built-up areas of cities around the world from 200,000 square kilometers to 600,000.<sup>6</sup> Oftentimes, sprawling cities expand with inefficient low-density developments and extensive road networks for car-based transport. This has negative implications for global emissions.

Compounding the need for adequate infrastructure, expansion is often in areas near natural hazards, rivers, and coastlines; and new city dwellers are often living in informal and unplanned settlements.<sup>7</sup> These population centers are especially susceptible to stresses and shocks from hurricanes, tsunamis, floods, and other natural disasters.<sup>8</sup> The rising sea levels and the associated sinking or collapse of coastal lands in the 136 largest coastal cities could trigger \$1 trillion in losses unless those cities make new investments in urban resilience.<sup>9</sup>



## 2. Underinvestment in infrastructure

According to estimates from the Organisation for Economic Co-operation and Development (OECD), to support expected rates of economic growth, the world will need to spend about 3.5 percent of GDP on infrastructure through 2030—a total of \$71 trillion or an average of \$3.3 trillion a year. Governments will likely have to spend even more on top of that sum to mitigate climate change and cope with its effects.<sup>10</sup> As municipalities grow and become more crowded, there will be an even greater need for investment in vital infrastructure assets.

There has been limited investment in infrastructure to date, and this includes a lack of investment in basic infrastructure, including water, power, and sanitation. Therefore, despite increasing pressure to ramp up infrastructure development, investment in infrastructure has actually declined in recent years. Right after the financial crisis of the late 2000s, large infrastructure projects featured heavily in the spending programs that developed nations launched to stimulate economic recovery. Nevertheless, those initiatives peaked around 2009. Since then, many developed nations have actually reduced their infrastructure spending, which further increases the funding gap for the future. The effect was also evident in developing countries. Private capital for infrastructure in Africa declined each year from 2008–2012.<sup>11</sup>

## 3. A lack of available funds

Significant investment is needed to close the infrastructure gap. There is little chance that governments will close this gap if they keep financing infrastructure projects as they have in the past, mainly with public funds. In many economies, government deficits, increased public debt-to-GDP ratios, and the difficulty of delivering efficient investment spending have forced public officials to reduce the funds they allocate to infrastructure.<sup>12</sup>

As they expand, cities come under pressure to provide municipal services to more and more citizens, whilst not being able to accrue the necessary tax income to fund them. This can be due to a host of reasons. Inefficient or ineffective tax collection is sometimes an issue, due to systemic deficiencies of public authorities or a specific context in which taxpayers themselves do not pay for such services. Alternatively, while taxes are collected, the quantity may be insufficient for what planned government spending requires.

## 4. Country risk significantly impacts investment ability/credit ratings

Developing economies, both from private sector and institutional investor perspectives, offer significant infrastructure risks, including political and regulatory risk, macroeconomic and business risks, and technical risk. Political risks can include government changes to policies or regulations that adversely affect infrastructure investments. Macroeconomic risks refer to an infrastructure asset's exposure to the business cycle and changes in market demand, or general risks due to varying economic variables (e.g., fluctuations in inflation or interest rates). Lastly, technical risks refer to the varying skills of the technicians involved in implementing an infrastructure project or the varying complexity of the project itself.<sup>13</sup> There are varying characterizations for these risks, with other options including the following:

- a) construction risk,
- b) sponsor risk,
- c) operating risk,
- d) technology risk,
- e) environmental and planning risk,
- f) legal risk, and
- g) force majeure risk.<sup>14</sup>

The risks above are heightened in developing economies due to weaker and/or less stable economic and financial conditions. Institutional investors face the added challenge of securing an investment-grade rating necessary to invest in specific projects. The World Bank Group estimates that less than 20 percent of the largest 500 cities in developing countries are creditworthy for their local markets. This lowered investment ability makes it even more difficult to finance public infrastructure investments.<sup>15</sup>

**5. There is a need for larger, more complex infrastructure transactions**

Governments pursue long-term, strategic infrastructure investment projects to make transformational change in their societies and for their cities. This scale of investment can address the developing region challenges mentioned above, but it requires capability and capacity in local markets—both on the part of government and the private sector. IDOs can be particularly helpful in this context where, among other things, they can play the critical role of supporting cities and infrastructure investors in allocating the risk and return among transaction counterparties. IDOs include multilateral development banks, development finance institutions, and bilateral donors, which provide both funding and financing mechanisms as well as debt and equity finance, together with technical assistance, to support economic and social development in developing economies.

**6. IDOs can support finance-constrained governments**

The United Nation's Sustainable Development Goals (SDGs) are a collection of 17 cross-sector goals aimed at tackling global development challenges, particularly in Africa, South Asia, and low-income regions that have poor access to basic infrastructure. The United Nations estimates that globally economic infrastructure investments will need to increase by \$1.1 trillion per year to achieve the SDGs, in addition to the \$3.3 trillion already identified.<sup>16</sup>

IDOs can support developing economies in leveraging private capital for infrastructure, through both offering a range of concessional finance products—low-interest loans, equity investments, and/or credit guarantees—as well as helping mitigate risk through technical assistance.



# A model for delivering a successful project

City governments can consider the following model for delivering successful projects:

01. understanding the project and value, including
  - A. the business model for the project, and
  - B. the value generated;
02. consider funding and finance options; and lastly,
03. determining the relevant procurement and delivery method.<sup>17</sup>

This process allows project teams to evaluate infrastructure projects and determine the need for private sector and/or IDO participation in financing.



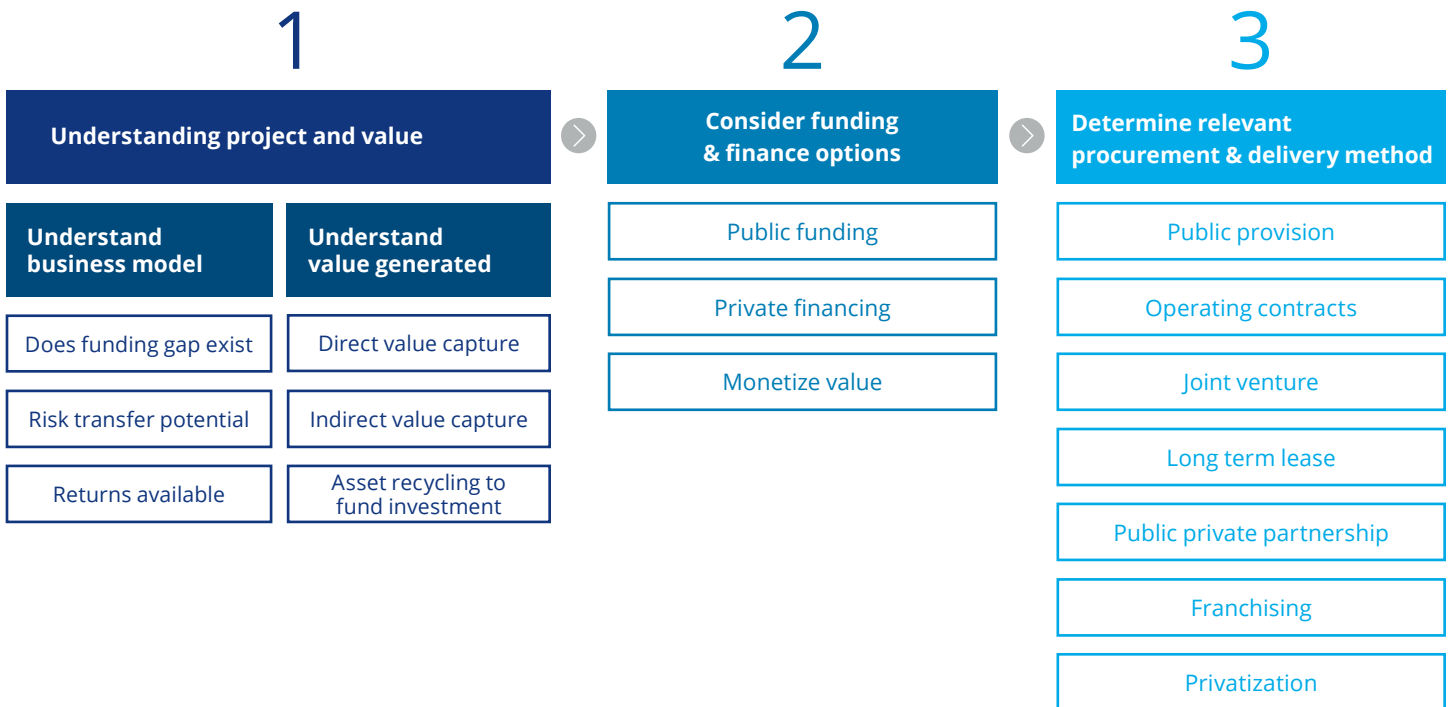
### Preparing the infrastructure project's business model

Infrastructure projects require clear funding streams—a clear path to revenue (including public sector payments)—in order to seek private financing. A business model for an infrastructure project designates who will deliver and pay for the delivery of an infrastructure project (in this case), as well as how the counterparties in an infrastructure project assume associated risks. A business model considers the project's overall delivery impact as well as its cash-flow impact. For the delivery impact, project teams should consider what the project is delivering (what are the key activities involved); the value proposition of the project's activities (whether it is meeting the needs of end users), and then the method for delivering that value proposition (what are the relevant communication or distribution channels). For the cash-flow impact, the teams will need to evaluate the project's cost and revenue structure.<sup>18</sup>

For city governments in developing economies, the development of a business model will help them decide who will pay for the services of an infrastructure project and who will assume associated risks. If the public sector assumes the risk, it would typically pay to build and operate a service and receive return in the form of savings and/or greater efficiency created by the project. Government may charge direct or indirect fees to the public, as an additional means of earning project revenue. Lastly, government may identify values generated from the project that it can sell to third parties to generate revenue. Examples of business models include:<sup>19</sup>

- Financing model payments: This is a model in which the public sector provides payments received that match agreed cost (including finance) amounts, allowing full coverage of expenditure and agreed returns. Similar models are used in availability-based public-private partnership structures.

Figure 2. A model for delivering a successful project



- **User fees/charges:** In this model, users (third parties) pay directly for services, such as through road tolls. This is riskier than public sector payment due to the uncertainty of quantifying payments in advance. In certain cases, the higher risk can be offset by guarantees (discussed further below).
- **Indirect income generation:** This is where the revenue is generated from ancillary services allowed by the provider of the asset—for example, through advertising revenue. In this example, revenue streams are generated by selling advertising space in the asset. Wi-Fi kiosks in New York that, through finance by advertising income, provide a free service to users.<sup>20</sup>

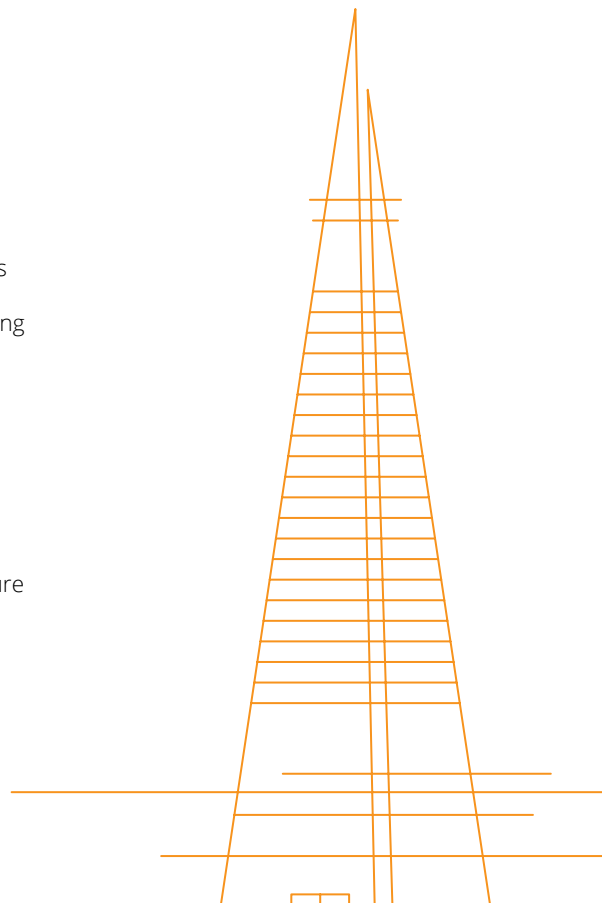
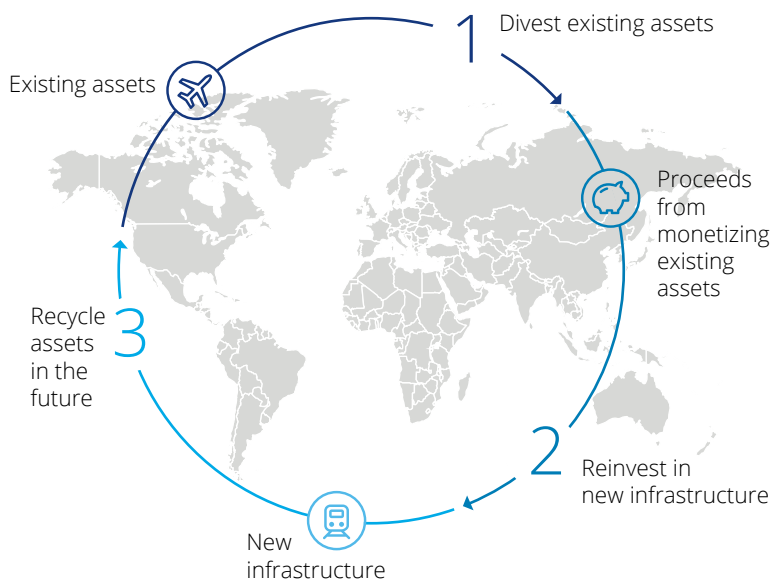
**Value capture to enhance public investment**

Value capture involves monetizing some of the value that an infrastructure project generates directly or indirectly. It is defined as the difference between the value of the infrastructure before and after making improvements. Value capture is thus a means of providing an additional contribution to funding for a project, through this incremental increase in value, and thus complements

traditional funding strategies. It is a means for government to enhance its overall government portfolio and achieve value for money by leveraging its existing assets and/or deploying legal regulatory measures to encourage greater development.

A project to build new infrastructure, or improve existing facilities, will likely increase the value of the land surrounding that project. This gives the city government an opportunity to capture some of the appreciation of that value and to obtain private financing based on that value increase. It might use direct charges, taxes, and levies (this will depend on planning permissions for development) for infrastructure access. A government that builds a new transit hub, for instance, could create a special taxing district around that hub. The transit station will likely draw more people into the area, giving nearby businesses access to more customers. The special tax collected from businesses near the hub can help to offset the cost of the construction project, and businesses will be willing to pay it due to the direct benefits of the new investment in their area.

**Figure 3. A cycle for value capture and asset recycling**



Project teams may use direct value capture and indirect value capture, as well as asset recycling strategies, which are summarized below:

- **Direct value capture:** Project teams can directly generate value for an infrastructure project through strategies such as impact fees (e.g., charging developers a fee for new infrastructure delivered as part of an urban development project), user fees, revenue sharing, profit sharing, and/or refinancing gain share.
- **Indirect value capture:** Project teams can identify indirect value capture through selling development rights (e.g., a zoning change) in exchange for an infrastructure development contribution from developers.
- **Asset recycling:** Cities can also consider selling and/or leasing public assets in order to fund infrastructure development for a current or future project.<sup>21</sup>

**Financing options for developing economies**

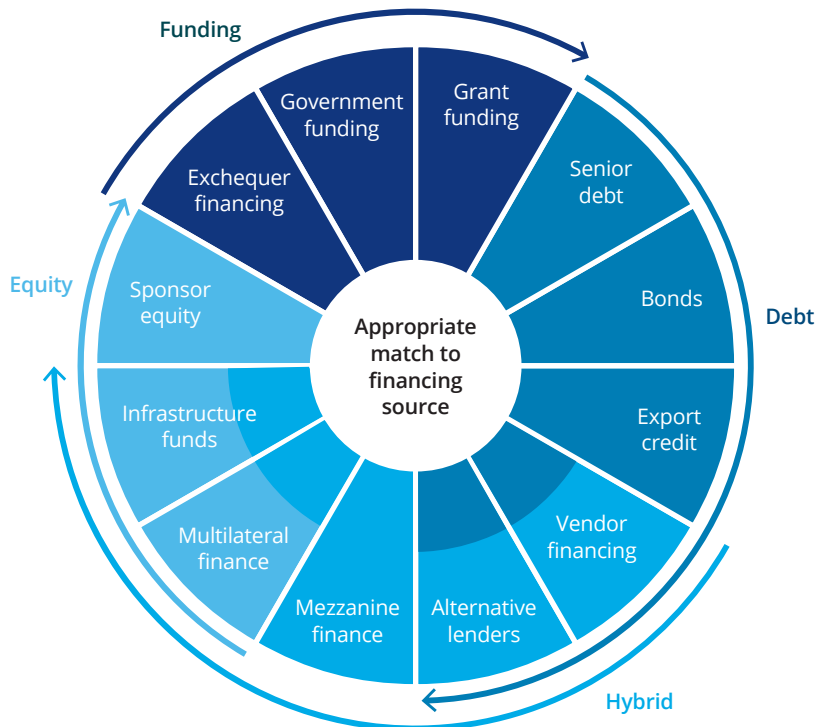
For cities around the world, the most common sources of finance for infrastructure projects have been public funds in the form of own-source revenues and intergovernmental transfers. Own-source revenues are funds that governments can collect themselves. They include property taxes, income taxes, retail taxes, and other taxes, along with fees for business licenses, and the use of public facilities or other activities. Non-tax revenues also include proceeds from the lease or sale of public assets (also referenced in the Value capture to enhance public investment section above). Intergovernmental transfers are grants provided by higher levels of government—for example, money that a federal or state government gives to a city for a specific project or program.<sup>22</sup>

However, the use of own-source revenues and intergovernmental transfers has its limitations. For example, in some developing countries, large cities with large proportions of low-income residents generate

little in the way of taxes or fees. In Pakistan, for instance, large cities obtain only about 7 percent of their revenues from own-source revenues.<sup>23</sup> Many countries also find it difficult to collect property taxes because of obstacles such as weak cadastral systems and a lack of established property rights.

The multiyear timelines often associated with infrastructure projects also make it difficult to use own-source revenues or intergovernmental transfers. Annual planning cycles and budgeting schedules do not easily accommodate long-term projects. Political cycles may also disrupt finance—for example, when a city council approves funding for a project, but then the next election cycle brings in legislators who want to scrap the initiative. In addition, certain significant and infrastructure costs will require repayment over the long term, also exceeding typical budget schedules or political cycles. The figure below presents these traditional funding means as government funding and exchequer financing.

**Figure 4. Financing options to consider**



City governments in developing economies will thus need to explore long-term financing arrangements to allow them to invest in strategic infrastructure initiatives. These cities will often require multiple private investors to attract new sources of capital in the form of debt or equity. Some investors will only want to invest in traditional infrastructure projects, such as roads and transportation systems, while others may have investments focused on particular assets, sectors, countries, or themes. Thus, cities will need to identify, if applicable, different sources of investment for different aspects of a project.

As mentioned above, projects in developing economies are, as a rule, riskier than projects in more developed markets, due to project-related technical risks, political and legal/regulatory risks, and macroeconomic risks. A greater risk profile for investors, and potential insufficient revenue, typically means that—in terms of the business model—investors will require higher returns. In addition, investors may fear that transaction costs in developing economies will be high, and the investment projects that governments are promoting are not well prepared. IDOs—particularly multilateral development banks, development finance institutions, and bilateral donors—can support private infrastructure investment in developing economies through both offering their own equity finance to projects (e.g., multilateral finance, infrastructure funds; see figure 4) and mobilizing private capital investments that leverage their own financing products.

Developing cities therefore have the advantage of accessing donor concessional financing or multilateral finance, in which a donor agency provides a grant or low-interest loan to a city or country to support a designated project. These loans are typically offered at below market rate, and thereby offer cities lower financing costs for long-term infrastructure needs. Often, with donor loan financing, governments can use the cash infusion as leverage to raise further private financing. Additional donor agency instruments include credit guarantees, which are offered to protect private lenders from a government's failure to make payments.<sup>24</sup> Credit

guarantees further reduce risks to private investors in developing regions and thus can enhance the ability for governments to mobilize private financing.

Project teams should evaluate the following mix of private and multilateral financing mechanisms below, in addition to exploring options to blend or combine multiple mechanisms:

- **Project financing:** This is the financial assessment of a given project, where remuneration is set based on the estimated cash flows and profits generated by that project.
- **Traditional loans and leases:** A loan that allows a government to pay for an infrastructure investment over time. Financing is at the project level and involves private equity partners. Repayment is provided by the public sector or a third party or user payments.
- **Vendor finance:** This is an arrangement whereby an equipment vendor; an engineering, procurement, and construction (EPC) contractor; or another supplier offer financing for a project. Either of these vendors may have a better understanding of a specific project's technical risks and thus would be more willing to assume those risks than a commercial lender.
- **Multilateral investment loans (“concessional finance”):** IDOs and namely multilateral development banks, such as the World Bank, provide investment loans that finance goods, works (such as infrastructure projects), and services in support of economic development in numerous sectors (this may include transport, water, sanitation, etc.). These loans are typically for a 5- to 10-year period.<sup>25</sup>
- **Multilateral risk guarantees:** IDOs aim to promote private financing in developing economies through providing guarantees, particularly to cover the risks the private sector is unable to absorb or manage. Risk guarantees cover specific sovereign or political risks; this protects private lenders against debt service defaults resulting from a government not upholding payment obligations agreed as part of a concession or similar agreement.<sup>26</sup>



- **Multilateral credit guarantees:** IDOs also use credit guarantees to cover all risks borne by a private lender within a specified financing period. This assists governments in accessing alternate sources of debt financing with long maturities that are otherwise unavailable.<sup>27</sup>
- **Blended finance:** This mechanism refers to a combination of IDO concessional finance with commercial finance by certain IDOs (e.g., International Finance Corporation) and co-investors. This unlocks funding for projects that would not be achieved based on commercial terms.<sup>28</sup>

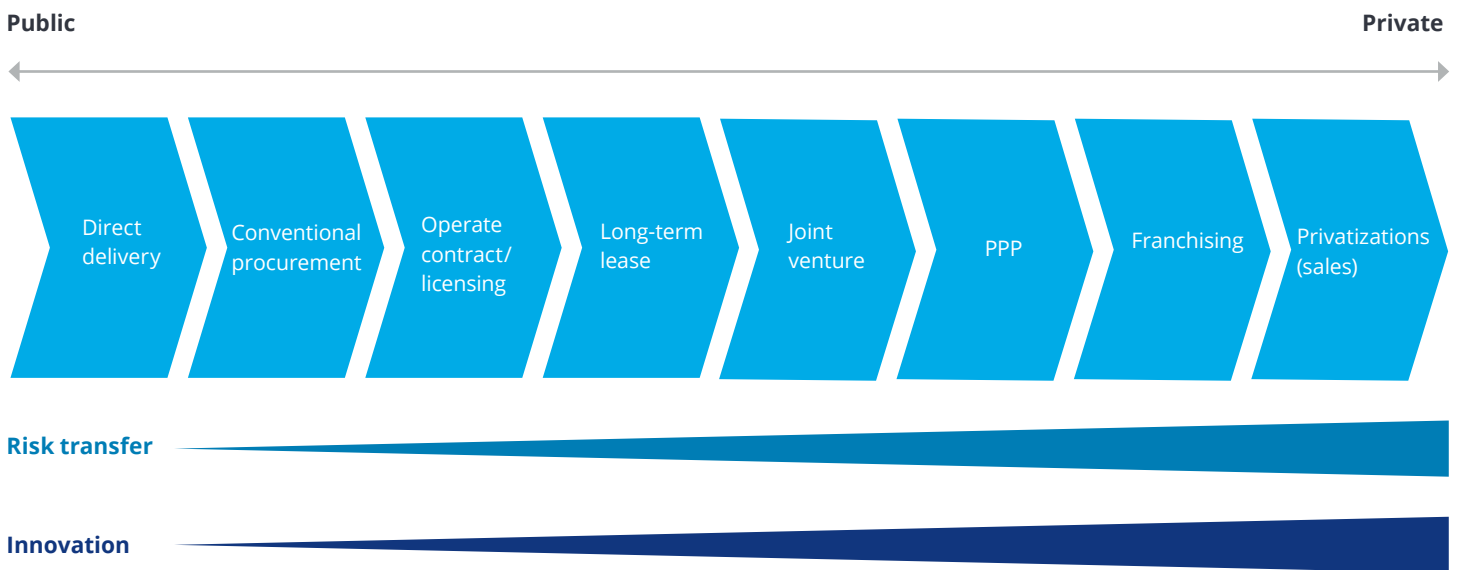
**Procurement structures for private sector participation**

City governments in developing economies can choose from a range of procurement structures and/or mechanisms to accommodate their business models, value capture, and funding/financing strategies. There are structures along a procurement spectrum—from wholly public options at one end to wholly private ones at the other—with varying levels of private sector

participation. The choice for the public sector is whether it sees the benefit in foregoing direct delivery and the associated proceeds (where it assumes the risk) in exchange for a more private procurement model where it accesses greater innovation (and transfers the risk to the private sector). The optimal method will vary based on the city’s financing capacity, its relative expertise in design, build, finance, and operations functions for the specific project, and both its risk appetite and desire for innovation.

Government may choose to transfer risk to the private sector in instances where the private sector has specific expertise that the government does not or in order to achieve more innovation through a private sector procurement model. The blended finance option presented above—combining IDO loan financing with commercial financing and potentially government funds—would likely create a procurement structure such as a Public-Private Partnership (PPP) or joint venture, discussed below.

**Figure 6. A spectrum of procurement structures**



A number of these procurement structures are summarized below:

- **Direct delivery:** The public sector provides goods, works, or services directly to the customer utilizing public sector assets and staff.
- **Operating contracts:** The public sector contracts (typically shorter term) with a vendor to provide goods, works, and services. These contracts may be for a range of activities, going from technical assistance to full responsibility for the operation and management of a public infrastructure asset.
- **Joint venture:** The public and private sector would jointly deliver an asset/service in this model, utilizing the capabilities and capacity of both. The public sector often chooses such a structure to involve itself in a project even though it does not provide funding; it provides an asset that is jointly utilized through the joint venture.
- **Public-private partnership (PPP):** The government forms a contract with the private sector (typically longer term) for the provision of works or services. A PPP aims to increase the efficiency of an infrastructure project by creating a long-term relationship between the public sector partner and a private operator or financier. The relationship provides the government not only financing, but also corporate expertise in conducting the project. Whereas a PPP may involve construction of an asset, payment is actually made based on the private sector's performance and the availability of the works or services procured. In this instance (depending on the form of PPP), the public sector may choose to push all manageable risks for the private sector as the best means to delivering value for money.

# New smart cities solutions

As they work to close the infrastructure gap, city governments in developing economies must strongly consider smart infrastructure solutions, which use advanced technologies to deliver works and services to citizens.

Because they help cities operate faster, more effectively, and more efficiently, smart infrastructure solutions help governments leapfrog common traditional infrastructure options and common service delivery constraints. Thus, as project teams help craft infrastructure delivery business models, and then prepare the related procurement structures, they should consider the technological implications of the project—ensuring the project will create value over the long term. The examples (below) in Africa (region-wide), Argentina, and Kosovo present technological innovations used by the developing economies across regions to foster innovation in infrastructure provision and improve public service delivery.





### Africa (region-wide)

Mobile phone-based technological innovations in Africa have allowed countries in the region to surpass or leapfrog challenges in both communication and financial infrastructure. In communication, countries in these developing economies (here and throughout the developing world) have not had to invest in landlines due to the expansion of mobile phone use. More specifically, Ethiopia, Libya, and South Sudan did not previously make substantial telecommunication cable installations, and thus would not need to upgrade from analogue to Asymmetric Digital Subscriber Line (ADSL)—they can immediately implement the latest 5G/LTE networks.<sup>29</sup> Mobile banking applications also reduced the need for common financial sector infrastructure as in developed nations, instead allowing users to transfer value through phones rather than relying on brick-and-mortar banks or ATMs.<sup>30</sup>

### Buenos Aires, Argentina

Buenos Aires provides one example of the benefits a government gains when it leverages smart cities solutions. In 2010, the city implemented a new IT system that has improved its response to infrastructure problems and helped to head off some problems before they even occur.

Today, rather than phoning a call center to ask the government to fix potholes, remove graffiti, or respond to other issues, citizens in Buenos Aires can use a mobile app or social media to make those requests. The citizen might, for instance, tweet a picture of a broken sidewalk along with a short description. Using integrated geographic information system (GIS) technology, the app sends the location of the problem to the relevant government agency and dispatches a vendor to make a repair. Then a city street inspector uses a mobile device to confirm and document the completed work. Government agencies also use an electronic dashboard to monitor the status of each complaint and capture citizen feedback.

In addition, Buenos Aires uses data from sensors and crowdsourcing to pinpoint potential problems in specific locations. For example, sensors that measure the speed, direction, and level of water in sewage drains can predict when flooding is likely to occur and generate alarms, allowing city workers to respond to the problem before floodwater has a chance to harm people or property.<sup>31</sup>

Thanks to these smart technologies, Buenos Aires has seen the average time to resolve a complaint drop by 93 percent without incurring additional costs, allowing the city to fix more problems in less time.<sup>32</sup>

### Krusha e Madhe, Kosovo

The World Bank has used unmanned aerial vehicles (UAVs)—commonly known as drones—in Kosovo to conduct quick, low-cost land surveys, allowing residents of one village to officially establish their property rights. Officials with the national government hope to apply similar technology in cities.

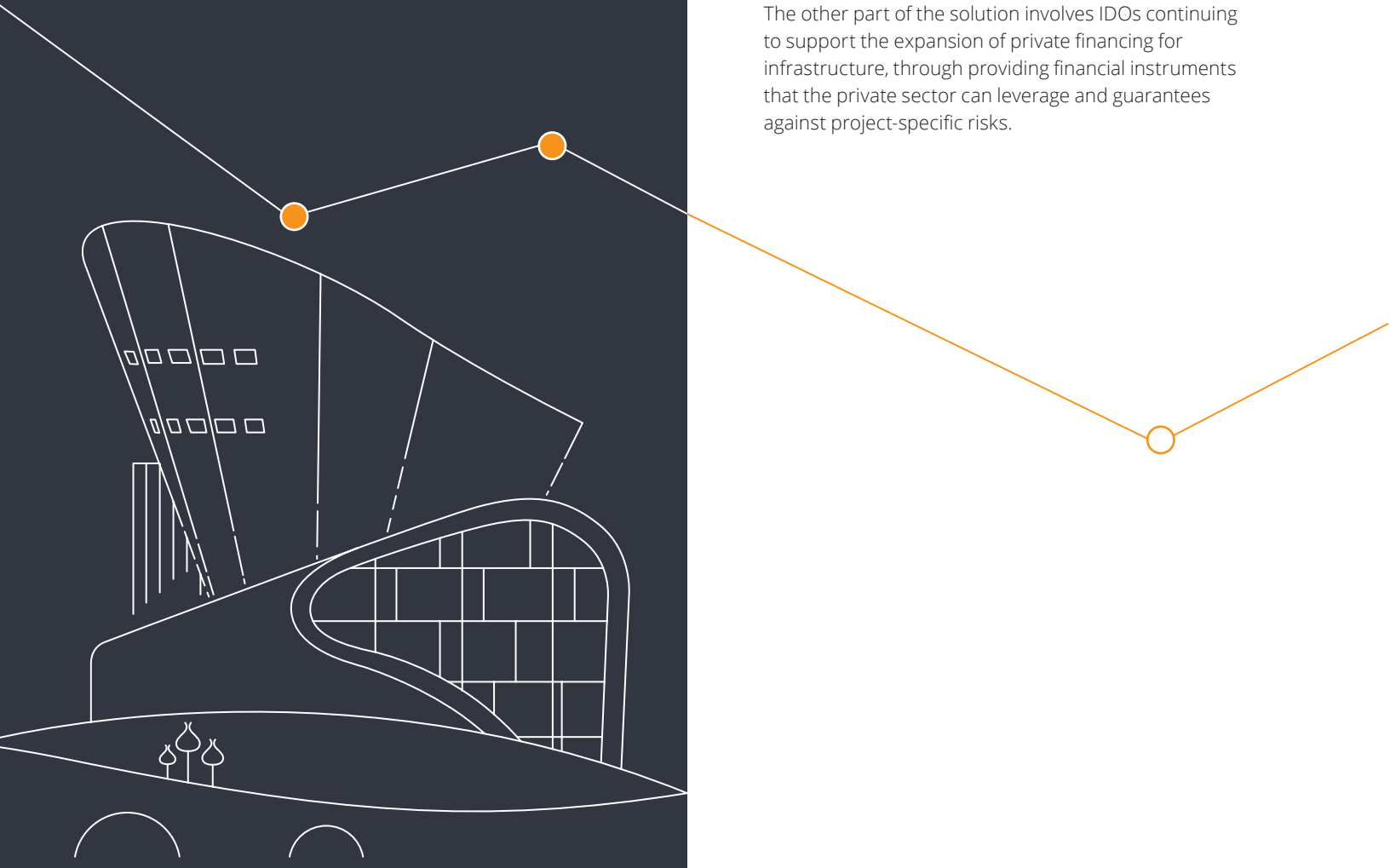
In the village of Krusha e Madhe, where most men and boys were killed during the conflicts of the late 1990s, women have been working to improve their lives by establishing business cooperatives. In the past, because most of the women did not have formal registration for their homes or lands, they could not use those assets as collateral when seeking credit. In 2015, World Bank employees spent one week collecting data with a UAV, creating high-resolution maps to support the official registration of lands in the village.<sup>33</sup>

Kosovo's cities have seen rapid expansion in recent years, including many informal settlements and illegal construction. To address this problem, the government of Kosovo has started a program that lets landowners legalize their property rights. One specialist involved in the project in Krusha e Madhe has observed that the same technology could support those efforts in cities, helping to produce maps and 3D models that are accurate, current, and cost-effective.<sup>34</sup>

# Conclusion

Public funding combined with private sector participation in projects offers greater capability and capacity to city governments in developing economies to implement their infrastructure projects, as indeed traditional funding approaches will not be sufficient to meet their significant infrastructure needs.

However, the challenge has been, and will be, decreasing risk and providing adequate return to private investors interested in providing debt and equity capital in these markets. Part of the solution will be city governments and project teams accurately evaluating the business model of a project and attracting investors to finance specific aspects of these projects, based on their preferences. The other part of the solution involves IDOs continuing to support the expansion of private financing for infrastructure, through providing financial instruments that the private sector can leverage and guarantees against project-specific risks.



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