

## Are Pylons in Your Portfolio?

### Why Private Finance for Electricity Transmission Infrastructure in Africa Is Critical, Difficult, and Solvable



#### Like night and day

Picture a vast sunbaked plain. Dry, degraded bushland as far as the eye can see. Parched earth, too hard to cultivate. Just 100 kilometers away lies a bustling metropolis; a five-million strong throng of humanity full of potential. But power in the city goes out every morning and evening, just when people need it most. The lucky few may have backup generators, offering noisy, polluting power at vast expense. For the rest, no light to read by, cool air to work by, rotten food in warm refrigerators, dead mobile phones.

In one place, a struggle to survive under a surplus of solar energy. In the other, a struggle to thrive under a dearth of electricity. This irony is not lost on the management and boards of private power companies trying to get their projects financed. While [solar is by far the cheapest source of electricity](#)<sup>1</sup>, transporting electricity from solar farms to sweltering cities often verges on the impossible.

For example, rolling blackouts have been raging in South Africa for years, [yet more than three gigawatts of newly awarded wind projects were put on hold](#) as the national utility, Eskom, was unable to offer a reliable grid connection. In West Africa, countries such as Ghana, Côte d'Ivoire, and Nigeria are locked into using high-cost diesel and gas-fired power plants despite attractive solar resources in their northern regions.

**So, what's the hold up? As is so often the case, it boils down to money, or lack thereof.** Low tariffs, extreme levels of power theft, and technical losses means that for most African utilities, just paying their debts and staff is a stretch. Payments to independent power producers (IPPs) are a third priority, investment in ailing grids a distant fourth. The result is hundreds of thousands of kilometers of high-voltage lines and thousands of network reinforcement and modernization projects gathering dust on shelves.

Some may argue that this is reason enough to abandon the dream of centrally controlled power systems and opt for small-scale distributed renewables. In some remote locations that may well be true. However, there is ample evidence that the economies of scale, and thus the low unit prices of generating energy from large, project-financed wind and solar projects (even when combined with batteries), easily justifies the cost of the high-voltage power transmission infrastructure. Moreover, high-voltage systems are the only proven means of delivering electricity reliably and at the voltages necessary for industry. In short, transmission lines are fundamental to the ability of African countries to meet their energy access and green growth policy commitments, whether that be domestic targets for GDP growth, or international targets under SDG 7, or the Paris Agreement on Climate Change.

**How much investment is needed?** A simple review of a sample of grid development plans indicates that sub-Saharan African nations need to fund at least \$5 billion and probably closer to \$10 billion annually for power transmission to achieve their growth and energy access ambitions. Compare this with the meager half-billion dollars invested in 2023, and the scale of the mountain to be climbed becomes clear.



## Finding the missing billions

Paying for pylons and other transmission infrastructure often falls to multilateral and bilateral development banks from both Western countries and China. Organizations like the United States' [Millennium Challenge Corporation](#) and Germany's

[KfW](#) are among those leading the charge. But transmission lines are high-cost projects with long lead times. These projects compete with calls to support crumbling healthcare services, improve education, or meet urgent humanitarian needs. Moreover, many governments are so indebted that they are unable to accept more loans for critical infrastructure, even on the most generous terms. Mismanagement of electricity utilities, opaque procurement processes, and inefficiency don't help, either.

So, if public funding is falling short, what about private investors? On the surface, private infrastructure capital markets look like potentially rich fishing grounds. In 2023, [global private equity flows to infrastructure totaled around \\$425 billion a year](#), of which the clean energy transition was by far the largest investment category. Turning to power transmission specifically, Africa 50, an infrastructure investor, estimates that private investors have piled [over \\$55 billion into transmission in emerging markets](#) over the past 25 years. One oft-cited example is Brazil where [private developers have funded and built nearly 700,000 kilometers of power lines](#) since 1994. Brazil's population is one-seventh of sub-Saharan Africa's, but it now has more kilometers of high-voltage lines.

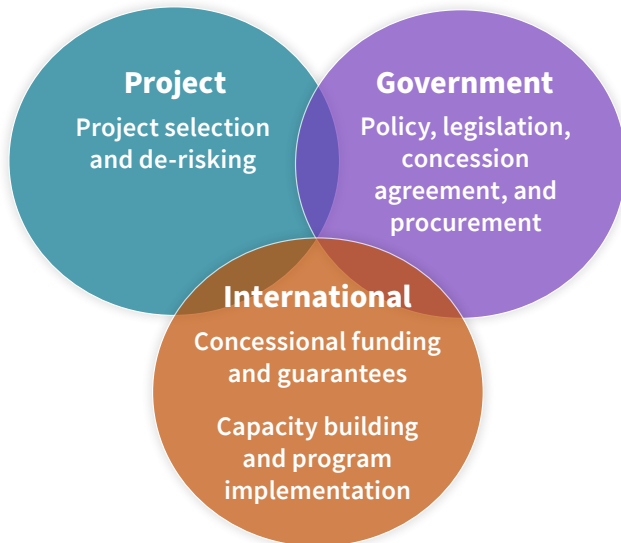
Look deeper and it becomes apparent that Brazil is the exception that proves the rule. In reality, global stocks of private infrastructure capital are both tight and limited in focus. For a start, pension fund risk management policies mean that about 80 percent of that \$425 billion in equity is restricted to low-risk Organisation for Economic Co-operation and Development (OECD) markets or investment-grade companies and financial products. Most of the rest finds its way into well-regulated emerging markets such as China, Brazil, Vietnam, and the Philippines. These conservative allocation decisions have served institutional investors well, given the outperformance of core infrastructure investments over the previous 10 years vs. traditional equities on a risk/return basis.

Contrast this with the fact that infrastructure investment in “developing” and “frontier” markets is far riskier, while the returns are typically too meager to compensate for that risk. How, then, can we get private infrastructure investors excited about power transmission in Africa? Is it even possible?

## Nothing is impossible

As a company that works at the nexus of government, business, and finance, Tetra Tech sees work to be done at each level, as shown in Figure 1.

Figure 1



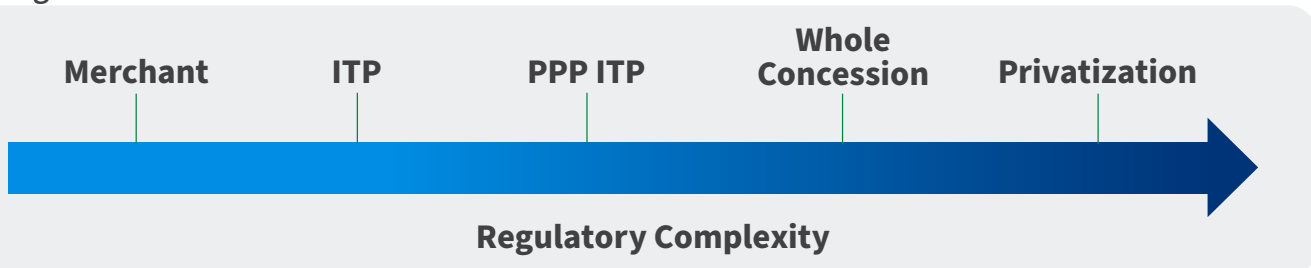
As monopoly owners of national transmission systems, governments first need to be persuaded of the case for private investment. Leaving aside the risk of vested interests putting a break on reform, a good place to start is to communicate the evidence from other countries (e.g., Brazil and India) and the urgency of the task if they wish to grow their economies and solve energy poverty.

Once persuaded, governments need assistance designing a nationally appropriate legal, regulatory, and commercial framework. Many proven models are in use around the world. On a sliding scale of regulatory complexity (see Figure 2 below), they range from deregulated merchant lines (simpler) to full grid privatization (complex).

Our consultations with African governments, investors, and infrastructure specialists indicate that project-financed independent transmission projects (ITPs) generally offer governments the best balance of benefit versus cost. For one, they are close in nature to the tried-and-tested IPP model, often necessitating only minor modifications to the regulatory framework. In some countries, politics may dictate that the government take a minority ownership share in a public-private partnership (PPP) model, which means careful thought must go into the governance of PPPs to avoid conflicts of interest.

Regulators and ministries must then come to agreement on a revenue model that gives investors and lenders reasonable certainty over their long-term returns on capital. In this case, fixed charges for availability are infinitely preferable to wheeling charges based on unpredictable energy flows that investors have no control over. Infrastructure investors like steady, inflation-busting returns. Venture capitalists they are not. They also do their homework, meaning countries where tariff revenues are substantially below cost of supply are likely to be given short shrift. Thus, bringing in private investors does not absolve governments of the responsibility to create financially sustainable electricity markets.

Figure 2





Detailed concession documents play an important role in clearly and fairly defining the rights and obligations of private owners with respect to government and the transmission system operator. Whether and how to run a competitive procurement process is another key decision to be made by government. Should the currently small cohort of potential developers be forced to compete against each other to drive down costs, or are bilateral arrangements sufficient, so long as construction costs are “in range” of international norms?

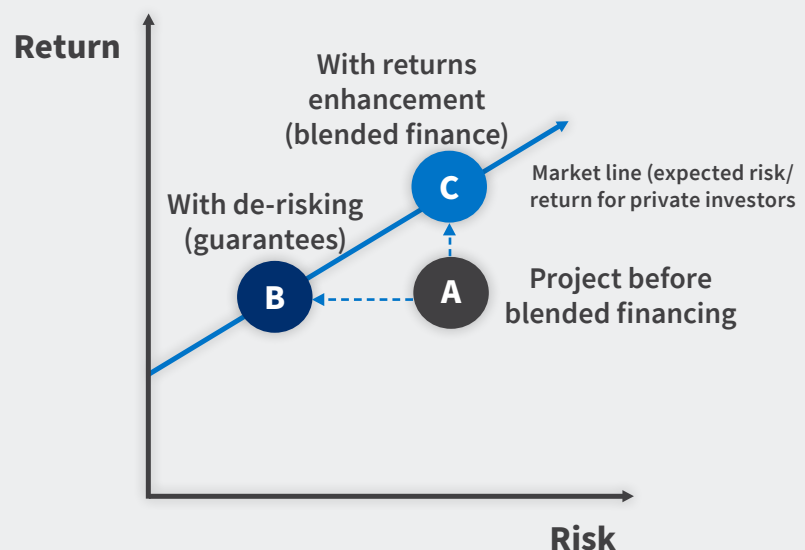
**Any transmission project being readied for private investment needs to be carefully evaluated against alternatives, planned, designed, costed, and de-risked.** Grid companies often give short shrift to the first stage of this process, focusing only on large, expensive transmission lines to add to their regulated asset base, even where alternatives exist. For example, strategically located battery energy storage, substation upgrades, reconductoring or use of one or more grid enhancement technologies (e.g., dynamic line ratings, advanced power flow controls, and topology optimization) can dramatically improve network capacity, efficiency, and longevity at lower cost and with minimal environmental footprint.

When new lines are clearly required, one of the first priorities at the project level is to address the thorny, sometimes protracted challenge of acquiring rights of way while ensuring the environmental and social impact assessment complies with international standards. No project is going to secure concessional or commercial financing if it cuts through tropical forest or demolishes the homes of marginalized communities. International Finance Corporation (IFC) Performance Standards are the touchstone here, but project managers should also look for ways to make positive contributions to environmental conservation (“nature-positive investments”) and create opportunities for project-affected communities to share in project benefits.

Nor does attracting private investment mean that donors and development finance institutions are off the hook. By offering concessional finance to enhance project returns and blended finance or guarantees to protect against commercial and political risk, **DFIs will continue to play a key role** in convincing institutional investors to allocate funding toward this new infrastructure category. Thankfully, a recent surge in climate finance commitments from developed countries means a plethora of grant, concessionary, and blended financing platforms now exist with a mandate to support clean energy transition deals such as power transmission. The same goes for risk-reducing guarantees. Organizations like [African Trade and Investment Development Insurance](#), the [Green Guarantee Company](#), export credit agencies, the [World Bank](#), and the [Multilateral Investment Guarantee Agency](#) have key roles to play.

All this helps open transmission investment to institutional players who crave long-term, stable, lower-risk returns.

**Figure 3: How Blended Finance Reduces Risk and Improves Returns (Adapted from Convergence Finance)**



## A bright future, down the line

*Today, Tetra Tech is serving as a pathfinder within African transmission system finance. Our Sustainable Energy Finance advisory team is working with clients to draw up new business models and financial products for private transmission investments in Africa.*

Our world-class power system engineers provide state-of-the-art analysis of transmission networks and develop sector master plans. We're also providing owner's engineering services to one of the first private transmission developers active on the continent.

## Sustainable Energy Finance

Leveraging public and private capital at scale to finance the clean and just energy transition.

## The need is urgent, as is the opportunity

Could ITPs be the next big thing for global infrastructure investors? That is the \$50 billion question and the key to the future for millions of young Africans.

To learn how Tetra Tech can support your organization to navigate transmission system development and financing, please get in touch.



<sup>1</sup> Solar photovoltaic (PV) combined with batteries now costs less than most forms of dispatchable thermal energy, allowing it to power evening peak loads. Cheap PV on its own may also be used to replace expensive dispatchable energy during the daytime, lowering overall cost of supply and—in the case of hydropower—increasing availability of dispatchable energy to serve evening and morning peaks. See [Lazard's Levelized Cost of Energy Analysis—Version 16.0](#).

### Our Services

- Impact and blended finance strategic advisory
- Project finance and transaction advisory
- Financial modeling
- Investment due diligence
- Financing instruments for climate change mitigation and adaptation
- Carbon finance
- Green and sustainability bonds

### Contact us:

Will Greene    
Senior Director  
Sustainable Energy Finance

Jessica West    
Senior Director  
Business Development



1515 N. Courthouse Road  
Suite 1000  
Arlington, VA 22201 USA

tetratech.com  
+1 (703) 387-2100

