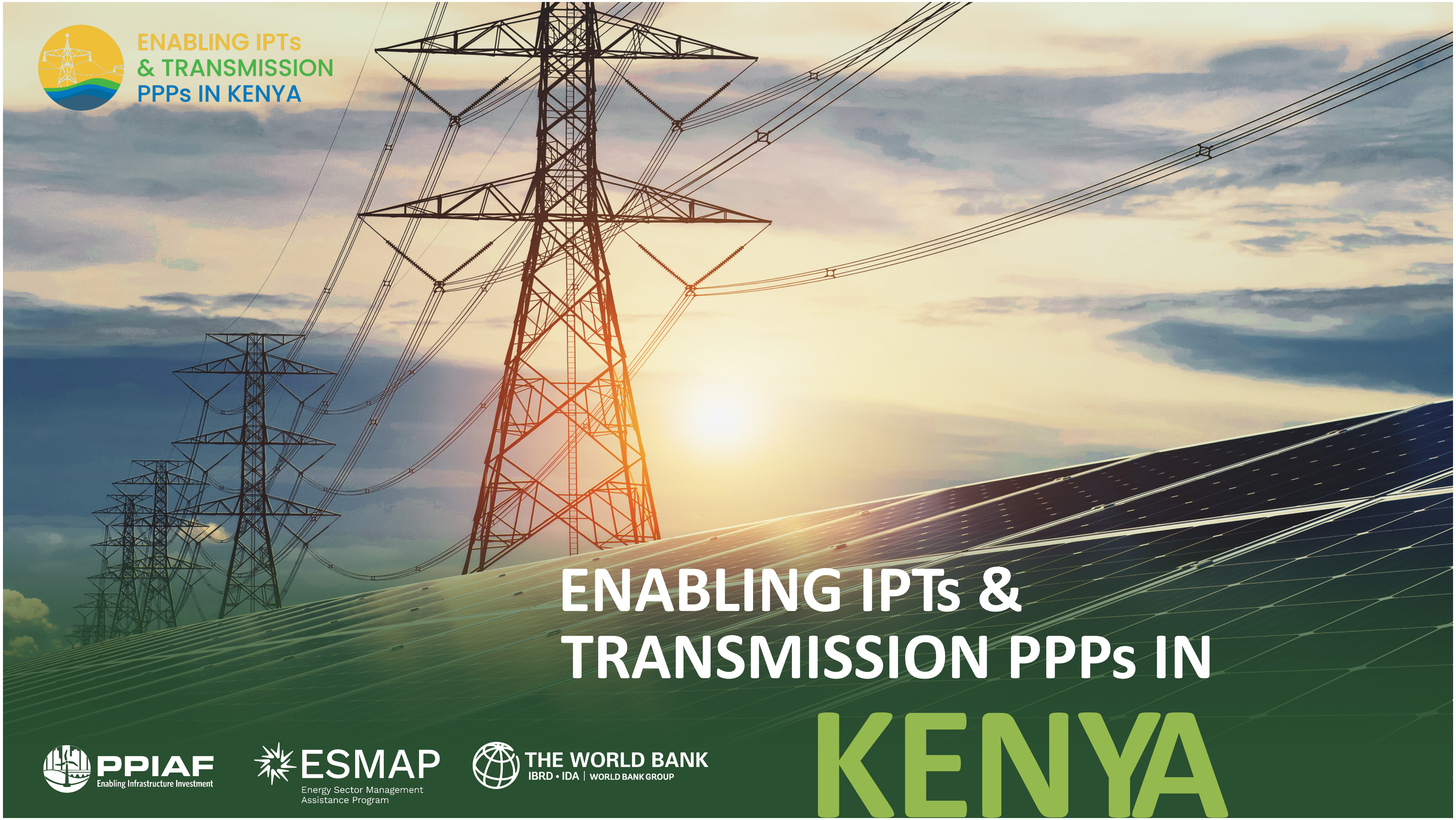

ENABLING IPTs & TRANSMISSION PPPs IN KENYA

PPIAF Enabling Infrastructure Investment

ESMAP Energy Sector Management Assistance Program

THE WORLD BANK IBRD • IDA | WORLD BANK GROUP

Workshop on Private Investment in Electricity Transmission in Africa
Nairobi, 1 & 2 April 2025

Transmission business models with private investment

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Outline 1 – Review of business models

- Transmission investment needs in Africa
- Private transmission investment in Africa
- Can regulation help to attract private investment?
- Transmission capacity expansion: Decision models
- Private investment in transmission: Business models
    - Whole-of-grid concessions
    - Privatisation
    - Merchant lines
    - Industrial demand-driven models and
    - Independent power transmission (IPT) projects
- Comparative evaluation

Outline 2 – The ITP model

- ITP definition and formats
- Enabling environment
- Phases of an ITP project
  - Project development
  - Construction
  - Operation
- Stakeholders
- Financing structure
- Contractual structure
- Risk allocation matrix
- Wrap-up and other considerations

Outline 1 – Review of business models

- **Transmission investment needs in Africa**
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The need to scale up transmission investment in Africa

Transmission, which **contributes a relatively small part of the overall cost of the sector value chain**, needs to move in tandem with additions to generation capacity and demand growth.

Transmission lines reduce overall costs by ensuring economies of scale in generation; creating access to cost-efficient sources of generation; reducing the reserves needed to ensure security of supply; and supporting the integration of renewables into the energy system.

Even so, transmission remains a **neglected** part of the sector value chain **by private investment**.

Presently almost all transmission investment in Africa is financed by state-owned enterprises.

https://www.worldbank.org/en/topic/energy/publication/linking-up-public-private-partnerships-in-power-transmission-in-africa

The **critical nature of transmission infrastructure** to the overall function of the power system cannot be overstated. Transmission is a linchpin for decarbonisation.

Africa has fewer **kilometres of transmission lines per person** than any other region in the world.

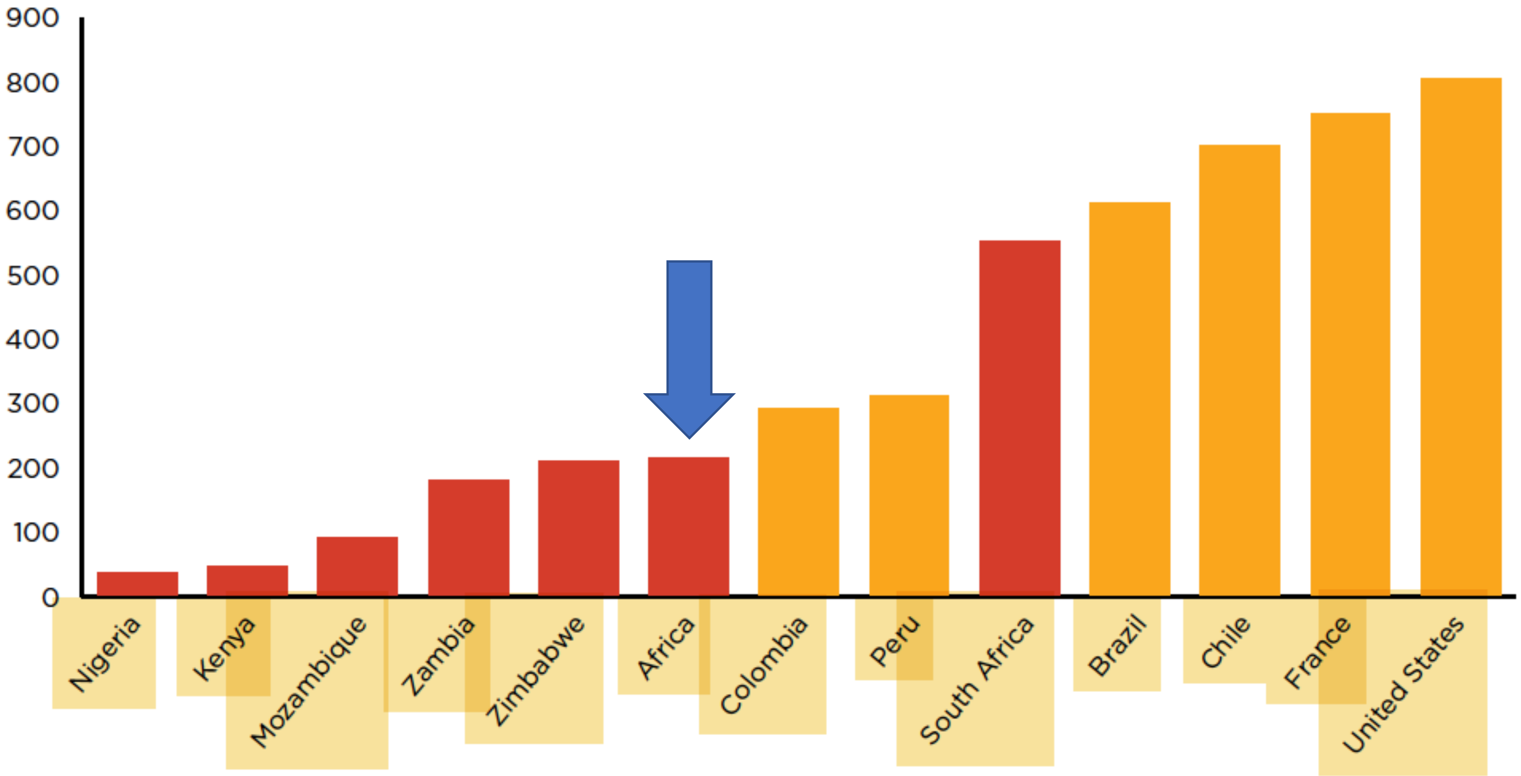
Historically, **grid projects in sub-Saharan Africa have been made by state-owned utilities**, mostly funded by governments through DFIs, and underwritten with **sovereign guarantees.**

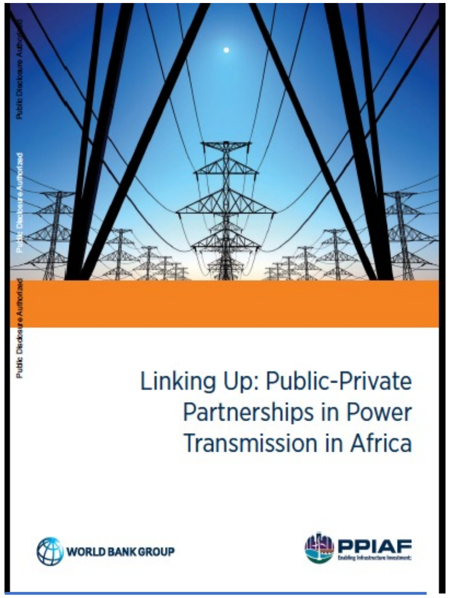
There is currently a **need for significant additional investment** in transmission on the African continent. This need is **unlikely to be met through the existing sources of funding** for the sector.

https://www.worldbank.org/en/topic/energy/publication/linking-up-public-private-partnerships-in-power-transmission-in-africa

Transmission lines per capita

(kilometers of transmission lines per million people, data accessed in 2016)





Source: Castalia. Data sourced from Trimble, C. et al., "T&D Data—State-owned national grid T&D data," 2016, http://data.worldbank.org/data-catalog/affordable-viable-power-for-africa (accessed October 30, 2016); Rafael Ferreira, "Private Participation in Transmission Expansion: the Brazilian Model", Presentation from consultation workshop, Nairobi, Kenya, September 26, 2016.

The label "Africa" corresponds to "sub-Saharan Africa minus South Africa"

Why is the scaling up of investment in transmission needed in Africa?

Of 38 countries, 9 have no transmission lines above 100 kV. **The combined length of transmission in 38 countries in Africa is 112,196 km**. The country of Brazil has a longer transmission network than Africa, at 125,640 km, and, at 257,000 km, the United States of America (United States) has more than twice the length of the African transmission network. Despite its large land mass, Africa also has fewer kilometers of transmission lines per capita than other regions.

The length of transmission lines in Africa is 220 km per million people (excluding South Africa). In contrast, Colombia has 295km of transmission lines per million people, Peru has 339km, Brazil has 610km, Chile has 694km, and the United States has 807km.

Building more transmission lines and upgrading transmission capacity will be an essential part of the overall expansion of the electricity sector

https://www.worldbank.org/en/topic/energy/publication/linking-up-public-private-partnerships-in-power-transmission-in-africa

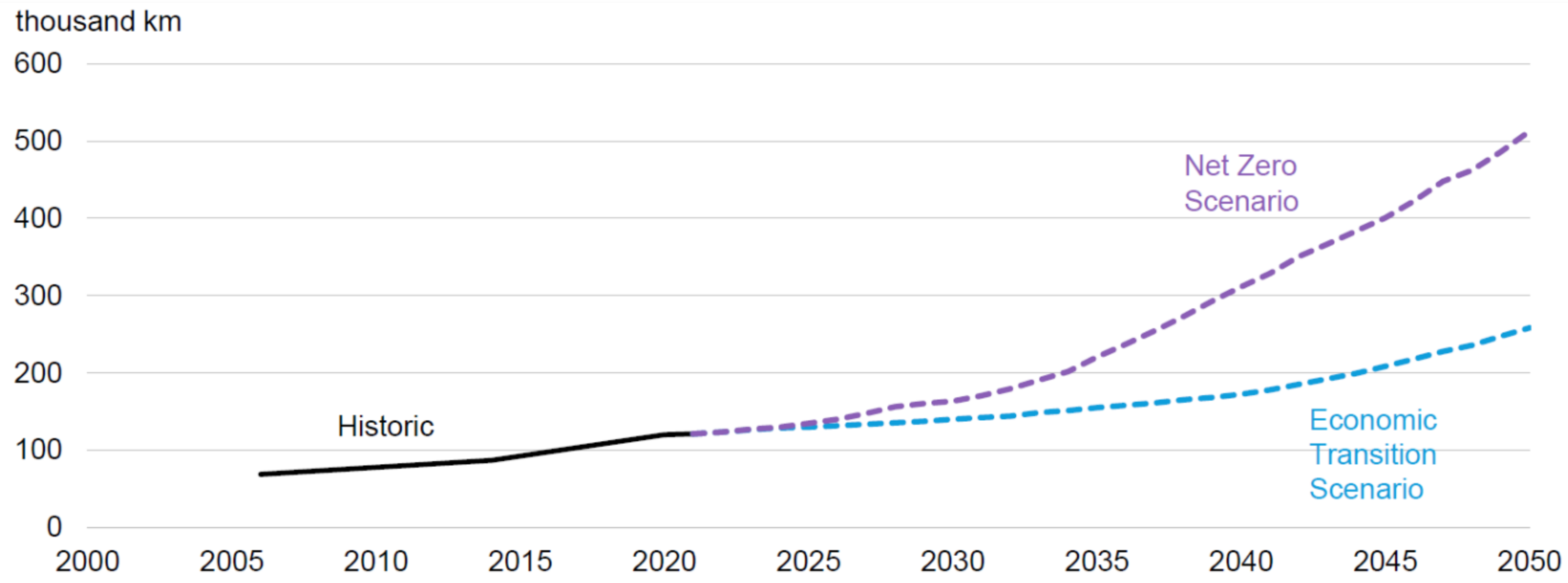
Data Sources

Trimble, C. et al., “State owned national grid T&D data,” **2014**
http://data.worldbank.org/data-catalog/affordable-viable-power-for-africa

Data available for the following countries: Angola, Benin, Botswana, Burkina Faso, **Burundi (x)**, Cameroon, Congo, Dem. Rep., Congo, Rep., Côte d’Ivoire, Ethiopia, Gabon, Ghana, Guinea, **Guinea-Bissau (x)**, Kenya, Lesotho, **Liberia (x)**, **Madagascar (x)**, Malawi, Mali, **Mauritius (x)**, Mozambique, Namibia, **Niger (x),** Nigeria, Rwanda, **São Tomé and Príncipe (x)**, Senegal, **Seychelles (x)**, Sierra Leone, South Africa, Sudan, Swaziland, Tanzania, **Togo (x)**, Uganda, Zambia, and Zimbabwe.

The nine countries marked with an (x) have no transmission lines above 100 kV.

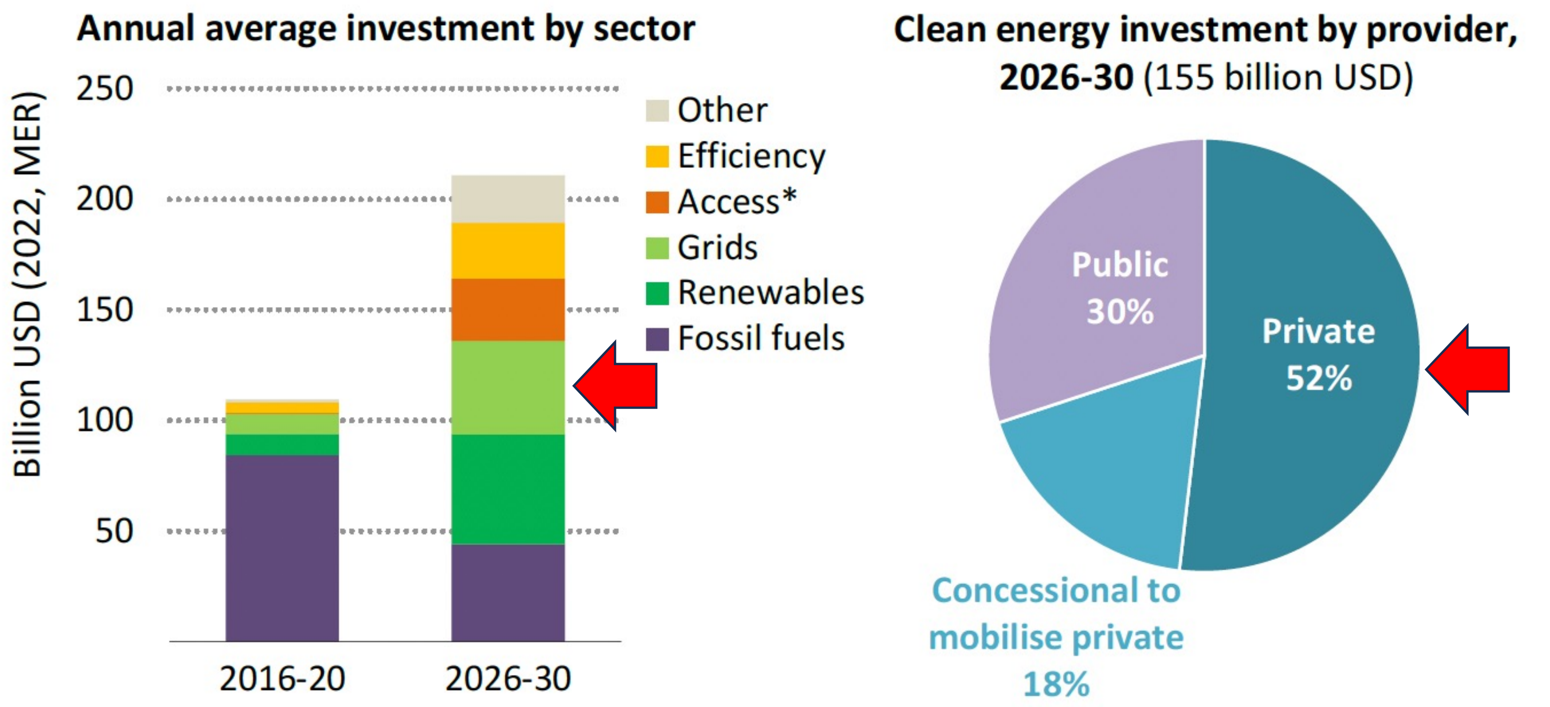
Africa's transmission grids need to grow four-fold to achieve net zero by 2050



Source: BloombergNEF, Global Transmission. Note: Transmission defined as >200kV. Forecast based on BloomberrgNEF's New Energy Outlook 2022.

Slide provided by Chris Flavin Interim co-CEO, Gridworks

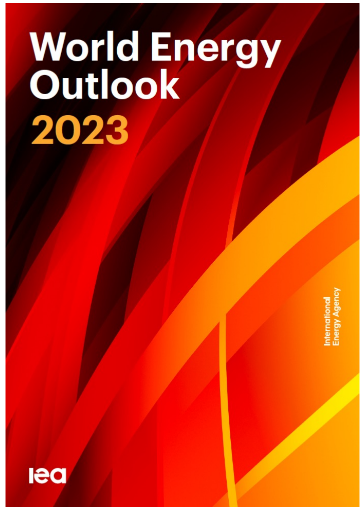
Figure 5.12 ▷ Investment needs to meet Africa's sustainable goals by 2030



Energy investment needs to double to achieve energy and climate goals, with concessional capital reaching USD 28 billion each year by the end of this decade

* Access includes investment related to fossil fuel sources.

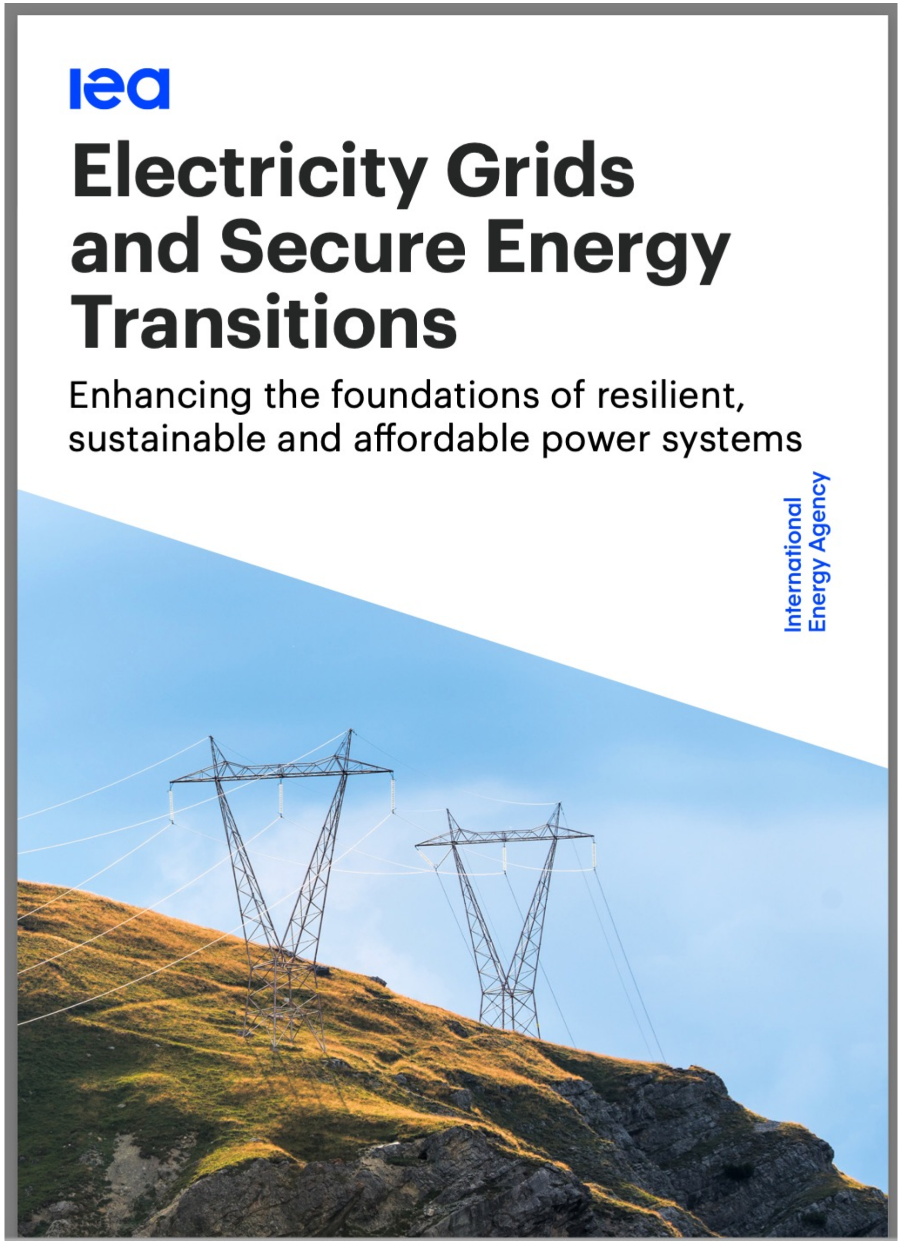
Note: MER = market exchange rate; Other = low-emissions fuels, nuclear, battery storage, fossil fuel power with CCUS, and non-efficiency investment in the buildings, industry and transport sectors.



Meeting Africa's rising energy demand, providing universal access to modern energy by 2030 & achieving energy & climate goals means more than doubling energy investment this decade. This requires over $200 billion per year from 2026 to 2030, **of which almost $50 billion per year are for transmission & distribution networks.**

IEA 2023 WEO, Chapter 5.5

Stress in the transmission infrastructure supply chain



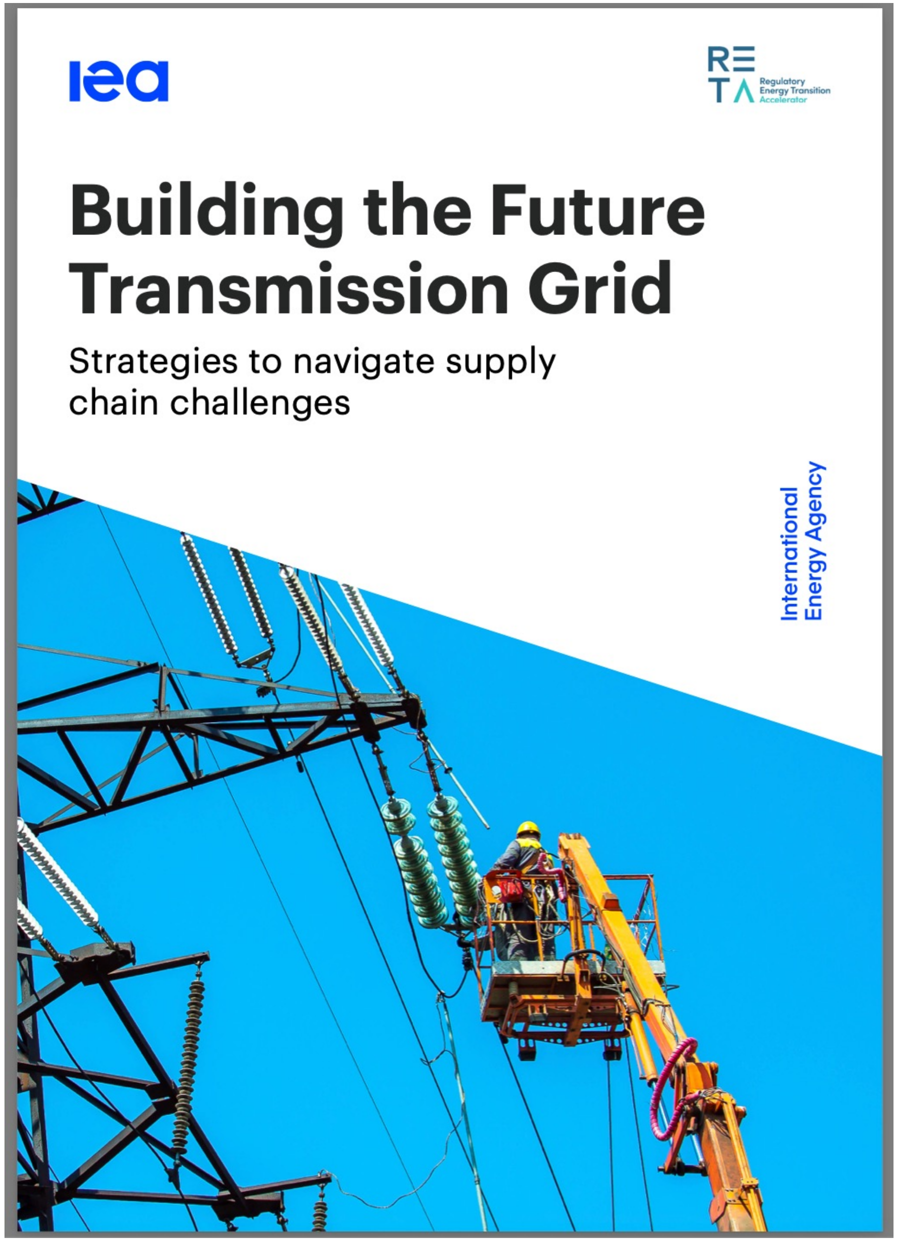
PUBLISHED OCTOBER 2023

This report offers a **global stocktake of the world's electricity grids as they stand today**, taking a detailed look at grid infrastructure, connection queues, the cost of outages, grid congestion, generation curtailment, and timelines for grid development.

We find that there are already signs today that grids are becoming a bottleneck to clean energy transitions and analyse the risks we face if grid development and reform do not advance fast enough.

We find that **delayed action means prolonging reliance on fossil fuels,** resulting in an increase in emissions and costs to society. An unprecedented level of attention from policy makers and business leaders is needed to ensure grids support clean energy transitions and maintain electricity security.

The report concludes with key recommendations for policy makers, highlighting the necessary actions in areas including investment, regulation and planning.



PUBLISHED FEBRUARY 2025

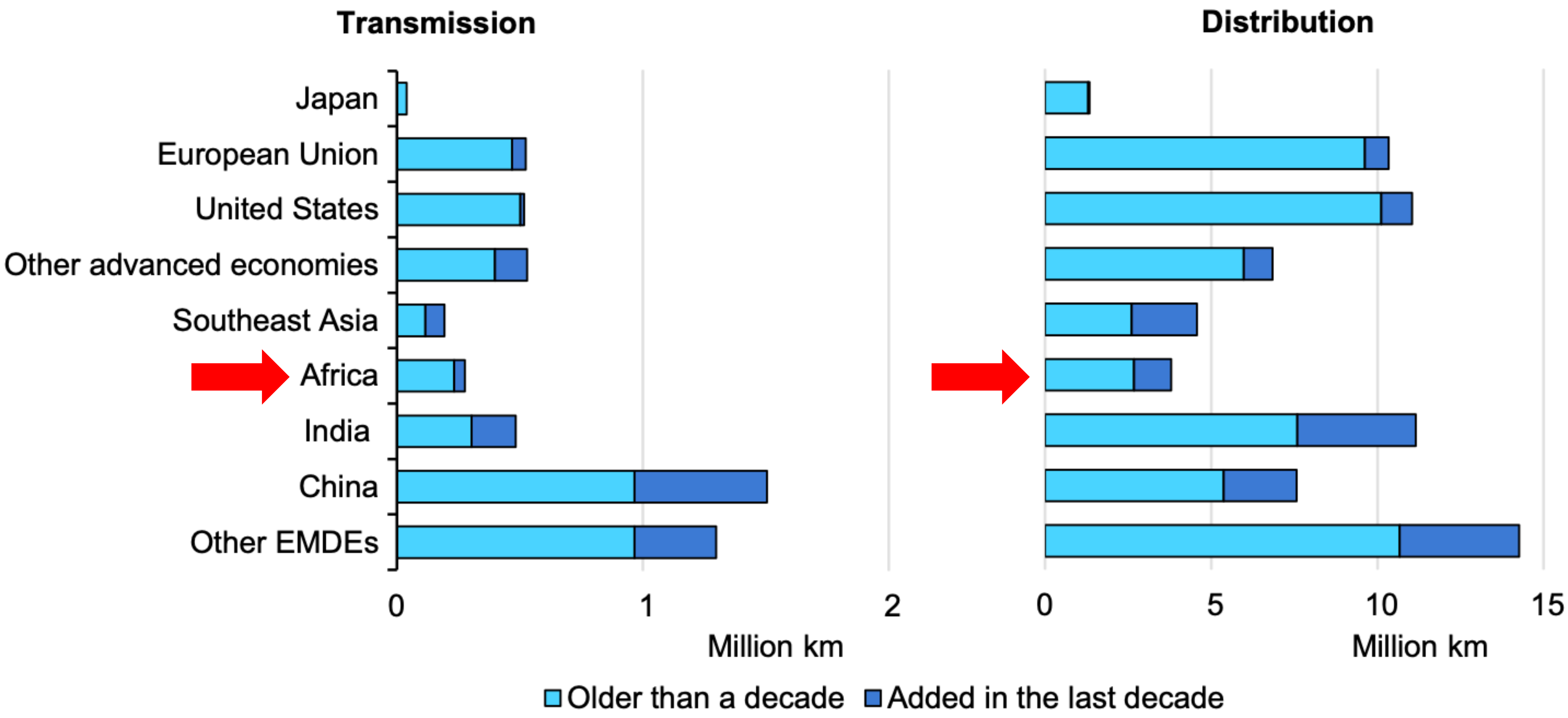
Building on the analysis Electricity Grids and Secure Energy Transitions, this report identifies actionable strategies to address challenges related to the supply chain for grid infrastructure, with a focus on transmission lines with voltages that exceed 66 kilovolts.

This report highlights growing constraints in the supply chain, the need for long-term procurement mechanisms, and the importance of coordinated planning to ensure timely infrastructure development.

The findings serve as a guide for policymakers, regulators and industry leaders to navigate the complex landscape of transmission expansion and modernisation in the clean energy transition.

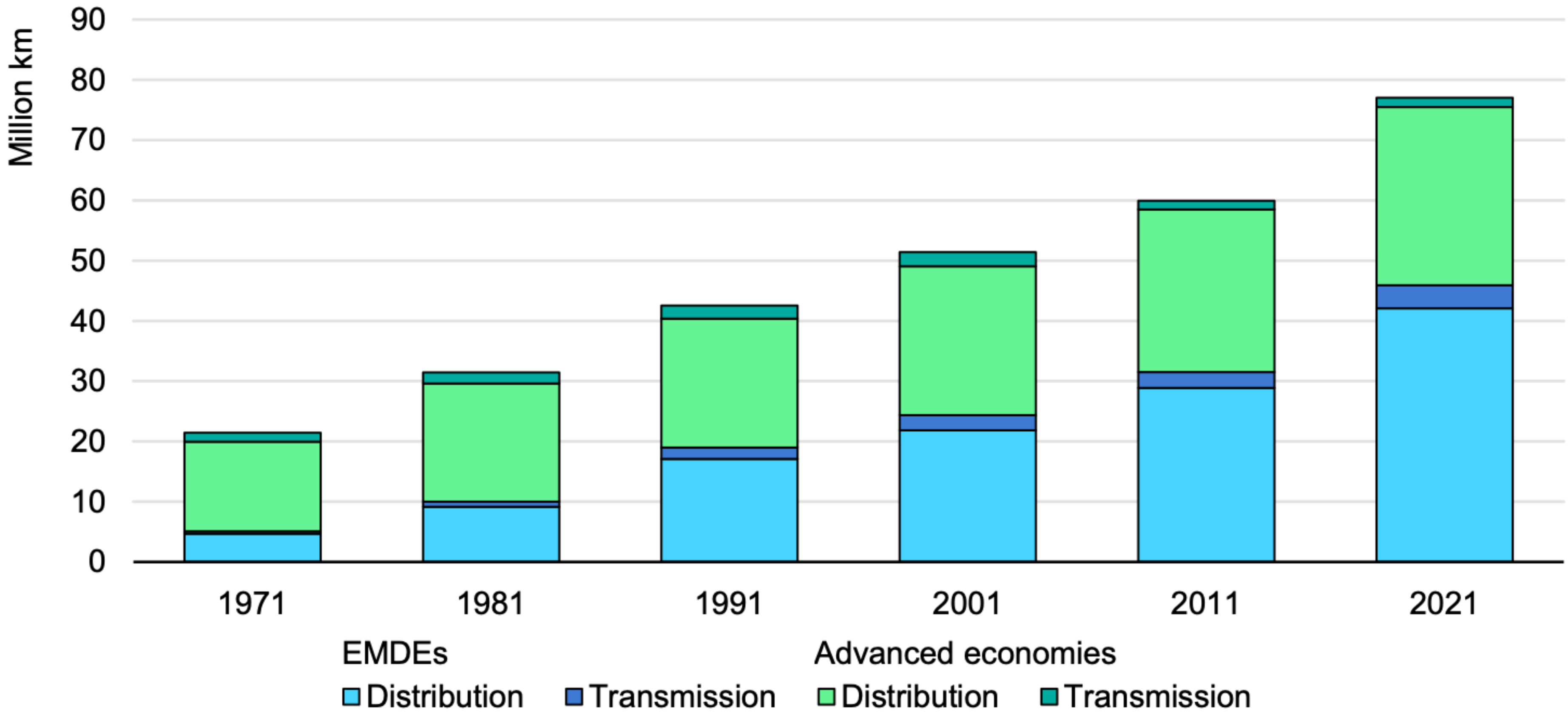
https://iea.blob.core.windows.net/assets/6fbf940a-d4e8-4156-b8e0-07c2f793c094/BuildingtheFutureTransmissionGrid.pdf

Electricity transmission and distribution lengths by age and country/region, 2021



Sources: IEA analysis based on Global Transmission.

Global historical grid length, 1971-2021



Note: Line route length of grids.
Sources: IEA analysis based on Global Transmission and NRG Expert.

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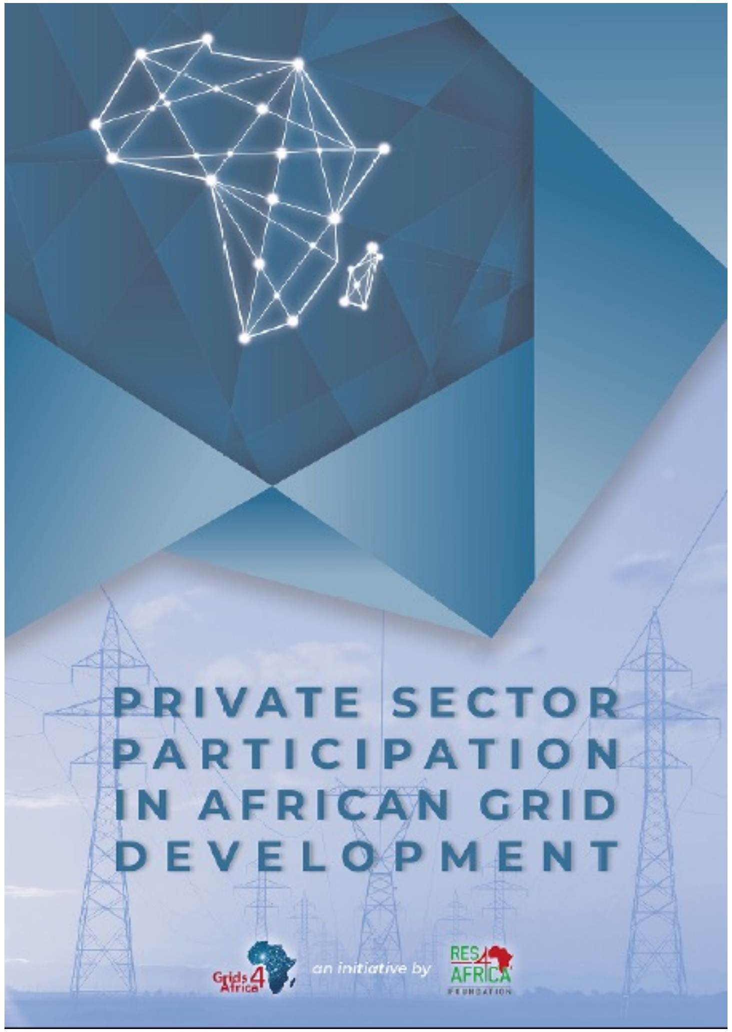
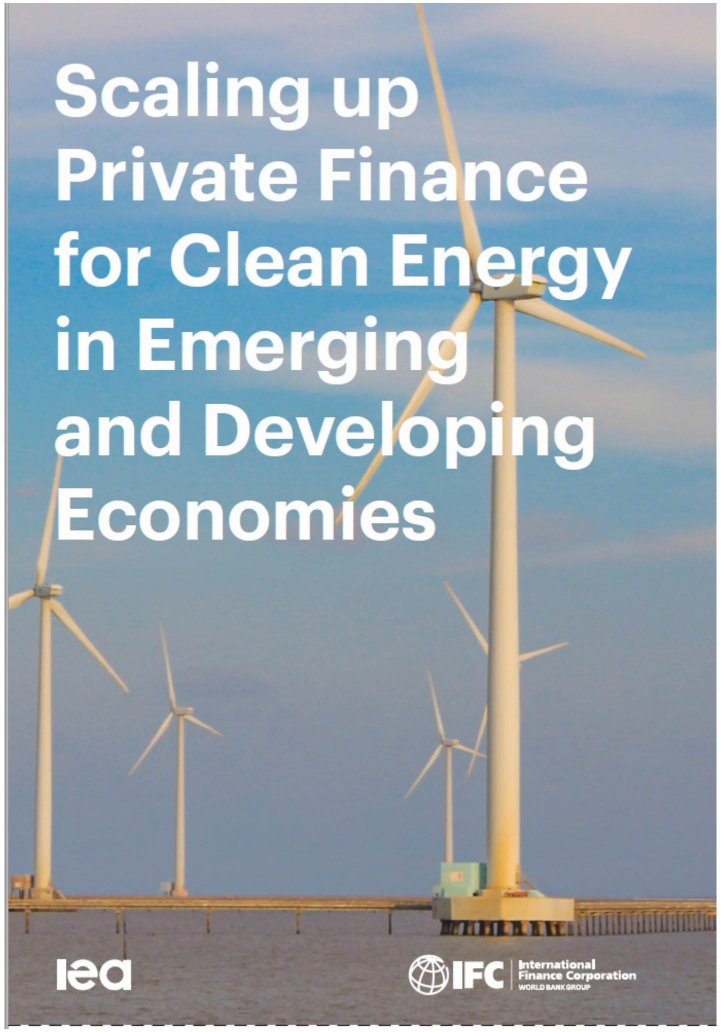
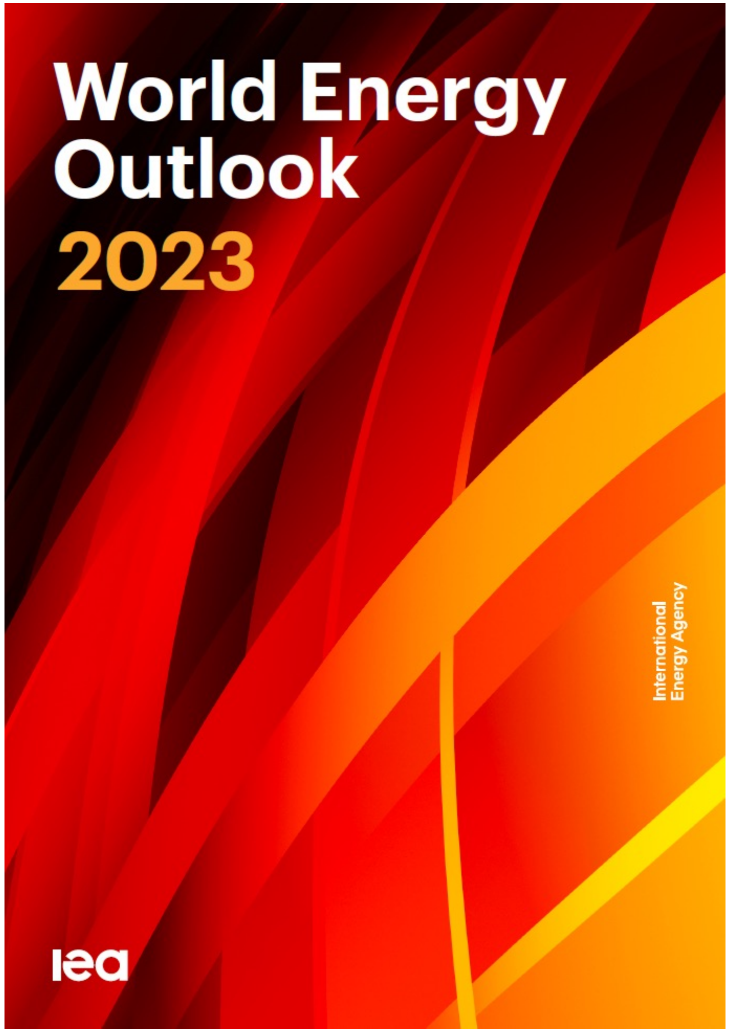
The evidence is overwhelming:
There is no private investment in transmission in Africa

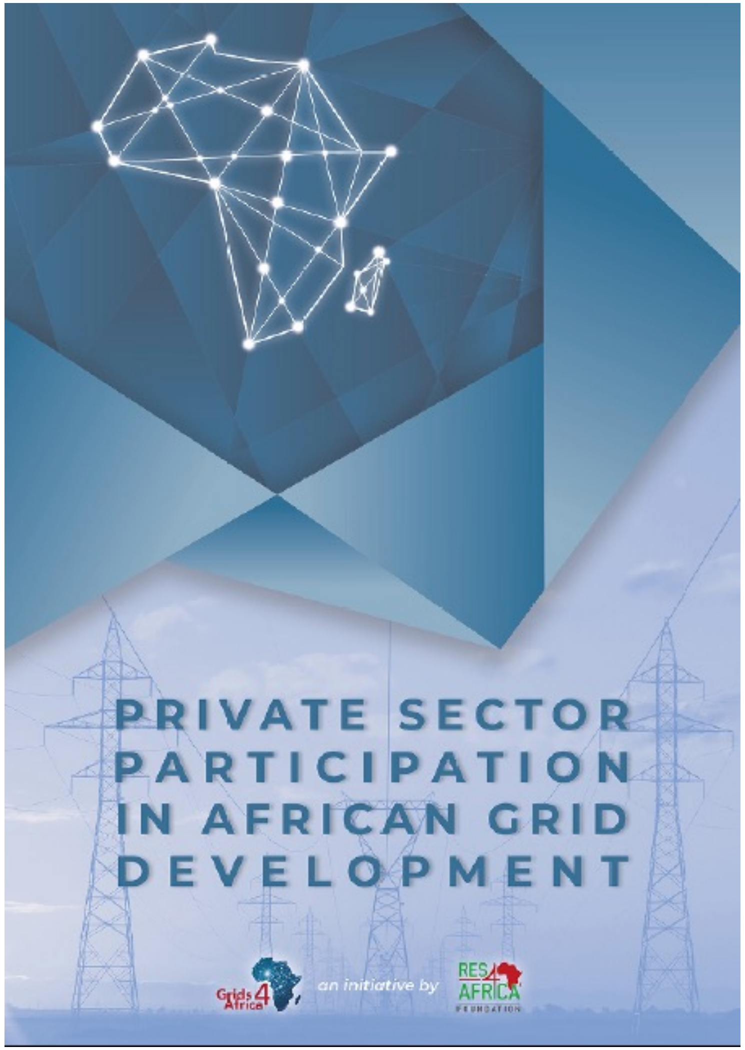
(although some recent initiatives might start to change this)



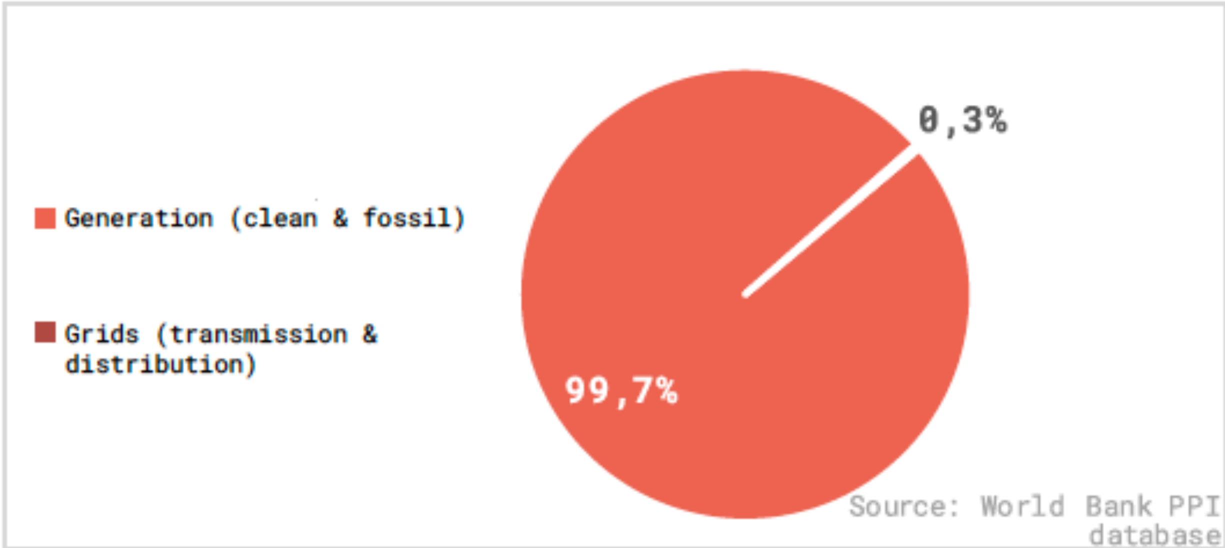




https://www.res4africa.org/calendar-news/79po1jnb8nbasjvf3s8x8bnogbhff4
https://www.iea.org/reports/scaling-up-private-finance-for-clean-energy-in-emerging-and-developing-economies
https://www.iea.org/reports/world-energy-outlook-2023



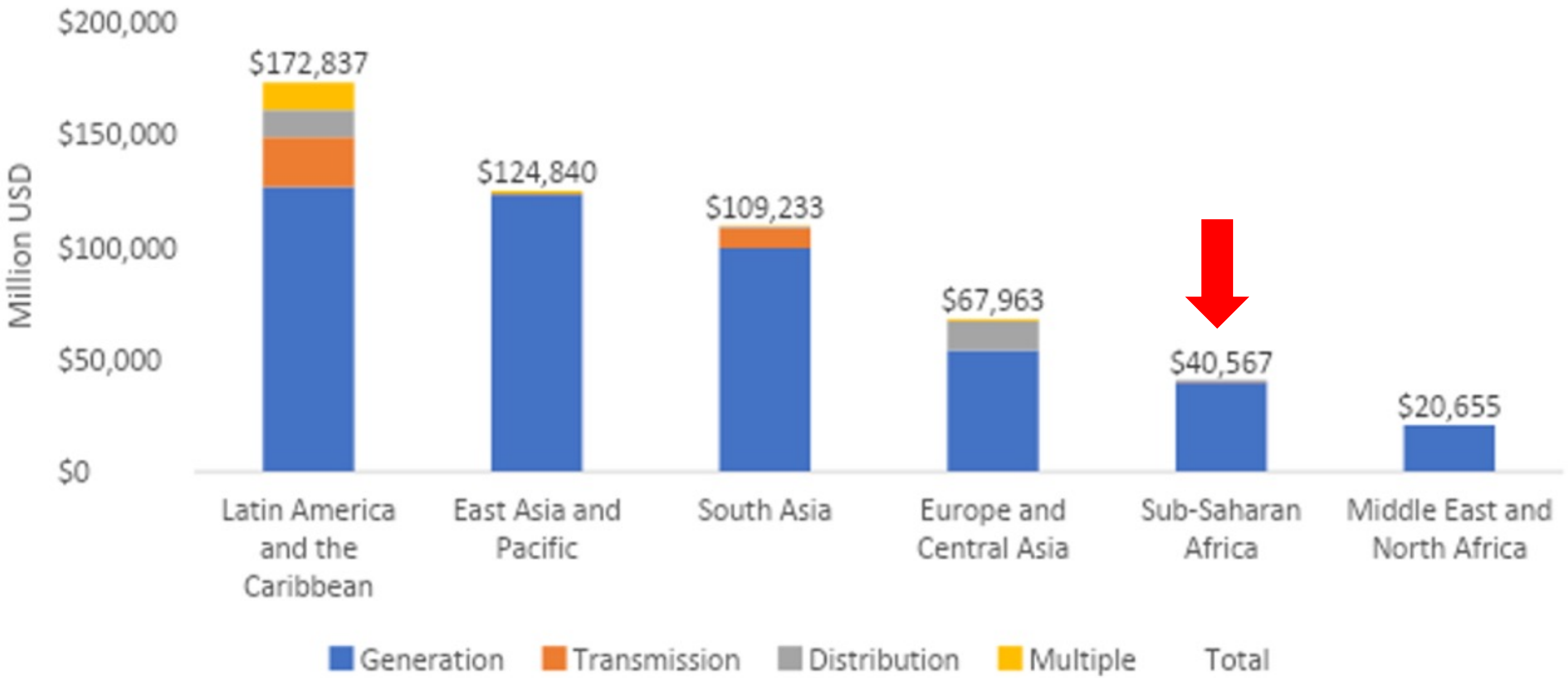
The percentage of private investment in African electricity networks is negligible



Private investments in the electricity sector over 2010-20 (% share of total) for a sample of 10 African countries: Algeria, Ethiopia, Ghana, Kenya, Morocco, Senegal, South Africa, Tanzania, Uganda, Zambia

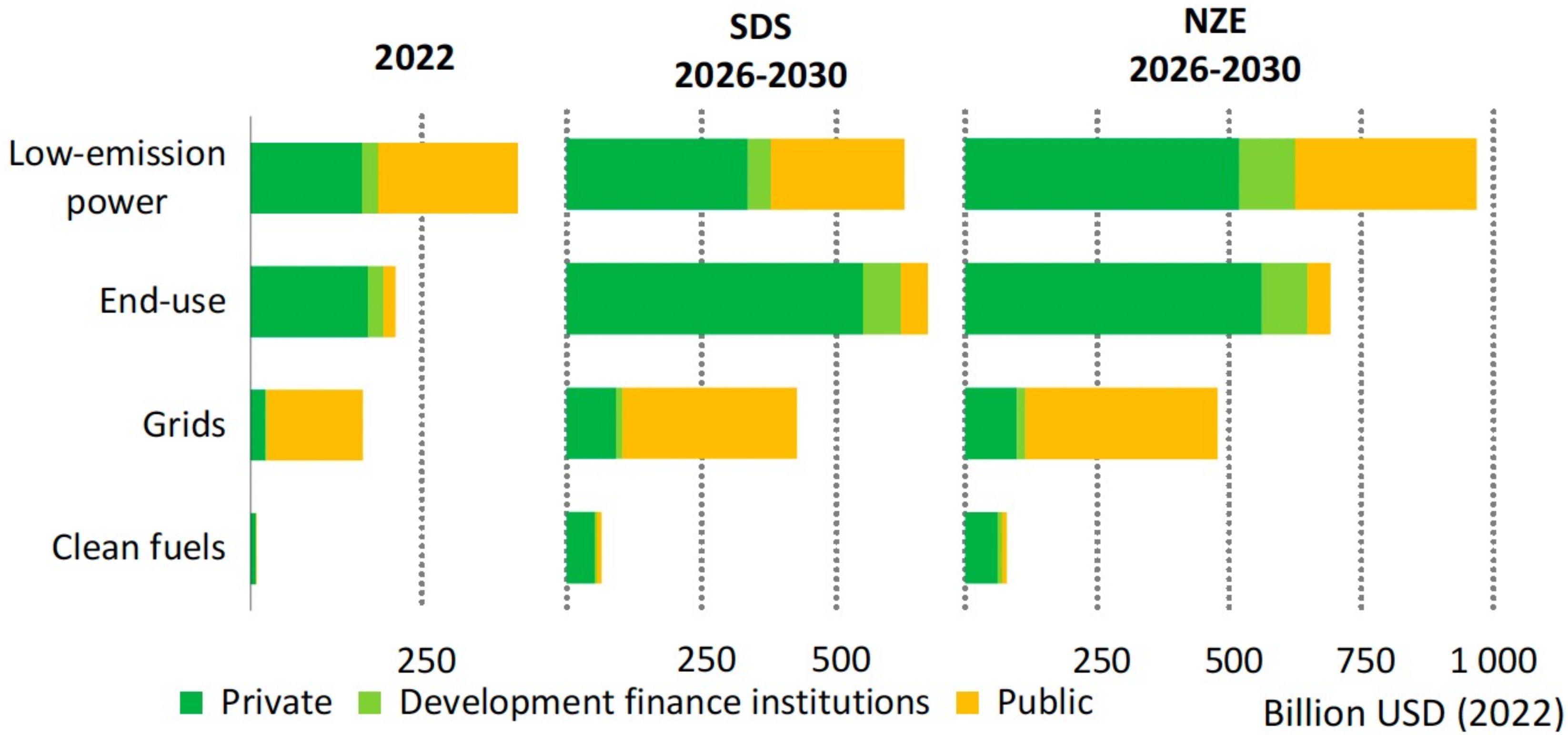
https://www.res4africa.org/calendar-news/79po1jnb8nbasjvf3s8x8bnogbhff4

Almost no private capital has been invested in transmission 2010-2020



Slide provided by Chris Flavin, CEO, Gridworks

Figure 2.15 ▷ Estimated sources of finance for clean energy investment in EMDEs by sector in the NZE Scenario and SDS



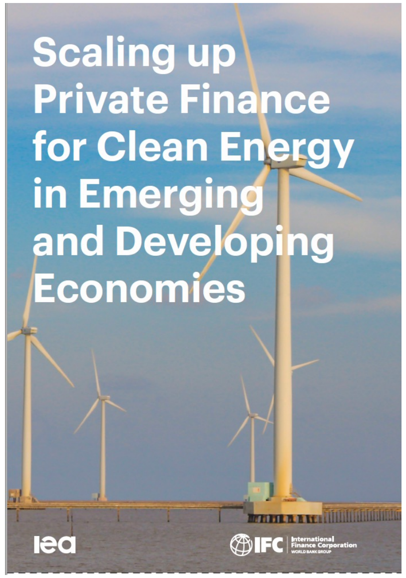
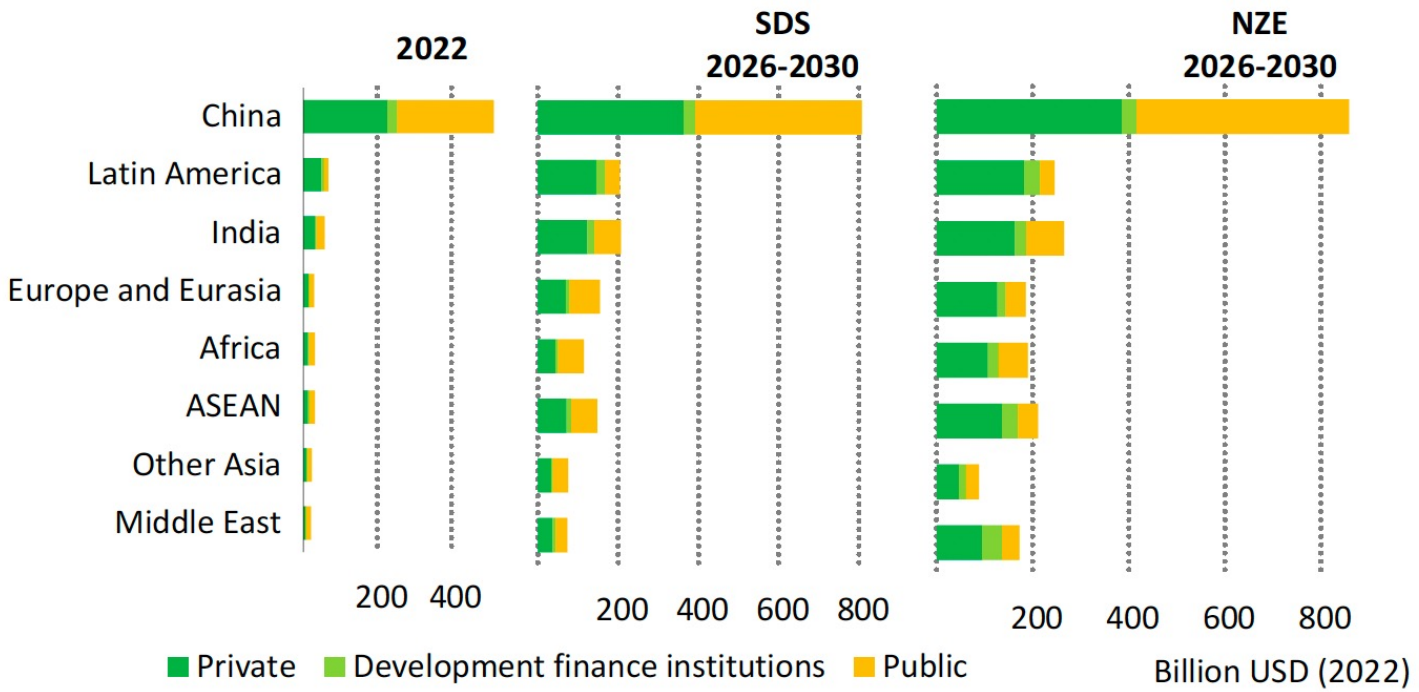
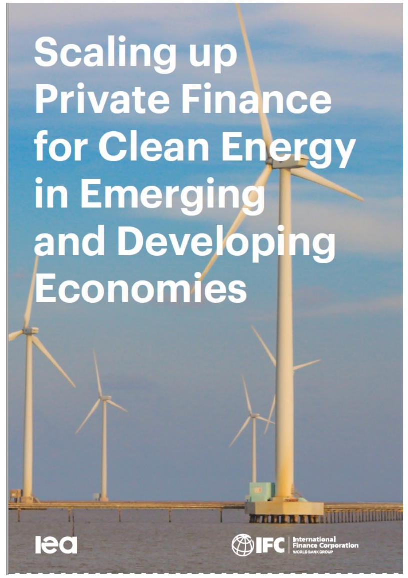


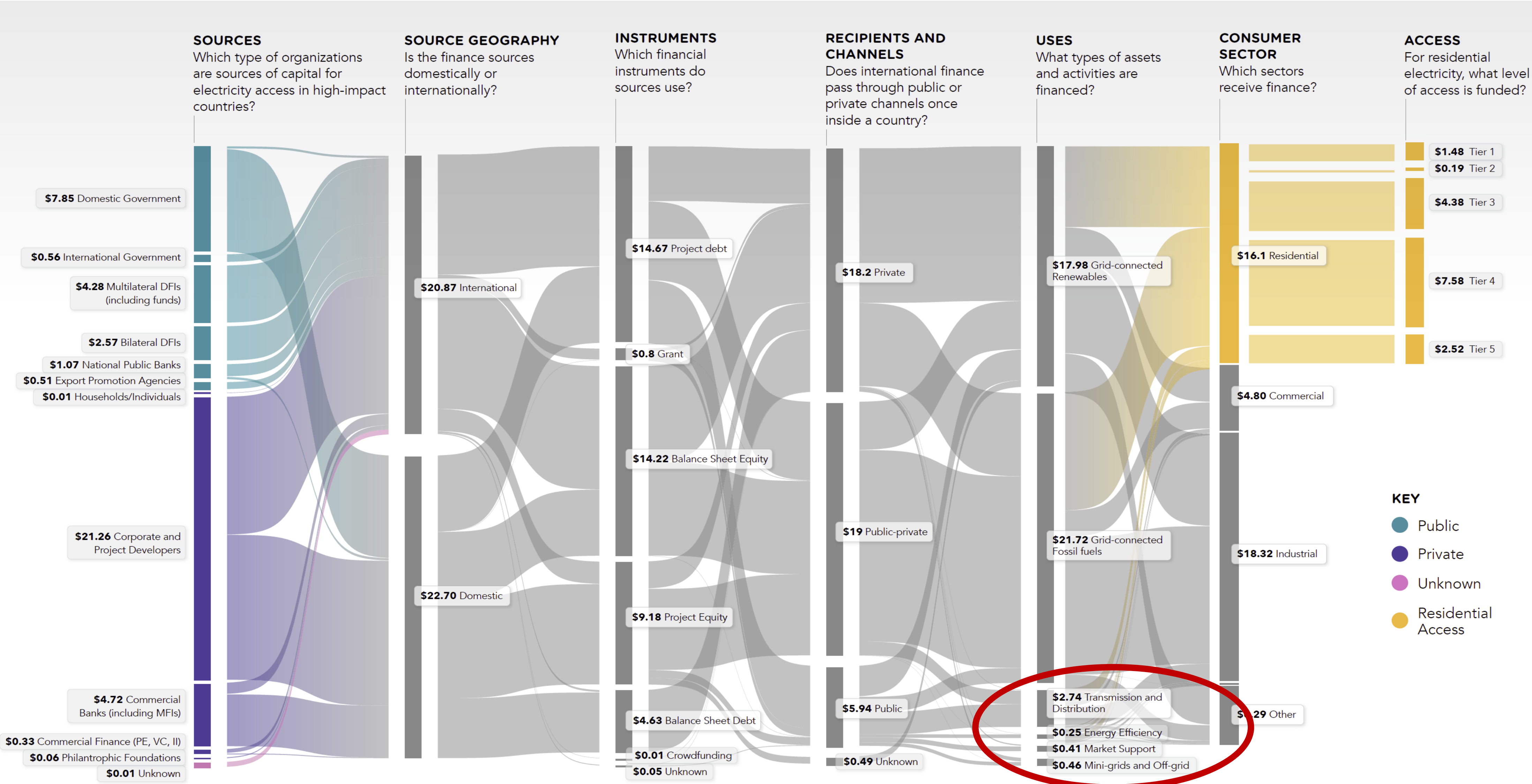
Figure 2.16 ▷ Clean energy investment in EMDEs by public and private ownership and region in the NZE Scenario and SDS



All regions need to see a sharp uplift in financing from private actors in order to get on track with energy-related SDGs and to tackle climate change



TRACKED FINANCE FOR ELECTRICITY IN HIGH-IMPACT COUNTRIES 2020 (USD billion)



Energizing Finance: Understanding the Landscape 2020

Networks. Source IEA World Energy Outlook.

Electricity networks are the foundation of reliable and affordable electricity systems, making them critical infrastructure in all modern economies. There are around 80 million kilometres of networks in the world today.

Over the next decade, investment in these networks needs to increase substantially in order to maintain and improve grid reliability, support clean energy transitions and provide access to electricity to all. In the STEPS, investment in transmission and distribution grids climbs from less than USD 300 billion on average per year over the past five years to over USD 370 billion on average over the next decade, with most of the increase going to distribution (Figure 4.30). The APS calls for only marginally higher grid investment to 2030, but the level of investment needed rises significantly after 2030 in line with the pace of overall decarbonisation. In the NZE, grid investment to 2030 averages USD 630 billion per year, a major increase in an area where new projects often span a decade or more.

The main catalyst for investment to reinforce and extend electricity networks is electricity demand growth. By 2030, electricity demand rises by about 30% in both the STEPS and APS, while it increases by almost 45% in the NZE.
In all scenarios, at least 60% of investments to 2050 are in emerging market and developing economies, where millions of new customers continue to be connected to the network and end-uses are increasingly electrified. In advanced economies, investments are largely focused on ensuring network reliability throughout the transition to a decarbonised power sector facing higher demand. Interconnections have a part to play in all regions in meeting rising flexibility needs, maximising the use of available resources and ensuring overall system reliability.
Policy makers have a crucial role to play in setting long-term visions and plans for electricity aimed at ensuring that electricity network expansion and modernisation keep pace with expanding renewables deployment and new sources of demand. Clear visions and plans will limit uncertainty for regulators, investors and project developers in terms of system needs and market conditions, and in so doing will help to minimise the costs of transitions.

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Resorting to private investment is inevitable, because massive investment is needed, and public finance cannot do the job

What isn’t working?

Limited government balance sheets

Limited multilateral and ECA funding

Small set of contractors

SOURCE: GRIDWORKS

Financing infrastructure projects

African governments cannot provide funds for the utilities to reach financial viability. Governments are constrained by fiscal limitations originating outside the power sector, and market perceptions based on their overall fiscal position and on aggregate indicators, such as the ratio of annual deficits or total debt to GDP. This means that they may not be able to borrow to invest, even on financially viable projects that could eventually improve their fiscal position.

On top of this, as shown by the 2016 WB study “Making Power Affordable for Africa and Viable for Its Utilities”, the immense majority of African distribution utilities have a systematic deficit of revenues over costs, which would persist even in efficiency was improved.

A greater role of private finance could help ease the financing constraints and overcome the transmission deficit.

https://www.worldbank.org/en/topic/energy/publication/linking-up-public-private-partnerships-in-power-transmission-in-africa

Financing transmission projects

Public finance is relatively scarce in fiscally constrained environments. The opportunity cost of public capital in the power sector can be high, especially in countries facing demands to address other socioeconomic deficits.

African countries would benefit from introducing at least some degree of private finance in the transmission sector, following their successful experience attracting private investment in generation.

Given these conditions, utilities in Africa are already looking to the private sector to finance transmission investments.

Private involvement can also bring managerial skills, technical knowhow, and performance incentives.

Tenders to finance transmission investments will attract international bidders.

Private investments can also bring stronger accountability. The contract between the government and the private company will include performance obligations.

https://www.worldbank.org/en/topic/energy/publication/linking-up-public-private-partnerships-in-power-transmission-in-africa

The **primary constraint on private investment** is not the lack of the availability of capital.

The key constraint is, rather, the ability to access that funding through market **regulations and project structures that provide the predictable operating conditions and revenue** that are fundamental to any commercial investment.

It is difficult to prioritise and justify transmission projects when **transmission costs are not clear and transparently allocated** within the sector.

And **this is exactly what is happening in Africa**, which is not learning from the successful experiences around the world, including in developing countries.

https://www.worldbank.org/en/topic/energy/publication/linking-up-public-private-partnerships-in-power-transmission-in-africa

How can regulation help?
First, we must understand transmission from a regulatory perspective

(this is a brief review)

The challenge of power sector regulation

- The challenge (& the beauty) of power sector regulation resides in the necessary contribution of several activities with very different regulatory characterization & treatment
  - Centralised generation
  - **Transmission**
  - Distribution
  - Retail or commercialization
  - Distributed energy resources
  - System Operation
  - Market Operator (Power exchange)

The transmission activity as infrastructure

- The activity of transmission of electricity consists of
  - Deploying pylons, wires, insulators, breakers, transformers, substations, communications and protections.
  - Maintaining & keeping these assets in good operating condition most of the time, during their economic lifetime.
- And **nothing else**
  - **Secure and centralised operation of the power system is the responsibility of the System Operator**, not of the network owners.
  - There is **no reason to impede having multiple owners of transmission assets** in the same national transmission system.

The transmission activity as infrastructure

- The activity of transmission of electricity is a **natural monopoly**
  - Large economies of scale
  - Rights of way make very difficult to have multiple providers
  - Very large market power
  - Locational electricity prices are inadequate to cover the costs of transmission
- Therefore, **the transmission activity must be regulated as a natural monopoly, with remuneration based on the cost of service** *(or the outcome of an auction deciding who will build a new line or substation)*
  - Uniform annuities covering CAPEX & OPEX for the economic lifetime of the assets. Thus, a low risk, boooring activity, adequate to create an assets class, meant for patient, risk-averse investors like pension funds.

The transmission activity as infrastructure
Summary

- Transmission of electricity will be considered here as an **infrastructure activity**, NOT a commercial activity which buys energy cheap & sells it expensive.
- Transmission of electricity is a **natural monopoly** that must be regulated as such, centrally planned and with remuneration based on its efficient **cost of service.**
- Secure and centralised **operation of the power system is the responsibility of the System Operator**, not of the network owners.
- There is **no reason to impede having multiple owners of transmission assets** in the same national transmission system.

Is the current regulation of transmission helping?

Current transmission regulation creates unnecessary risks in transmission remuneration

- Regulation must try to **avoid unnecessary financial risks** *(which have negative consequences on the cost of capital)* to a natural monopoly activity like transmission, subject to regulation
  - Frequent **flawed regulatory interventions** (see next slide) create **unnecessary risk** *(therefore perfectly avoidable)* in the **remuneration** of the transmission activity.

REPUBLIC OF SOUTH AFRICA

ELECTRICITY REGULATION AMENDMENT BILL

(4D) Transmission and distribution licensees shall procure the energy they use to cover energy losses and reserve capacity in their system according to transparent, non-discriminatory and market-based procedures.

Flawed regulation creates investment risks

These are frequent **unnecessary regulatory risks** in the remuneration method

- **Revenues that depend on transactions or volume of utilization**, instead of the actually incurred costs, or standards, or results of an auction.
- **Regulatory updates of the historical rate base**, based on "replacement costs", "market value", or other creative methods.
- **Failure in ring fencing the transmission revenue requirement** in the revenues obtained from the end customer tariffs.
- **Flawed cost allocation methods** that lead to opposition to pay charges that are considered unfair.
- **Frequent re-calculation of transmission charges** or changes in methodology.
- Performance-based **incentives that go beyond the equipment failure.**
- Uncertainty in **remuneration beyond the economic life** of the transmission asset.

How to make transmission attractive to private investment?

How to make transmission attractive to private investment?

- Transmission must be treated as a regulated monopoly, **avoiding to introduce unnecessary risk** for investors.
- Once transmission has been centrally planned and built, **the “viability” of the project is not questioned.**
  - Do not make transmission **remuneration** depend on the volume of flows or of wheeling charges, **just use cost-of-service.**
  - Cost-of-service could be competitively determined by an auction
- The transmission cost is essentially a fixed cost. **Ring-fence the annuity & recover it (with priority) from the regulated end customer tariffs.**
  - Transmission owner must **refinance the decoupling** in time of debt service & regulated revenue requirement.

How to make transmission attractive to private investment?

- **Reduce other risks** (e.g., rights-of-way acquisition, permits, licenses) a priori by the government
- Add **availability incentives**, but not other incentives that are for the system operator.
- Establish **clear & stable transmission cost allocation rules, i.e., charges.**
  - This is particularly relevant for cross-border trade in **regional markets.**

Final recommendations

Make private investment in transmission possible by…

- … **ringfencing the remuneration** of critical transmission projects
- … **educating decision makers** *(abandon wheeling mindset, private transmission assets do not interfere with security, more transmission reduces costs)*
- … **eliminating unnecessary or incorrect regulation**, not adapted to the true nature of transmission
- … **simplifying cost allocation** of cross-border projects.

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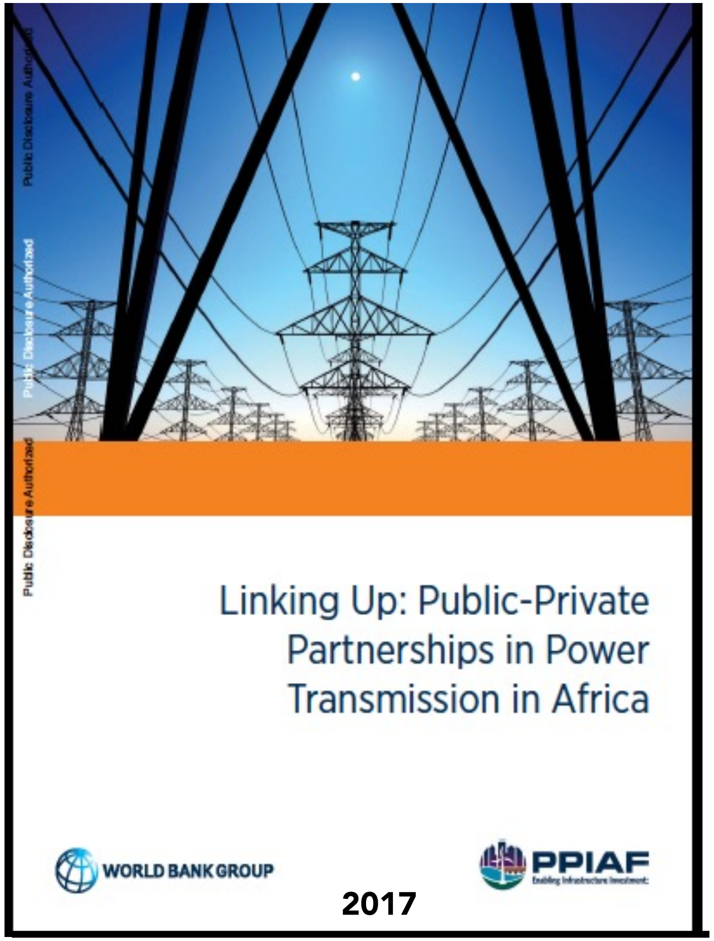

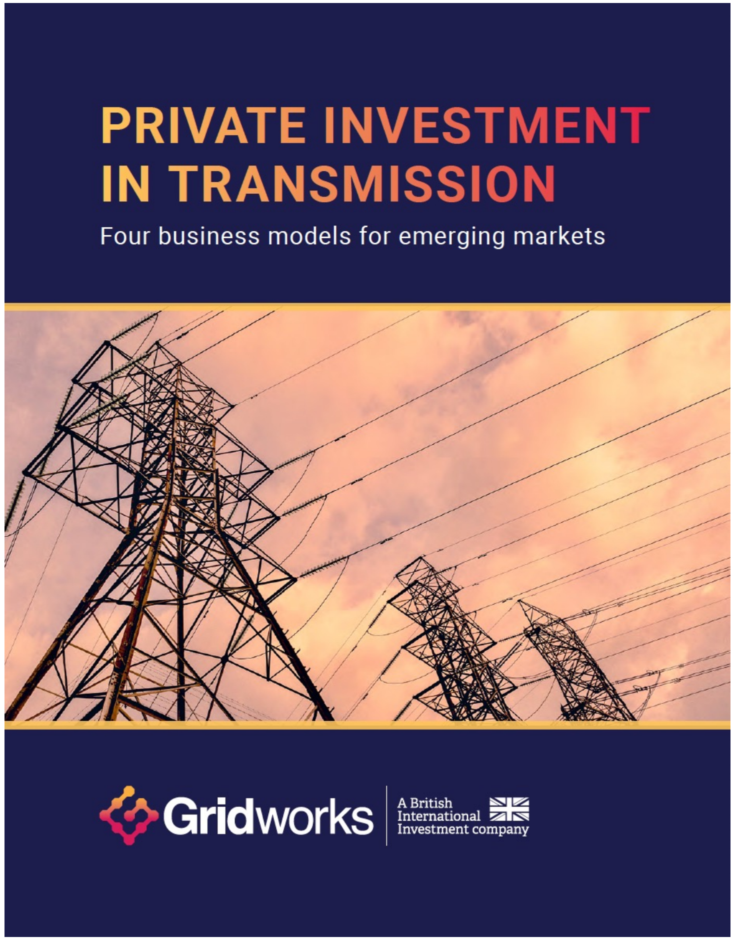

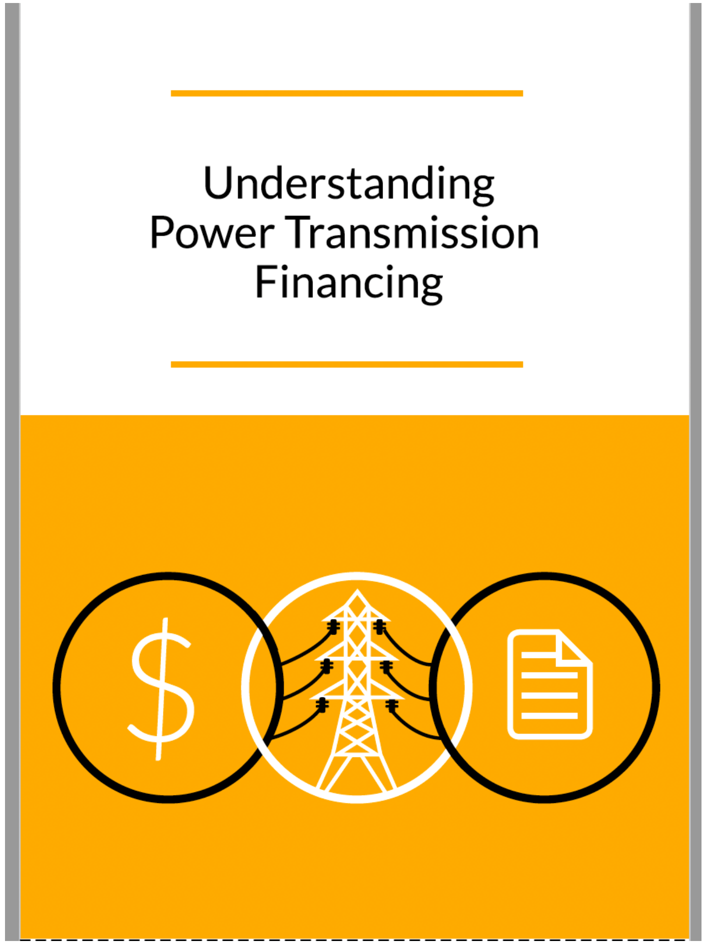

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https://gridworkspartners.com/wp-content/uploads/2023/05/Investment-in-Transmission-Gridworks.pdf
https://cldp.doc.gov/sites/default/files/2021-10/Understanding_Transmission_Financing.pdf

General considerations for all business models

General considerations

Which model is more suitable for a country, or a specific project, depends on many factors which are country and project-specific.

- Ownership, control and maintenance.
- Financing and how it relates to risk allocation.
- Regulatory framework.
- The role of the key stakeholders.

General considerations

Ownership, control and maintenance

- An obstacle to privately financed transmission infrastructure is often the **perception that the national power company or transmission system operator** *(TSO, who is the one actually controlling the power system and coordinating generation dispatch and power flows)* **will lose control over the power system.**
- **Operation and maintenance of the transmission assets can be separate**, as maintenance can be carried out by the private investor or a maintenance contractor or even be subcontracted to the national transmission company, but operation must always be only with the system operator.

General considerations

Regulatory framework

- It is usually possible to implement some of these private investment models within the existing frameworks.
- **If legal change is required, a pilot project could be structured** to address the lack of laws/regulations *(regulation by contract)* to test the ground and to ensure that the laws/regulations which will be finally approved are the right ones for the country.

General considerations

Financing and how it relates to risk allocation.

- A private investment model requires negotiating a **complex commercial transaction** subject to well-established market standards.
- **Risk allocation** is the key component of a project financing contract and it determines the success or failure of a privately-funded transmission project. Most challenging risks:
  - Acquisition of the “rights-of-way”
  - Securing the revenue stream.
- **Golden rule**: Each risk should be allocated to the party that is in the best position to first control and/or reduce it and then manage it.
  - Imposing risks on the private investor, even though it is not in the best position to manage them, will typically result in a more expensive or even unbankable project.

General considerations

The role of the key stakeholders.

- The **private developer/investor** who is responsible for project preparation, design, financing, construction and operation of the project.
- **Financing** – equity and debt – will be also generally provided by other **organisations** who will carry out due diligence of the project, ahead of financial closure.
- **The government**, typically via a **Government Services Agreement (GSA)** which supplements the agreement between the investor and the offtaker.
- **Multilateral Development Banks (MDBs)** who – can provide financial and diverse technical assistance, guarantees to secure project cash flow and offtaker risks, and political risk coverage.
- **Bilateral organisations and donor agencies** can also provide technical assistance, and grants or concessional lending to unlock larger sums of private sector investment.

Private investment may adopt several business models, some of which may be difficult to implement in most African countries

What are the business models of private-public partnerships in the transmission of electricity?

The four main models to attract private investment in transmission, are **privatizations**, **whole-of-grid concessions**, **independent power transmissions** (IPTs), and **merchant investments**.

Private finance has brought substantial investment in new transmission to the countries using these models.

Private companies now finance a large share of transmission investment in many countries in North and South America, and in Europe. Privately financed transmission has also been introduced in some developing countries. India, for example, has attracted US$5.5 billion of private investment in transmission since 2002.

Business models to facilitate private investment in transmission

- **Privatisations** (a sell of shares by a government in a state-owned utility or transmission company)
- **Whole-of-network concessions**.
- **Independent transmission projects** (ITPs)
- **Merchant** lines

These are archetype-like models, which can be adapted & implemented across a large variety of circumstances.

Models for private investment in transmission

1. **Indefinite privatizations** provide ownership of the transmission network to a private company, usually through a trade sale or public flotation of a government-owned transmission business. The private owner has the *exclusive right (and obligation) to develop new transmission in its area of operation*.

2. **Whole-of-grid concessions** provide *similar rights and responsibilities to privatizations, but for a shorter period*. In most cases, the government implements this business model with a *competitive tender of the concession* and enters a concession contract with the winning bidder.

Models for private investment in transmission

3. **Independent Transmission Projects (ITPs)** provide the rights and obligations associated with *a single transmission line, or a package of a few lines*. In most cases the government implements this business model by *tendering a long-term contract*, with payment dependent on the availability of the line.

4. **Merchant investors** *build and operate a single transmission line* ("merchant line"), typically a High Voltage Direct Current (HVDC) line. The merchant investor benefits from moving power from low-price regions to high-price regions. Merchant lines are a *private initiative* and are not initiated by the government. There are very few of them, for good reason.

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Whole-of-grid concessions – 1

- A whole-of-grid concession extends the right to develop, construct, operate, and maintain transmission infrastructure – but in general the property remains with the original public owner – to a private sector concessionaire, who in turn receives remuneration for the concession period (e.g., 30 years).
- The regulated amount that the **concessionaire is remunerated** in a year to cover its costs and earn a return on its investments (the annual revenue requirement) is calculated using **cost of service regulation**, which should be supplemented by performance-based remuneration.
  - **Unnecessary complications** in the procedure may include: an upfront payment by the concessionaire to get the concession, which could include a rental fee for the existing assets; or the collection of tariffs from the beneficiaries (supply and demand, in general) of the transmission services.
  - **Transmission tariffs must** be cost-reflective – in the aggregate – to **recover the concessionaire's costs**. Otherwise, the government or state-owned utility must cover the deficit for the concession to attract investment.

Whole-of-grid concessions – 2

- **The concessionaire**, via a project company, is typically **responsible for:**
  - the **operation and maintenance** of the transmission infrastructure;
  - **refurbishments**, restoration and repairs to existing transmission assets;
  - construction of **new transmission** infrastructure, upgrades, and expansions within the concession area;
  - **all investments required for the stable and efficient operation** of the transmission infrastructure; and
  - **operational control** of the transmission network within the concession area, if there is no separate System Operator.

Whole-of-grid concessions – 2

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  - construction of new transmission infrastructure, upgrades, and expansions within the concession area;
  - all investments required for the stable and efficient operation of the transmission infrastructure; and
  - operational control of the transmission network within the concession area, if there is no separate System Operator.
- The concessionaire will expand, reinforce, and upgrade the transmission system to the extent required to provide transmission service within the relevant host country, and to the extent that expansion projects are approved by the regulator and included in the regulated remuneration.

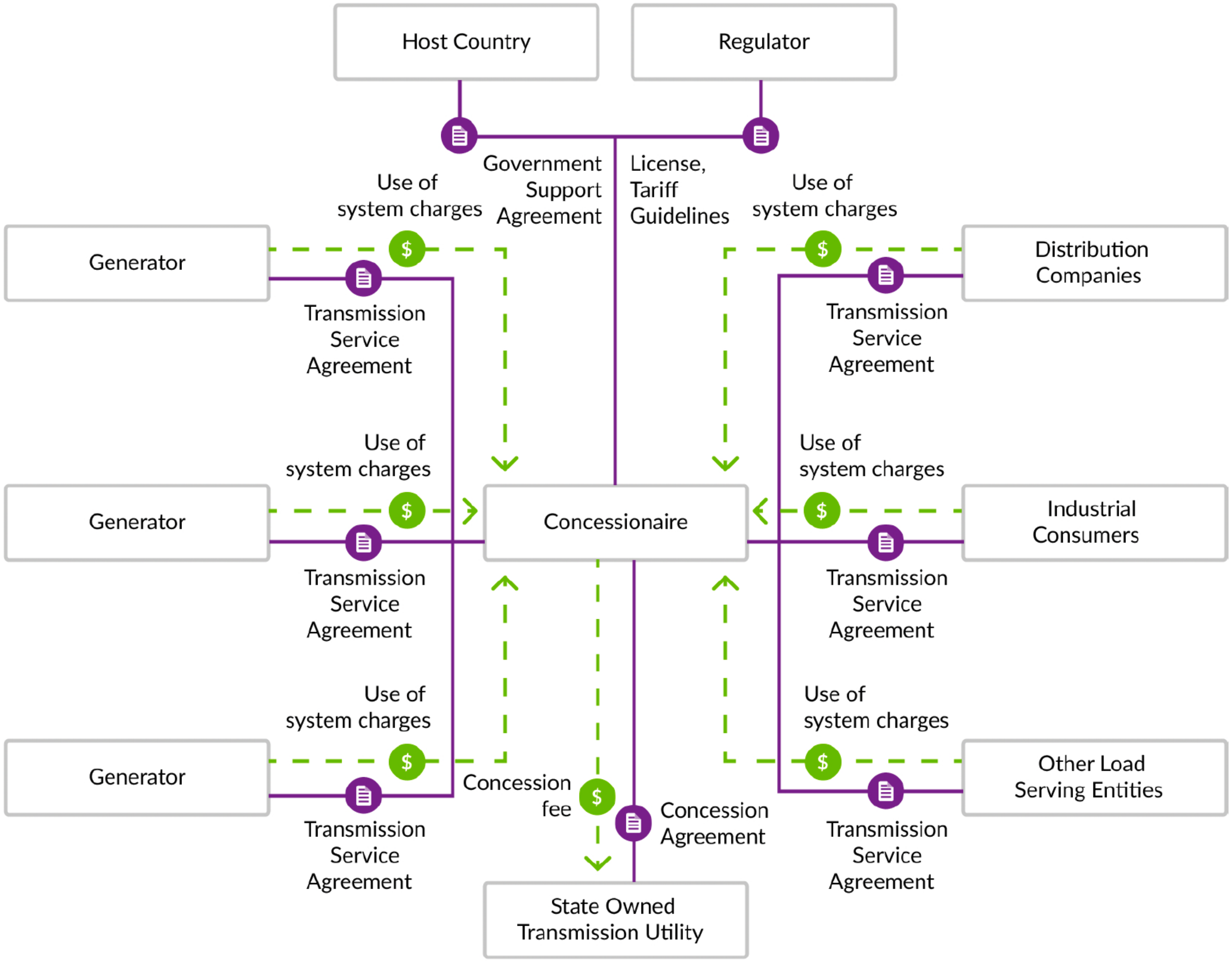
Whole-of-grid concessions – 3

- The initial assets and the assets invested by the concessionaire are transferred back to the state-owned (transmission) utility at the end of the concession.
  - Payment for the residual value of new investments is due to the concessionaire.
- The cost-of-service and the transmission tariff methodology to be used by the regulator must be clearly articulated in the concession agreement.
  - The soundness and certainty of this methodology are critical to the success of implementing a whole-of-grid concession.
  - The KPIs set by the regulator and their economic implications must be clearly established in the concession contract.
- The government's role is limited to planning and the functions of the independent regulator.
  - Transmission capacity expansion planning corresponds to the national government, but the concessionaire should be a key actor in the process.

Whole-of-grid concessions – 4

- A whole-of-grid concession can be procured by
  - conducting an international competitive tender or
  - through direct negotiation.
- In a competitive tender, the qualification and evaluation criteria of the tender determine the selection of a concessionaire.
  - Economic considerations (e.g., offer a rate-of-return on new investments) can be also a factor in the selection.
- The concession agreement may require that the concessionaire will pay an upfront fees to the (transmission) state-owned utility.
  - To cover any existing liabilities that have not be transferred to the concessionaire and to administer the concession agreement.
  - The upfront fee may also include a rental fee for the existing assets for the concession period; then the RAB for the concessionaire must include these assets.

The concession structure



Whole-of-grid concessions – 5

- **The country's legislative framework must permit private sector parties to own and operate strategic transmission assets.**
- **In countries without adequate regulation or institutions** whole-of-grid concessions can still be achieved through "**regulation by contract**", i.e., a government support agreement with an annex that describes the adopted methodology.

Whole-of-grid concessions – 6

Financing models for whole-of-grid concessions

- Network industries require ongoing investment. Ongoing investment requires ongoing increases to the equity invested in the business and ongoing increases (and repayments) of debt.
- Project finance structures are not well suited to ongoing and open-ended borrowing. For this reason, network utilities with ongoing investment requirements are, as a general rule, financed using corporate finance, not project finance. This has several implications.
  - Lower debt-to-equity ratios
  - Shorter tenors than with project finance
  - Floating rates in debt obligations
  - Constant need to borrow to roll over the debt obligations.

Whole-of-grid concessions – 7

Transmission assets can continue to benefit from donors

- A whole-of-grid concession does not preclude donors and MDBs from still financing new transmission infrastructure build, nor does it change the role of DFI or ECA lending for new transmission assets.
- Donor funding can also provide viability gap funding to help support a concessionaire's acquisition of a regulated asset base, with the remainder of the funding being financed by the concessionaire.
- The concessionaire would earn a return on the portion of the asset base it has self-financed, but not a return on the donor portion of the financing.

Whole-of-grid concessions – 8

- **A whole-of-grid concession may be appropriate if** a host country desires to.
  - leverage the experience and know-how of the **private sector to better maintain and operate the existing transmission network**,
  - relieve budgetary constraints by **transferring the responsibility for financing capital expenses to the private sector,**
  - while **retaining long term ownership** over the transmission system.

Whole-of-grid concessions – 8

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  - leverage the experience and know-how of the private sector to better maintain and operate the existing transmission network,
  - relieve budgetary constraints by transferring the responsibility for financing capital expenses to the private sector,
  - while retaining long term ownership over the transmission system.
- **A whole-of-grid concession may be less attractive** to a host country that:
  - has an existing transmission utility network whose performance equals or exceeds international performance benchmarks; and
  - is targeting financing for just one or a package of transmission infrastructure assets that might be more efficiently financed via IPT.

African experience with whole-of-grid concessions

Country	Period	Scope of concession	Name of utility under concession	Parties and shares
Cameroon	20 years (2001–2021)	Concession for generation, transmission, and distribution. However, the transmission concession ended in August 2015	SONEL (Société Nacionale d'Électricité)	• AES SONEL (United States): 51% • Government: 44% • Company's personnel: 5% • In 2014, AES sold its stake in AES SONEL to Actis. The company was renamed ENEO
Mali	20 years (2000–2020)	Concession for generation, transmission, distribution, and supply of electricity and water	EDM (Électricité du Mali)	• SAUR/IPS-WA(France/Canada): 34% • Government: 66% SAUR and IPS-WA had 39% and 21% of the concession, respectively, until 2005
Senegal	2 years (1999–2001)	Concession for generation, transmission, distribution, and sale of electricity	SENELEC (Société National d'Éléctricité du Sénégal)	• Elyo (France) and Hydro-Québec (Canada): 34% • Government: 66%
Country	**Period**	**Scope of affermage**	**Related utility**	**Parties and shares**
Gabon	25 years (1997–2021)	O&M contract	SEEG (Société d'Énergie et d'Eau du Gabon)	• Veolia[2] (France): 51% • Government: 49%
Cote d'Ivoire	20 years (1990–2020)	O&M contract	CIE (Compagnie Ivoirienne d'Électricité)	• SAUR (France/Canada): 51% • Government: 49%

Source: Developed by Castalia. Table contains examples of African countries that introduced concessions (including transmission) and affermage contracts since 1990.

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Privatisation

- Privatisation is the transfer of full ownership in the transmission infrastructure to a private-sector party. Here it is assumed that privatisation applies to the entire transmission system in a country.
- Once privatisation has taken place, the transmission company is typically restructured and the government influence on the operation and management is limited to regulatory activities.
- The process of unbundling the vertically integrated utility, and privatising the transmission segment takes considerable planning, political will, and appropriate legal reforms.

Privatisation

Privatisation can be implemented in at least three ways:

- A sale of shares — where all or a majority of the shareholding of the existing transmission company is transferred to a private entity.
  - In this option, the existing transmission company and its licences remain unchanged and the transfer occurs at the shareholding level;
- A sale of assets — where there is a sale of the transmission business as a going concern.
  - In this option, the private party would be expected to form a new transmission company and acquire the relevant transmission licences in the name of the new entity; or
- A statutory transfer — where legislation is passed imposing a compulsory transfer of the transmission assets or shareholding, to a private party.
  - In this option, the transfer would be prescribed by the legislation and any conditions attached to such law.

Privatisation

- Privatisation may be an option to be considered under the **following prevailing conditions**:
  - where there is a partial or full **legal unbundling of the transmission system operating function**;
  - where **a private-sector party is allowed by law to hold a transmission licence** for the construction and operation of the transmission infrastructure; and
  - where **there is an independent regulator** to ensure technical compliance and ensure appropriate tariff structures.

Privatisation

- **Challenges** to this model include a **government's concerns** about loss of ownership of its natural monopoly and **control**, the fear that privatisation will result in **increased tariffs** and the risk of significant **job losses** with the public utility.

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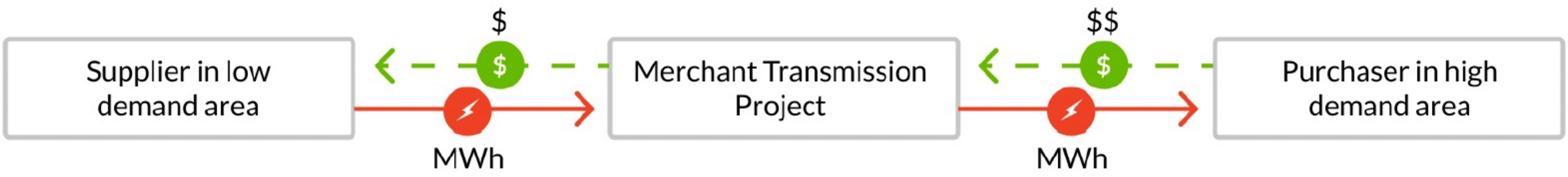
Merchant lines

- Merchant lines are developed by independent companies seeking to use the system to wheel power between zones in the power system where there is a difference in electricity prices.
  - Trading power from lower-priced markets into higher-priced markets allows the company to profit from pricing arbitrage.
- Merchant lines may try to be financially viable by
  - Joining and trading between two weakly interconnected (or non previously connected) independently operated and regulated power systems with substantially different electricity prices, trying to avoid equalising these prices.
  - Joining two nodes – with substantially different electricity prices – in an insufficiently interconnected power system or marketplace where prices in nodes or areas are determined by some market-based or centralised dispatch procedure, like in a regional power pool.

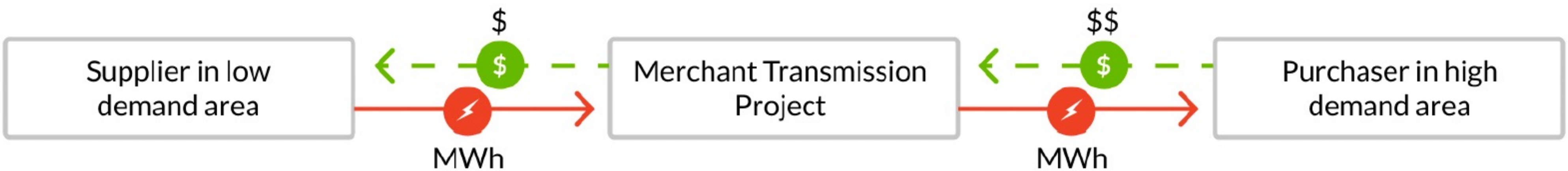
Merchant lines

- This model may not be viable (or **very risky**) in power systems **where tariffs are set at politically determined** or artificially low levels.



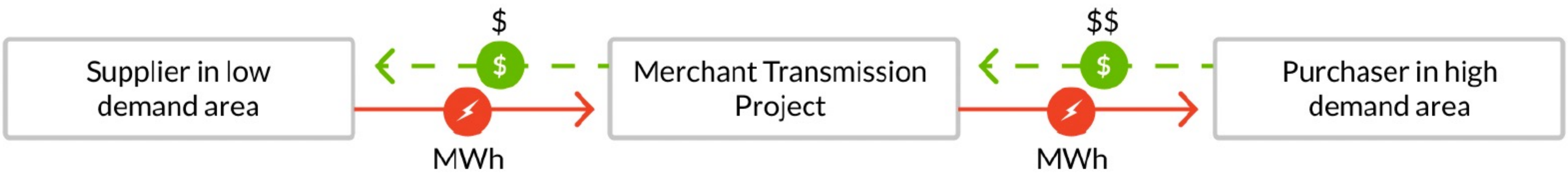
Merchant lines

- This model may not be viable (or very risky) in power systems where tariffs are set at politically determined or artificially low levels.
- Merchant lines are usually **not part of the traditional planning** of a transmission system but are instead born of market opportunity and **may be allowed but not encouraged.**



Merchant lines

- This model may not be viable (or very risky) in power systems where tariffs are set at politically determined or artificially low levels.
- Merchant lines are usually not part of the traditional planning of a transmission system but are instead born of market opportunity and may be allowed but not encouraged.
- The assets of a merchant line/system are entirely owned, managed and controlled by the private party who invests or finances its construction, obtains permits and land rights, with no financial interest by the state-owned utility.



Merchant lines

- The implementation of the merchant model is only possible where private entities are allowed to hold a licence for the construction and operation of a transmission infrastructure, among other regulatory requirements.
  - Governments with weakly connected power systems with substantially different prices and with challenges to interconnect may welcome a merchant investor.
- The commercial viability of a merchant line rests entirely on its ability to capture value through power pricing arbitrage across markets or by selling its capacity to third parties. While the substantial price difference exists.
- To secure a revenue source the merchant line owner may sign long-term bilateral contracts in advance with selling and buying parties at both ends of the line.
  - Only lines with a very large B/C ratio would be built with this model.

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Industrial demand-driven models

- In the industrial demand-driven model, transmission expansion is driven by the electricity needs of one or more large industrial consumers. The transmission line is developed to serve the industrial area where the large consumer(s) conduct their businesses.
- The relevant transmission line, once built, could remain in the hands of the private sector or could be handed back to the transmission utility.
- A key challenge to this model is determining the mechanisms for granting access to other network users that are not part of the industrial users.

Independent Power Producers have invested in short transmission lines to connect to the grid

- A small number of transmission lines connecting generators (IPPs) to the grid have been privately financed. These investments are always attached to generation projects and are usually a small portion of the overall investment in the project.
- These transmission investments are generally bundled with the IPP generation investment. The private investor financing the connection line is the same IPP developer that builds and finances the generation plant.
- The IPP developer may own and operate the transmission line under a long-term contract, or transfer the line to the system operator or government-owned transmission utility once the line is commissioned.
- In cases where the IPP continues to own and operate the connecting line, costs are generally factored in the price set in the Power Purchase Agreement (PPA).

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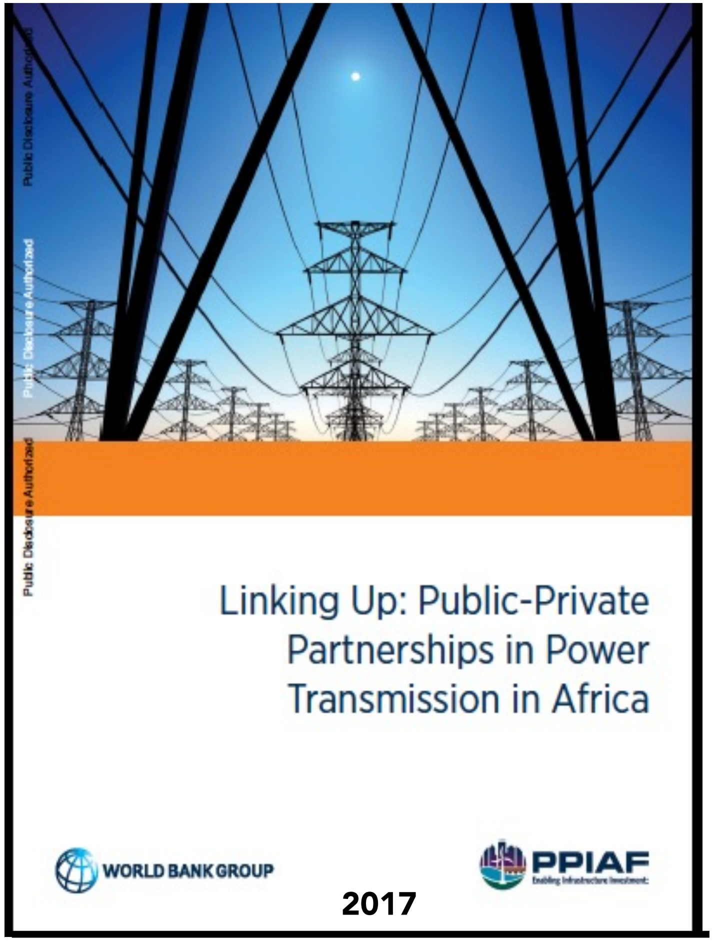
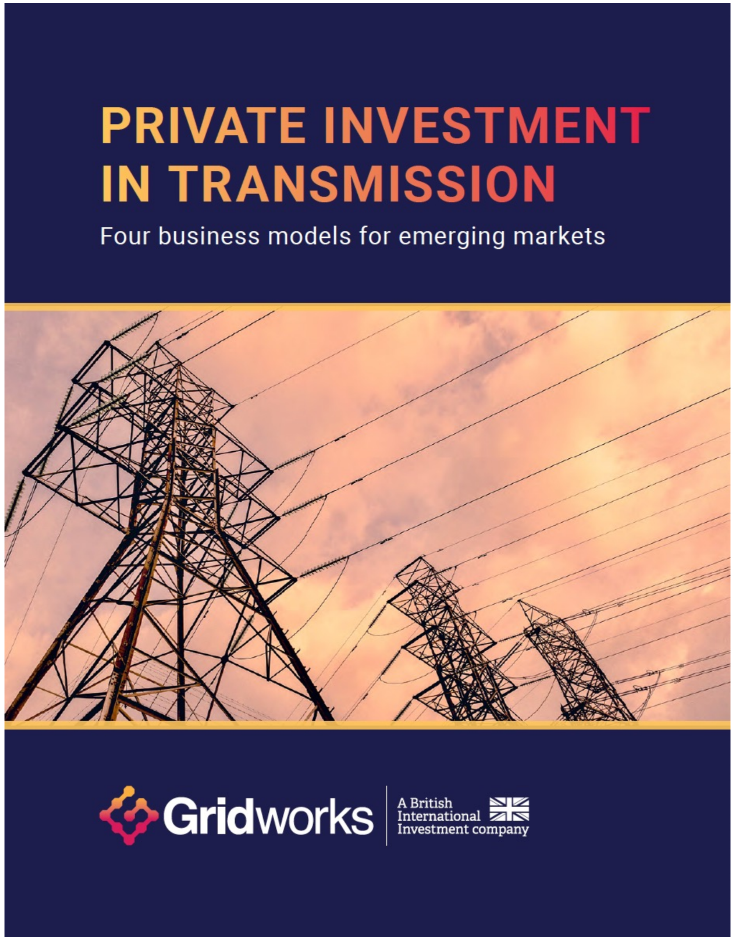
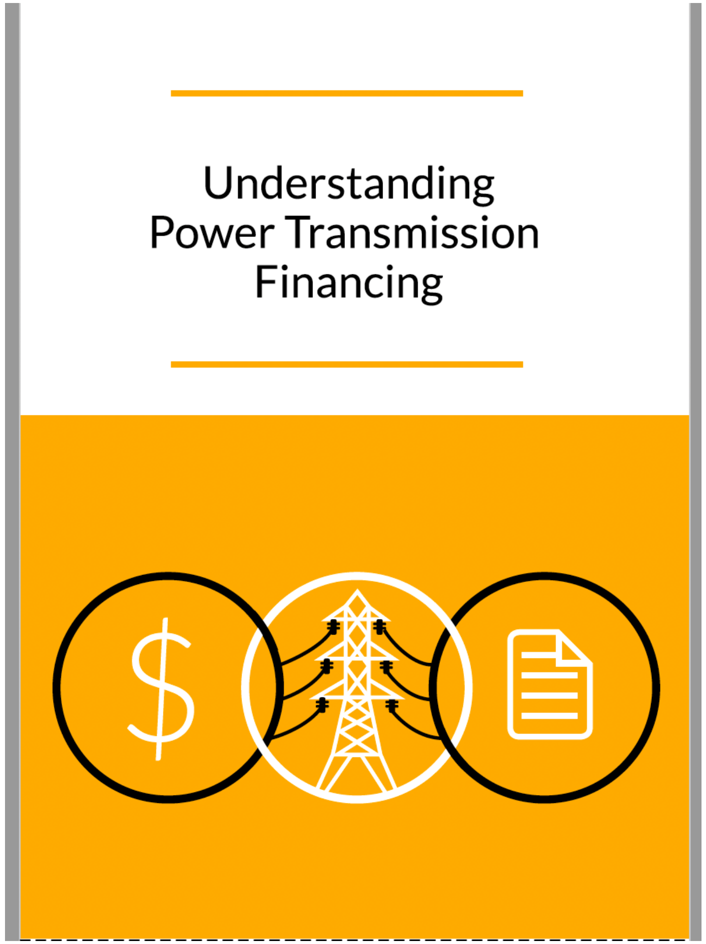






https://www.worldbank.org/en/topic/energy/publication/linking-up-public-private-partnerships-in-power-transmission-in-africa
https://gridworkspartners.com/wp-content/uploads/2023/05/Investment-in-Transmission-Gridworks.pdf
https://cldp.doc.gov/sites/default/files/2021-10/Understanding_Transmission_Financing.pdf

The Independent Transmission Project (ITP) model

- The **ITP** involves the construction and maintenance of **a single transmission line or a package** of transmission lines **under a long-term contract**, typically awarded in a competitive tender, generally between the state-owned utility that is responsible for transmission and the (private) project company that is established to undertake the project.
- Private finance via tenders allows the state-owned utility, or the government, to pay **competitive prices for transmission services**.

The Independent Transmission Project (ITP) model

- **Project finance can allow state-owned utilities to raise additional capital** that would otherwise be unavailable, by separating out a portion of cash flows related to some specific investments.
- **Under a project finance structure, the government's guarantee on payment does not make the fiscal position worse**.
  - Rather, it ensures that a small increase in electricity tariffs intended to pay for a financially viable project will be truly dedicated to that and will not be used for other debt services or expenditures.

Africa has little privately financed transmission, but substantial private investment in generation via IPPs, like ITPs in many aspects

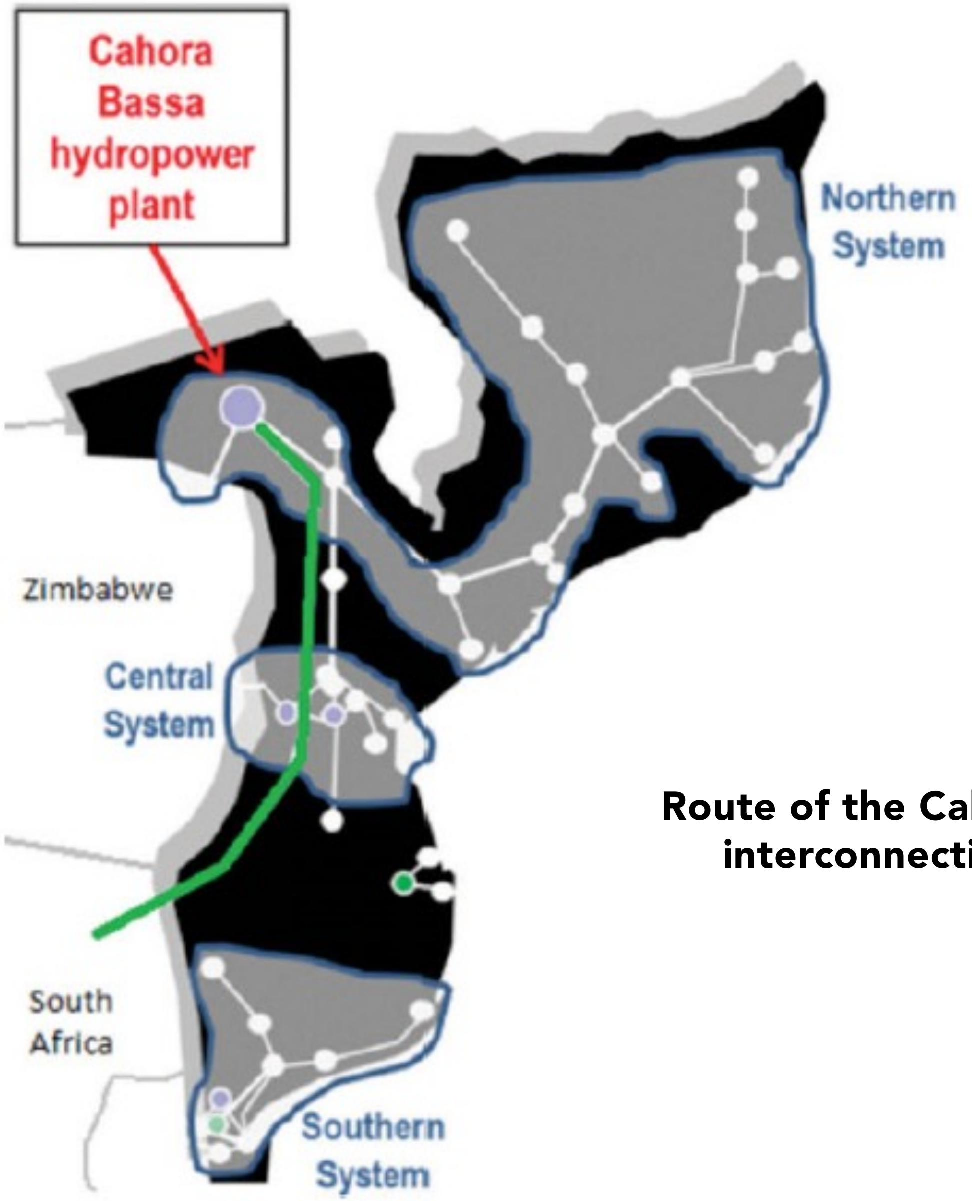
- In most countries in Africa the government-owned utilities have exclusivity over the transmission grid and finance all transmission investments. In some cases, this is required in legislation.

Africa has little privately financed transmission, but substantial private investment in generation via IPPs, like ITPs in many aspects

- In most countries in Africa the government-owned utilities have exclusivity over the transmission grid and finance all transmission investments. In some cases, this is required in legislation.
- Since 1999 three countries in Africa have introduced private sector participation (PSP) in the transmission sector, through **whole-of-grid concessions**: Cameroon, Mali, and Senegal. In these cases, the **government has retained a considerable share of ownership**. These have not achieved significant investment in transmission, though they have brought operational benefits.
- Africa has **no experience** of privately financed transmission lines through **IPTs or merchant lines**. Some preliminary steps have been made to prepare for IPT tenders, but no projects have been awarded.

Experiences with privately financed transmission in Africa

- The Africa's experience with private sector participation in the transmission sector has been **negligible, primarily through whole-of-grid concessions**. Though these have not achieved significant investment in transmission, they have brought some operational benefits.
- **No African countries have done merchant investments in transmission**. Other countries have developed HVDC lines connecting hydro generators to markets using a merchant investment model. In Africa, these types of investments have been publicly funded—like the Cahora Bassa HVDC line.
  - The Cahora Bassa interconnection is a HVDC transmission line (533 kV) from the 2,075 MW Cahora Bassa hydropower plant to the Apollo converter station near Johannesburg. The interconnection was built mainly to export energy from HCB to South Africa.



Route of the Cahora Bassa interconnection line

Potential of IPTs in Africa

- Africa has no experience of privately-financed transmission lines through IPTs or merchant lines.
  - Some preliminary steps have been made to prepare for ITP tenders in Nigeria, but no projects have been awarded (see next slide).
- ITPs could be the most promising business model to involve the private sector in Africa.
  - ITPs have performed well in other developing countries, have led to substantial private investment in transmission, significant cost savings through tenders, and to contractual agreements that are thus far stable.
  - Further, the risks that IPT investors carry are like those that IPP investors carry, and the IPP business model has worked well in Africa.

A failed attempt in Africa to tender for IPTs

The Transmission Company of Nigeria (TCN) requested bids for prequalification of a group of projects in November 2014, under a privately financed business model similar to the IPT. The bids were to rehabilitate, repair, replace, and expand 330 kV and 132 kV lines, as well as the 330/132 kV and 132/33 kV substations and transformers. The projects were based on recommendations from a study prepared by Manitoba Hydro International (MHI) published in 2013.[12]

TCN received 73 applications for prequalification. TCN evaluated the technical and financial capability on a pass/fail basis. Twenty-nine applications were prequalified and moved to the next stage (commercial stage). The respondents to the request for prequalification were from Nigeria and elsewhere, including Australia, Brazil, China, France, India, Italy, Lebanon, South Africa, South Korea, Spain, Switzerland, Turkey, the United Arab Emirates, and the United States.

TCN did not take this shortlist or the bidding process further. Two reasons were the weak financial viability of the power sector in Nigeria, and the lack of clarity over the transmission business model.

Steps to realize the potential of IPTs for Africa

- The approach to introducing IPTs can draw on the lessons from introducing IPPs in Africa, and international experience in IPTs.
- Legislation, licenses, and other legal instruments can be amended to provide for multiple transmission providers. Concessional finance can be adapted to this new business model, in the same way that concessional finance has supported both debt and equity for IPPs in Africa.
- A small percentage of power sector revenues can be placed into an escrow account to enable a trial of IPTs. Where necessary, additional financial security can be provided.
- African governments can build capability in-house and appoint transaction advisors. They can identify projects for initial tenders, prepare the TSAs, run tenders, evaluate bids, and award the contracts.

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Approaches for private investment in transmission

	Indefinite privatization	Whole-of-grid concession	Independent Power Transmission (IPT)	Merchant investment
Term	Indefinite	Long term: often 25 years or more	Long term: often 25 years or more	Indefinite
Coverage	All existing and new lines within a country or region	All existing and new lines within a country or region	Individual line or package of lines. New lines only	Single major line, often HVDC
Revenues	Annual revenues set by the regulator to ensure a reasonable return on and of capital, and subject to periodic regulatory review	Annual revenues set by the regulator to ensure a reasonable return on and of capital, and subject to periodic regulatory review or to arbitration clauses under concession law	Annual revenues largely or entirely set by the winning bid	Revenues dependent on MWh of flow along the line and price differentials between the two ends of the line
Incentives	Related to whole-of-grid performance	Related to whole-of-grid performance	Availability for the line (typically 98%)	Ability to move power from lower-price areas to higher-price areas
Access	Open access to all transmission users on an equal basis	Open access to all transmission users on an equal basis	Open access to all transmission users on an equal basis	Proprietary access. Access rights used by owner or on-sold

Approaches for private investment in transmission with examples

	Indefinite privatization	Whole-of-grid concession	Independent Power Transmission (IPT)	Merchant investment
Examples—Global	United Kingdom, Germany, parts of France, parts of Australia, some South American countries (including Argentina, Chile)	Philippines	Mexico, South America (including Brazil, Chile, Colombia, Peru), India, United Kingdom, Canada, Australia, United States	Australia, United States
Examples—Africa	None	Cameroon, Mali, Senegal, Cote d'Ivoire	None	None

Independent power transmissions are the most broadly applicable business model for increasing privately financed transmission in Africa

- African governments need to implement a model for private finance of transmission.
- The four business models discussed previously have all successfully mobilized private finance for transmission, under the appropriate conditions. The key question is how well they will work in Africa.
- **IPTs seem to be the business model best suited to the conditions in Africa, as justified in the following slide against several performance criteria.**

Performance of the business models against assessment criteria

	Indefinite privatization	Whole-of-grid concession	Independent Power Transmission (IPT)	Merchant line
Applicability Is the model applicable to all types of transmission investment in Africa?	Yes	Yes	Yes	No. Typically used for a single major line, often HVDC, between two markets
Economies of scale Can the model achieve economies of scale in African transmission?	Yes	Yes	Yes in most cases, but may not realize economies of scale in small countries in Africa	Most merchant lines are major enough to realize economies of scale
Competition Does the model ensure competitive pressure on private providers of transmission in Africa?	Only on the initial transaction	Only on the initial transaction and on (infrequent) rebidding on contract expiry	Yes, through competition for each new line	Yes, but only for the merchant line
Investor confidence in African regulatory capability Can the model proceed despite the limited track record of economic regulators in Africa?	No	Uncertain	Yes. Much less need for periodic review by regulators	Not relevant. Merchant projects are not subject to regulated charges
Consistency with power sector reform Is the model consistent with the intention in all African pools to promote open access networks and competition in generation?	Yes	Yes	Yes	No. Works better as a link between markets rather than within markets. Also at risk of stranding from non-merchant investments
Policy flexibility Can the model be tested while African governments keep existing approaches in place?	No. Requires commitment to significant reform	No. Requires commitment to significant reform	Yes	Yes
Track record Is the model proven in other low-income countries?	No. Few examples of successful privatization in low-income countries	Yes, but limited track record	Yes, with substantial track record	No

The present situation of transmission in most African utilities does NOT suggest to privatise or concession the entire national networks, but to attract private investment to key transmission projects & to reinforce the networks piecemeal.

Outline 2 – The ITP model

- ITP definition and formats
- Enabling environment
- Phases of an ITP project
  - Project development
  - Construction
  - Operation
- Stakeholders
- Financing structure
- Contractual structure
- Risk allocation matrix
- Wrap-up and other considerations

The Independent Transmission Project (ITP) model

Overall definition

ITP Business models

- Build-Own-Operate (BOO)
- Build-Own-Operate-Transfer (BOOT)
- Build-Own-Transfer (BOT)

Enabling environment

Phases of the project

- Project development
  - The commercial case / Suitability of alternative funding sources / Project size / Challenges / Preparatory work (comprehensive feasibility study / environmental and social impact assessment (ESIA) / development of the EPC strategy / permitting and licensing / financial plan
- Construction
- Operations

Stakeholders

Contractual structure

Risk allocation matrix

Financing structure

Other considerations

MAIN SOURCE: "Understanding Power Transmission Financing". https://cldp.doc.gov/sites/default/files/2021-10/Understanding_Transmission_Financing.pdf

Outline 2 – The ITP model

- **ITP definition and formats**
- Enabling environment
- Phases of an ITP project
  - Project development
  - Construction
  - Operation
- Stakeholders
- Financing structure
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- Wrap-up and other considerations

The ITP model – Definition

- The **ITP** typically involves the construction and maintenance of **a single transmission line or a package** of transmission lines **under a long-term contract**, generally between the state-owned utility that is responsible for transmission and the (private) project company that is established to undertake the project.
- **The contract** typically defines the economic **payment model**, and the **roles and responsibilities** for the new infrastructure, including ownership, construction, maintenance and financing responsibilities.
- These contracts can be structured as **transmission service agreements (TSA)** but may also take other forms such as lease or line concession agreements.
- An IPT is typically used for the development of greenfield assets, but the same concept can be used for the **refurbishment of existing transmission assets**.

The ITP business models

- Build-Own-Operate-Transfer (BOOT), is the most common format successfully implemented in Latin America and Asia.
- Build-Own-Transfer (BOT)
- Build-Own-Operate (BOO)

ITP models vary by degree of ownership and maintenance obligations.

In all ITP models the private party assumes the construction and financing risk.

The return on investment expectations, as well as the cost of financing, will increase the more the project company bears risks that condition its repayment.

The ITP business models

NOTE: "**Operation**" here refers to the specific **maintenance activities** required to ensure that a transmission line and other associated infrastructure are available to be used when specified, i.e., just "maintenance" & **nothing to do with "System operation"** which is carried out by the transmission utility or the transmission system operator (TSO) on a whole network basis and involves system control, operation of transmission infrastructure and dispatch of generation facilities.

Therefore:

- **ITP does not cause loss of security or control of the network**, because the owner of the ITP asset has no control on the operation of the power system,
- The **scheduling of the maintenance** of the ITP facilities should be made (or authorized at least) by the system operator, considering the whole network needs
- The **remuneration of the ITP infrastructure should not depend on its flows or its losses**, which are beyond the control of the ITP owner.
- The remuneration of the ITP infrastructure must have a component associated to the performance of the asset, **linked to its availability**.

The ITP business models – BOOT

- **Build-Own-Operate-Transfer (BOOT)**
  - The TSA specifies that the project company has a responsibility to **maintain and operate** the transmission infrastructure **for a period** after the assets are constructed, before **transferring ownership and O&M obligations back** to the transmission utility.
  - A portion of the annuity payment may be conditioned on the transmission infrastructure meeting predefined KPIs.
  - Is the most common format successfully implemented in Latin America and Asia.

The ITP business models – BOT

- **Build-Own-Transfer (BOT)**
    - **Once the assets are constructed, the project company must transfer the ownership** of assets to the transmission utility upon project completion.
    - O&M for the transmission infrastructure is not the project company's responsibility and will most likely fall to the transmission utility.
    - **The annuity payment must not depend on the transmission assets' performance**, because the project company is not responsible for asset maintenance or operation.

The ITP business models – BOO

- **Build-Own-Operate (BOO)**
  - The TSA grants the project company the right to build and maintain the transmission infrastructure. **It is necessary to define the end conditions** (length? new payment? ownership transfer? buy-out?)
  - A portion of the annuity payment may be conditioned on the transmission infrastructure meeting predefined KPIs.

The ITP model and the demand risk

- **The project company does not take demand risk (volume or price), or utilisation of transmission infrastructure risk, since the system operator will determine how, when, and by what means the grid is managed and electricity is dispatched.**
- Therefore, the simplest way of structuring TSA payments is as a fixed return on investment amortised over the term of the TSA, structured as a **service charge with scheduled payment dates**.
- This type of **annuity** defines the revenue stream by which investors and lenders can recover their respective capital injections, which should lower lenders’ cost of capital and investors’ return expectations.
- When the transaction is structured appropriately, **the annuity payment becomes the key criterion for selecting the winning bidder** (assuming that competitive bidding is used).

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The ITP model – The enabling environment

- Countries who are familiar with the process and requirements of IPPs are likely to have the capacity and relevant experience to enable IPTs.
- The regulator or other relevant authority must be able to grant a transmission license to the project company.
- However, there may be a legal prohibition on private companies owning and operating transmission infrastructure.
  - It is possible to circumvent this restriction while still using the ITP instrument.*
  - Otherwise, the country’s regulation must be amended.
- The regulator is responsible for monitoring compliance with the license conditions , including approval of the payment model and the implications related to meeting the KPIs, but not reviewing complex tariffs as with IPPs.

(*) With the BOT model.

Outline 2 – The ITP model

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The ITP model – Phase 1: Project development

The justification for the project: Transmission planning.

- The "**golden rule**" (cost / benefit analysis, CBA) must be used by some technically competent and independent agency to **identify a comprehensive transmission expansion plan** or, at least, a short list of transmission infrastructures with defined characteristics to be built and when.
  - Note that, in general, these new transmission assets should reduce rather than increase the end customer regulated tariffs.
  - There are other benefits beyond costs.
- Evaluation by MoE / Regulator and once the project approved, no further economic justification is needed.
- Still pending RoW and environmental permits.

Transmission planning

(a reminder)

The "regulatory test"
What is a "justified" investment?

The golden rule of transmission investment:

"Invest in projects with the highest possible estimated ratio of system benefits over transmission costs over the useful life of the asset"

- Transmission costs can be estimated accurately
- However, future system benefits are difficult to estimate: i) because of uncertainty in future system behaviour; & ii) because of the diverse nature of the potential benefits to be considered.

The "regulatory test" in practice

- A fully convincing "regulatory test" to verify that a proposed investment is justified has been largely missing in practice at country level everywhere.
- The current predominant criterion in European countries & most of US is to comply with prescribed security criteria *(some countries have mandatory "Grid Codes")* & to reduce network bottlenecks.
- Some countries specifically include the criterion of economic efficiency, but it is not clear how this is applied *(or if it is actually applied).*

Relevance of the investment criteria

- Criteria for transmission expansion should be the basis of
  - The transmission planning decision-making in practice
  - The allocation of transmission costs
- In theory the criteria must account for several costs & benefits
  - Reliability improvement, System operation cost reduction, Market building at national & regional levels, Market power mitigation, Implementation of energy policies *(environmental targets, broad transmission overlays)*

but in practice just reliability & (not always) operating cost reduction are considered.

Transmission planning

(end)

The ITP model – Phase 1: Project development

The commercial case for the ITP project. What projects are suited for an ITP business model?

- Projects included with priority in the national transmission plan.
- Projects that can be delivered faster with lower O&M costs by the private sector.
- IPT is unlikely to be a suitable solution for small projects (e.g. <US$50 million) but several projects (not necessarily related physically) can be aggregated into a portfolio.
- Absence of specific challenges, like environmental or social risks.

The ITP model – Phase 1: Project development

These workstreams must be completed during the preparation stage

- A comprehensive **feasibility study** to reaffirm the need for the project.
- **Environmental and social impact assessment (ESIA)**, usually conducted by third-party consultants. Early consultations with all the key stakeholders are essential.
- Development of an **EPC procurement strategy**. The IPT company typically runs a process to choose an EPC contractor, or separate suppliers of equipment and a contractor for civil works.
    - Risk allocation between the transmission utility, project company, and construction contractors may become complex.
- **Permitting and licensing**. This may include land acquisition/lease, construction permits (including access to the site), environmental permits, grid connection agreements, operating permits, etc. IF the country has a grid code, it should be considered.
- Development of a **financial plan**. Iterations with financiers and the previous tasks until all conditions are met and the project reaches "**financial closure**".

The ITP model – Phase 1: Project development

Preparatory work

- **Countries can carry out preparatory work centrally before conducting a tender process** to attract a greater level of investor interest and procure the most cost-effective construction solution and lowest cost of financing.
  - For instance, the feasibility study, the environmental and social impact assessment (ESIA), permitting and licensing.
  - This requires more governmental resources, which could be **centralised in a specialised ITP Office**.
  - The clear benefit of the preparatory work is to **reduce the risk for the private company** as well as the time for project development by the private company and therefore the annuity cost.
  - It is also **consistent with the ITP mindset**, whereby the decision to build the infrastructure is made initially by the government, which therefore must find the most efficient approach to implement it.

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The ITP model – Phase 2: Construction

- After a financial closure has been achieved, construction will begin.
- The project company will typically **manage construction or supervise a third party** acting as construction manager.
- **Lenders** typically fund the construction, although in some cases the **equity investor** may decide to finance the construction phase and refinance once the asset is built and delivered.

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The ITP model – Phase 3: Operations

- **Maintenance of the asset**, which may include some localised operational activities, is **responsibility of the project company (BOOT model)**, which may do it itself, hire a contractor to undertake this maintenance or agree to transfer the responsibility to the transmission utility (**BOT model**).
  - This has an **impact on the nature of the payments** (the components to be included in the annuity) & the responsibility for the KPIs and their economic implications.

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The ITP model – Stakeholders & their roles

Developer / equity sponsor

- The project developer(s)/equity sponsor(s) manages the project company and is the key point of interface during the lifetime of the ITP investment.
- The project developer usually carries out work and funds early-stage activities "on risk" and is paid development fees, typically at financial close.
- The developer takes responsibility for arranging debt financing for the project company.

Lenders

- Lenders verify the bankability of the project company ahead of financial close and finance the project company with loans. International commercial lenders will likely only be able to participate with some kind of political risk or credit insurance from an ECA or DFI. Some local funding may be available.

The ITP model – Stakeholders & their roles

Off-taker

- The "off-taker" is responsible for paying the ITP under the TSA. In most cases, this will be the transmission utility, but it could be another government entity.

Transmission utility

- The transmission utility will continue to be responsible for all transmission activities in the host country and it will control the system operation. Its existing infrastructure will interface with the ITP's infrastructure.
- The ITP projects typically involve the transfer of the ITP company to the transmission utility at the end of the term of the TSA (BOOT model).

The ITP model – Stakeholders & their roles

Host government

- The host government **typically assumes certain state risks** to protect the project company from risks it is not best placed to manage. The agreement between the government and the project company may be reflected in the **Government Service/Support Agreement (GSA).**
- The level of support provided by the government in this respect will have an **impact on the availability and pricing of debt and equity finance** available for the IPT project.

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The ITP model – The financing structure – 1

- The simple payment structure in the ITP model (the annuity) is based on the availability and performance of the transmission infrastructure and therefore completely removes demand risk based on utilisation (volume or end-user fees).
- This has the benefit of clearly defining a predictable revenue stream which represents a lower risk for investors and therefore attracts a lower cost of capital.
- Any variability to the revenue stream introduced via KPI metrics based on a split of risk allocation between the project company and the transmission utility (e.g., for commissioning or O&M responsibilities) may impact revenue risk but has the advantage of ensuring service quality, which should improve the operating performance and "availability" of the transmission infrastructure.

The ITP model – The financing structure – 2

- The TSA term is purposely defined for a long period (15 years plus) to spread the cost of long-term transmission assets across many years and minimise the short-term impact of servicing these payments on tariff structures.
- The predictability of the revenue stream set out within the TSA is the key form of security relied upon by project lenders in ITP projects.
- This results in the **major advantage of the ITP business model**, which is the ability for transmission utilities or host governments to expand transmission infrastructure **using off-balance-sheet financing**, via third-party investment and financing.
- Thus, it is critical to **minimise any sovereign contingent liability** and therefore to free up fiscal space liberating financial resources for other purposes.

The ITP model – The financing structure – 3

- Whether additional credit support for the lenders from a host government is required will be a function of the credit of the entity responsible for making scheduled payments.
- The paying entity, or off-taker, is the state-owned transmission company. If there are concerns about its ability to make timely scheduled payments, **several approaches can be pursued** to provide liquidity support:
  - **Government Support Arrangements** including termination payments in the event of non-payment under a TSA;
  - Give a high degree of **priority in payment waterfalls to the ITP project company from the revenues collected** from the end customer tariffs;
  - Establishing a bank account or a letter of credit structure that maintains **6-month payment reserves**; and
  - **Non-sovereign** credit enhancement products.

Advantages of IPT models

Although ECA support (typically for an EPC contractor) offers a host government an off-balance sheet funding solution, the ECA still requires an implicit guarantee by requiring the MoF to be a borrower for their financing facility which can put pressure on the country's debt capacity. In addition, the ECA requirement that the borrower provides a 15% contribution means there is still some amount of cash outlay expected from public resources, usually in the form of a down payment. While there could be alternative ways to finance the 15% contribution, this will take additional time and resources to structure, which can result in other inefficiencies.

While IPT financing may be more expensive than concessional loans or ECA financing benefitting from an implicit sovereign guarantee, it can attract a more diverse set of lenders and result in a lower cost for the project. As highlighted in the risk allocation matrix above, many types of lenders can provide cost competitive financing to support IPT business models. As outlined in the contract structure diagram in Figure 5.1, the borrower will be the project company that enters into distinct construction and TSA contracts, and if applicable, an O&M services agreement.

Depending on the amount of financing to be raised, the lender(s) can include MDBs, bilateral DFIs and ECAs who can provide long-term loans.

Commercial lenders may be able to provide longer tenor loans with additional political and/or credit risk insurance from an ECA or MDB.

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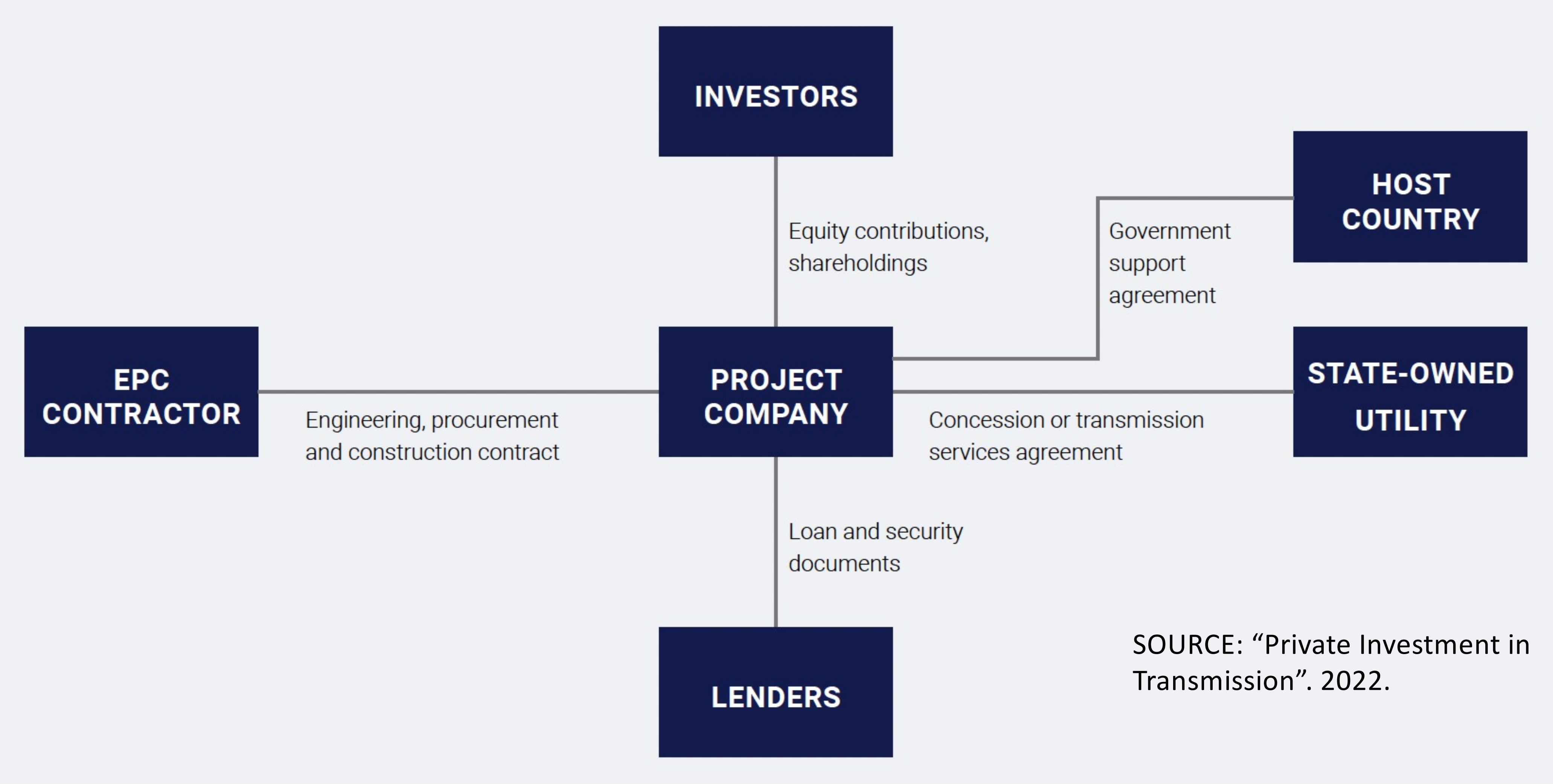
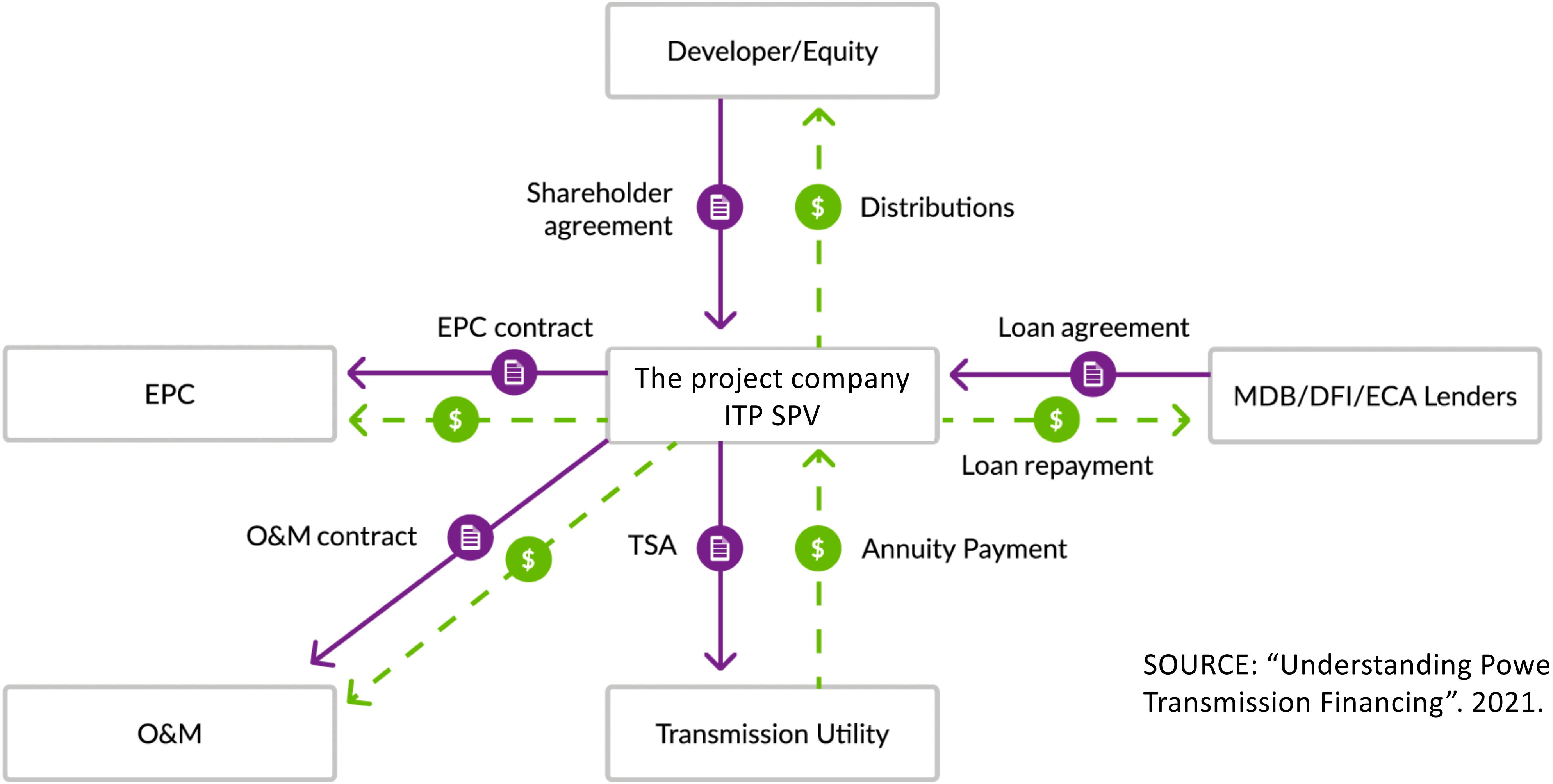
The ITP model – Contractual structure



SOURCE: "Private Investment in Transmission". 2022.

The ITP model – Contractual structure



SOURCE: "Understanding Power Transmission Financing". 2021.

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The ITP model – Risks -1

Financial risk

- Demand risk
- Buy-out payment
- Foreign exchange rates
- Credit risk
- Inflation and interest rates

Land risk

- Pre-existing environmental conditions
- Land acquistion risk
- Pre-existing conditions in the title

The ITP model – Risks -2

Technical risk

- Construction and commissioning of assets
- Interface risks
- Accident, damage and theft
- Technology risks
- Operation, maintenance and technical performance

Social and environmental risk

- Resettlement
- Climate change
- Non-political force majeure events
- Health and safety

The ITP model – Risks -3

Political and regulatory risk

Licensing and permitting

Political force majeure events

Changes in law

Dispute resolution

Formal dispute resolution

Informal dispute resolution

The risk allocation matrix

Risk	Stakeholder bearing risk: Govt/ Transmission utility	Stakeholder bearing risk: IPT project company
Financial risk		✓
Demand risk	✓	
Credit risk	✓	✓
Inflation	✓	✓
Interest rates		✓
Foreign exchange rates	✓	
Buy-out payment	✓	
Land		
Pre-existing environmental conditions	✓	
Pre-existing conditions in the title	✓	
Land acquisition	✓	

The risk allocation matrix

Risk	Stakeholder bearing risk: Govt/ Transmission utility	Stakeholder bearing risk: IPT project company
Technical risk		
Construction and commissioning of assets		✓
Scope changes before or during construction	✓	✓
Interface between lines, substations, and generation facilities	✓	✓
Technical risks related to the adoption of new technologies		✓
Operation, maintenance, technical performance	✓	✓
KPIs, service levels		✓
Accidents, damage, theft		✓

The risk allocation matrix

Risk	Stakeholder bearing risk: Govt/ Transmission utility	Stakeholder bearing risk: IPT project company
Social and environmental risk		
Social and environmental impacts		✓
Occupational health and safety	✓	✓
Resettlement	✓	✓
Non-political force majeure events	✓	✓
Political and Regulatory Risks		
Initial issuance of licenses, permits		✓
Renewals, modifications	✓	
Changes in law	✓	
Changes in tax	✓	
Political force majeure events	✓	
Disputes		
Resolution of disputes arising under contracts	✓	✓

Risk allocation in the ITP model – comments

Demand risk

- Demand risk is the risk that **there will not be enough demand for electricity** from end users in a prescribed period to enable the payment of the ITP annuity.
- **In the ITP model the annuity does not depend on the use of transmission assets.**
- The **payment of the ITP annuity must be respected** regardless of the revenue collected with the tariffs.
- Therefore, **demand risk in the ITP model is born by the end customers** (if the end customer tariffs are cost reflective, or the publicly-owned utility otherwise)

Risk allocation in the ITP model – comments

Credit risk - 1

- **The ability of existing utilities to make payments to private transmission companies under long-term contracts** is referred to as "credit risk". This risk is significant in many African countries if utilities are insolvent.
- The (unlikely) possibility that the government decides to **terminate the ITP** project and **might not be able to pay the buy-out cost** is also part of the credit risk.
- Unless the state-owned transmission company has an investment grade credit rating—which is highly unusual in emerging markets—**some form of credit support** for the payment obligations of the state-owned transmission utility **will be necessary**.
- In many African countries **sovereign debt capacity is a limiting factor** for expansion of transmission networks at present and (from the expert literature) offering **a put and call option agreement with liquidity support to mitigate credit risk** may be a good solution to support private investment. **The resulting risk will be born by the host government.**

Risk allocation in the ITP model – comments

Credit risk - 2

- **Alternative form of credit support #1:** Give priority to ITP projects in the allocation of payments to the supply activities from the revenues collected from the regulated tariffs.
  - This is an internal regulatory decision. It may require to modify the form in which tariffs are collected and payments are made.
  - Note that: i) transmission costs are typically about 10% and ITP projects will be a fraction of this 10%; ii) well-planned transmission infrastructure should reduce total supply costs (in the long-term).

Risk allocation in the ITP model – comments

Credit risk - 3

- **Alternative form of credit support #2:** Security over revenue accounts associated with the **predictable revenue stream** and any credit-enhanced liquidity solutions and other contractual arrangements are arguably where lenders should focus their attention when structuring bankable solutions.
  - A disruptive idea. **Securitisation**. Once the line has been successfully built and has started to generate income from the annuities, **the project company could sell to a third party the right to receive the remaining annuities until the end of the concession.** Transmission ownership and **maintenance obligations** could be transferred to the state-owned transmission company (BOT model). **The ITP investor would be totally decoupled from the project.**

Risk allocation in the ITP model – comments

Inflation

- The costs of maintaining the transmission infrastructure will vary over time and will be subject to inflation throughout a long-term project.
- The O&M component of the availability payment must be adjusted for inflation by the regulator over the term of the contract and this should be reflected in the TSA. The risk will be born by consumers.

Interest rates

- The annuity should not change depending on changes in interest rates. This will represent a refinancing risk for the project company if it cannot borrow at fixed interest rates or if the tenor of the loans does not match the length of the TSA.
- Risk mitigants may include hedging products, but their availability and price for long term local currency in African markets might be challenging. The risk will be born by the project company.

Risk allocation in the ITP model – comments

Foreign exchange rates

- Long-term local currency debt is a challenge in many African countries and the annuity likely will be denominated in some hard foreign currency or in local currency but with a regular adjustment for exchange rates.
- However, in African countries with strong availability of long-term local currency debt it may be possible to denominate par of the annuity in local currency.
- Therefore, the risk of foreign exchange rates will be born by the state-owned transmission company and passed on to consumers through tariff changes.
- Even where this risk is passed-through to the utility or government, an investor will need to consider the impact of foreign exchange risk as part of the overall credit risk assessment that was commented earlier.

Risk allocation in the ITP model – comments

Land

- Acquiring transmission rights-of-way requires considerable political, community, social, economic, and environmental considerations for each community or geographic terrain along the transmission line route. Resettlement and the security of the infrastructure — from both a public safety perspective and against vandalism or theft — increases the risk of delays in, and escalates the costs of, developing and delivering transmission infrastructure.
- The experience from around the world suggests that land acquisition/right-of-way risk, in most cases, is best handled by the government or a public sector entity.
- The cost of acquiring the rights of way, easements, and other interests in land that are required by the project may be borne by the state-owned transmission utility or the project company, regardless of which of them is responsible for acquiring those interests.
- The acquisition of all the required interests in land would typically constitute a condition precedent to the first disbursement of the project's loans.

Risk allocation in the ITP model – comments

Construction and commissioning of new assets

- Changes in the construction scope of work required may occur at different stages of the project and may have significant impacts on the budget, schedule, and overall viability of the project.
- Changes may involve the specification of certain components, the designed redundancy, and interfaces with the existing or future components of the power grid. Yet, the most disruptive scope change is the change in the routing of the transmission line.
- The project company is responsible for construction and commissioning of new assets and will seek to mitigate and pass through many of these risks by contracting with EPC contractors.
- The existence of a grid code helps to set the design specification.

Risk allocation in the ITP model – comments

Maintenance and technical performance

- The maintenance of the assets **can either be the responsibility of the state-owned transmission company or the project company**. The best approach **depends on**
  - How **effectiv**e the state-owned transmission company is in O&M
  - How closely integrated are the ITP assets with the rest of the network
  - The **scale** of the new assets
- If the project company takes the maintenance responsibility, it will also take the risk on **variations of the cost of providing these services** over the period of the TSA, subject to periodic adjustments for inflation.

Risk allocation in the ITP model – comments

Licenses and permits

- The **project company must apply** for and diligently prosecute its applications for all licenses and permits.
- Significant licenses are **granted prior to financial close** and usually have a term that is the same as the term of the transmission purchase agreement.
- **If a public authority fails to grant a license** or permit when the applicable requirements have been met, that failure would typically be **treated as a political force majeure event.**
- A failure to renew a license or a modification to the terms of a license that effectively prevents the project company from performing its obligations or exercising its rights under the concession will constitute a change in law (see later).

Risk allocation in the ITP model – comments

Social and environmental impacts

- The project company will typically be **responsible for conducting social and environmental impact assessments,** complying with the stakeholder consultation and environmental laws of the host country.
- As indicated when dealing with the “preparatory work”, **the government can carry out preparatory work centrally before conducting a tender process** to attract a greater level of investor interest and procure the most cost-effective construction solution and lowest cost of financing.
  - **This can apply to licenses, permits and the social and environmental impact assessments.**

Risk allocation in the ITP model – comments

Changes in law

- **Changes in law** that modify the costs incurred by the project company or the revenues earned by the project company should be **addressed through changes to the annuity or by one-time payments**, depending on the nature of the change in law.
- Changes in the tax system should be addressed through changes in the annuity.
- The **Government Support Agreement must provide remedies** to the project company in respect of changes in law or in the tax system. Those remedies may include the payment of a termination payment and transfer of the assets to the government.

Risk allocation in the ITP model – comments

Force majeure events

- The project company must mitigate the effects of force majeure events to the extent possible. Where it is practical to do so, **the project company will be required to insure against these risks.**

Political force majeure events

- If the project company is prevented from performing its obligations or exercising its rights under the project agreements in a manner that is material due to the occurrence of a political force majeure event, **the project company could take remedial actions such as termination or legal enforcement.**

Resolution of disputes under contracts

- Disputes arising under the project agreements are resolved by international arbitration to the extent they are not resolved informally.

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Sound regulation & international experience conclude that…

- The **ITP approach makes sense** & it seems the only sensible course of action
  - for **critical projects**
  - for a gradual, **piecemeal development** of an entire network
- Some concerns are unfounded
  - ITP does not cause loss of **security** or control of the network
  - ITP can be implemented under **any regulation**
  - ITP is similar to the well-known **IPP model**
  - ITP has **predictable** revenues

Sound regulation & international experience conclude that…

- ITPs are **less disruptive** interventions in the transmission sector than the other available private business models as they typically **can be implemented with limited or no regulatory reform**.
- The IPT model, therefore, has the potential to **help African transmission utilities quickly finance critical infrastructure projects.**
- An important conclusion that can be drawn from the experiences of Brazil, Peru, India, and other countries is that **IPTs are often implemented at a fraction of the anticipated cost**.

How to make transmission attractive to private investment?

Transmission must be treated as a regulated monopoly, **avoiding to introduce unnecessary risks for investors**. Thus:

- Once transmission has been centrally planned and built, **the "viability" of the project is not questioned.**
  - Do not make transmission **remuneration** depend on the volume of flows or of wheeling charges, **just use cost-of-service.**
- The transmission cost is essentially a fixed cost. **Ring-fence the annuity** & recover it with priority from the regulated end customer tariffs.
  - Note that a few ITP projects add a small fraction to the total transmission cost, which is typically about 10% of the tariff. And they are meant to reduce total costs.
  - **No impact on sovereign debt** if ringfencing is secure in tariff design.

How to make transmission attractive to private investment?

(continuation)

- Establish **clear & stable transmission cost allocation rules, i.e., charges.**
  - This is particularly relevant for cross-border trade in **regional markets.**
- Governmental ITP Office *(with new mindset for transmission)* must get ready **licensing**, **environmental permits** & **rights of way**, **in advance.**
- **Some risks remain** with the ITP developer:
  - The winner of the tender must reach **financial closure** with financiers & later **refinance** the project once line is ready to enter in operation.
  - **Construction delays** & service **failures.**

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Workshop on Private Investment in Electricity Transmission in Africa
Nairobi, 1 & 2 April 2025

Transmission business models with private investment

AFRICAN SCHOOL OF REGULATION

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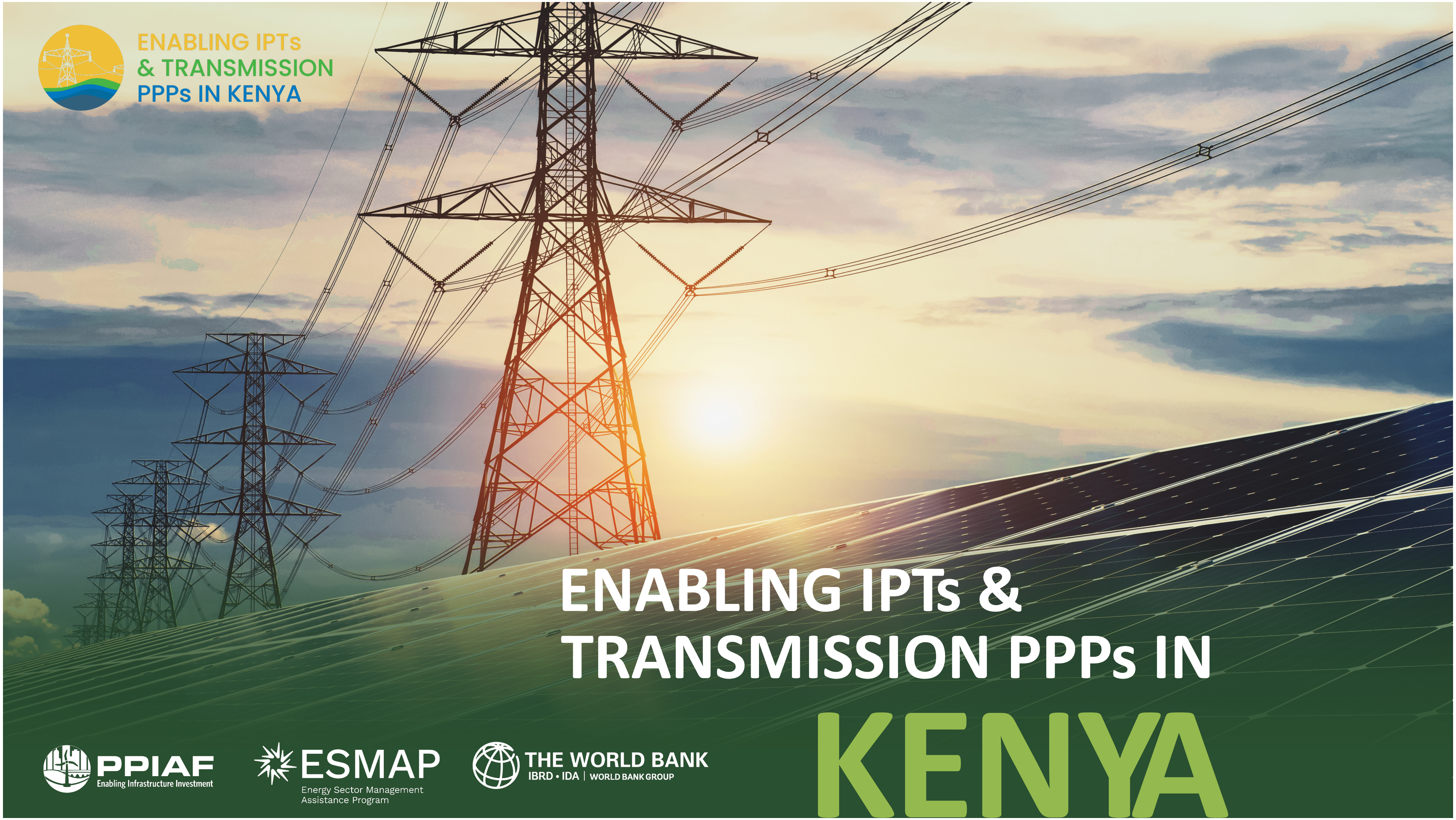

ENABLING IPTs & TRANSMISSION PPPs IN KENYA

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PPIAF Enabling Infrastructure Investment
ESMAP Energy Sector Management Assistance Program
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