New business and funding models to resolve grid infrastructure constraints in South Africa

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MERIDIAN ECONOMICS
NAVIGATING COMPLEXITY

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- Disclaimer:

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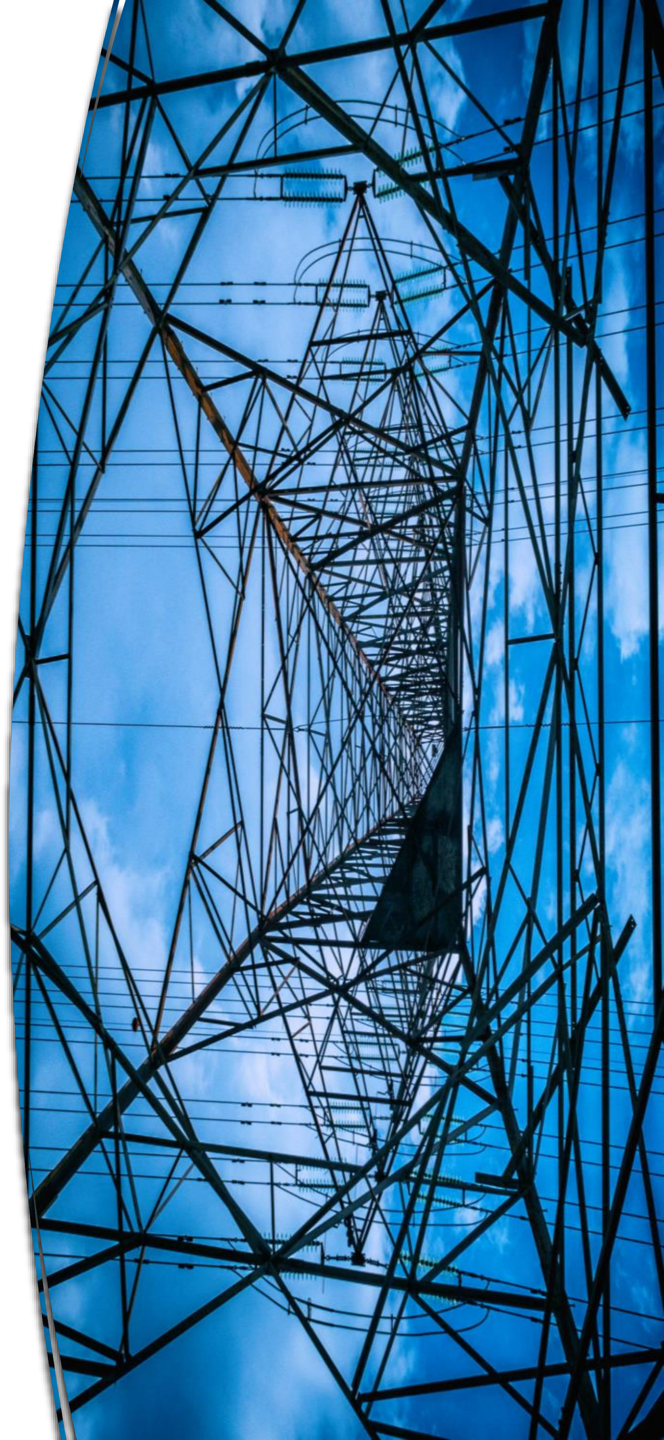
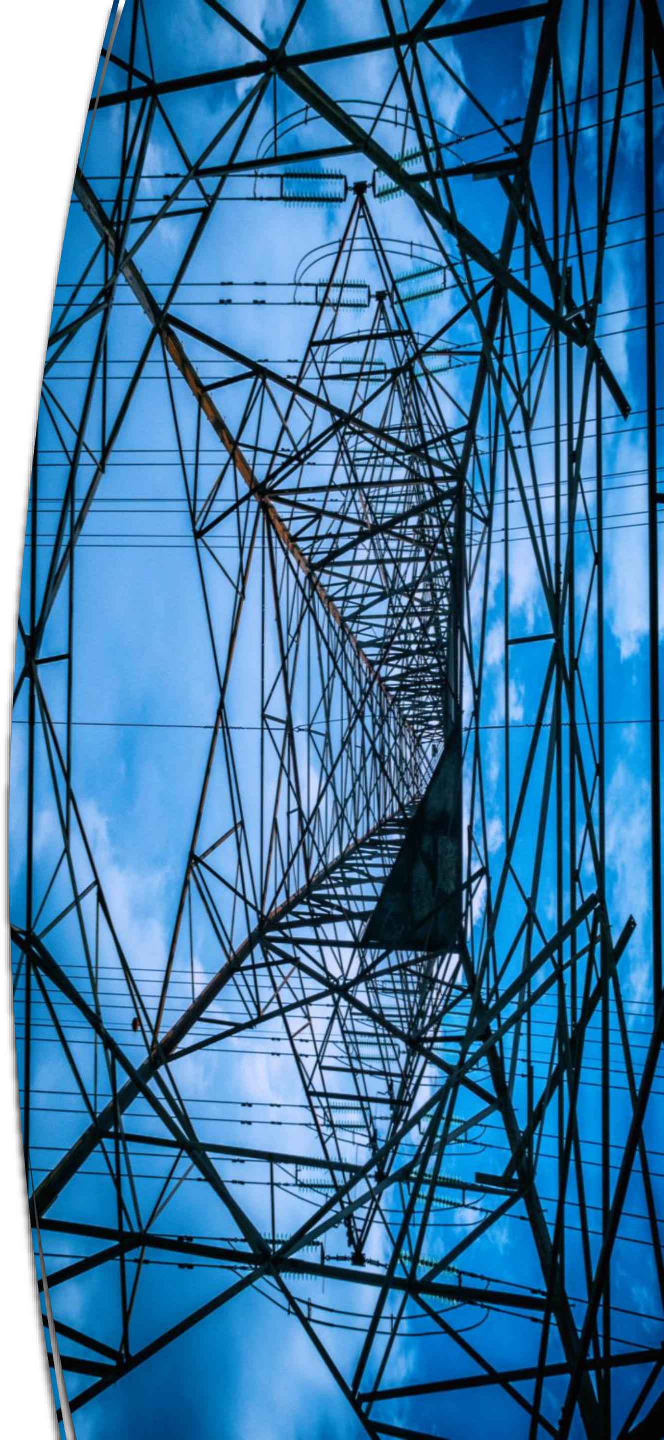


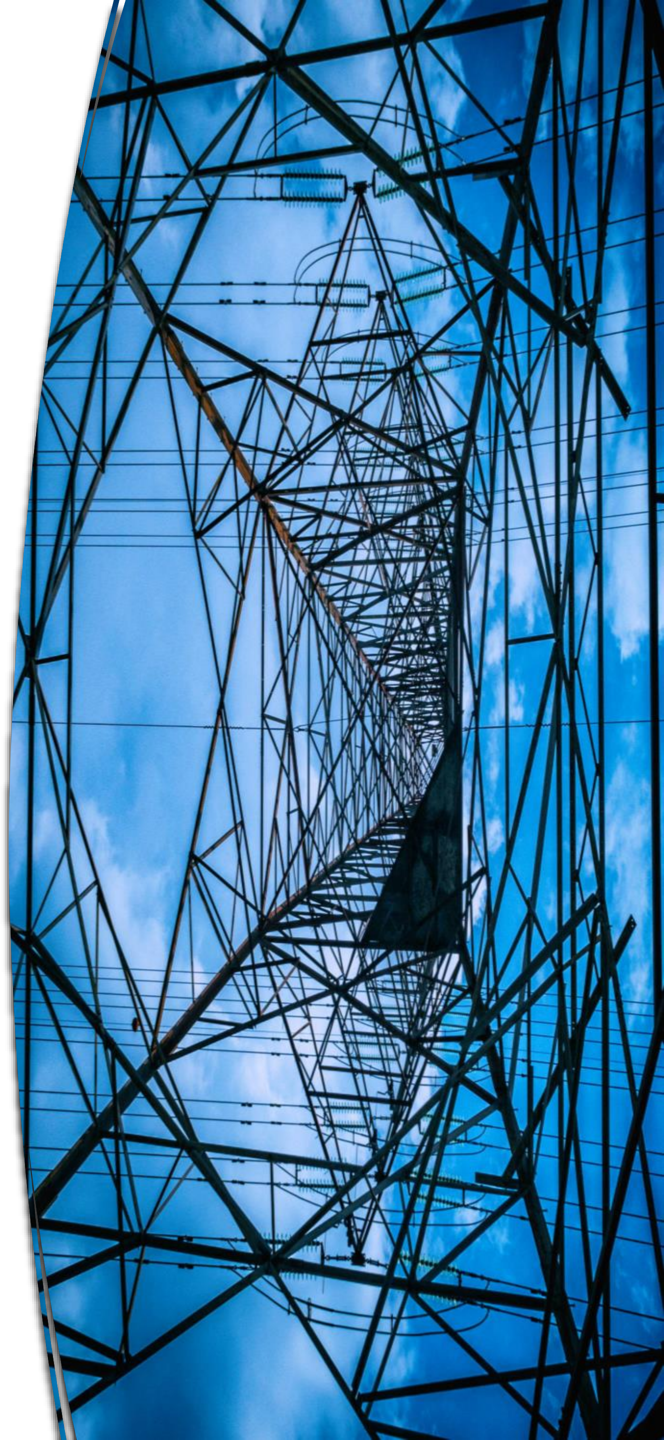
Aims

To progress practical insight into appropriate Independent Power Transmission (IPT) models for South Africa's circumstances by:

- Improving the understanding of all the facets of the challenge in South Africa:
  - ❑ The infrastructure rollout needs;
  - ❑ The specific financing and execution challenges in the SA power sector;
  - ❑ The challenges arising from fundamental techno-economic characteristics of power transmission networks that must be resolved by any model (natural monopoly; positive externalities, etc.)
- Selecting and developing private sector models that respond appropriately to these challenges
- Suggesting practical steps for the way forward

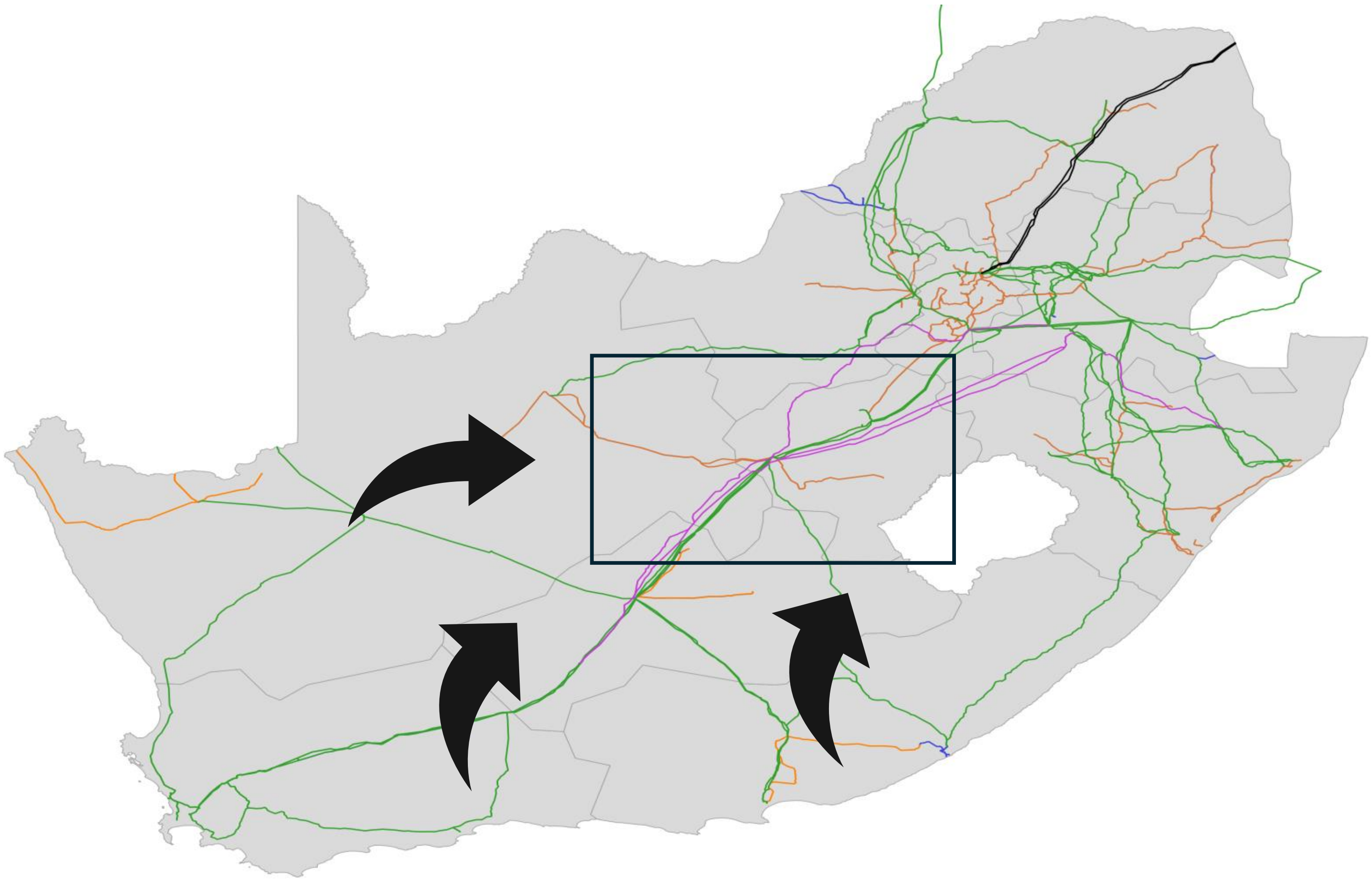


Presentation Outline



Understanding the nature of the problem

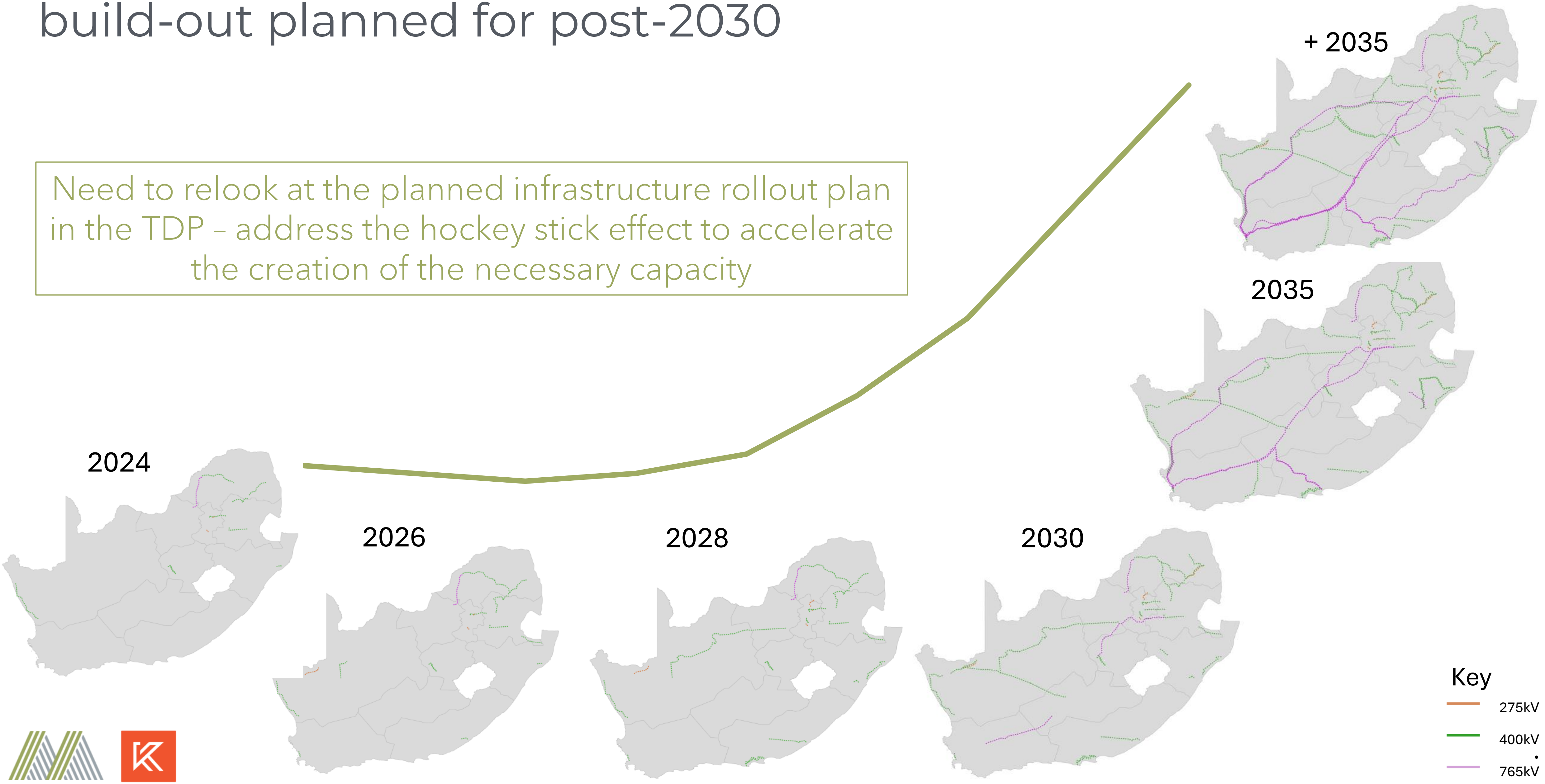
Grid backbone bottlenecks need to be unlocked while new large-scale power generation needs to be evacuated from the periphery to the main grid



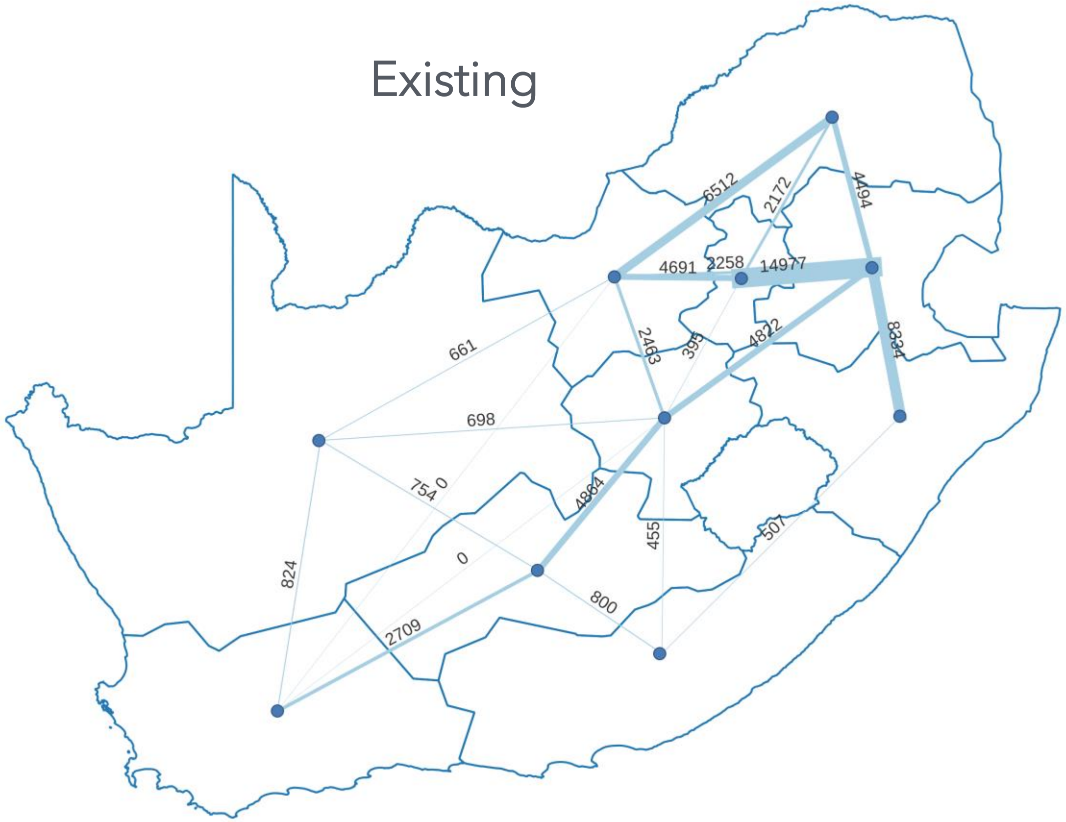
- Currently the new generation activities are in the western, northern, and eastern cape, while the dominant demand (load) is located to the north.
- Based on the geographic location of the generation and load centres the current bottleneck for the large scale inter-zonal transfer of power is in the centre of the grid.
- Grid investment is required (a) along the main central backbones and outwards (inside-out approach), and (b) at the periphery inwards to evacuate power from the new generation sites to the main network (an outside-in approach)

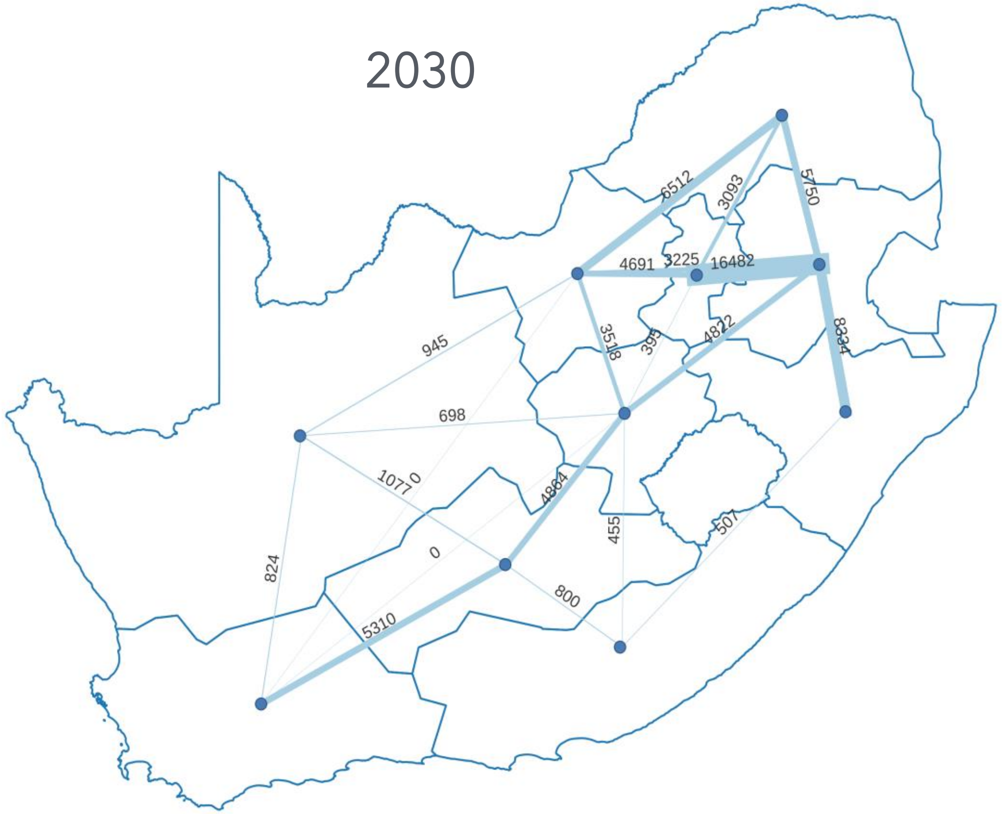
Current plans suffer from a hockey stick effect with most grid build-out planned for post-2030

Need to relook at the planned infrastructure rollout plan in the TDP – address the hockey stick effect to accelerate the creation of the necessary capacity



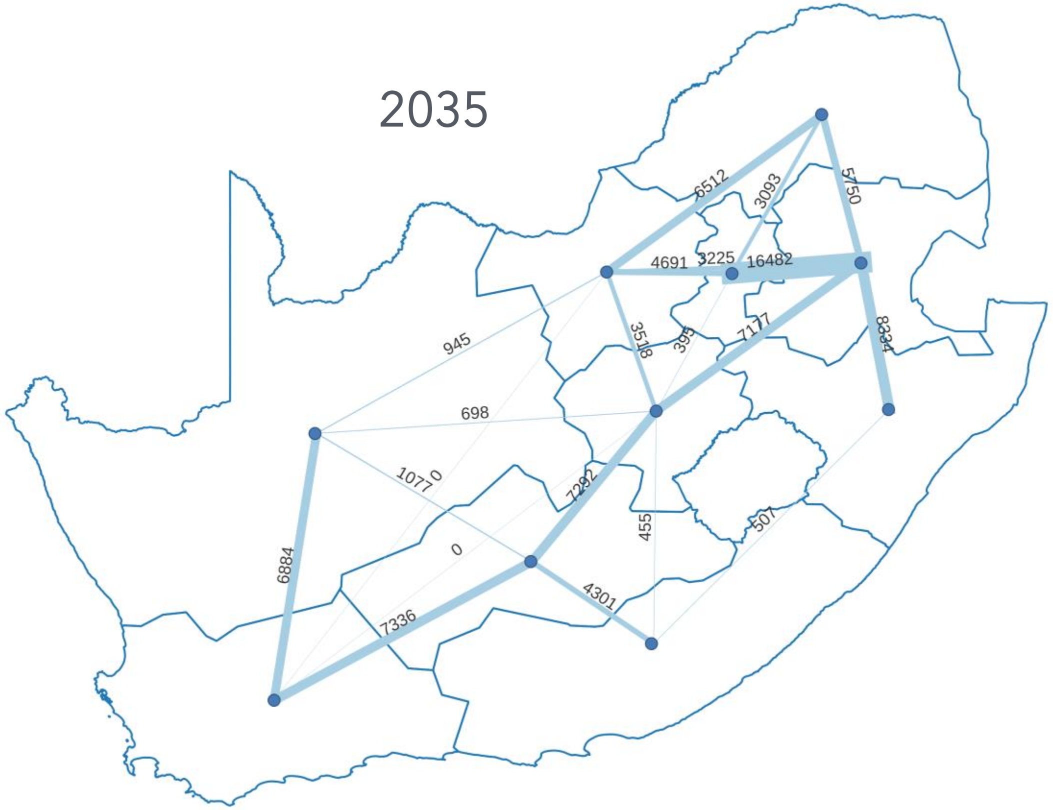
Modelled grid transfer capacities reveal that the incremental TDP changes will not unlock adequate evacuation capacity from the Northern, Western, and Eastern Cape where the best renewable resources are located until post-2035.

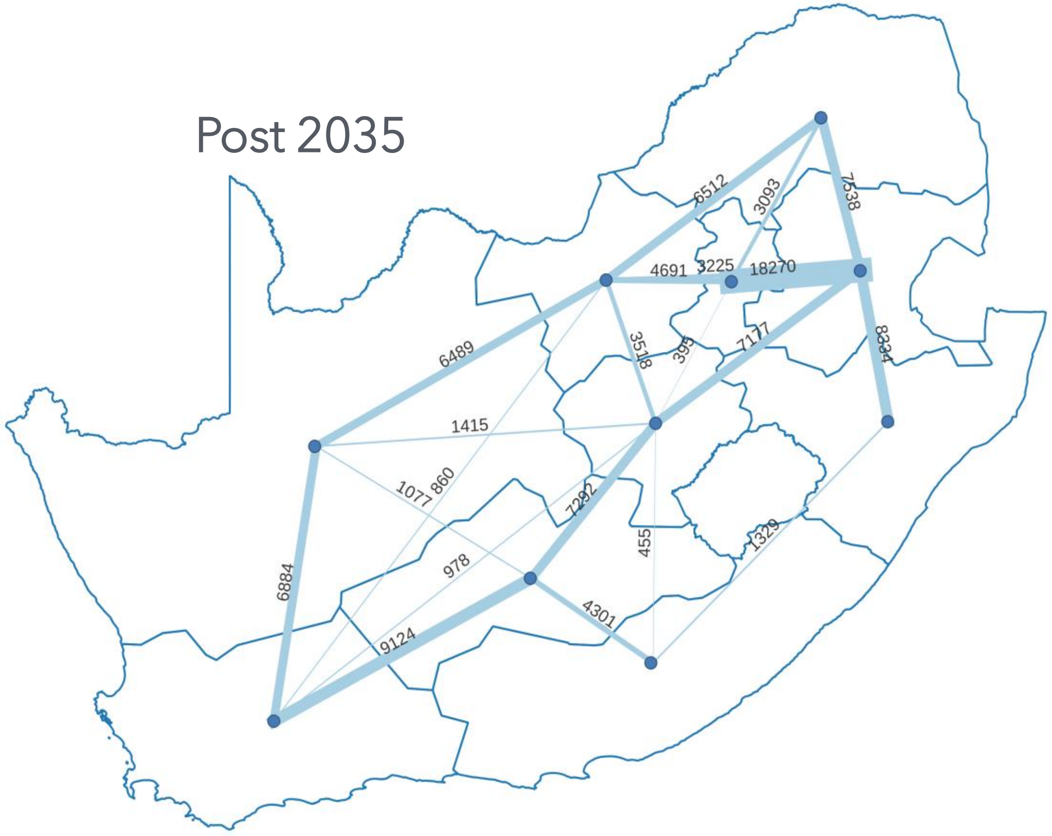




Transfer capacities are shown in MW

Further investigation is required to understand if the post-2035 transfer capacities will be sufficient to support the generation profiles in the Northern, Western, and Eastern Cape.





Transfer capacities are shown in MW

Eskom’s regulated transmission tariffs result in negative returns which undermines the financing of further capacity expansion

Allowable Revenue (R’m)	FY2023	FY2024	FY2025	FY2026	FY2027
Regulated Asset Base (RAB)	126,225	133,217	139,777	147,568	159,405
Nominal WACC %	-1.99%	0.69%	0.87%	1.65%	3.04%
Real Pretax WACC%	7.1%	7.1%	7.1%	7.1%	7.1%
Returns	-2,513	922	1,220	2,427	4,838
Operating Costs (E)	5,349	5,678	5,741	6,071	6,441
Depreciation (D)	6,334	6,634	6,919	7,059	7,398
MYPD5 Allowable Revenue	9,170	13,234	13,880	15,557	18,677
Approved RCAs for Liquidation	609	-	-	-	-
MYPD5 Allowable Revenue including RCAs	9,779	13,234	13,880	15,557	18,677
Revenue/RAB	8%	10%	10%	11%	12%

- Shows that current tariff levels are not cost-reflective and that Eskom is playing catch-up. This can be seen in their nominal WACC/applied for RoA percentages.
- Indicative that current tariff levels won’t be able to support commercial returns on investment in transmission infrastructure assets. Eskom has for years stated that they are attempting to migrate towards cost-reflective tariffs but are taking a phased approach due to the likelihood of significant price escalation if done at once. (MYPD 5 2023-2025)

Source: MYPD 5 Revenue Application FY2023-FY2025

Transmission tariff levels are not cost reflective and the structure disincentivises appropriate grid investments

- The current transmission asset base is old and has been funded and amortised within the single financial pool in Eskom.
- Tariffs are based on earning a return on depreciated asset values and are unlikely to reflect the cost of new capacity
- The current geographic structure of the transmission tariff are still designed from the perspective that power flows from Mpumalanga to the rest of the country. This is seen in the R0 tariffs for generators in the Cape & Karoo

Customer/load transmission tariffs

Transmission Zone	Voltage	Transmission network charge (R/kVA/m)
<300km	< 500 V	17,51
	≥ 500 V & < 66 kV	16,00
	≥ 66kV & ≤ 132 kV	15,57
	> 132 kV	19,70
> 300 km and ≤ 600 km	< 500 V	17,63
	≥ 500 V & < 66 kV	16,14
	≥ 66kV & ≤ 132 kV	15,69
	> 132 kV	19,86
> 600 km and ≤ 900 km	< 500 V	17,84
	≥ 500 V & < 66 kV	16,29
	≥ 66kV & ≤ 132 kV	15,78
	> 132 kV	20,16
> 900 km	< 500 V	17,95
	≥ 500 V & < 66 kV	16,48
	≥ 66kV & ≤ 132 kV	15,93
	> 132 kV	20,30

Transmission network charges for generators

TUoS [> 132kV]	Network charge [R/kW]	VAT incl
Cape	**R 0,00**	*R 0,00*
Karoo	**R 0,00**	*R 0,00*
Kwazulu-Natal	**R 4,14**	*R 4,76*
Vaal	**R 13,77**	*R 15,84*
Waterberg	**R 17,63**	*R 20,27*
Mpumalanga	**R 16,36**	*R 18,81*

We need to redesign the current dysfunctional transmission tariff structure and increase tariff levels to be cost-reflective for any of the private transmission models to work

Disaggregation of the infrastructure requirement reveals gaps

Analysis of the Eskom TDP suggests that the levels of infrastructure spend & project prioritization may not be sufficient for the country's needs. This is a concern given that what is already in the TDP is proving a challenge for Eskom to execute.

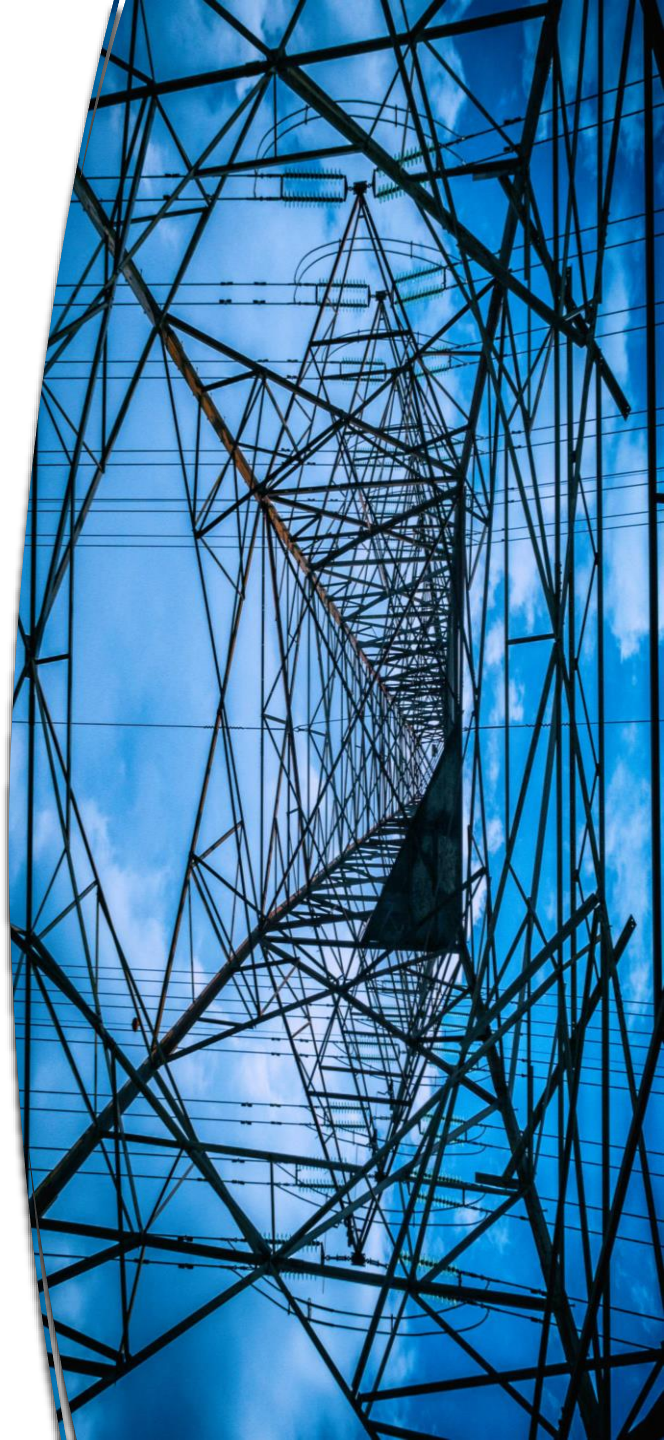
Historically very low build-out rates of new grid by Eskom-avg 200-300km per annum vs required >2000km per annum.

The three best renewable energy endowed provinces have close to zero grid capacity left.

The ramp-up rate in the grid build proposed in the TDP is heavily skewed to post 2030 (hockey stick)- this doesn't address the urgency of the situation.

The current transmission asset base is old and has been funded and amortised within the single financial pool in Eskom

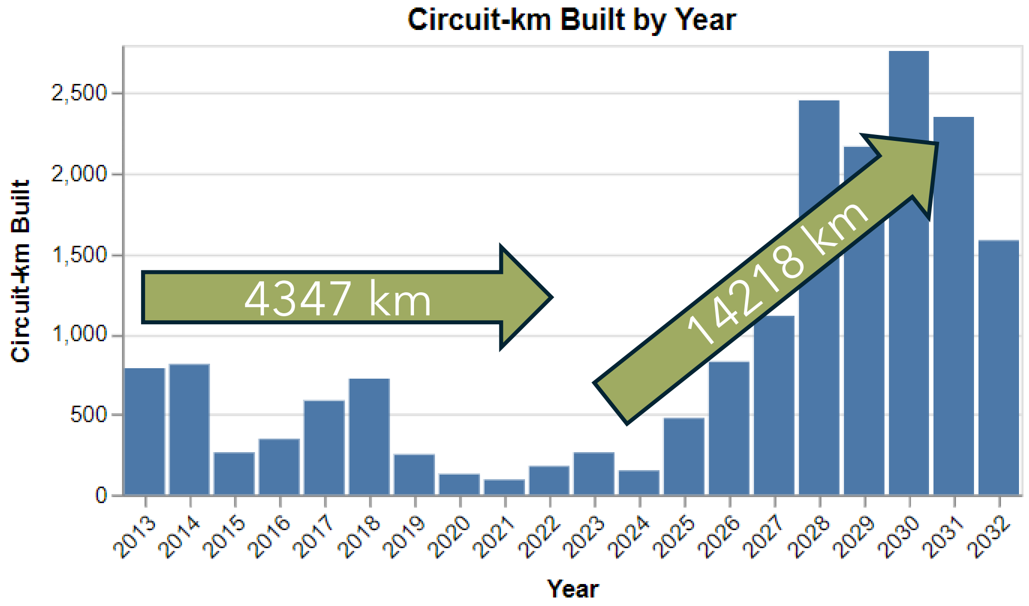
Tariffs are based on earning a return on depreciated asset values and are unlikely to reflect the cost of new capacity.



The need for private sector investment in transmission in South Africa

The historical build & financing of transmission infrastructure by Eskom has not kept pace with new generation requirements

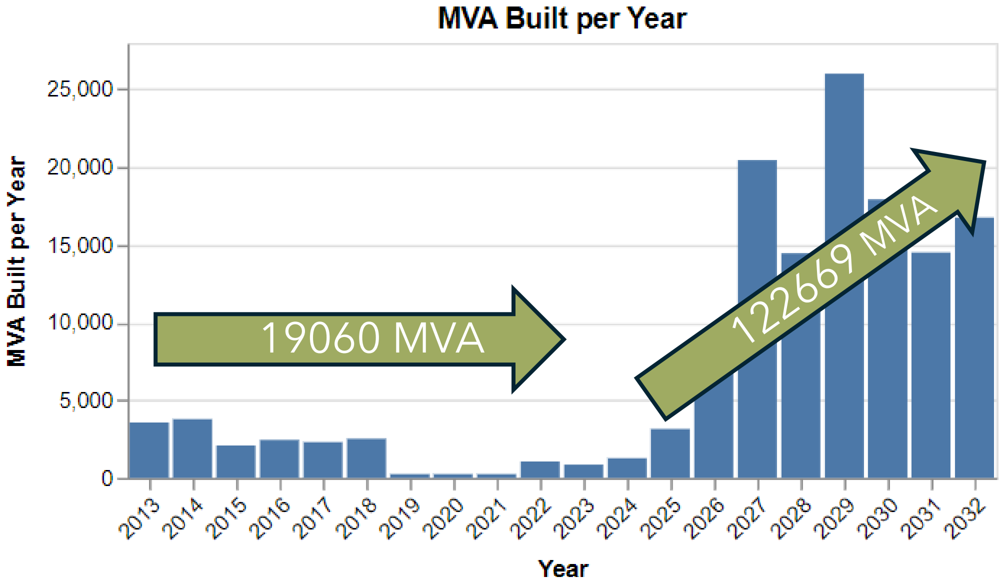
Line Build Out Rates 2013-2032



Source: Eskom TDP 2023

- 325% increase in transmission infrastructure in the next 10 years compared to last 10-year actuals
- The new 14 218 km represents 43% of the current 33 000km circuit total

Transformer Investment 2013-2032



Source: Eskom TDP 2023

- 600% increase in transformer capacity in the next 10 years compared to last 10-year actuals
- 122 669 MVA is 77% of current 160019 MVA total transformer capacity

The value of unlocking private investment opportunities in transmission infrastructure

1


Transmission flexibility

2


Revenue

3


Multiple tenders

4

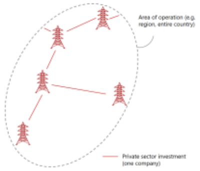
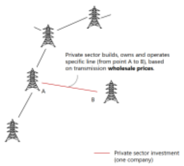
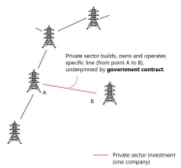
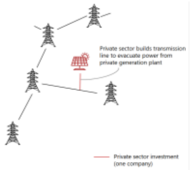

Cost saving

5


Policy reform

- IPTs can be applied to all types of transmission investment, including transmissions at different voltages, within and between countries and using both HVDC and HVAC technologies.
- IPTs can be introduced on a project-by-project basis, while existing arrangements remain in place.
- Pre-established revenue through the tender process, increases investor confidence.
- By running multiple tenders for each line or a package of lines, IPTs create competitive pressure. The most efficient and lowest cost project is accepted.
- Economies of scale can be achieved with large projects.
- Substantial cost saving through tenders and stable contractual agreements achieved in low- and middle-income countries.
- The reforms being implemented have the common desire for increased competition in wholesale electricity provision.

A range of Independent Power Transmission (IPT) models are in use globally

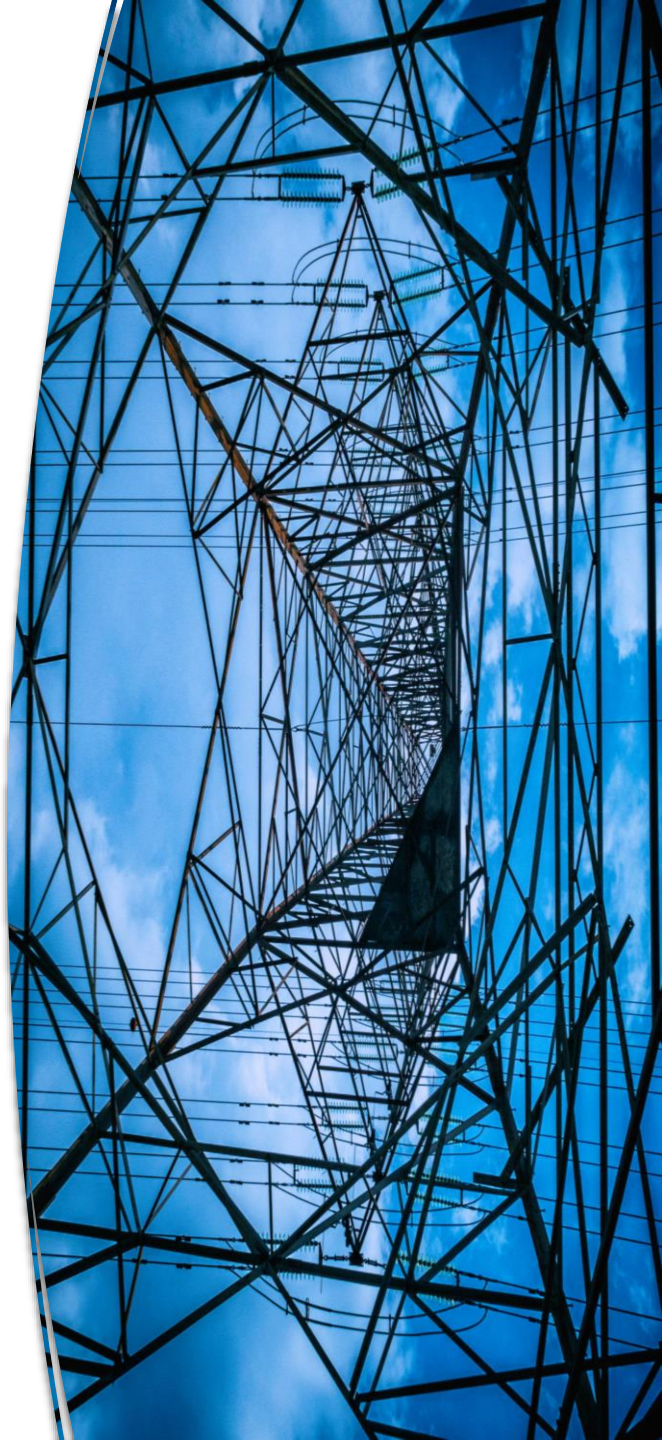
Business Model	Whole of Network Long Term Concession	Build Own Operate & Transfer (BOOT)/Independent Transmission Projects	Merchant Lines	Dedicated Lines for IPPs/Customers
Graphical representation				
Explanation	A private corporation secures a prolonged agreement to oversee and administer current transmission assets, assuming responsibility for enlarging the transmission network within its operational region.	A private company undertakes the financing, construction, and operation of a new transmission line through a long-term agreement. Subsequently, the line is returned to the government by the company.	A transmission line is financed, constructed, and operated by a private company, with the entirety of its revenues generated from short-term wholesale transmission market prices.	A newly constructed line facilitates the transfer of power from an Independent Power Producer (IPP) and connects it to the existing grid.
Length of Agreement	30-50 years or indefinite	>25 years	Indefinite	Same as IPP unless the line is transferred at the commission.
Scope of Agreement	All current and future transmission lines within a specific and restricted zone (country, region).	Single or multiple lines	New Line	New Line
Determination of Revenue	Controlled income, is typically determined on an annual basis and subject to periodic evaluation by regulatory authorities.	Most of the revenues are determined by the winning bid for the entire duration of the contract. Conditioned on the premise that line meets 98% capacity availability conditions	Income generated from wholesale market prices is occasionally bolstered by price mechanisms such as a cap and floor scheme.	If the line is not transferred, revenues are determined as a component of the Independent Power Producer (IPP) contract payment.
Financing	Compensation from Transmission Customers, Development Finance Institutions (DFIs), Multilateral Development Banks (MDBs), Corporate bonds, Commercial lenders, and Government backing	Private sector, DFIs, Commercial lenders, Sovereign support	Corporate bonds, Equity, Commercial lenders	Private sector, DFIs, Commercial lenders, Sovereign support
Regulatory Requirements	Necessitates substantial regulatory restructuring to establish the framework for private sector management of the transmission network. Need private sector to trust regulatory environment.	This model requires a lower regulatory capacity for implementation and presents a reduced regulatory risk for investors. Regulatory efforts should concentrate on operations to guarantee transparency and adherence to national regulations in operating the transmission line.	Requires well-developed wholesale markets. Doesn't require an underlying sovereign contract for investors.	Typically, this does not necessitate extensive regulatory capabilities or significant power sector reform.
Duties of the private sector	Assets are transferred to a private entity through lease or sale, with ownership reverting to the government/utility at the conclusion of the concession period.	Various models are feasible, ranging from sole construction to encompassing planning, construction, control, maintenance, and operation.	Privately owned including tariff setting	Various models are feasible, ranging from sole construction to encompassing planning, construction, control, maintenance, and operation.
Risks	Changes in regulation	The risks associated with construction, commissioning the line within the contractually specified timeframe, and operating the line are transferred to private consortium. The investor is not exposed to price risk. Transaction costs may be high due to individual procurement of lines.	The risks associated with construction, operation, and pricing.	The risks related to construction and operation, particularly if the line is not transferred upon the commissioning of the Independent Power Producer (IPP) plant. Mainly applied on an ad-hoc basis and therefore often doesn't take broader system into account.
Case Studies	Phillipines, Scotland	Brazil; Chile; Colombia; Peru; India;UK; Australia; USA	Australia & USA	South Africa and Globally applied (Europe)

Numerous studies on private sector transmission models have recently been completed in South Africa

Project/Key Stakeholder	Entities Involved	Project Description
PMU/JETIP Office/NT	Genesis/Cornerstone/Pinsent Masons	To develop and propose an optimal off-balance sheet financing mechanism that enables Eskom to unlock additional concessional loans and private sector funding for transmission grid infrastructure.
PEAC Briefing Note	Meridian	Unpacking the rationale for considering different IPT models to mobilise investment in transmission infrastructure.
NECOM Workstream 10	Headed by Eskom	Workstream dealing with unlocking transmission
IFC/National Treasury	NT & IFC	IPT Models- specifically looking at the Escrow options and the role of the NTCSA
PCC	UKpact Funding	How to create a cost reflective electricity pricing regime
PCC	Going to put RFP out- Work with Eskom and DMRE as partners	Actual grid study, modelling, capacity expansion, resource modelling- develop public access assets. Build on models that already exist. How much capital will be needed- different scenarios including curtailment
PCC	DBSA/NT/NPC	Financing electricity infrastructure- generation and transmission- real capital market assumptions- ie. Capital costs. Balance of payments/national guarantees – how they affect financing access. Address the nuclear question- assumptions around cost of nuclear. Risk assessment of finance options
University of Stellenbosch		Run the Eskom DIGSILENT model- technical modelling of the grid
Expression of Interest Document	Presidency	Krutham and Meridian Economics were asked to put together an expression of interest document for the presidency to set the terms and conditions for an RFP for transmission service providers.
Better Finance, Better Grid	CST; CSRES; Blended Finance Task Team	Models and approaches to unlocking existing grid capacity and building new capacity

The circumstances in SA suggest that two complementary IPT procurement models are required to meet SA grid expansion needs

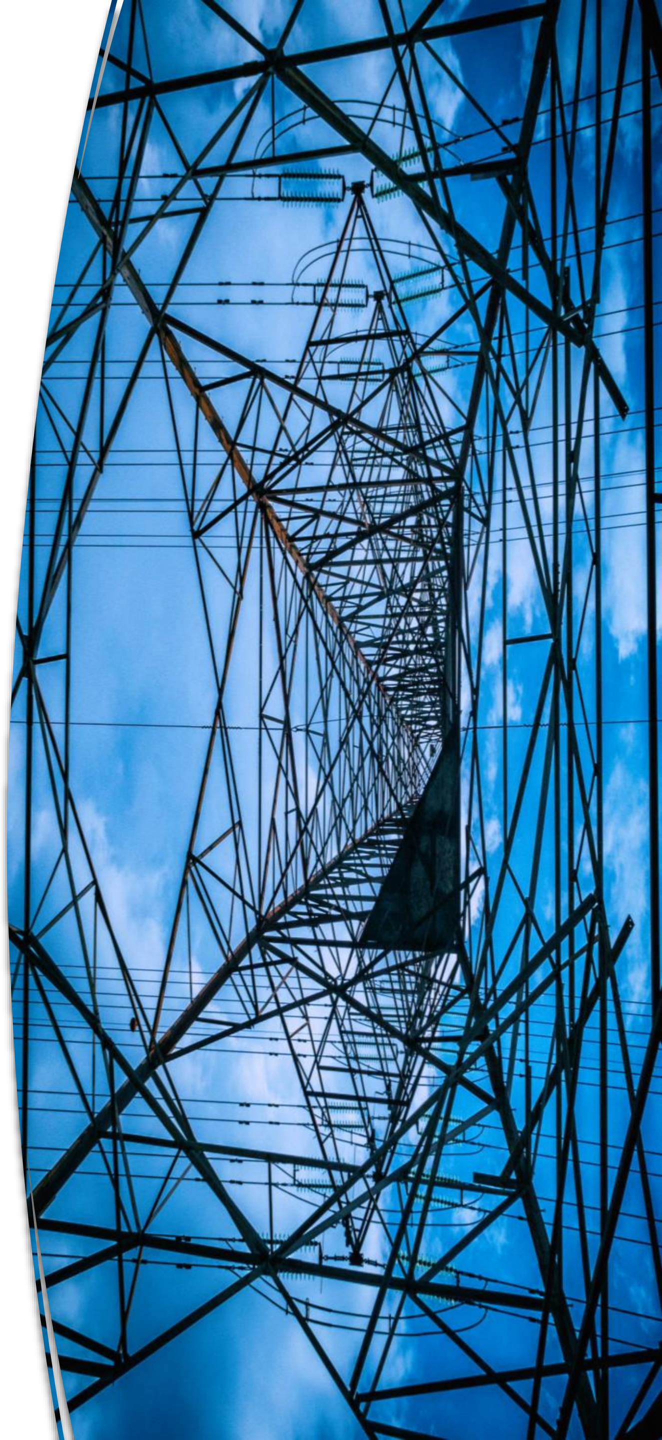
- While unavoidable, the conventional state procured IPT approach will have limited reach, due to:
  - ❑ Its need for state procurement capacity that does not currently exist; and
  - ❑ The poor creditworthiness of Eskom / NTSCA and the hard limits on the sovereign's capacity to provide additional financial guarantees to compensate for this.
- IPPs are already demonstrating that they can finance and construct 132kV collector grids and 400kV interconnection infrastructure. This creates an important precedent for a model that can be adjusted and "supersized" to contribute to delivering SA's grid expansion needs.
  - ❑ International precedent for "collector grid" IPTs also support this approach
- SA will therefore benefit from adopting two complementary IPT models:
  1. The conventional state-backed IPT Model for large inter-zone power transfer projects (400kV & 765kV) that work from the "inside, out".
  2. An IPP-backed IPT model for power collection and deep connection projects (132kv & 400kV) that work from the "outside, in".



The two new models for private sector transmission development should reflect insights from the economics of transmission infrastructure to ensure that public interest outcomes are achieved

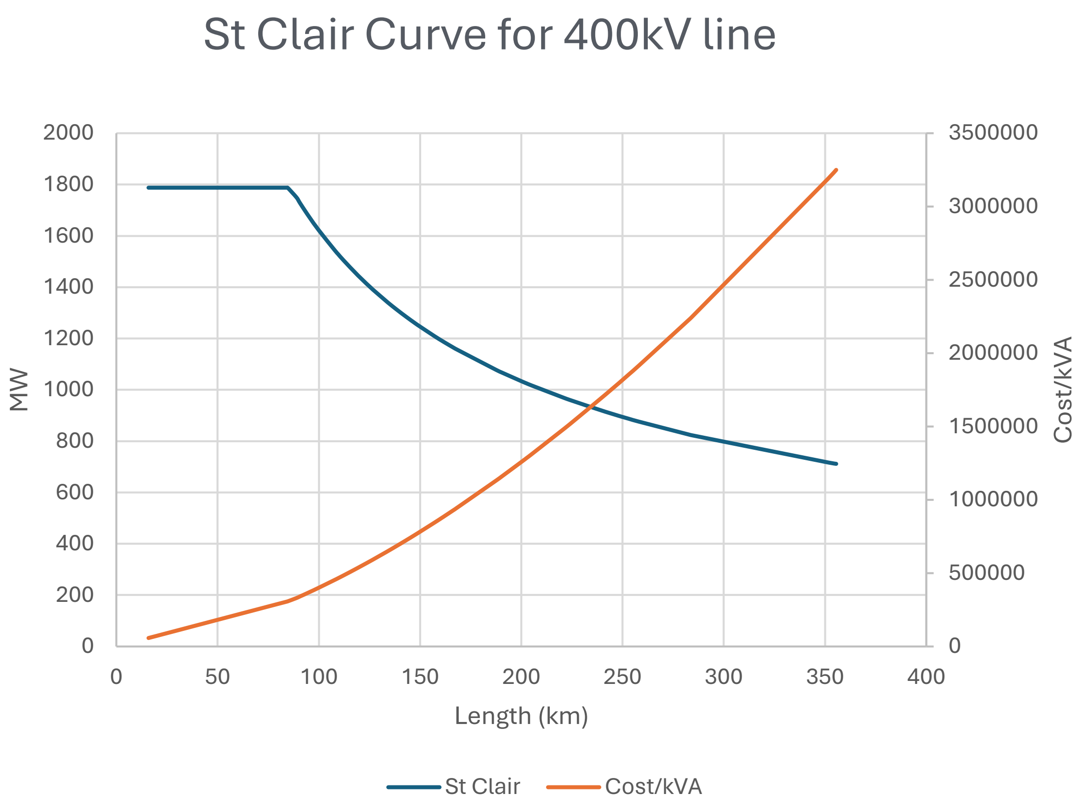
The economic characteristics of transmission shape the policies for the sector’s industrial organisation

- **Economies of scale**: Power transmission involves significant initial capital investment in infrastructure. The unit cost for electricity transfer capacity decreases as the transfer capacity of the installation increases. This creates powerful economies of scale.
- **Natural monopoly**: Due to its economies of scale characteristics transmission is often considered a natural monopoly. This means a single network can supply the entire market more efficiently than if there were several competing networks. This typically leads to the development of winner takes all competition where a single entity comes to dominate the market, putting it in a position to abuse its dominant position – a market failure. Consequently, transmission grids are usually regulated in some form to prevent abuse of monopoly power.
- **Minimum expansion increments**: Due to economies of scale grid capacity increases are subject to minimum increment sizes which might create more capacity and cost more than the immediate requirement. This additional capacity creates optionality which, if it cannot be captured by the investor, would be a positive externality and would therefore result in a market failure.
- **Positive network externalities**: The value of the transmission network increases as more generation sources and consumers are connected. A larger network enhances reliability and reduces costs by facilitating resource sharing and access to a wider, complementary mix of energy sources, including renewables. The benefits of incremental capacity expansion in the center of the grid tends to accrue to all participants. In contrast, expansions at the periphery accrue mostly to the parties that it connects to the grid. Grid investors might not be able to capture the full value of these benefits – especially from “backbone” expansions – which reflects a market failure and will (all things being equal) result in underinvestment in capacity.
- **Long asset lives**: Appropriate maintenance and some refurbishment enable asset lives of >50 years.



Economics of power transfer capacity versus line length

Transfer capacity costs increase faster after a threshold level



Line specifications
Voltage: 400kV line
Conductor Configuration: 3 string line
Installed capacity: 1800 (MVA)

The St. Clair curve is used to estimate the maximum power a transmission line can carry safely and reliably. It considers two key limitations of transmission lines:

1. Thermal Limits: This refers to the maximum current a line can carry without overheating the conductors.
2. Surge Impedance Loading (SIL) and Steady-State Stability Limits: These limitations relate to the line's ability to maintain stable voltage during normal operation and sudden disturbances (surges) in the power system. When a large amount of power flows through a line, it can cause a voltage drop at the receiving end. The curve itself is usually comprised of two sections:

1. Thermal Limit Section: This section starts at the origin and gradually slopes upwards. It represents the increasing power handling capability as the line length shortens. Shorter lines experience less resistance, allowing them to carry more current without overheating.
2. Surge Impedance Loading (SIL) Limit Section: As the line length increases, the thermal limit reaches a plateau. This is because the increasing line impedance starts to limit the power transfer capability due to voltage stability concerns. This section of the curve might be flat or even slightly decrease with increasing line length.

Key Points Illustrated by the St. Clair Curve:

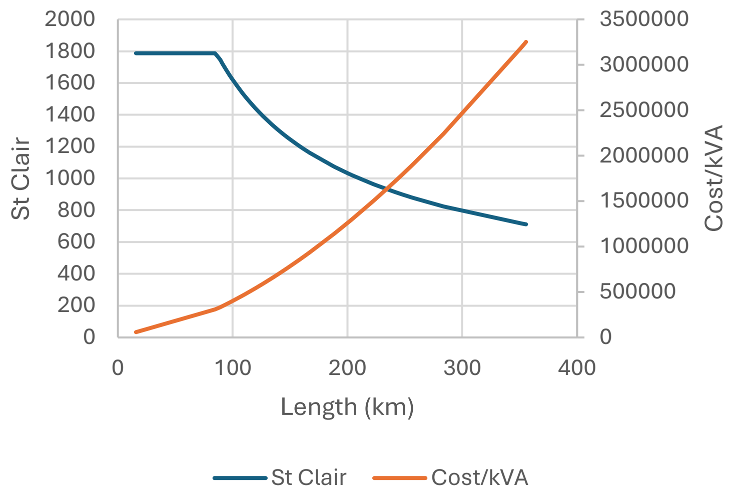
- Optimal Line Length: The curve helps identify the optimal line length for a given power transfer requirement. Longer lines become increasingly limited by stability concerns, even if they have sufficient thermal capacity.
- Importance of Line Design: The curve is a simplified model, and actual transmission line capabilities depend on various factors like conductor material, size, and cooling methods. Optimizing line design can improve its thermal and stability limits.

Summary: Economics of transmission

Natural monopoly: Economies of scale, network effects and high fixed costs imply that larger or single entities can provide the service at lower costs – leading to market concentration and monopoly power.

Positive Network Externalities: The benefits of incremental capacity expansion in the center of the grid tend to accrue to all participants, while expansions at the periphery accrue mostly to the parties that it connects to the grid. Grid investors might not be able to capture the full value of these benefits – especially from "backbone" expansions – which will (all things be equal) result in underinvestment in capacity and reflect a market failure

St Clair Curve for 400kV line



Key points illustrated by the St Clair curve:

- ❑ Transfer capacity costs increase faster after a threshold level
- ❑ Optimal line length for a given power transfer requirement
- ❑ Importance of Line Design

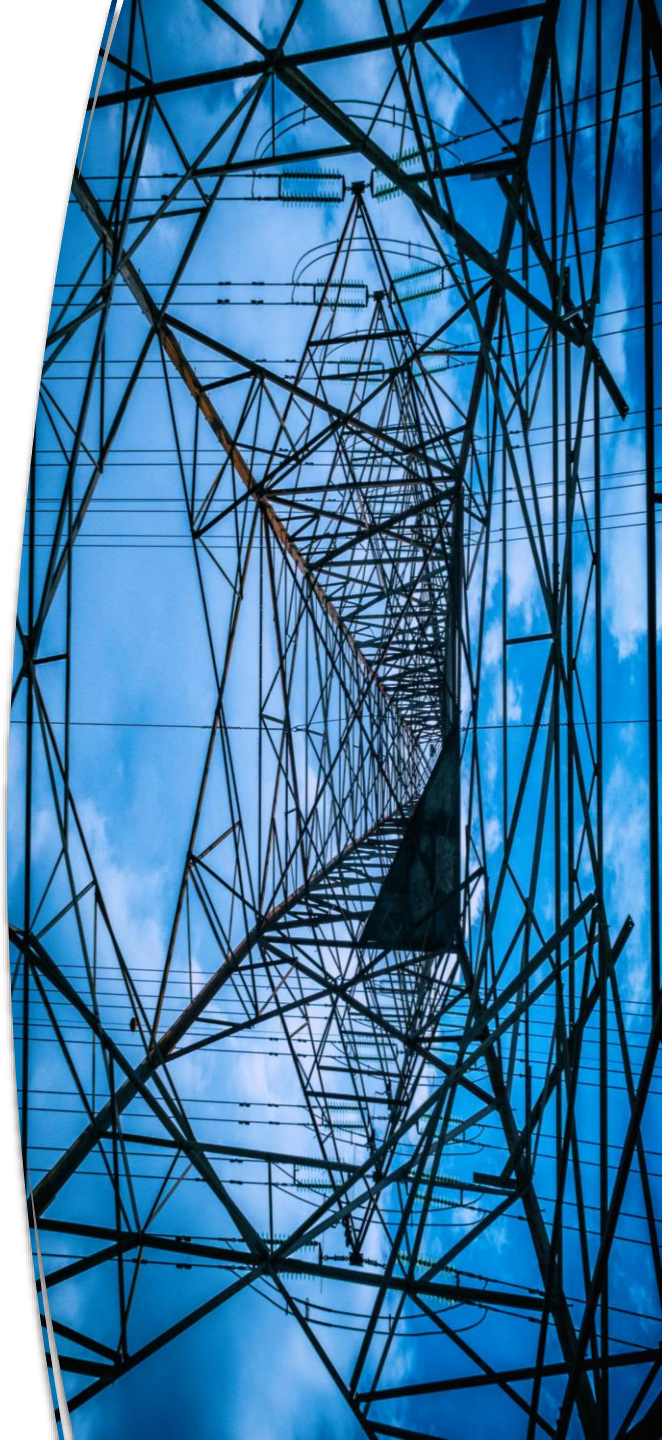
These two points mentioned above have a direct influence on the appropriate business models for each situation infrastructure project

New private sector-based transmission models should be designed to achieve positive public interest outcomes

Historically transmission services were provided by large, vertically integrated monopolies – like Eskom, which combines generation, distribution, and transmission – that could be publicly or privately owned. More recently, these entities have come under comprehensive economic regulation.

Internationally the introduction of competition in generation and retail, decentralised generation technologies, the digitisation of power systems, and innovation in procurement and commercial models have opened options for industry organisations that more effectively resolve the challenges presented by Transmission economics (outlined above). Key principles are the following:

- Transmission providers should be independent of market participants (unbundled)
- Transmission capacity should be competitively procured with risks allocated efficiently to create appropriate incentives
- Regulatory:
  - ❑ Pricing based on ex-ante **competitive procurement** is much better than ex post cost of supply regulation. Regulatory secure revenue streams.
  - ❑ Clearly defined fair rules and processes for grid access and interconnection rights

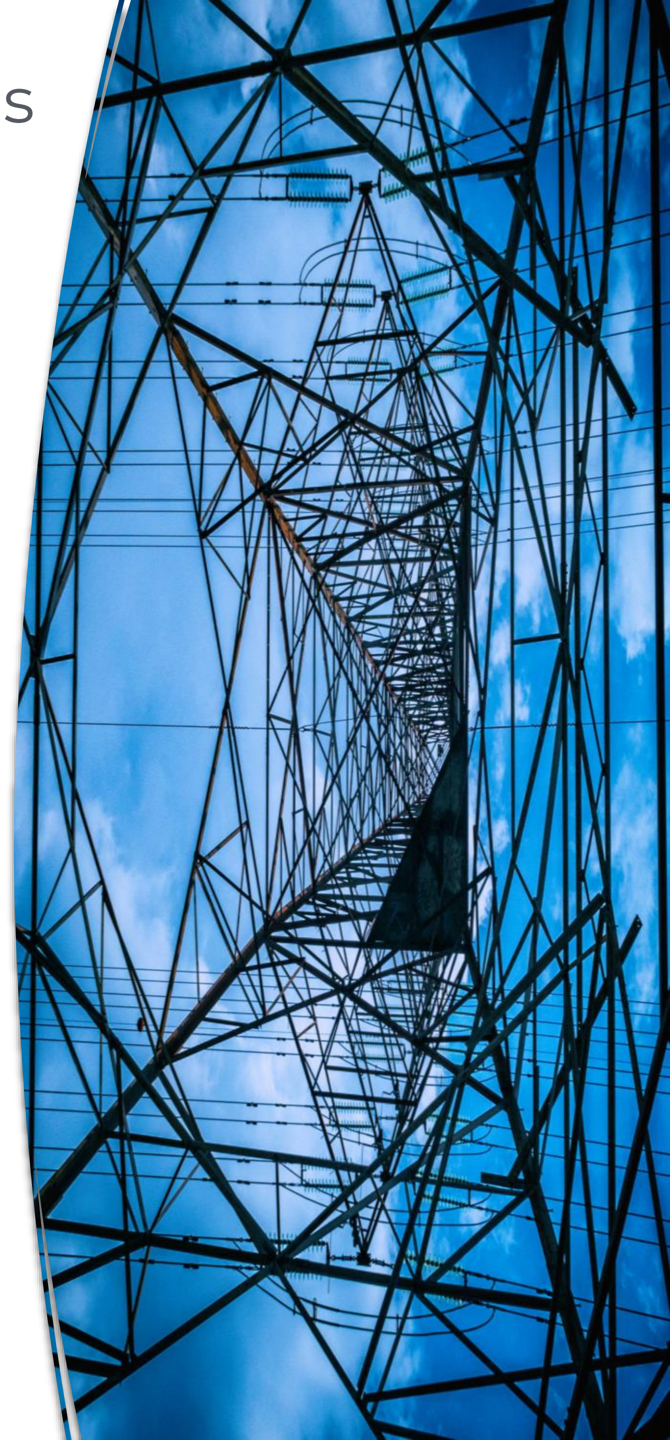


Option 1: The State-backed IPT model

Working from the inside-out

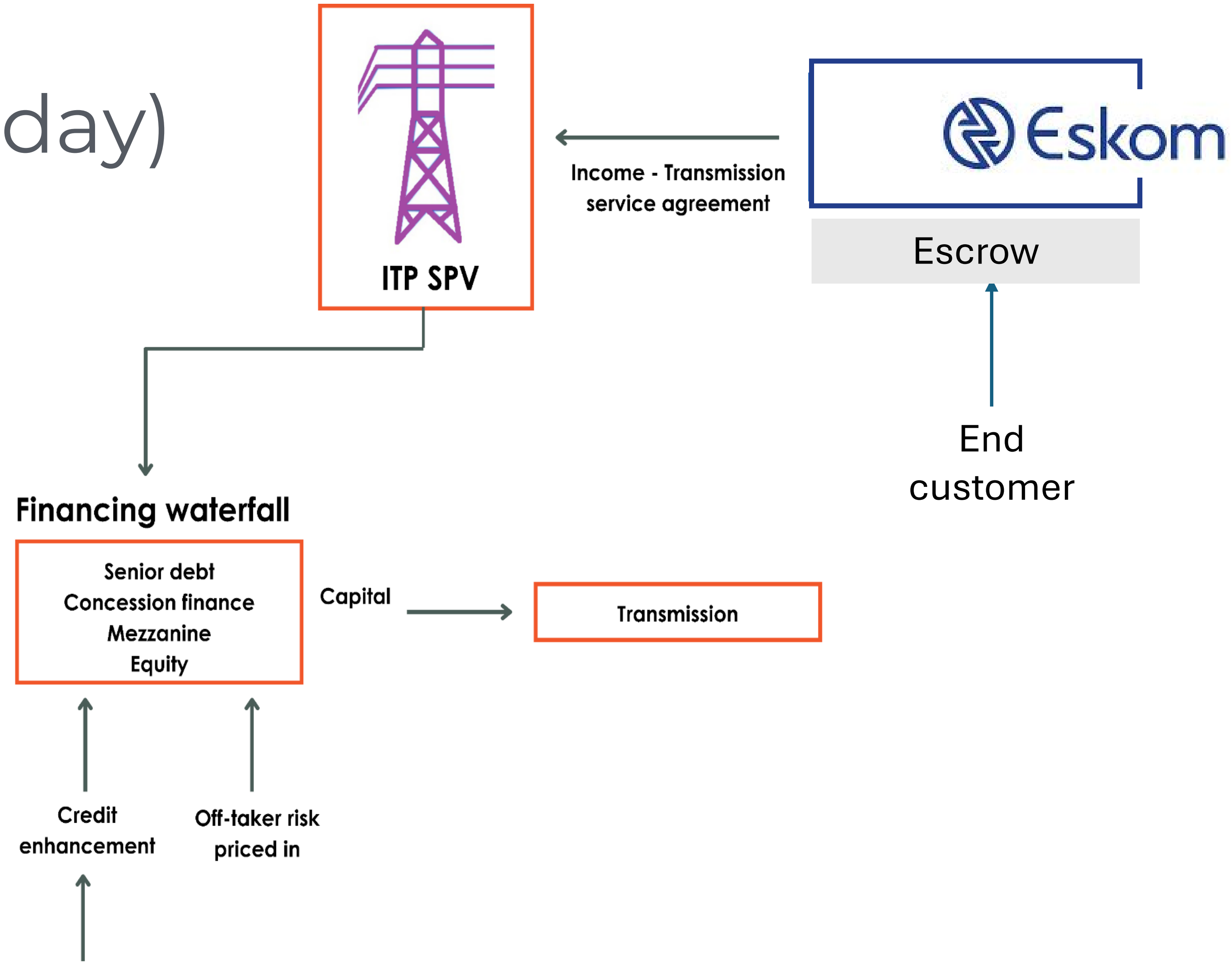
A State-backed Independent Power Transmission model is best suited to roll-out common grid backbone infrastructure

- Given the positive externalities of large 765kV and 400kV inter zonal power transfer infrastructure expansions we propose that a state-backed (NTCSA) IPT model be used.
- A Build, Own, Operate and Transfer (BOOT) IPT model for private sector investment in the grid can be structured along the following lines:
  - ❑ Procurement auctions can be run to appoint project companies (20–30-year concessions). A private company undertakes the financing, construction and operation of the line under this agreement
  - ❑ In terms of its Transmission Service Agreement (TSA) a project company is obligated to maintain and operate the transmission infrastructure for a specific period following construction.
  - ❑ TSA capacity payments generate a fixed return over the contract term.
  - ❑ After the 20-to-30-year period, the ownership and operational and maintenance (O&M) responsibilities are transferred back to the transmission utility.
  - ❑ A portion of the annuity payment is contingent upon the transmission infrastructure meeting predefined Key Performance Indicators (KPIs).



Simple doable IPT (today)

- Eskom or the NTCSA will sign a transmission service agreement (TSA) with a Special Purpose Vehicle (SPV)
- The construction of the IPT will be financed through the SPV's financing waterfall structure
- The SPV will have either have credit enhancements or the off-taker risks will be priced into the SPV
- An "escrow" type account could be created that money from users of the grid directly flows to lenders
- Note: Eskom / NTCSA is not principal in this transaction, by which we mean it is not taking on any balance sheet risk – no covenant implications
- Eskom / NTSCA enters into an agreement and payment is from tariffs



Sources:
- Guarantees: NT, MIGA's NHSFO, Backup guarantee facilities
- FLF - JETP concessionary finance
- Brics financing
- Use of Escrow accountsExport credit financing

Unpacking the finance approach- spectrum of private sector involvement

Fully state provided

Fully privately provided

Road – all financing, construction, regulation by the Government

Government hospital
Finance: Gov
Construction: Pvt
Regulation: Gov
Operation: Gov

Government school
Finance: Gov / Pvt
Construction: Pvt
Regulation: Gov
Operation: SGB/Gov

Leased Facility
Finance: bullet payments by government
Construction: Pvt
Regulation:Gov
Operation:Gov

Relatively uncharted waters

- Private sector financing for public infrastructure
- IPTs
- Old-school PPPs
- “New” PPPs Commercial Mortgages, etc

Private school and private hospital
Finance: Pvt
Construction: Pvt
Regulation:Gov
Operation:Pvt

Private house
Finance: Pvt
Construction: Pvt
Regulation: Gvmnt
Operation:Pvt

House in the bush
Private

Role of Gov: “Taskmaster” – deliver better and quicker i.e. strong management of private-sector construction

Role of Gov: “Steward” – simplify entry for private sector while improving standards

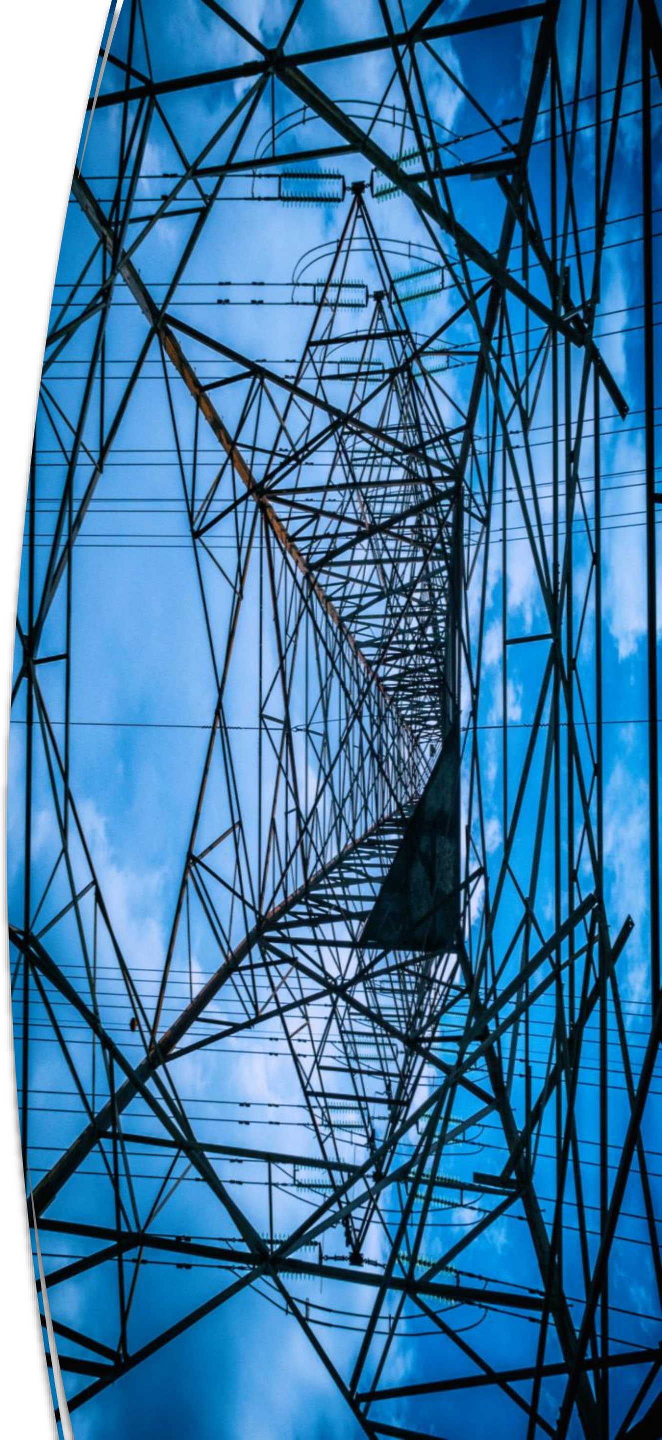
The financing model needs to be matched to the nature of the project

This section summarises the key attributes of a public-sector driven IPT project in which the public sector initiates and manages the procurement process, but much of the execution risk is shifted to the private sector.

It is developed from two key observations:

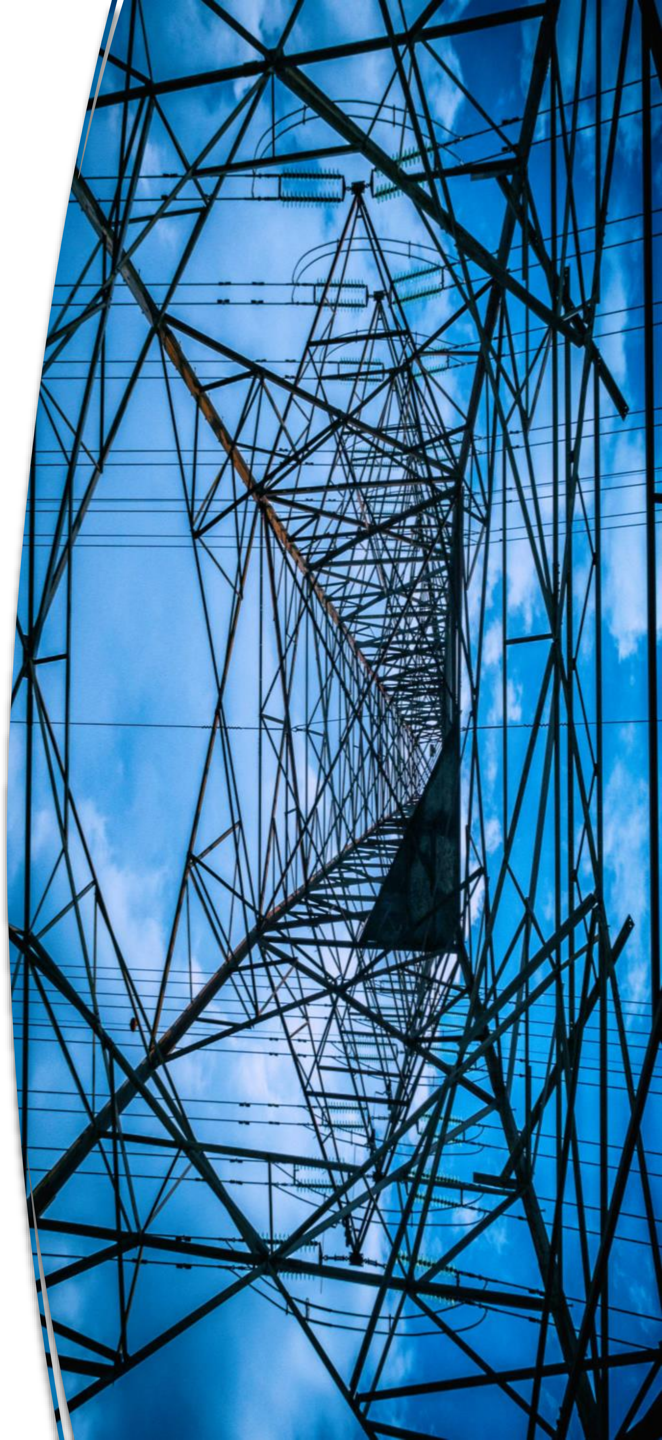
1. Eskom is not creditworthy in its current state and does not have adequate execution capacity given the size of the challenge.

2. Therefore innovative ways of containing costs and allocating risk will be required to limit the reliance on sovereign support.



The nature of the challenge: Credit worthiness of off taker/Eskom

- Eskom's financial situation remains very weak. The entity's net loss before tax worsened from ZAR 15.2 bn in 2022 to ZAR 31.6 bn. Municipal debt arrears have also risen from R44.8bn in 2022 to ZAR 58.5 bn. A tariff increase of 9.61% is unlikely to solve these problems with Eskom experiencing a "utility death spiral" as declining demand leads to lower revenue and higher tariffs which encourage customers to use less electricity from Eskom.
- It is currently in the process of debt relief. National Treasury has announced debt relief of ZAR254bn, improving Eskom's credit rating despite remaining in "highly speculative" territory. While this is a positive development compared to being at severe risk of default, concerns still linger regarding Eskom's ongoing liquidity.
- Significant leadership changes, including a new board, have only highlighted continued governance challenges at the utility – another factor that will make it difficult for the utility to take on more debt.
- Eskom has insufficient cash flows to service debt and cover transmission line buildout costs. This necessitates using project finance to attract private investment while ring-fencing cash flows to meet financial obligations, including debt repayments.



A range of risks need to be mitigated to give comfort to lenders (1)

Risk	Allocation	Comments	Potential Mitigants
Demand risk	NTCSA/Users	• Structure as an availability IPT with a take-or-pay Transmission Service Agreement • Use current tariff structure for users to pay their share of the increased capacity, but not line usage.	• Use of the current Eskom tariff structure reallocates the risk to the users and the residual is the credit/offtaker payment risk as noted below.
Credit risk of offtaker/counterparty payment risk	NTCSA/funders	• Assuming there is no Treasury guarantee of this risk, there would be availability payments structured under the current tariff arrangements with numerous revenue sources. • If project finance/PPP structures are used, this will qualify as non-recourse finance and cash flows will need to be ring-fenced to make the availability payments for the transmission lines built by the SPV. • Loan-to-value ratios will need to be determined (60% is standard but can be as high as 8%).	Arrange a liquidity backstop. This can be done in several ways: • Through an escrow account whereby NTCSA and/or the users deposit payments in advance. • A fund structure using donor funds or L/Cs from a bank covering the payments from the users or NTCSA. • Obtain a financial guarantee or insurance from a development bank (AfBD or NDB, etc) or other entities • Large industrial users can provide support or guarantees for their own payments (performance L/Cs, etc).
Construction	SPV/lenders	• Construction of transmission lines is viewed to be relatively low risk (if above ground). • Construction falls within the usual lending scope of commercial banks. • "Relief Events" is a new concept introduced to cover private sector risks linked to the "construction mafia".	• The project company normally brings its own private sector finance and the lenders include performance L/Cs • L/Cs can be backstopped by other guarantors if required (e.g. Kenya) • Provisions for Force Majeure and Relief Events will be needed.
Escalation/inflation	NTCSA/Users	• IPT/PPP agreements normally have escalation charges which get passed on to users through increased tariffs.	• Adequate contractual provisions and hedging. • Offset through tariffs.
FX / interest rate exposure	NTCSA/Users	• To the extent possible the funding should be denominated in ZAR and sourced in the local bank and capital markets.	• SA has deep and liquid markets to hedge both interest rate and FX risk • Guarantees for the hedge structures can be obtained if needed. • Export credit agencies should be used to finance imported content.
Ops and maintenance / availability of TX lines	NTCSA/SPV	• Unclear if NCTSA (Eskom) or the SPV is responsible for ops and maintenance. • A determination needs to be made as to which option is best, what the existing government policy is, and if it should change.	• Performance bonds or other instruments can be used if needed.

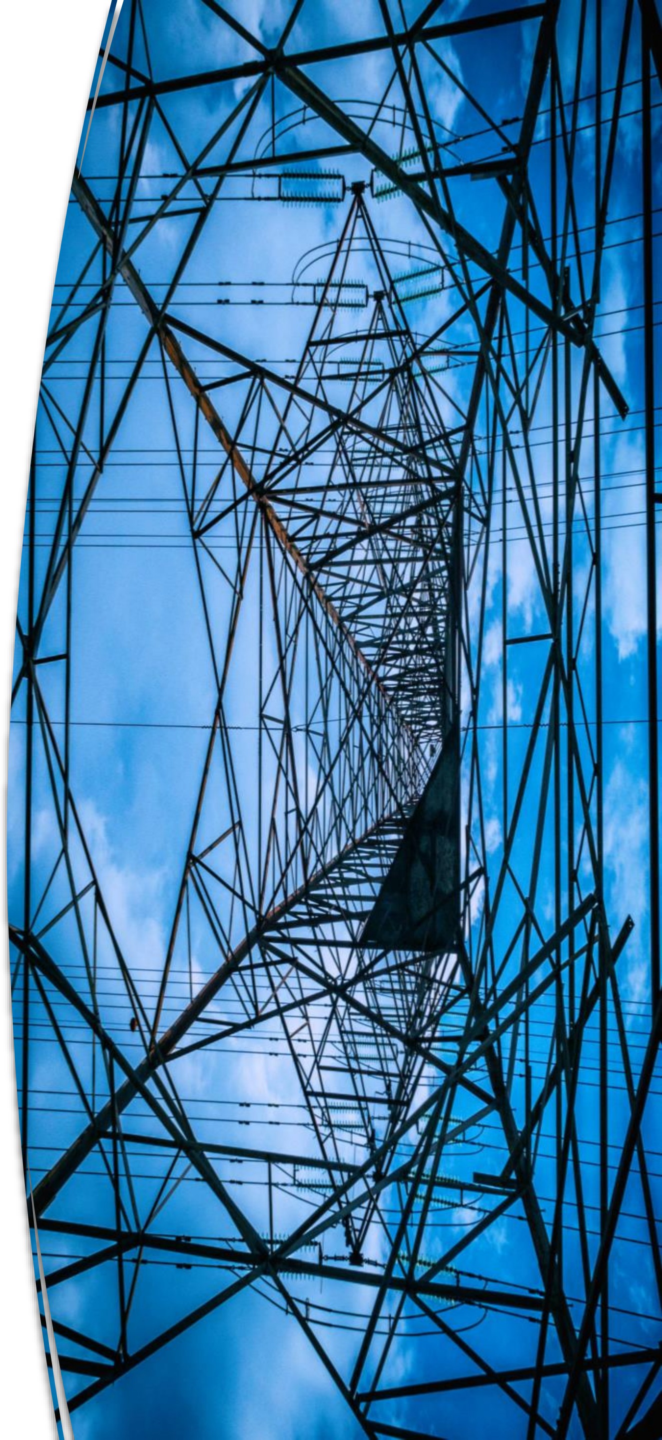
A range of risks need to be mitigated to give comfort to lenders (2)

Risk	Allocation	Comments	Potential Mitigants
Land/permits/licenses/concessions	NTCSA/SA Gov't	• This cost can be passed to the SPV but it is a condition precedent to the disbursements under the funding arrangements.	• The risks associated with the land, rights of way etc. can be covered by a gov't guarantee or a "relief event". • REIPPPP risk mitigation measures can be considered.
Changes in law/regulations/tariff structure/tax structure	SA Gov't/Users	• These should be addressed in a limited NT guarantee as they are in the control of government.	• NT guarantee. • Alternatively, a guarantee from another entity (MIGA, OPIC, etc).
Force majeure / relief events	SA Gov't/Project Company	• Force majeure events can trigger events of default or termination provisions • Relief events can be more flexible allowing for cure periods or renegotiations.	• Force majeure events can be limited in scope with the residuals covered by "Relief Event" clauses which allow for a cure period, termination, and dispute resolution to claim compensation.

The ability to obtain additional guarantees is limited

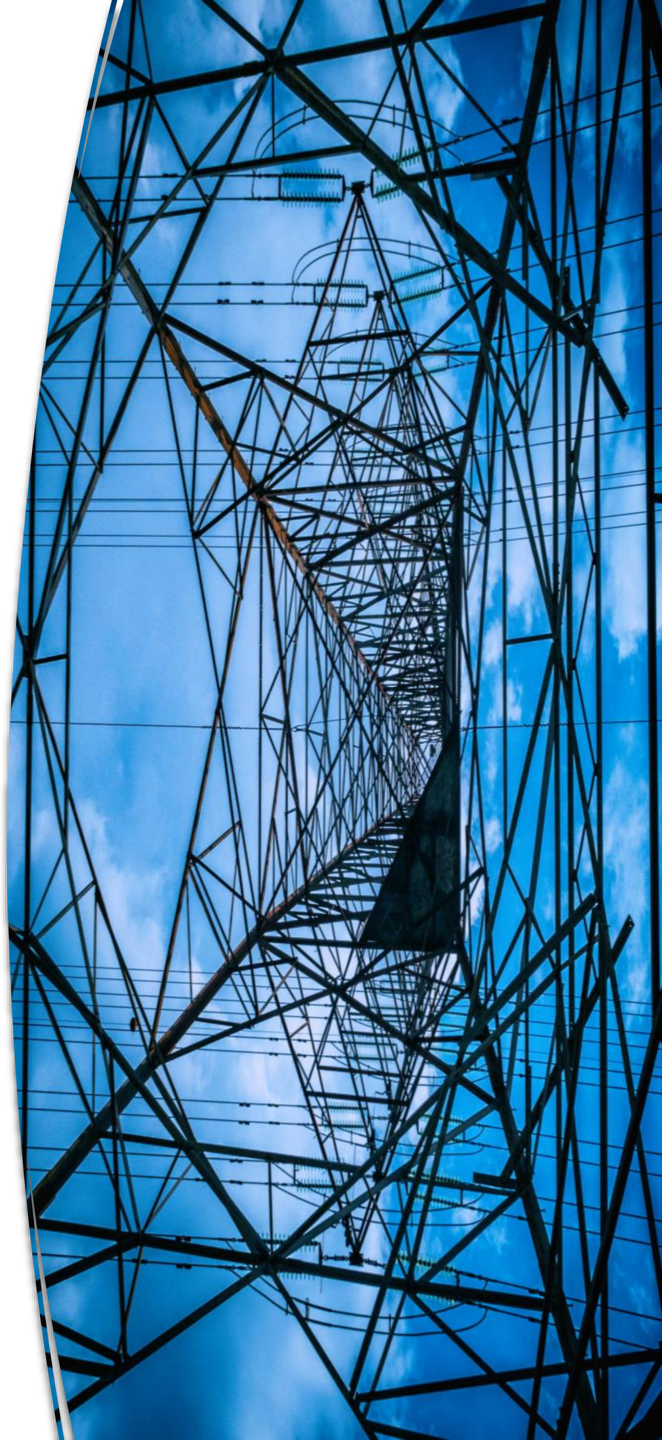
- A government guarantee is issued in terms of the PFMA as a contractual obligation to cover beneficiaries unable to meet their financial obligations, such as loan/bond repayments.
- Guarantees have several features:
    - The issuance of guarantees should be limited to reduce the gross contingent liability obligation;
    - They allow public entities to use guarantees to borrow on the strength of their balance sheets;
    - In exceptional cases, guarantees can be used to support restructuring objectives and to meet international agreement obligations; and
    - Levying guarantee fees can equalise benefits on borrowing cost margins of public entities borrowing with a guarantee and those borrowing without a guarantee.

- It is highly unlikely that the National Treasury will issue any more guarantees to Eskom. The only possibility for additional guarantees may be similar to those issued for the first few rounds of the Independent Power Producers Programme, based on developing a new market.
- There is a narrow path, in our view, to how to obtain a guarantee. This will require a formulated financial structure that significantly reduces the cash flow risk to Treasury – in short, a cast-iron financial structure that only requires credit enhancement as an add-on (or to develop the market).



Considerations for National Treasury guarantee

- If NT grants a guarantee, then the costs of borrowing are likely to be substantially lower <u>and</u> other guarantors may also step in (e.g., MIGA)
- NT is concerned about:
  - 'moral hazard' where the guaranteed entity free rides and has no incentive to take sufficient steps to prevent a guarantee being called and
  - 'adverse selection' where only bad borrowers apply for a guarantee as those that don't need a guarantee don't apply for one
- NT guarantee <u>might</u> be granted if the design of the income and payment flows reduces risks to NT
  - "A guarantee will be granted if one isn't needed"
  - However, this highlights that derisking needs to occur in the financial model **before** a guarantee is requested
  - Escrow models may reduce this risk



Impact on the pricing of a sovereign guarantee (1)

The IPT structure, like a BOOT, would use project finance techniques to allocate, manage, and price risks.

→ Recent market sounding for a project finance PPP indicates:

→ Sufficient debt capacity and demand in local market/currency (ZAR).

→ Most commercial lenders can underwrite and syndicate.

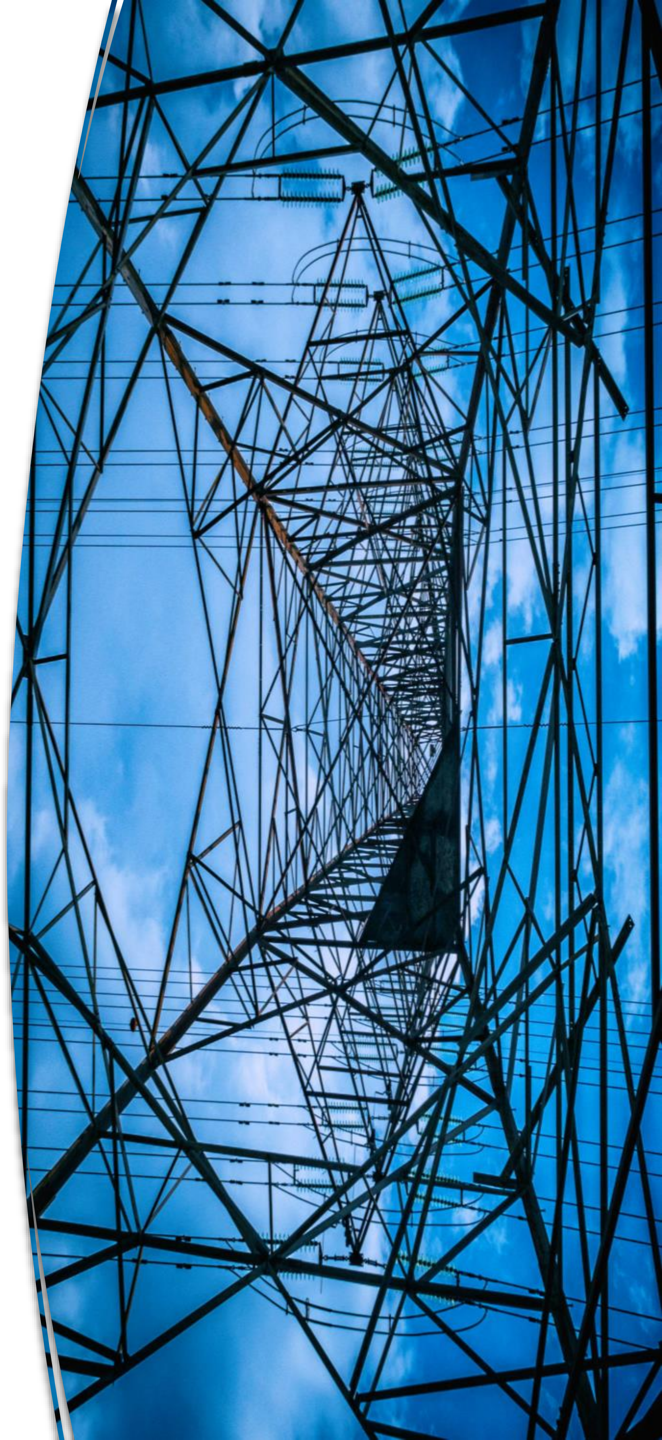
→ A large institutional investor base is interested in infrastructure projects (many were active in the REIPPPPs).

→ Several multilateral lenders are active in SA (African Development Bank, New Development Bank).

→ Pricing reference can be based on successful REIPPPP auction bids.

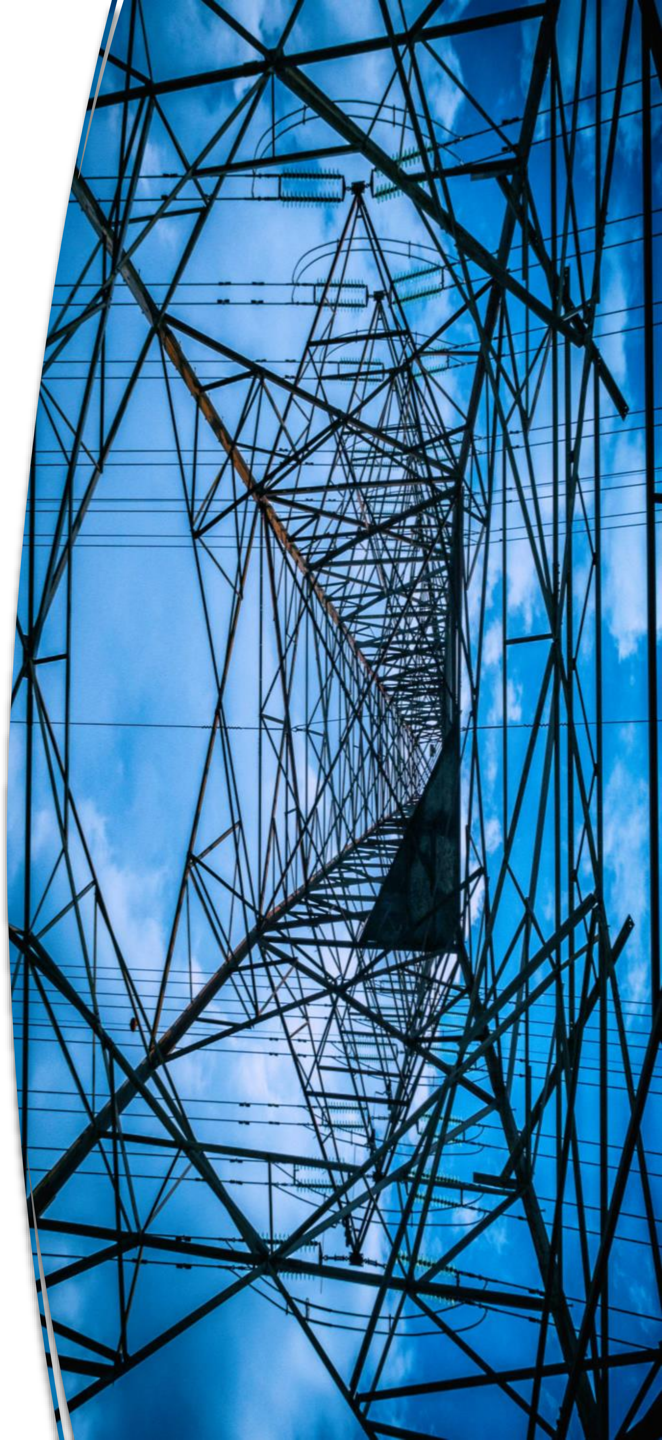
→ Market conditions are fluid, and a specific market sounding is recommended to validate pricing assumptions.

→ Equity return expectations range from IRR 10 – 13% IRR, with most targeting 18%.



Impact on the pricing of a sovereign guarantee (2)

- Senior debt – approx. 287 bps with high of 400 bps (without explicit government guarantee)
- Upfront fee of 113 bps
- Facility agency fee of ZAR 350,000
- Commitment fee of 1% of debt
- All in rate of swap and credit margin – 77 bps
- Gearing ratio of 80%
- Debt Service Coverage Ratio of 1.2x
- 3-month JIBAR is the most common base rate used for project finance in SA and debt is subsequently fixed through interest rate swaps. Some entities such as the World Bank guarantee these types of swaps.

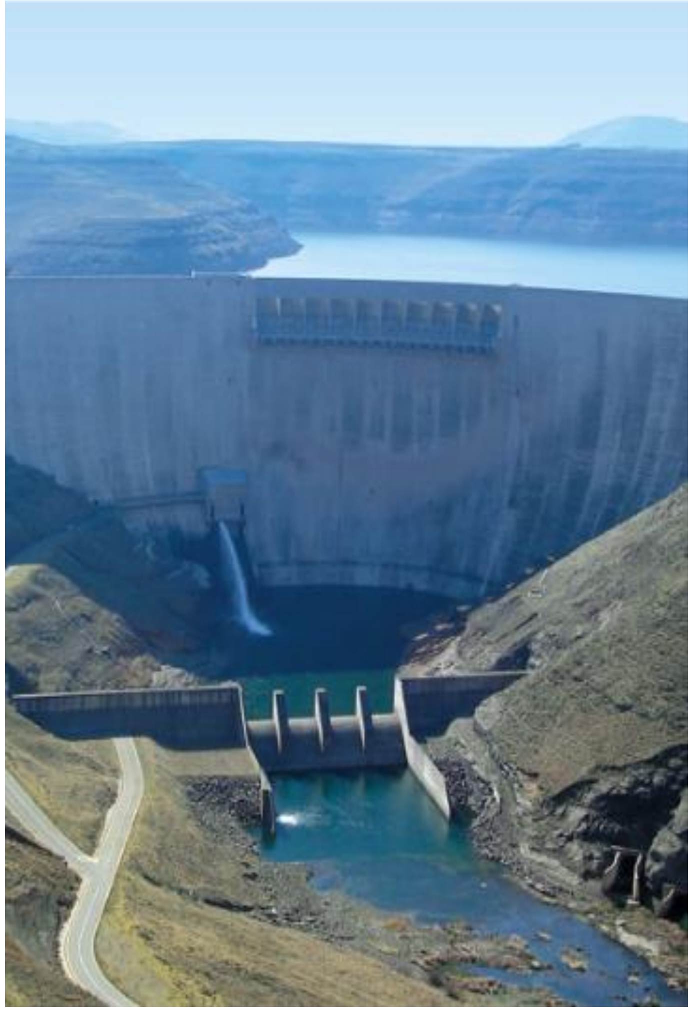


How the escrow arrangement could be operationalised in the South African context to reduce the reliance on sovereign guarantee

Step	Description
1. Establishment of the Escrow Account	As part of the offtake agreement or Transmission Services Agreement, the project developer and the off-taker agree to establish an escrow account. This account would be held in an SA bank (one of the big 5), in compliance with Nersa regulations and tariff structures/terms.
2. Deposit of Funds	To guarantee service availability, the off-taker (or users) prepays for transmission services by depositing funds into an escrow account at predetermined intervals as outlined in the Transmission Services Agreement. Funds are earmarked and ring fenced for payment to the project developer (SPV).
3. Security for Payment Obligations	Funds held in the escrow account serve as security for the off-taker's payment obligations under the Transmission Services Agreement, providing assurance to SPV equity and debt funders.
4. Release of Funds	The Transmission Services Agreement dictates the release of funds from the escrow account to the SPV. This release is triggered upon achieving predetermined milestones, such as transmission line availability, meeting specific tariff structures, or fulfilling other outlined conditions.
5. Protection for Both Parties	The escrow account provides protection for both the SPV (project developer) and the off-taker (NTSA). It ensures payment sources in case of off-taker defaults and demonstrates commitment to payment obligations, potentially improving financing terms.
6. Management and Oversight	A designated third-party agent (one of the SA big 5 banks) manages and oversees the escrow account to ensure adherence to the transparency and accountability provisions of the Transmission Services Agreement.
7. Flexibility and Adaptability	Escrow accounts can be structured flexibly to accommodate project dynamic changes, like payment schedule adjustments or additional fund releases due to cost overruns or force majeure events.

An 'escrow' structured like the water trading entity model would give lenders substantial comfort

	Water	Electricity
Brief description	Trans Caledon Tunnel Authority borrows money from banks & uses the money to build infrastructure	The IPTs borrow money from banks
	The Water Trading Entity invoices end users of water for monthly water consumption which includes a "TCTA" charge	Users of electricity are invoiced for electricity, and this includes an "IPT charge".
	TCTA uses this to repay the loans	IPT uses this to repay loans
Who invoices?	Water trading entity	Option (1) Eskom/NTCSA or Option (2) Distribution (e.g. City Power)
Legal / impact on covenants	WTE acts as a payment agent of TCTA	Option (1) Eskom is agent – no impact on covenants Option (2) Eskom is not involved
Who pays?	All	As this is backbone that benefits all, it can be collected by all – tariff reform is urgently need

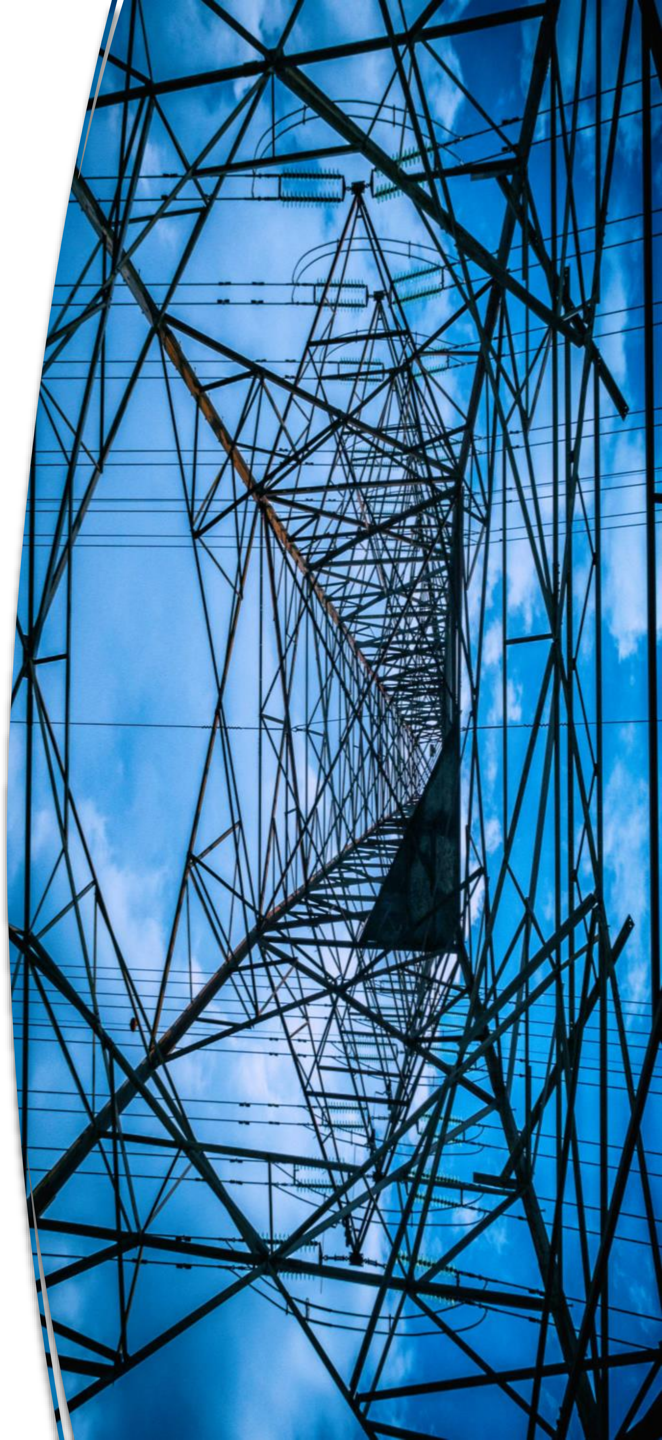


Institutional and regulatory changes required

A new "Electricity Regulation on New Transmission Capacity" will be required, linked to the Electricity Regulation Act.

Note:

- NERSA regulations lack clarity regarding Eskom's obligations beyond signing PPAs.
- In addition to regulations, an inter-government framework between Eskom, DMRE, DPE and NT is still required that lays out what is being committed to, both separately and together.
- With the current ERA stalled, now is an opportunity to include elements relating to New Transmission Capacity.



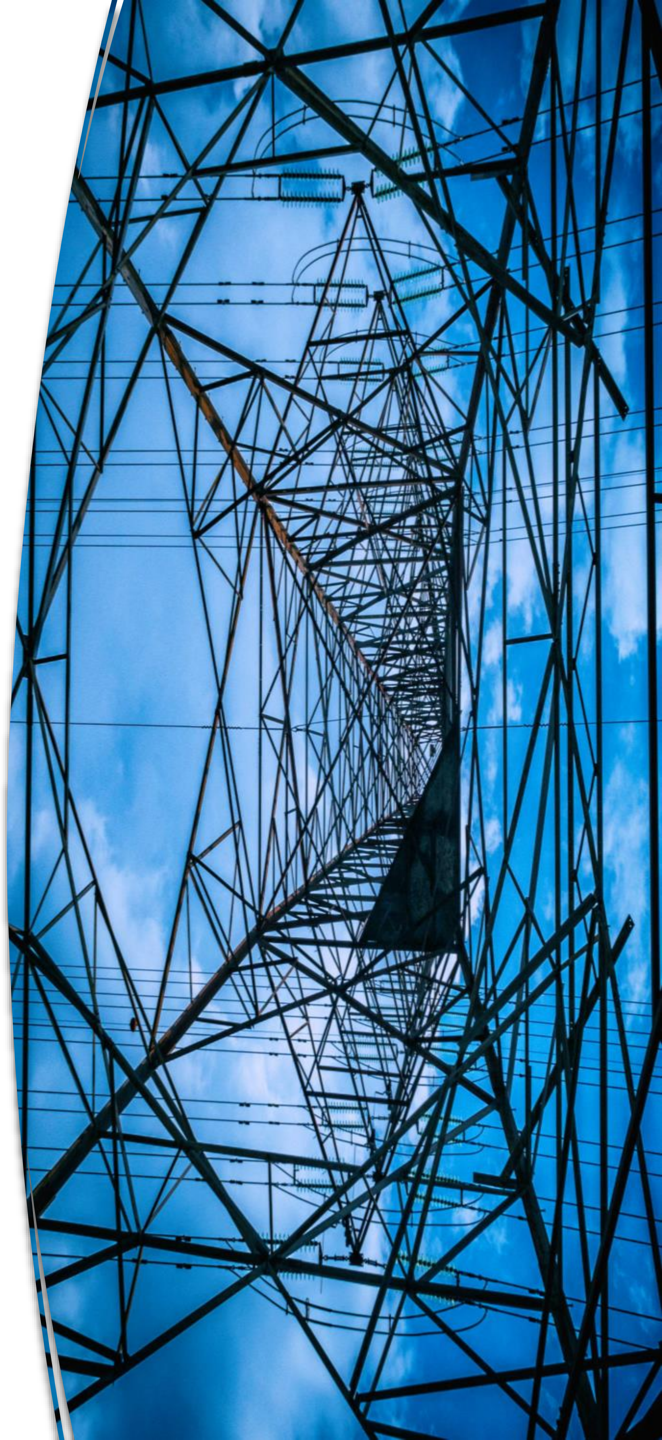
Example of a term sheet for a conventional government backed IPT model

A generic term sheet for an Independent Power Transmission Project (IPT) typically includes several key components that outline the structure, roles, and responsibilities of the project. These projects are a way to attract capital into the transmission sector to fund key infrastructure and transfer risk to the private sector. The IPT structure allows private investors or groups of investors to construct, own, and maintain specific transmission infrastructure under a concession or Transmission Services Agreement granted by the host country.

- Some key elements that are generally included in a term sheet for an IPT are:

1. Project Overview: This includes the scope of the project, like the construction of transmission lines or substations, and its objectives.
2. Roles and Responsibilities: Outlining the roles of the investor, the state-owned transmission company, and other stakeholders.
3. Financial Structure: Details on funding, including the mix of equity and debt, financing sources, and financial obligations of parties.
4. Risk Allocation: Identifying and allocating risks such as construction risks, operational risks, and financial risks among the parties involved.
5. Regulatory and Licensing Requirements: Information on the necessary regulatory approvals and licenses required for the project.
6. Payments and Pricing Structure: The mechanism for payments to the project company, which could be fixed payments independent of the quantity of power transmitted.
7. Maintenance and Operation: Terms regarding who is responsible for the maintenance and operation of the transmission lines.
8. Duration and Termination Clauses: The time period of the project and conditions under which the agreement can be terminated.

The term sheet would also typically include detailed legal and contractual structures to facilitate the use of project financing techniques. It is important to note that while these are common elements, the specific details and structure can vary based on the jurisdiction and specific project requirements.



Setting up the procurement of a conventional government backed IPT model

What would a good IPT office look like?

The procurer needs to meet these expectations:

- **D**esign and run a sophisticated, multi-project, multi-billion-dollar international competitive public procurement programme
- **M**eet complex infrastructural requirements
- **O**perate in a complex public institutional landscape
- **W**in the confidence of the local and international private sector who have strong reasons to be distrustful of Eskom and Government’s ability to commit
- **T**o attract a large number of high-quality parties at a time when there are numerous international grid investment opportunities elsewhere, and suppliers are stretched to capacity
- **S**outh Africa will have to be at least as competitive an investment destination as with the IPP rounds, if not more so

What would a good IPT office look like?

Experience of a High Performance REIPP Office	Why this factor is important
Had a high calibre programme champion	• A champion can manage all levels of players; take pressure and insulate operations for effective execution; hire the right people/advisors; manage consultants effectively; communicate clearly; resist bullying and corruption; inspire confidence in programme design and execution; navigate complex procurement and contracting processes; engage convincingly with senior gov't officials; explain the programme to stakeholders; maintain consistent communication with the private sector. • Note: once the champion left the IPPO, the calibre of REIPP operations declined, which showed in poor conceptualisation of REIPPPP BW6, which failed to check for transmission capacity.
Tight-knit management team with extensive experience of projects, public procurement, and working with the private sector	• Proven ability to close public sector projects, meeting regulations while maintaining stakeholder trust. • Track record in PPPs as transaction advisors. • Highly professional problem-solvers and facilitators rather than regulators.
Strong ability to engage with private sector	• Allays concerns and gathers feedback on design, legal or technology issues • Allows for professional and informed interaction throughout the bidding and deal-closing process demonstrating expert knowledge and avoiding manipulation by either party. • Key for building trust and market confidence in the programme.
Strong ability to engage with and persuade senior public officials and stakeholders	• Key for creating new regulations and securing necessary approvals: Department of Energy; bid committees; Treasury; the Minister of Finance. • Obtaining financial support: Guarantees, seed funding, and leveraging the DBSA frameworks. • Facilitates Eskom's participation: Finalising deals, high-level planning coordination. • Enables alignment with socio-economic goals: DTI targets and requirements.
Ability to meet announced deadlines	• Allows for a successful bid process and closure of deals, in the manner that was promised. • Key to showing private sector that Government is serious about this programme.
Ability to run a rolling series of bidding rounds with substantial capacity allocation	• Gives certainty, key to create market confidence as more players become geared to participate in successive rounds. • Raises the level of competition, helping to ensure quality bidders and lower prices.
High quality/'no nonsense': Transparency of bidding process, standardisation of bidding documents, clarity and quality of information available	• Ensures predictability, certainty and thus confidence from the market in the process. • Provides clarity on non-negotiable aspects of the process, so that players don't waste time trying to individualise aspects, reinforcing that there was a level playing field for all.
Innovative, problem-solving style	• The uniqueness, complexity, ambition and degree of innovation required on multiple fronts requires an advanced problem-solving approach. Being situated within a standard bureaucratic environment or with a bureaucratic mentality will fall short of the task required.

What would a good IPT office look like?

Experience of a High Performance REIPP Office	Why is this factor important
Freedom to bring in a large workforce of private sector advisors.	• Contribute to running a quality professional process by helping to design the overall process framework, injecting international best practices through relevant documentation, managing and evaluating bids, and incorporating lessons learnt as programme progresses. • This was key in getting the right infrastructural design with technologies that were relatively new to South Africa, in benefiting from international learnings from countries that had experience, and in creating a procurement process that could accommodate and win confidence of large international players as well as local, from project operators to financiers and suppliers. • Advisors were on short-term contracts and companies rotated so as not to become entrenched and attached to process.
Very high security	• Key to keeping any political influence or corruption out. Thus, the multi-billion IPP-programme stood out as an exception in not falling prey to State Capture.
Autonomy and insulation	• Allowed he IPP Office maximum possible flexibility in running its operations. • No outside interference.
Situated outside departmental government	• Location here means PPP regulatory process did not apply and was also off-budget (thus not having National Budget system requirements and constraints). This was key for flexibility and speed.
Access to substantive resources for operations	• Large upfront investment in expertise: The IPPO dedicated a significant portion of its budget to bringing in a large team of local and international advisors (130-150) in the first round alone. This expertise cost around US$10 million which is relatively small compared to the size of the programme. • Aside from large operational costs, the office did not need to have a substantial balance sheet for procurement. IPPO was started with R80m from DBSA, technical assistance funding from bilateral donors. Later R100m given by NT (from the Jobs Fund, thus off-budget, and used partially repaid to DBSA). Partway through the second round, program budget funding shifted to relying on bidder registration fees and fees paid by successful IPPs on signing (1% of total project costs).
Key government support	• Political champions are needed. Strong buy-in and working relationships with DoE (to pass new regulation, agree on programme, get approvals on procurement, sign-off at financial closure) and Treasury (seed-funding, PPP skills, guarantee framework passed, leveraging off Treasury's institutional influence and knowledge to get things done in Government). • Government support is underpinned by an inter-governmental framework which includes the DoE, DPE, NT and Eskom.
Timelines for set-up	• The IPPO took 8 months to start operating, but this can be done in 3-4 months if preparations are made and the right calibre leadership team is chosen and given the necessary autonomy and resources. • The first 3 months is for getting the core team in place, contracting experts to help with design, studying international case models, and establishing best practice. • The DoE should start setting up new regulations beforehand.
In conclusion: High calibre team operating according to international best practice that showed they were serious	• Key to allaying private sector concerns about the procurement process and working with Eskom. • Successively attracted more players with each round, creating a competitive market for South Africa's REIPP programme.

Where should an IPT office be situated?

Qualities required	NTCSA	IPP Office – establish a new Tx division	DBSA	Department eg DoE or NT
High calibre programme champion	This champion is required regardless of where the team is located.			
Tight-knit management team with extensive experience of projects, public procurement, working with the private sector	Will need to be sourced – not a large pool in SA.	Existing team has lost the Champion and other capacity, has a different ethos under DBSA leadership, and is not performing to previous standards. An entirely new capacity would need to be recreated.	Does not have this available, would need to source from elsewhere.	
Strong ability to engage with private sector	Must be sourced in.	Must be sourced in for new team.	Modest & must be sourced in.	Treasury has this ability. However, the DoE is not that experienced.
Strong ability to engage with and persuade senior public officials and stakeholders	If high calibre team described above is brought in.	Need to source additional high calibre individuals.	Modest current ability. Depends on calibre of team brought in.	Modest.
Ability to meet announced deadlines	Needs to be ensured.	Yes	Depends on calibre of team brought in.	No
Ability to run a rolling series of bidding rounds with substantial capacity allocation	Need to create new capacity	Need to create new capacity	Not within current set up. Need create a new capacity with autonomy to do so.	Not possible in departmental context
Transparency of bidding process, standardisation of bidding documents, clarity and quality of information available	Possible	Possible	Not their current approach, but can allow new team its own MO.	Departmental procurement processes would apply – a no-go on all counts.

Where should an IPT office be situated?

Qualities required	NTCSA	IPP Office – establish a new Tx division	DBSA	Department eg DoE or NT
Innovative, problem-solving style	Since the NCTSA would be new, it has the freedom to create a new culture.	Yes, in the past. The new team must be given autonomy and exude this style.	Not clear. New team must be given autonomy and exude this style.	Constrained by departmental operating procedures.
Freedom to bring in a large workforce of private sector advisors.	Yes. There could be benefits of skills transfer as well as setting the professional tone from the outset as NTCSA is built up.	Yes	Yes	Not possible in departmental context.
Very high security	Can be created	Exists, and would need to be extended.	Not as high as required. Would need to dedicate a free-standing facility on existing premises.	No
Situated outside departmental government	Yes	Yes	Yes	No
Access to substantive resources for operations	Requires seed-funding	Requires seed-funding	Might be able to supply from own funding	No
Strong Government Support	Needs to be skilfully forged wherever the team sits. Relationships with DoE, NT and Eskom are key.			
Timeline for set-up	3-4 months if an NTCSA shell is in place.	3-4 months, if given autonomy.	3-4 months, if given autonomy.	Years.

Option 2: The IPP-backed IPT model

Working from the outside–in.

Internationally the IPP-backed grid collector model is becoming more prevalent

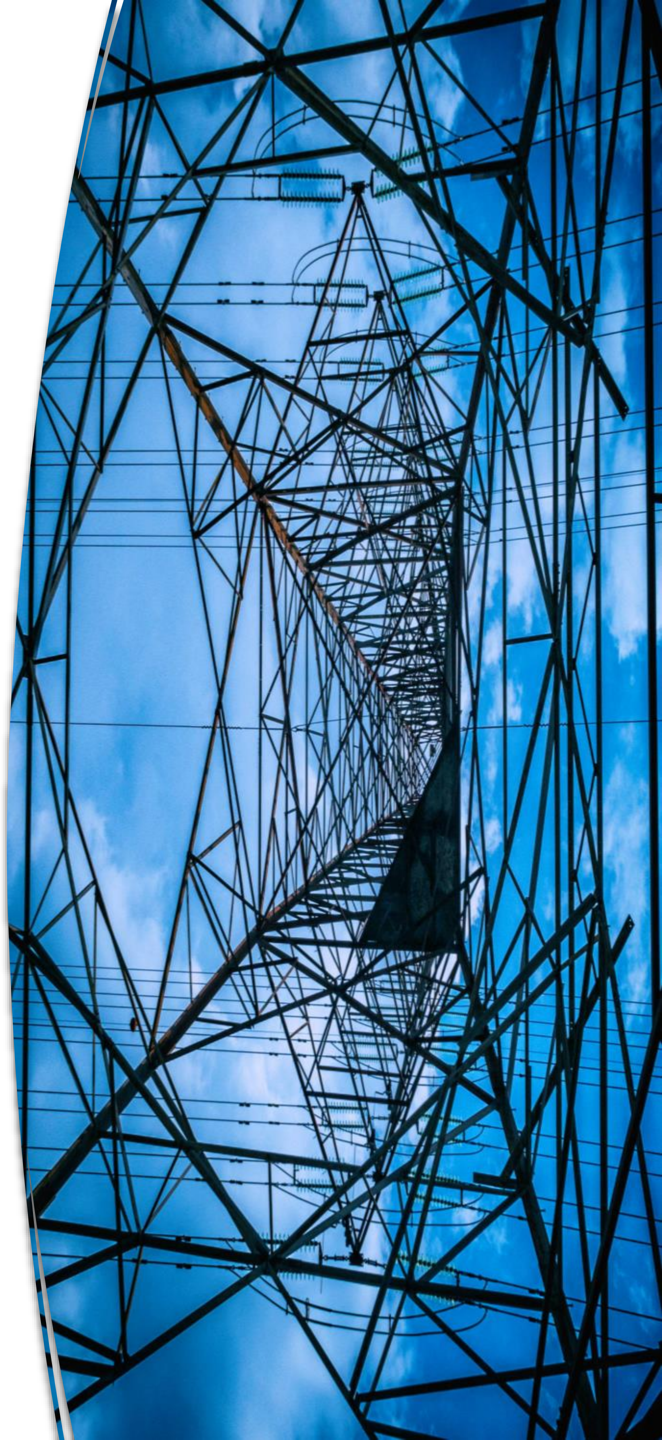
Grid Collector Aggregation Model in Germany and Spain	
Business Model	Private Grid company builds and operates grid lines and substation infrastructure from IPPs to the main public backbone infrastructure
Clients	Collects/connects multiple IPP projects that pay to use grid and substation infrastructure. These IPPs have their own private off takers for the energy that they provide either through PPAs or through selling onto the market.
Relationship Structure with TSO	The public Transmission System owner only "sees" the high-voltage side of the inter-connecting busbar (400KV). This saves TSO from dealing with many private projects – it only deals with the collector, therefore reducing the technical complexity of deals.
Responsibilities	Private grid company is responsible for route selection; servitudes/right of way negotiations; line commissioning; construction; financing; EIAs; Operation & Maintenance Should it be necessary for the TSO to call for generation curtailment at the interconnection, the private grid company also implements (translates) the instruction by implementing a pre-agreed individual generator curtailment scheme.
Tariff Model	IPPs pay a tariff to use the collector grid. This tariff will have a grid connection per MW component and a running charge per MW component

The current IPP "self-build" model emerged to meet the need for new grid infrastructure to connect REIPPP IPPs to the transmission system

- Renewable energy technologies particularly wind and solar have dramatically altered the energy generation landscape and have changed how electricity is transmitted and distributed.
- The grid collector model has arisen out of the need for grid and substations to be built to connect renewable energy IPP projects to existing grid networks. In many instances, this grid network has not existed before.
- While the 132kV and below lines are classified as "distribution" networks they are typically not provided by Eskom or Municipal distributors because there are very few loads (customers) in the rural areas where RE projects are constructed.
- Eskom has acknowledged that this is an issue and is not something that they can handle on their own given current constraints. This is why they have developed a self-build policy.
- Eskom's self build policy statement states the following:

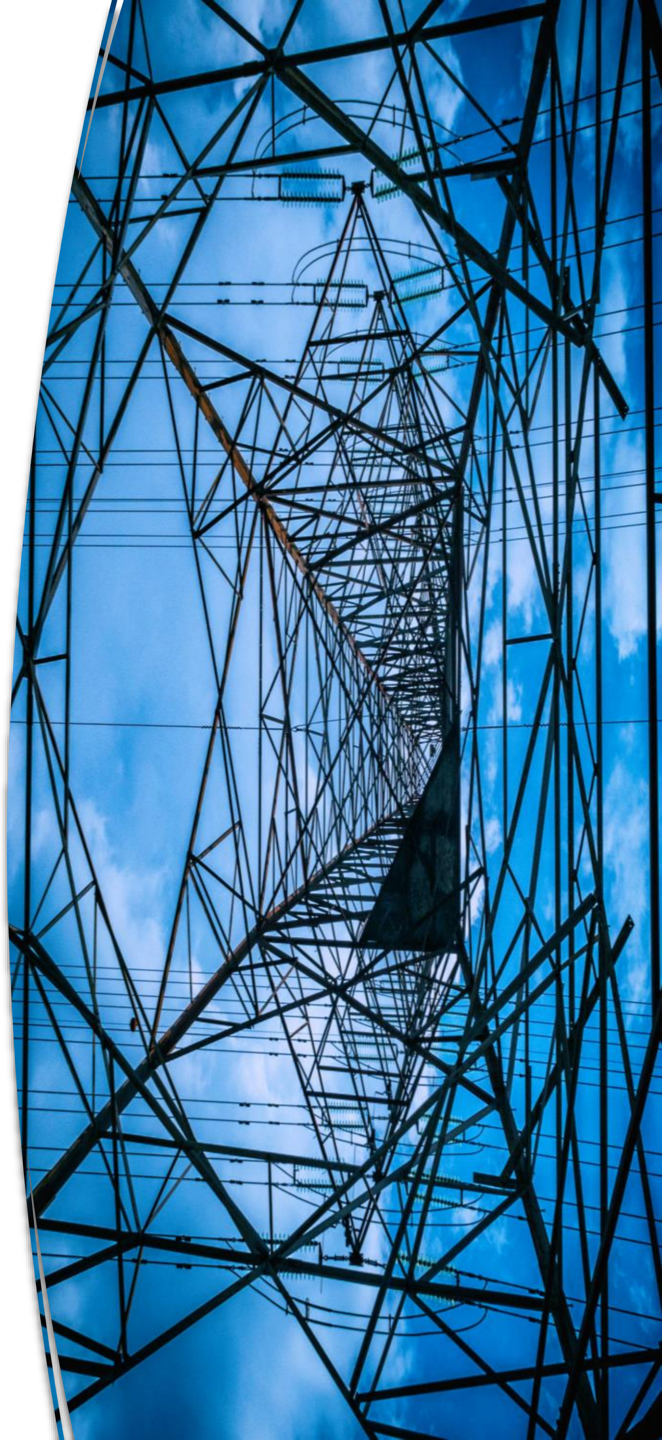
"The Distribution Division recognises that there may be instances where it would be beneficial to both Eskom and the Customer to opt for Self-Build. Examples include instances where a Customer is in a more advantageous position than Eskom to build connection assets and thus achieve efficiencies in the capital cost and/or connection timelines."

- This policy, together with the South African Grid Code Transmission Tariff Code (2022) sets out parameters for self-build options and repayment mechanisms for investing in substation infrastructure. However, there are still significant market and regulatory barriers that inhibit this model from extended its reach and encouraging the private sector to build "deeper" into the grid.



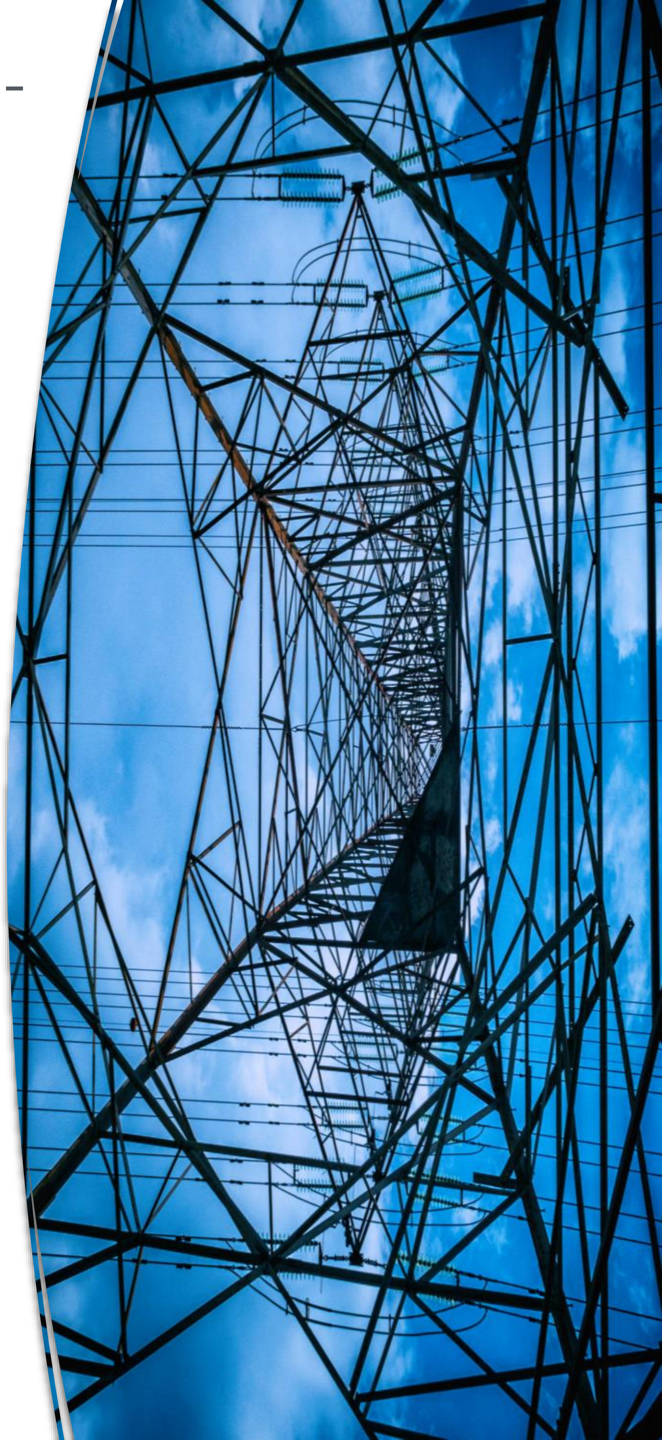
Given the increasing cost of IPP grid connections and greater role for private power off-takers, the current self-build model is not fit for purpose

- The self-build model sets a valuable precedent for the role of private sector-initiated collector grid construction, but the challenges limiting its future effectiveness include the following:
- Cost recovery: IPPs currently absorb the costs of building 132kV lines to connect to substations on the 400kV network and then hand over the assets to Eskom with no reimbursement of the cost.
  - While this model has worked for projects selling into the REIPPP (grid costs were recovered in the bid price and socialised over the entire Eskom customer base) and for the "low hanging fruit" of projects closer to transmission infrastructure with available capacity, it will not be sustainable into the future:
  - Costs are increasing: Longer 132kV collector lines, possibly interconnecting multiple RE projects will have to be built, and increasingly main transmission system substations and even lines on the 400kV network will also be required.
  - Private power off-takers cannot spread new grid costs over the national customer base: The cost of large grid projects will have to be recovered from private IPP customers who do not have the opportunity to spread the cost over the entire national customer base. The Transmission grid code currently only allows for the cost of "transformers" to be recovered from Eskom by non-REIPPP IPPs. These greater costs and "concentrated" cost recovery will have the effect of limiting the number of non-REIPPP projects that will be financially viable and bankable.
- Securing capacity: Given the fact that RE economics of scale increasingly drives the construction of very large projects (100s of MWs) that are rolled out in several phases, investors need to secure the grid capacity created by their initial investment/commitment, but not used immediately. Under the current self-build model where the assets are handed over to Eskom, investors lose the rights to the grid capacity for subsequent project phases. This will have the effect of inhibiting the construction of these very large projects that are increasingly required to meet SA's power need.



The self-build model can be expanded to establish an IPP-backed IPT model and provide incentives for IPPs to take on the build-out of 132-400kV power evacuation capacity

- An IPP-backed IPT model can be used to connect new generators and expand power evacuation capacity
- Is a further evolution of the current "self-build" model for IPPs
    - *(The "self-build" model is limited to 132kV lines and MTS substations, and requires immediate free transfer of the assets to Eskom)*
- It enables IPPs to procure the financing and delivery of deep grid connections on a collective basis
- Is based on an IPT BOOT model in which the IPT counterparty is not a state entity but rather several closely located IPPs
    - *Equivalent to a situation where several remote mines commission the construction and maintenance of a road network to connect them to the national road system*
- Unlocks direct access to a lower risk diversified portfolio of private sector balance sheets (IPPs have signed PPAs with a diversified range of off-takers)
    - *Eliminates the need for sovereign financial guarantees.*
- Unlocks additional execution and financing capacity for accelerated and efficient roll-out of IPP grid infrastructure
- Finance structure can include equity project debt finance and concessional climate finance.
- The revenue model will likely require customers to receive credits for the IPT capacity charge payments (via the IPPs), against the grid charges on their Eskom accounts.

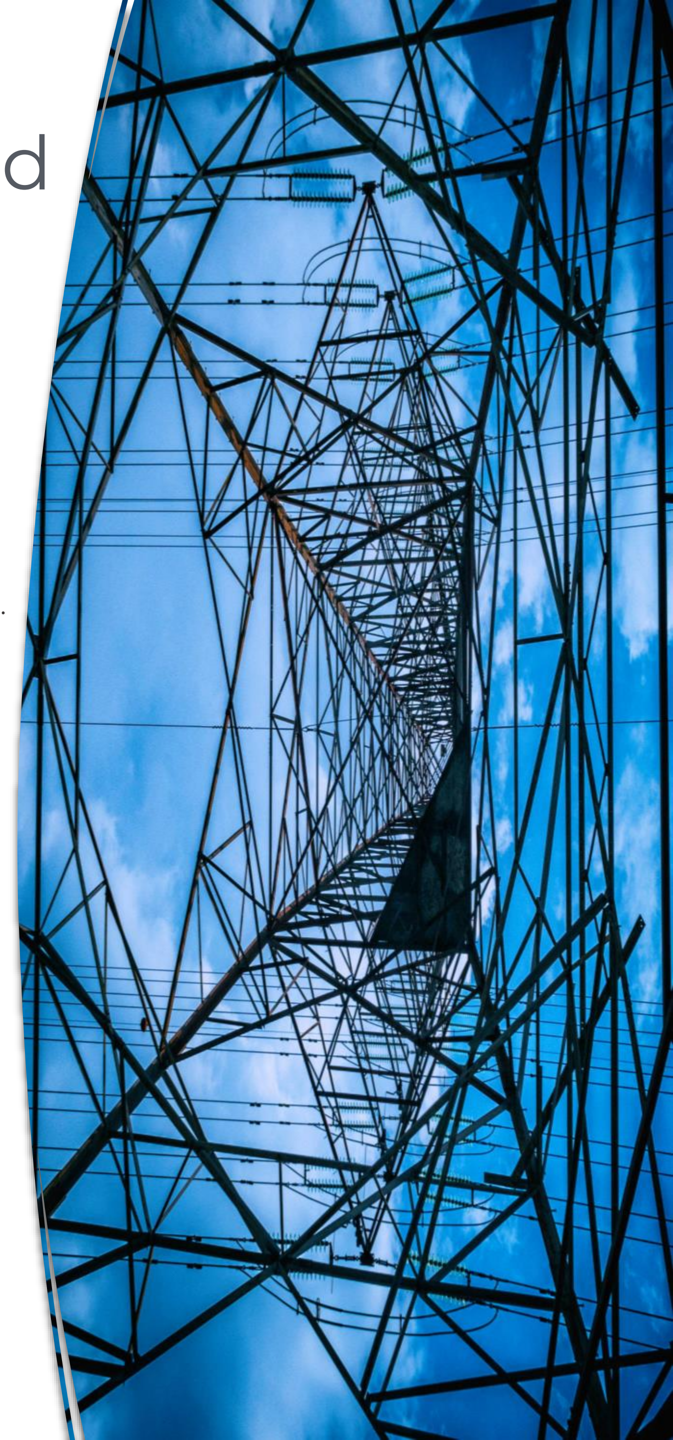


A “supersized” IPP-backed IPT model will require appropriate adjustments to the current policy and regulatory framework

- This approach aims to set up a complementary grid development model that accelerates the expansion of the power grid beyond that which is possible based on the balance sheet and execution capacity of the state alone (either the Eskom / NTSCA’s EPC approach or the state-backed IPT approach).
- The objective of this approach is to set up the policy and regulatory framework that enables IPPs to collaborate in procuring 132 and 400kV power evacuation capacity including associated substations from independent power transmission companies.

To set out a framework that would enable this, the following questions need to be considered:

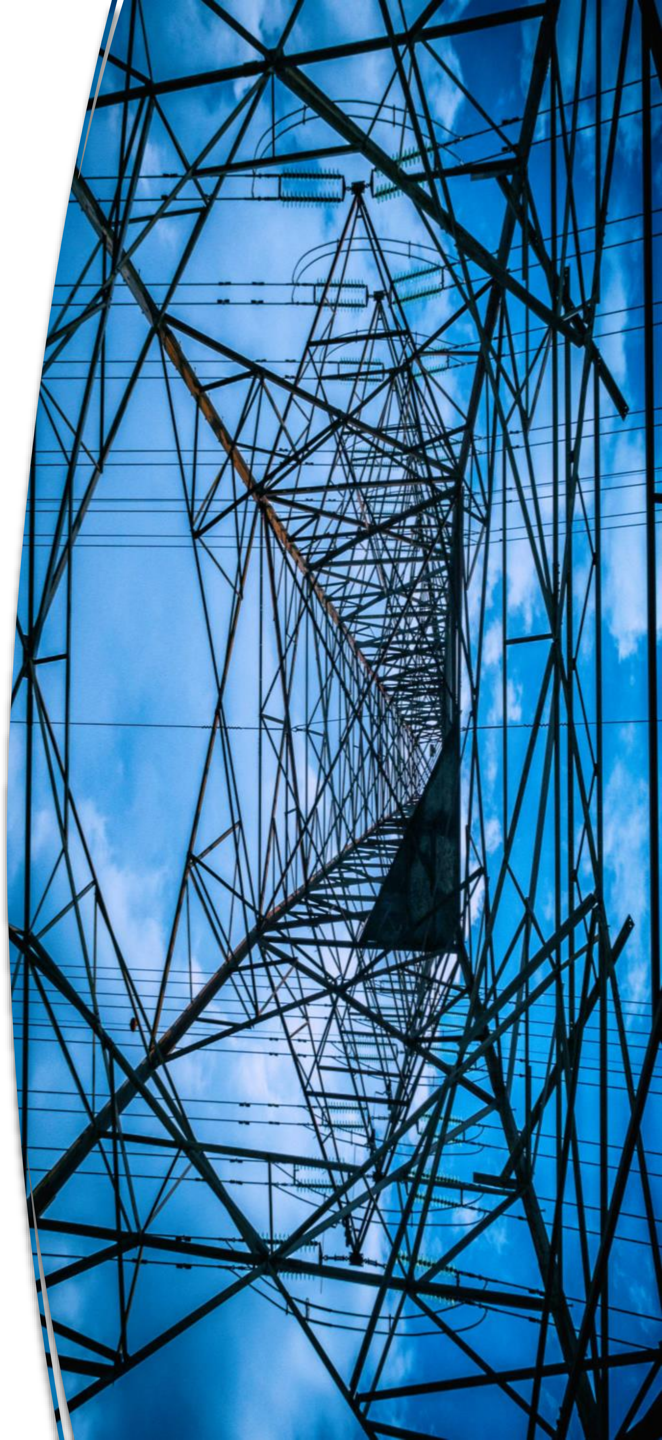
1. How does one set up the framework to enable near-located IPP developers to jointly procure an IPT?
2. How does one ensure appropriate incentives or rules to ensure that projects are competitively bid and efficiently executed?
3. How does one ensure fair and equitable participation by different project developers over time?
4. How does one ease the regulatory burden, associated risks and therefore costs for developers?
5. How do you unlock the necessary revenue streams and make projects bankable without sovereign guarantees?
6. Can mechanisms be established to enable IPPs and their customers to avoid double payment for grid capacity (due to standard Eskom / NTSCA grid charges) to improve the viability and bankability of these projects (and their associated IPPs)?
7. If there is still a revenue gap how is this addressed? Is there a role for DFIs to assist by providing concessional finance to reduce its cost?



Suggested actions to establish a framework that supports the implementation of the IPP-backed model

The framework should set up an operating environment that allows IPPs to collaborate to procure the establishment common shared infrastructure and build deeper into the grid which would incorporate construction into the 400kV network with associated substations. To achieve this the following needs to be done:

- Eskom self-build rules must be amended to extend the current 132kV self-build model to include the roll-out of 400kV infrastructure. This should allow for the delay of the transfer requirement for a period of approximately 25 years to allow for the amortisation of the investment from IPP grid capacity charges.
- The current NERSA license exemption for IPP distribution grids must be extended to all "IPP grid connector" infrastructure – irrespective of the voltages employed (the focus is on the economic function, not the nature of the technology). An amendment to section 3.2 of Schedule 2 of the Electricity Regulation Act will therefore be required to also exempt the operation of distribution and transmission infrastructure connecting IPPs "to the licenced Distributor's or Transmitter's assets", from licensing requirements.
- Establish cost-reflective Eskom transmission tariffs and rebalance tariff structure to reflect the inverted grid congestion patterns.
- The establishment of an appropriate legal instrument to ensure that IPP customers (and their distributors) can claim a credit against their Eskom transmission charges for the IPT capacity charges paid (via their IPPs).



Principles to consider when amending the Eskom self-build rules to accommodate interconnection with IPP-backed IPTs

IPP backed projects can claim credits up to the maximum value of the recalculated Eskom Gen Transmission Tariff and their private customers can claim a credit against the recalculated customer transmission tariff.

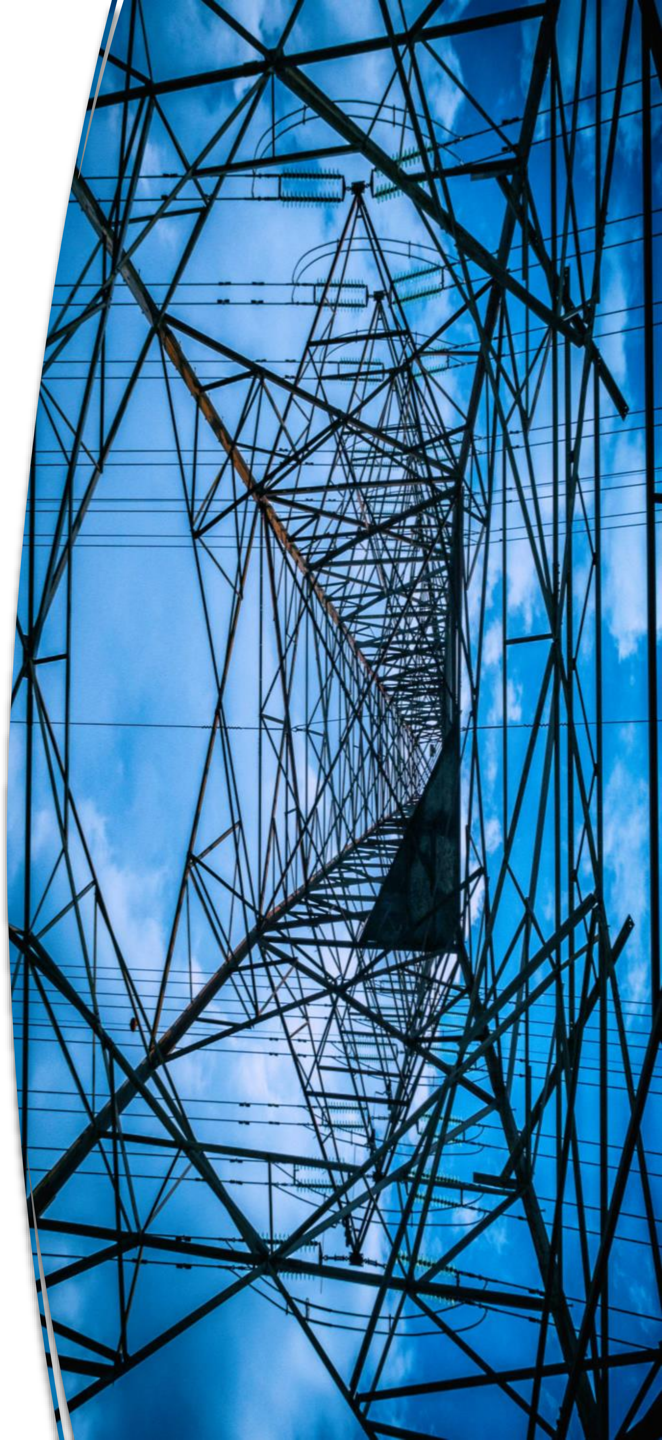
An application fee is to be paid by the applicant which will be reimbursed when the project reaches financial close/or if the relevant authority doesn't process the application in the stipulated/published timeframes.

The application needs to include clear cost recovery rules concerning the later joining of third-party access to the shared infrastructure.

Numerous entities should be eligible to apply for grid interconnection with Eskom/NTSCA: load customers; IPPs; grid demand aggregators; etc.

Projects must demonstrate an advanced stage of development and readiness such as environmental authorizations, land rights secured, and resource measurements – the intent is to ensure that projects can reach financial close in relatively short timeframes.

The basis for refusal of the interconnection application by the NTSCA will be limited to cases where: (a) the power can't be accommodated on the grid; or (b) a similar IPT project has already been allowed to interconnect at that location.



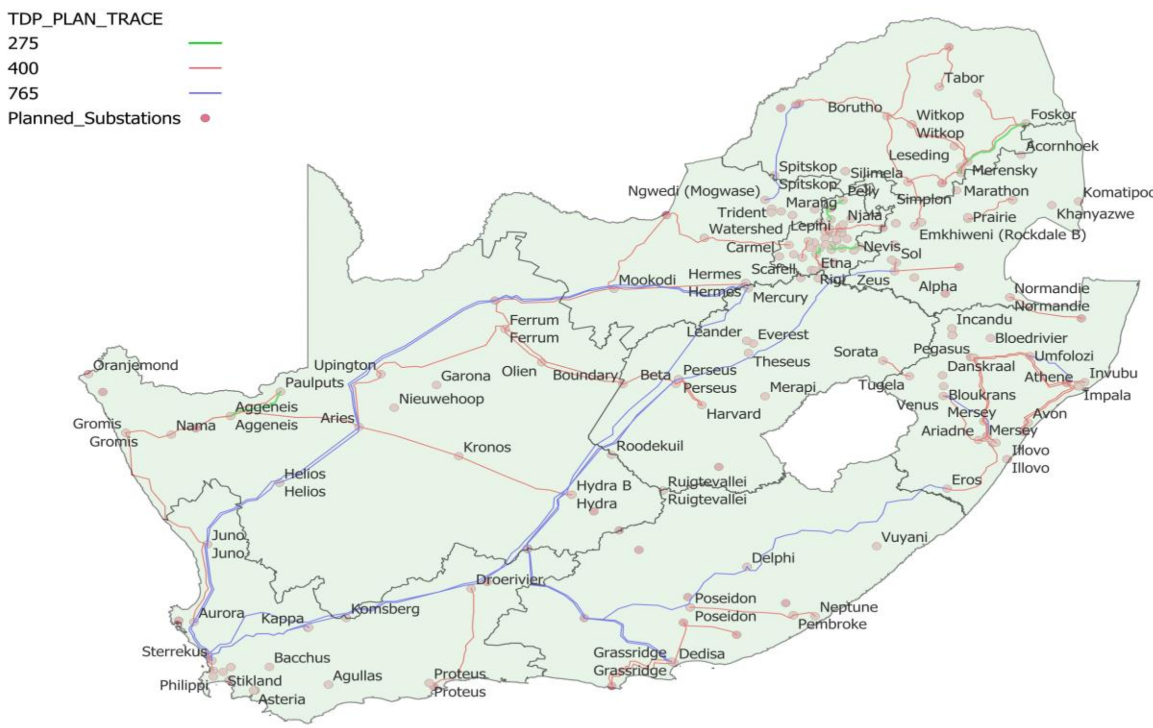
Case study example of a 400kV line infrastructure investment, demonstrating the need for transmission tariff restructuring.

A financial model was developed to establish the business case for investing in a 400kV line project

- As part of this project, we wanted to establish what the revenue flows/tariffs would need to be to support the expansion of the self-build model which promotes IPP-backed private investment into the build out of 400kV lines.

- The current TDP reveals that there is over 7920km of 400KV lines that require building and therefore represents a significant portion of the infrastructure requirement that could be done by the IPP-backed model if the revenue model and tariffs are set correctly.

TDP trace map of new lines to be built



Input assumptions for the financial model developed for a 400kV line of 150km in length

Financial Assumptions

Parameter	Value
Costs expressed in	2024
Inflation (Rand inflation)	4.5%
Tax rate	27.0%
Cost of Equity	
Equity return (Nominal)	14%
Equity return (Real)	9.1%
Cost of Debt	
Debt fraction	75%
Construction debt fraction by years	
Interest rate on debt	11.0%
Debt Tenor (years)	20.00
Year Fraction for new Debt	50%
Implied WACC	
Vanilla WACC (Nominal)	11.75%
Vanilla WACC (Real)	6.9%
After Tax WACC (Nominal)	9.5%
After Tax WACC (Real)	4.81%

Tech Assumptions

Parameter	Unit	Base Case
First full operational year	year	2025
Construction period	year	1
Operational period	years	20
Capacity	kVA	1 300 000
Length of line	km	150
Capex.Overnight Capital Cost	ZAR	2 675 000 000
Capex.Grid connection cost	ZAR	0
Opex.Fixed O&M costs	ZAR/yr	53 500 000
Opex.Variable O&M costs	ZAR/kWh	0

Line Capacity Uptake Scenarios

0,20,40,60,80
0,30,60,90
0,100

Results from the financial model for an IPP backed 400kV line- Generator based in the Cape, customer based <300km from Mpumalanga

	Required tariff to reach an NPV of Zero (rands/kw)					Optimal 400kV line length
	Combined tariff required	**Current Eskom Tariffs**				
		Gen tariff	Customer tariff	Tariff Gap (rands)	Tariff Gap (% increase needed	
15 Year BOOT (100% capacity take up)	23,53	0	15,57	7,96	51%	95,59km
15 Year BOOT (30,60,90)	29,42	0	15,57	13.85	89%	38,17km
20 Year BOOT (100% capacity take up)	20,74	0	15,57	5,17	33%	110,18km
20 Year BOOT (30,60,90)	25,51	0	15,57	9,94	64%	81,14
25 Year BOOT (100% capacity take up)	19,39	0	15,57	3,82	25%	116,61km
25 Year BOOT (30,60,90)	23,65	0	15,57	8.08	52%	94,91

Indicative of the need for realignment of transmission tariffs

The current transmission tariffs are not supportive of decentralised generation

Customer/load transmission tariffs

Transmission Zone	Voltage	Transmission network charge (R/kVA/m)
<300km	< 500 V	17,51
	≥ 500 V & < 66 kV	16,00
	≥ 66kV & ≤ 132 kV	15,57
	> 132 kV	19,70
> 300 km and ≤ 600 km	< 500 V	17,63
	≥ 500 V & < 66 kV	16,14
	≥ 66kV & ≤ 132 kV	15,69
	> 132 kV	19,86
> 600 km and ≤ 900 km	< 500 V	17,84
	≥ 500 V & < 66 kV	16,29
	≥ 66kV & ≤ 132 kV	15,78
	> 132 kV	20,16
> 900 km	< 500 V	17,95
	≥ 500 V & < 66 kV	16,48
	≥ 66kV & ≤ 132 kV	15,93
	> 132 kV	20,30

Source: Eskom Tariff Booklet 2023

Transmission network charges for generators

TUoS [> 132kV]	Network charge [R/kW]	
		VAT incl
Cape	**R 0,00**	*R 0,00*
Karoo	**R 0,00**	*R 0,00*
Kwazulu-Natal	**R 4,14**	*R 4,76*
Vaal	**R 13,77**	*R 15,84*
Waterberg	**R 17,63**	*R 20,27*
Mpumalanga	**R 16,36**	*R 18,81*

Source: Eskom Tariff Booklet 2023

- ❑ Tariffs are still designed from the perspective that power flows from Mpumalanga to the rest of the country. This is seen in the R0 tariffs for generators in the Cape & Karoo.
- ❑ As is seen in the slide above, currently there is no financial incentive for IPP's based in the Cape, with customers in Mpumalanga to build out 400kV lines unless transmission tariffs are increased

International case studies reveal different tariff structuring methods that could be applied to support an IPP backed model

1.) Network Integrated Transmission Service (NITS) contracts

These address the transmission load within the provider's service area. The rate for these transmission services depends on the provider's annual transmission revenue requirement (ATRR). The ATRR is the revenue required to provide services to its customers and deliver a fair return to shareholders.

If we assume an ATRR of R1 billion per year is required by the grid operator, each customer pays a calculated percentage of that R1 billion to collect that revenue. This is determined as follows:

- First, the operator identifies the system peak – the point at which the load is highest across the entire territory for a given month. Then, they determine each customer's coincident peak (CP) – their individual usage at that specific time.
- Customers with higher CPs, relative to the system peak, pay a larger share of the ATRR. This translates to Customer's Transmission Cost = ATRR x (Customer CP / System CP).

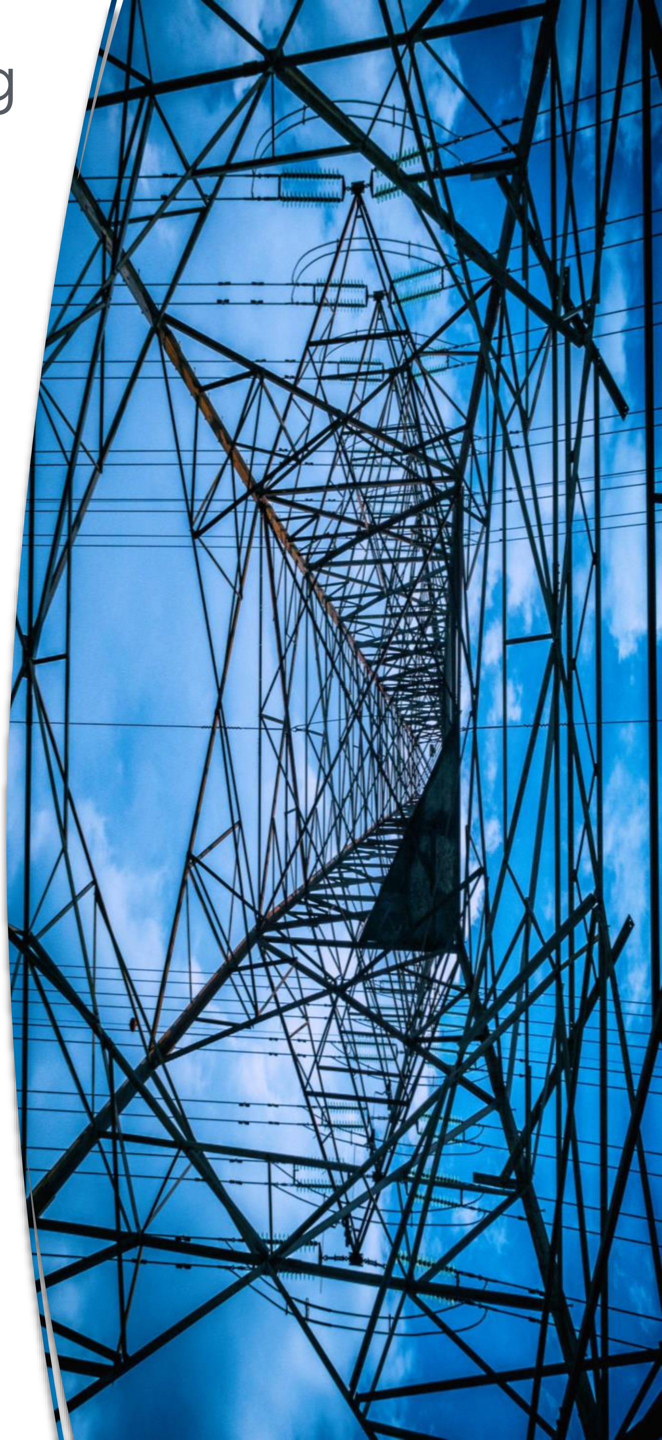
2.) Time-based Point-to-Point Transmission Contracts

The other type of transmission contract is called Point-to-Point (PTP). The grid operator's tariff defines how they can bill for the electricity wheeled through their grid. Rather than focusing on a ratio to allocate the ATRR target as with NITS, PTP contracts bill based on each megawatt hours the grid operator transferred.

Customers must make a reservation with the grid operator to receive wheeled power. For example, they must inform the provider that they need 400 MW of firm service between X and Y time. Reservations can last years, months, weeks, days, or hours – the specified time frame is the service increment. The billed rate for the reservation will differ depending on the service increment and whether it's firm or non-firm. It may also differ based on the time of day the pass-through happens, depending on how the operator's tariff is written.

Customers pay to reserve the capacity, so the grid operator bills for the amount reserved, whether consumed or not. Reservations can be resold and redirected if not fully utilised to recover costs.

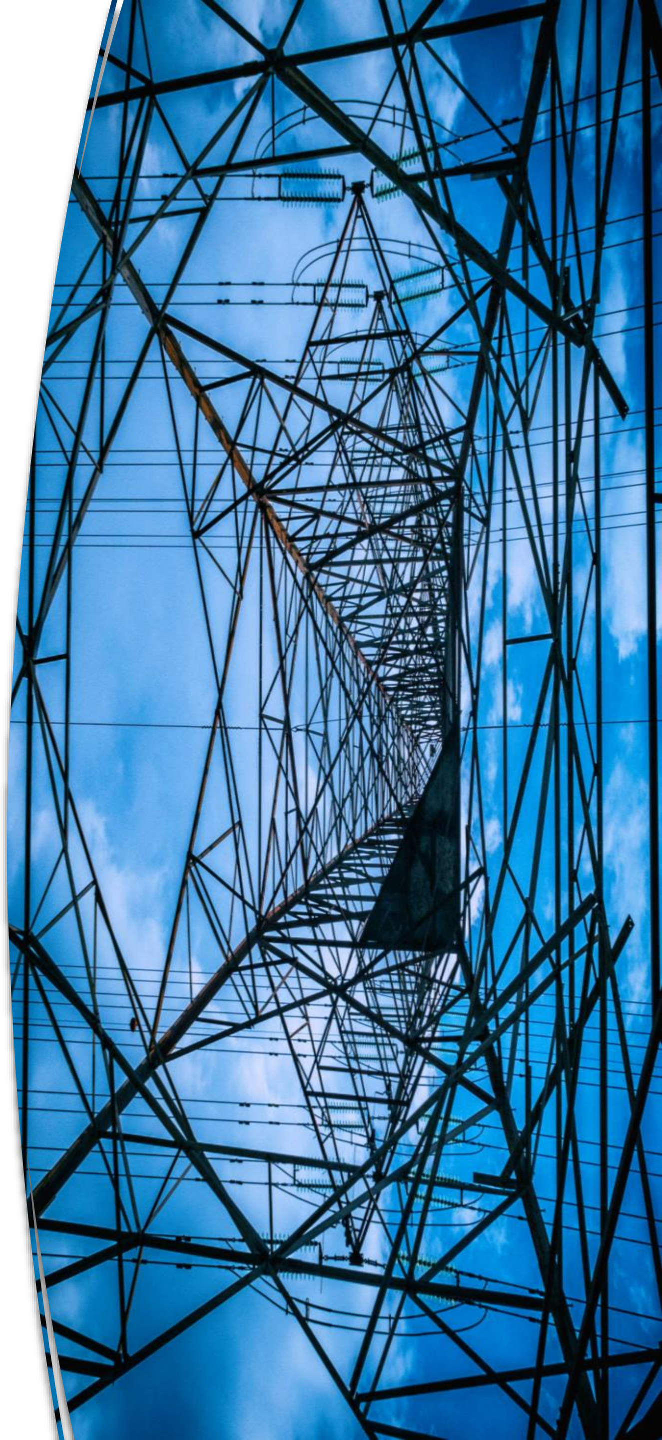
As with NITS contracts, PTP transmission contract rates include ancillary services charges as defined in the tariff. PTP settlements also include charges for transmission losses when electricity is sent over long distances



Conclusions & Recommendations

Conclusions & Recommendations

- ❑Need to revisit the planned infrastructure roll-out plan in the Eskom Transmission Development Plan to address the hockey stick effect and increase its ambition
- ❑Given the nature of the challenges in SA two complementary IPT models are required in addition to the Eskom EPC build-out model, to address the urgency for grid infrastructure expansions.
- ❑Need to redesign the current dysfunctional transmission tariff structure and increase tariff levels to be cost reflective (to support both Eskom EPC projects and the IPT models)
- ❑Need to finalise Escrow/Credit risk model for conventional IPT-backed model
- ❑Need a licensing exemption to support an IPP-backed model



Proposed next steps

Collate the necessary advisory expertise and skills set in a co-ordinated team to develop pilot projects for both the conventional IPT model and the IPP-backed IPT model. Key work areas required would be the following:

- ❑ Redesign transmission tariffs (level and geographic structure)
- ❑ For the state-backed IPT model:
  - ❑ Design principles and implementation guidelines for the Escrow model for the State-backed IPT model and outline any regulatory and implementation hurdles.
  - ❑ Assist in the setting up of an IPT office and its eventual integration with the NTCSA.
- ❑ For the IPP-backed IPT model:
  - ❑ Investigate and set up the legal framework to allow customers and IPPs to claim credits against Eskom transmission charges.
  - ❑ Prepare and publish a license exemption under section 3.2 of Schedule 2 of ERA for IPP distribution and connector grids.
  - ❑ Amend self-build rules to allow interconnection of up to 400kV infrastructure and facilitate the operation of an interconnected IPT (as proposed above).
  - ❑ The South African Renewable Energy Grid Survey which is administered by Eskom; SAPVIA and SAWEA provides data on planned generation projects and the overall expected grid expansion requirements. This can also be used to provide an indication of where applications for IPP-backed IPTs can be expected.