Financing Approaches to The Energy Transition in South Africa

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Executive Summary

Concise overview of South Africa's energy transition challenges and opportunities.

South Africa's energy transition is at a pivotal moment. The country faces **persistent load-shedding, heavy coal dependence (~77% of electricity), aging infrastructure, and grid constraints**, challenging energy security and climate commitments. Yet, it holds significant opportunities: **world-class wind and solar resources, declining renewable technology costs, and strong investor interest**. With **clear policy frameworks, blended finance, and catalytic capital**, South Africa can diversify its energy mix, reduce emissions, create green jobs, and enhance economic resilience, positioning itself as a leader in Africa's clean energy transition while ensuring a just transition for coal-dependent communities.

Why financing models are critical to achieving a just, scalable energy transition.

Financing models are the linchpin of South Africa's energy transition. The shift from coal to renewables requires **large-scale, upfront capital**, but high financing costs, currency risks, and policy uncertainty hinder investment flows. Blended finance and catalytic capital can **de-risk projects, lower the cost of capital (WACC), and attract private and institutional investors**, enabling renewables to scale competitively.
Thoughtful financing models ensure the transition is **just** by mobilizing resources for reskilling workers, supporting affected communities, and expanding energy access, ensuring that **climate goals and inclusive economic development progress hand in hand.**

Summary of innovative financing mechanisms applicable to South Africa's context.

To advance a just, scalable energy transition, South Africa can leverage **innovative financing mechanisms**, including:

✅ **Blended finance** combining concessional and commercial capital to de-risk projects.
✅ **Green, sustainability, and diaspora bonds** to mobilize institutional and retail investment.
✅ **Results-Based Financing (RBF)** to incentivize energy access and distributed energy solutions.
✅ **Public-Private Partnerships (PPPs) and IPP frameworks** with clear, bankable PPAs.
✅ **Currency and political risk guarantees** to address investor concerns.
✅ **Catalytic capital from DFIs and philanthropic actors** to crowd in private investment.

These mechanisms can **lower financing costs, attract private capital, and build a resilient pipeline of renewable energy projects**, ensuring South Africa's climate goals are met while driving inclusive economic growth.

"We need to transition to a low-carbon, climate-resilient economy in a way that is just, inclusive, and advances the goals of sustainable development."
— South Africa's National Development Plan 2030 (NDP)

Context: The Energy Transition Landscape in South Africa

Current energy mix and dependence on coal.

1️⃣ Heavy Dependence on Coal:

✅ **Coal dominates South Africa's electricity generation**, providing **~77% of total electricity supply (2023)**.
✅ South Africa is the **7th largest coal producer globally** and heavily reliant on domestic coal for energy security and employment.
✅ Key coal statistics:

- **Eskom's generation fleet (~44 GW installed capacity)** is predominantly coal-fired.
- Coal is also used in **industrial processes** (e.g., Sasol's coal-to-liquid fuel operations).

2️⃣ Renewable Energy Share:

✅ Renewables are growing but from a low base:

- **Wind:** ~5% of generation capacity.
- **Solar PV and CSP:** ~6% of generation capacity.
- **Hydropower (including imports from Mozambique):** ~3%.

✅ Renewables contribute **~11–12% of installed capacity** but only **~6–7% of actual electricity generation** due to intermittency and grid limitations.

3️⃣ Other Sources:

✅ **Nuclear (Koeberg Plant):** Provides ~5% of total electricity generation.
✅ **Gas:** Minimal contribution (~3%) but targeted for expansion under the IRP 2019.

4️⃣ Challenges with the Current Mix:

✅ **Aging coal plants:** Frequent breakdowns and maintenance issues lead to **rolling blackouts (load shedding)**.
✅ **High carbon intensity:** South Africa's energy sector is among the world's highest in emissions per kWh.
✅ Grid constraints limit the integration of new renewable capacity.

5️⃣ Transition Pathway:

Under **IRP 2019 and climate commitments:**
✅ Gradual decommissioning of aging coal plants.
✅ Expansion of **renewables (wind, solar) and gas** to diversify the energy mix.
✅ Net zero emissions target by 2050 while ensuring a **just transition** to protect jobs and communities reliant on coal.

Government commitments (IRP, net zero goals by 2050).

1️⃣ Integrated Resource Plan (IRP) 2019:

- **Main planning document for electricity generation** through 2030.
- Aims to **decrease coal's dominance** while increasing renewable energy in the energy mix.
- **Key targets by 2030:**
  - **6,000 MW** of new solar PV capacity.
  - **14,400 MW** of new wind capacity.
  - **3,000 MW** of gas capacity.
  - **2,500 MW** of hydropower imports.
  - **Coal capacity reduced from ~77% to ~59%** of the generation mix.
- Supports **decommissioning aging coal plants** while ensuring grid stability.
- Emphasizes the need for **storage solutions and flexible generation** to complement renewables.

2️⃣ Net Zero by 2050 Commitment:

- South Africa has committed to **net zero greenhouse gas emissions by 2050** in line with its **Nationally Determined Contribution (NDC) under the Paris Agreement**.
- The **Presidential Climate Commission** has endorsed the 2050 net zero goal while emphasizing a **just energy transition** that protects workers and communities reliant on the coal industry.
- The **Low Emissions Development Strategy 2050 (LEDS)** outlines pathways for decarbonizing the economy, with a focus on:
  - **Decarbonizing** the electricity sector.
  - **Transitioning** to electric mobility.
  - **Improving energy efficiency** in industry and buildings.
  - Developing **green hydrogen** and **battery storage** industries.
- South Africa's **Just Energy Transition Partnership (JETP)** has secured **$8.5 billion in climate finance pledges** from the US, UK, EU, Germany, and France to support coal transition and the scaling of renewables.

Alignment with SDGs:

These commitments align with:

✅ **SDG 7 (Affordable and Clean Energy).**
✅ **SDG 13 (Climate Action).**
✅ **SDG 8 (Decent Work and Economic Growth)** through a just transition approach.

Grid constraints and the role of Eskom.

1️⃣ Who is Eskom?

- **Eskom** is **South Africa's state-owned electricity utility**, responsible for **~90% of electricity generation and nearly all transmission** in the country.
- It operates **coal-fired, nuclear, hydro, and renewable energy plants**, with coal dominating the generation mix (~80%).

2️⃣ *Grid Constraints in South Africa:*

✅ **Aging Infrastructure:**
- Much of Eskom's coal fleet is over **40 years old**, leading to frequent breakdowns and **high maintenance requirements**.
- **Transmission and distribution infrastructure** requires significant upgrades to accommodate **renewables and increased demand**.

✅ **Load Shedding & Power Cuts:**
- Due to generation shortfalls and unplanned outages, **"load shedding" (rolling blackouts)** have become common, sometimes several hours per day.
- This has resulted in **economic losses of ~$24 million/day** and eroded investor confidence.

✅ **Limited Grid Capacity for Renewables:**
- Grid congestion, especially in **renewable-rich provinces like the Northern Cape**, limits the connection of new solar and wind projects.
- Lack of flexible grid capacity to integrate **variable renewable energy** into the system.

✅ **Financial Constraints:**
- Eskom faces a **debt burden exceeding ZAR 400 billion (~$21 billion)**, limiting its ability to invest in grid expansion and maintenance.
- **Financial instability** impacts operational efficiency and system reliability.

✅ **Transmission Bottlenecks:**
- **Delays** in expanding and modernizing **transmission lines** to renewable energy zones **hinder scaling up renewables**.
- **Lack of grid access** is a significant barrier for **Independent Power Producers (IPPs)**.

3️⃣ *Role of Eskom in the Energy Transition:*

⚡ Eskom will play a **central role in the energy transition** through:
- **Decommissioning old coal-fired plants** in line with IRP 2019 and JETP.
- **Facilitating grid upgrades and expansion** to enable renewables integration.
- Potential **unbundling** into separate generation, transmission, and distribution entities to improve efficiency and attract investment.
- Supporting **public-private partnerships (PPPs)** with IPPs to scale clean energy capacity.

Social and economic implications (job creation, energy access, economic diversification).

1️⃣ *Job Creation*

✅ **Renewable energy projects are labor-intensive during construction**, creating short-term jobs in engineering, civil works, and logistics.

✅ Long-term jobs in:
- Operations and maintenance of solar, wind, and grid infrastructure.
- Manufacturing of renewable energy components (if local supply chains are developed).
- Ancillary services (metering, digital monitoring, customer support for distributed energy).

✅ In South Africa:
- REIPPPP created **>30,000 job years** since inception, with targets for local employment and skills development.

✅ Energy transition can enable **re-skilling of workers from fossil fuel sectors**, supporting a **Just Transition**.

2️⃣ Energy Access

✅ Renewable energy (including distributed solar and mini-grids) **expands access to reliable electricity in underserved and rural areas**.

✅ Supports:

- Improved healthcare (lighting, refrigeration for vaccines).
- Enhanced education (evening study, digital learning).
- Women's empowerment (reducing time spent collecting fuel, enabling entrepreneurship).

✅ Reduces reliance on expensive diesel generators, lowering household and SME energy costs.

3️⃣ Economic Diversification

✅ Shifts economies from fossil fuel dependence to **diverse, resilient, low-carbon industries**.

✅ Stimulates:

- Green manufacturing (solar panels, wind turbines, batteries).
- Green hydrogen industries (for exports and industrial decarbonization).
- Digital services linked to energy systems (smart grids, AI optimization).

✅ Attracts **foreign and domestic investment into new sectors**, fostering innovation and entrepreneurship.

✅ In mining economies (e.g., South Africa, DRC), renewable energy can:

- Lower operational costs for mining companies.
- Power beneficiation and value-addition industries.
- Support green value chains (e.g., critical minerals for batteries).

Climate commitments under Paris Agreement and alignment with SDGs.

1️⃣ Paris Agreement Commitments:

✅ **Ratified in November 2016**, committing South Africa to **contribute to global efforts** to limit warming to well below 2°C, pursuing efforts to limit to 1.5°C.

✅ Submitted updated **Nationally Determined Contribution (NDC) in 2021:**

- Target: Reduce greenhouse gas (GHG) emissions to between **350–420 $MtCO_2e$ by 2030**, aligning with a pathway to **net zero by 2050**.
- This revised target is **significantly more ambitious than the previous 2020 NDC**, reflecting increased climate action urgency.

✅ Commitment to a **Just Energy Transition** to protect livelihoods and communities dependent on coal while shifting to a low-carbon economy.

✅ The **Presidential Climate Commission (PCC)** oversees climate action implementation and the transition framework to ensure accountability.

2️⃣ Alignment with the Sustainable Development Goals (SDGs):

South Africa's climate commitments are directly aligned with:

✅ **SDG 7 (Affordable and Clean Energy):**

- Expanding access to affordable, reliable, sustainable energy while scaling renewables and modernizing the grid.

✅ **SDG 13 (Climate Action):**
- Taking urgent action to combat climate change through mitigation, adaptation, and resilience-building.

✅ **SDG 8 (Decent Work and Economic Growth):**
- Supporting job creation in green industries while ensuring a **Just Transition** for coal-reliant communities.

✅ **SDG 9 (Industry, Innovation, and Infrastructure):**
- Investing in clean energy infrastructure and green industrialization as part of the low-carbon transition.

✅ **SDG 11 (Sustainable Cities and Communities):**
- Supporting local climate resilience and sustainable urban development through clean transport and energy efficiency.

3️⃣ Implementation Pathways:

- Guided by the **Low Emissions Development Strategy (LEDS) 2050**.
- Supported by the **Just Energy Transition Partnership (JETP)**, mobilizing **$8.5 billion** from partner countries to support **the coal-to-clean transition**.
- Integrated with **IRP 2019 targets**, which
  - increase renewable energy share while
  - gradually reducing coal dependency.

Financing Challenges in South Africa's Energy Transition

High upfront capital costs for renewables.

1️⃣ Why are upfront costs high?

✅ **Renewable energy projects (solar, wind) require significant initial capital investment** to cover:
- Land acquisition or leasing.
- Engineering, procurement, and construction (EPC) costs.[1]
- Grid connection and transmission upgrades.
- Import of technology (solar panels, wind turbines) due to limited local manufacturing.

✅ Despite **low operational and maintenance costs**, the high upfront capital intensity poses a barrier to scaling renewables.

✅ **Financing costs are high** due to:
- Currency risk (ZAR volatility).
- Perceived sovereign and policy risk.
- Grid constraints leading to delayed connections.

[1] EPC refers to the **all-in costs of designing, purchasing, and building a renewable energy or infrastructure project, up to the point it is ready to operate.**

2️⃣ Typical Cost Ranges:

- Utility-scale **solar PV** in South Africa:
  ~$800–$1,200 per kW installed capacity.[2]
- Utility-scale **onshore wind**:
  ~$1,300–$1,800 per kW installed capacity.[3]
- Grid connection and transmission **upgrades** can add **~10–20% to project costs** depending on location (see **Annex C**)

Policy and regulatory uncertainties.

1️⃣ Inconsistent Policy Signals:

✅ Delays and changes in **renewable energy procurement rounds** (e.g., REIPPPP) have created **uncertainty for developers and investors**.

✅ **Policy reversals or slow approvals** in licensing and environmental clearances hinder project timelines.

2️⃣ Eskom Unbundling Uncertainty:

✅ The plan to **unbundle Eskom into generation, transmission, and distribution entities** is progressing slowly, creating uncertainty about future grid access, wheeling charges, and PPA frameworks for Independent Power Producers (IPPs).

✅ Unclear timeline and structure for **grid management impact investment planning**.[4]

3️⃣ Grid Access and Connection Challenges:

✅ Lack of clarity on **grid allocation priorities and congestion management** in renewable-rich provinces (e.g., Northern Cape).

✅ **Uncertain timelines** for grid upgrades needed to absorb new renewable capacity.

4️⃣ PPA and Tariff Instability:

✅ Concerns around:

- Eskom's financial viability impacting **off-taker risk.**
- Potential changes to **tariff structures**.
- **Delays in finalizing PPAs** after bid awards.

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[2] It **describes the typical upfront cost to build a large-scale solar photovoltaic (PV) power plant** in South Africa.

[3] It **describes the typical upfront cost to build a large-scale onshore wind power plant** (wind farm) in South Africa or comparable markets.

[4] Grid management impacting investment planning means that uncertainties in how, when, and where grid infrastructure will support renewables **directly affect the ability of investors** to plan, finance, and execute clean energy projects effectively.

5️⃣ Carbon Pricing Uncertainty:

✅ South Africa introduced a **carbon tax in 2019**, but future levels, exemptions, and sectoral applications remain **uncertain**, affecting **investor calculations** for long-term energy projects.

6️⃣ Policy Alignment Challenges:

✅ **Misalignment** between:

- Climate policies under the **Presidential Climate Commission** and IRP 2019.
- Economic development priorities and energy transition pathways (e.g., coal phase-out pace vs. just transition concerns).

Implications for Investors:

✅ **Regulatory uncertainty** increases perceived risk, raising the **Weighted Average Cost of Capital (WACC)** for renewable projects.[5]

✅ Delays in procurement and connection **reduce investor confidence.**

✅ Consistent, transparent, and stable policies are critical to attract **catalytic and private capital** at scale for the energy transition.

Currency and sovereign risk perceptions.

1️⃣ Currency Risk

✅ **Definition:**

Risk that the local currency (e.g., ZAR in South Africa, KES in Kenya) will depreciate against hard currencies (USD, EUR) used to raise financing, **increasing debt servicing costs and reducing returns for foreign investors.**

✅ **Relevance:**

- Renewable energy projects typically generate revenues in **local currency**, while debt and equity financing are often in **hard currency**.
- Exchange rate volatility can **deter foreign investment or raise required returns (WACC)**.

✅ **In South Africa:**

- ZAR has historically been volatile, affected by global commodity prices, domestic politics, and macroeconomic conditions.

[5] **WACC = the average rate of return that investors and lenders require to finance a project, weighted by the proportion of debt and equity used.** It reflects:

- The **cost of debt** (interest rates on loans).
- The **cost of equity** (returns expected by investors).
- The **risk profile of the project and market** (Annex D).

- This volatility raises perceived risk for foreign lenders and equity investors, increasing hedging costs.

✅ **Mitigation mechanisms:**

- Currency hedging (but expensive and not always available for long tenors).
- Local currency financing (if available at scale).
- Blended finance structures with concessional capital to offset currency risks.

Sovereign Risk

✅ **Definition:**
Perceived risk of government-related issues affecting investments, including:

- Political instability.
- Policy reversals or regulatory unpredictability.
- Breach of contract or PPA renegotiation.
- Weak legal enforcement frameworks.
- Public sector offtaker (e.g., Eskom) creditworthiness concerns.

✅ **In South Africa:**

- Eskom's financial challenges have raised concerns about PPA reliability.
- Policy delays in procurement rounds (e.g., REIPPPP) create uncertainty for project pipelines.
- General macro-fiscal pressures contribute to higher sovereign risk perception.

✅ **Impact:**

- Increases the risk premium required by investors and lenders, raising the **cost of capital (WACC)**.
- Limits the appetite of institutional investors to deploy large-scale capital.
- Requires stronger risk mitigation instruments (e.g., political risk insurance).

Limited domestic institutional investment allocation to clean energy

Despite **South Africa's renewable energy potential and clear decarbonization needs**, **local institutional investors (pension funds, insurers, asset managers)** have **low allocations to clean energy investments.**

Regulatory and Policy Constraints

✅ **Prescribed Assets Concerns:**
Past and potential future policies **requiring pension funds to hold** specific government assets have made funds **cautious**.

✅ **Prudential Regulation Limits:**
Regulation 28 of the Pension Funds Act **restricts exposure to certain asset classes**, making large infrastructure allocations **more complex.**

✅ **Policy Uncertainty in Energy:**
Inconsistent procurement timelines, delayed PPAs, and unclear grid connection policies increase **perceived risk.**

2️⃣ Perceived High Risk

✅ **Off-taker Risk:** Eskom's financial instability **raises concerns about payment security** under PPAs.

✅ **Project Risk:** Infrastructure projects in South Africa are perceived as complex and long-term, **misaligned with some funds' liquidity preferences.**

✅ **Currency Risk:** Clean energy project **returns are in ZAR**, while investors may prefer **diversified currency exposures.**

3️⃣ Lack of Suitable Investment Vehicles

✅ Few **local blended finance vehicles or green infrastructure funds** that match the risk-return profile institutional investors require.

✅ Limited availability of **investment-grade, de-risked, scalable projects**.

✅ **Limited track record and** case studies for local funds investing successfully in clean energy.

4️⃣ Capacity and Expertise Gaps

✅ Many institutional investors lack **internal expertise to evaluate clean energy project risks**.

✅ **Smaller funds** may lack resources to conduct due diligence on project pipelines.

5️⃣ Liquidity and Return Expectations

✅ Clean energy infrastructure investments are **illiquid, long-term, and have complex cash flow structures**, unlike **traditional listed** equities and bonds.

✅ Preference for **liquid assets** due to member withdrawal requirements and accounting practices.

Social equity and affordability concerns (Just Energy Transition).

1️⃣ High Dependence on Coal for Jobs and Economy

✅ South Africa's coal industry employs **~80,000 workers directly**, with many more in supporting industries.
✅ Entire communities in **Mpumalanga and other coal regions** rely on coal for livelihoods.
✅ Transitioning away from coal **risks job losses, local economic decline, and social disruption** if not managed inclusively.

2️⃣ Energy Access and Affordability Challenges

✅ While **85% of South Africans have electricity access**, reliability is low due to rolling blackouts (load shedding).
✅ Energy poverty persists, with **high electricity prices** relative to income affecting low-income households.
✅ Transition costs may be passed onto consumers through tariffs, **increasing inequality if mitigation measures are not implemented.**

3️⃣ Just Energy Transition Framework

The **Presidential Climate Commission** and government commitments emphasize:
✅ A **Just Transition** ensuring:

- Protection of affected workers through **reskilling and reemployment** in clean industries.
- Economic **diversification** in coal-reliant regions.
- **Social dialogue** with communities to design inclusive transition plans.

✅ Funded in part by the **$8.5 billion Just Energy Transition Partnership (JETP)** to support:

- Decommissioning of coal plants.
- Scaling renewable energy and green jobs.
- Social protection and retraining programs.

4️⃣ Alignment with Social Equity Principles

✅ The Just Energy Transition in South Africa aims to:

- **Avoid burdening the poor** with higher energy costs.
- Use **renewable energy deployment to create new local jobs and enterprise opportunities.**
- Ensure clean energy **benefits are equitably distributed,** not concentrated in wealthier urban centers.

5️⃣ Tensions and Challenges

✅ Balancing **climate goals with economic development** in a country with high unemployment (~32%) and inequality.
✅ Ensuring that **decarbonization** does not deepen existing poverty and social disparities.
✅ **Managing public resistance** to higher tariffs while funding the transition.

Innovative Financing Approaches & Models

Organized under **four subheadings**:

☑ Blended Finance Models:

Role of catalytic capital, DFIs, and concessional funding to de-risk private capital.

1️⃣ What is Catalytic Capital?

Catalytic capital refers to **investment capital that is patient, risk-tolerant, and concessionary**, used to:

✅ **Enable** high-impact projects that cannot secure purely commercial funding.
✅ **De-risk** investments for private investors by **absorbing first losses or offering guarantees**.
✅ **Demonstrate** viability to crowd in commercial capital at scale.

2️⃣ Role of DFIs (Development Finance Institutions)

DFIs (e.g., IFC, AfDB, DBSA) play a critical role by:

✅ Providing **anchor investments** in clean energy and infrastructure projects.
✅ Offering **concessional loans, guarantees, and credit enhancements** to lower perceived risk.
✅ **Supporting project preparation and technical assistance** to build pipelines of bankable projects.
✅ Reducing **the cost of capital** and increasing **the risk appetite** of private investors.

3️⃣ Why is De-risking Needed?

In emerging markets like South Africa:

✅ Clean energy projects face **high perceived risks** (currency risk, policy risk, offtaker risk, construction risk).
✅ **High financing costs (WACC)** can render renewable projects financially uncompetitive without concessional support.
✅ Grid constraints and policy uncertainties further increase **investor hesitation.**

4️⃣ Mechanisms for De-risking:

✅ **First-Loss Capital:** Catalytic investors absorb initial losses, protecting senior investors.
✅ **Guarantees:** Partial risk or credit guarantees reduce investor exposure to project risks.
✅ **Blended Finance Structures:** Combine grants, concessional loans, and commercial capital to improve project bankability.
✅ **Anchor Investments:** DFIs provide early capital to validate project feasibility.

5️⃣ Example in South Africa: JETP

The **Just Energy Transition Partnership (JETP)** mobilizes **$8.5 billion in concessional funding** to support South Africa's transition from coal to renewables while de-risking projects for private investors through:

- ✅ Grid upgrades.
- ✅ Renewable energy expansion.
- ✅ Social protection for a just transition.

6️⃣ Outcomes:

Using catalytic capital and DFI support:

- ✅ Lowers perceived and actual project risks.
- ✅ Reduces the cost of capital for renewable energy projects.
- ✅ Unlocks private sector capital at scale, accelerating the clean energy transition.

Examples: Climate Investment Funds, Just Energy Transition Partnership (JETP).

1️⃣ Climate Investment Funds (CIF)

- ✅ **What it is:**
  - Established in 2008, CIF is one of the world's largest climate finance mechanisms.
  - Administered by the World Bank and implemented through **Multilateral Development Banks (MDBs)**.
- ✅ **How it works:**
  - Provides **concessional financing** (grants, low-interest loans) to de-risk climate projects in developing countries.
  - Uses **blended finance to attract private investment** into clean energy, resilience, and sustainable transport.
- ✅ **Programs include:**
  - **Clean Technology Fund (CTF):** Supports utility-scale renewables, energy efficiency, and grid integration.
  - **Scaling Up Renewable Energy in Low-Income Countries Program (SREP):** Supports energy access through renewables.
- ✅ **Impact:**
  - Over **$8 billion deployed**, leveraging more than **$60 billion in co-financing** from private investors, MDBs, and governments.
  - De-risking structures have enabled **large-scale solar, wind, and geothermal projects** in high-risk markets.

2️⃣ Just Energy Transition Partnership (JETP) – South Africa

- ✅ **What it is:**
  - Launched at COP26 (2021) to support **South Africa's transition from coal to renewables**.
  - Partnership between South Africa and **France, Germany, UK, US, and the EU**.
- ✅ **Financial commitment:**
  - **$8.5 billion pledged** in concessional finance, grants, and guarantees.
- ✅ **How it works:**
  - Supports:
    - Accelerated coal decommissioning.
    - Expansion of renewable energy and green hydrogen.
    - Grid modernization to integrate renewables.

- Economic diversification and social protection in coal-dependent regions (Just Transition).

✅ **Role in de-risking:**
- Concessional finance reduces project costs and perceived risks, encouraging private capital participation.
- Facilitates **blended finance structures** to crowd in institutional and private investors.

✅ **Impact goals:**
- Align with South Africa's **net zero by 2050 target**.
- Drive **green job creation** while ensuring social equity in the transition.

☑ Green Bonds & Climate Debt Instruments:

Use of municipal and sovereign green bonds for energy projects.

1️⃣What are Green Bonds?
Green bonds are **debt instruments used to raise funds specifically for climate and environmental projects**, including clean energy, energy efficiency, and sustainable transport.

✅ Funds are earmarked for green projects.
✅ Investors receive fixed income while contributing to climate action.
✅ Aligned with frameworks like the **Green Bond Principles (ICMA)**.

2️⃣Sovereign Green Bonds
✅ Issued by national governments to fund climate-aligned projects.
✅ **Examples:**
- **South Africa's Sovereign Green Bond:**
  - Issued in 2022, raising **ZAR 1.5 billion (~$85 million)**.
  - Proceeds allocated to renewable energy, sustainable water, and low-carbon transport.
  - Demonstrates government commitment to climate goals while deepening green capital markets.

✅ Benefits:
- Mobilize large-scale capital for **grid upgrades, utility-scale renewables, and transmission expansion**.
- Set pricing benchmarks and encourage private sector participation.

3️⃣Municipal Green Bonds
✅ Issued by cities or municipalities to fund local clean energy and climate projects.
✅ Can finance:
- Rooftop solar installations on public buildings.
- Energy efficiency retrofits.
- Local grid upgrades for renewable integration.

✅ **Examples globally:**
- **City of Cape Town Green Bond (2017):** First in Africa, raised **ZAR 1 billion** for water and energy efficiency, and transport projects.
- Municipal green bonds in Kenya and Nigeria are under development for similar purposes.

4️⃣ **Advantages for Energy Projects:**

✅ **Access to lower-cost, long-term capital** for infrastructure-heavy renewable energy projects.

✅ Enable **municipalities to directly invest in decentralized clean energy solutions** while creating local green jobs.

✅ Strengthen climate-aligned fiscal frameworks and deepen domestic green capital markets.

5️⃣ **Challenges:**

✅ Requires clear green project pipelines and transparency in fund allocation.

✅ Creditworthiness of municipalities can affect investor interest.

✅ Technical capacity needed to develop, issue, and manage green bonds effectively.

Potential of ESG-focused debt instruments to channel institutional investment.

1️⃣ **What are ESG-Focused Debt Instruments?**

Debt instruments designed to align with **Environmental, Social, and Governance (ESG)** principles, including:

✅ **Green Bonds:** Fund climate and environmental projects (renewables, energy efficiency).

✅ **Social Bonds:** Finance social projects (affordable housing, health access).

✅ **Sustainability Bonds:** Combine environmental and social project financing.

✅ **Sustainability-Linked Bonds (SLBs):** Tied to issuer's ESG performance (e.g., emissions reduction targets).

2️⃣ **Why Are They Attractive to Institutional Investors?**

✅ Align with growing **ESG mandates** of pension funds, insurers, and asset managers.

✅ Provide **stable, fixed-income returns** while meeting sustainability goals.

✅ Improve portfolio climate risk resilience and support net zero pathways.

✅ High market liquidity in many regions, facilitating large-scale capital deployment.

3️⃣ **Current Market Momentum**

✅ Global ESG debt issuance surpassed **$1 trillion in 2023**, with green bonds dominating.

✅ African issuances are increasing, with South Africa, Kenya, and Nigeria issuing sovereign and municipal green bonds.

✅ South African pension funds (under Reg 28) can allocate to ESG-aligned instruments if risk/return profiles align.

4️⃣ **Role in Energy Transition Financing**

✅ ESG debt instruments can channel **institutional capital into renewable energy, grid upgrades, and clean transport** by:

- Lowering financing costs for clean energy developers.
- Providing long-term capital matching project life cycles.
- Enabling governments and municipalities to fund just transition investments.

✅ Examples:

- **South Africa's Sovereign Green Bond:** Raised funds for renewables and sustainable infrastructure.

- **City of Cape Town Green Bond:** Supported energy efficiency and climate resilience.

5️⃣ Challenges to Scale Further

✅ Need for:

- Standardization and transparency in ESG reporting.
- Robust pipelines of **bankable green projects**.
- Improved credit enhancement to attract risk-averse institutional capital in emerging markets.

✅ Mitigation of concerns about **greenwashing** to maintain investor trust.

☑ Public-Private Partnerships (PPPs):

Case studies of successful IPPs in renewables.

1️⃣ Mainstream Renewable Power (South Africa)

✅ **Project:** Khobab and Loeriesfontein Wind Farms

✅ **Capacity:** 280 MW combined (two 140 MW wind farms).

✅ **Context:** Developed under South Africa's **REIPPPP (Renewable Energy Independent Power Producer Procurement Programme)**.

✅ **Impact:**

- Supplies ~240,000 homes with clean electricity.
- Displaces ~550,000 tonnes of CO_2 annually.
- Created ~1,100 jobs during construction, prioritizing local communities.

✅ **Key success factors:**

- Clear PPA with Eskom.
- Government support under REIPPPP.
- Community ownership model with a local trust holding equity.

2️⃣ Enel Green Power (South Africa)

✅ **Project:** Garob Wind Farm

✅ **Capacity:** 145 MW wind project in Northern Cape.

✅ **Impact:**

- Generates ~573 GWh/year, avoiding ~600,000 tonnes of CO_2 annually.
- Created ~500 local jobs during construction and prioritised local suppliers.

✅ **Key success factors:**

- Supported by REIPPPP with transparent bidding.
- Enel leveraged global expertise while building local capacity.
- Clear grid connection plan aligned with IRP targets.

3️⃣ **Lake Turkana Wind Power (Kenya)**

✅ **Capacity:** 310 MW (Africa's largest wind farm).
✅ **Impact:**

- Provides ~17% of Kenya's electricity needs.
- Displaces ~700,000 tonnes of CO_2 annually.
- Infrastructure investment included a 428 km transmission line, improving grid stability.
  ✅ **Key success factors:**
- Blended finance structure with AfDB, EIB, and private investors.
- Long-term PPA with Kenya Power.
- Community benefit-sharing models with local development funds.

4️⃣ **Gigawatt Global (Rwanda)**

✅ **Project:** 8.5 MW Solar Field near Kigali.
✅ **Impact:**

- Increased Rwanda's electricity generation capacity by 6%.
- Powers 15,000 homes while avoiding ~8,000 tonnes of CO_2 annually.
  ✅ **Key success factors:**
- First utility-scale solar IPP in East Africa.
- Supported by Power Africa, EIB, and Norwegian investors.
- 25-year PPA with Rwanda Energy Utility Corporation Limited (EUCL).

Common Success Factors Across IPP Case Studies:

✅ **Clear and bankable PPAs:** Offtaker security essential for financing.
✅ **Supportive policy frameworks:** Programs like REIPPPP reduce investor risk.
✅ **Blended finance structures:** DFIs and concessional capital reduce WACC.
✅ **Community engagement and local benefits:** Create buy-in and enhance sustainability.
✅ **Grid connection planning:** Critical to avoid curtailment and delays.

Models for leveraging private sector expertise and capital.

1️⃣ Public-Private Partnerships (PPPs)
✅ What it is: Collaborative agreements where the public sector partners with private companies to finance, build, and operate projects (e.g., renewable energy, grid infrastructure).
✅ Benefits:

- Shares risks and responsibilities.
- Leverages private technical expertise and project management skills.
- Accesses private capital while ensuring public oversight.

✅ **Example:** South Africa's REIPPPP, where private IPPs finance and operate renewable projects under PPAs, supported by government procurement.

2️⃣ Blended Finance Structures

✅ **What it is:** Use of **catalytic capital (grants, concessional loans, guarantees)** from DFIs, philanthropies, or governments to de-risk investments and attract private capital.

✅ **Mechanisms:**

- **First-loss capital:** Protects private investors from initial losses.
- **Credit guarantees:** Improve credit ratings of projects.
- **Co-investment funds:** Pool public and private capital for scalable projects.

✅ **Example:** Climate Investment Funds, JETP in South Africa.

3️⃣ Green Bonds and ESG Debt Instruments

✅ Issue **green bonds, sustainability bonds, or sustainability-linked bonds** to raise debt capital from institutional investors for clean energy projects.

✅ Provides **long-term, low-cost capital** while aligning with investor ESG mandates.

✅ **Example:** South Africa's Sovereign Green Bond and City of Cape Town's municipal green bond.

4️⃣ Independent Power Producer (IPP) Models

✅ Private developers finance, construct, and operate renewable energy projects, selling electricity under long-term PPAs with utilities or corporates.

✅ Mobilizes private technical expertise and financial resources while expanding clean energy capacity.

✅ **Example:** Mainstream Renewable Power and Enel Green Power projects in South Africa under REIPPPP.

5️⃣ Corporate Offtake Agreements (Corporate PPAs)

✅ Corporates procure renewable energy directly from IPPs to meet decarbonization and ESG targets.

✅ Provides stable cash flows for projects, reducing reliance on public utilities.

✅ **Example:** Mining and manufacturing companies in South Africa signing PPAs for renewable power supply.

6️⃣ Technical Assistance Facilities

✅ Pair technical expertise with funding to de-risk projects and build pipelines of bankable projects.

✅ Example: Africa GreenCo, Africa50 Project Development Facility.

In Summary:

Models for leveraging private sector expertise and capital include:

✅ Public-Private Partnerships (PPPs).

✅ Blended finance structures.

✅ Green and ESG bond issuance.
✅ IPP-led renewable projects.
✅ Corporate PPAs.
✅ Technical assistance for pipeline development.

These models help **bridge financing gaps, reduce project risks, and accelerate climate-aligned investments**, supporting **SDG 7 (Clean Energy), SDG 13 (Climate Action), and SDG 17 (Partnerships for the Goals).**

☑ Community and SME Participation:

Crowdfunding models for community solar.

1️⃣ What is Community Solar?

Community solar allows **multiple community members to jointly invest in or subscribe to a solar energy project** and share its benefits, especially where rooftop solar is not feasible.

2️⃣ Why Crowdfunding?

✅ **Addresses upfront capital barriers** for community solar by pooling small contributions from many individuals.
✅ Engages local communities, increasing **ownership and acceptance of renewable projects**.
✅ Democratizes clean energy investment, enabling participation from low-to-middle-income households.

3️⃣ Crowdfunding Models:

✅ **Donation-Based:**
- Contributors donate funds to support solar installations for community benefit (schools, clinics).
- No financial returns, but supports local development and climate action.

✅ **Reward-Based:**
- Donors receive non-financial rewards (recognition, discounts from local businesses).

✅ **Lending-Based (Debt Crowdfunding):**
- Community members lend money to a solar project with the promise of repayment with interest from project revenues.
- Example: Participants receive quarterly repayments from electricity sales.

✅ **Equity-Based:**
- Investors receive equity shares in the community solar project.
- Returns are paid from electricity sales or power purchase agreements (PPAs) with utilities or cooperatives.

✅ **Subscription Models:**
- Households subscribe to purchase a portion of the electricity generated by the community solar project.
- Provides bill credits or reduced electricity rates.

4️⃣ Benefits of Crowdfunding for Community Solar:

✅ Mobilizes **local and diaspora capital** for local climate solutions.
✅ Builds **community ownership and trust** in the energy transition.
✅ Enables inclusive participation, supporting **energy equity**.
✅ Can leverage concessional or catalytic co-investment from philanthropies or municipalities to further de-risk projects.

5️⃣ Challenges:

✅ Regulatory barriers in some markets (PPAs, grid connection).
✅ Need for robust project governance and transparency to protect small investors.
✅ Currency and payment system constraints in low-income markets.

6️⃣ Case Example:

✅ **SunFunder (Africa):** Started with crowdfunding debt finance for off-grid solar projects, evolving to larger blended finance vehicles.
✅ **SolarShare (Canada):** Equity crowdfunding for solar cooperatives, paying dividends to local investors.
✅ **Trine (Africa-focused):** Debt crowdfunding enabling European retail investors to finance African solar projects.

Empowering local SMEs in supply chains through targeted financing.

1️⃣ Why Local SMEs Matter in Supply Chains:

✅ SMEs are **critical suppliers, distributors, and service providers** in clean energy, agriculture, and manufacturing value chains.
✅ They **create local jobs, build resilience, and drive inclusive growth** in emerging markets.
✅ However, SMEs often face **limited access to affordable finance** due to perceived high risks and lack of collateral.

2️⃣ Challenges Faced by SMEs:

- Limited working capital to fulfill larger orders.
- High financing costs from local lenders.
- Difficulty accessing trade finance and invoice discounting.
- Lack of credit history or formal documentation.

3️⃣ Targeted Financing Solutions:

✅ **Blended Finance Facilities:**
  - Combine concessional and commercial capital to de-risk lending to SMEs.
  - Example: **Africa SME Climate Fund** structures.
✅ **Supply Chain Financing:**
  - Anchor buyers (multinationals) support supplier SMEs with early payments or guaranteed invoice discounting.
  - Reduces SME liquidity constraints while ensuring reliable supply chains.
✅ **Green Credit Lines:**

- Local financial institutions receive concessional funds to on-lend to SMEs adopting clean technologies or sustainable practices.

✅ **Catalytic Grant Funding:**
- Technical assistance and small grants for SMEs to meet quality, sustainability, and certification standards, increasing their eligibility for supply chain inclusion.

✅ **Digital Financing Platforms:**
- Leverage fintech to assess SME creditworthiness through transaction histories, enabling microloans and trade finance digitally.

4️⃣ Impact on Supply Chains:

✅ Strengthens **resilience and sustainability** of supply chains.
✅ Increases **local content and value addition** in sectors like clean energy and agriculture.
✅ Empowers local entrepreneurs while aligning supply chains with **SDG 8 (Decent Work), SDG 9 (Industry), and SDG 12 (Responsible Consumption).**

Case Examples and Regional Lessons

JETP in South Africa: structure, funding, and lessons to date.

Examples from Kenya (off-grid solar financing) and Morocco (scaling wind/solar) relevant to South Africa.

Kenya: Off-Grid Solar Financing

✅ **Context:**
- Kenya has one of Africa's most advanced off-grid solar markets.
- Driven by the need to electrify rural areas, reaching **75% electrification in 2022** with off-grid solutions playing a critical role.

✅ **Key Models:**

1️⃣ Pay-As-You-Go (PAYG) Solar:
- Companies like **M-KOPA, d.light, and Sun King** provide solar home systems with flexible payment plans via mobile money.
- Customers pay in small installments, making solar affordable and accessible.

2️⃣ Blended Finance:
- **SunFunder and SIMA Funds** blended concessional capital with commercial debt to finance off-grid solar companies.
- DFIs like **IFC, AfDB, and KfW** provided anchor investments and guarantees, lowering risk for private investors.

3️⃣ Results-Based Financing (RBF):
- The **Kenya Off-Grid Solar Access Project (KOSAP)** offers subsidies upon verified connection of customers, reducing upfront risk for developers.

✅ **Lessons for South Africa:**
- Mobile-enabled payment systems can enhance off-grid solar affordability in rural areas.
- Blended finance can de-risk lending to off-grid solar firms.
- RBF schemes can support mini-grids in underserved communities.
- Strong regulatory frameworks enable private sector participation.

Morocco: Scaling Wind and Solar

✅ **Context:**

- Morocco targets **52% of installed capacity from renewables by 2030**.
- Country has no significant fossil fuel resources, making energy security a driver for renewables.

✅ **Key Models:**

1️⃣ Utility-Scale Solar: Noor Ouarzazate Solar Complex

- One of the world's largest concentrated solar power (CSP) plants (~580 MW).
- Financed through **blended finance**:
  - DFIs (World Bank, AfDB, KfW, AFD) provided concessional loans.
  - Private sector participation via Independent Power Producers (IPPs) under long-term PPAs with MASEN.

2️⃣ Wind Energy Expansion:

- Morocco's wind projects (e.g., Tarfaya Wind Farm, 301 MW) were developed under PPPs with private operators like Nareva and Enel Green Power.

3️⃣ Policy and Institutional Framework:

- The **Moroccan Agency for Sustainable Energy (MASEN)** coordinates renewable energy projects, providing clear procurement frameworks and de-risking investor participation.

✅ **Lessons for South Africa:**

- Establishing a strong central agency (like MASEN) to coordinate projects and de-risk investment can accelerate renewable deployment.
- PPP and blended finance models can scale utility-scale wind and solar.
- Long-term PPAs and clear procurement frameworks (like REIPPPP) are critical for investor confidence.

Role of diaspora and catalytic capital models in financing distributed energy.

1️⃣ Why Distributed Energy Matters

✅ Distributed energy systems (mini-grids, rooftop solar, PAYG solar home systems) are essential for **energy access in rural and peri-urban areas** in Africa.

✅ They enable **clean, reliable, and decentralized electricity**, advancing **SDG 7 (Clean Energy)** and **SDG 13 (Climate Action)**.

2️⃣ The Role of the African Diaspora

✅ The African diaspora remits **$50 billion+ annually** to the continent, but primarily for consumption.

✅ Redirecting a **portion of remittances into productive, climate-aligned investments** can:

- Provide patient, flexible capital for distributed energy.
- Reduce dependence on high-cost debt and aid.
- Enable communities to co-own energy assets, creating local buy-in.

✅ Diaspora can:

- Invest via **diaspora bonds** for distributed energy projects.
- Co-invest through **crowdfunding platforms** targeting community energy projects.
- Act as ambassadors for building trust in local projects.

3️⃣ Catalytic Capital Models

✅ **Catalytic capital** refers to **patient, risk-tolerant capital** used to de-risk distributed energy investments and attract private capital.

Mechanisms include:

✅ **First-loss capital** by philanthropies or DFIs to protect private investors.

✅ **Results-based financing (RBF):** Payments tied to verified energy connections, reducing upfront risk for developers.

✅ **Blended finance structures:** Combining grants, concessional loans, and commercial capital to lower the weighted average cost of capital.

✅ **Anchor investments by catalytic actors** to validate new business models (e.g., PAYG solar).

4️⃣ Examples:

✅ **Diaspora Engagement:**

- Ethiopia's diaspora bonds (although primarily for infrastructure, the model is replicable for distributed energy).
- Platforms like **Homestrings** have piloted diaspora co-investment in African infrastructure.

✅ **Catalytic Capital Initiatives:**

- **Beyond the Grid Fund for Africa (BGFA):** Uses RBF to de-risk off-grid energy solutions in Africa.
- **SunFunder:** Started with crowdfunding and concessional catalytic capital, now blends commercial debt to scale off-grid solar.
- **Africa Enterprise Challenge Fund (AECF):** Grants and concessional loans to de-risk off-grid solar and mini-grid investments.

5️⃣ Why This Matters:

✅ **Distributed energy projects often face financing challenges:**

- Small ticket sizes, high transaction costs.
- Perceived high risk in low-income rural markets.
- Lack of collateral from customers and developers.

✅ Diaspora and catalytic capital **can address these challenges by providing flexible capital, reducing risk, and leveraging local trust networks**.

Recommendations for Stakeholders

- For **government**:
  - regulatory stability,
  - enabling environment for private capital.
- For **DFIs and impact investors**: use of
  - first-loss and
  - risk mitigation instruments.
- For **local financial institutions**:
  - capacity-building for climate-aligned lending.
- For **global partners**:
  - aligning technical assistance with investment pipelines.

Conclusion

Financing the energy transition is essential for South Africa's climate goals and economic resilience.

Financing the energy transition is **essential for South Africa's climate goals and economic resilience.** A just, well-managed transition will:

✅ **Reduce dependence on coal**, lowering emissions in line with Paris Agreement and net zero targets.

✅ **Enhance energy security**, addressing chronic load-shedding and grid challenges.

✅ **Unlock economic opportunities**, creating green jobs, supporting local SMEs, and diversifying the economy.

✅ **Expand energy access**, particularly in underserved areas, improving quality of life and economic inclusion.

However, scaling clean energy investment **requires:**

- **Mobilizing catalytic capital** to de-risk projects and crowd in private finance.
- Leveraging **blended finance structures** to lower the cost of capital (WACC).
- Strengthening **policy and regulatory frameworks** for clarity and investor confidence.
- Addressing **currency and sovereign risk perceptions** through guarantees and innovative risk-sharing tools.
- Engaging **local capital markets and institutional investors** to channel domestic resources into the transition.

With the right financial tools, partnerships, and policy alignment, **South Africa can transform its energy system into a driver of climate action, economic resilience, and inclusive growth.**

4IP Group's role in mobilizing catalytic capital and facilitating blended finance frameworks.

As South Africa and other African economies transition toward cleaner, more resilient energy systems, **4IP Group plays a catalytic role in unlocking the capital needed for this transformation.**

Specifically, **4IP Group:**

- **Structures catalytic capital vehicles** that blend concessional, patient capital with commercial finance, reducing risk and lowering the cost of capital for renewable energy and distributed energy projects.

- **Advises governments, DFIs, and impact investors** on frameworks to mobilize private capital through innovative financing mechanisms (e.g., results-based financing, guarantees, green bonds, and blended finance facilities).

- **Facilitates multi-stakeholder partnerships** between governments, development partners, institutional investors, and local financial institutions to align capital flows with climate and SDG objectives.

🔹 **Builds capacity within emerging fund managers** to attract and deploy capital into energy transition investments, leveraging its **Invisible Heart Podcast Series and training platforms** to share lessons learned and practical deal structuring insights.

🔹 **Connects African diaspora and faith-driven investors** with clean energy opportunities, leveraging remittances and mission-aligned capital to support distributed energy solutions.

In doing so, 4IP Group:

✅ **Enables the scaling of clean energy investment pipelines.**
✅ Supports a **just energy transition** while addressing job creation and economic diversification.
✅ **Accelerates Africa's climate goals and energy resilience** while delivering sustainable, impactful returns for investors.

Through these efforts, **4IP Group contributes meaningfully to closing the energy finance gap in Africa while supporting the continent's net zero transition and inclusive development.**

Invitation to collaborate and explore scalable financing models for Africa's energy transition.

At **4IP Group**, we believe that **Africa's energy transition requires collective action to unlock scalable, catalytic, and blended finance models**.

We invite:
✅ **Governments and DFIs** seeking to de-risk clean energy investments.
✅ **Impact and institutional investors** looking to align portfolios with climate and SDG objectives.
✅ **Local fund managers and innovators** building Africa's renewable energy pipelines.
✅ **Diaspora and mission-aligned capital providers** eager to drive climate-resilient development,

to **collaborate with us** in structuring financing frameworks that accelerate Africa's transition toward clean, reliable, and inclusive energy systems.
Together, we can

- mobilize the capital Africa needs,
- deliver bankable projects at scale, and
- ensure the energy transition becomes a driver of economic resilience, job creation, and climate action across the continent.

📩 **Let's connect to explore how we can align our strengths to advance Africa's energy transition.**

About 4IP Group

4IP Group is a Geneva-based advisory firm specializing in values-aligned capital mobilization, impact investing education, and regenerative finance solutions. Its offerings can be found on the the 3i Sustainability Platform.
4IP Group is also an aspiring impact fund manager through The Invisible Heart Ventures Fund No.2, which intends to bridge the worlds of faith, finance, and innovation to catalyze equitable development.

To learn more, visit www.4ipgroup.com or engage with us on the 3i Platform.[6]

[6] 4IP Group - https://tribe.3isustainability.com/spaces/18127967/content

Annex A:

☑ Key Statistics: Energy Transition in South Africa

⚡ ***Current Energy Mix:***
- ***~80% of electricity*** *from coal (Eskom, 2024).*
- *Renewables (wind, solar, hydro) contribute* ***~12%*** *of generation capacity.*

🌍 ***Emission Commitments:***
- *Pledged to reach* ***net zero by 2050****.*
- *South Africa is the* ***12th largest global CO_2 emitter*** *(IEA, 2023).*

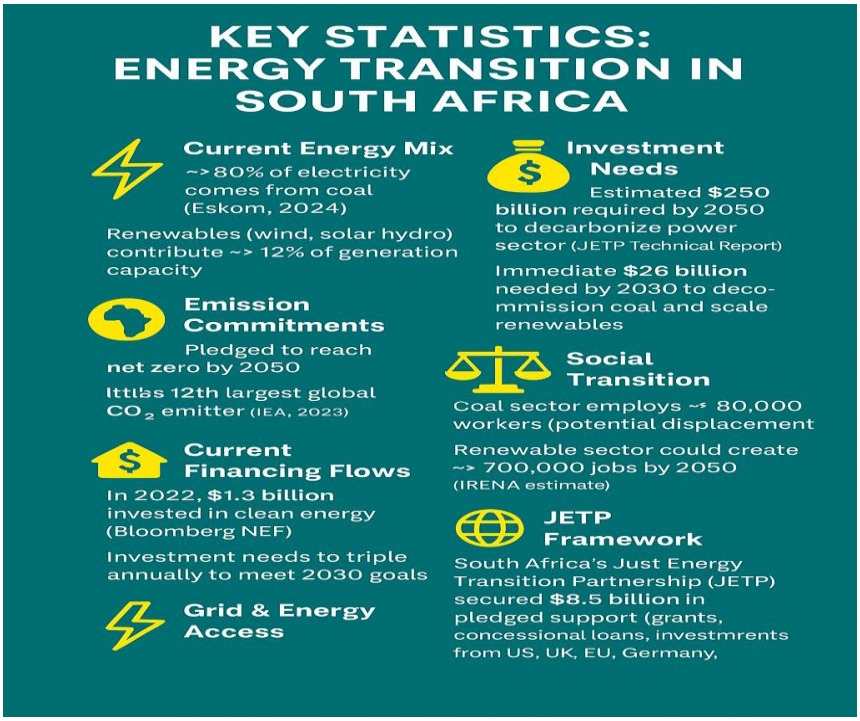
💰 ***Investment Needs:***
- *Estimated* ***$250 billion required by 2050*** *to decarbonize power sector (JETP Technical Report).*
- *Immediate* ***$26 billion needed by 2030*** *to decommission coal and scale renewables.*

⚖️ ***Social Transition:***
- *Coal sector employs* ***~80,000 workers*** *(potential displacement).*
- *Renewable sector could create* ***~300,000 jobs by 2030*** *(IRENA estimate).*

💸 ***Current Financing Flows:***
- *In 2022,* ***$1.3 billion*** *invested in clean energy (Bloomberg NEF).*
- *Investment gap: needs to* ***triple annually*** *to meet 2030 goals.*

⚡ ***Grid & Energy Access:***
- *Electricity access:* ***85% nationally****, but reliability challenges persist.*
- *Rolling blackouts cost* ***~$24 million per day*** *in economic output (CSIR).*

🌐 ***JETP Framework:***
- *South Africa's* ***Just Energy Transition Partnership (JETP)*** *secured* ***$8.5 billion in pledged support*** *(grants, concessional loans, investments) from the US, UK, EU, Germany, and France.*



🌍 Diagram Title: Financing Structures for South Africa's Energy Transition

Annex B: Links to key frameworks: JETP, IRP 2019, SDG 7/13 alignment.

1️⃣ Just Energy Transition Partnership (JETP) – South Africa

A framework mobilizing **$8.5 billion in climate finance** from the US, UK, EU, Germany, and France to support South Africa's just energy transition while ensuring social inclusion and job protection.

- Summary: JETP South Africa Overview (UK Gov)
- Technical Inputs: JETP Investment Plan (Nov 2022)
- Analysis: JETP: Opportunities and Challenges (Brookings)

2️⃣ Integrated Resource Plan (IRP) 2019 – South Africa

South Africa's official long-term energy plan outlining generation targets, renewables integration, and coal decommissioning to 2030.

- Official Document: IRP 2019 Full Document (Dept. of Mineral Resources & Energy)
- Summary & Analysis: CSIR IRP 2019 Highlights
- Update Discussion: Daily Maverick Analysis of IRP

3️⃣ SDG 7 & 13 Alignment

✅ **SDG 7 – Affordable and Clean Energy**
Goal: Ensure access to affordable, reliable, sustainable, and modern energy for all.

- UN SDG 7 Overview

✅ **SDG 13 – Climate Action**
Goal: Take urgent action to combat climate change and its impacts.

- UN SDG 13 Overview

4IP Group's offerings related to structuring catalytic capital and facilitating blended finance in the energy sector.

At **4IP Group**, we specialize in **mobilizing catalytic capital and structuring blended finance solutions** to unlock scalable, SDG-aligned investments in emerging and frontier markets, including the **clean energy transition in South Africa**.

Our Core Offerings:

✅ 1️⃣ **Transaction Structuring & Advisory**

- Designing **blended finance vehicles** combining grants, concessional debt, guarantees, and commercial capital to de-risk renewable energy investments.
- Facilitating **impact-driven investment platforms** aligned with SDG 7 (Clean Energy) and SDG 13 (Climate Action).

✅ 2️⃣ **Catalytic Capital Mobilization**

- Engaging **foundations, DFIs, philanthropies, and catalytic investors** to provide first-loss capital and credit enhancements.
- Structuring investment mechanisms that crowd in private institutional capital for clean energy projects.

✅ 3️⃣ **Capacity Building & Technical Assistance**

- Supporting local financial institutions and project developers to **align project pipelines with investor requirements**.
- Assisting stakeholders to develop **investment-ready, climate-aligned business models** in the renewable energy sector.

✅ 4️⃣ **Convening Investors & Ecosystem Builders**

- Through platforms like our **SIIA Impact Summit** and **Invisible Heart Podcast Series**, we connect investors, policymakers, and innovators to foster deal flows in the clean energy transition.

How We Add Value in the Energy Sector:

⚡ Support **utility-scale renewables, mini-grids, and grid modernization projects** with tailored financial structuring.
⚡ Align investment frameworks with **South Africa's JETP and IRP 2019**, ensuring policy coherence.
⚡ Unlock **Africa-Europe collaboration** for scalable capital flows into climate-positive infrastructure.

📍 Learn more:
🌐 4IP Group Website
🌐 4IP Catalytic Capital & Blended Finance Toolkit

Annex C: Typical Cost Ranges Breaking it down:

"Utility-scale solar PV in South Africa: ~$800–$1,200 per kW installed capacity."

✅ **"Utility-scale solar PV"** = Large solar farms (e.g., 10 MW, 50 MW, 100 MW) that supply electricity to the grid, not just rooftops for individual buildings.

✅ **"$800–$1,200 per kW installed capacity"** means:

- For **every 1 kilowatt (kW)** of electricity generation capacity built, it typically costs between **$800 and $1,200** in **capital expenditure (CAPEX)**.
- 1 kW = 0.001 MW
- For a **1 MW solar plant (1,000 kW)**, the total CAPEX would be:
    - $800 x 1,000 = $800,000 (lower range).
    - $1,200 x 1,000 = $1,200,000 (upper range).

✅ This cost includes:

- **Engineering, Procurement, and Construction (EPC) costs.**
- Equipment (solar panels, inverters, cabling).
- Site preparation and installation.
- Grid connection infrastructure.

"Utility-scale onshore wind: ~$1,300–$1,800 per kW installed capacity."

Breaking it down:

✅ **"Utility-scale onshore wind"** = Large wind farms (e.g., 10 MW, 50 MW, 100 MW) built on land (not offshore) that generate electricity for the national grid.

✅ **"$1,300–$1,800 per kW installed capacity"** means:

- For **every 1 kilowatt (kW)** of electricity generation capacity installed, it typically costs between **$1,300 and $1,800** in **capital expenditure (CAPEX)**.
- Since **1,000 kW = 1 MW**, for a **50 MW wind farm**, the total CAPEX would be:
    - $1,300 x 50,000 = $65 million (lower range).
    - $1,800 x 50,000 = $90 million (upper range).

✅ This CAPEX covers:

- **Engineering, Procurement, and Construction (EPC) costs**.
- Turbines (blades, towers, nacelles).

- Foundations and civil works.
- Grid connection infrastructure and substations.
- Access roads and site preparation.

Why are costs higher than solar?

✅ Wind turbines and their installation are **more complex and capital-intensive** than solar PV panels.
✅ Requires:

- Heavy transport and crane operations.
- Precise wind resource assessments.
- Grid infrastructure upgrades in remote wind-rich areas.
  ✅ However, wind energy often delivers **higher capacity factors (35–45%)**, generating more electricity per installed MW than solar.

Why it matters:

✅ This cost range is crucial for:

- Calculating **Levelized Cost of Electricity (LCOE)**.
- Assessing financial viability and tariff competitiveness in auctions (e.g., REIPPPP).
- Planning financing needs and debt structuring for developers and investors.

✅ Lowering these costs through efficient procurement and local manufacturing can make wind more competitive in South Africa's transition.

Annex D: What is the Weighted Average Cost of Capital (WACC) for Renewable Projects?

1️⃣ *What is WACC?*

✅ **WACC = the average rate of return that investors and lenders require to finance a project, weighted by the proportion of debt and equity used.**

✅ It reflects:

- The **cost of debt** (interest rates on loans).
- The **cost of equity** (returns expected by investors).
- The **risk profile of the project and market**.

✅ Formula:

$$WACC = \frac{E}{V} \times Re + \frac{D}{V} \times Rd \times (1 - T)$$

Where:

- E = Market value of equity
- D = Market value of debt
- $V = E + D$ = Total financing
- Re = Cost of equity
- Rd = Cost of debt
- T = Tax rate

2️⃣ *Why WACC Matters for Renewables*

✅ WACC directly impacts the **Levelized Cost of Electricity (LCOE)**:

- Higher WACC = Higher LCOE = Less competitive renewable energy prices.
- Lower WACC = Lower LCOE = More affordable clean energy.

✅ Renewable projects are **capital-intensive (70–80% CAPEX upfront)**, so financing costs significantly affect project viability.

3️⃣ *Typical WACC for Renewable Projects*

✅ **Ranges:**

- In **Europe (low-risk markets):** 3–5% (due to lower perceived risks and stable policy).
- In **emerging markets (e.g., South Africa):** 8–12% (due to higher currency, political, and offtaker risks).
- In **high-risk markets:** 12–20%.

✅ South Africa under REIPPPP:

- Historically achieved WACC of **8–10%** for utility-scale solar and wind projects.
- Higher under current grid constraints, currency fluctuations, and policy uncertainty.

Factors Affecting WACC:

✅ Macroeconomic:

- Inflation and interest rates.
- Exchange rate volatility.

✅ Project-specific:

- Offtaker creditworthiness (e.g., Eskom risk).
- Grid connection certainty.
- Regulatory stability.

✅ Use of **blended finance or catalytic capital** (e.g., concessional loans, guarantees) can **reduce WACC by de-risking projects**, making renewable projects bankable and scalable.

In Summary:

✅ **WACC for renewable projects is the blended cost of debt and equity required by financiers, typically 8–12% in South Africa.**
✅ It is **critical in determining the cost-competitiveness and bankability of renewable energy projects.**
✅ Lowering WACC through

- policy stability and
- de-risking mechanisms

accelerates the clean energy transition.