The Lab

CLEAN UTILITIES FOR AFFORDABLE HOUSING

INSTRUMENT ANALYSIS
SEPTEMBER 2024

Clean Utilities for Affordable Housing

LAB INSTRUMENT ANALYSIS
September 2024

DESCRIPTION & GOAL

Clean Utilities for Affordable Housing mobilizes capital to expand access to renewable energy for vulnerable households. This innovative business model, built on partnerships with major landlords, aggregates utility demand and enhances credit quality to catalyze commercial capital at scale.

SECTOR

Energy; Buildings

FINANCE TARGET

Clean Utilities for Affordable Housing aims to raise USD 54 million (ZAR 976 million) in concessional and private capital to support the provision of renewable energy services to affordable housing residents in South Africa; a market segment currently underserved in terms of financing and renewable energy solutions.

GEOGRAPHY

For the first phase: South Africa
In the future: Kenya

The Lab identifies, develops, and launches sustainable finance instruments that can drive billions to a low-carbon economy. The 2024 Lab cycle targets four thematic areas (mitigation, adaptation, high-integrity forests, and sustainable agriculture and food systems) and five geographic regions (Brazil, East & Southern Africa, India, Latin America & the Caribbean, and the Philippines).

AUTHORS AND ACKNOWLEDGEMENTS

The authors of this brief are Megan Sager and Justin Standish-White.

The authors would like to acknowledge the following professionals for their cooperation and valued contributions, including the proponents Jackline Okeyo, Umar Salman, Bongani Sibisi, and Professor Philip Larocco (Mzansi Clean Energy Capital); and the working group members Anne-Marie Chidzero (FSD Africa), Blake Bowden, Nic Watchorn and Solly Mboweni (International Housing Solutions), Katherine Cox (TUHF), Kasief Isaacs (Mergence Investment Managers), Kebu Phiri (Development Bank of Southern Africa), Lindi Mtshali and Teboho Makhabane (Sanlam Investments), Luis Aguirre-Torres (NYSERDA), Mark van Wyk (Infra Impact), Mike Peo (Nedbank), Monojeet Pal (African Development Bank), Nadia Kruger-Levy (Proparco), Ommid Saberi and Sandeep Singh (International Finance Corporation), Peter George (Enabling Qapital), and Shujaat Khan (Ezra Climate).

The authors would also like to thank Barbara Buchner, Ben Broché, Rachael Axelrod, Jonathan First, Angela Woodall, Elana Fortin, Pauline Baudry, Sam Goodman, and Júlio Lubianco for their continuous advice, support, comments, design, and internal review.

Bloomberg Philanthropies, the United Nations Development Programme, and the governments of Canada, Germany, the United Kingdom, and the United States have funded the Lab's 2024 programs. Climate Policy Initiative (CPI) serves as the Secretariat and analytical provider.

Bloomberg Philanthropies

Canada

Federal Ministry for Economic Affairs and Climate Action

Foreign, Commonwealth & Development Office

Department for Energy Security & Net Zero

UNDP

CLIMATE POLICY INITIATIVE

SUMMARY

Affordable housing residents in South Africa face rapidly increasing electricity prices and frequent outages, a situation mirrored in many other developing economies. The country's coal-fired power system drives one of the most carbon-intensive grids globally, with aging plants unable to keep pace with demand.

Clean Utilities for Affordable Housing (Clean Utilities) centers on a catalytic subordinated funding vehicle tackling the inability of affordable housing residents to access clean, cheap, reliable solar energy. In its first phase, it aims to raise USD 54m of impact capital.

Renewable energy is delivered as a service, minimizing the technical and financial burdens for landlords. Along with discounts facilitated by solar technology, this facilitates the provision of backup energy during frequent outages, increasing the competitiveness of the real estate offering while reducing tenant churn due to spiraling national utility tariff hikes.

The Fund provides a large tranche of blended finance anchored by subordinated funding into portfolio-tied special purpose vehicles (SPVs). This credit enhancement catalyzes commercial senior debt, facilitating the flow of large volumes of renewable energy asset finance into an unserved market. Landlords can co-invest equity in the SPVs, enabling value sharing and alignment of incentives.

Clean Utilities is:

- **Innovative:** The Fund aims to unlock an overlooked low- and moderate-income (LMI) utility market segment through the aggregation of utility demand and derisking commercial investment, delivering a first-of-a-kind impact instrument to renewable energy investors in South Africa.
- **Actionable:** An African clean technology project development and investment team with deep local experience in the property sector is preparing pilot projects, leveraging established relationships with large landlords to build pipelines. Several investors have expressed interest in commercial and concessional funding tranches.
- **Financially Sustainable:** The Fund limits reliance on concessional funding. To accelerate first close, it may leverage the demonstrated appetite for carbon credits from heavy emitters subject to carbon tax in South Africa, engaging in presales. As the investment thesis is proven, returns enabled by economies of scale and rigorous project investment criteria diminish the need for concessional risk capital, which will be replaced by retained earnings.
- **Catalytic:** Clean Utilities catalyzes commercial capital at scale, attracting USD18 million (ZAR 324 million) in senior debt in South Africa alone, 50% leverage via Fund provision of subordinated funding. It targets 28,000 affordable housing units over five years, with township retail and Kenyan housing slated for the next phases.

Clean Utilities' next step is to raise funds for its proof-of-concept phase with major affordable housing developers in Johannesburg and Cape Town, whilst setting up the partnerships and contracts required for the implementation of the Fund structure.

TABLE OF CONTENTS

CONTEXT

Affordable Housing residents in South Africa depend on unstable, expensive, carbon-intensive grid electricity. Clean Utilities' servitization model eliminates the barriers to switching to affordable renewable energy in this unserved market.

The coal-fired power system in South Africa (SA) drives one of the world's most carbon-intensive grids, with aging plants unable to meet demand. Households account for 25% (IEA 2021) of electricity use and 17%[1] of total emissions. More affluent grid users are rapidly switching to embedded renewable energy solutions (i.e., typically rooftop solar systems), which offer greater energy security through storage integration, and shield users from spiraling electricity prices.

SA's just transition policies aim to mitigate social risk as the country decarbonizes through its USD 100 billion Just Energy Transition Investment Plan (The Presidency of the Republic of South Africa 2022). This plan aims to ensure clean energy access and protect against economic dislocations—actions that are viewed as central to the country's sustainable development. This policy is supported by the International Partnership Group, with a USD 9.6 billion pledge to date.

Low- and middle-income (LMI) households in SA face rising utility bills due to a lack of access to affordable, clean technology. Building typology, rental tenure, and credit availability are barriers to action. Additionally, landlords lack the capital and technical expertise to provide portfolio solutions and are also dealing with erosion of tenant affordability. Despite an abundance of renewable energy investment in SA, there are no investment vehicles targeting the affordable housing market due to an unfavorable risk-return profile.

The Clean Utilities for Affordable Housing instrument can unlock a USD 70 million+ opportunity, starting in SA (USD 50 million+ equating to over ZAR 900 million) and expanding to Kenya (USD 20 million+). A servitization model rolled out in partnership with major affordable housing landlords eliminates upfront costs for tenants while minimizing on-site technical expertise requirements. Landlords act as demand aggregators, reducing risk and administrative barriers to serving thousands of LMI households.

Clean Utilities is unique in Africa as the first instrument targeting grid-connected LMI households. It structurally aligns incentives with the landlord as an anchor off-taker, attracting diverse investors by aggregating subordinated funding, injecting equity into landlord SPVs, and derisking participation for senior lenders.

The proponent team is a first-time fund manager with extensive, affordable housing networks. Mzansi Clean Energy Capital (MCEC) is led by CEO Jackline Okeyo, a non-executive director for a large African affordable housing landlord International Housing Solutions (IHS), leveraging her experience in SA property finance and affordable housing leadership.

---

[1] Direct residential emissions: 2.65%. Energy sector emissions: 54.8%. Hence, total emissions from households = 2.65% + 0.25 * 54.8% = 16.65%

CONCEPT

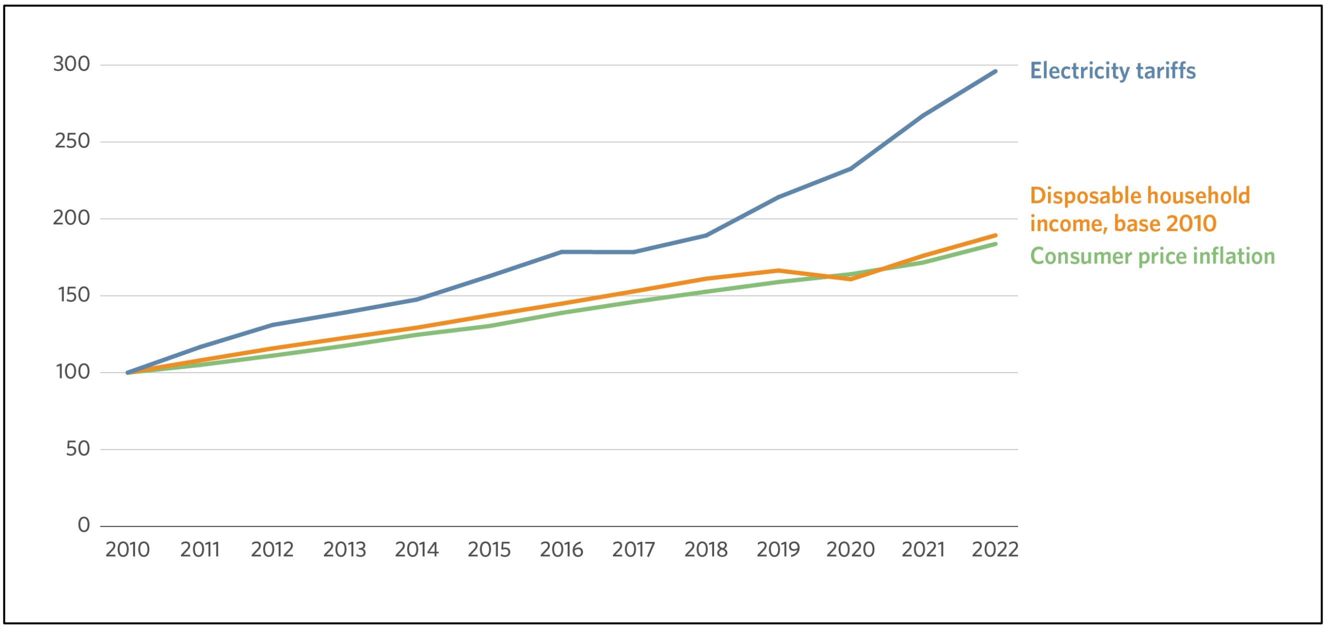
1. INNOVATION

Clean Utilities is the only investment platform offering renewable energy to South Africa's affordable housing market, tapping unmet demand from patient impact infrastructure investors.

1.1 **BARRIERS ADDRESSED:** LACK OF RENEWABLE ENERGY FOR AFFORDABLE HOUSING

Affordable housing residents lack access to renewable energy solutions. This market segment is perceived as risky by dominant retail lenders like banks, while affordable homes in multi-story apartment blocks often lack the roof space required to install solar-PV systems. Clean Utilities provides renewable energy services, eliminating the need for technology ownership and, thus, end-user finance. The Fund will partner with landlords to install the solar systems and sell the energy directly to the tenants at discounted rates relative to national utility rates, which will be negotiated at project inception. Landlords will coordinate the utility administration, with revenues flowing into the structure used to service debt, cover Fund expenses, and pay dividends. Tariff discounts enabled by clean technologies are vital to ensuring the financial security of LMI households, as electricity tariff inflation has outpaced increases in disposable household income by 3.5% on average annually since 2010 (see Figure 1), worsening energy poverty. As green technologies such as clean cookstoves and water efficiency measures are added, complementary technical assistance (TA) can equip end users to best utilize them.

Figure 1: Declining affordability of grid electricity, SA



Note: All series are indexed to 2010 (2010=100).
Sources: Eskom, Historical Average Prices: Residential. South African Reserve Bank, Disposable income per capita of households. World Bank, Consumer Price Index (CPI)

Landlords lack the capital and technical know-how to provide renewable energy services directly. Landlords are hesitant to go beyond their core business and incur the risks and capital outlay of implementing renewable energy solutions for their vulnerable, cost-sensitive customer base. Partnering with Clean Utilities leverages its utility data to design optimal technology solutions while implementing off-balance sheet structures to absorb financial and technology performance risks. Landlords are offered an option to co-invest, incentivizing uptake with the promise of returns (Hammerle, White, and Sturmberg 2023).

Renewable energy investors do not have access to investable propositions in the LMI segment. Clean Utilities offers an innovative structure that aggregates user demand into bankable offtake agreements with creditworthy landlords. At the Fund level, portfolio and credit enhancement strategies are employed to improve risk-return profiles, including monetization of carbon credits within SA's carbon tax system, where demand outstrips supply at c. USD10/tCO_2e (ZAR 180/tCO_2e)[2]. The Fund-SPV structure creates flexible investment options for investors with diverse profiles and objectives, including SA's commercial banks—the mainstay of senior debt for renewable energy, with an exposure of over USD 6 billion (ZAR 108 billion) (Nedbank 2023; Standard Bank 2023; FirstRand 2023; Absa 2023; Investec 2023).[3]

1.2 INNOVATION: UNIQUE CLEAN ENERGY IMPACT INVESTMENT STRUCTURE

Clean Utilities is the first-to-market servitization instrument providing a sustainable solution to African urban LMI households' utility challenges. It differs from existing instruments in (1) enabling embedded generation in housing developments, (2) going beyond renewable energy to enable energy and water efficiency, and (3) introducing a catalytic structure that is appealing to diverse commercial investors.

Technology solution

Existing servitization models exclude embedded generation for residential developments. Instead, they focus on utility-scale plants serving national utilities (e.g., Eskom in SA) and major commercial and industrial (C&I) customers. They use traditional project finance structures with sovereign guarantees or strong corporate balance sheets to provide investors with the necessary comfort to make medium-to-long-term investments, often with limited liquidity opportunities. Existing models also focus on a single technology, typically solar, supplemented by battery storage or other forms of backup.

Clean Utilities' portfolio approach enables the aggregation of smaller-scale energy projects, leveraging utility insights to optimize technology solutions. Partnering with major landlords enables the development of solutions at the level of housing portfolios (typically 5,000-10,000 units) while giving rise to bankable long-term offtake agreements. Utility data sharing enables the Fund Manager to develop intelligent insights into usage patterns and customize propositions, including clean cooking and sustainable water services, which will amplify resident financial savings and increase building energy efficiency.

Further, LMI servitization models target off-grid customers rather than those grappling with large utility burdens in urban environments. Pay-as-you-go models concentrate on energy

---

[2] Interviews with carbon brokers sourcing offsets for SA carbon taxpayers
[3] Total exposure of ZAR 108.2 billion = USD 6 billion per exchange rate of 1:18 (used throughout).

access for primarily rural customers and are usually tied to basic solar home systems. In the key market of SA, the least cost-financed energy options are hybrid solar solutions financed at unaffordable rates to most LMI households (~USD 50 per month – ~ZAR 900 per month). Financial solutions target solar asset ownership, which is unsuitable for renters. Clean Utilities' model can easily accommodate tenant changes in housing units, eliminating friction at the housing unit level.

Financial instrument

The Fund will establish SPVs, which own and operate the clean technologies, collecting revenues. SPVs will be linked to landlords to invest in clean technologies supplying utility services across their portfolios[4]. The Fund will facilitate the aggregation of capital sources to provide subordinated funding into SPVs, supplemented by commercial senior debt advanced against the security provided by assets. Portfolio ringfencing will allow flexibility in structuring equity arrangements with individual landlords while avoiding risk contamination.

Most existing financial instruments accommodate limited investor types, e.g., private equity or debt. In contrast, Clean Utilities offers three structured investment opportunities for institutional investors, banks, and affordable housing investors:

1. A subordinated funding vehicle (target size: USD 30 million or ZAR 540 million) will inject 40-50% of the capital into utility SPVs (around USD 5 million or ZAR 90 million – each[5]) while guaranteeing up to six months of forward debt service for senior lenders. This appeals to equity investors, including private equity, open-ended infrastructure equity, and mezzanine funds.
2. SPVs will accommodate senior lenders with an appetite to advance credit to bankable landlords. These are most likely to be local commercial banks, supplying around 50% of project capital (around USD 2.5 million – ZAR 45 million – per SPV).
3. Individual SPVs will offer landlords a share in the upside via equity participation.

The first fund, which is SA-focused, will be operated in local currency. Figures are quoted in USD for international audiences, as well as ZAR in brackets.

[4] This type of entity is often referred to as an 'assetco'
[5] Each SPV is expected to serve 3,000-7,000 households, delivering 10-20 MW solar capacity.

Table 1: Instruments similar to Clean Utilities (CU)

Similar Instruments	Overview	CU Differentiation
Cooling as a Service*	Servitization model providing clean cooling in emerging markets, with bank-financed technology enabled via a guarantee.	Provides sustainable energy services to vulnerable households, catalyzing finance from diverse infrastructure investors in derisked portfolio SPVs.
Distributed Energy for Social Housing (Popluz)*	Fund offering distributed renewable energy access to low-income households in Brazil via a servitization model.	Demand aggregation lowers transaction costs and facilitates scale, attracting senior lenders to SPVs. Carbon finance supports capitalization and potential yield uplift.
Solar Project Developers: Commercial & Industrial (C&I) sector	Develop mid-to-large solar systems via long-term PPAs backed by corporate offtake agreements. Often vertically integrated (EPC, O&M). Attract direct investment (equity) or develop SPVs (assetcos) to finance portfolios.	Offers diverse technologies for residential end users, and a more diverse range of investment opportunities.
Sun Exchange	A crowdsourced fintech, now also targeting institutional investors, with a rooftop solar portfolio focused on schools.	
Energy Investment Platforms (ARE, Revego, NOA)	Instruments offering investment in SPVs focused on utility-scale solar or wind plants, mainly serving Eskom or major C&I customers, often offer liquidity, e.g., via listings.	Serves a niche market facing high utility fees, driving impact and expanding the renewable energy infrastructure investment universe.
Vantage Capital GreenX	Mezzanine debt instrument offering CPI-linked notes to institutional investors seeking exposure to renewable energy projects with CPI-linked returns.	
Wetility	Users pay monthly fees for hybrid solar solutions. Targets homeowners, mostly middle and high income, expanding through investment by large insurer Sanlam.	Focused on LMI renters, using structuring and incentives to compete on risk-adjusted returns.

** Cooling as a Service and Popluz are Former Lab instruments.*

2. INSTRUMENT MECHANICS

Clean Utilities centers on a subordinated funding vehicle portfolio of SPVs, providing affordable credit risk mitigation to catalyze commercial senior debt at scale.

Clean Utilities is designed as a flexible structure to efficiently allocate risks and returns across a diverse funder group. At its core is a subordinated capital vehicle (open-ended) that will aggregate first-loss, equity, and mezzanine finance to provide credit enhancement to utility SPVs (also known as asset companies, or assetco's) set up to serve major affordable housing landlords. The Fund will act as an impact investor, financing projects that target competitive market-linked returns technology. Projects will be developed by Mzansi Devco in partnership with landlords. A linked TA facility assists in preparing projects and equips landlords and end users to effectively use technology post-installation, optimizing resource efficiency.

Demand aggregation is central to the structure, enabling scaling. For the anchor technology, namely solar energy, landlords will enter 15-year power purchase agreements[6] with 10-20% tariff discounts, locking in inflation-linked, predictable escalation profiles. The proposed solar systems will be installed on rooftops, with shared building infrastructure routing power to housing units. Landlords will resell power to tenants and export any excess to the grid. As battery technology costs fall, backup will be added to reduce exposure to outages and meet residential demand outside peak solar yield times.

The scope of clean technology solutions will expand over time. A growing understanding of end-user needs on site will enable the addition of further sustainable utility services, including efficient, clean cooking and low-cost greywater, scaling SPVs, and growing commercial lender relationships as renewable energy loans are amortized. To manage technology risk, Mzansi Devco will engage experts and engineering, procurement, and construction providers (EPCs) for expert design, installation, and management services adapted to the needs of each housing development.

Senior lenders will participate directly in SPVs, enabled by scale, bankable offtake agreements, and credit enhancement by the Fund. The Fund will provide a large tranche of subordinated funding[7] and security via a six-month forward debt service cover guarantee. Limiting exposure to cash flow volatility and providing access to a debt service reserve should enable funder acceptance of a more flexible take-and-pay agreement.[8]

Initially, the Fund will be capitalized by concessional debt and first-loss/equity funding. Concessional debt is likely to be sourced from development finance institutions (DFIs), while first-loss funding will be derived from catalytic grants from philanthropies and/or prepayments for carbon credits from SA heavy emitters securing offsets to manage their

---

[6] Long-term PPAs are well accepted in the SA market. Whilst several large landlords have signalled willingness to engage on this basis, the Clean Utilities commercial agreements may have buyout provisions to cover instances where a property transaction necessitates early termination.
[7] Anticipated to be 50-60% of capital expenditure, initially.
[8] For clarity, offtakers will be bound to purchase a predefined quantity of kilowatt hours with limited rights to extend the term of the contract if the volume of offtake dips temporarily, due to higher vacancies or shocks (e.g. pandemic).

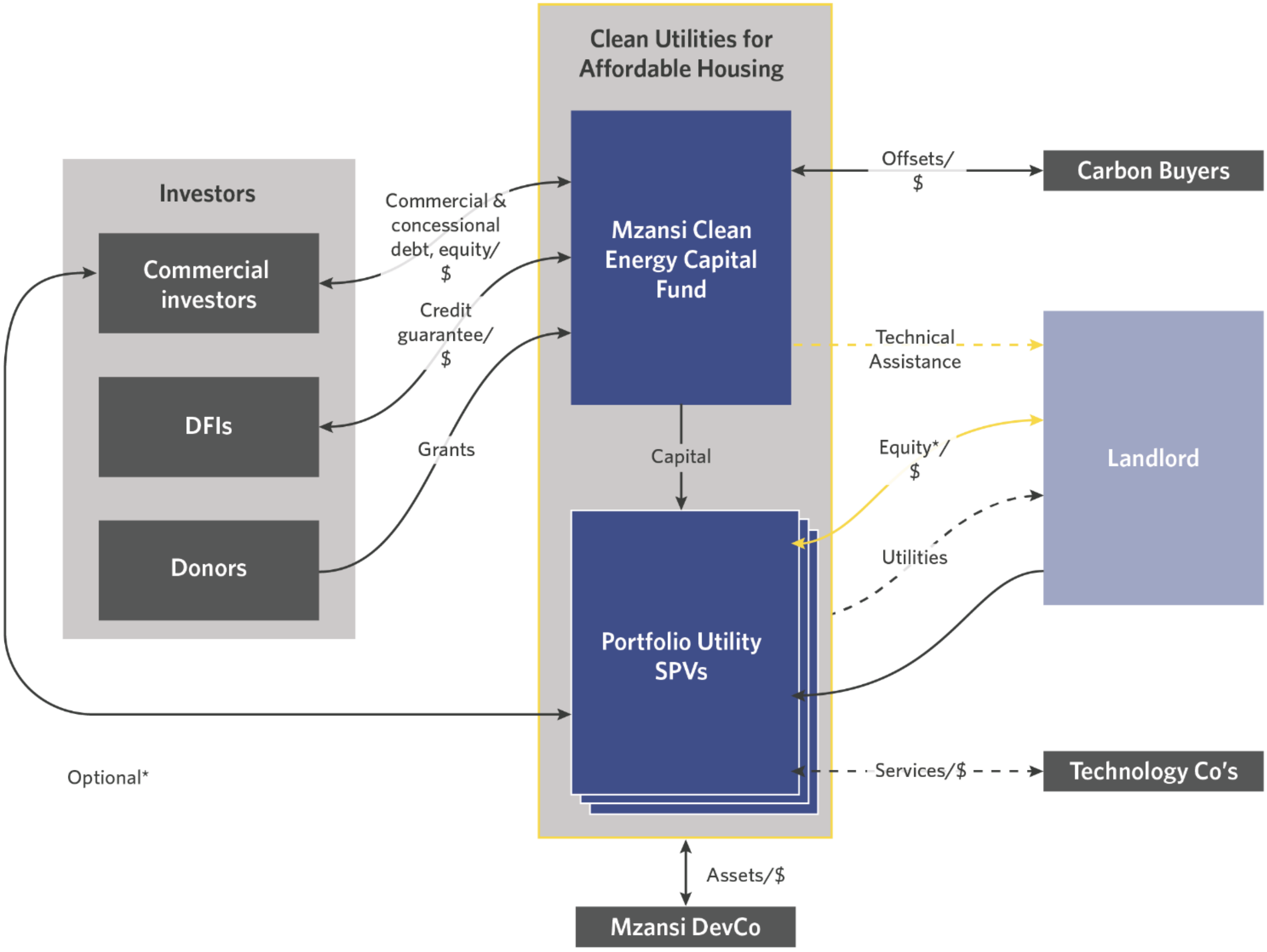
rising tax liability[9]. As track record builds, commercial subordinated debt from impact infrastructure funds will reduce the need for concessional debt, supplemented by private equity to absorb risk.

Key stakeholders include the following:

- **Philanthropies and donors:** To catalyze the first projects and provide TA throughout the Fund's life.
- **DFIs:** To provide concessional subordinated debt to manage the impact of risk premiums on pricing to landlords and absorb the impact of shocks in the operating environment (e.g., rotational outages).
- **Investors:** Including primarily impact investors active in infrastructure to provide equity and mezzanine finance to the Fund.
- **Carbon buyers/investors,** willing to advance funding against forward purchase agreements to secure future offtake.
- **Banks and other senior lenders:** To supply asset finance at scale.
- **Landlords:** To aggregate tenant demand in the form of binding offtake agreements, provide utility data and premises for technology installation and operation, and tenant monitoring and feedback.
- **End users:** To inform the choice of technologies and ultimately enable climate impact, adapting behavior as novel appliances are introduced, guided by TA.
- **Fund Manager:** The Fund Manager will raise capital at the Fund and SPV level as it manages the Fund and TA facility. MCEC will play this role. Initially, it will partner with an established infrastructure fund manager, whilst building capability. The Fund will be governed by an investment committee, including anchor investors and independent property and technology experts, to ensure sound decision-making.
- **Project developer:** To work with landlords to determine utility needs and optimal solutions and negotiate and manage contracts to deliver these, presenting projects to the Fund investment committee. Mzansi Devco is an MCEC-affiliated entity with an independent board that will play this role.
- **Technology companies:** To guide and implement technology choices, enabling monetization of technology investments. These will be appointed and overseen by Mzansi Devco (technology experts for analysis and design; EPCs for implementation).

[9] The tax rate of ZAR 190(~USD 10)/tCO_2e, and is set to more than double in the next decade

Figure 2: Instrument mechanics



2.1 POTENTIAL CHALLENGES TO INSTRUMENT SUCCESS

Table 2: Key instrument risks

Risk type	Description	Risk Response Strategy
Offtake Risk	Lack of landlord demand	• Create incentives within SPVs to capture benefits for landlords. • Leverage proponent's strong networks in the affordable housing market. Note: demand has been tested: three projects are currently under development with two large landlords
	Redundant supply	• Conservatively sized energy systems supply only 40-50% of an essential service need. • Landlords will guarantee offtake volume over contract life • All systems will have multiple sources of demand, whether on-site (commercial tenants) or off-site (municipal feed-in or wheeling).
	Rejection by end users	• Leader tech (solar) is behind the meter —end users will not see it. • TA will be provided to equip end users regarding technology benefits for follow-on technologies.

Market Risk	Tariff structures change or escalation slows, rendering pricing uncompetitive	• Offer a conservative, inflation-linked tariff escalation profile. • Carbon upside: could supplement profitability to enable lower tariffs later on.
Credit Risk	Landlord default on offtake obligations	• Largest, most stable landlords with strong balance sheets and robust property management infrastructure selected as partners. • Discount relative to municipal tariff and value-sharing options provide structural incentive to keep account current • Step-in rights to collect directly from end users in the event of default • DSRA with guarantee from Fund as contingency, to allow time for remediation (payment of arrears or intervention e.g. foreclosing on system and installing elsewhere) • First loss layer in Fund absorbs limited losses
Liquidity Risk	Cash flow volatility due to seasonality and/or fluctuations in end-user customer demand	• Debt Service Reserve Account in place with guarantee from Fund. • Portfolio effect provides a natural hedge against volatility.
	Asset liquidity (lack of market to liquidate solar assets if necessary)	• PV-only systems initially installed (higher cash flow & return than battery storage). • A secondhand solar market is emerging.
Operating Risk	Technology breakdown or inefficiency	• Warranties and operations and maintenance agreements with EPCs, installers and original equipment manufacturers • Insurance to be taken by SPVs over assets
	High transaction costs: It is expensive to develop bespoke technology at a smaller scale	• Sharing of utility data to enable cross-selling at the development level. • Standardize contract structure across projects to reduce replication costs. • Outsource commoditized services (e.g., installation) to remain lean.
Legal & Regulatory	Feed-in risks: - Delays in feed-in system implementation in certain municipalities - Tariffs decrease in municipalities where systems are operational	• No reliance placed on the sale of excess power to municipalities where the feed-in tariff system is not already active.
	Exposure to regulation variation between regions	• Engage municipal experts in system design.
	Carbon credits: complex and rapidly evolving regulatory landscape	• Low reliance on carbon revenues: modeling incorporates less than 30% of potential, which can be substituted upfront by either grants or patient equity if demand fails to materialize. • Modeling budgets for carbon certification costs and expert fees to ensure carbon accreditation is successful.

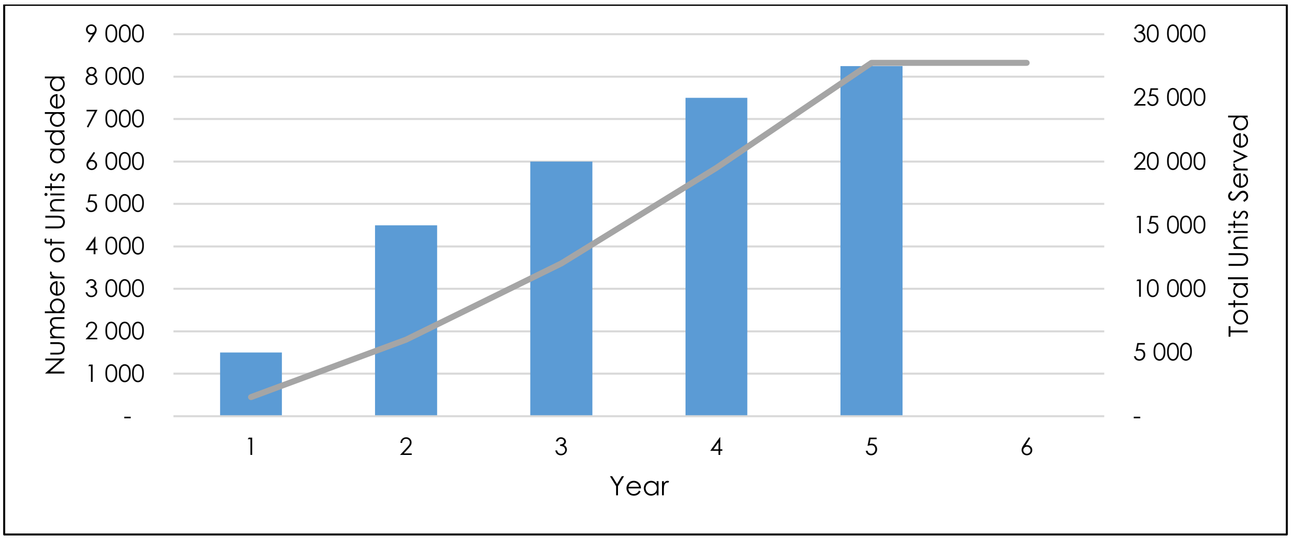
MARKET TEST AND BEYOND

3. IMPLEMENTATION PATHWAY AND REPLICATION

Clean Utilities will initially target 28,000 units in affordable housing developments across South Africa. Replication potential exists in township retail and other affordable housing markets across Africa, especially Kenya.

Clean Utilities will be rolled out in SA initially, funding solar installations for affordable housing developments first. It will deploy the local currency equivalent of USD 54 million (ZAR 976 million) in its initial phase. The proof-of-concept projects will include three affordable housing buildings with a total of 1400 units.[10]. Thereafter, Clean Utilities aims to scale rapidly, with an objective of serving 28,000 units in the first five years. Up to eleven developments will be rolled out per year, with smaller-scale developments in Cape Town compensated for by higher residential tariffs and an operational municipal feed-in tariff scheme. Scalability will be achieved through relationships with major affordable housing landlords; in SA, 10 targets alone manage over 50,000 rental units nationwide. These include International Housing Solutions (30,000+ units), Johannesburg Housing Company (~5,000 units), and several fund portfolios (including Transcend, Indluplace, and Old Mutual).

Figure 3: Portfolio build-up in SA (units of affordable housing)



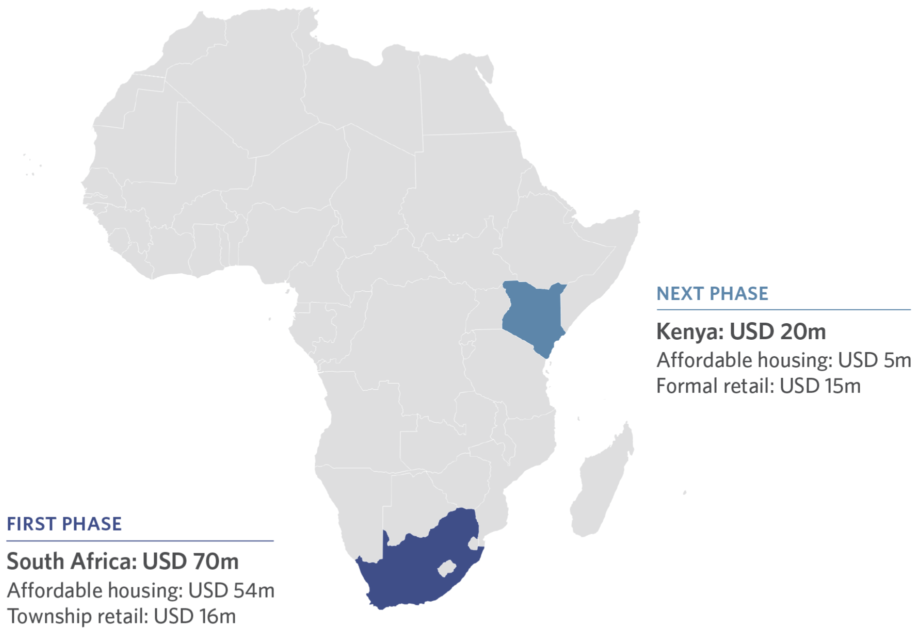
In the longer term, the Fund is well positioned to expand to new markets, including township retail, and new geographies, namely Kenya (affordable housing and/or retail). The total investment opportunity associated with these opportunities equates to USD 36, of which Fund investment provides USD 19 million.

[10] Each development is owned by a single landlord. A single development can constitute several buildings, usually one large site.

Growth drivers include the following:

- In SA, there is rapid informal-sector-led growth in peri-urban economies, with spillover effects to the township retail segment. Conservatively, an addressable opportunity of USD 16 million (ZAR 289 million) is expected across 100+ centers surrounding metropolitan nodes.
- In Kenya, robust economic growth, rapid urbanization, and a policy push to grow the affordable housing market signal future residential opportunity. The addressable market is conservatively estimated at 3,500 units, representing an investment opportunity of USD 5 million.
- Kenya has one of the largest retail markets in Africa, with strong growth in recent years. Overall, it serves a similar demographic to SA's township retail market, given lower average income levels. The Kenyan retail investment opportunity is estimated at USD 14 million.

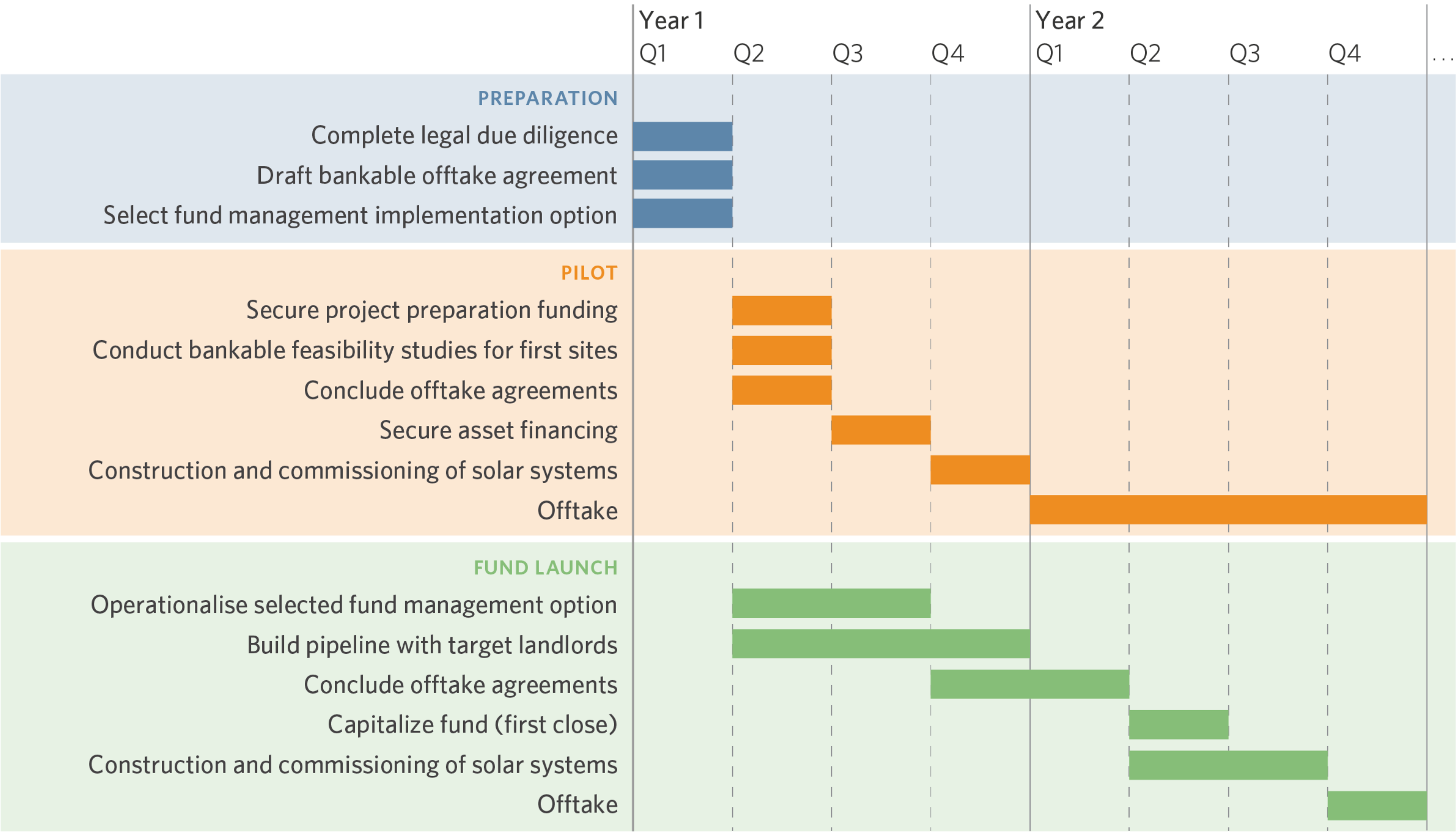
Figure 4: Target markets



As a first-time fund manager, MCEC will partner with an established infrastructure investment manager with the required financial services license and track record. Mzansi Devco will secure a credible panel of key service providers with the expertise and footprint to manage a national rollout. Without well-performing technologies, the Fund will not be able to deliver returns.

The first milestone will be concluding offtake and funding agreements for the pilot sites, currently underway, to be established within SPVs overseen by Mzansi Devco prior to Fund set-up. This will enable fine-tuning the landlord proposition, a live test of the business model, and case studies to drum up appetite in the landlord community. These agreements are expected to be signed within six months of endorsement, with plants operational within six months thereafter, as reflected in Figure 5.

Figure 5: Implementation Plan



4. FINANCIAL IMPACT AND SUSTAINABILITY

4.1 QUANTITATIVE MODELING

A 15-year fund model has been developed to assess the performance of the Fund's investment in subsidiary investments (projects and/or SPVs), covering the scale of SA's planned affordable housing rollout. It is assumed that the Fund will invest in multiple SPVs and earn returns through interest on subordinated debt and dividends.

Sensitivity testing reveals key financial feasibility drivers: solar yield, initial project capex, tariff starting price, and escalation profile. These variables are under the Fund Manager's control, apart from solar yield, where factors like rotational outages or fluctuating demand on site could result in lower system yield and, thus, lower sales.[11]

Table 3: Key modeling assumptions

Variable	Base scenario
Solar yield (kWh/kW/a)	1,440
Solar plant capacity factor (% peak capacity)	18.3%
Tariff ratio relative to municipal rate	85%
Tariff starting price - low (City of Johannesburg)	USD 0.09 (ZAR 1.70)
Tariff starting price – high (City of Cape Town)	USD 0.13 (ZAR 2.40)
Tariff ratio relative to municipal rate	85%
Solar plant capital cost (USD'000 / MW)	USD 536 000 / MW (ZAR 9 659 000 / MW)

The greatest risk to the feasibility of the model is lower sales, most likely due to unpredictable events such as rotational grid outages curtailing solar production. The model incorporates an effective buffer of 15% in remunerated solar yield; the feasibility threshold is 1,200 kWh/kW/a, equating to a 15.2% capacity factor, which appears reasonable in context. This risk can be mitigated through the integration of energy storage on-site, subject to commercial feasibility, or else transferring the risk either to a landlord or a developmental investor.[12] However, given the recent past, it is not impossible that this level of loss in yield could be exceeded, given the state of South Africa's grid, highlighting the critical role of concessional capital in operating this instrument in an unpredictable emerging market context.

Uncertainty in site characteristics was addressed by encompassing diverse site types and undertaking scenario modeling to assess the impact of varying critical parameters. Minimal reliance was placed on carbon revenues, given potential shifts in the carbon landscape, allowing for full carbon project development costs but only monetizing yields from the first

---

[11] To cover this risk, contracts will be extended so that the same number of units is sold but over a longer period.

[12] In the commercial sector, this would involve a guaranteed offtake commitment by the landlord to pay for a defined quantity of kilowatt hours over a given period of time, typically a year. In this instance, it may be necessary to negotiate flexibility in subordinated debt repayment terms to cater for these impacts

three years in the form of presales. Should these not materialize, they could be replaced by grants. A basic discount of 15% to prevailing grid tariffs was implemented throughout, ensuring affordability.

Table 4: Scenario modeling assumptions

Variable	Low scenario	Base scenario	High scenario
Tariff escalation factor (%/a)	6.0% (CPI+0%)	7.0% (CPI+1%)	8.0% (CPI+2%)
SPV Opex as % of assets	6.0%	5.0%	4.0%
SPV Opex inflation	7.0% (CPI+1%)	6.0% (CPI+0%)	5.0% (CPI-1%)
Senior debt maturity	8	10	12
Senior debt pricing	Prime + 2%	Prime	Prime - 2%
Subordinated debt pricing	Prime + 4%	Prime + 2%	Prime

Note: SA prime rate was 11.75% at the time of modeling.

Modeling reveals a swift pathway to financial sustainability, assuming no shocks materialize, with operating breakeven achieved in year two and a Fund internal rate of return (IRR) of 20-30% in local currency terms in the base case. This, in turn, enables a long-term equity IRR of 30% in local currency, which aligns with infrastructure investor return expectations, validated through consultation. No allowance was made for losses due to shocks such as rotational grid outages, given both their unpredictable nature and recent improvements in grid stability[13].

While the ability to offer tariff discounts relies on concessional debt being available upfront, the build-up of retained income within the Fund contains financing costs in the future.

Table 5: Results

Type of Capital	Low scenario	Base scenario	High scenario
Fund IRR (ZAR)	19.9%	26.9%	33.5%
Equity IRR (ZAR)	26.0%	42.3%	55.9%
Operational breakeven (year)	Year 2	Year 2	Year 2
Project 1 Unlevered IRR (ZAR) (illustrative for Johannesburg)	23.9%	26.0%	27.9%
Project 2 Unlevered IRR (ZAR) (illustrative for Cape Town)	23.4%	25.4%	27.3%

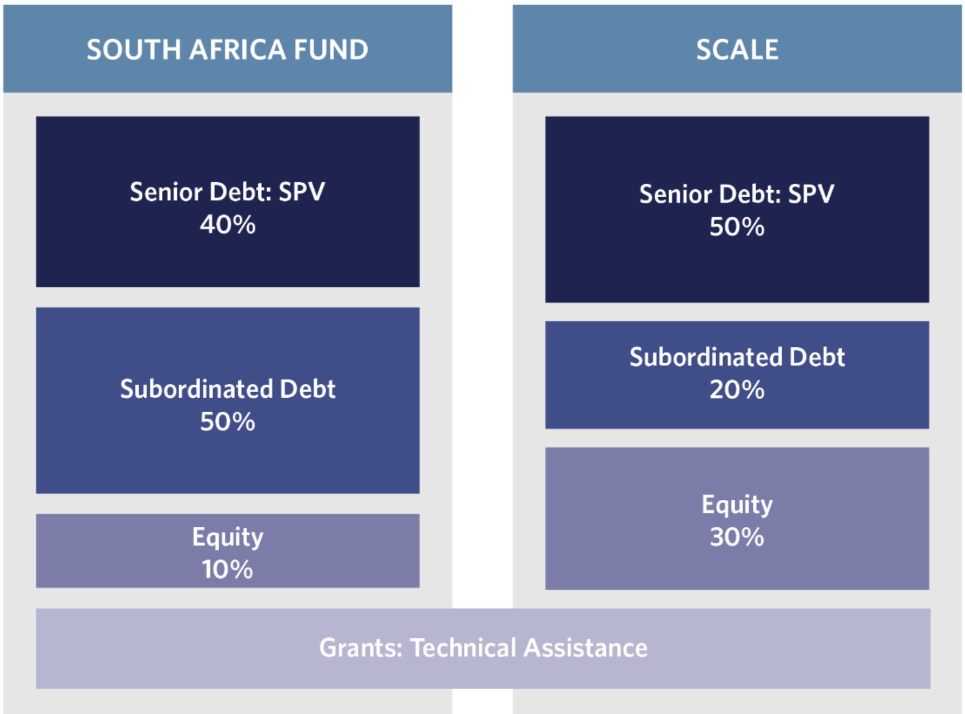
[13] South Africa had experienced 8 months without rotational outages at the time of writing, attributed to improved energy availability across the national utility fleet; the longevity of the improvement was unknown.

4.2 PRIVATE FINANCE MOBILIZATION AND REPLICATION POTENTIAL

Private capital will be mobilized at the Fund and SPV levels. Private capital comprises 60% (USD 33 million – ZAR 586 million) of project investment and 40% (USD 14 million – ZAR 260 million) of initial Fund capitalization. Fund equity is initially sourced from philanthropic donations and the presale of carbon credits, supplemented by retained earnings that would be reinvested in projects. Most of the balance of Fund capital will be derived from concessional subordinated debt from development finance institutions, carrying risk while the model is proven. By creating a de-risked environment upfront when the Fund invests in a new market segment, concessional funding creates additionality by unlocking the flow of private capital into impact-driven investment, enabling the development of a track record. Over time, the build-up of retained earnings is expected to reduce reliance on public funding. In future years, concessional debt will be earmarked for launching the model in new markets and geographies, providing a degree of shelter to private investors and banks while the track record builds.

To deal with capacity challenges, grant funding will be mobilized for a TA facility to the value of USD 2 million. The objective of the facility will be to improve project investment readiness and equip landlords and users for technology use, improving uptake. TA will be provided by local commercial and technical experts relying on the strong network of the Fund Manager. A portion of Fund returns will likely be diverted to the recapitalization of the TA facility in the future, as the model proves itself.

Figure 6: Evolution of the capital stack



Private capital mobilization potential approaches USD 40 million (ZAR 720 million) up to 2030 in SA alone:

- SA affordable housing: USD 30 million – ~ZAR 540 million (Phase 1)
- SA township retail: USD 9 million – ~ZAR 160 million (Phase 2)

In Kenya, private capital of USD 12 million could be mobilized by 2035 across the retail and affordable housing segments.

5. ENVIRONMENTAL AND SOCIO-ECONOMIC IMPACT

Clean Utilities contributes to a just transition by cutting emissions while improving the quality of life for affordable housing residents and creating green jobs.

Clean Utilities enables a just transition for a share of the households at the highest risk of being left behind as businesses and high-income households switch to decentralized solar to reduce their reliance on conventional utilities. This contributes to decarbonizing African cities while promoting socially inclusive approaches to climate investment. It also aligns with key SA policies, including the country's Just Transition Framework and the ambitious USD 100 million Just Energy Transition Investment Plan.

5.1 ENVIRONMENTAL IMPACT

Clean Utilities will enable the low-carbon energy transition through the rapid adoption of clean energy solutions. The Fund aims to enable the installation of 65 MWp of solar energy for affordable housing developments in its first phase, providing affordable clean energy to LMI households. Over the 15-year project lifecycle, 1,352 GWh of renewable energy will be generated, avoiding 1,369 ktCO_2e by replacing grid-tied electricity, the bulk of which is reliant on coal.

While climate mitigation is Clean Utilities' primary focus, it will also improve resilience. Embedded generation systems restrict the impact of natural disasters on energy security via damage to transmission and distribution infrastructure or large centralized utility plants.

Table 6: Quantitative impact contributions to environmental SDGs

Relevant SDG	Indicator	Typical project results	Total results
Affordable and clean energy (SDG 7)	Renewable energy capacity	1.8 MWp	65 MWp
	Renewable energy generation	36.5 GWh	1,352 GWh
Climate action (SDG 13)	Emissions reduction	37 ktCO_2e	1,369 ktCO_2e

In the future, the Clean Utilities Fund aims to evolve to include other utilities, notably water, at which stage additional impact indicators could be added.

5.2 SOCIAL AND ECONOMIC IMPACT

Clean Utilities supports a just energy transition by enabling a switch to renewable energy for vulnerable households. Upwards of 80% of beneficiaries are expected to have a household income below USD 1,600 (ZAR 30,000), with over 22,000 LMI households benefiting from clean energy access in Phase 1 alone. When paired with additional technologies such as green cookstoves and behavioral change resulting from education initiatives could lead to a 20% reduction in baseline grid energy usage, in line with the EDGE green building standard.

Clean Utilities will stimulate green growth through infrastructure investments and local job creation. It is estimated that 45% of capital expenditures will be local content, totaling USD 24 million (ZAR 440 million), stimulating green supply chains. During Phase 1, over 1,000 green value chain jobs are expected to be created, approximately 60% of which are on-site (primarily engineering, procurement, and construction jobs), and the balance in the green technology supply chain (including services like legal and logistics, and manufacturing). This co-benefit is critical for maintaining support for renewable energy in countries with high unemployment, like SA, particularly given the geopolitics of solar supply chains.

Clean Utilities delivers gender-positive action. Mzansi is headed by an African woman, making this a female-led initiative. In addition, 40% or 9,000 of the beneficiary households are estimated to be female-headed, positioning the Fund well for gender-lens investing frameworks such as the 2X Challenge. Female-headed households are often more vulnerable and tend to have higher dependency ratios (i.e., ratios of children and elderly to working adults). Beyond affordable housing, the Fund expects to support 100+ female-led or -owned small- medium- or micro-sized enterprises (SMMEs), given that a third of the SMMEs supported in the commercial component of rental space (mixed-use buildings in inner city areas) is expected to comprise female-led or -owned SMMEs.

Table 7: Quantitative impact contributions to social and economic SDGs

Relevant SDG	Indicator	Results
Affordable and Clean Energy / Gender (SDGs 5 and 7)	Female-headed households as a share of beneficiaries	40%
	Total female-headed households benefiting	8,880
	Female-owned/-led SMMEs as a share of all SMMEs	33%
	Total female-owned/-led SMMEs benefiting	102
Decent work and economic growth (SDG 8)	Local procurement of goods and services as a share of total capital	45%
	Procurement of local content	USD 24m (ZAR 440m)
	Total direct jobs created	653
	Total indirect jobs created	437

Table 8: Contributions to social and economic SDGs

Relevant SDG	Results
Affordable and clean energy (SDG 7)	• Most clean energy beneficiaries are expected to be from LMI households. • The Fund intends to negotiate tariff discounts for LMI tenants with the landlords, aiming to provide discounted tariffs relative to the municipal rate, leading to more affordable energy. • A TA facility will fund education on clean and efficient energy usage.
Gender (SDG 5)	• The Fund is led by a female CEO and co-founder. • Female-headed households make up a significant portion of the LMI group in SA and are expected to benefit in the same proportion from clean energy. • Female-owned SMMEs will be supported by clean energy within the developments.
Decent work and economic growth (SDG 8)	• Local content spending is expected to be almost half of the spend, and a higher figure may be possible. • A significant number of jobs would be created during the implementation of funded projects.

NEXT STEPS

The next steps center on project development at the pilot sites, working closely with landlord partners on incentive structures to drive participation. Priority steps include drafting a sound power procurement agreement that meets investor expectations and performing a deeper regulatory review to ensure compliance. At the same time, MCEC will engage with experienced investment managers to formalize a partnership enabling Fund set-up and capitalization.

Regarding capital raising, the MCEC team is mobilizing project preparation funds and capital to implement the first energy systems, which Mzansi Devco can roll out with technology providers. This will be done prior to establishing the full financial structure with the support of an experienced fund manager. It will soon commence fundraising for the TA facility, which will prepare landlords and end users for implementation.

REFERENCES

Absa (2023). Absa Group Limited: Climate Report 2023. Page 39.

Behr, J., and Chothia, M. (2023). The Electricity Regulation Amendment Bill: A New Era for the Energy Sector. Weksmans Attorneys. Available: https://www.werksmans.com/legal-updates-and-opinions/the-electricity-regulation-amendment-bill-a-new-era-for-the-energy-sector/

BusinessTech. (2023). South Africa's Shocking Savings Rate. Available: https://businesstech.co.za/news/lifestyle/683005/south-africas-shocking-savings-rate/

BusinessTech. (2024). New electricity laws for South Africa passed by parliament. Available: https://businesstech.co.za/news/energy/760801/new-electricity-laws-for-south-africa-passed-by-parliament/

Carden, K., Fisher-Jeffes, L., Young, C., Barnes, J., and Winter, K. (2018). Guidelines for greywater use and management in South Africa. Water Research Commission. Available: https://www.wrc.org.za/wp-content/uploads/mdocs/TT%20746-17.pdf

Centre for Affordable Housing Finance in Africa. (2023). Housing Finance in Africa Yearbook - 14th edition. Available: https://housingfinanceafrica.org/documents/2023-housing-finance-in-africa-yearbook/

City of Cape Town. (2019). Guidelines for the installation of alternative water systems. Available: https://resource.capetown.gov.za/documentcentre/Documents/Procedures%2C%20guidelines%20and%20regulations/Guidelines%20for%20Alternative%20Water%20Installations.pdf

City of Cape Town. (2023). Annexure 6 – Tariffs, fees, and charges book. Available: https://resource.capetown.gov.za/documentcentre/Documents/Financial%20documents/Budget_2023-24_Ann6-25-Electricity-ConsumptionandGeneration.pdf

City of Cape Town. (2024). Apply to install and use an alternative water system. Available: https://www.capetown.gov.za/City-Connect/Apply/Municipal-services/Water-and-sanitation/apply-to-install-and-use-an-alternative-water-system

Cliffe Dekker Hofmeyr. (2024). Quarterly energy market update. Available: https://www.cliffedekkerhofmeyr.com/news/publications/2024/Sector/Projects/projects-and-energy-17-april-quarterly-energy-market-update

COBENEFITS (2019). Future skills and job creation through renewable energy in Vietnam - Assessing the co-benefits of decarbonising the power sector. Available: https://www.cobenefits.info/resources/cobenefits-south-africa-jobs-skills/

Cytonn. (2018). Kenya Real Estate Retail Sector Report 2018. Available: https://cytonn.com/uploads/downloads/cytonn-retail-report-2018-vff.pdf

Cytonn. (2023). Kenya Real Estate Retail Sector Report 2023. Available:https://cytonn.com/uploads/downloads/kenya-real-estate-retail-sector-report-2023-v4.pdf

Demacon. (2010). Impact of Township Shopping Centres. Available: https://www.ukesa.info/library/view/impact-of-township-shopping-centres

Department of Mineral Resources and Energy. (2021a). REIPPPP Focus On Solar Photovoltaic (PV).

Department of Mineral Resources and Energy. (2021b). REIPPPP Bid Window 6.

Department of Mineral Resources and Energy. (2024). Publication for Comments: Integrated Resource Plan, 2023. Available: https://cer.org.za/wp-content/uploads/2006/08/Draft-Integrated-Resource-Plan-2023-for-comment-4-Jan-2024.pdf

Ensor, L. (2021). Presidency supports calls for independent water regulator. Business Live. Available: https://www.businesslive.co.za/bd/national/2021-03-25-presidency-supports-calls-for-independent-water-regulator/

Entrepreneurship to the Point. (2022). Accelerating Women-owned Businesses in Male-dominated Sectors: A South African Case Study. Available: https://ettp.co.za/wp-content/uploads/2022/11/eTTP_ResearchBooklet_Final.pdf

Erasmus, D. (2024). Energy Council wants electricity bill enacted despite municipal fears. Business Live. Available: https://www.businesslive.co.za/bd/national/2024-05-23-energy-council-wants-electricity-bill-enacted-despite-municipal-fears/

Escience Associates. (2013). The Localisation Potential of Photovoltaics and a Strategy to Support Large Scale Roll-Out in South Africa. Available: http://awsassets.wwf.org.za/downloads/the_localisation_potential_of_pv_and_a_strategy_to_support_large_scale_roll_out_in_sa.pdf

Eskom. (2022). What you need to know about the wheeling of electricity. Available: https://www.eskom.co.za/distribution/wp-content/uploads/2022/07/20220721-Wheeling-concept_Introduction.final_.pdf

Feris, J., Pienaar, A., and Brandt, P. (2024). A snapshot of South Africa's Integrated Resource Plan 2023. CDH Incorporated. Available: A snapshot of South Africa's draft Integrated Resource Plan 2023 - Cliffe Dekker Hofmeyr

FirstRand. (2023). FirstRand: Climate Change: Strategies 2023. Page 22.

Foster, K., Paladh, R., Knox, A., and Bhagwan, J. (2022). Position Paper: The opportunity of independent water producers in South Africa. Water Research Commission. Available: https://www.wrc.org.za/wp-content/uploads/mdocs/Working%20Paper_IWP_Feb%202022.pdf

GreenCape (2024). Energy Services Market Intelligence Report. GreenCape. Available: https://greencape.co.za/wp-content/uploads/2024/04/Energy-Services-MIR-2024-digital.pdf

Hammerle, M., White, L.V. and Sturmberg, B. (2023). Solar for renters: Investigating investor perspectives of barriers and policies. Energy Policy, 174, p.113417. Available: https://doi.org/10.1016/j.enpol.2023.113417.

IEA. (2021). IEA: Countries: South Africa: Electricity. https://www.iea.org/countries/south-africa/electricity#how-is-electricity-used-in-south-africa

Illidge, M. (2023). Good news for home solar in Joburg and Durban - nothing for Pretoria. My Broadband. Available: https://mybroadband.co.za/news/energy/527805-cape-town-vs-pretoria-vs-durban-best-electricity-feed-in-tariffs.html

Investec (2023). Investec: Creating Enduring Worth: Climate and Nature-related Financial Disclosures 2023. Page 73.

Johannesburg Housing Company. (2021). How to Know if You Qualify for JHC's Social Housing Solution. Accessed: https://www.jhc.co.za/news/how-know-if-you-qualify-jhcs-social-housing-solution

Kuzwayo, M., (2018). University of Witwatersrand. Local Content Requirements and the Manufacture of Solar Photovoltaic Components in South Africa. Available: https://wiredspace.wits.ac.za/server/api/core/bitstreams/ecb2d291-270d-40e8-8685-c63f97c28954/content

Labuschagne, H. (2024). Cape Town vs Pretoria vs Durban – Best electricity feed-in tariffs. My BroadBand. Available: https://mybroadband.co.za/news/energy/527805-cape-town-vs-pretoria-vs-durban-best-electricity-feed-in-tariffs.html

Makhaya, T. (2017) Reality of being a female entrepreneur in SA, SME South Africa. Available: https://smesouthafrica.co.za/17480/women-entrepreneurs-report-survey/

Mastercard. (2021). Mastercard Index of Women Entrepreneurs.

National Renewable Energy Laboratory. (2016). The International Jobs and Economic Development Impacts (I-JEDI) tool. Available: https://www.nrel.gov/analysis/jedi/international.html

National Energy Crisis Committee. (2023). Fact Sheet on the Electricity Regulation Amendment (ERA) Bill. Available: https://www.stateofthenation.gov.za/assets/downloads/Fact_Sheet_Electricity_Regulation_FAQ_V2-17Nov.pdf

Nedbank. (2023). Nedbank: Climate Report for the year ended 31 December 2023. Page 85.

South African Council of Shopping Centres (2016). Major Retail Types, Classification, and the Hierarchy of Retail Facilities in South Africa. South African Council of Shopping Centres Available: https://urbanstudies.co.za/wp-content/uploads/2016/11/Classification-2016.pdf

South African Local Government Association. (2023). Wheeling in South African Municipalities. Available: https://www.sseg.org.za/wp-content/uploads/2023/07/SALGA-Status-of-Wheeling-Report-July-2023.pdf

Social Housing Regulatory Authority. (no date). Social Housing Regulatory Authority. Available: https://www.shra.org.za/ (Accessed: 15 August 2024).

Standard Bank. (2023). Standard Bank Group: Climate-Related Financial Disclosures Report for the year ended 31 December 2023. Page 41.

Stats SA. (2022). General Household Survey. Available: https://www.statssa.gov.za/publications/P0318/P03182022.pdf

The Architectural Association of Kenya. (2022). The Status of The Built Environment Report: January – December 2022. Available: https://aak.or.ke/download/the-status-of-the-built-environment-report-january-december-2022/

The Presidency of the Republic of South Africa. (2022). Just Energy Transition Implementation Plan 2023-2027. Available: https://www.stateofthenation.gov.za/assets/downloads/JET%20Implementation%20Plan%202023-2027.pdf

Trade and Industrial Policy Strategies (2022). The state of research on renewable energy value chains in South Africa: Firms and employment characteristics. Available: https://tips.org.za/research-archive/sustainable-growth/green-economy-2/item/4440-the-state-of-research-on-renewable-energy-value-chains-in-south-africa-firms-and-employment-characteristics

Van der Poel, J., and Kota, M. (2021). New issues with amended amended schedule 2 of the Electricity Regulation Act for private power generation. Webber Wentzel. Available: https://www.webberwentzel.com/News/Pages/new-issues-with-amended-amended-schedule-2-of-the-electricity-regulation-act-for-private-power-generation.aspx

World Bank. (2017). Kenya Economic Update: Housing—Unavailable and Unaffordable. Available: https://documents.worldbank.org/en/publication/documents-reports/documentdetail/988191491576935397/kenya-economic-update-housing-unavailable-and-unaffordable

APPENDICES

APPENDIX 1: REGULATION

<u>**High-level policy objectives and trends**</u>

South Africa's energy sector and policy environment are fast shifting towards mass uptake of renewable energy. The latest Integrated Resource Plan, 2023 (IRP) outlines South Africa's strategy to meet energy demand until 2030, which requires 29 GW of new capacity, 3.6 GW (12%) of which is expected to come from solar PV (Department of Mineral Resources and Energy 2024; Cliffe Dekker Hofmeyer 2024). This is likely a conservative objective as the current pipeline of proposed private sector PV projects seeks to add 6.3GW of capacity in the same timeframe. Further, GreenCape estimated that rooftop PV capacity grew from 2.1 GW to 3.2 GW between 2022 and 2023 and is expected to reach 10 GW by 2030 (GreenCape 2024).

Essential to this transition will be the role of embedded generation, which will require the following per the Presidency's Just Energy Transition Implementation Plan (JET IP) (The Presidency of the Republic of South Africa 2024)**.**

1. Improved distribution infrastructure and capabilities such as smart metering to accommodate Small Scale Embedded Generation (SSEG).
2. A clear wheeling framework to enable and incentivize wheeling.
3. Municipal tariff frameworks that adapt to support and incentivize SSEG
4. A competitive electricity market to attract private investment to the energy generation sector and lower barriers to entry.

<u>**IPP Licensing, Grid Access, and Sale to Municipalities**</u>

South Africa's energy generation sector is rapidly evolving, opening grid access opportunities for small- and large-scale private generators. The soon-to-be-signed Electricity Regulation Amendment Bill seeks to radically adapt the sector and create a more competitive electricity market by providing for the creation of a Transmission Systems Operator to buy, transmit, and sell electricity, as a part of unbundling the national utility, Eskom (National Energy Crisis Committee 2023; BusinessTech 2024). A 2021 amendment to the Electricity Regulation Act removed licensing requirements for EG facilities under 100 MW, only requiring registration with NERSA (Van der Poel and Kota 2021). This included exporting and wheeling facilities, thereby reducing regulatory barriers to SSEG, although practical barriers remain.

Municipalities are the key enablers in practice, and as the state grid opens to IPPs, they will no longer operate as monopoly electricity suppliers and need to create an enabling policy and practical environment to facilitate SSEG within municipalities (Erasmus 2024). The JET IP emphasizes municipalities' role and estimates an infrastructure spend need of over R300bn to prepare the grid for SSEG and the broader energy transition (The Presidency of the Republic of South Africa 2022).

<u>**Feed in detail**</u>

Specifically, feed-in from SSEG requires bidirectional meters and other municipality-determined technicalities. However, the ERA amendment will standardize technical requirements at the national level and remove licensing requirements (Behr and Chothia 2023). In 2023, 43% of municipalities allowed SSEG on their network, 41% had official application processes, and only 26% had approved SSEG tariffs (GreenCape 2024). The table below details the status of feed-in feasibility across four key municipalities:

Table 9: Status of feed-in feasibility across different municipalities

Municipality	Status	Tariff	Notes
City of Cape Town (City of Cape Town 2023)	Active	R1.00/kWh	R0.29/kWh incentive until July 2025
City of Ethekwini (Labuschagne 2024)	Under development	R1.44/kWh	Monthly fee of R126.86/kVa of power output from inverter (i.e., R698 monthly for a 5.5kWA inverter)
City of Tshwane (Illidge 2023)	Under development	R0.81/kWh	Fees unclear
City of Joburg (Eskom 2022)	Under development	R0.85/kWh	Fees Unclear. Must be on time of use tariff structure.

Wheeling and private trading

The 2021 ERA amendment to remove licensing requirements below 100MW made wheeling far more feasible as a scalable solution to SA's Renewable Energy generation constraints. However, as outlined by the JET IP, the current wheeling policy and tariff landscape is fragmented and inconsistent, inhibiting private investment in wheeling projects. A draft national wheeling framework has been submitted to NERSA, which will standardize wheeling requirements but will still require an enabling environment at the municipal level (Cliffe Dekker Hofmeyer 2024).

In practice, municipal wheeling systems are in their early stages, with a handful of municipalities[14] having wheeling systems in place (South African Local Government Association 2023)**.** Areas serviced directly by the national utility have functional wheeling arrangements, wheeling 150 GWh per year.

Forecast Tariff pathway

Since 2019, the average annual tariff increase has been 12.5%, with an 18.65% increase for 2024/25. GreenCape predicts that low solar PV prices will limit daytime time-of-use tariff increases (~6% p.a.) as public procurement of solar PV increases. However, non-energy charges and TOU tariffs outside of daylight hours will increase above inflation, to counter losses from low solar PV prices. Namely, peak and off-peak rates are projected to increase at 18-19% p.a. (GreenCape 2024).

Water Regulations

South Africa's water sector is highly regulated, particularly for producers who need to adhere to the National Water Act, 1998 and acquire Water Use Licenses (Foster, Paladh, Knox, and Bhagwan 2022). However, the present government has highlighted the need for independent water producers to contribute to SA's water security and the establishment of an independent water regulator (Ensor 2021). Municipalities are reluctant to establish

[14] Nelson Mandela Bay (operational), George (pilot completed), City of Cape Town (pilot completed)

agreements with private providers, though the City of Cape Town (COCT) has made special legal arrangements for large residential developments previously (City of Cape Town 2019).

Whilst the provision of potable water faces major regulatory barriers, greywater capture and provision form a more promising market opportunity. Licensing is not required at a national level, but municipalities such as the COCT require approval and adherence to safety guidelines for domestic systems (City of Cape Town 2024). However, regulation for *service provision* is unclear and may require becoming a formally registered Water Services Intermediary (Carden, Fisher-Jeffes, Young, Barnes, and Winter 2017).

APPENDIX 2: MODELING

Project-level Modeling and Assumptions

All projects are modeled identically, adapted for project-level inputs. The below outlines the inputs into project-level cashflows and where key operating, market, and financing assumptions are made and their subsequent justifications. As Clean Utilities Fund owns the projects, these dividends flow up to the fund, alongside financing repayments to the fund.

$$Cashflow\ for\ dividend = Revenue - Op.Costs - Financing\ Costs - Taxation$$

Electricity generation and revenue

Projects generate revenue from renewable energy generation and subsequent offtake by a mix of residential and commercial off-takers, as well as export to the local grid, where possible. The annual energy output of a project for a year is given by:

$$Energy\ Generation = Nb.Panels \times Nb.Developments \times Wattage \times Annual\ Solar\ Yield \times (1 - Efficiency\ Loss)^{Year\ of\ Project}$$

Projects consist of multiple developments. The number of panels per development is constant. However, the total number of developments per project and the number of projects per year vary. Some parameters are set as constant across projects, as outlined below.

Table 10: Constant parameters across projects

Parameter	Assumed value	Rationale
Wattage	550W	Standard Solar Panel used for all modeling
Annual Solar Yield	1440 kWh/kWp	Representative yield across South Africa
Efficiency Loss	0.5%	Annual reduction in panel efficiency
Number of panels per project	3200	Project-specific assumption informed by real-world project
System size per project	1.76MW	Project-specific assumption informed by real-world project

Table 11: Breakdown of the number of projects started per year

Year(s)	Projects within that year	# Developments	Size in MW
1	**1 – 2**	2	3.52 MW
2	**3 – 6**	6	10.56 MW
3	**7 – 10**	8	14.08 MW
4	**11 – 12**	10	17.60 MW
5	**13 – 15**	11	19.36 MW

Energy that is generated is sold to residential and commercial customers, or exported to the grid at the local feed in tariff rate. The assumed demand mix varies between two scenarios, referred to as System A and System B. System A is modeled on developments where export is not possible but commercial off-takers are on site, such as many developments in Johannesburg. System B relies on the potential to export excess energy to the grid and does not assume a commercial component, which is currently only feasible in Cape Town developments. System B also assumes that batteries are purchased in the 'second stage' of the project, to allow for complete residential offtake as energy can be supplied out of sync with the solar irradiation profile.

Table 12: System-specific parameters

Parameter		System A: Mixed-use developments	System B: Suburban developments (with export)
Initial demand offtake mix		80% Residential 20% Commercial	80% Residential 20% Export
Second stage demand offtake mix		N/A	100% Residential
Tariff reference point		City of Joburg	City of Cape Town
Baseline tariff	**Residential**	R1.70	R2.40
	Commercial	R3.00	N/A
	Export	N/A	R0.80
Annual tariff increase		7%	

Tariff rates are allowed to vary between systems, being benchmarked against local tariffs but reduced by 15% to ensure consumer savings. In practicality, offtake and tariffs may adapt according to landlord circumstances and negotiations, but these systems provide a baseline structure for developments with or without export as a possibility for excess capacity.

<u>System sizing</u>

Actual project system size during implementation will be adapted to developments and demand analysis. However, modeling was based on a 755-unit development in Johannesburg as the base project. For the base project, electricity consumption data has been provided by the proponent.

- The average unit was shown to consume 15kWh per day, and, as the baseline system has no energy storage capacity, it was designed to meet 8kWh of this capacity. This requires demand shaping to align with solar irradiation profiles, which is achieved by using solar energy to power major appliances such as centralized water heaters.
- Given that residential offtake is 80% of demand, this requires ~10kWh of generation per day. This is achieved by a system size of around 3200 panels.
- For system B, it is assumed that 1000 batteries[15] will be installed in project year 7 once prices have reduced substantially (assumed price to be R12 000).
- In year 10, inverters will need to be replaced at a cost of R800 000 per project. The above Capital Expenditure can be summarized in the table below.

[15] For batteries with 9.6kWh of storage (48V x 200ah), assuming an 80% depth of discharge and 90% battery round trip efficiency, we require roughly 1000 batteries to meet the storage requirements of 755 units at 10kWh of consumption per day.

Table 13: Capex breakdown for baseline project

Variable	Value	Rationale
Units served	755	Client data
Total Initial CapEx	R17 000 000	3200 panels as well as accompanying inverters etc.
Initial CapEx per unit	R23 800	Calculation
Capacity per unit	2.3 kW ~9kWh per day	3200 550W panels, annual solar yield of 1440 kWh/kWp
System Upgrade CapEx (System B only)	R12 000 000	1000 batteries required
Upgrade CapEx per unit	R15 900	Calculation
Recapitalization	R800 000	New inverters

Operating Costs

Operating costs are modeled in two components, fixed and proportional. As the fund handles the majority of operations internally, operating costs are minimal at the project level. Proportional costs are modeled as a % of initial Capex, so for 5% proportional costs on a R17 000 000 project, this would be R850 000. A once-off project development cost is incurred in the first year, assumed to be R1 000 000. The assumed operating costs are listed below. Furthermore, operating costs face an inflation rate of 6% per year. A scaling factor has been modeled for projects with multiple developments to simplify the modeling, as opposed to adding 30+ individual tabs for projects.

Table 14: Operating costs breakdown

Variable	Value
Fixed costs	
Audit fees	R50 000
Proportional costs (as % of assets under management)	
Asset management	1.5%
Insurance	1.0%
Operations and maintenance	2.5%
Once-off operating costs	
Project development cost	R1 000 000
Operating cost inflation	6% p.a.

Financing Costs

Projects are funded by a combination of equity, senior debt from private sources (e.g. Nedbank, Wesbank) **and subordinated debt from the Clean Utilities Fund**. Subordinated debt is provided on favorable terms, with a moratorium period where no interest is accrued, as well as an interest-only period where projects only need to service interest payments. The specific assumptions for this financing are as below. Battery Financing and Recapitalization for new inverters are financed with private capital on separate terms, referred to as 'subsequent debt'.

Table 15: Financing costs breakdown for SPVs

Variable	Value	Rationale
Debt % of Capital Cost	90%	Internal assumption
% of Debt that is Senior	50%	Stakeholder discussions
Senior Debt Interest Rate	11.75%	
Senior Debt Tenor	10 years	
Subordinated Debt Interest Rate	15.75%	
Subordinated Debt Tenor	10 years	
Subordinated Debt Moratorium	2 years	
Subordinated Debt Interest-Only Period	2 years	
Subsequent Debt Interest Rate	15.75%	
Subsequent Debt Amortization Rate	5 years	

<u>**Tax Payments**</u>

Income tax on positive cashflows is calculated at 27%. However, due to major capital expenditure, depreciation calculations are vital to tax calculations as assessed losses are carried forward for several years before tax payments are actually incurred.

Table 16: Tax breakdown

Variable	Value
Income Tax Rate	27%
Depreciation Period	5 years

<u>**Fund model mechanics and key assumptions**</u>

The Fund's main revenues are:

1. **Interest income** earned on subordinated debt deployed to SPVs,
2. **Dividend income** earned from investments in SPVs,
3. **Interest earned on excess cash** invested in money market funds,
4. **Management fee** charged to various SPVs

The Fund's main costs are:

1. **Fund manager fees**,
2. **Financing costs**, including interest expense payable to concessional & commercial lenders,
3. **Professional fees**

Furthermore, fundamental assumptions made to model are outlined in the table below.

Table 17: Fundamental model assumptions

Category	Dimension	Description/ rationale
Fund structure & capitalization	**Structure**	Solar assets are housed within multiple SPVs. Fund advances funding to the SPVs via equity and subordinated debt
	Fund type	Perpetual
	Commercial Senior Debt*	Commercial senior debt funds 45% of asset purchases (this debt is advanced directly to SPVs)
	Subordinated debt	Concessional & commercial debt is raised in years 1 to 5 by fund and advanced as blended subordinated debt to various SPVs to fund further 45% of solar projects.
	Guarantee & Debt Service Reserve Account	SPVs are obligated to maintain a Debt Service Reserve Account to provide additional security to Senior Debt lenders. The Fund provides a guarantee over these DSR accounts.
	Accumulated Profits	Certain solar projects invest in batteries 5-7 years into projects. These expenditures within SPVs are funded by Fund debt using accumulated profits within the fund.
	Equity	Equity injections are made in years 1 and 2 into fund. These make up 10% of fund capital structure. SPVs also raise 10% equity in first year of projects.
Equity terms	**Instrument type**	Equity (cash injection)
	Instrument maturity	15 years
	Investor return	Dividends (and repayment of initial contribution where feasible)
	Timing of investor payments	Payment of dividends is subject to available cash flow. The principal investment is redeemed upon maturity (dependent on available cash position)
Income structure	**Interest on SPV finance**	Primary revenue stream is interest income on subordinated debt advanced to various SPVs
	Dividends	Secondary revenue stream is dividend income from investments made in various SPVs
	Interest on positive cash balances	Interest earned on excess cash via treasury strategies
	Management fee	Fund charges an asset management fee to SPVs at 1.5% of asset value, including management of financial assets (e.g. cash holdings) and technology operations and maintenance
	Guarantee fee	Guarantee fee charged to SPVs over Debt Service Reserve Account deficit/shortfall
Cost structure	**Fund management fee structure**	Flat fee in first two years. Thereafter an asset management fee of 2.5% of AUM is charged.
	Debt raising fees	Debt raising fees of 1% on all debt
	Professional fees	Consultants' and legal fees
	Carbon development costs	Initial set up costs of carbon credit development per project and ongoing related costs for first 10 years of projects

<u>Sensitivity analysis</u>

The Lab Secretariat audited the fund and project-level models prepared to confirm they were functioning properly. A deeper analysis was performed on the project-level models for the two project models for Cape Town and Johannesburg-based projects. Both projects are expected to be $1 million, 750 housing unit, pilot projects that will launch within the next year. The Lab Secretariat took the base case from Mzansi's projections on these model projects and carried out an analysis of the eight most critical variables to identify which had the greatest impact on project economics.

The Secretariat carried out a sensitivity analysis of these key variables, increasing and decreasing each by 10% and 20% to understand which variables had the most significant impact on project returns. The chart in Figure 6 shows these results, with the left side showing what a 10% and 20% negative impact on the variable would do to the return, and the right side showing the impact of a positive change to the variable.

Figure 7: Sensitivity analysis results

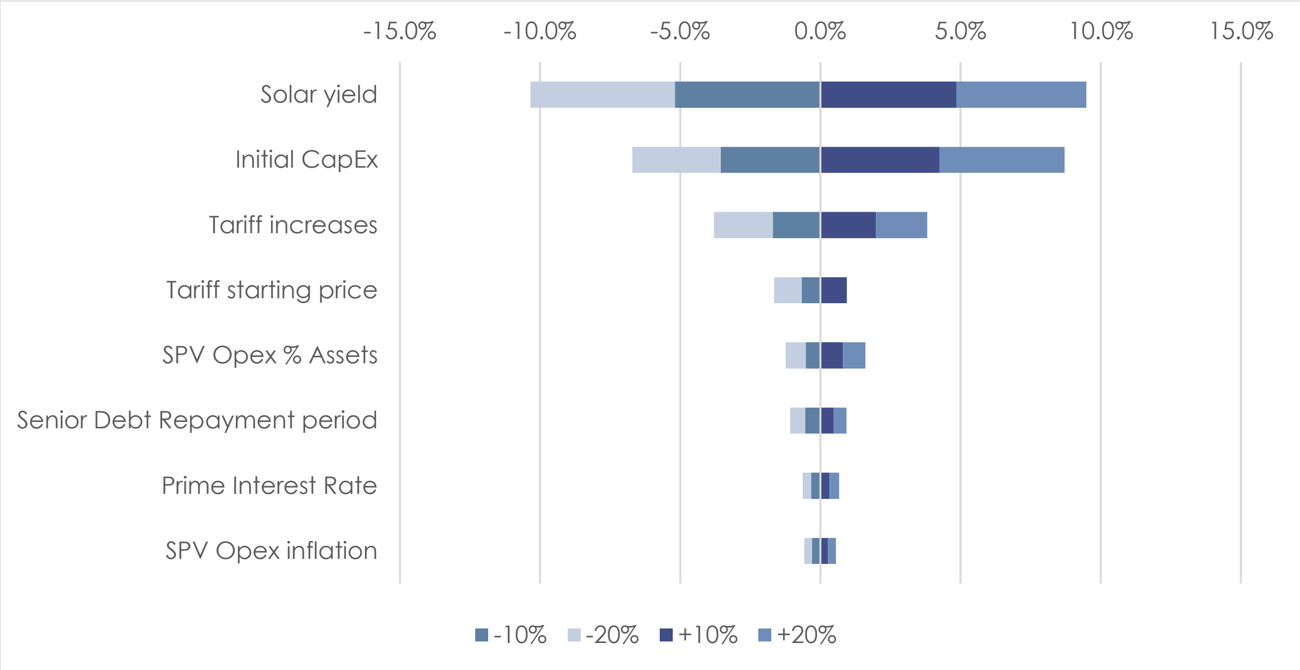


Figure 6: Tariff starting price was only increased by 10% as a 20% increase would have exceeded municipal tariffs, which is unrealistic.

Based on this analysis, the project returns are most sensitive to changes in capital expenditures (CAPEX), tariff prices, and solar yield.

- Solar yield is a measure of forecasted energy harvested from the solar system. The sensitivity of this variable indicates the importance of professional expertise in determining the specifications of the solar system to be used.
- The high sensitivity of both CAPEX and solar yield also indicates the importance of initially being conservative in terms of the size of the system installed to ensure that close to 100% of the energy produced by the system is being used, and therefore CAPEX investment is being optimized.
- In terms of CAPEX and starting tariff prices, these variables can both be determined before the commencement of a project and are somewhat interdependent. The CAPEX assumptions are based on the current market price of a 1.76MW system. The baseline tariff price is based on 85% of the current market municipal rates. Should there be upward increases in CAPEX, Mzansi should review the tariff prices and potentially negotiate adjusted starting tariff prices or tariff increases with landlords to ensure the projects remain viable prior to commencement of the project.

Scenario analysis

To understand CU's initial capital needs and its long-term financial sustainability, three growth pathways were modeled. These tested the sensitivity of the viability of the Fund to both favorable and less favorable market conditions.

In each of the scenarios, the cash flows and debt serviceability of both the individual projects and funds were analyzed. For this analysis, the focus was primarily on the variables that are likely to change once a project has been implemented, namely market variables such as annual tariff increases, inflation, and interest rates. Changes in these variables were coupled with changes in the tenor of senior debt to test the cash flows, returns, and debt serviceability of both the projects and the fund.

Under favorable conditions, annual tariff increases were adjusted upwards, coupled with longer debt tenors and lower inflation and interest rate assumptions. Under less favorable conditions, annual price increases were lowered, the average tenor was shortened, and higher assumptions were used for inflation, interest rates, and operating expense quantums.

Table 18: Summary of scenario assumptions

Type of Capital	Low scenario	Base scenario	High scenario
Solar yield	No change	1440 kWh/kWp	No change
Tariff starting price (residential @ City of Johannesburg)	No change	R 1.70	No change
Tariff starting price (residential @ City of Cape Town)	No change	R 2.40	No change
Tariff ratio relative to municipal rate)	No change	85%	No change
Tariff increases	6.0% (CPI+0%)	7.0% (CPI+1%)	8.0% (CPI+2%)
SPV Opex as % of assets	6.0%	5.0%	4.0%
SPV Opex inflation	7.0% (CPI+1%)	6.0% (CPI+0%)	5.0% (CPI-1%)
Senior debt repayment period	8	10	12
Prime interest rate	No change	11.75%	No change
Senior debt pricing	Prime + 2%	Prime	Prime -2%
Subordinated debt pricing	Prime + 4%	Prime +2%	Prime
Initial Capex	No change	537 USD'000/MW 9 659 ZAR'000/MW	No change

Fund results

The CU fund is expected to reach commercial sustainability within 3-5 years of inception as the portfolio scales up. Equity cash injections of ~$3,5m in total are expected to be made in years 1 and 2 into the fund to provide necessary working capital while the operational revenue builds up. The fund will begin with two to three pilot projects in year 1 totaling ~ $2-3m in investment and then ramp up over the next years exponentially to ~$25m AUM by the end of year 5.

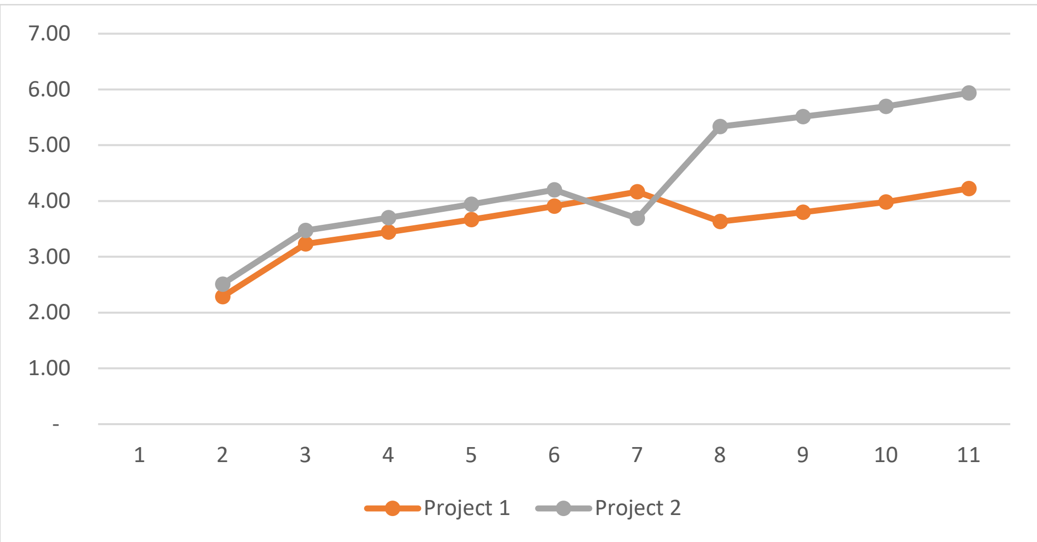
In all scenarios, it is assumed that the SPVs will be funded 90% by debt and 10% by equity. Of this 90% debt, half of it will be senior debt advanced by commercial lenders. The remainder of the debt and equity will be advanced from the CU fund. The CU fund capital stack is initially also assumed to be 10% equity, made up of cash injections from private or philanthropic funders, and 90% debt from concessional and commercial sources. Over time, the proportion of debt steadily decreases as the fund pays its financiers with accumulated profits.

Table 19: Key scenario outcomes

Type of Capital	Low scenario	Base scenario	High scenario
Fund IRR	19.9%	26.9%	33.5%
Equity IRR	26.0%	42.3%	55.9%
Operational breakeven (year)	Year 2	Year 2	Year 2
Project 1 Unlevered IRR (illustrative Johannesburg project)	23.9%	26.0%	27.9%
Project 2 Unlevered IRR (illustrative Cape Town project)	23.4%	25.4%	27.3%

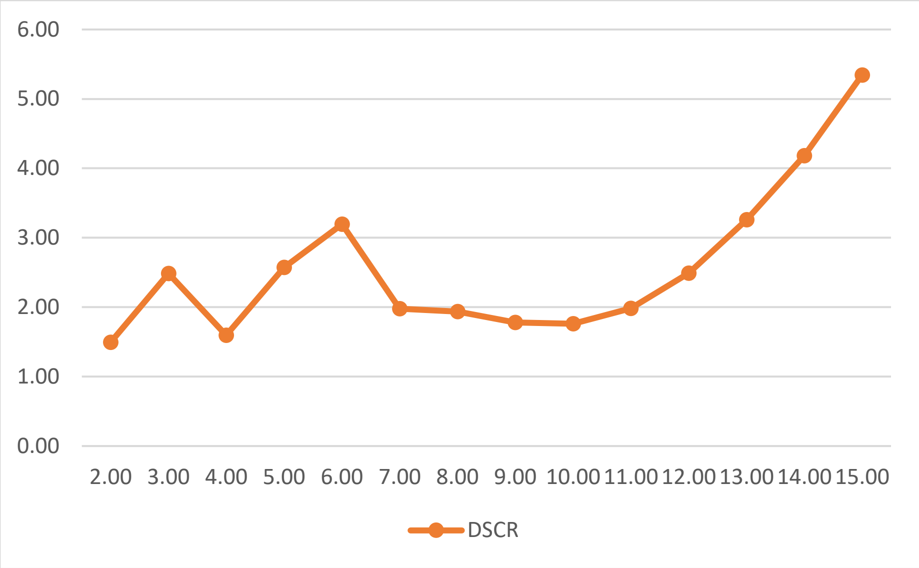
In all three of the scenarios modeled, the returns (as measured by IRR) were ~20% and higher for the fund, as well as both types of projects. The PV-only systems installed in both projects quickly generate operational profits and ensure strong cash flow generation. Both projects are, therefore, operationally cash-positive from the first year of operation. The fund will require equity injections in the first year to provide working capital for the fund setup and project development costs, however, between years 2-3, the fund will become self-sustaining. The fund steadily becomes highly cash generative yielding strong returns to investors. These accumulated profits can be distributed to equity shareholders as dividends, paid to debt providers as incentive payments, provide means for performance fees to asset managers, or reinvested in further capital projects.

Figure 8: Senior debt DSCR in SPVs at baseline scenario



The debt serviceability of the senior debt advanced to the SPVs remained well above the hurdle rate of 1.5 for all three of the scenarios. It is assumed that debt is only raised by the fund in year 2 (with equity injections being used to float the fund in year 1). Should the fund elect to raise debt in year 1, it will be necessary to include a one or two-year debt moratorium. The fund DSCR remains above the hurdle rate of 1.4 in all three scenarios.

Figure 9: DSCR over life of fund at baseline scenario



In the low scenario, to ensure adequate debt serviceability is in place, it was assumed that debt moratoriums would be put in place on both the debt raised by the fund, as well as the subordinated debt advanced to the SPVs. The addition of batteries in the Cape Town projects in years 7 to 9 also put additional strain on debt serviceability in the low scenario. To remedy this, levers available are to delay the installation of batteries, or to not install batteries, or to put debt moratoriums in place on the subordinated debt advanced by the CU fund.

APPENDIX 3: MARKET SIZING

In consideration of replication, three potential markets were sized with to calculate the potential fund opportunity, these were township retail in South Africa, Kenya affordable housing, and Kenya retail. The total addressable market for each of these was conservatively estimated, and the fund opportunity was sized by assuming the same fund structure, i.e., 55% of the addressable market was assumed as the fund opportunity.

Township retail in South Africa has a total addressable market of USD 16.1m (ZAR 289m) and a potential fund opportunity of USD 8.9m (ZAR 159m). The solar capacity per square meter for retail was assumed at 74.8kWp based on a representative case study provided by the secretariat. In this case study, the total floor size for the retail center was 3 250$m^{2,}$ and the installed capacity was 238kWp. There are eight metros in South Africa, and it was assumed that each would have retail floor space of at least 50 000m^2. The 50 000m^2 is a conservative assumption based on 2010 data, where the total township floor space was ~160 000m^2 across three metros (Demacon 2010). Capex per kWp was maintained as for the demonstration project model at USD 537 per kWp (ZAR 9 660 per kWp).

The Kenya affordable housing market has a total addressable market of USD 4.6m and a potential fund opportunity of USD 8.9m. Annual housing units built in Kenya are assumed at 50,000 units (World Bank 2017). Given the sparse data available, a 10-year rolling stock, by applying the 50,000 units as constant p.a., was used to calculate the market size, culminating in 500,000 units. An addressable of 20% was assumed for conservativism. 78% of units in Kenya are rental units (Centre for Affordable Housing Finance in Africa 2023). Actual figures for affordable housing in Kenya for 2017-2022 were 13 529 units, which would amount to 4.5% of all units built in the same period (The Architectural Association of Kenya 2022). The 4.5% was applied to the 10-year housing stock, to find a total affordable housing stock of 3 518. The same solar project size parameters as with the demonstration project model, i.e., 1 300 USD CapEx per unit, were applied to calculate the total market.

The Kenya retail market has a total addressable market of USD 14.4m and a potential fund opportunity of USD 7.9m. The same representative case for retail centers was assumed as per SA retail, assuming 74.8kWp capacity per square meter. Kenya mall retail floor space was assumed as a representative figure for retail, and the total space in 2018 was 1 400 000m^2 in 2018. To scale the figure, the growth in retail floor space for Nairobi was applied to Kenya, which was 28% growth between 2018 and 2023 (Cytonn 2018; Cytonn 2023). This amounted to 1 800 000m^2 retail floor space for Kenya in 2023, which was assumed as the market size. A conservative addressable market was assumed at 20%, amounting to 400 000m^2 and, therefore, 26 900kWp energy demand for solar. The same price per kWp was assumed as with SA at USD 547 per kWp.

APPENDIX 4: IMPACT

Catalytic impact indicators

The fund aims to raise a total of ~R 650m and expects to secure an additional ~R 330m senior debt, which would flow directly through the SPVs, with a total fund plus SPV capital raised culminating to ~R 980m.

- **40% of the fund capital is expected to be private, valuing ~R 260m**
- **60% of the capital invested into the SPVs is expected to be private, valuing ~R 586m**

Table 20: Breakdown of capital raised

Fund		
Variable	**Value**	**Rationale**
Subordinated debt – public	~R 390m	Subordinated debt will be sourced in the form of development finance. The likely partner for this funding is DBSA.
Equity – private	~R 65m	Initially, equity would be raised through donations and presales of carbon credits.
Retained earnings – private	~R 195m	Retained earnings will be used to build up a capital reserve to fund future equity investments and loans to the SPVs.
SPVs		
Variable	**Value**	**Rationale**
Subordinated debt – public	~R 390m	The fund will loan capital to the SPVs from its built-up equity reserves and concessional loans.
Senior debt – private	~R 326m	Senior debt will be sought for each of the projects from commercial banks.
Equity – private	~R 260m	The fund will invest equity directly into the SPVs.

Climate change indicators

The total renewable energy benefits are broken down into three indicators:

- **Renewable energy capacity invested in: The cumulative expected capacity of the projects is 65MWp.**
  - A base system size was assumed at 1.76MW and a growth factor applied later in the fund life cycle so that multiple projects were launched per year, with a total collective size ranging between 1.76MW and 8.8MW per year.
- **Renewable energy generated: Assuming a 15-year project lifespan, the cumulative renewable energy generated is estimated to be 1 351 620MWh.**
  - Individual solar generation per project was calculated on an annual basis by using the following assumptions:
    - Baseline panel size: 550W
    - Annual efficiency loss: 0.5%
    - Annual solar yield: 1440kWh/kWp
    - Unique number of developments per project and year.

- <u>Carbon offset</u>**: The cumulative renewable energy generated is estimated to be 1 369 191 tCO_2e.**
    - A ratio of tCO_2e to MWh generated of 1.013 was used to calculate the total carbon offset.

<u>**Income and gender SDG indicators**</u>

Vulnerable groups would be supported through the provision of energy and training, and lower electricity costs per kWh:

- **The fund would aim to support 22,200 low- and moderate-income (LMI) households.** The fund targets affordable housing developments. However, some of the households may not fall within an LMI bracket. We have assumed that 80% of households would be LMI, totaling 22,200 out of 27,500. All the tenants will also receive training and education on their solar products.
- **The tariff for the solar systems will be set at a lower than the market rate to incentivize the use of the systems.** At the baseline scenario for the model, the tariff will be set at an 85% market rate, amounting to a 15% financial benefit per kWh for households. This may vary depending on project-specific negotiations.

Gender benefits stem from female leadership at the fund level, female households benefiting, and female SMME owners benefiting:

- **The Fund Manager will be female-led.** Mzansi Clean Energy Capital (MCEC) will be the Clean Utilities Fund Manager. The CEO and co-founder of MCEC is female. Hence, the Fund Manager is female-led, resulting in female representation in leadership at the investor level.
- **There will be ~12k female household beneficiaries.** The households in the developments are expected to be 43% female-headed by focusing on the R1 800 to R19 999 per month income bracket. Consequently, the total number of female-headed households expected to benefit would be 12 091.
    - The income range for the affordable housing segment was assumed to be somewhere in the range of R 1500 – R22 000 (Social Housing Regulatory Authority [no date]; Johannesburg Housing Company 2021). Since the bracket varies by source, the final bracket was based on the Stats SA expenditure brackets outlined below.
    - Monthly expenditure was used as a proxy for monthly income, assuming limited to no savings in lower-income households (BusinessTech 2024).
    - 43% of all households earning between R1 800 and R19 999 per month are female-headed (Stats SA 2022).
- **83 Female owned-SMMEs are expected to benefit from renewable energy provided.**
    - Eight of the projects are expected to have commercial tenants.
    - It is assumed that all commercial tenants would be retail tenants.
    - The commercial space is assumed to take up 12.5% of the total development floor space, hence keeping the floor space of units constant and scaling up

the total development floor space, the total retail space per development would be ~3 214m².

- o With ~3 214m² retail floor space, there would be ~17 stores per development (South African Council of Shopping Centres 2016). This figure was calculated by estimating the relative number of stores for different retail centers as per a South African Council of Shopping Center report.
- o Female SMME ownership is assumed at 1/3 or 33% (Makhaya 2017; Entrepreneurship to the Point 2022; Mastercard 2016).

Local economic development is enabled through local CapEx spend and job creation.

- **Local CapEx spend is assumed to be 45% of total CapEx, which totals ~R 440m CapEx spend.** The actual local content spend of REIPPP in 2021 was 48% (Department of Mineral Resources and Energy 2021b). The local content requirements for IPP REIPPP bid window 6 is at least 40% during construction and 45% during operations, and a threshold of 45% has been used for past windows (Department of Mineral Resources and Energy 2021a; Kuzwayo 2018).
- **The total jobs created from the projects are estimated to be 653 direct and 437 indirect**. Permanent jobs are expected to total 521 jobs, and temporary jobs are expected to total 568 jobs. The ratio for jobs was estimated at 10.02 direct and 6.71 indirect jobs per MW (Trade and Industrial Policy Strategies 2022). This was validated by considering multiple studies with figures for direct jobs ranging between 7.7 and 10.02 and figures for indirect jobs ranging between 4.71 and 8.8 jobs per MW (Escience Associates 2013; National Renewable Energy Laboratory 2016; COBENEFITS 2019).
    - o Direct jobs include jobs created by engineering, procurement, and construction companies.
    - o Indirect jobs include jobs created along the renewable energy value chain, which include services (legal, funders, logistics, and consultants), and manufacturing of solar inputs.