



## **Bridging the gap:**

# Innovative finance enabling the uptake of small-scale embedded generation

The uptake of embedded solar generation has exploded in South Africa, particularly in the commercial and industrial sectors. The most significant consideration for companies is selecting the most appropriate financing option for their project.



## Main insights

- Over the last 18 months, the embedded solar generation sector has grown to an installed capacity of more than 3.2 GW in SA.
- Accessing finance has shifted from a barrier to a competitive means of extracting additional value. Selecting the right finance option is an important consideration.
- Outright purchases still provide the best return on investment (ROI) over the lifetime of the asset, but power purchase agreements (PPAs) and lease agreements have cash flow and system performance benefits.
- Solar PPAs and leasing structures are becoming increasingly common and account for between 20% and 30% of new commercial & industrial (C&I) projects.

### This industry brief is written for:

C&I and agricultural businesses who would like to procure solar photovoltaic (PV) and want to understand how they can finance the system.



## Context

There has been a surge in demand for embedded generation<sup>1</sup> in the C&I and residential sectors due largely to the ongoing energy crisis. Over the last 18 months, the sector has grown to more than 3.2 GW of installed capacity.

Like other renewable energy technologies, (PV) systems have faced the problem of high upfront costs and appropriate finance options. This problem is particularly pronounced in emerging economies where limited purchasing power and a lack of suitable financial products constitute additional obstacles to the broader dissemination of solar PV technology.

Many affected customers may not be able to raise the necessary capital to fund technologies such as solar PV systems and energy storage. In particular, the cost for the latter can become exorbitant the larger the storage requirement<sup>2</sup>.

Over the past three years, alternative procurements options have emerged in the South African market. These not only bridge this finance gap but also provide the added benefit of reduced system performance risk over their contract terms. The diversification of available finance options from commercial debt to include power purchase agreements, rooftop rentals and solar leasing has created new opportunities for investment in energy security.

## Overview of different procurement options for an embedded generation solar project

Deciding which finance option is the most appropriate for an embedded generation solar project has become a key consideration for South African businesses. This industry brief reviews three finance options, and for each model, possible providers are listed along with an illustrative cash flow comparison:

- **Option 1:** Outright purchase and commercial debt.
- **Option 2:** Solar PPA.
- **Option 3:** Embedded generation leasing.

<sup>1</sup> Largely solar photovoltaic and Lithium-ion battery storage.

<sup>2</sup> The latest bouts of loadshedding have also taken on a new characteristic with multiple loadshedding slots during a single day, often over 2-4 hours at a time.



## Option 1: Outright purchase and commercial debt

Commercial banks have been the dominant lender in the embedded generation market. They have had sufficient time to gauge the risk and opportunities in the South African energy transition. Many have now set up dedicated divisions with the capacity to assist clients by structuring finance deals to meet their energy needs. This was the focus of the [Industry Brief: Financing Rooftop Solar PV 2021](#).

Typically, commercial banks will offer an amortized loan backed against the asset as collateral. Due to the maturity of the solar PV industry and internal due diligence measures taken by lenders, loans are offered at attractive lending rates. New investment traffic is generally driven through existing business banking clients or through dedicated solar platforms such as those developed by [Standard Bank](#) and [Hohm Energy](#).

Several additional commercial lenders have emerged since the 2021 brief was published:

**Discovery Bank:** Dedicated solar budget facility at interest rates from prime minus 2% over 72 months for values R6 000 to R1 million.

**Investec:** Asset finance term loans for the C&I sector, and tapping into unutilized home loan facilities for residential customers.

**First Fund:** Loans for renewable projects with a minimum ask of R50 million.

**Business Partners:** Energy fund for small, medium and micro-enterprises (SMMEs). Loans valued from R250 000 to R 2.5 million at prime +1% interest rate.

**Inyosi:** Fund to the value of R200 million provided to support black-owned businesses with loans for energy security interventions.



In an outright debt-financed purchase, the client, as the owner of the system, can claim the [12B tax incentive](#) which significantly reduces the effective cost of investment. In the other options covered in the brief, the client misses out on this benefit as the developer is entitled to claim in those scenarios.

System performance risk remains a challenge for this model. This can be mitigated through an operations and maintenance (O&M) contract with an engineering, procurement and construction company (EPC), which for the C&I sector usually amounts to 2-3% of the project value per annum

## Option 2: Solar PPAs

In PPAs, the developer provides the solar PV system at no upfront cost to the customer. Unlike outright purchases, installation, operations and maintenance of the system are fully covered by the solar services provider. This funding option often includes insurance and performance guarantees.

This is very attractive for cash-constrained clients who cannot raise the necessary capital. PPAs have increased since the economic shock of the Covid-19 pandemic and businesses battling both cash flow and an energy crisis.

Traditionally a PPA tariff is billed monthly, based solely on the amount of electricity (kWh) the client consumes from

an installed system. This tariff increases annually at a fixed escalation or is linked to increases in the applicable distribution utilities tariff, allowing businesses to more accurately predict future energy costs.

PPAs terms are usually 15 to 20 years with typical PPA tariff rates pegged at 70% to 85% of the applicable distribution utilities tariff. Whilst the general trend ([Figure 1](#)) has been a decreasing PPA procurement cost, in 2023 prices went up ~20% due to increases in the cost of equipment owing to the supply chain constraints on the back of the COVID-19 lockdowns and spiking global demand for solar PV components.

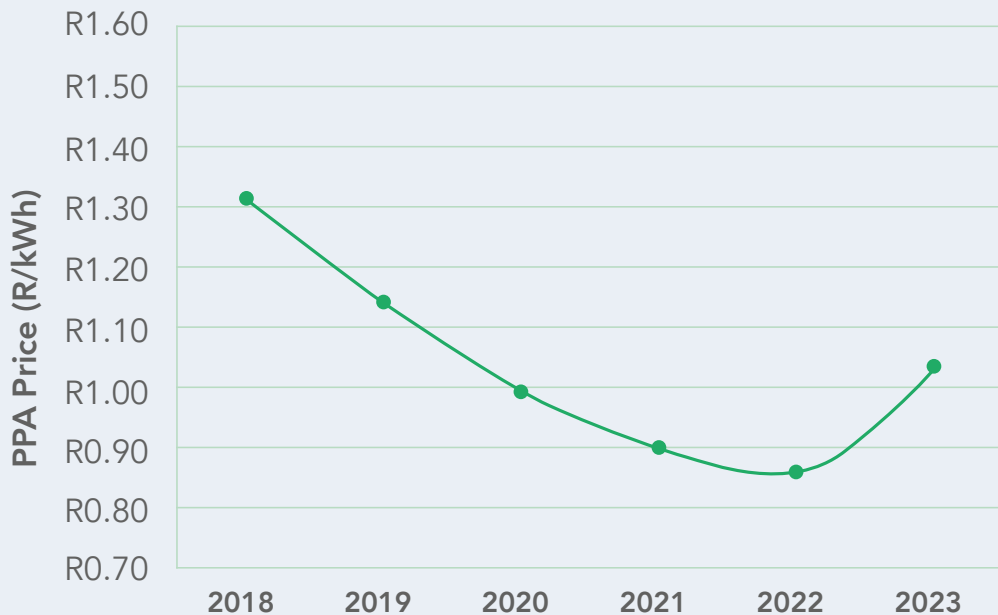


Figure 1: PPA Procurement Price Trend (500kWp C&I)

The relative trajectory of the PPA tariff and distributor tariff determines the viability of the project for both the developer and the client. Most contracts will also include clauses that specify options for the clients to buy out ownership of the system, or for the developer to sell on the project.

Currently, PPAs account for ~30% of new C&I projects and there is a significant demand for PPA finance backers and bridging financiers as the market segment continues to grow. There are several market players operating in South Africa. A list of possible providers can be found on the [South African Solar Photovoltaic Industry Association's members database](#). Given the length of the contract, selecting a reputable service provider is an important consideration.

## Option 3: Embedded generation leasing

In an embedded generation lease model, the client pays a monthly fixed fee for the electricity provided (regardless of fluctuations in production or consumption) by the system. The client gains ownership of the system at the end of the lease term. **Figure 2** shows a lease-to-own system by Soly on Creation Wines, Hermanus.

There are many similarities to a PPA. The developer and contracted EPC undertake the installation, operations and maintenance of the system during the lease term. The pre-agreed fixed monthly fee escalates based on inflation (CPI), but unlike PPAs, the lease term is often shorter ranging from five to 10 years.

The lease model is quickly becoming the standard alternative for procuring energy storage in the C&I sector with a linked PPA for the solar PV component of the combined solar PV and battery energy storage system.

It is very difficult for a PPA provider to model the inclusion of storage into a blended PPA rate, as the battery lifespan and overall economics is dependent on usage patterns which are quite volatile within a systemic loadshedding environment.

In most cases current Li-Ion energy storage technologies have a 10-year warranty at most, whereas PPA terms are usually 15 years, so this necessitates the inclusion of at least one replacement. The overall result is that the blended PPA rate will be exorbitant as the clients are covering these uncertainties and future costs from the outset of the contract.

Linking the lease terms to the useful life of the storage asset (the largest cost item in most installations) increases economic viability and predictability. In parallel the storage lease can be linked with a PPA for the solar PV system.



Figure 2: Creation Wines, Hermanus Lease-to-Own by Soly

## Illustrative cash flow comparison

Figure 3, Figure 4, Figure 5 and Figure 6 provide a comparison of cash flows for the same 100kWp PV system based on the different procurement options discussed above. The main takeaway to note is that the greater the capital and performance risk taken by the client, the greater their long-term potential return on the project. The following general assumptions are used for all of the models:

- **Annual Consumption:** 180 100 kWh
- **Annual generation:** 255 500 kWh
- **The percentage of generation for own-use:** 90%

Figure 3 shows an outright purchase of a 100kWp system with a five-year break-even point using 125% depreciation in the first year (12B), a 3% operations and maintained contract per annum and no feed-in tariff.

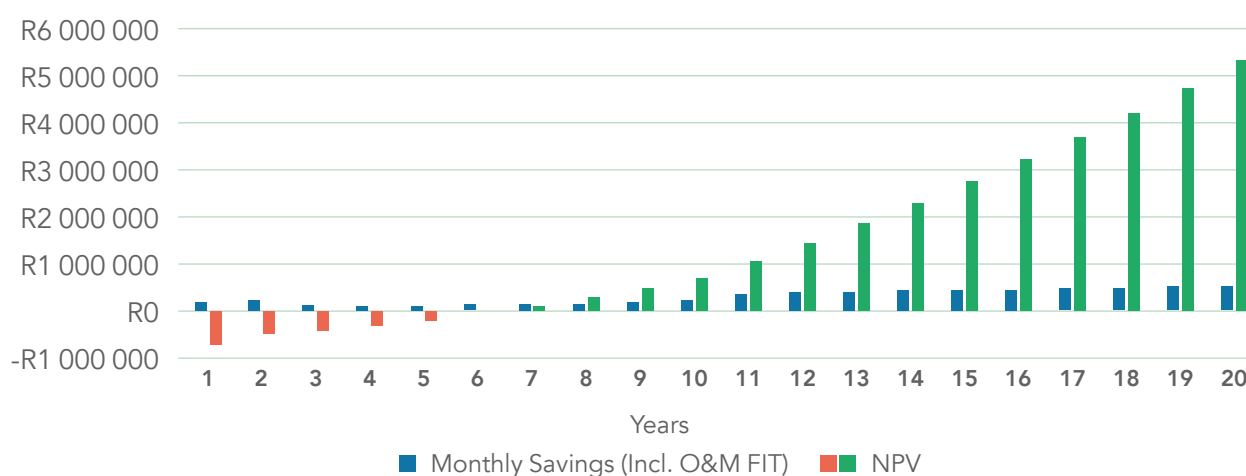


Figure 3: Projected value - 100kWp outright purchase

Figure 4 shows a system financed through a commercial debt facility with a 10-year term. 12B was claimed at 125% of project value in the first year, and a 3% O&M contract per annum was included with a loan interest rate of 8% and approximate amortised monthly payments of R16 000. No feed-in tariff was included.

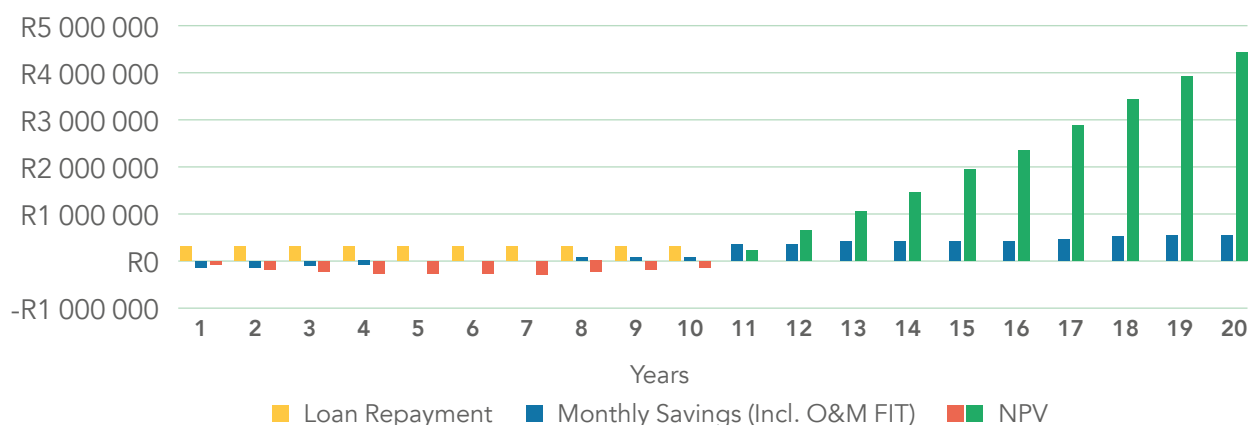
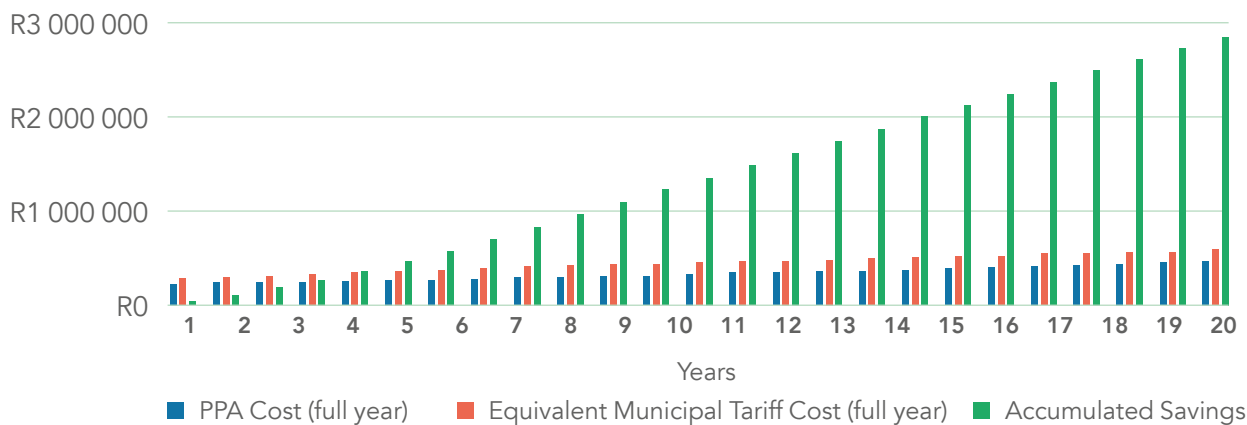


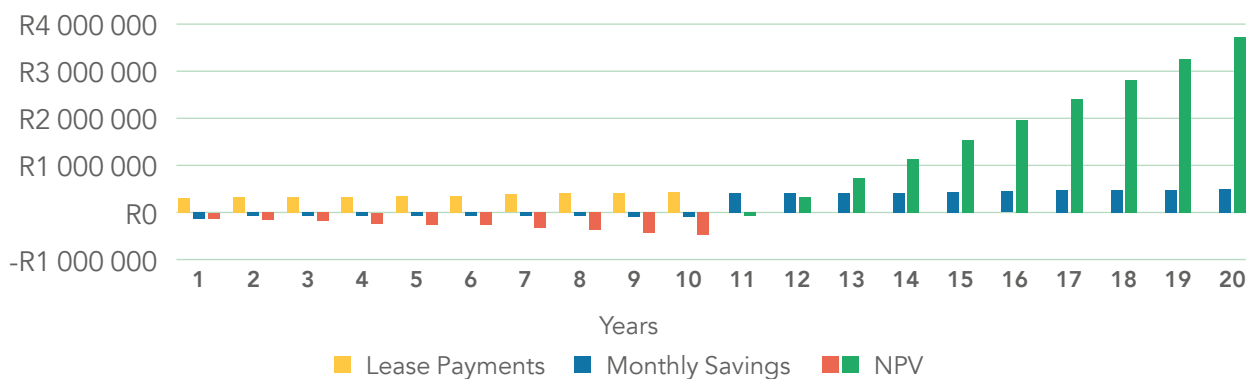
Figure 4: Projected value - 100kWp debt finance

**Figure 5** presents a 100kWp system purchased through a PPA finance structure. The PPA rate is set at R1.20 /kWh with an escalation rate of 3% per annum.



**Figure 5:** Projected value - 100kWp PV PPA

**Figure 6** provides a cost estimate of a 100kWp PV system financed through a 10-year solar lease. The monthly payments were set at R24 500 with a 5% annual escalation and a 3% O&M contract per annum after the lease term.



**Figure 6:** Projected value - 100kWp PV lease



# Determining the right procurement option

Table 1 and Figure 7 provide the necessary decision bases for determining an appropriate procurement path based on system needs.

Table 1: Procurement options summary

Procurement option	Why? When?
Outright purchase	Want to maximize the benefit of the system. Capital outlay can be funded off the business balance sheet.
Debt finance	Want to maximize the benefit of the system. Capital needs to be raised from commercial debt.
Solar lease	Cannot afford the previous two options, but want to own the system in the long term. Want to minimize system performance risk over the lease term.
Solar PPA	Don't need to own the asset. Achieve utility bill savings from day one of operation with the developer ensuring adequate system performance.
Roof rental agreement	Limited on-site energy demand but large available roof area e.g. warehouses.

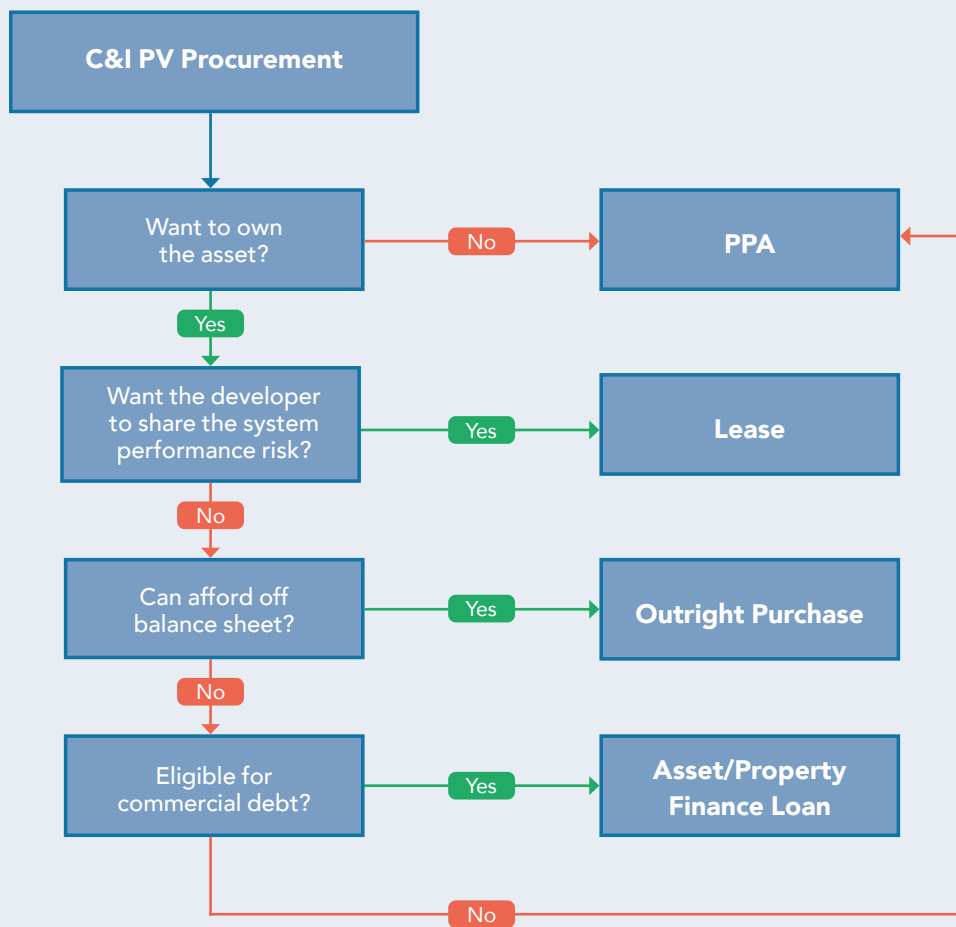


Figure 7: Procurement decision tree



**Table 2** indicates current costs for systems ranging from 100kWp to 1MW based on the four funding models discussed above.

Table 2: Cost of procurement 2023/24

Procurement options / system size	<100 kWp	<500 kWp	<500 kWp	>1 MW
<b>Balance sheet</b> (per Wp)	R 12.00 - 16.50	R 12.00 - 15.00	R 11.50 – 14.00	R 11.00 – 13.50
<b>Debt finance</b> (5 - 10 years)	Above amortized plus ~Prime -2% interest p.a., competitive rates will vary.			
<b>Lease-to-own (10 years)</b> (per month excl. escalation pa)	R 7 000 - R30 000	R 25 000 - R120 000	R100 000 - R200 000	>R210 000
<b>PPA (10 - 20 years)</b> (per kWh)	R1.10 - R 1.45	R1.00 - R 1.30	95c – R 1.15	80c - 90c







# Incentives

Table 3: Solar PV incentives

<p><b>Feed-in tariffs (FITs)</b></p> <p>Customers are 'paid' for any electricity they feed onto the grid, through reductions in their energy bills. See <a href="#">ES MIR 2023</a> pg. 33-34 for municipalities that offer FITs.</p> <p>The City of Cape Town offers a lucrative tariff at 103c/kWh which includes a 25c supplement until 2025. It has also gained approval from the National Treasury for customers to be paid cash for exported energy without the limitation of having to be a net consumer (i.e. consuming more than they export).</p>	<p><b>Solar PV is VAT deductible</b></p> <p>VAT registered entities can deduct the VAT portion of the solar PV system.</p>
<p><b>12B tax allowance</b></p> <p>Allows businesses to deduct the costs of asset investments that generate energy over one year or three years, which creates a cash flow benefit in the early years of a project.</p> <p>Businesses can deduct 50% of the costs in the first year, 30% in the second and 20% in the third for qualifying investments in wind, concentrated solar, hydropower below 30 megawatts (MW), biomass and solar PV projects above 1MW. Investors in solar PV projects below 1MW can deduct 100% of the cost in the first year.</p> <p>Under the expanded incentive, businesses will be able to claim a 125% deduction in the first year for all renewable energy projects, with no thresholds on generation capacity. This adjusted incentive will be available only for investments brought into use for the first time between 1 March 2023 and 28 February 2025.</p>	<p><b>Carbon tax</b></p> <p>An increase was announced to the carbon tax rate to R144 effective from 1 January 2022 on taxable activities as defined in Schedule 2 of the Carbon Tax Act. To uphold South Africa's COP26 commitments, the rate will increase each year by at least R15 until it reaches R300. From 2026, the government intends to escalate the carbon price more rapidly every year to reach at least R450 by 2030, and R1800 beyond 2050.</p> <p>Renewable energy &amp; energy efficiency projects do not qualify for additional international carbon credit registries. They can however apply to the voluntary carbon market. The minimum project size for this to be financially viable is 1000+ ton Co2eq per annum, or 950 000 kWh diverted grid consumption or ~150 kWp PV capacity.</p>
<p><b>12L tax allowance</b></p> <p>Provides as a deduction, in determining the taxable income of a taxpayer, an amount in respect of energy efficiency savings. The deduction will be calculated at 95c/kWh of energy efficiency savings and has to be measured and confirmed by an institution, board or body as prescribed by regulation.</p>	<p><b>Private household</b></p> <p>Private households can claim a 25% rebate on the cost of photovoltaic (PV) solar panels, up to R15 000 per individual.</p> <ul style="list-style-type: none"> <li>• Solar PV panels must have a minimum capacity of 275W per panel (design output).</li> <li>• The solar PV panels must form part of a system that is connected to the mains distribution of the private residence (there is some indication that feed-in is required to qualify - meaning added metering costs).</li> </ul>



# Next steps



To find out more contact GreenCape, [energy@greencape.co.za](mailto:energy@greencape.co.za)



For additional financing information visit GreenCape's Green Finance Desk:  
<https://green-cape.co.za/sector/green-finance/>



Useful Resources:  
Green Economy Climate Finance Database 2022  
Financing Rooftop Small Scale Embedded Generation



This industry brief was made possible thanks to the support of the **City of Cape Town**

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