2021 version

Solar PV Business Case

Executive support in the Western Cape

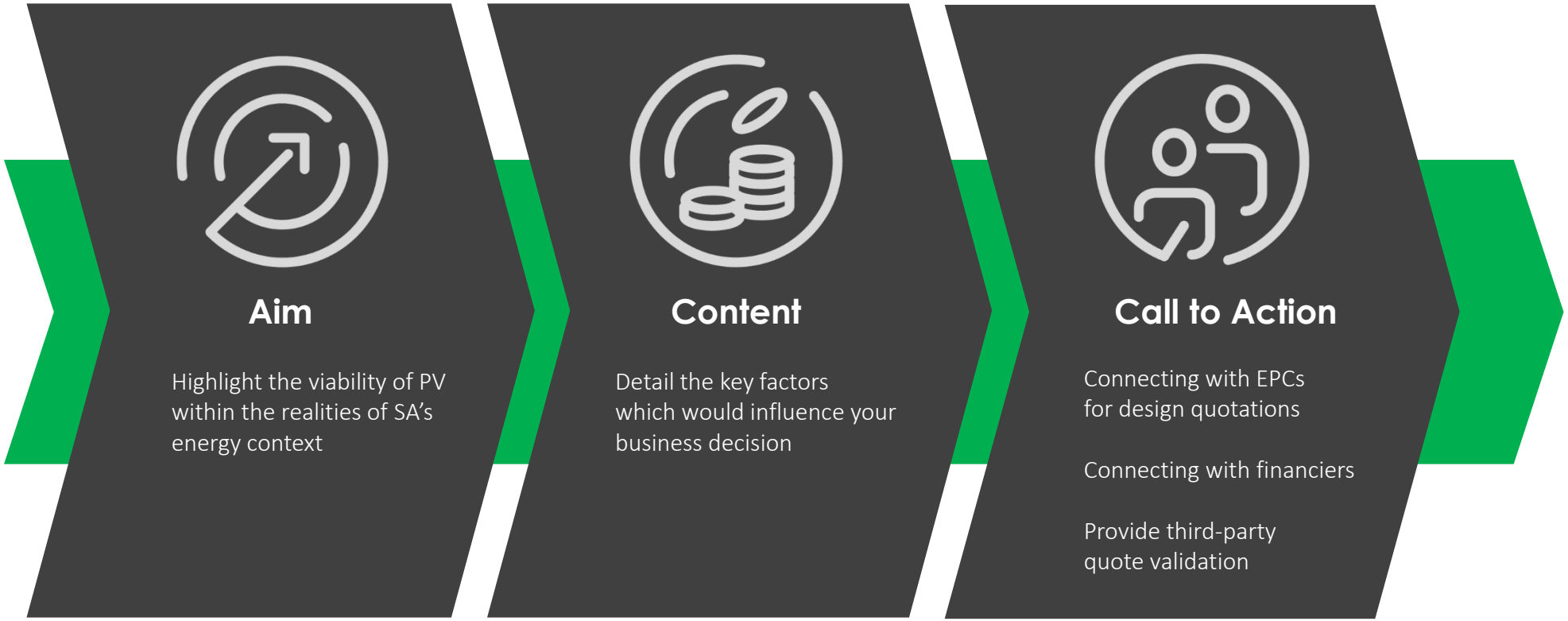
GreenCape Sector Development Agency

Image: Shoprite Constantia

GreenCape

Executive Decision Support Pack

Providing all the information you need to make an informed investment



GreenCape

Who we are

GreenCape is a non-profit organisation that drives the widespread adoption of economically viable green economy solutions.

We work with businesses, investors, academia and government to help unlock the **investment** and **employment** potential of green technologies and services, and to support a transition to a resilient **green economy**.

Link: 2021 Market Intelligence Reports

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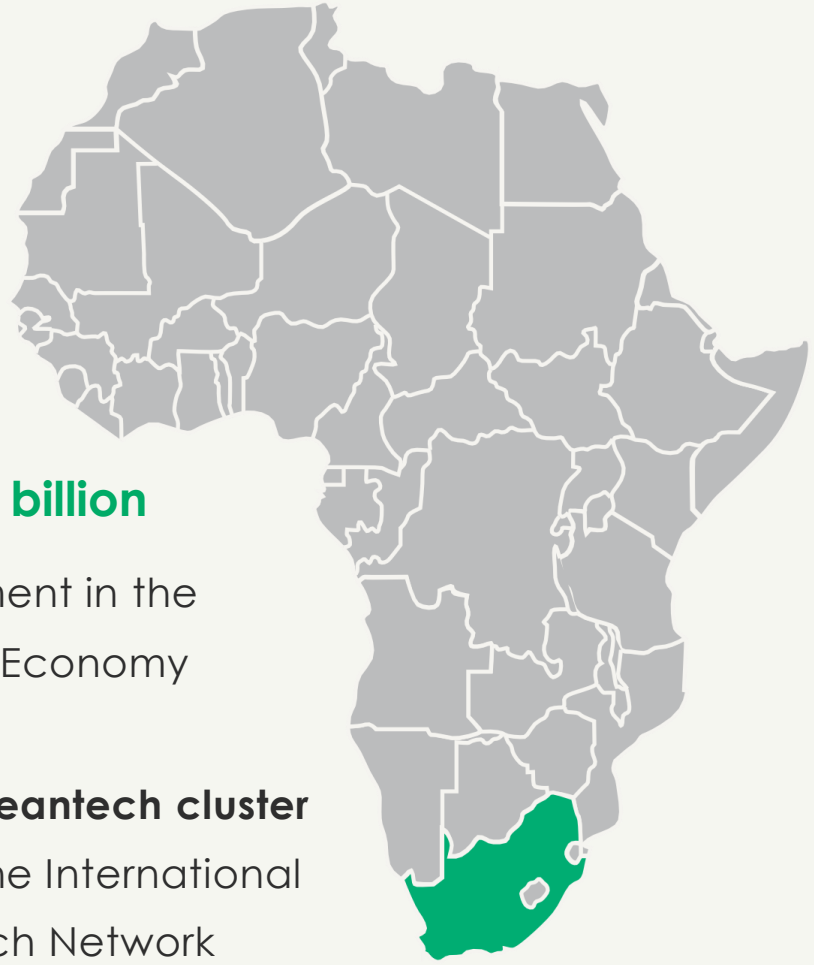
Our **impact over 10 years**

> ~ 19 000 local jobs

> ~ 2 000 members



~ R 42 billion

investment in the Green Economy

1st African Cleantech cluster member of the International Cleantech Network

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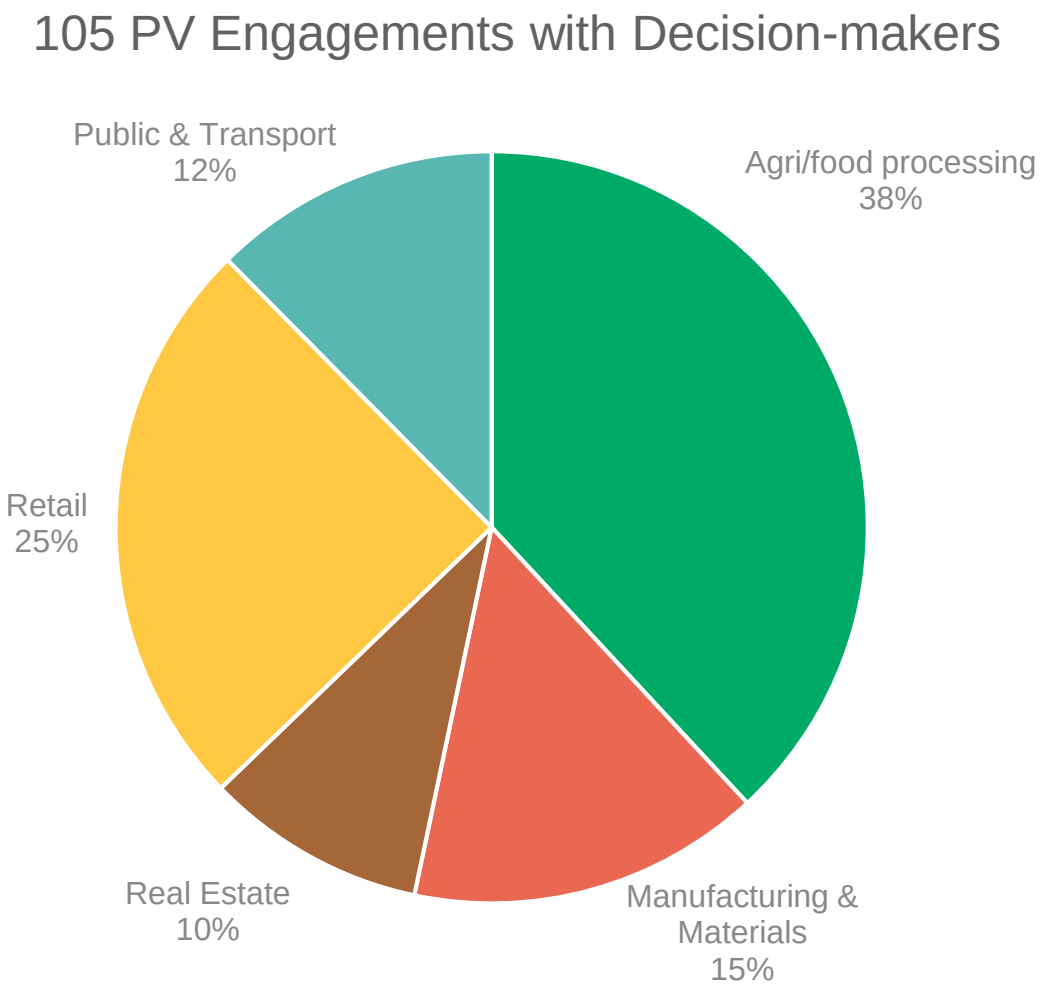
Current Progress 2017-2020



66% procurement rate

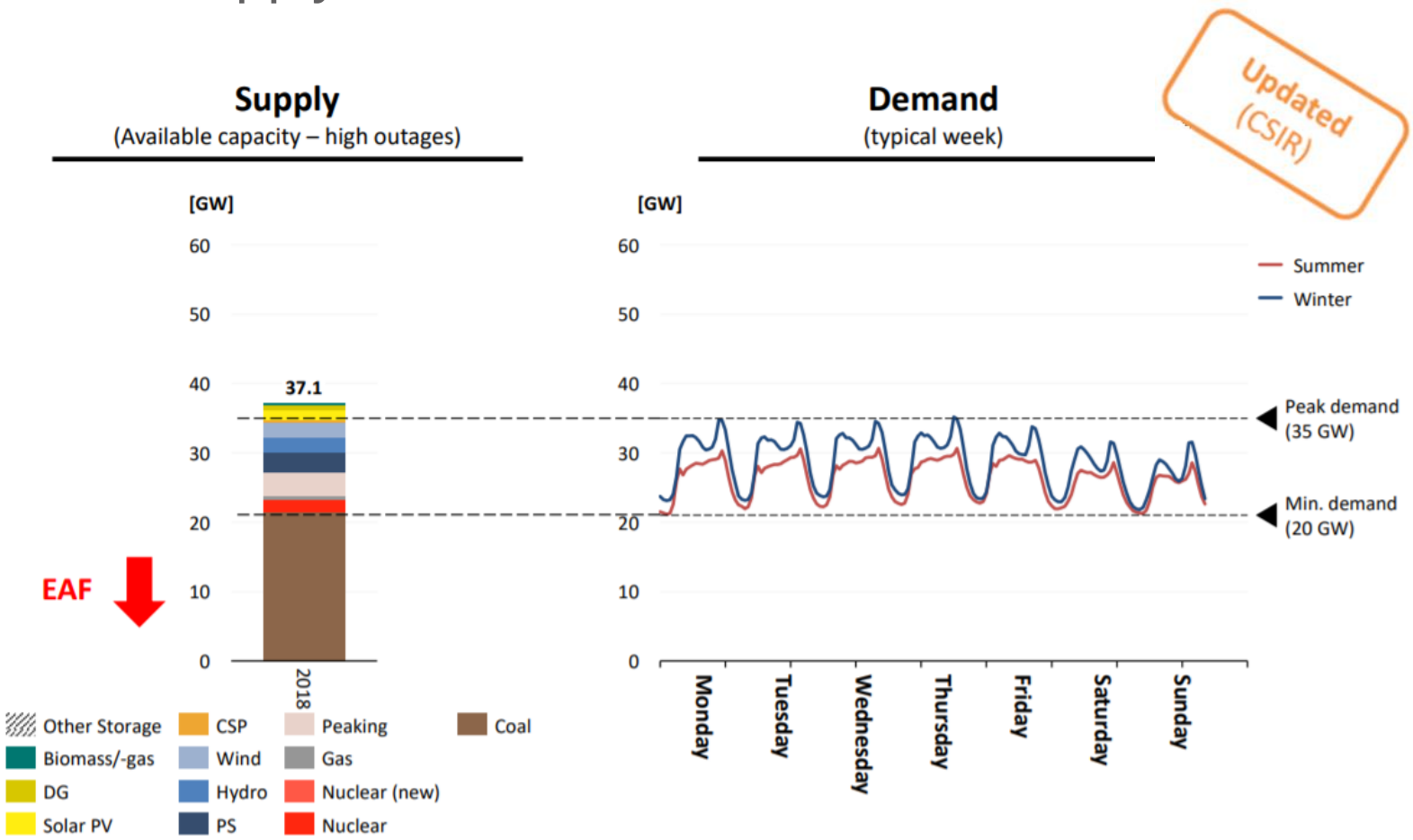
(Have gone on to discuss procurement with service providers)

Source: GreenCape analysis

Defining the Problem

- ❑ Rising Tariffs
- ❑ Loadshedding
- ❑ Business Environment

National Supply Crisis

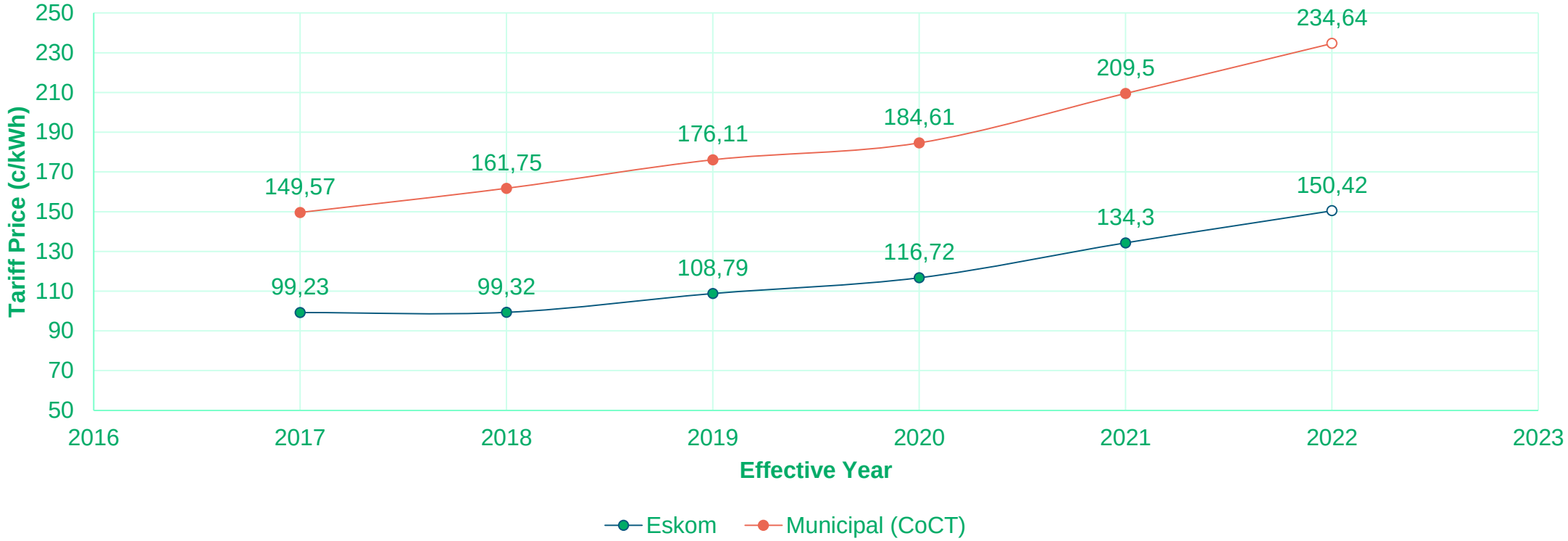


EAF (energy availability factor), **The percentage of maximum energy generation that a plant is capable of supplying to the electrical grid**, limited only by planned and unplanned outages.

Down from 72% in 2018
to 61% in 2021

Source: CSIR Study - Setting Up for the 2020s

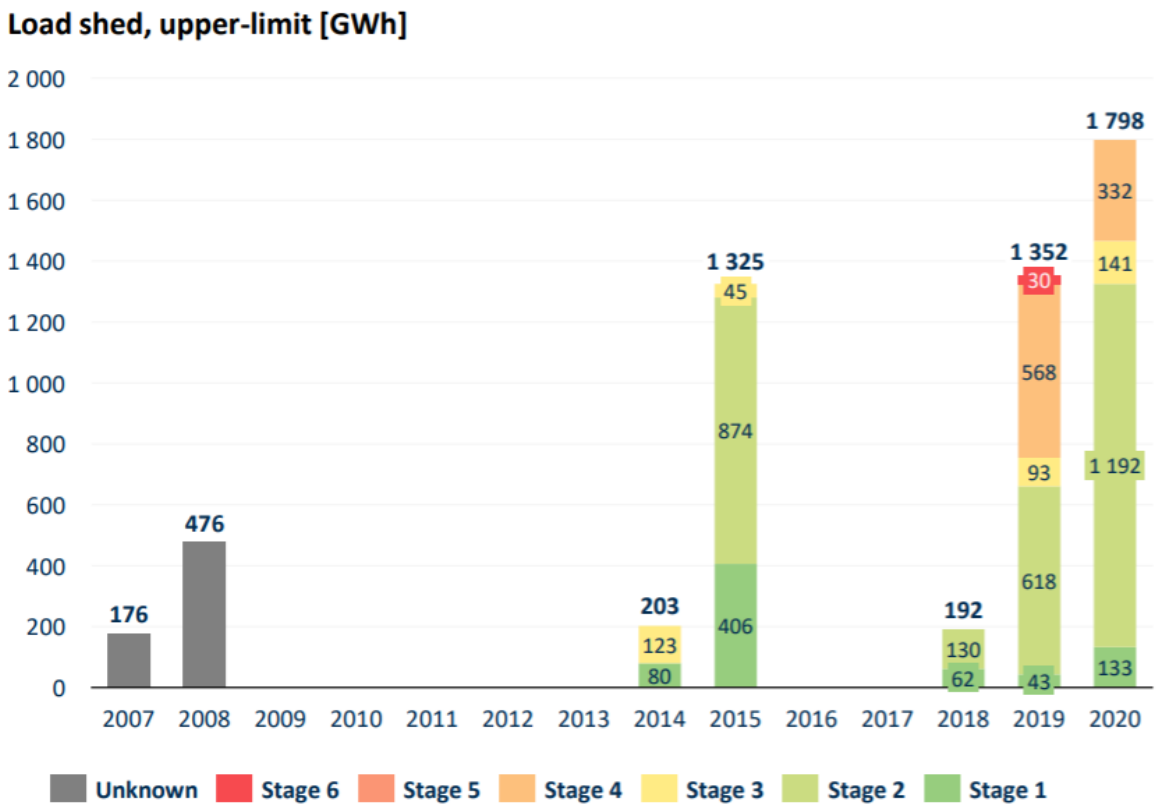
Rising Electricity Tariffs - Up approx. 40% 2017-2021



Period 2017-2021 increase: ~40% | Average per annum increase: 11%
Bulk price analysis, expect variance between municipalities

Source: GreenCape analysis

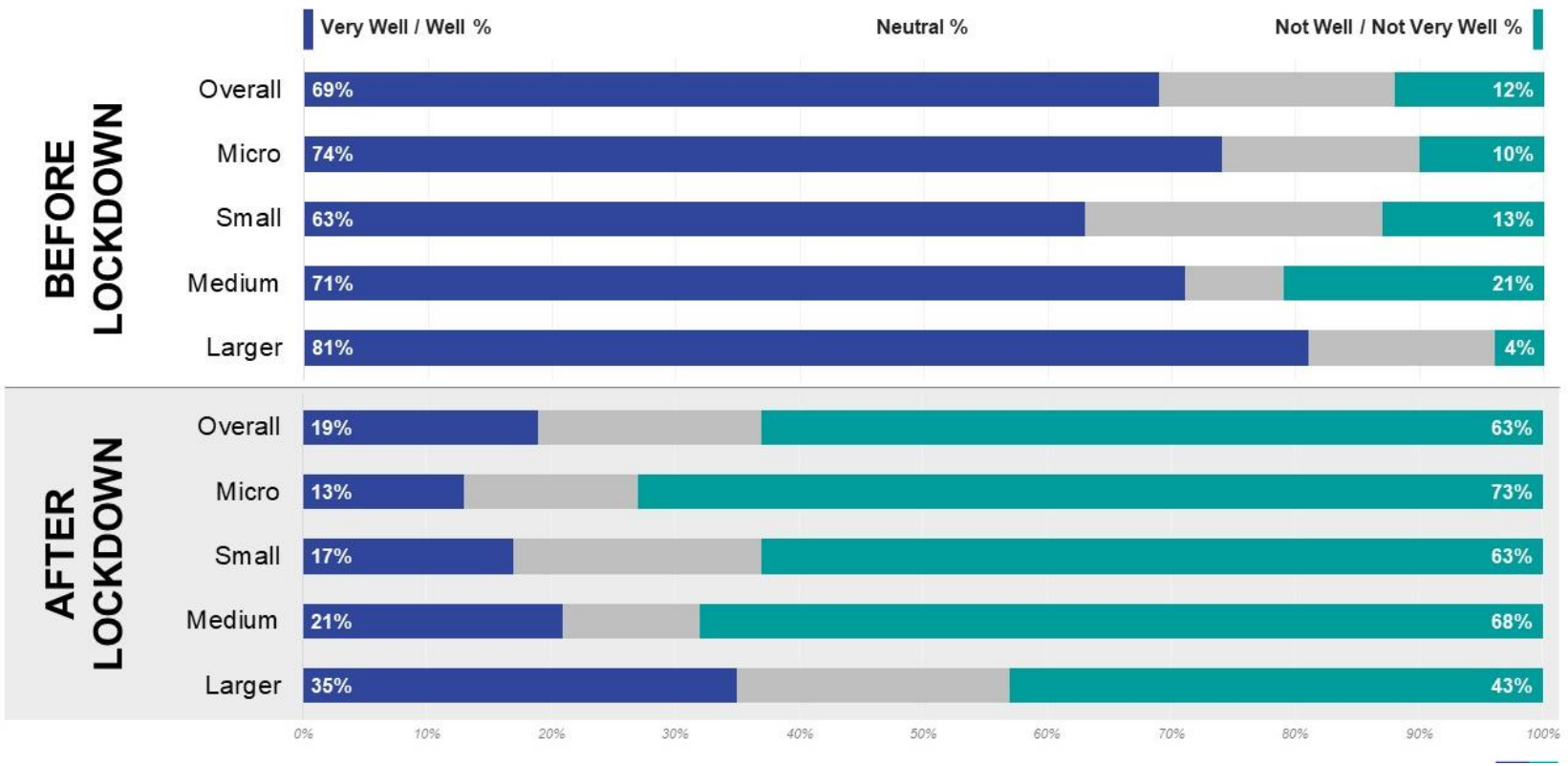
Best case scenario: Loadshedding for another 3-5 years



Year	Duration of outages (hours)	Energy shed (GWh)
2007	-	176
2008	-	476
....	....	....
2014	121	203
2015	852	1325
2016	-	-
2017	-	-
2018	127	192
2019	530	1352
2020	859	1798

Source: CSIR Study - Utility Scale Statistics 2021

Economic downturn & Covid-19 pandemic severe impact on SMMEs



Business Sustainability Study

38% estimate that it will take more than a year for their businesses to recover.

28% state that they do not know how long the recovery period will be, as things are still too uncertain.

8% are convinced that their businesses will not be able to recover after the pandemic and that they are therefore considering closing their doors.

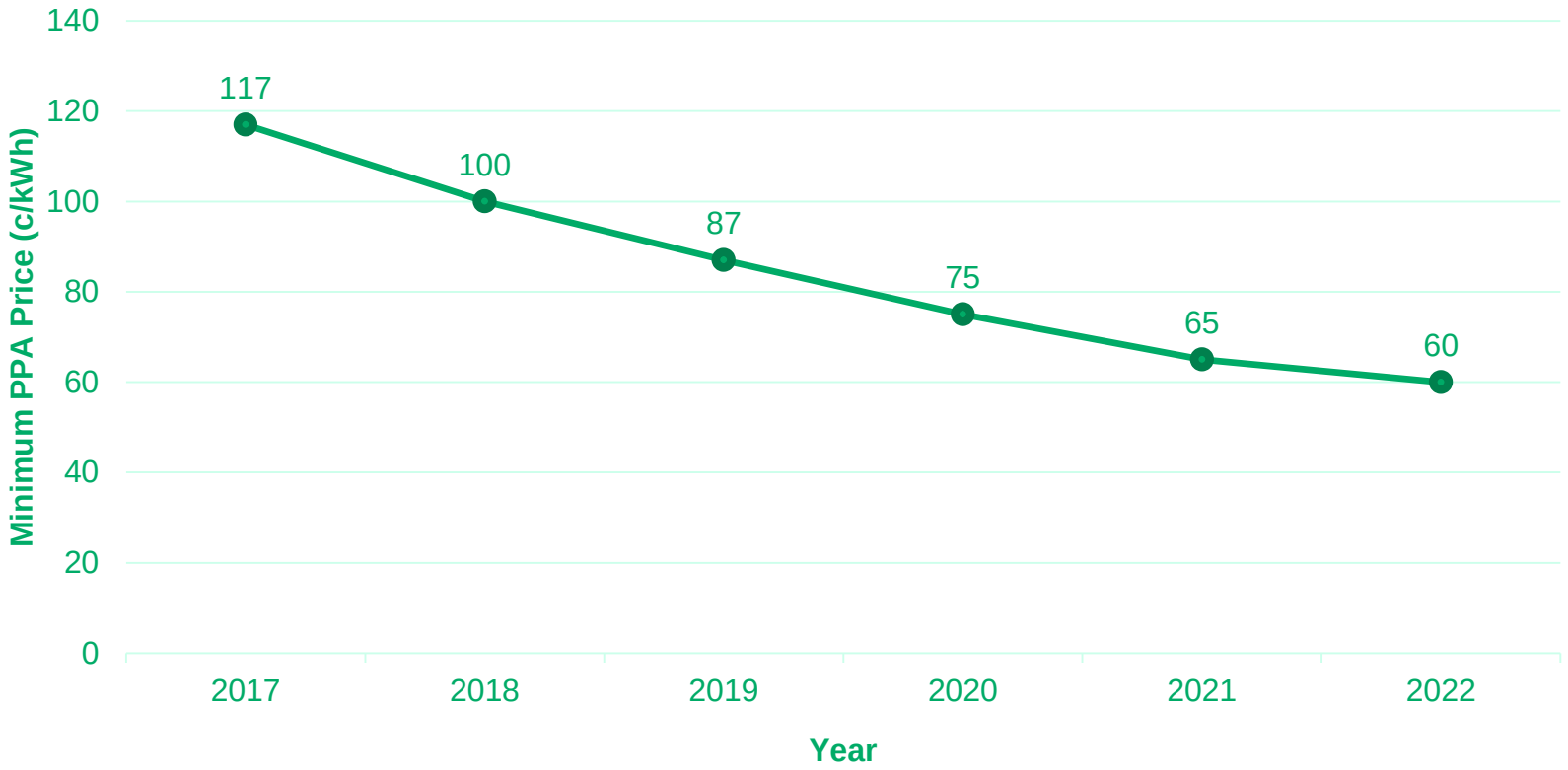
Source: Ipsos Study - SMMEs Covid19 Impact

Why does PV makes sense now?

- ❑ Cheaper c/kWh
- ❑ Flexible procurement options
- ❑ Technology & support

Why does PV makes sense now?

Declining PV Costs



Key Drivers

- Mass production of PV panels have driven manufacturing costs down 82% since 2010
- Progress in inverter and ancillary component technology has had a further cost reduction effect
- Reduced perceived risk on PV development allows for cheaper project finance

Source: GreenCape analysis

Solar PV Procurement Options

Option	Description
Balance Sheet	The solar PV system is funded by the customer, the cost is high but in return the client gets all of the savings benefit. The client takes ownership of the annual costs of running the solar PV system
Debt Finance	Banks offer loans for solar PV installations for a period of between 5-10 years and monthly payments are a fixed fee. The collateral requirement for the debt funding is often taken against the underlying property or the system (asset).
Lease agreement **Rent-to-Own**	The installation, maintenance and management of the solar panel and its components is paid for by the solar PV provider, while the business pays a fixed monthly lease payment for the duration of the lease term. The fixed monthly payment is determined based on the estimated annual production of the solar system and not on the solar energy produced or consumed.
Power Purchase Agreement (PPA)	The solar PV system is installed at no upfront cost.The installation, O&M of the system are fully covered by the solar services provider. This funding mechanism includes insurance and performance guarantees, with the biggest advantage being reduced electricity costs from day one.

Additional Benefits

Benefit	Description
12B Tax Incentive	Section 12B of the Income Tax Act makes provision for a capital allowance for movable assets used in the production of renewable energy. The incentive makes allowances **100% asset accelerated depreciation** in first financial year that the asset is brought online. This equates to a **28% deduction on the business' income tax.**
Carbon Intensity Reduction Less Carbon Tax	The first phase has a carbon tax rate of **R120 per ton of carbon dioxide equivalent emissions**. This rate will increase annually by inflation plus 2 per cent until 2022, and annually by inflation thereafter. Affected industries: Energy, manufacturing & construction, mining, chemical
Roof Rental	The owner rents their rooftop to a solar provider who builds a solar system and enters into a PPA to sell the energy from the system. The company entering into the PPA does not necessarily need to be the same as the company leasing the rooftop. **Market rate per m2: R 5.00 - 7.00**
PV Resale to Tenants	The owner installs solar PV system benefiting from a reduced power purchase agreement rate and then 'on-sells' the electricity generated by the PV system to tenants at a rate equivalent to the higher municipal tariff

Why does PV makes sense now?

Technology

- Most Municipalities in the Western Cape and NERSA have approved list of inverters that comply with grid connection requirements
- It is recommended that service providers implement tier 1 components
- Tier 1 suppliers generally offer longer warranties and have an option of warranty extension

Support

- Projects are implemented quicker due to increase in expertise and availability of components. On average turnaround is 3 months from signing to commissioning.
- Most EPC companies have O&M agreements with clients to service the solar system
- The PV Green Card is becoming a key regulatory certification for installers nationally

Costing

- Market price benchmarks
- Expected ROI
- Implications of storage

Market Price Benchmarks 2021/22

Procurement Options / System Size	<100 kWp	<500 kWp	>500 kWp	>1 MW
Balance Sheet (per kWp)	R 11 000 - 15 000	R 10 500 - 13 000	R 10 000 - 12 000	R 8 000 - 9 500
Debt Finance (5 - 10 year period)	Above amortized plus 5-8% interest pa			
Lease-to-Own (per month excl. escalation pa)	R 7 000 - 14 500	R 12 000 - 60 000	R 50 000 - 100 000	R 85 000 - 250 000
Power Purchase Agreement (PPA) (per kWh)	0.90c - R 1.20	0.80c - R 1.00	0.60c - 0.90c	0.56c - 0.70c

Source: GreenCape analysis

Project Model – Outright Purchase

System size (kW): 100 kW_p

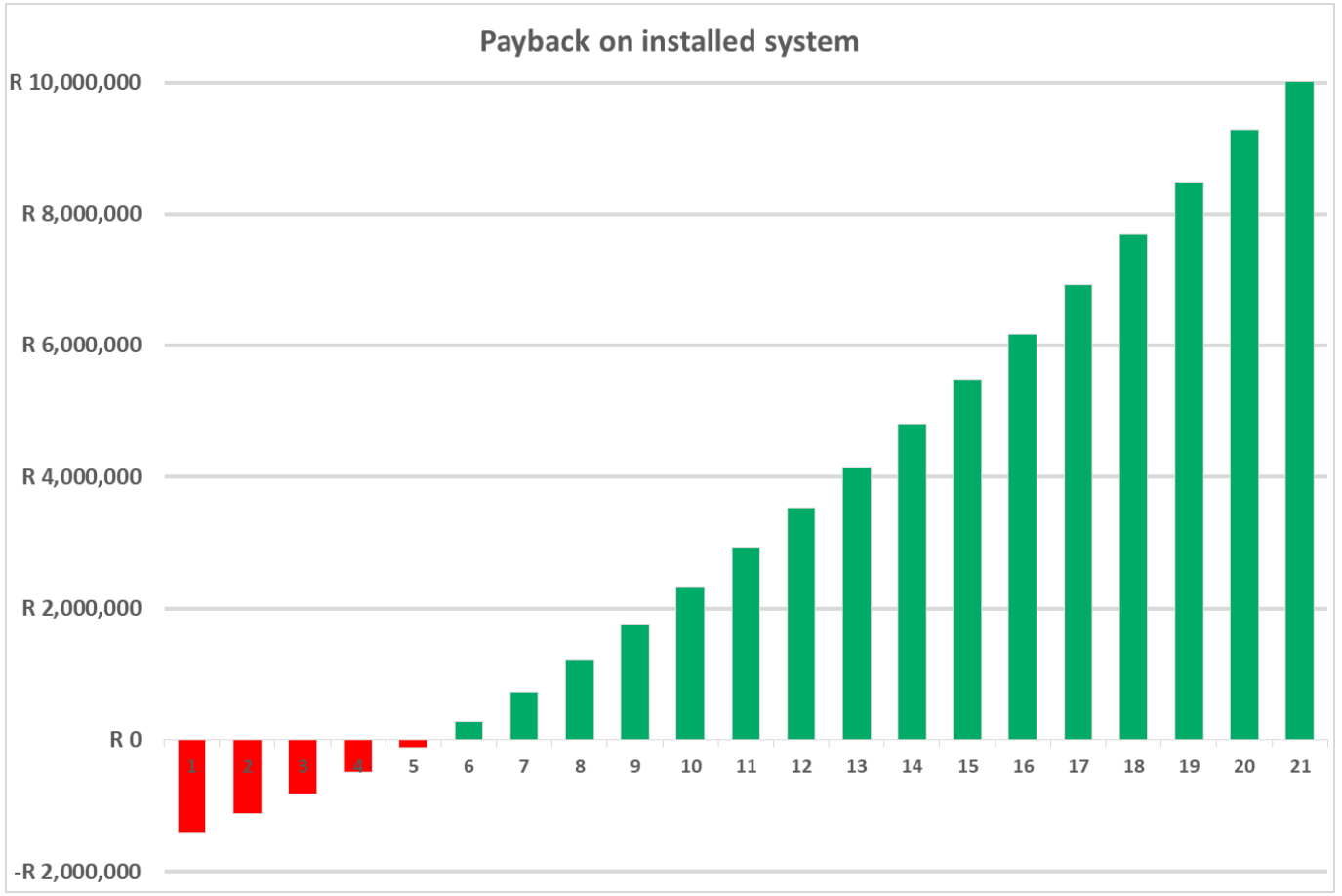
Cost of system: R 1.4 million

Electricity generated in a year: 255 500kWh

Yearly electricity consumption: 180 100kWh+

% of generation for own use: 80%

Payback period: 5 years



Source: GreenCape analysis

Project Model – Solar PPA

System size (kW): 100 kW_p

Electricity generated in a year: 255 500kWh

Yearly electricity consumption: 180 100kWh+

% of generation for own use: 80%

Source: GreenCape analysis

Energy Storage

Technology	Pros	Cons	Cost Range R/kWh
Lithium - Ion	Low operating and maintenance cost	High upfront cost Recharge time Lifespan of 3500 cycles (10 yrs depending on use)	Upfront: R 4 000 – 10 000
Diesel Generator	Higher energy density - 27x Li-ion Lifespan of 20000 hrs (20 yrs depending on use)	Rising diesel prices Chance of breakdown Potential carbon tax on emissions	Upfront: R 2000 – 2500 (Per kW) Operating: - 1. Fuel: R 4 – 5 - 2. O&M: 0.20c-0.50c

Over the course of a 20 year period Li-ion will still cost upwards of 5 times more than diesel genset
Battery lifetime and resulting replacement costs are highly dependent on the nature of usage

Source: GreenCape analysis

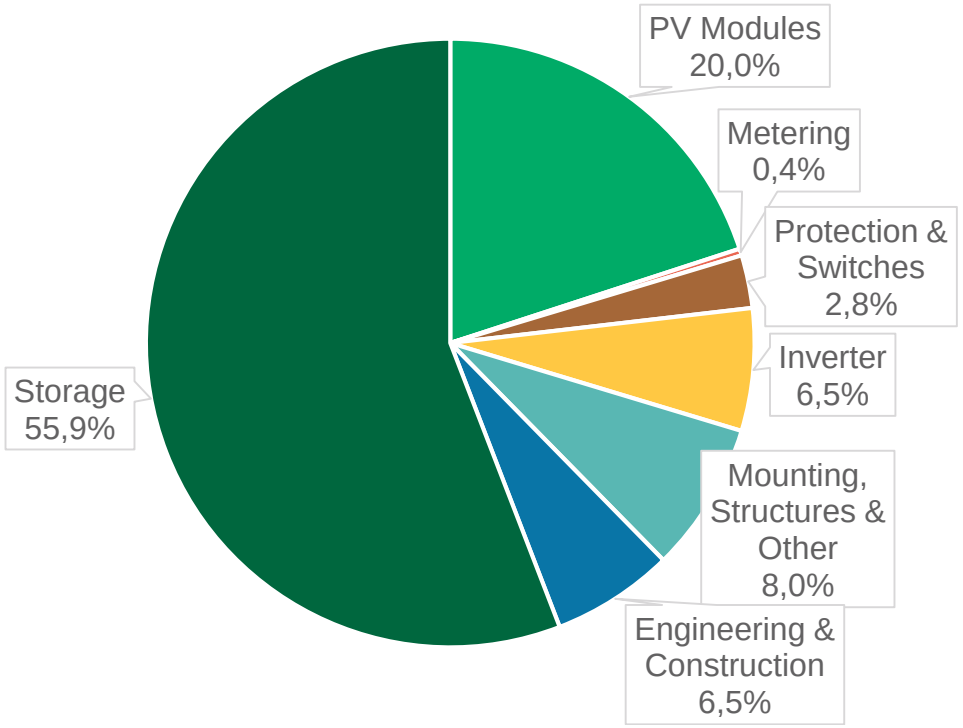
Example
Li - ion
Case

300 kWp System
LS = Stage 2

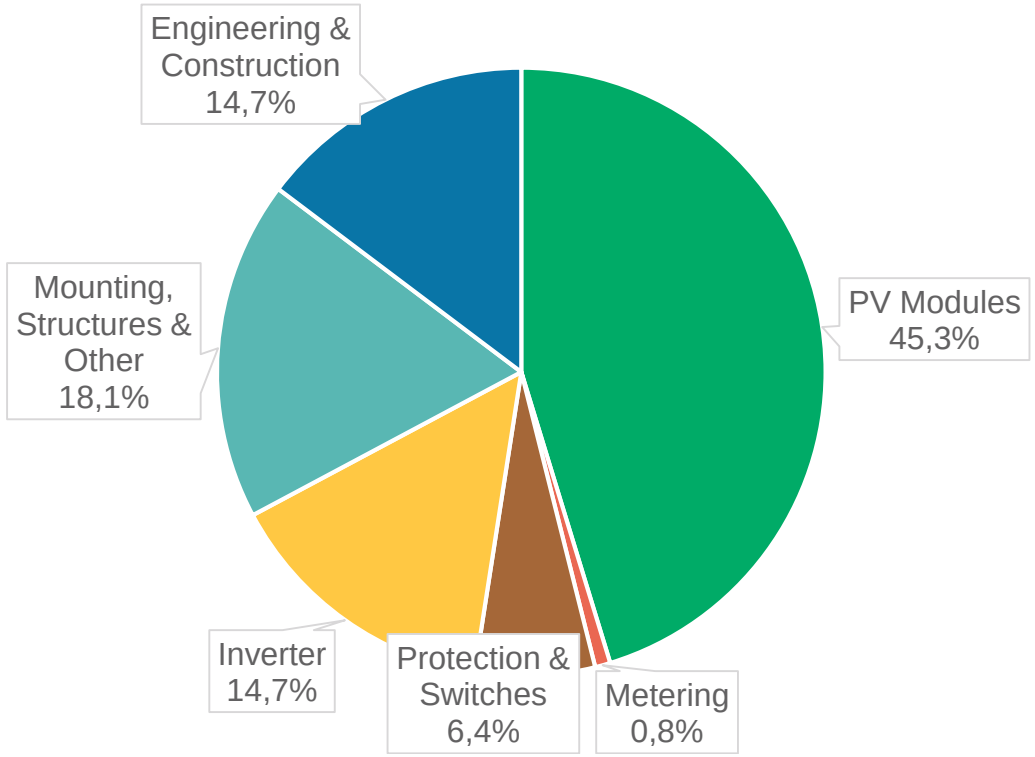
850 kWh 2 hrs per day

Takeaway
Storage is a significant portion
Consider underlying opportunity costs

% Investment with Storage [R 7 Mil]



% Investment without Storage [R3.2 Mil]



Source: GreenCape analysis

Regulations

- Licensing
- Registration & feed-in tariffs

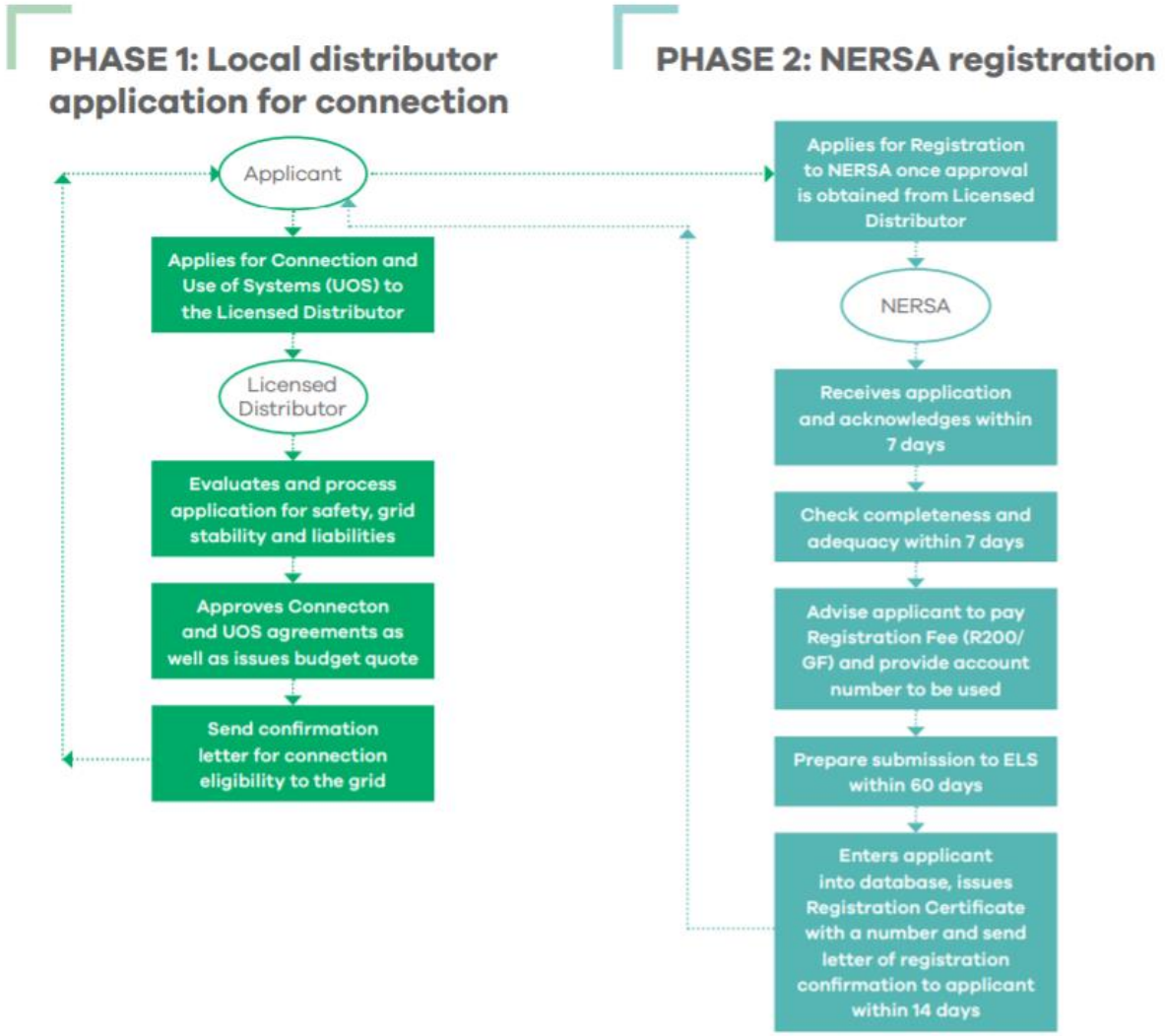
Licensing & Registration

	Activity	<100kW	100kW-1MW	1MW-100MW
NERSA	Registration	[1]	✓	✓
	Licensing			
Municipality /Eskom	Application for connection	✓	✓	✓

[1] Not required when there is already an existing point of connection. The local distribution utility must keep a register of such installations and must prescribe the conditions for connection.

Source: GreenCape analysis

Licensing & Registration



The service provider should facilitate these processes. We are available to assist if this becomes a project bottleneck.

Source: GreenCape analysis

System Sizing

Beyond the site-specific design elements that influence the achievable size of the PV system, there are also limitations based on the connection to local infrastructure:

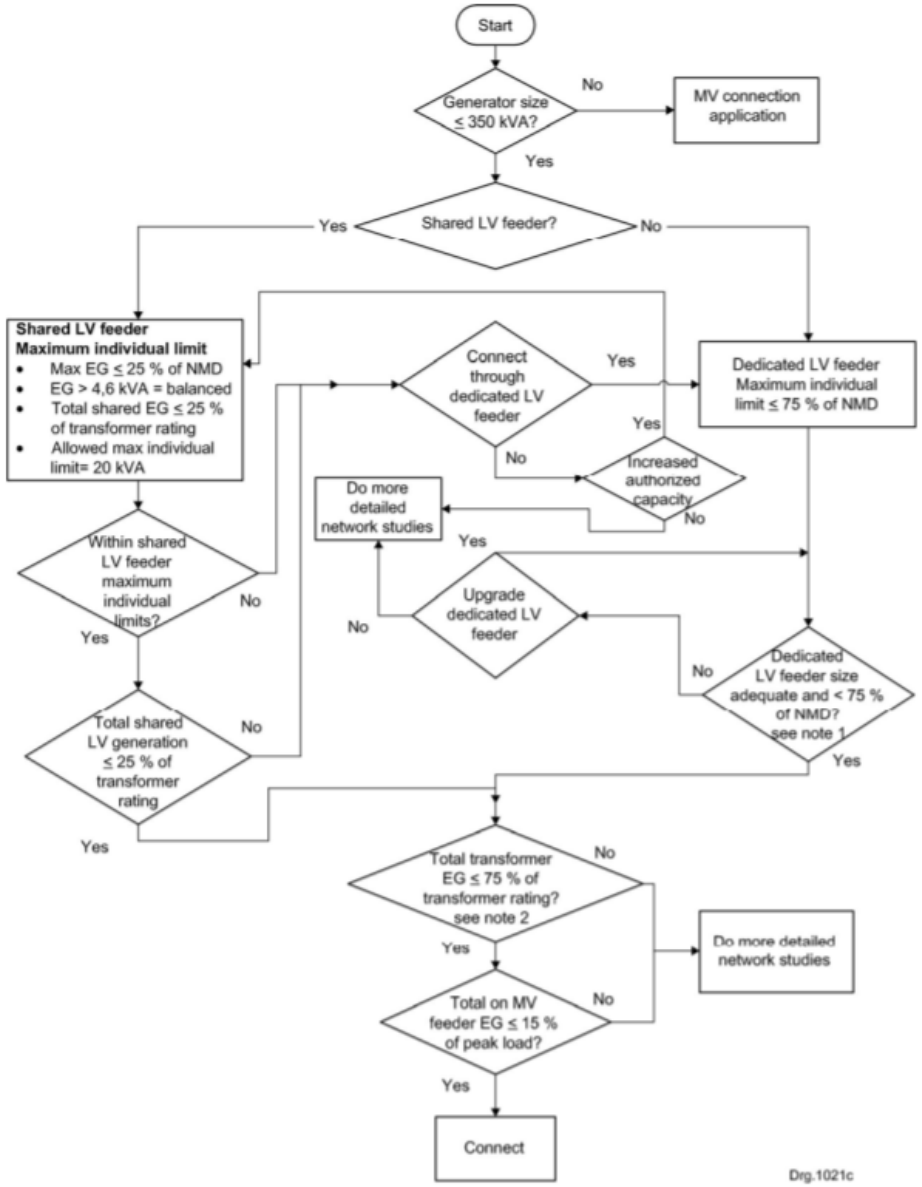
Shared LV Feeder

The maximum individual generation limit in a shared LV feeder is 25 % of the customer's notified maximum demand (NMD), up to a maximum of 20 kVA (generators greater than 20 kVA should be connected through a dedicated LV feeder).

Dedicated LV Feeder

The maximum generator size is limited to 75 % of the NMD.

The NMD for a site will have been determined upon initial connection to the grid.



Source: Grid Interconnection of Embedded Generation - NRS 097-2-3: 2014

Municipal SSEG Processes

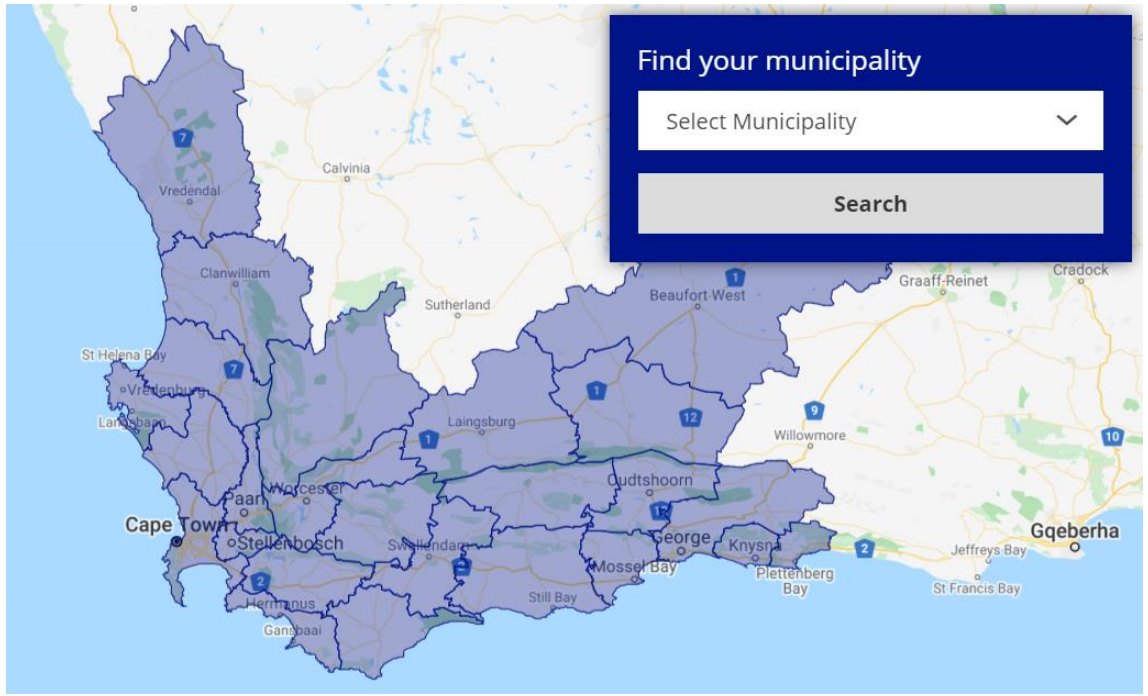
Municipality	Have an official SSEG application process?	Have SSEG tariff?	Have Feed-in Tariff
Beaufort West	✓	✓	✓
Bergrivier			
Bitou	✓	✓	✓
Breede Valley	✓	✓	✓
Cape Agulhas	✓	✓	✓
Cederberg		✓	✓
Cape Town	✓	✓	✓
Drakenstein	✓	✓	✓
George	✓	✓	✓
Kannaland			
Hessequa	✓	✓	✓
Knysna	✓	✓	✓
Laingsburg			
Langeberg	✓	✓	✓
Matzikama		✓	✓
Mossel Bay	✓	✓	✓
Oudtshoorn	✓	✓	✓
Overstrand	✓	✓	✓
Prince Albert			
Saldanha Bay	✓	✓	✓
Stellenbosch	✓	✓	✓
Swartland	✓	✓	✓
Swellendam			
Theewaterskloof	✓	✓	✓
Witzenberg	✓		

Most Western Cape municipalities have developed SSEG processes.

Our team is also able to assist with facilitation in scenarios where this is not the case yet

Source: GreenCape analysis

Two-part Tariff System



Cape Town Solar PV Tariff

Non-Residential Small-Scale Embedded Generation — Commercial

Commercial	Tariff Type			
Fixed Charges	**Monthly Charges**	**Flat**	**TOU**	**IBT**
	The fixed charge depends on the customer's category regardless of SSEG status			
Export Tariff (Feed-In)		73.87 c/kWh		
Import Tariff		SSEG customer's continue to import electricity at current tariff	SSEG customer's continue to import electricity at current tariff	SSEG customer's continue to import electricity at current tariff

Link: SSEG Tariff Map

Consult in conjunction with your local municipalities most recent tariff book

Source: GreenCape analysis

The Support Team

Multi-disciplinary expertise at your service

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Thank You

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