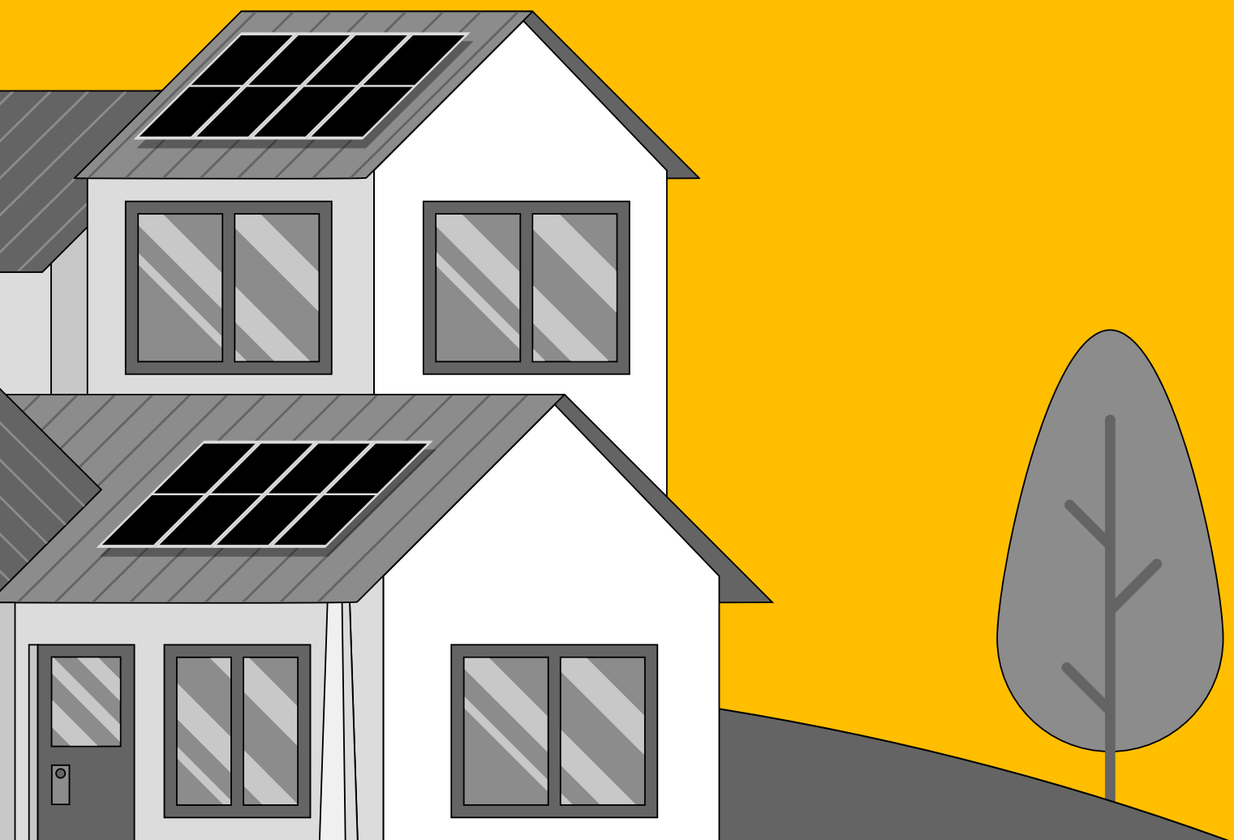
gosolr

Light Paper

Quarterly Solar Update

April 2024

Introduction



South Africa has an energy problem. That’s in no way news to anyone. We don’t produce enough, it costs a lot of money, and what we produce has a profoundly bad impact on the environment.

Coupled with continued consumer frustration fueled by tariff increases, record-breaking periods of load shedding, and a rising cost of living, you’d be one of a few that didn’t think the outlook looked bleak.

That being said, it’s not all doom and gloom.

We’re seeing more and more developments in renewable energy solutions, innovations in how we currently use power, and increased scope for creating clean, sustainable energy that can directly impact the continued energy crisis.

This inaugural ‘GoSolr Quarterly Solar Update’ distils the current conversations, latest stats, and key issues from across the energy sector to provide a comprehensive energy index that we will update quarterly.

In it, we explore some of the energy generation issues we face in South Africa, shine a light on regulatory developments (and shortfalls), and examine our national generation mix, opportunities, and key consumer drivers.

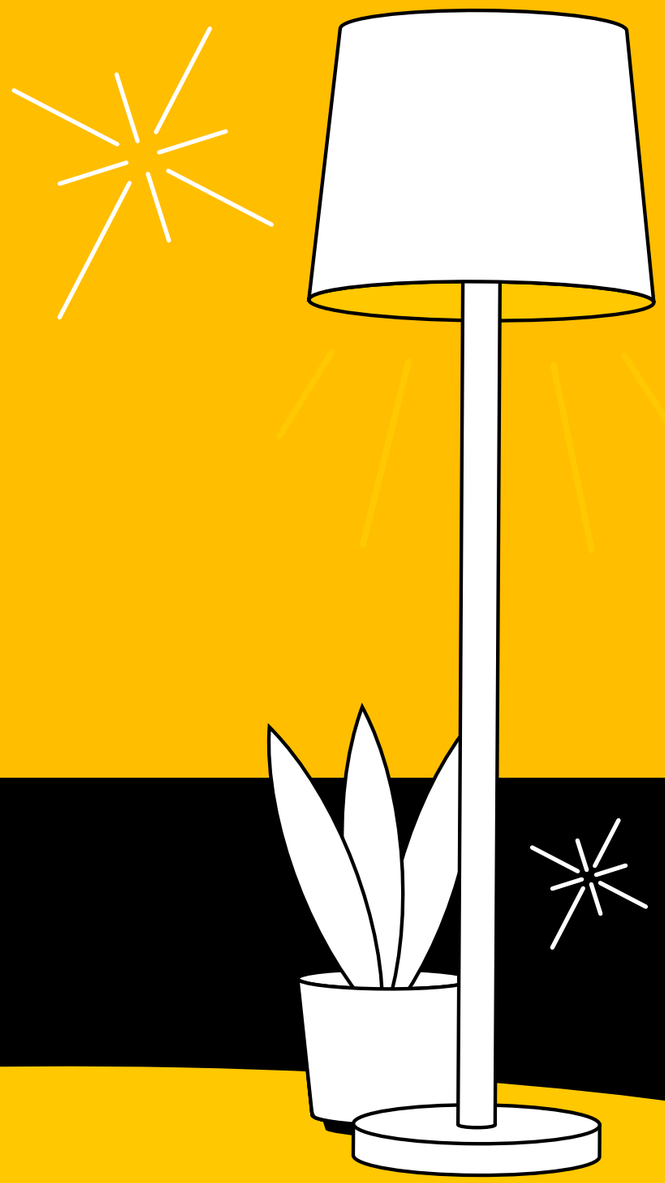
We know that there is immense potential in solar power generation and its ability to pull us out of the current energy crisis. The future of energy in South Africa lies in solar, that leads to ample clean power, job creation, new recycling systems, and – believe it or not – cost savings for South African households.

Here’s why and how.

SECTION 1

State of solar in 2024

Our cost-of-lighting is a crisis



Quarter 1 (January – March) 2024 at a glance

68 days

of load shedding this quarter

Source: *ESP*

South African electricity generation mix:

77.04% Coal
9.91% Solar
5.23% Wind
3.74% Nuclear
1.98% Hydro
2.10% Other

Source: *Ember*

5 440MW

of energy derived from roof top solar has been added to the grid as of March 2024. That represents an estimated gain of 236MW in the first quarter of 2024

Source: *Eskom*

2 630MW

of rooftop solar added to our electricity generation mix in 2023. This contributed to an average load shedding stage drop to level 1-2 this quarter, down from an average of level 3-4 in the same quarter last year

Source: *Eskom*

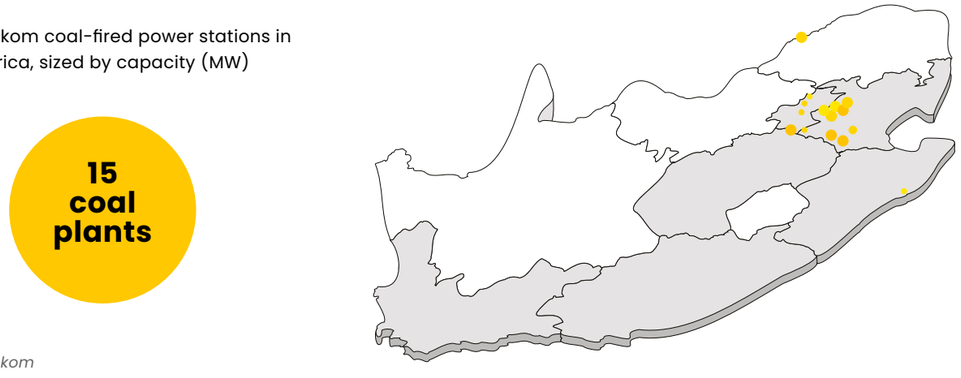
Our reality is unfortunately one of an apparent insurmountable energy crisis, and the reasons for this are complex and multifaceted.

We have a problem with where we're getting our energy

Load shedding won't go away anytime soon, but the energy mix is moving towards more renewables. Q1 tracked 68 days of power cuts, with our electricity production primarily relying on 12 (down from 15) ageing Eskom coal plants. The situation remains dire.

The bulk of South Africa's electricity is provided by 15 coal plants

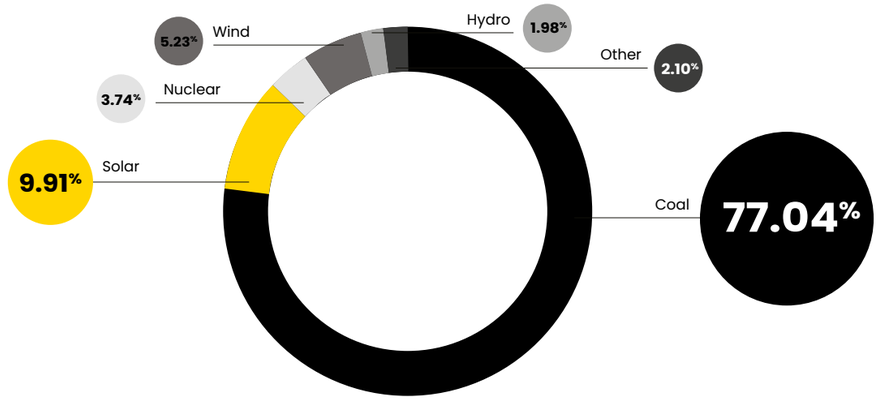
Figure 1:
Active Eskom coal-fired power stations in South Africa, sized by capacity (MW)



Source: *Eskom*

Complicating matters further, South Africa is the largest carbon emitter in Africa, with 77% of our electricity generation coming from coal. According to the Africa Energy Outlook 2022 report from the IEA (International Energy Agency), some 33% of Africa's CO2 emissions in 2020 were from South Africa alone. Yet, we only occupy 4% of the entire continent's landmass.

Figure 2:
National electricity generation mix



Source: *Ember*

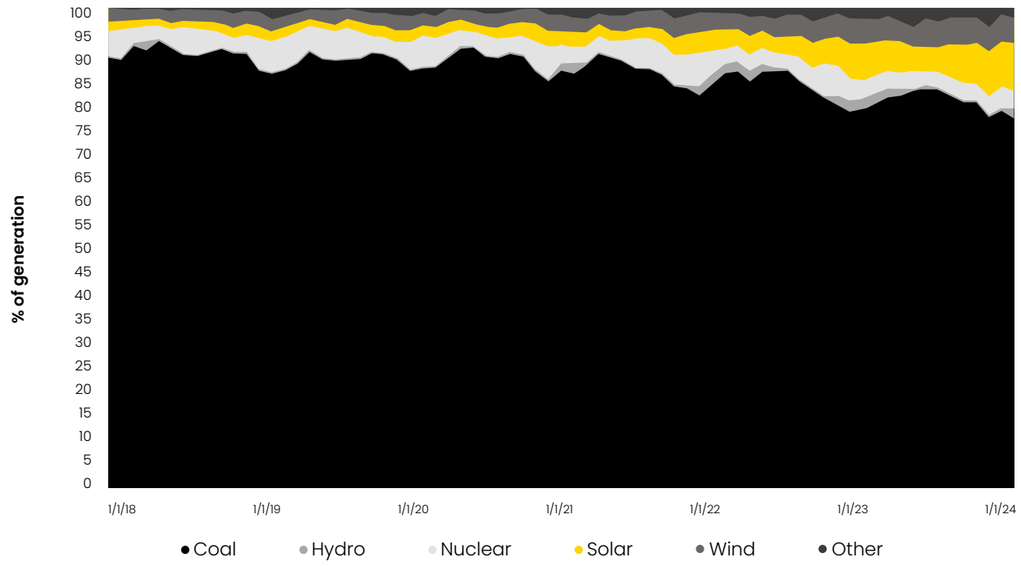
Debt-ridden Eskom is responsible for generating most of the country's electricity supply.

However, the degradation of the existing Eskom coal fleet due to lack of maintenance and investment has led to the annual average energy availability factor[1] declining from 94% in 2002, to below 55% in 2023.

Although Q1 2024 has shown early signs of recovery, we know what's fueling (or technically not fueling) the electricity crisis.

[1] *The amount of time that it is able to produce electricity over a certain period, divided by the amount of the time in the period.*

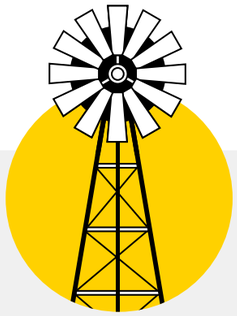
Figure 3:
South Africa's energy transition



Source: *Ember*

Solar continues to offer a viable solution

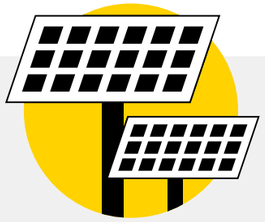
On a global scale, the fossil fuel era is entering a structural decline, and the promise of clean energy is materialising. In their **"World Energy Outlook 2023"** report, the IEA foresees a significant transformation, predicting that:



In 2025

renewables will surpass coal as the largest source of global electricty generation

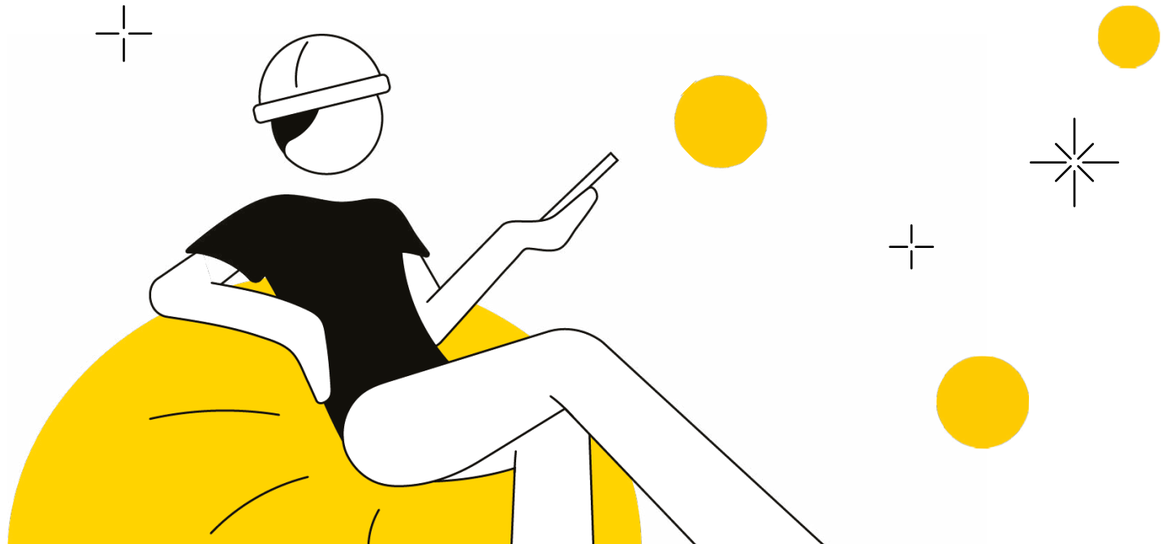
Source: *IEA*



By 2028

renewables will account for 42% of global electricity generation, with solar at 13% of the total mix

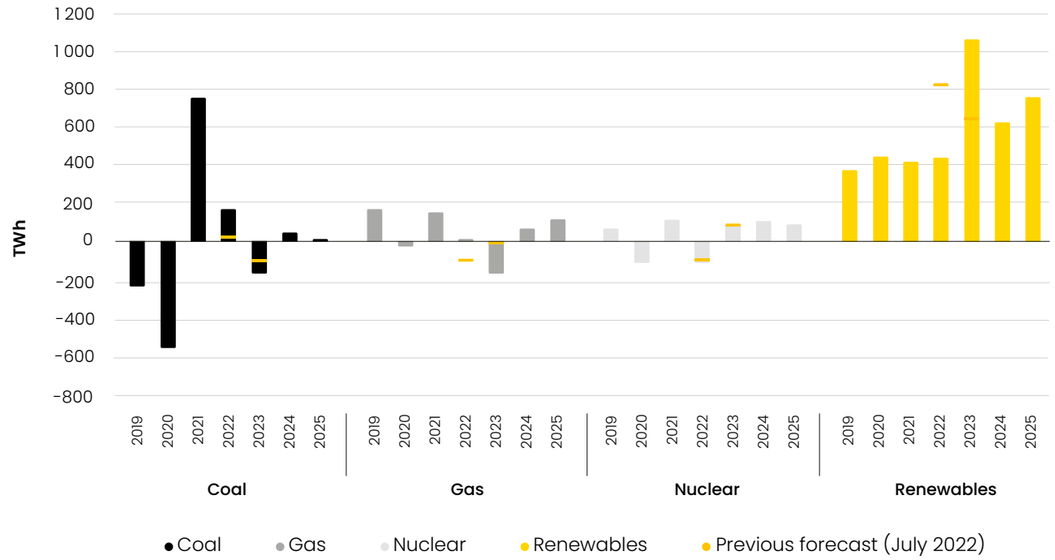
Source: *IEA*



In 2023, 507 000MW of additional renewable electricity capacity were added globally, with the IEA reporting that three-quarters of this global addition came from solar PV. To put this in perspective, Eskom has 44 602MW of installed capacity, and 1 000MW is enough to power around 700 000 homes.

The IEA is optimistic about the future of renewables, projecting that 35% of global electricity generation will be from renewables by next year. This is a significant shift, as illustrated in the graph below, showing how the dominance of coal, gas, and nuclear is gradually giving way to the rise of renewables.

Figure 4:
Year-on-year global change in electricity generation by source, 2019-2025



Source: *World Economic Forum*

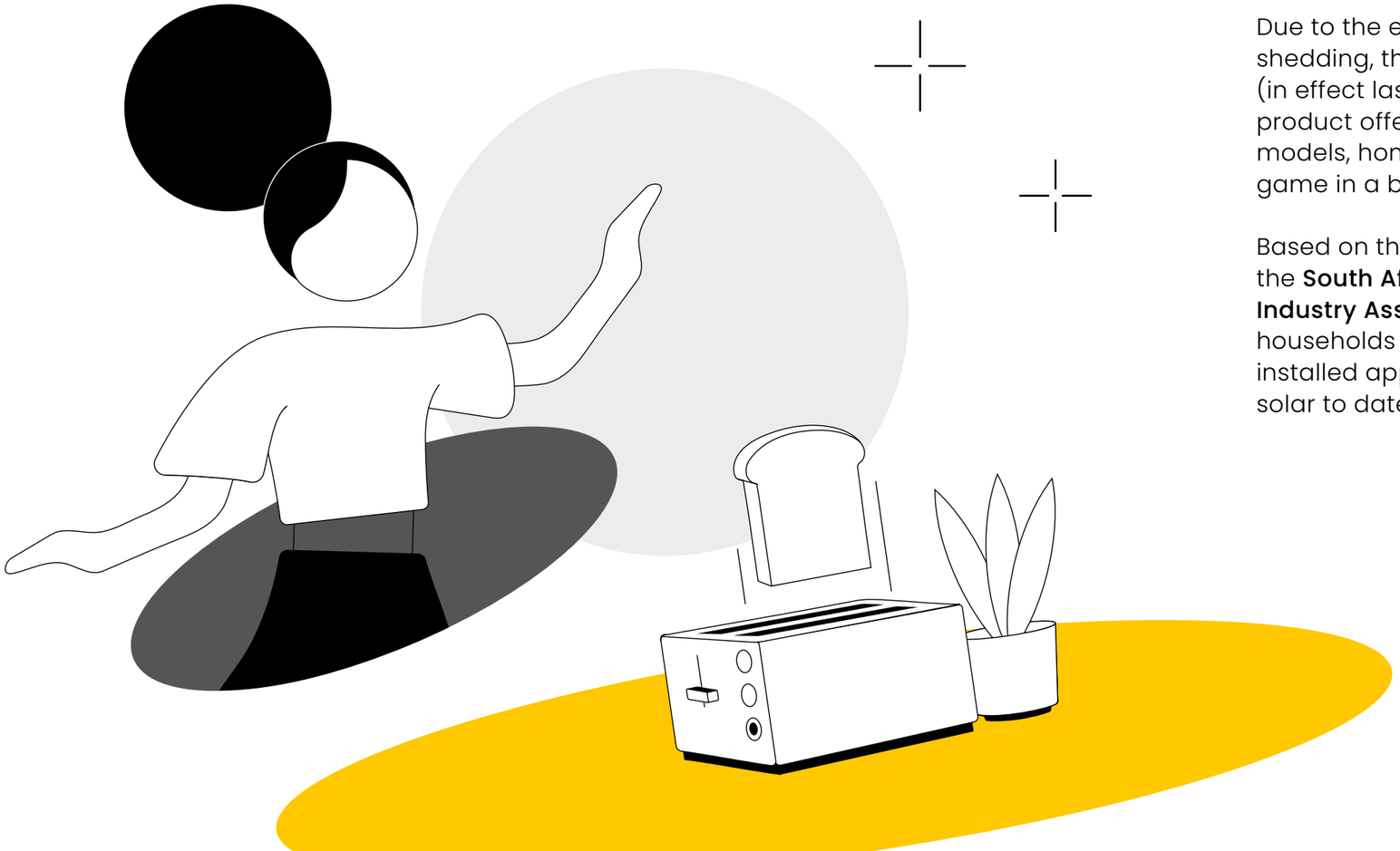
This shift presents a golden opportunity for South Africa to harness solar energy and put an end to the economically damaging energy crisis once and for all.

Sounds easy enough?

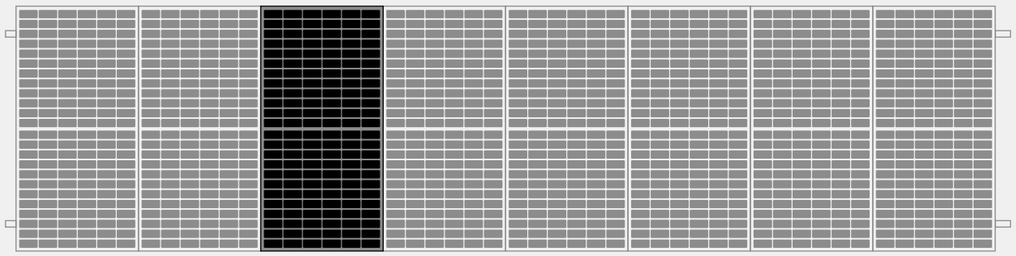
Private households have made a significant contribution in driving solar power adoption in South Africa

South Africa has climbed aboard the solar train, initially led by commercial solar investment but now boosted by residential solar installations.

Eskom estimates that as of March 2024, approximately 5 440MW of residential and rooftop solar has been installed across the country. Rooftop solar increased by 2 630MW in 2023, and a further 236MW has been added in the first quarter of 2024.



Estimated installed rooftop solar in South Africa



Total:	2023:	Q1 2024:
5 440MW	**2 630MW**	**236MW**

Source: *Eskom*

Due to the escalation in load shedding, the solar tax incentive (in effect last year), and more solar product offerings and financing models, homeowners got into the game in a big way in 2023.

Based on the latest data from the **South African Photovoltaic Industry Association (SAPVIA)**, households alone have likely installed approximately 620MW of solar to date.

The fact remains that despite the obstacles, rooftop solar continues to enjoy a marked increase in adoption as ways to access it continue to open. From May 2022 to June 2023, it increased by 349%, and we expect a much higher number come June 2024.

When assessing the residential solar adoption rate against other nations, South Africa is estimated at approximately 0.69%, which is way behind the United States' 3% and the United Kingdom's 4% and we've got a long way to reach Australia's 31%.

Without solar, our energy crisis would be much worse

Rooftop solar systems on homes and businesses are already helping to narrow the country's electricity supply gap:

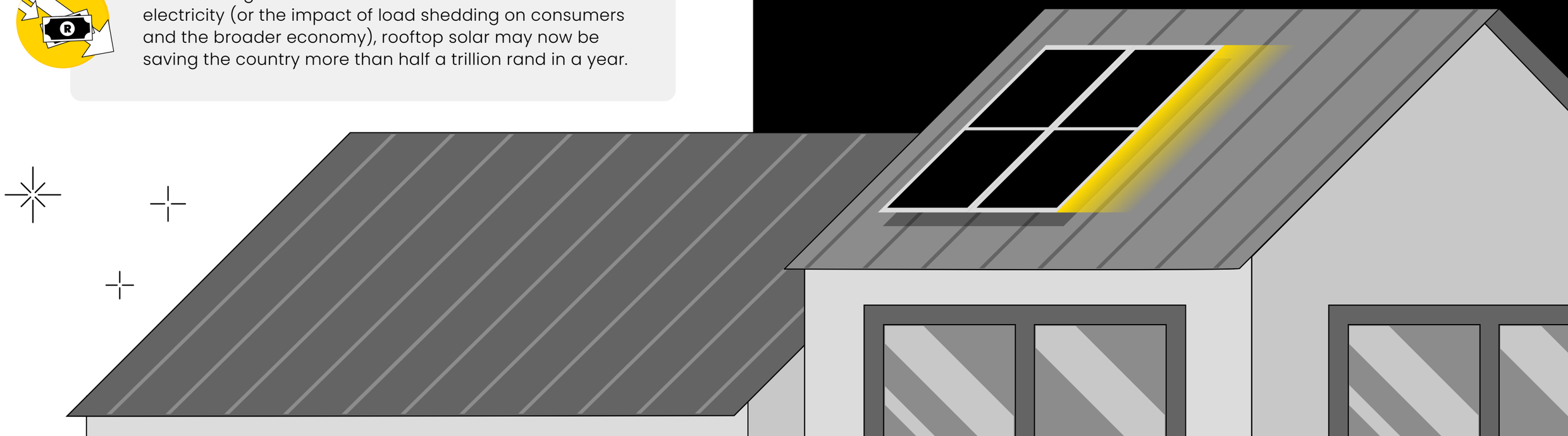
In 2023 – a record year for load shedding for all the wrong reasons – South Africa's electricity demand exceeded supply by some 16 000 000MWh (megawatt hours) leading to even more rolling blackouts.

However, modelling shows that without rooftop solar, reducing the demand on the grid, the gap would have been as wide as 23 000 000MWh. In other words, the supply shortfall would have been 44% higher, and load shedding would have been significantly worse.

Based on regulators' estimates for the cost of unserved electricity (or the impact of load shedding on consumers and the broader economy), rooftop solar may now be saving the country more than half a trillion rand in a year.

Without rooftop solar alleviating demand on the national grid, the energy shortfall in 2023 would have been 44% worse than it was.

Besides relieving pressure on the grid, business and residential solar owners in some cities can sell excess energy back into the grid, which further helps to meet demand. What's needed to facilitate this and adequately harness alternative sources of power is complete, comprehensive, and consistent regulations and policies. This is where we currently fall short.



SECTION 2

The reality of regulatory changes

Our patchwork policy problem

Quarter 1 (January – March) 2024 at a glance

12.74%

Eskom increases electricity tariffs by 12.74% from 1 April 2024

Source: *Eskom*

Political parties release their **election manifestos** with solving the power cuts, and in some cases, tackling climate changes, as key policy focus areas

Source: *Daily Maverick*

City of Cape Town:

- Launches "Cash for Power Programme"
- Announces online authorisation portal for residential system

Source: *CoCT*

While we might have the ideal environment for solar energy and a clear appetite to grow this industry, we're continuously challenged by inconsistent national policy, regulations, and costs.

The problem is the industry is governed by legislation from over 15 years ago. The National Energy Act of 2008 and the National Energy Regulator Act (2004) are left to guide an industry that has rapidly changed in one year, let alone one-and-a-half decades.

There are many players driving policy and it's not consistent

We have a handful of key players, namely; NERSA (the National Energy Regulator of South Africa), the Minister of Mineral Resources and Energy, Eskom, and the 257 metropolitan, district, and local municipalities.

Municipalities buy and sell electricity at different rates, and only a handful allow homes and businesses to inject excess solar power into the grid.

Moreover, the bidirectional meters needed for feeding power back into the grid remain prohibitively expensive for many households and the net consumer requirement limits how much solar power can be fed back to the grid.

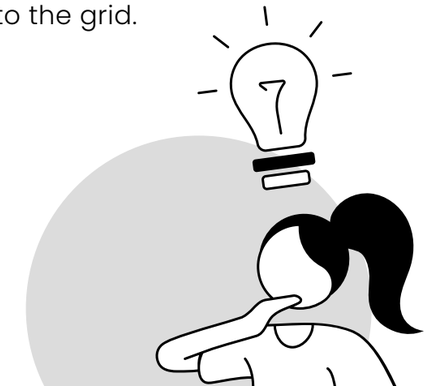


Figure 6:

Municipal EG summary by province

Province	Number of municipal distributors in the province	Number of municipalities allowing EG installations		Number of municipalities allowing EG installations		Number of municipalities with SSEG tariffs		Estimated capacity (MW) of registered EG systems	
		2020	2023	2020	2023	2020	2023	2020	2023
Eastern Cape	22	4	6	5	7	2	3	10.7	40.6
Free State	17	0	2	0	2	1	1	0.0	3.9
Gauteng	9	4	6	3	5	2	4	131.0	283.5
Kwazulu-Natal	25	3	7	2	7	1	2	35.5	115.8
Limpopo	16	5	5	5	5	1	2	37	12.7
Mpumalanga	14	5	5	4	4	3	3	17.0	38
Northern Cape	4	9	12	4	11	2	8	4.1	10.1
North-West	13	2	4	2	4	0	0	17.6	5.4
Western Cape	25	22	24	18	22	19	20	64.3	147.9
Total	**165**	**54**	**71**	**43**	**67**	**31**	**43**	**283.8**	**657.9**

Source: *SALGA Status of Embedded Generation in in South African Municipalities*

There has, however, been some progress on a national level:

In July 2022, the government abolished the 100MW licensing threshold for private generation projects, which has enabled a flood of new projects.

In 2023, NERSA approved The National Transmission Company of South Africa a new energy trading licence, allowing developers to sign a power purchase agreement (PPA) with the energy trader. These traders can then provide a diversified customer pool alongside flexible and affordable energy contracts for the local market while reducing the overall off-take risk for developers. Due to the complexity of the NERSA application process, we currently only have three to five licence holders.

These steps are significant, but more needs to be done, specifically regarding residential solar.

With the upcoming elections looming many promises are being made

As in any election year, political parties have ramped up their calls for rapid transformation of the energy sector, placing a great emphasis on solving the power cuts as part of their manifestos.

According to the Party manifestos: 2024 | Daily Mavericks election summary, the following focus areas have been outlined. The key takeout remains that each party sees the value – and need – for a just energy transition and that incentives are key to driving further growth of the solar industry (residential and commercial).

Figure 7:

Party manifestos: 2024 | Daily Maverick

Action SA	**Action SA have grand plans for green needs, including:** • Expanding private energy production and running a liberalised energy market • Introducing microgrids - small, localised energy grids • Introducing solar panel installation subsidies, and univeral access to rooftop solar panels and solar-powered geysers • A gradual transition from a coal-fired energy system to a renewables-based infrustructure
ANC	**Tackling power cuts remains the ANC's key campaign pillar, with focus placed on supporting cheaper, subsidised solar power.** They aim to prioritise green technologies, energy efficiency, waste management, climate-smart agriculture, and "eco-friendly" production. Other goals include: • Becoming a world player in green hydrogen, battery and electric vehicle production • Priorisiting investment in the transmission grid • Developing gas, nuclear and hydropower projects • Establishing a national oil company for refineries

DA	**The DA have placed emphasis on the environment and climate change in addition to their calls for addressing the energy crisis.** They promise: • A sturdy focus on renewable energy - manufacturing, easing high tariffs for imports (solar panels etc) • Commitment to net zero carbon emissions • Breaking up Eskom's monopoly, and moving the utility away from energy generation • Promoting self-generation and devolving energy decisions to municipalities • Allowing homes and businesses to sell to the grid
EFF	**The EFF does not support decomissioning coal-fired power stations or the principles of a just transition, and instead supports local. They will however progressively introduce carbon taxes.** On energy, they plan to: • Repair existing power station fleet • Stop decommissioning of coal-fired power plants • Focus on carbon capture, clean coal and nuclear energy, with a starring role for Russia • Encourage shale gas explosion • Direct Eskom to develop a substantial renewable energy division • Grant 200kWh/month free electricty to poor households
FF+	**The FF+ want to empower Green Scorpions and retire coal-fired power stations.** In response to the energy crisis, they want: • Rapid transition to renewable energy - tax incentives and zero-rated solar panels • Unbundling of Eskom over the medium to long term, and privatise • Incentives for solar installations
Good party	**The Good Party see the primary way to mitigate climate change is through green energy production.** They: • Actively support renewable energy as the way to end load shedding as "green energy is the cheapest and most effective form of energy production" • Want a rapid transition to renewable energy within the private sector • Support transition for coal industry workers and nearby communities in coal belts
IFP	**The IFP do not place much focus on the environment or climate change, but to tackle power cuts they're calling to:** • Manage Eskom as a public-private partnership • Cut unnecessary fuel levies • Maintain coal as a primary energy source while promoting renewables • Support the green hydrogen economy
Rise Mzansi	**Rise Mzanzi plans to implement their 'Leave no one behind' policy in which coal uses decreases steadily along with a balanced, green energy mix, tax deductions for rooftop solar, and to fully electrify the transport system.** They aim to tackle power cuts by: • Changing the Eskom board, reviewing all contracts, firing corrupt officials and reforming procurement • Developing local solar production and installation by tapping international climate change transition finance

Source: *Daily Maverick Elections 24 Manifesto Watch*

The costs of energy keeps increasing

The new Eskom tariffs were in effect from 1 April 2024, building on the initial 18.65% increase for 23/24 with another increase of 12.74%. Municipality increases will follow in July and differ between municipalities.

This price hike brought the average electricity tariff to R2.07 per kWh excl. VAT (up from R1.84 per kWh excl. VAT). This is a national estimate, and local municipality tariffs may differ.

The cost of solar adoption is prohibitive

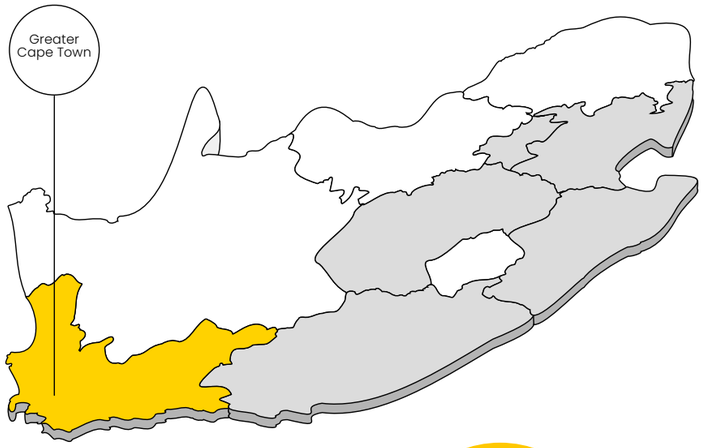
Regulatory headaches aside, a significant factor is cost.

The upfront installation of a rooftop solar power system is expensive (ranging between R60 000 to R250 000), although it's "free" thereafter (excluding wear and tear as well as maintenance of batteries and other hardware).

Recently some, but not all, provinces have allowed businesses and consumers to sell excess power generated by solar back into the grid. However, customers also need to foot the bill for a bi-directional meter to be able to feed power back into the grid. At present, the cost of having one of these meters installed often exceeds R10 000. Unfortunately, most of the feed-in tariffs around the country often don't make the expense worthwhile once the meter cost is taken into account.

City of Cape Town: a blue print for the rest

When it comes to resolving the energy crisis, the City of Cape Town (CoCT) has been the most proactive, developing the most comprehensive strategy, as summarised below:



July 2023

Commercial and industrial customers with embedded generation (or their own power solutions) are allowed to be net sellers. Previously, these customers were prevented from feeding back more kWh units of power than they consumed from CoCT in a given annual billing period. The CoCT now credits the electricity bills of net consumers on a rand basis and is willing to pay the excess if the customer is in credit.

October 2023

The CoCT issued a 60MW demand response tender to appoint third-party aggregators to facilitate voluntary residential and small-scale commercial customers reducing their power use at a given time so that city-supplied customers can be protected from the impacts of load shedding. The aggregators determine the incentives for the customers, and the city rewards the aggregators based on the tender terms and conditions.

February 2024

Residents with rooftop solar systems were also allowed to register with the CoCT's **'Cash for Power Programme'** through which they can sell any excess electricity back to the municipal grid. This works by compensating registered homeowners first by having their municipal bill credited, and once the utility bill is credited to zero, the city pays out in cash. The feed-in tariff of 87c/kWh excl. VAT has been approved by NERSA, with the city sweetening the deal by offering customers an extra incentive of 25c/kWh excl. VAT.

March 2024

The CoCT also announced the creation of an online solar authorisation portal to reduce waiting times for certifications to install residential solar and battery systems. While meters retail for around R10 508 incl. VAT, the City of Cape Town maintain that by the end of 2024 they will retail for half of that – increasing access to feed in benefits for consumers.

SECTION 3

From obstacles to opportunity

The outlook remains sunny

Quarter 1 (January – March) 2024 at a glance

There are about

17.8 million

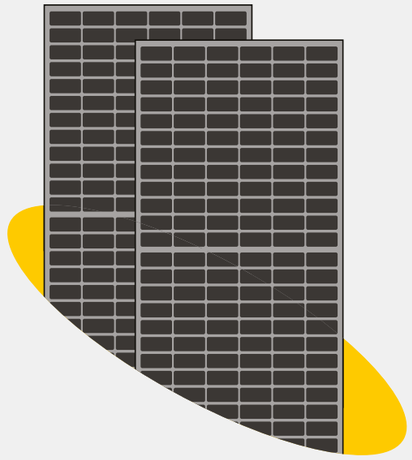
homes in South Africa

Source: *Stats SA*

Estimated

0.69%

of these currently have rooftop solar



Source: *GoSolr*

There are about 17.8 million homes in South Africa. Of these, roughly 2.2 million of these in the middle-to-higher income brackets.

It's estimated that we currently have 124 000 homes with solar, which means only 0.69% of our total recorded home base has made the switch, accounting for an estimated 5.64% of the middle-to-higher income bracket market.

South Africa ranks third in the world as having the best solar potential

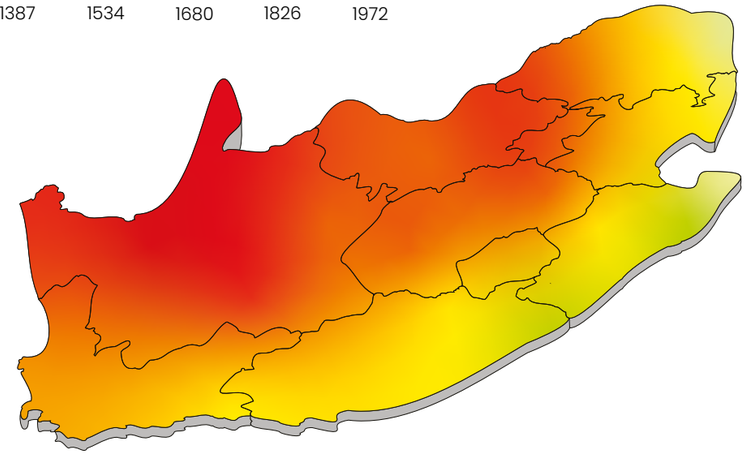
A 2023 report by Deloitte entitled "Africa's Energy Outlook - Renewables as the pathway to energy prosperity" highlights that with an average of 2 500 hours of sunshine per year, 4.5-6.6kWh/m2 of radiation level, and rainfall half the global average, South Africa ranks third in the global solar potential stakes.

Are we leveraging this advantage as fast as we can though?

Figure 8:
Heatmap

Long term average of PVOUT. period 1994-2015

Daily totals:	3.8	4.2	4.6	5.0	5.4
Yearly totals:	1387	1534	1680	1826	1972



Source: *'Africa's Energy Outlook' Deloitte, 2023*

Solar is becoming accessible to more people

While greater residential solar adoption is helping South Africa plug its power supply gap and is good news for homeowners (who are buffered against the effects of load shedding), this solution has historically been a costly endeavour available only to the middle-to-upper income brackets as a luxury purchase or investment.

The good news about the current status is that the scope for growth is incredible:

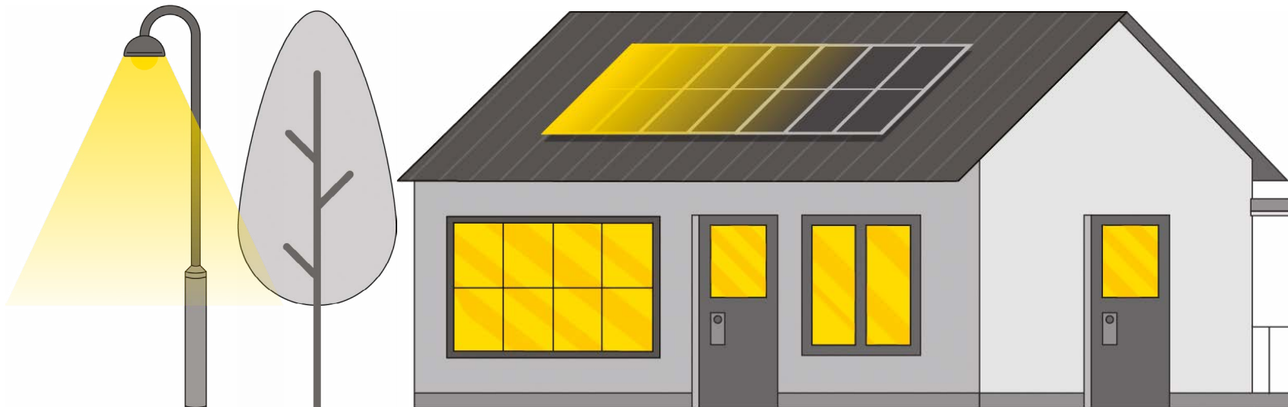
Subscription

Rent to own

Buy

As new players enter the market offering alternative solutions, subscription models, or rent-to-own options for everyday South Africans, the industry is rapidly opening up, decentralising access to clean, renewable energy and elevating the role that the private sector is playing in the energy crisis.

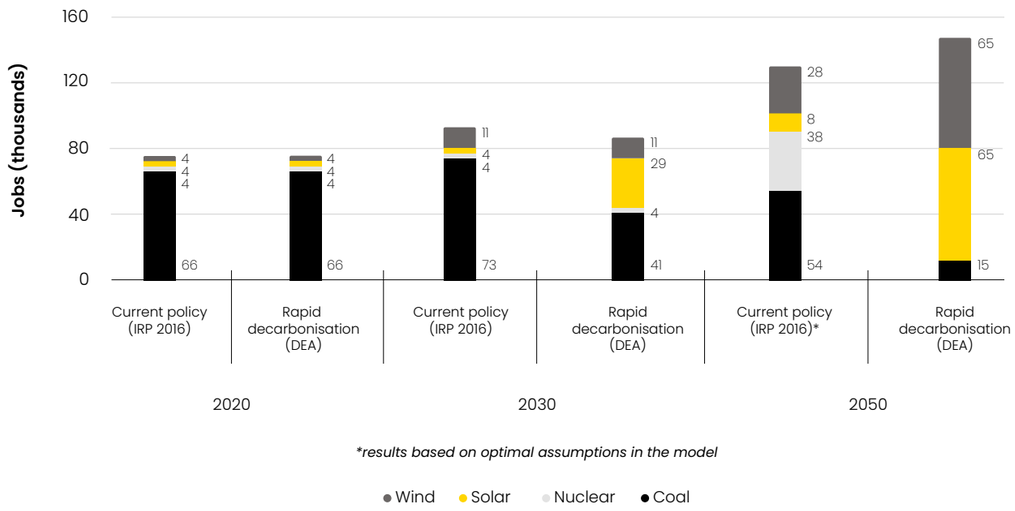
The case for solar power now not only strengthens, but opens up conversations that speak directly to alleviating load shedding, sustainability, and cost savings, which are now available to everyday citizens.



With industry expansion comes job opportunities

According to data aggregated by the COBENEFITS Information Hub, decarbonising South Africa's power sector could create around 145 000 net jobs in the next 26 years. Considering that we face one of the highest unemployment rates in the world, the move to clean power becomes even more imperative.

Figure 9:
Net employment in the power sector



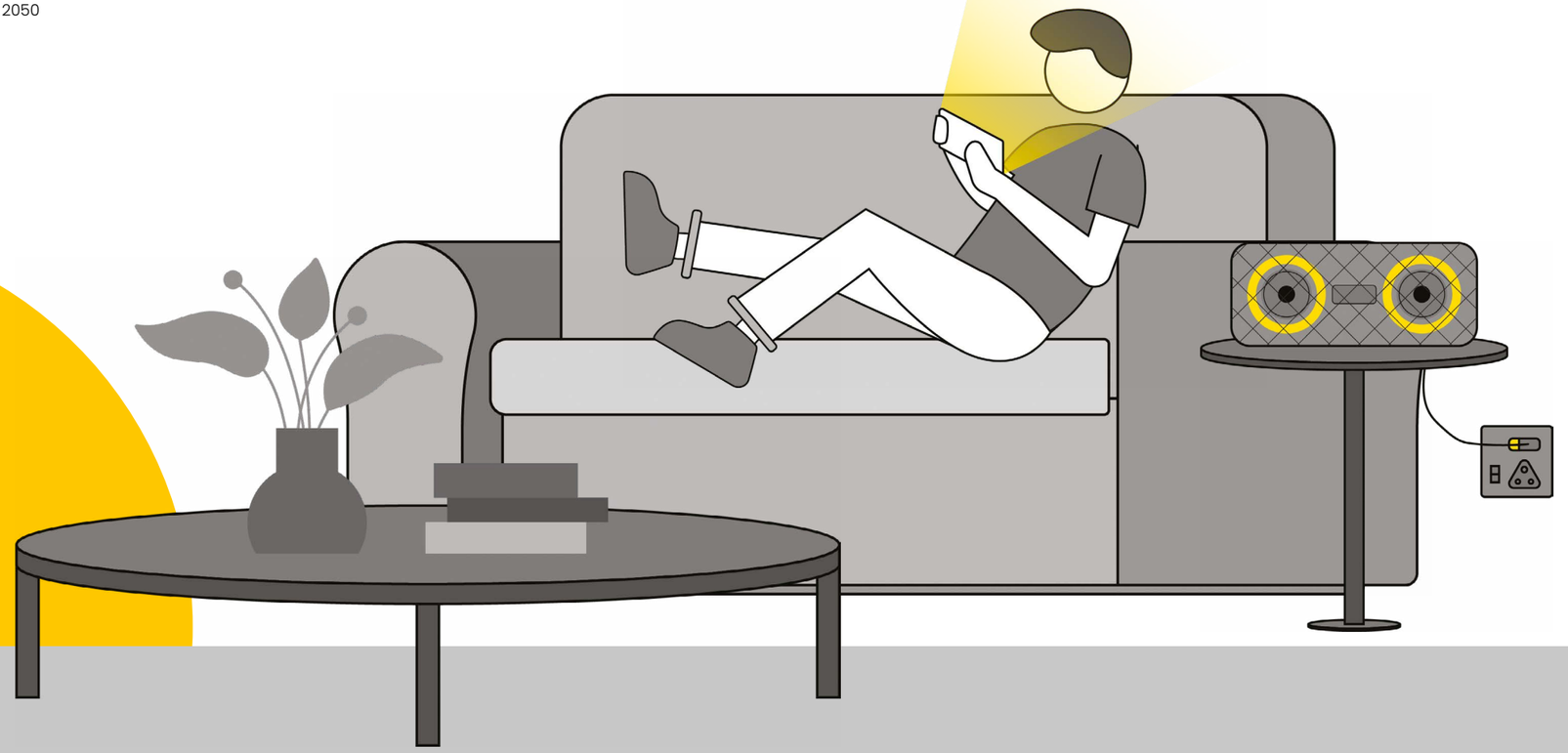
Source: *COBENEFITS Policy Report South Africa*

Solar panels are said to have a lifespan of 25 years (sometimes 30), which means that as adoption increases, so will the need for specialised technicians, installers, and providers in an industry that — for the most part — can't be automated.

Specialised skills and services are needed to address our looming solar panel recycling needs.

When panels and batteries reach end of life (or are damaged from severe weather), services and providers will be required with unique skill sets to drive this offshoot of the industry forward.

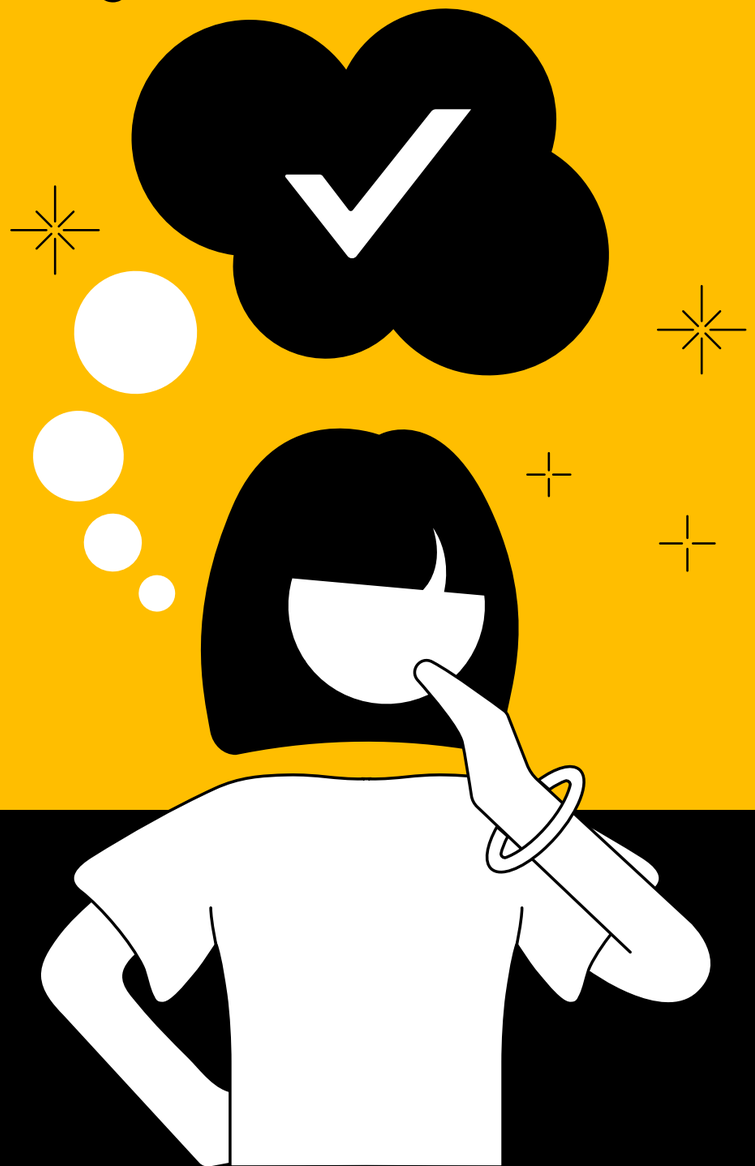
Decarbonising South Africa's power sector can create 145 000 net jobs by 2050



SECTION 4

Where does this leave us?

GoSolr weighs in



GoSolr's impact to date at a glance

70MW+
aggregated installed production capacity

60
hours of load shedding mitigated last year

40%
lost solar production due to lack of feed-in

140
direct jobs created

500+
indirect jobs created

We're heading into winter soon, when electricity demand typically increases, as our hours of sun and intensity of rays decrease for the season.

Experts are already predicting prolonged periods of stage-6 load shedding as Eskom conducts maintenance that it would normally do in summer when there's lower demand but cannot postpone due to the age of our coal-fired plants. So consumers are faced with juggling cost-of-living with cost-of-lighting.

So, how does solar energy play a role in our future, and where are we going?

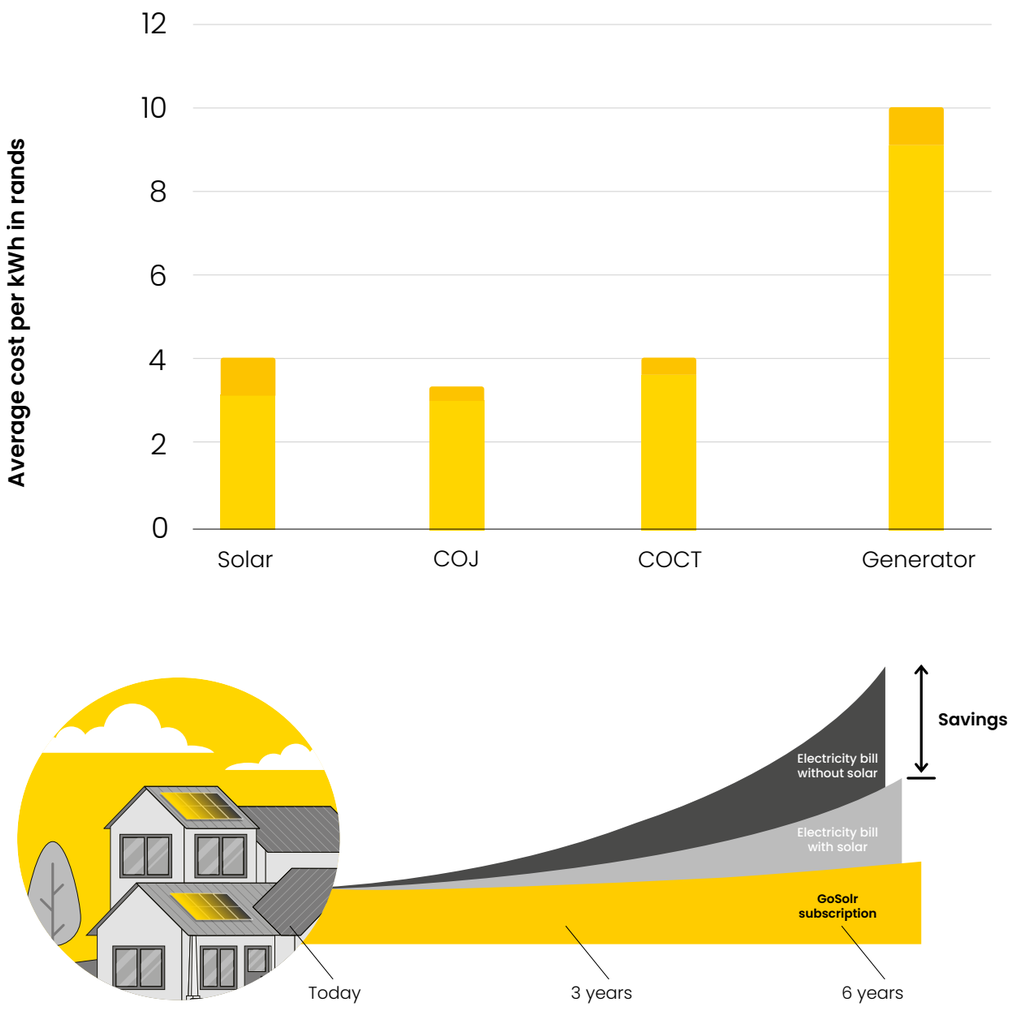
Adoption of solar in South Africa continues to grow rapidly

In just over two years, GoSolr has added more than 70MW of solar energy to the grid. We expect adoption to increase steadily as we reach electricity price parity in Johannesburg and Cape Town and education around solar improves.

Solar makes sense - and cents

When correctly set up, a house running on a rooftop solar system will be at parity with municipal tariffs and in the long run, will hedge homeowners against future price increases. Those running solar are already in line with the City of Cape Town's rate and within reach of the City of Johannesburg.

Figure 10:
Cost comparison



Source: *GoSolr*

The data shows more good news: a long-term investment in solar leads not only to relief from load shedding and lower municipal costs to actual savings as well.

Policy makers MUST align and take bolder steps

Solar is clean and efficient and can relieve the pressure on our failing energy grid and create jobs. How can we make this energy source more cost-effective and readily available?

Rather than implementing household tax incentives that further burden the fiscus, we need progressive solutions that encourage broad adoption. We need tax deductions reinstated for solar purchases (inclusive of bought, rent-to-own, or subscription-based). Government must implement a national feed-in tariff framework and regulators must reduce 'red tape' for Small-Scale-Embedded Generation (SSEG) applications.

Here's a quick look at what this solution could look like:

Figure 11:
Long term incentives comparison

VAT exemption for solar components	Subsidies	Tax deductions
High cost on the fiscus as an upfront loss of revenue. VAT exemptions should focus on household staples	Upfront cost to the fiscus, creates admin and requires managing payments	No upfront cost to the fiscus. Claimed at the end of the tax year and less admin intensive
Benefits households that can afford to acquire solar, bypassing lower and middle income groups	Can be designed for all income groups, but likely to favour wealthier households	Broad based and progressive if applied to subscription solar and outright purchases

Source: *GoSolr*

Radical steps must be taken to secure our energy supply—and solar will be key in driving this

Solar is the cheapest and easiest renewable energy source to deploy. By making it affordable and accessible to a wide range of consumers, it helps us bridge the energy gap as a collective.

We believe solar power's pivotal role lies in diversifying our energy mix, reducing our reliance on finite fossil fuels, and combatting climate change.

However, neglecting to prioritise solar and enact favourable policies poses tangible risks to our energy security. Continued dependence on non-renewables not only perpetuates environmental harm but also exposes us to geopolitical tensions, volatile prices, and supply disruptions. Without proactive measures to drive solar adoption and implement supportive policies, we risk compromising our ability to meet escalating energy demands, jeopardise economic stability, and intensify the global impacts of climate change.

The current patchwork of policies and processes, however well-intentioned, is far from optimal.

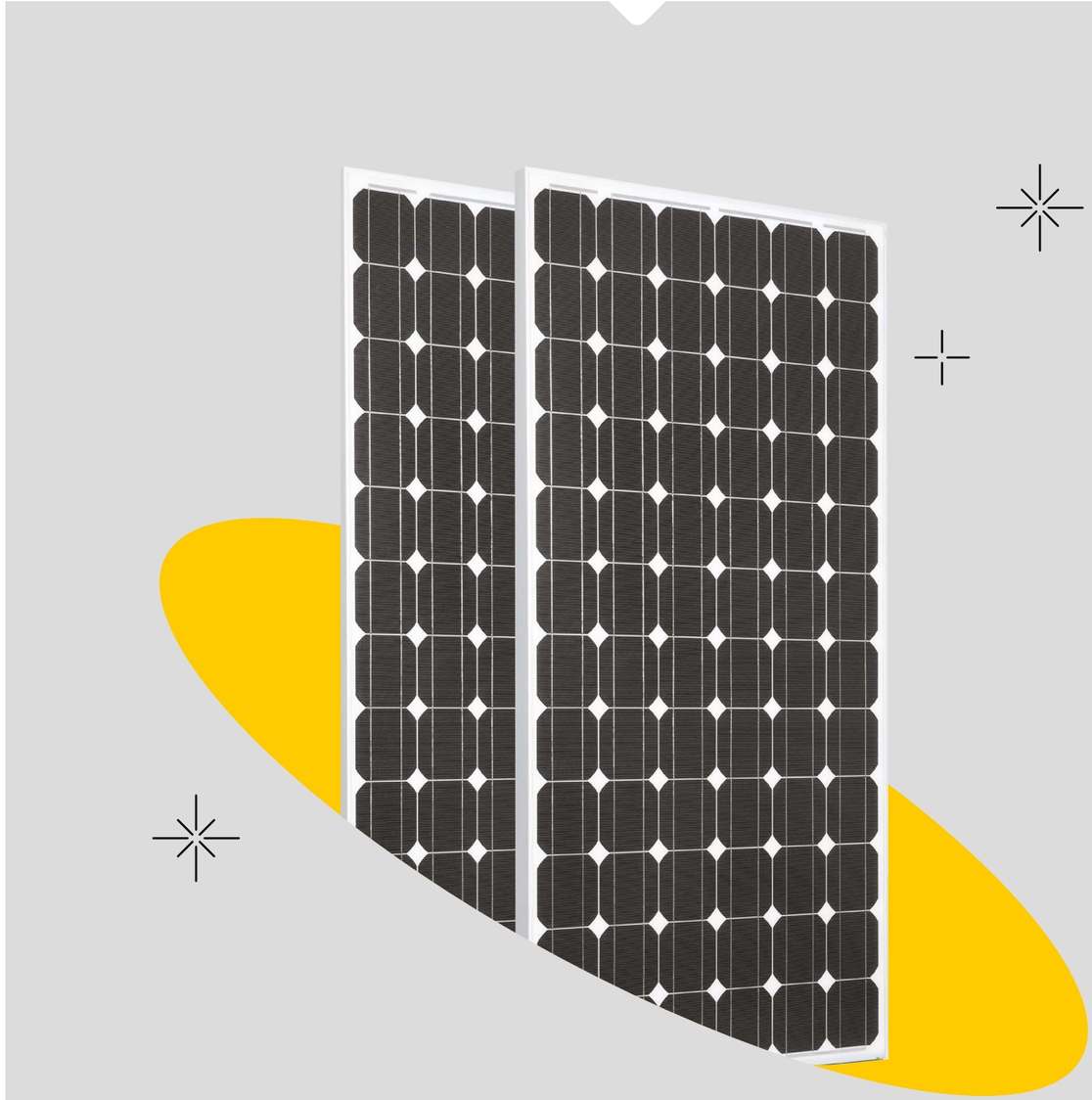
If we are to drive the industry forward and experience the positive benefits available from these solutions, customers (and the private sector) need clarity and certainty, which requires a clear set of policy guidelines for all electricity providers and municipalities.

We must take immediate measures to support a more robust and decentralised energy grid, reduce dependency on centralised power sources, and mitigate the impact of load shedding.

And we need to get a national policy framework for small-scale embedded generation that is consistent across provinces – and which is fixed. Once households and businesses have a clear set of guidelines, they can optimise their solar investment in line with the best practices and take maximum advantage of feed-in tariffs.

Only if we get this right can we begin to create a functional, interdependent ecosystem and move out of the energy crisis.

At GoSolr we staunchly advocate for solar energy as a linchpin in reshaping our energy landscape towards sustainability and security.



The burgeoning solar industry in South Africa stands as a beacon of opportunity, propelled by abundant sunlight, technological advancements, and declining costs.

Its lucrative potential lies not only in offering consumers a sustainable and cost-effective alternative to traditional energy sources but also in fostering energy independence and job creation across the nation.

For consumers, embracing solar power means not just reduced electricity bills but also greater resilience against energy shortages and price fluctuations. Moreover, the solar boom stimulates economic growth, attracting investment, creating jobs, and nurturing local expertise.

However, to fully realise the benefits of solar energy, supportive policies are imperative. Policymakers must prioritise grid integration, incentivise solar adoption and ensure equitable access to solar resources. We hope that government works with private sector as a priority to move fast in reviewing policy and looking for ways to mitigate the devastating impact of our energy crisis, cost of living and impact of climate change.

By harnessing the power of the sun and enacting robust policies, South Africa could lead the way and illuminate a path towards a greener, more prosperous future for all.

Andrew Middleton, CEO GoSolr

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