

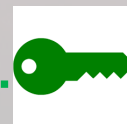
69TH AMEU CONVENTION

1 - 4 October 2023

CSIR International Convention Centre

Confronting South Africa's Electricity Crisis in the context of a 'Balanced Just Energy Transition' (BJET) and the need for a reliable and resilient national electricity grid

Grids of the Future – holding the key to faster Energy Transition...



Presented by Taru Madangombe

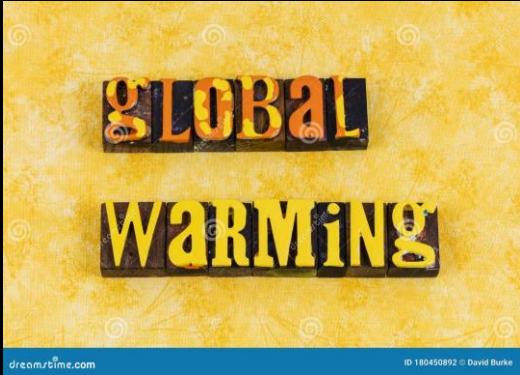
Middle East & Africa Vice President - Power & Grid Segment

Schneider Electric

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*“..Africa, and South Africa in particular is currently facing **TWO Simultaneous and Significant challenges**”*



We are facing an unprecedented Energy Crisis



Bloomberg.com
South Africa Power Outages May Have Reduced Growth by 3.2 Percentage Points
 South Africa's energy crisis may have reduced the nation's economic growth rate by as much as 3.2 percentage points last year and is likely...
 04 Jul 2023

The Conversation
South Africa's power crisis will continue until 2025 - and blackouts will take 5 years to phase out
 South Africa is in the middle of a severe electricity crisis, with enforced power cuts that have worsened every year.

702. 702
'Food production in South Africa is in crisis because of loadshedding'

The Conversation
South Africa's power crisis: going off the grid works for the wealthy -- but could deepen injustice for the poor
 South Africa's current electricity crisis has been described as "a perfect storm". A number of factors have converged to reach this point:...



IOL
Cost of Living Crisis: Load shedding's stranglehold on food prices
South Africans are grappling with the dual blow of load shedding and escalating food prices, a new report by Competition Commission's Essential Food Price Monitoring Report has revealed.

Investec

Counting the cost of load shedding

Unrelenting load shedding is having a major impact on SA's growth prospects. We look at what this means for the different sectors.

Load shedding in numbers

0 Days without load shedding in 2023	48.6% Eskom's lowest energy availability in Dec 2022 ¹	0.3% SA's expected real GDP growth in 2023 mainly due to the electricity crisis ²
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Macroeconomic impact of load shedding

R300bn Cost to SA economy in 2022 ³	5% Of SA's GDP lost in 2022 ³	R120bn Investment required for ailing Eskom grid
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In the short term, energy costs across South Africa have exploded

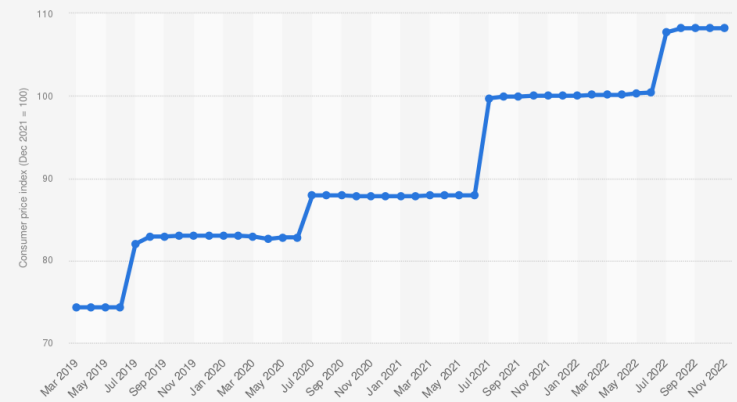
Inflation

6.9%

Energy Inflation

13.1%

Consumer price index (CPI) of electricity and other fuels in South Africa from March 2019 to November 2022



Source
Statistics South Africa
© Statista 2023

Additional information:
South Africa; March 2019 to November 2022

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In parallel, Global energy crisis is accelerating the energy transition...

Compounding many disruptions...



Utilities and Electricity Companies Are Accelerating Their Digital Journeys Creating Great Opportunities!

...and the Grid at the center of the Energy Transition



Each stakeholder has a role to play

- Regulators enable flexibility
- Accelerate Grid Operators Digitization
- Prosumers Engage with DER

- Loadshedding forcing end-users to be more self-reliant

- Massive PV adoption in housing, CIB, Mining at scale

- Approx >66GW of RE projects shovel ready
- 1500km of Tx lines/yr required
- Currently 300km/yr

...Key Bottlenecks

“..Our **grid infrastructure** is not ready to take on the **planned increase in generation capacity**...”

“...lack of **funding** and **private sector investment** is a serious challenge - >**R250Bn** required...”



...PLUS severe CLIMATE related INCIDENTS...



The Climate Issue is an Energy Issue.

30Gt Annual energy-related
CO2 emissions from
power gen + demand
side

Sources: OECD/IEA (2020), World Energy Outlook, Climate Watch (2020), Historical GHG emissions, Schneider Electric Research

37Gt Total Global Annual
CO2 emissions

Sources: Climate Watch (2020), Historical GHG emissions, Schneider Electric Research

= 80%
global CO2 emissions
come from the production
and consumption of energy

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Nobody Doubts the Case for Change. The Climate Issue is an Energy Issue...

But questions are still being asked?



ALJAZEERA News ▾ Ukraine war Features Economy Opinion Video

EXPLAINER
News | Climate

How much does Africa contribute to global carbon emissions?

Africa contributes just 4 percent of global carbon emissions despite being the continent that will suffer the most from climate change.



COUNCIL ON FOREIGN RELATIONS Foreign Affairs CFR Education Newsletters

United Nations Climate Change Topics ▾ Regions ▾ Explainers ▾ Research & Analysis ▾ Communities

IN BRIEF

Will South Africa's Power Crisis Sink Its Green Ambitions?

By Mariel Ferragamo | July 26, 2023 12:45 pm (EST)

A devastating power crisis is plaguing South Africa, battering its economy and



The Conversation

South Africa's power crisis will continue until 2025 - and blackouts will take 5 years to phase out

South Africa is in the middle of a severe electricity crisis, with enforced power cuts that have worsened every year.



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But How do we compromise
between Decarbonization and
Energy Security during this Energy
Transition...?

If we all collaborate to address
these challenges, we can move
our industry forward

Let's ride this wave together

...starting with the **low hanging fruits**

In the short term, less energy is available

“South Africa may delay shutting down many of its highly polluting coal-fired power stations to stem the crisis of daily electricity blackouts”

Cyril Ramaphosa
President of South Africa



“..The utility has been unable to increase the energy availability factor to 60%. The current EAF is 54.11%...”

M&G

XXX

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There is no shortage of energy

There is too much energy waste

For short term crisis, grids should help address this issue...

*Globally, **55%** of all the CO2 energy related emissions are due to inefficiencies on the Demand Side...*

**Waste Less = Use less
Spend less
Emit less**

For short term crisis, grids should help address the issue

by addressing

> \$2.5 B

annual T&D losses
in South Africa

Source: Heliyon & Schneider Electric

by leveraging
digitalization



to integrate
more renewables

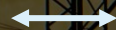
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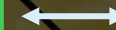


If the grid is critical for the short term, it's even more important for the mid and long term, orchestrating supply and demand

Prosumer revolution
Industries, buildings,
mobility



Grid
The backbone of SA
energy transition &
security



**Green power
Generation**
Hour-by-hour
uncertainty

Catalyzed by grid flexibility & digitalization

Grid stability/ resilience, VPP balancing, DRM, grid digitization

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Digital Grid delivers core values to Utilities

Sustainability



Utilities are under pressure to operate more efficiently while modernizing the grid & delivering improved service

In the mid and long term, the biggest challenge is still decarbonization of energy...

36.8 Gt
The new record high.

2022 CO₂ emissions from energy combustion and industrial processes.

Source: IEA Global Energy Review 2023

2.5°C
Our current trajectory.

That's saving 4Gt CO₂ per year, when we need to be saving 10-15Gt per year until 2030 to stay under 1.5°.

“Africa is already facing more severe climate change than most other parts of the world, despite bearing the least responsibility for the problem...” (IEA report 2022)

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Reliable + Affordable + Sustainable energy for all Africans is the immediate and absolute priority.....

To reach universal energy access by 2030

45% reduction
Extending National
Grids (by

>700
Million
People
without
Electricity

55%
Rural areas – mini & off-
grids

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We need to act for the short term while staying focused on the long term..

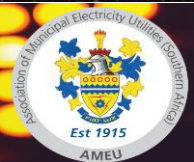
Energy independence & security

How we act

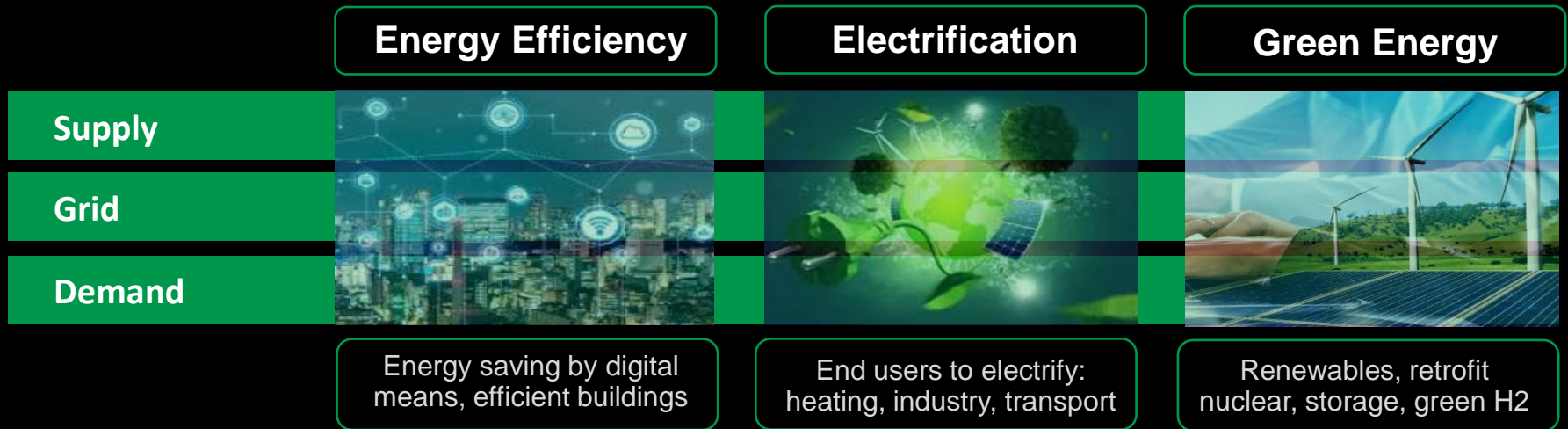
Energy decarbonization

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We see 3 fundamental approaches to overcome short- and long-term energy challenges across the ecosystem



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We can only deploy these approaches in the proper environment

How to overcome the dual challenge

Institutional

Economic

Technological

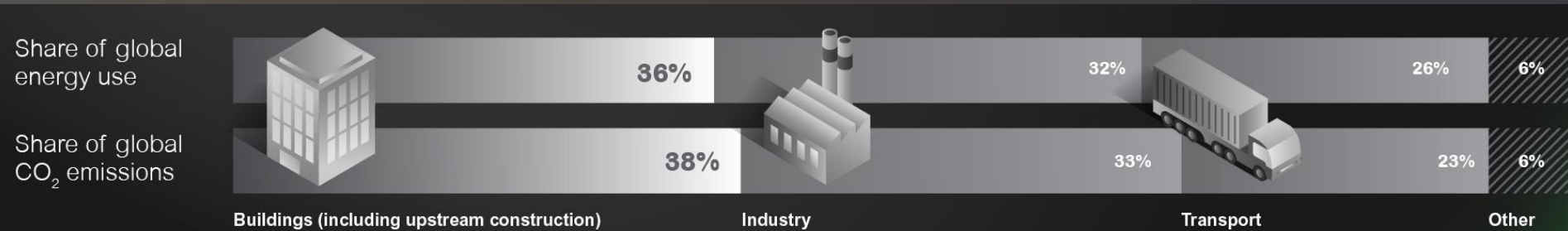
“Increased flexibility will be key to adapt our electricity system further towards variable and distributed renewable electricity generation” while avoiding a costly expansion of Africa’s electricity grid...”

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On the demand side, prosumers can act now for the short and long term




Take an example from buildings:




Microgrid

+



Efficiency

+



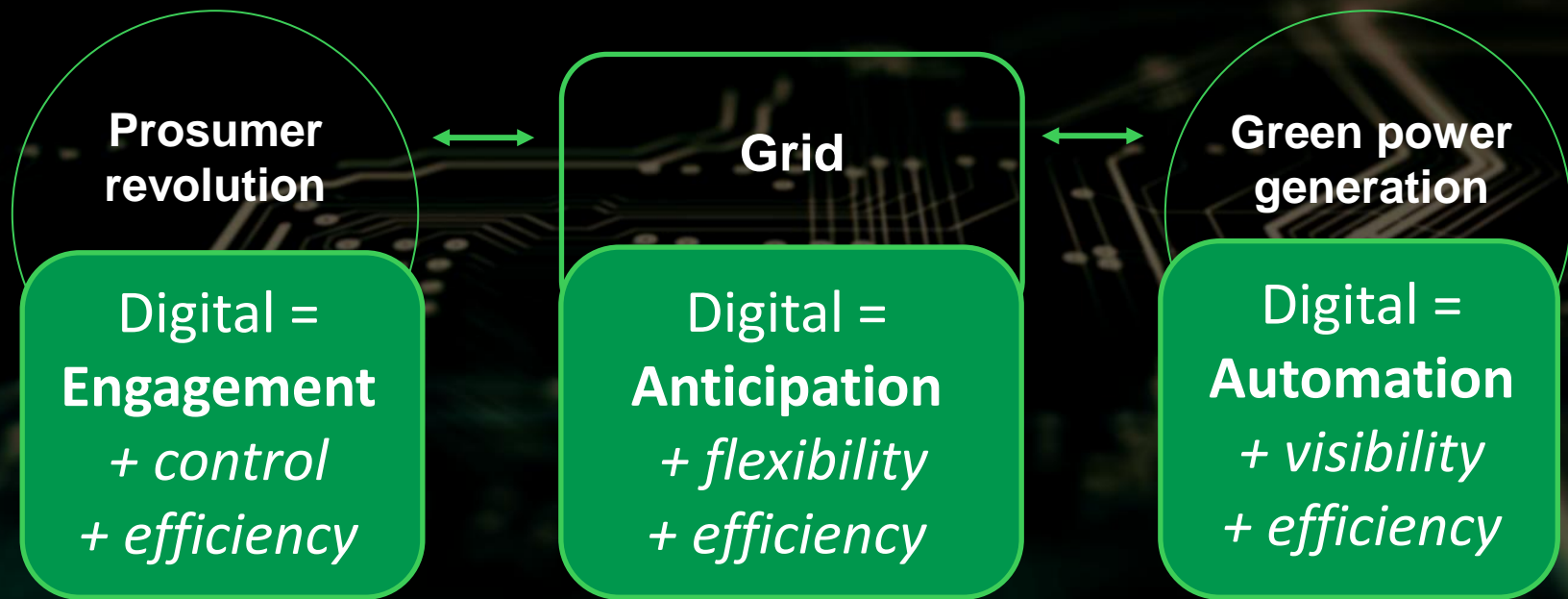
Electrification

=

from **-30%** to **-50%**
energy demand kWh/M²/yr

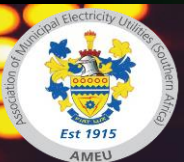
÷ 2 to **÷ 3**
carbon emissions kgCO₂/M²/yr
& energy spend USD/M²/yr

Digitalization is the best choice today because it addresses short- and long-term challenges..



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We know what we should do. But we're not doing it.

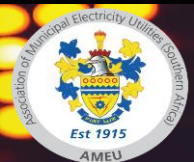
- We need to be pragmatic in our approach...
- Recipe for Energy Security & Climate Change challenges NOT the same for every country (ingredients the same)
- Energy choices NOW must address both Short-term & Long-term
- Digitalize and electrify with technologies that fit the institutional and economic landscapes of Africa and beyond.

Contact Taru on LinkedIn

<https://www.linkedin.com/in/taru-m-30770220>

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**Confronting South Africa's Electricity Crisis in the context of a 'Balanced Just Energy
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Thank you!

