

SOLAR POWER AFRICA

GRID RELIABILITY: Challenges & Opportunities

Zoë Lincoln – TNEI Africa

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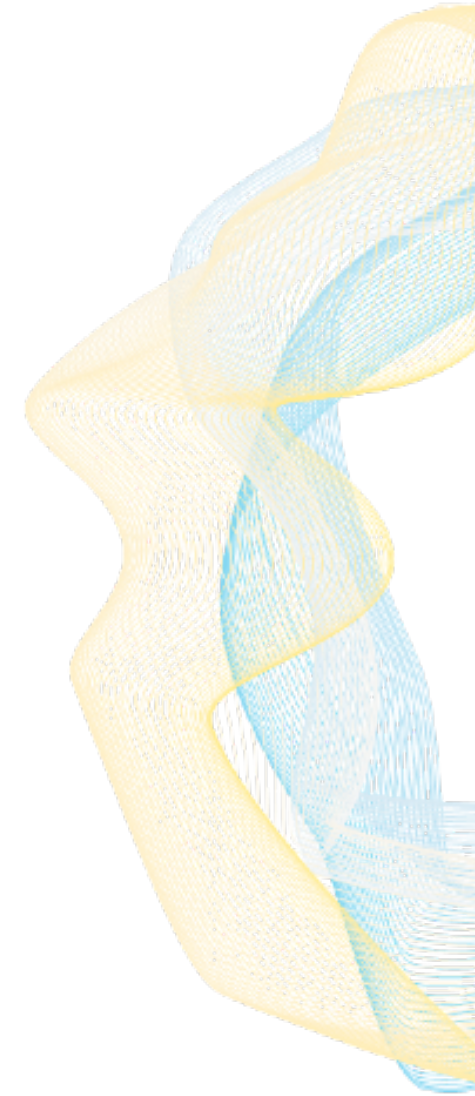
 **messe frankfurt**

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Grid Reliability – Facts & Common Misconceptions

- ✗ The Eskom grid is very unreliable
- ✗ In South Africa, we experience frequent load shedding because we have a weak grid
- ✗ Integrating renewables onto the grid will make it more reliable
- ✗ We should focus on building more renewables rather than investing in the grid
- ✗ Industrial/commercial customers and municipalities can establish their independence from the grid by wheeling renewable power from IPPs



- ✓ The South African electricity grid is a high-performing national asset
- ✓ Load shedding, as we know it, is as a result of insufficient generation, not insufficient grid capacity – this may change in the future though!
- ✓ Renewables do not preclude / eliminate the need for investments in grid reliability
- ✓ Wheeled power requires reliable grid connection near the generator, near the load, and on the complete network in between!

Challenge 1: An ambitious RE programme needs a robust grid

Integrated Resource Plan

2010

Year	Coal	Nuclear	Hydro	Wind	PV	Small Hydro	Landfill Gas	Gas	CSP	Biomass	Hybrid (battery)
2010	10 128	1 800	2 390	2 912	1 474	1 300	900	3 800	499	2 000	0
2011	2 120	0	0	0	0	0	0	0	0	0	0
2012	1 453	0	0	0	0	0	0	0	0	0	0
2013	1 133	0	0	0	0	0	0	0	0	0	0
2014	711	0	0	0	0	0	0	0	0	0	0
2015	262	0	0	0	0	0	0	0	0	0	0
2016	100	0	0	0	0	0	0	0	0	0	0
2017	0	0	0	0	0	0	0	0	0	0	0
2018	0	0	0	0	0	0	0	0	0	0	0
2019	0	0	0	0	0	0	0	0	0	0	0
2020	0	0	0	0	0	0	0	0	0	0	0
2021	0	0	0	0	0	0	0	0	0	0	0
2022	0	0	0	0	0	0	0	0	0	0	0
2023	0	0	0	0	0	0	0	0	0	0	0
2024	0	0	0	0	0	0	0	0	0	0	0
2025	0	0	0	0	0	0	0	0	0	0	0
2026	0	0	0	0	0	0	0	0	0	0	0
2027	0	0	0	0	0	0	0	0	0	0	0
2028	0	0	0	0	0	0	0	0	0	0	0
2029	0	0	0	0	0	0	0	0	0	0	0
2030	0	0	0	0	0	0	0	0	0	0	0
TOTAL	9 220	1 800	2 390	2 912	1 474	1 300	900	10 128	1 799	2 000	0

2018 draft

Table 1: Published Draft IRP 2018 (Approved by Cabinet for Consultation)

Year	Coal	Nuclear	Hydro	Wind	PV	Small Hydro	Landfill Gas	Gas	CSP	Biomass	Hybrid (battery)	Other	Decommissioned
2018	10 128	1 800	2 390	2 912	1 474	1 300	900	3 800	499	2 000	0	0	0
2019	2 120	0	0	0	0	0	0	0	0	0	0	0	0
2020	1 453	0	0	0	0	0	0	0	0	0	0	0	0
2021	1 133	0	0	0	0	0	0	0	0	0	0	0	0
2022	711	0	0	0	0	0	0	0	0	0	0	0	0
2023	262	0	0	0	0	0	0	0	0	0	0	0	0
2024	100	0	0	0	0	0	0	0	0	0	0	0	0
2025	0	0	0	0	0	0	0	0	0	0	0	0	0
2026	0	0	0	0	0	0	0	0	0	0	0	0	0
2027	0	0	0	0	0	0	0	0	0	0	0	0	0
2028	0	0	0	0	0	0	0	0	0	0	0	0	0
2029	0	0	0	0	0	0	0	0	0	0	0	0	0
2030	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	19 847	1 800	4 680	2 912	1 474	1 300	900	11 900	499	2 000	0	0	0
TOTAL	44.6	3.8	6.2	3.8	16.5	15.1	6.9	17.7	0.7	0	0	0	0

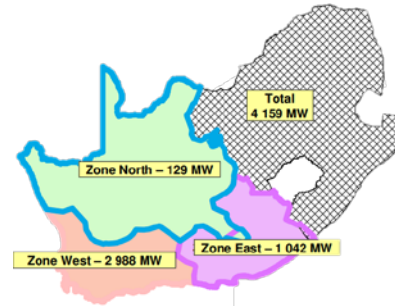
Legend: Installed Capacity (Green), Committed / Already Contracted Capacity (Yellow), Capacity Decommissioned (Red), New Additional Capacity (Light Green), Extension of Kromberg Plant Design Life (Light Blue), Includes Distributed Generation Capacity for own use (Light Purple)

2019

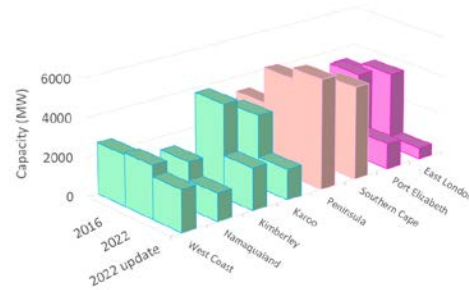
Table 5: IRP 2019

Year	Coal	Nuclear	Hydro	Wind	PV	Small Hydro	Landfill Gas	Gas	CSP	Biomass	Hybrid (battery)	Other	Decommissioned
2019	2 120	0	0	0	0	0	0	0	0	0	0	0	0
2020	1 453	0	0	0	0	0	0	0	0	0	0	0	0
2021	1 133	0	0	0	0	0	0	0	0	0	0	0	0
2022	711	0	0	0	0	0	0	0	0	0	0	0	0
2023	262	0	0	0	0	0	0	0	0	0	0	0	0
2024	100	0	0	0	0	0	0	0	0	0	0	0	0
2025	0	0	0	0	0	0	0	0	0	0	0	0	0
2026	0	0	0	0	0	0	0	0	0	0	0	0	0
2027	0	0	0	0	0	0	0	0	0	0	0	0	0
2028	0	0	0	0	0	0	0	0	0	0	0	0	0
2029	0	0	0	0	0	0	0	0	0	0	0	0	0
2030	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	4 266	0	0	0	0	0	0	0	0	0	0	0	0

2012



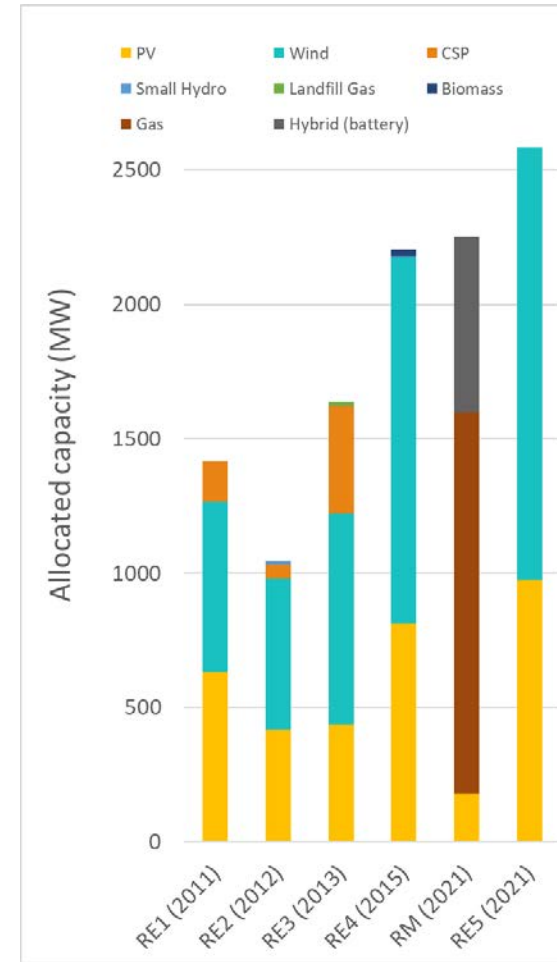
2016/2022/2022 update



2023



REIPP/RMIPP Allocations



TDP Completed Projects

2021

- Ankerlig-Sterrekus 400 kV line (WC)
- Kappa MTS (WC)
- Komsberg MTS (NC)
- Groeipunt MTS (NC)

2019

- Upington MTS (NC)
- Upington-Nieuwehoop 400 kV line (NC)
- Ferrum-Nieuwehoop line (NC)
- Gromis-Oranjemond 400 kV line (NC)
- Pinotage MTS (WC)
- Everest-Merapi 400 kV line (FS)
- Ngwedi MTS (NW)

2018

- Grassridge-Dedisa 132 kV line (EC)

2017

- Spitskop MTS (L)
- Borutho MTS and 400 kV lines (L)
- Kusile integration (Mp)
- Kronos MTS (NC)
- Aries-Nieuwehoop 400 kV line (NC)
- Vuyani MTS and 400 kV lines (KZN)
- Gamma-Kappa-Sterrekus 765 kV line (WC)

2016

- Thuso MTS (Gau)
- Medupi integration (L)
- Mercury-Mookodi-Ferrum 400 kV line (NW)
- Kappa 765/400 kV MTS (WC)
- Gamma-Kappa 765 kV line (WC)
- Gamma 765 kV Sw/S (WC)

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Challenge 2: Getting access to the grid



Apply for CEL



Receive CEL

Bid project

Preferred bidder; Accept CEL and request BQ

Accept BQ; Financial Close



GCCA published

RFP/RFB

GCCA published



0-30 days

> 30 days

< 90 days

TDP commits to unlocking constraints in GCCA, with clear funding mechanisms

90-120 days

Valid for 12 months but not reserved

Capacity reserved?

GCCA published



~ 12 months

Non PBs still have "valid" CELs

> 180 days

Ideal

Committed

Worst case

Opportunities & the Way Forward



The opportunities for solar remain fantastic!

- The grid has plenty of short-term capacity in previously-undeveloped provinces.
- Developments in high-resource areas will still be favoured long-term, once grid is unlocked.



The industry needs to work together as a community to achieve holistic success:

- Remembering that strengthening the grid to unlock high resource areas is better for everyone than incentivising development in lower-resource areas with available grid capacity
- Finding appropriate funding mechanisms for large, forward-looking Transmission grid projects
- Filling the gaps left by decommissioned thermal generation

Reliability of the grid is in everyone's best interests



Grid Codes will need to adapt to developments on the system – higher penetration of RE will likely require more onerous technology capabilities

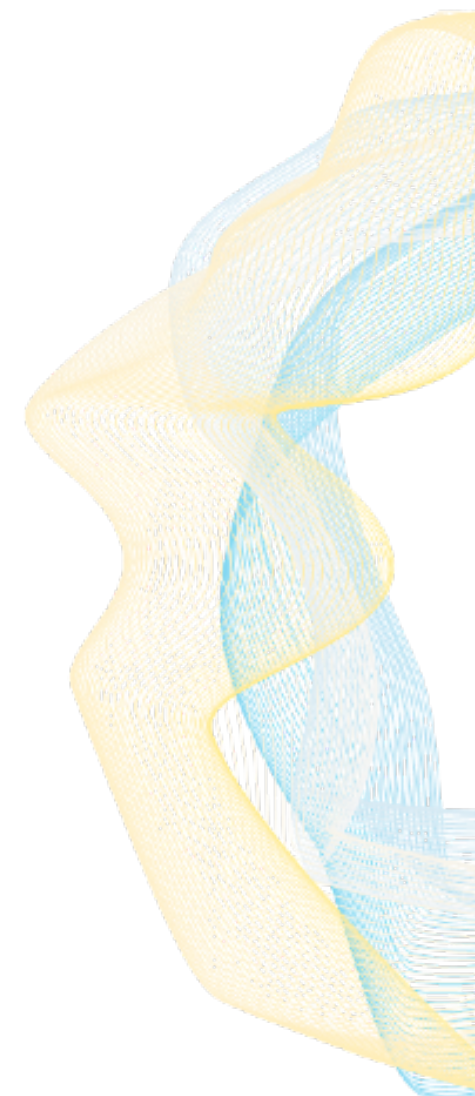


Generation projects will need to be resilient to progress delays while grid is being unlocked

Thank you!

Contact details:

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