Utility-scale power generation statistics in South Africa

2025
(1 January 2025 – 30 June 2025)

CSIR Energy Research Centre

September 2025

science, technology & innovation
Department:
Science, Technology and Innovation
REPUBLIC OF SOUTH AFRICA

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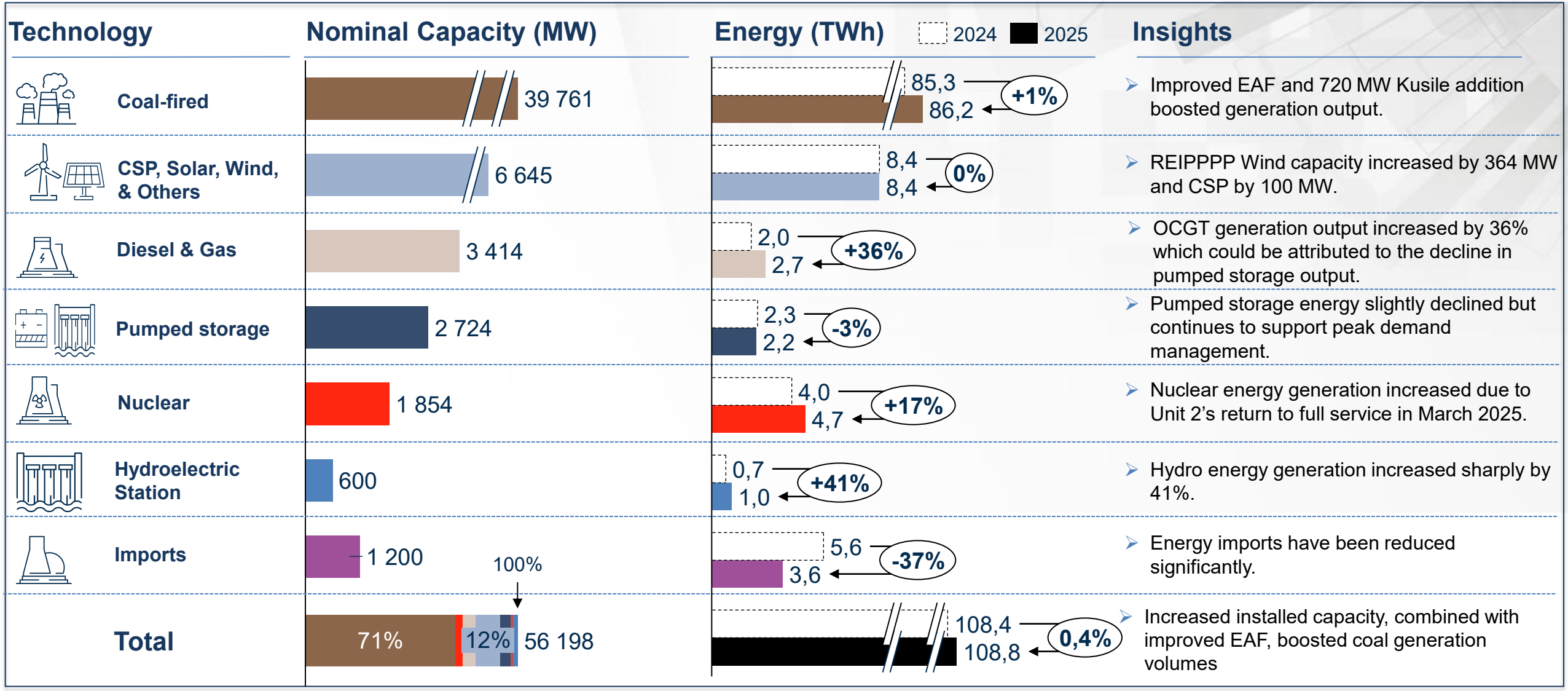
The addition of new generation capacity and a marginal improvement in EAF alleviates pressure on the power system amid declining energy demand in 2025.

The addition of new generation capacity from Eskom's Kusile and two wind REIPPPP plants enhanced energy output; the implemented NERSA tariff increase of 12.74% this year takes the average tariff to c/kWh 195.93.

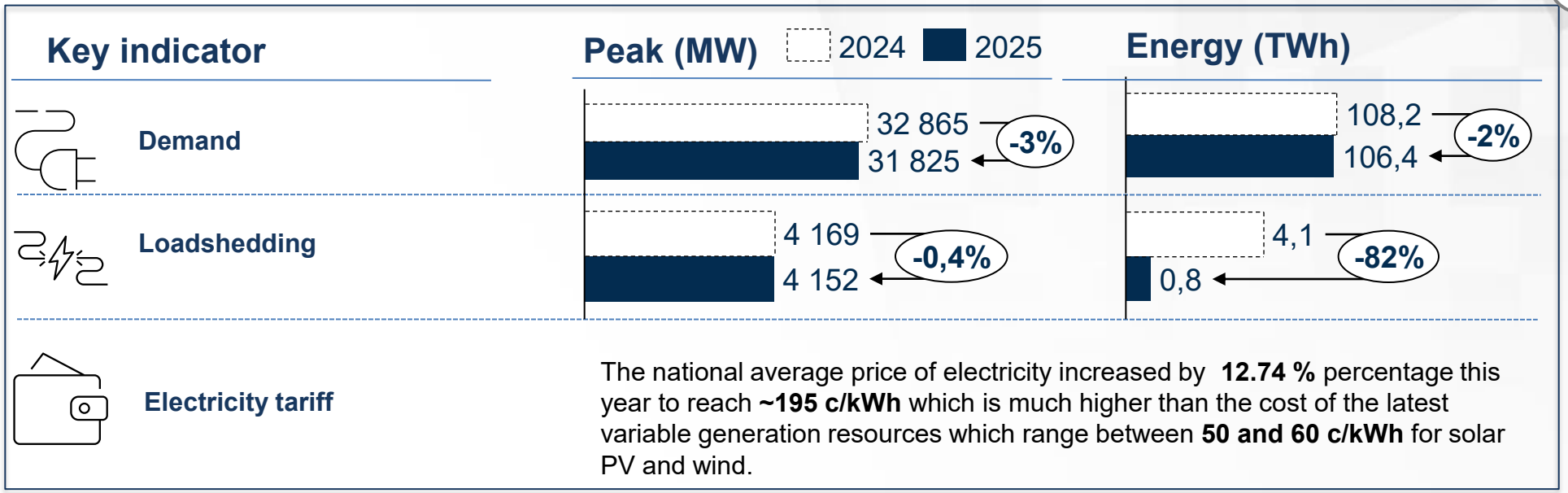
Theme	Key insights
Demand Analysis	➢ Demand for grid electricity continues to trend down; peak demand is 3% lower in the first half of 2025 compared to the peak demand recorded in the first half of 2024, mostly due to recent growth in embedded generation and energy efficiency interventions amid constrained generation supply and steep electricity tariff increases.
Generation Capacity	➢ Eskom fleet installed capacity increased by 720 MW in the first half of 2025 compared to the same period of 2024; therefore, energy generated from coal is relatively higher. Additional capacity from wind plants of 364 MW from the REIPPPP bid window 5, and 100 MW of dispatchable CSP.
EAF Analysis	➢ The Eskom fleet EAF marginally improved in the first half of 2025 compared to the previous year and reached an annual average of 58% which is 1% higher than the 57% reached in the same period of 2024.
Loadshedding statistics	➢ Load shedding continued to decline in the first half of 2025, with only 749 GWh shed compared to 4 126 GWh shed in 2024 — a reduction of 82% — reflecting improved power system performance and supply availability.
Tariff Analysis	➢ National average tariffs have risen 190% since 2014, mostly above inflation, with the projected 2026 hike (8.76%) exceeding the 4.5% Consumer Price Index (CPI) forecast and now above utility-scale solar photovoltaic (PV) Levelised Cost of Electricity (LCOE).

Summary of 2025 statistics: Total energy production increased marginally by 0.4% in the first half of 2025 compared to 2024, driven mainly by marginal improved EAF and new coal capacity.

Coal generation increased by 1% due to higher EAF and the commissioning of Kusile Unit 6, while import generation fell by 37% as domestic generation and hydro output rose, prompting increased diesel utilisation.



Summary of 2025 statistics: Actual loadshedding decreased by ~82% in the first half of 2025 compared to 2024 due to improvements in the energy availability factor (EAF) while energy demand decreased by 2% compared to the same period of 2024.

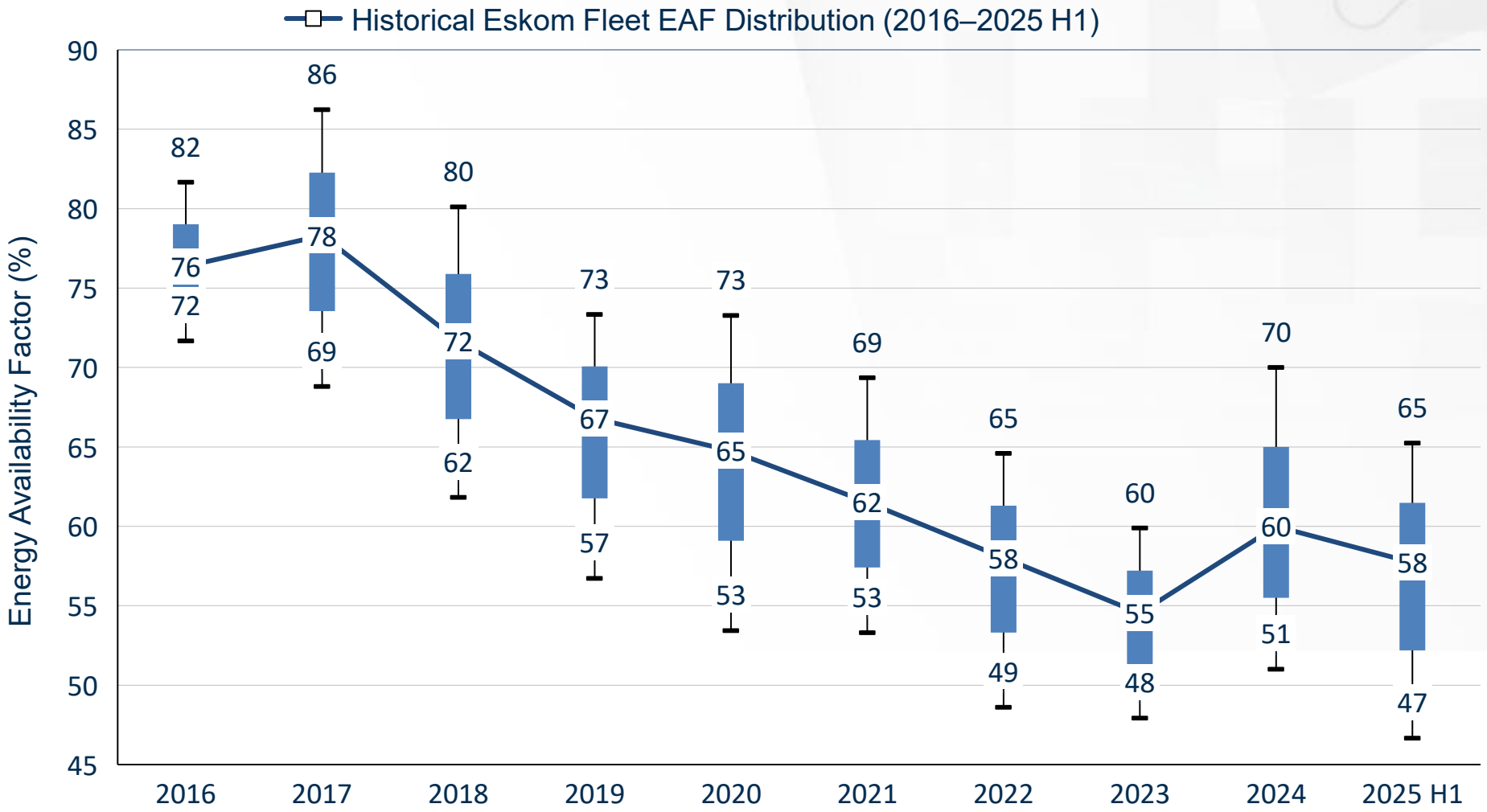


Insights

- Despite a 0.4% increase in total energy production in H1 2025, South Africa's electricity demand declined by 2% compared to the same period in 2024.
- Load-shed energy declined by 82% in the first half of 2025 compared to the same period in 2024.
- The national average price of electricity increased annually by an average of **~11%** over the last ten years, compared to the annual average inflation rate of **~5%**.

The annual average EAF was 58% by the end of June 2025, with the bulk of the winter period still ahead, where typically low planned maintenance is expected.

The Eskom fleet's median EAF for the first half of 2025 was 1 percentage point higher than the first half of 2024, and monthly values ranged from 47% to 65%.



- Median EAF in 2025 H1 was 58%, 1 percentage point higher than 2024 H1 (57%)
- Monthly EAF ranged from a minimum of 47% to a maximum of 65% in 2025 H1
- The Generation Recovery Plan continued to focus on coal-station performance, supporting EAF stability.

2016–2024 values are full-year; 2025 reflects H1 only. Box-and-whisker shows monthly min/median/max; Q1 and Q3 estimated as midpoints between min/median and median/max. Median marker equals the annual (or H1) average.

Sources: Eskom; CSIR analysis.

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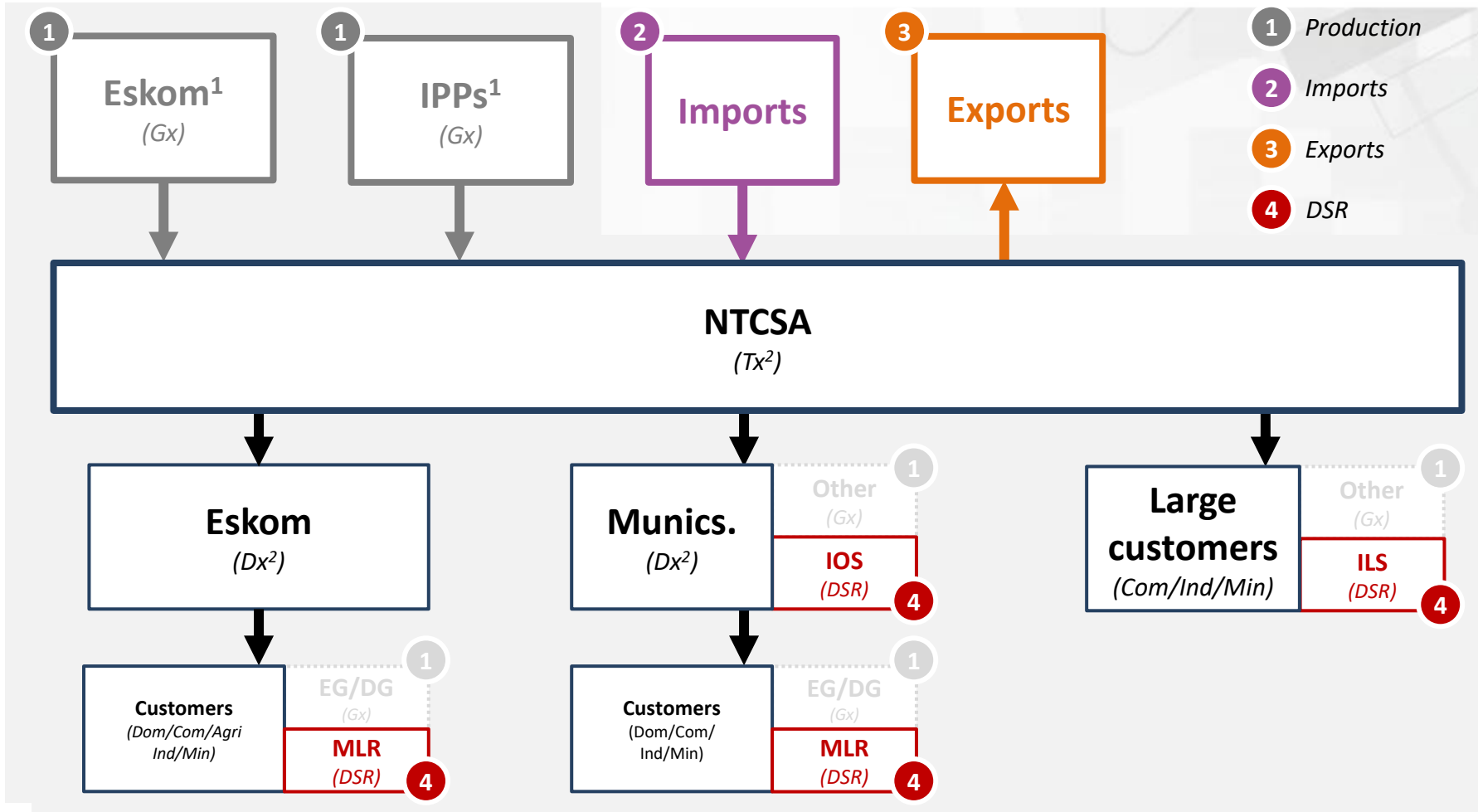
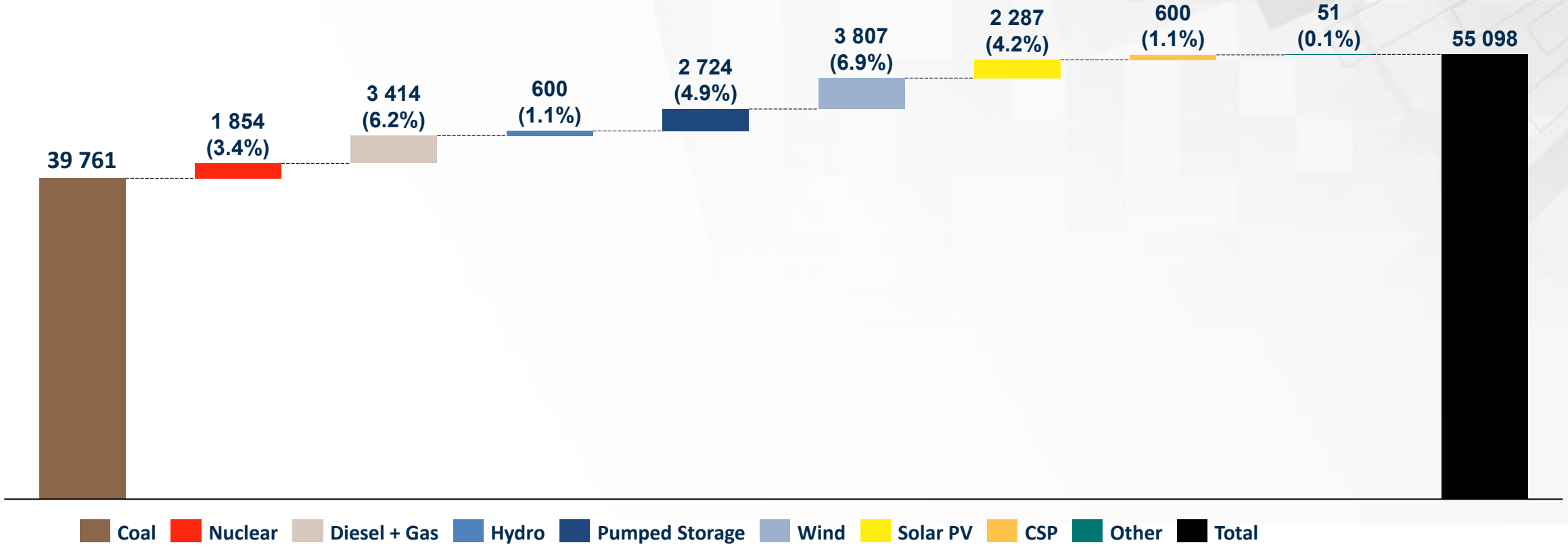
Equivalent wholesale electricity production and demand in South Africa, as measured and published by Eskom



EG = Embedded Generation; DG = Distributed Generation; Gx = Generation; Tx = Transmission; Dx = Distribution; Demand Side Response (DSR) = Manual Load Reduction (MLR) + Interruptible Load Supply (ILS) + Interruption of Supply (IOS); NOTES: Items in light faded gray are NOT included in statistics presented in this publication. [1] Power generated less power station load (auxillaries); Minus pumping load (Eskom owned pumped storage); [2] Transmission/distribution networks incur losses before delivery to customers

Actual Nominal Installed Capacity as of 30 June 2025 (excluding embedded generation and private capacity). In 2025, an additional generation capacity of 720 MW from Kusile, 364 MW from REIPPP wind, and 100 MW of CSP was added.

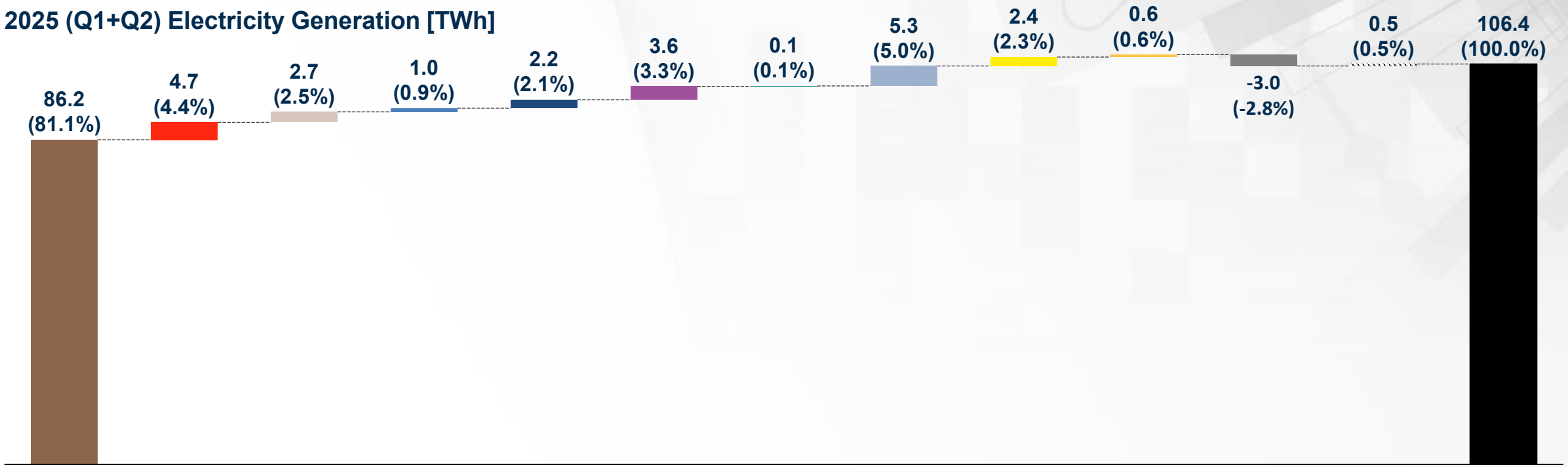
2025 Nominal capacity [MW]



Note: Eskom installed BESS capacity of 68 MW/292 MWh as of October 2024

Notes: RE = Renewable Energy; Total nominal installed capacity = Eskom capacity + IPPs; Embedded generation and municipal-owned capacity excluded
Sources: Eskom; CSIR analysis. Eskom Holdings SOC Ltd, Generation Plant Mix, GX 0001 Revision 32, July 2025, p. 2. Available at: www.eskom.co.za

In 2025, coal generation increased marginally compared to the same period in 2024, contributing 86.2 TWh of the approximately 106 TWh total system load (including DSR), while diesel energy resources increased by ~36% to meet the system load and DSR reduced by ~80% due to higher installed capacity this year amid lower system load.



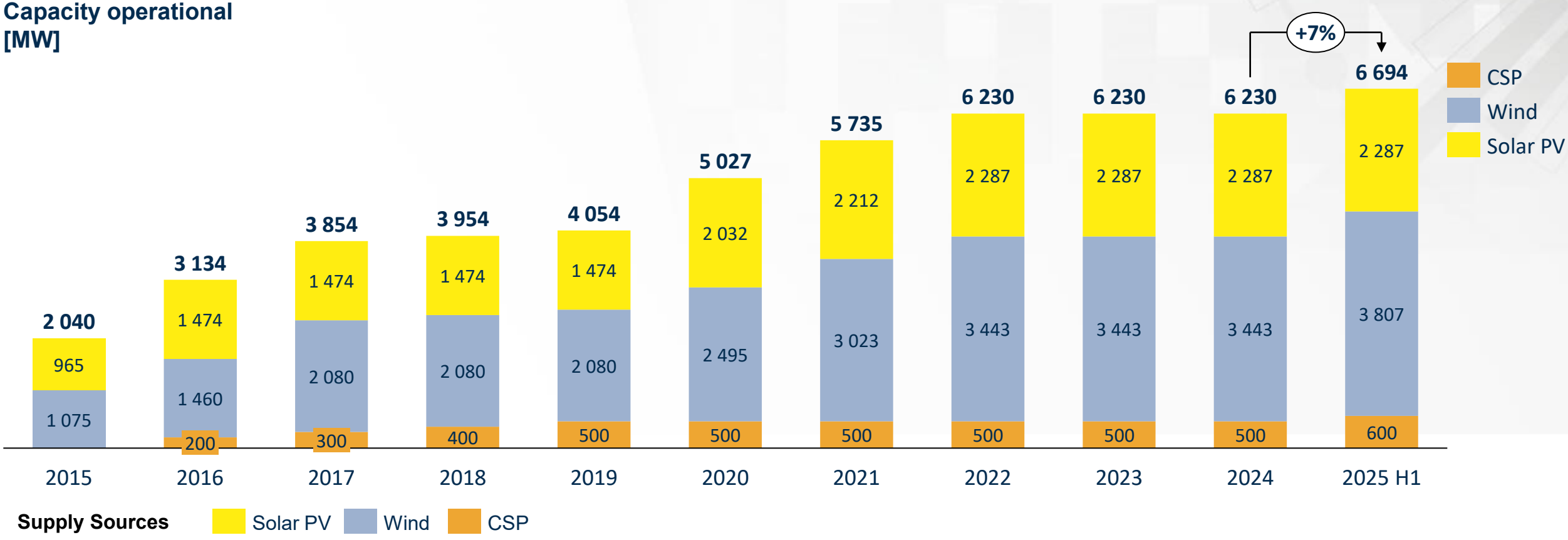
(Q1+Q2)	Coal	Nuclear	Diesel + Gas	Hydro	Pumped Storage	Imports	Other RE	Wind	Solar PV	CSP	Pump Load	DSR	System Load
2024 H1	85,3	4,0	2,0	0,7	2,3	5,6	0,1	5,2	2,5	0,6	-3,0	2,5	**107,8**
2025 H1	86,2	4,7	2,7	1,0	2,2	3,6	0,1	5,3	2,4	0,6	-3,0	0,5	**106,4**

Notes: Wind includes Eskom's Sere wind farm (100 MW). Wind and solar PV energy excludes curtailment and is thus lower than actual wind and solar PV generation. PS = pumped storage. Demand Side Response (DSR) = Manual Load Reduction (MLR) + Interruptible Load Supply (ILS) + Interruption of Supply (IOS)
Sources: Eskom; CSIR analysis. H1 refers to the first half of the year.

The REIPPPP saw a growth of ~7% in 2025 from new CSP and wind capacity.

By June 30, 2025, South Africa added 3 807 MW of wind energy, 2 287 MW of large-scale solar PV systems, and 600 MW of concentrated solar power (CSP) through the REIPPPP. In 2025 alone, wind and CSP capacity from the REIPPPP increased by 364 and 100 MW, respectively.

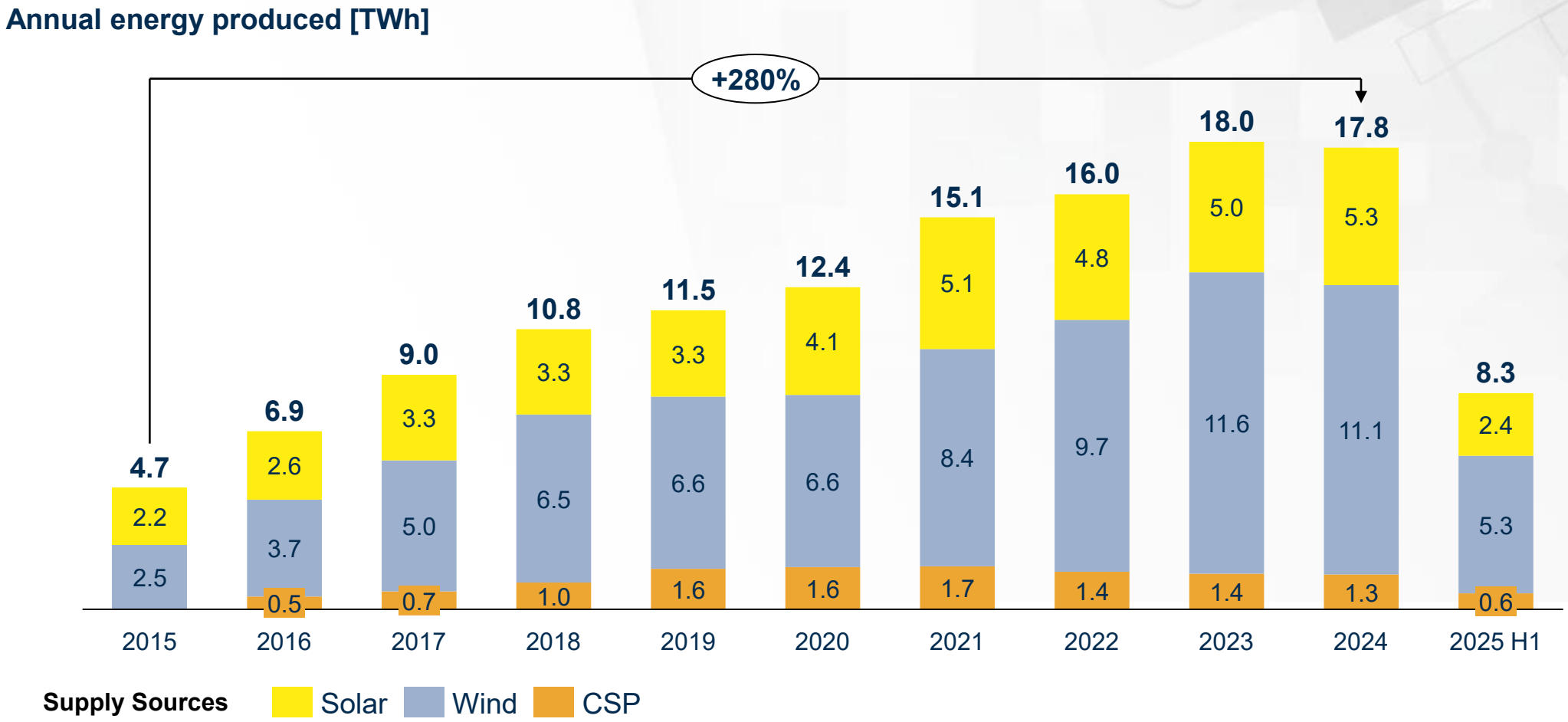
Capacity operational [MW]



*Notes: RSA = Republic of South Africa. Solar PV capacity = capacity at point of common coupling. Wind includes Eskom's Sere wind farm. H1 refers to the first half of the year.
Sources: Eskom; DoE IPP Office

Renewable energy generation from the REIPPP programme has grown by 280% since 2015.

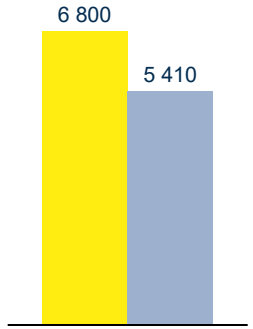
Generation from the REIPPPP remains unchanged at ~8.3 TWh in the first half of 2025 compared to the same period in 2024.



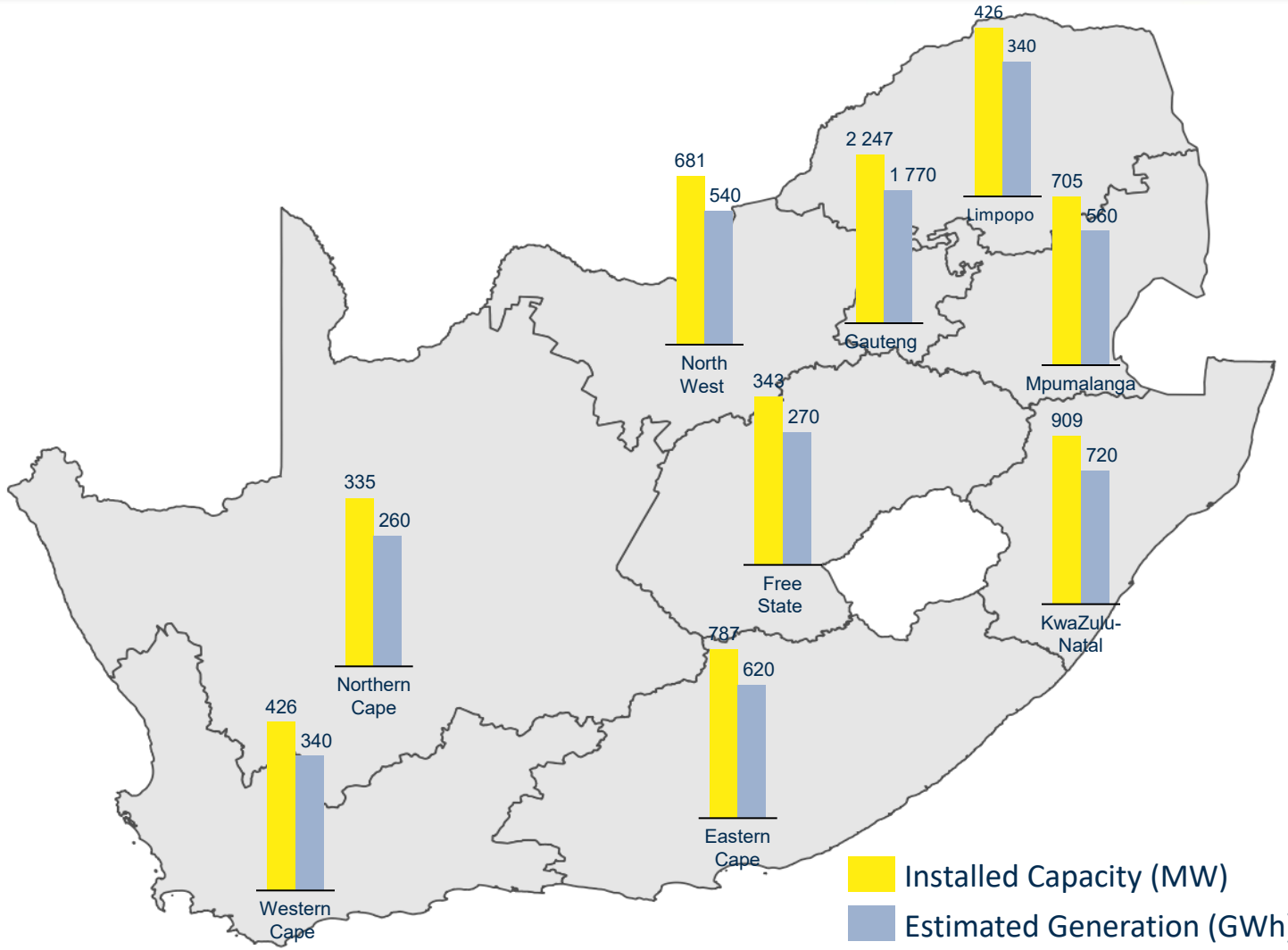
Notes: Wind includes Eskom's Sere wind farm (100 MW). CSP energy measured from date when more than two CSP plant were commissioned. Wind and solar PV energy excludes curtailment and is thus lower than actual wind and solar PV generation. H1 refers to the first half of the year.
Sources: Eskom; DEE IPP Office

Embedded/Private Generation (Installed Capacity & Output) H1 2025

By mid-2025, embedded rooftop PV capacity reached ~6 800 MW in the first half of 2025 compared to ~5 600 MW installed in the first half of 2024. The estimated 6 800 MW generated ~5.3 TWh compared to 4.7 TWh generated in the same period in 2024.



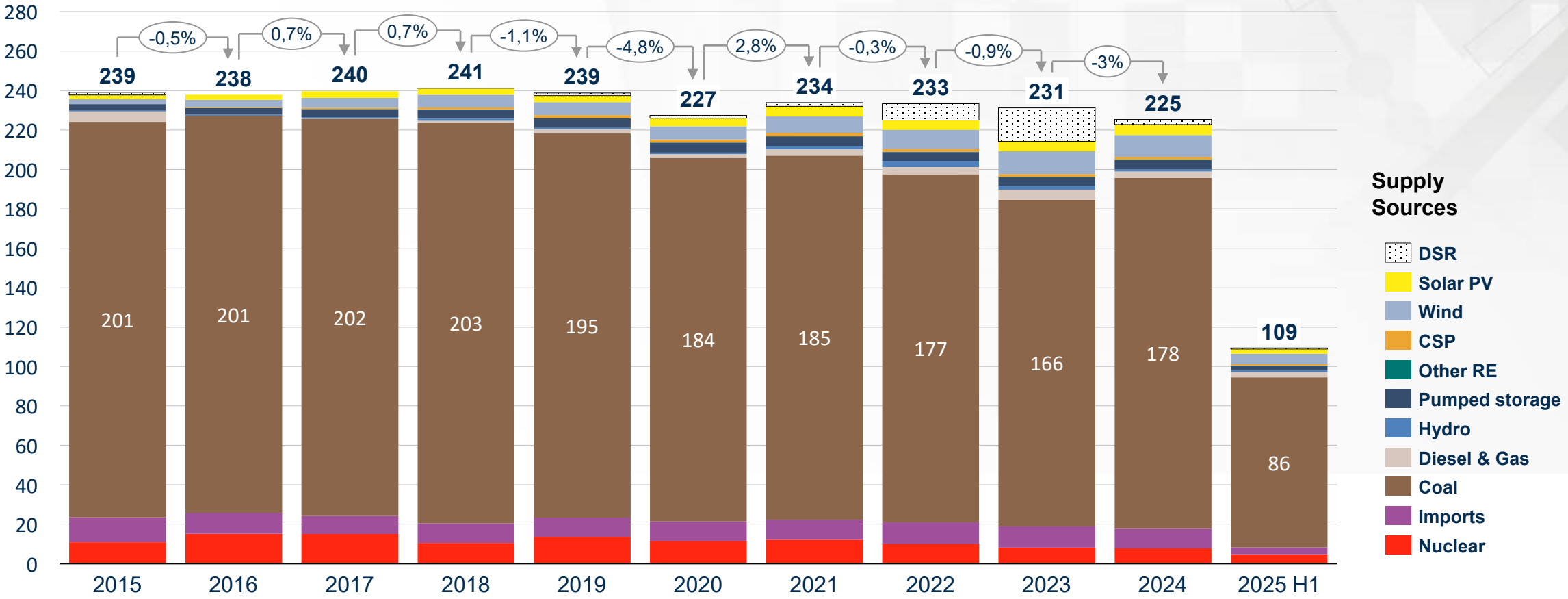
Total Embedded solar PV Capacity & Generation (H1 2025)



H1 refers to the first half of the year. Provincial generation is estimated as Capacity × 18% capacity factor × 4 380 h. Scope: rooftop PV only; excludes utility-scale IPPs. Totals may not sum due to rounding/reconciliation to the national estimate Sources: Eskom Generation Adequacy Report; RES4Africa Foundation (2024), *Assessment of the Techno-Economic Potential of Rooftop PV at Sites of Interest in South Africa.* Data to 30 Jun 2025.

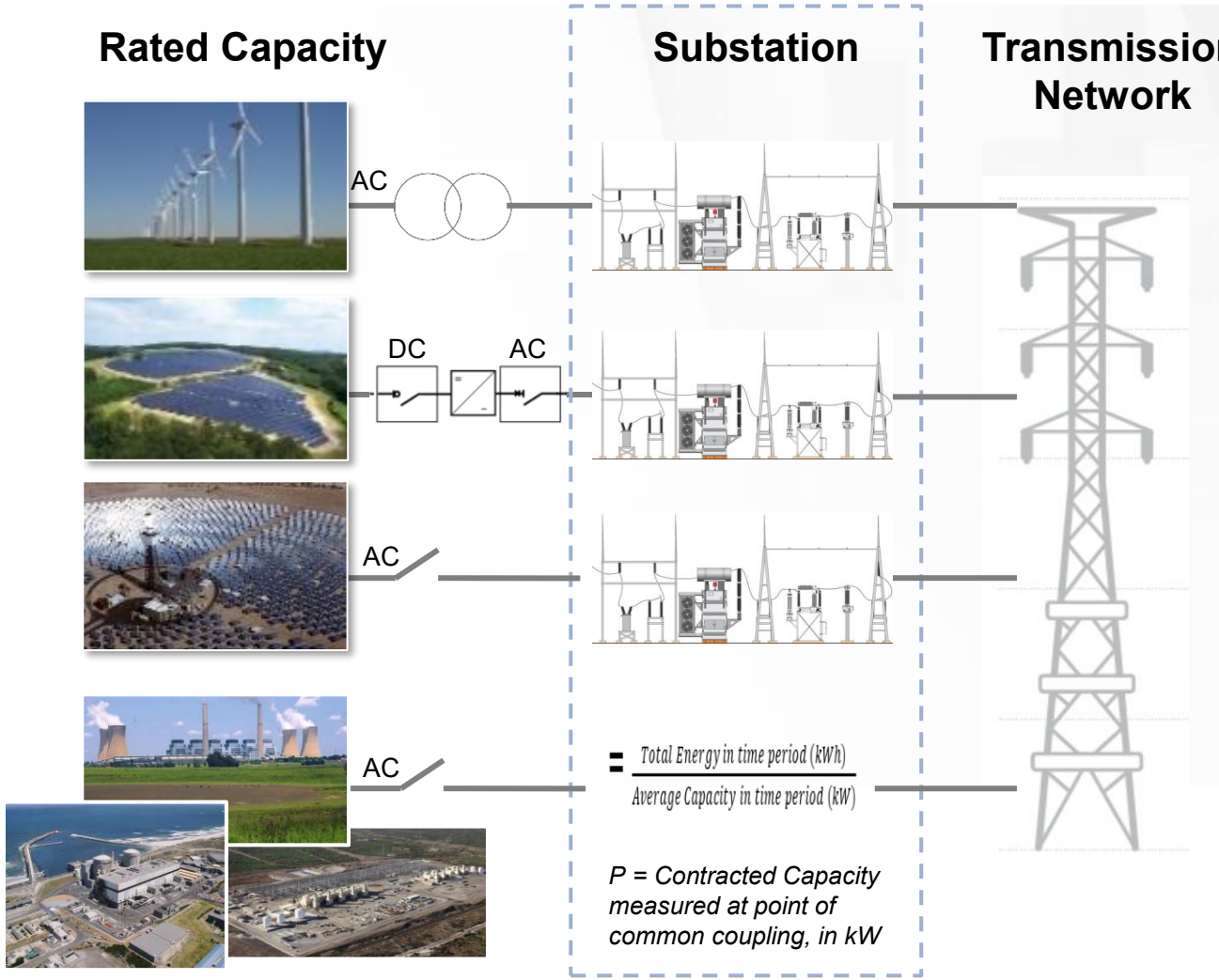
Eskom's electricity production in the first half of 2025 shows a positive outlook. Baseload generation from coal and nuclear sources increased by ~1.6 TWh in the first half of 2025 compared to the same period in 2024. However, diesel and gas generation output rose by ~0.7 TWh in the first half of 2025 compared to the same period last year. This contributed to a significant reduction in DSR, amounting to ~2 TWh.

Annual electricity production [TWh]



NOTES: As the total electricity production declines over the period 2014-2024, the total electricity losses are on the rise. The total electricity losses increased from 8.9% in 2014 to 11.9% in 2024
Demand Side Response (DSR) = Manual Load Reduction (MLR) + Interruptible Load Supply (ILS) + Interruption of Supply (IOS). DSR before 2018 has been estimated by the CSIR
Sources: Eskom; CSIR analysis H1 refers to the first half of the year.

Illustration: Calculation of the average capacity factor of operational power plant categories in South Africa



Average Capacity Factor (CF)

$$CF = \frac{\sum_{t=1}^{n} E_t}{\frac{\sum_{t=1}^{n} P_t}{n}}$$

$$= \frac{Total\ Energy\ in\ time\ period\ (kWh)}{Average\ Capacity\ in\ time\ period\ (kW)}$$

Where:
P = Contracted Capacity, in kW
E = Energy production, in kWh
t = Time period
n = Number of time periods

Notes: RSA = Republic of South Africa. Simplified illustration of technology grid interconnections

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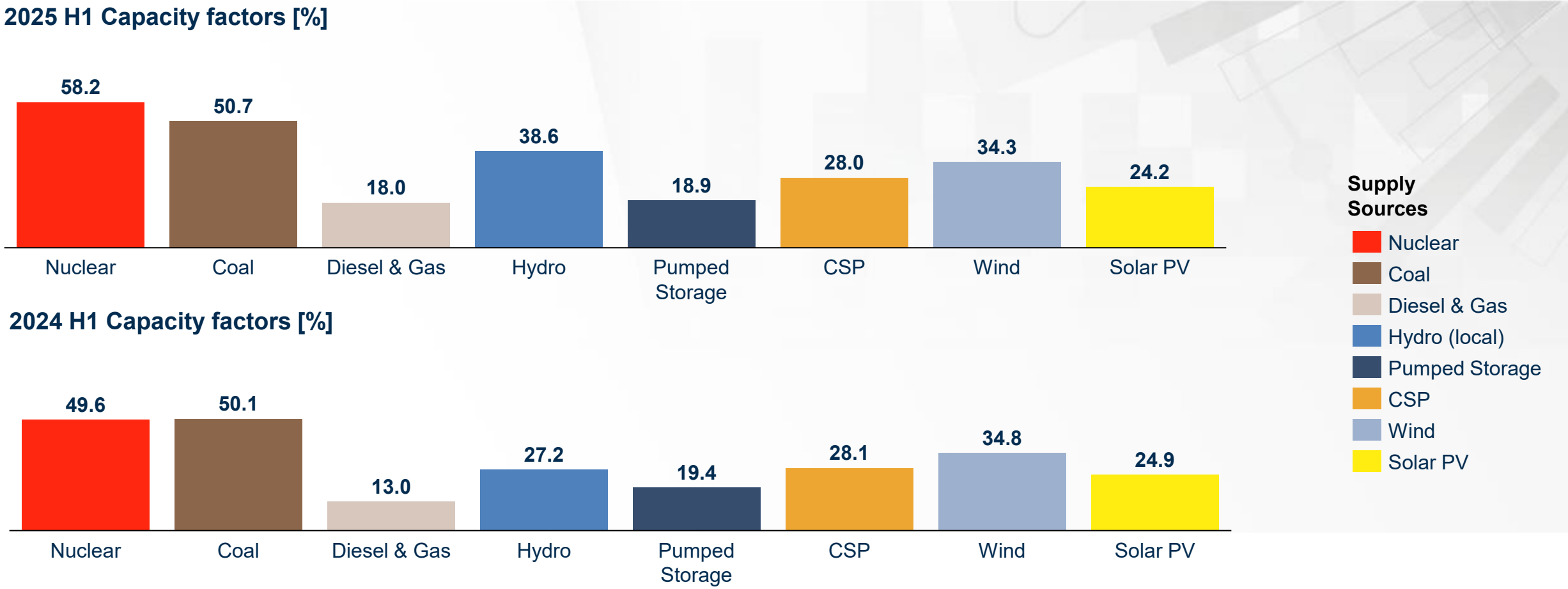
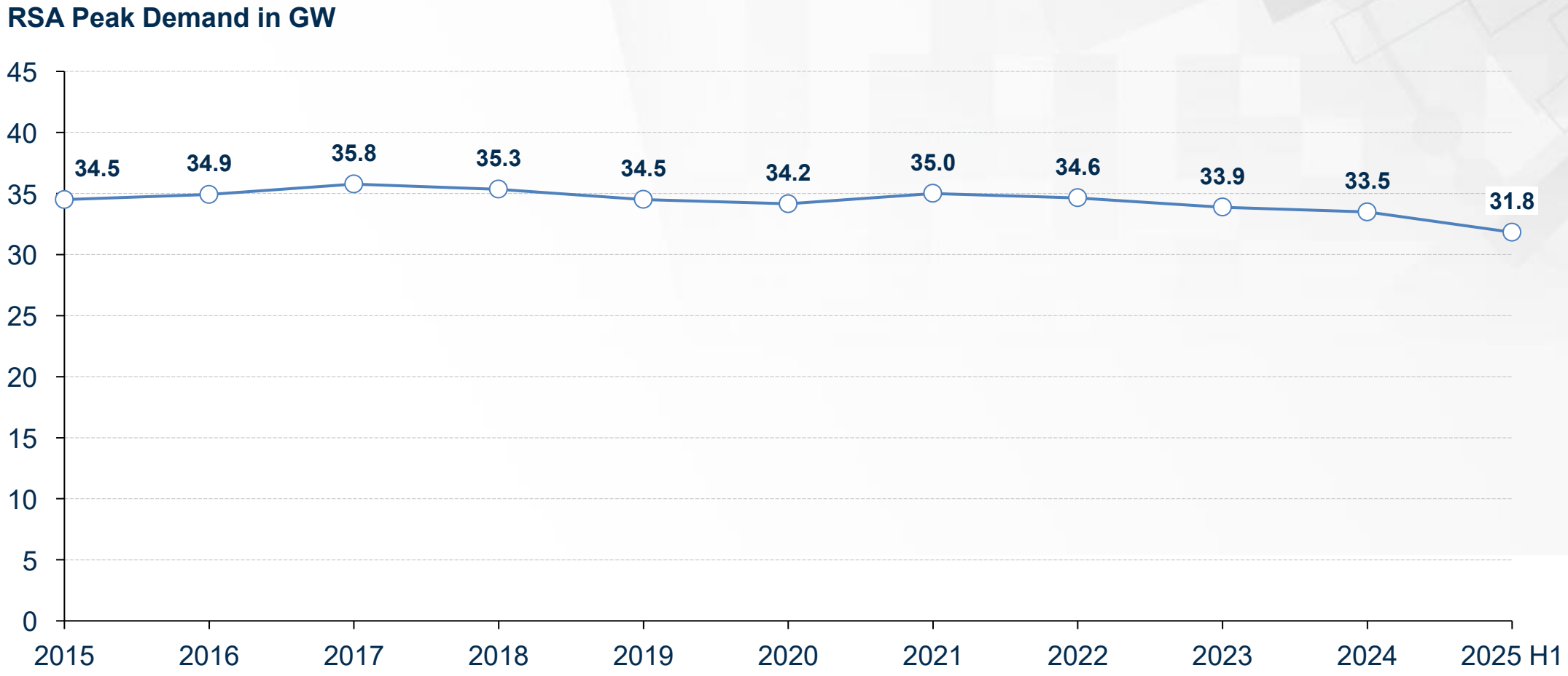
Coal utilisation: Annual capacity factor comparison by supply source. Diesel and gas utilisation increased by 5% in the first half of 2025 compared to the same period in 2024, supported by improvements in nuclear, coal, and hydro capacity factors.



Sources: Eskom; CSIR analysis
Notes: H1 refers to the first half of the year

Eskom's peak demand in the first half of 2025 decreased by 3% compared to the same period in 2024.

Historical annual peak demand has been gradually declining over the past decade, mostly due to recent growth in embedded generation and energy efficiency interventions amid constrained generation supply and steep electricity tariff increases.



Notes: Peak demand includes Demand Side Response (DSR) = Manual Load Reduction (MLR) + Interruptible Load Supply (ILS) + Interruption of Supply (IOS). H1 refers to the first half of the year.
Sources: Eskom; CSIR analysis.

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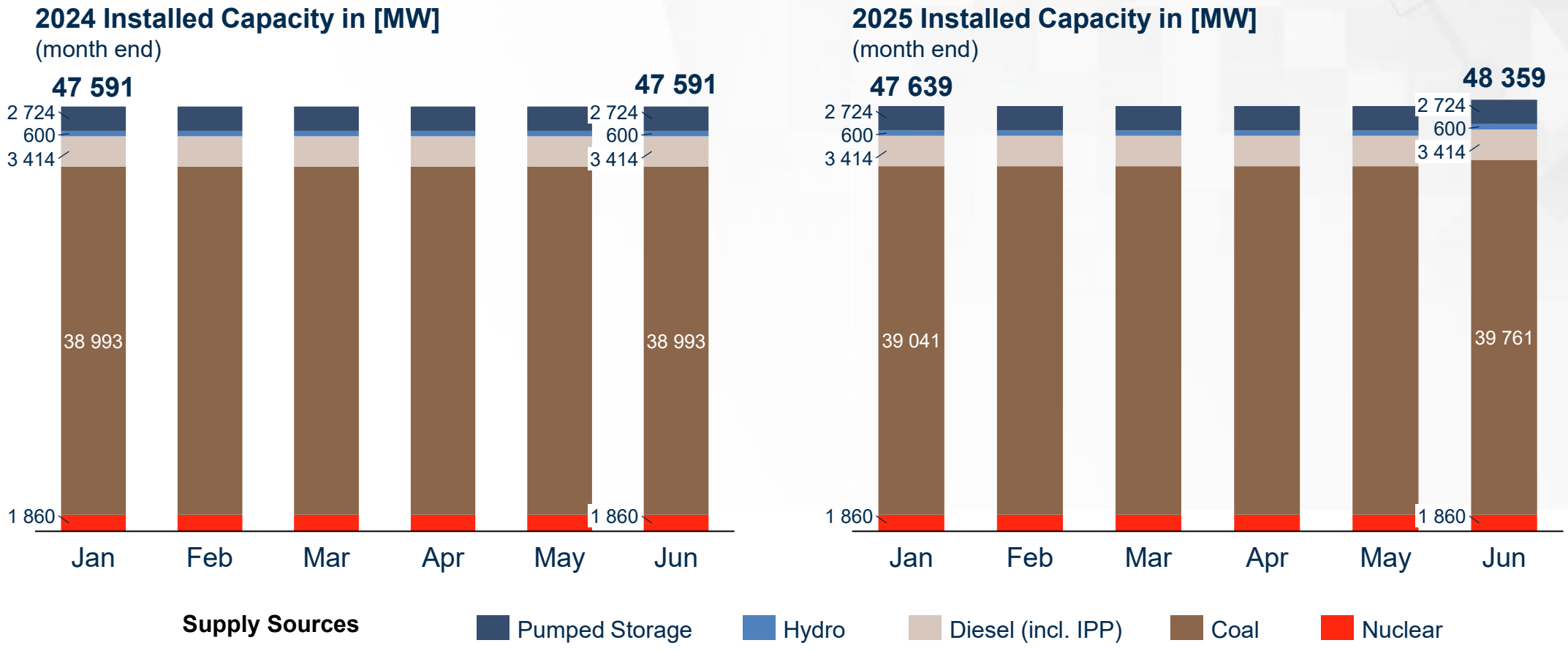
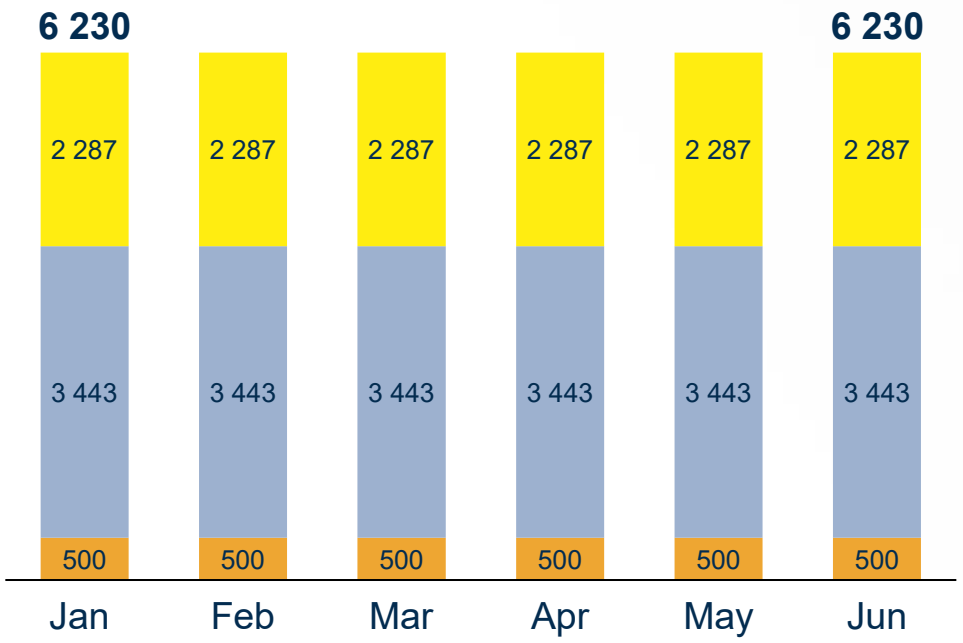
A comparison of Eskom power plants' monthly installed capacity shows that Kusile power station added 720 MW to the power grid from June 2025.



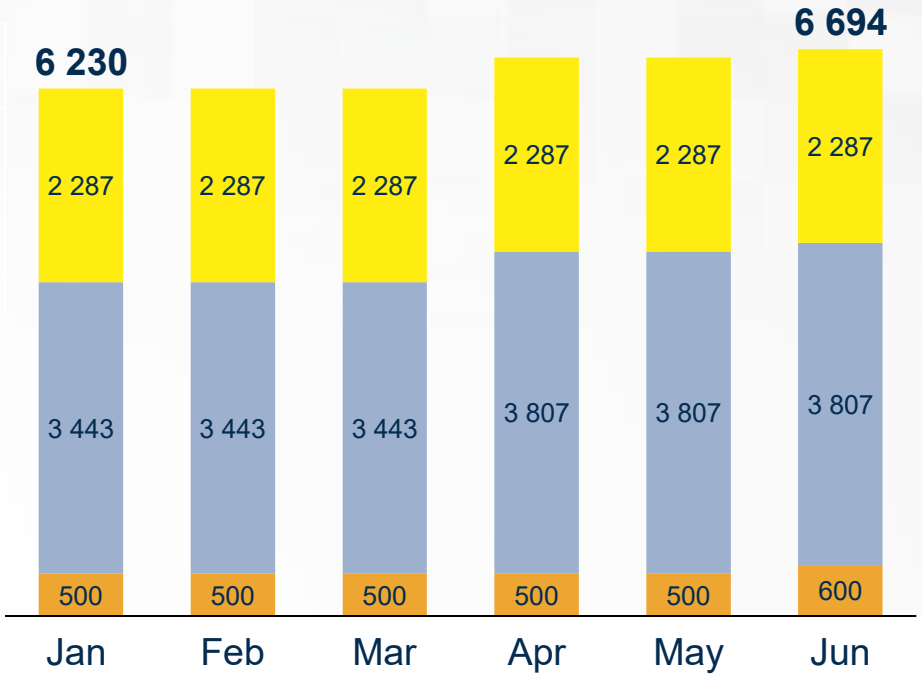
Sources: Eskom; CSIR analysis. Eskom data portal.

A comparison of REIPPPP capacity in 2025 and 2024 shows that 364 MW of new utility-scale wind and 100 MW from CSP generation capacity were added to the grid, increasing total REIPPPP capacity from 6 230 MW to 6 594 MW.

2024 Capacity operational [MW]
(month end)



2025 Capacity operational [MW]
(month end)



Capacity operational

2 287 MW

3 443 MW

500 MW

Supply Sources

Solar PV

Wind

CSP

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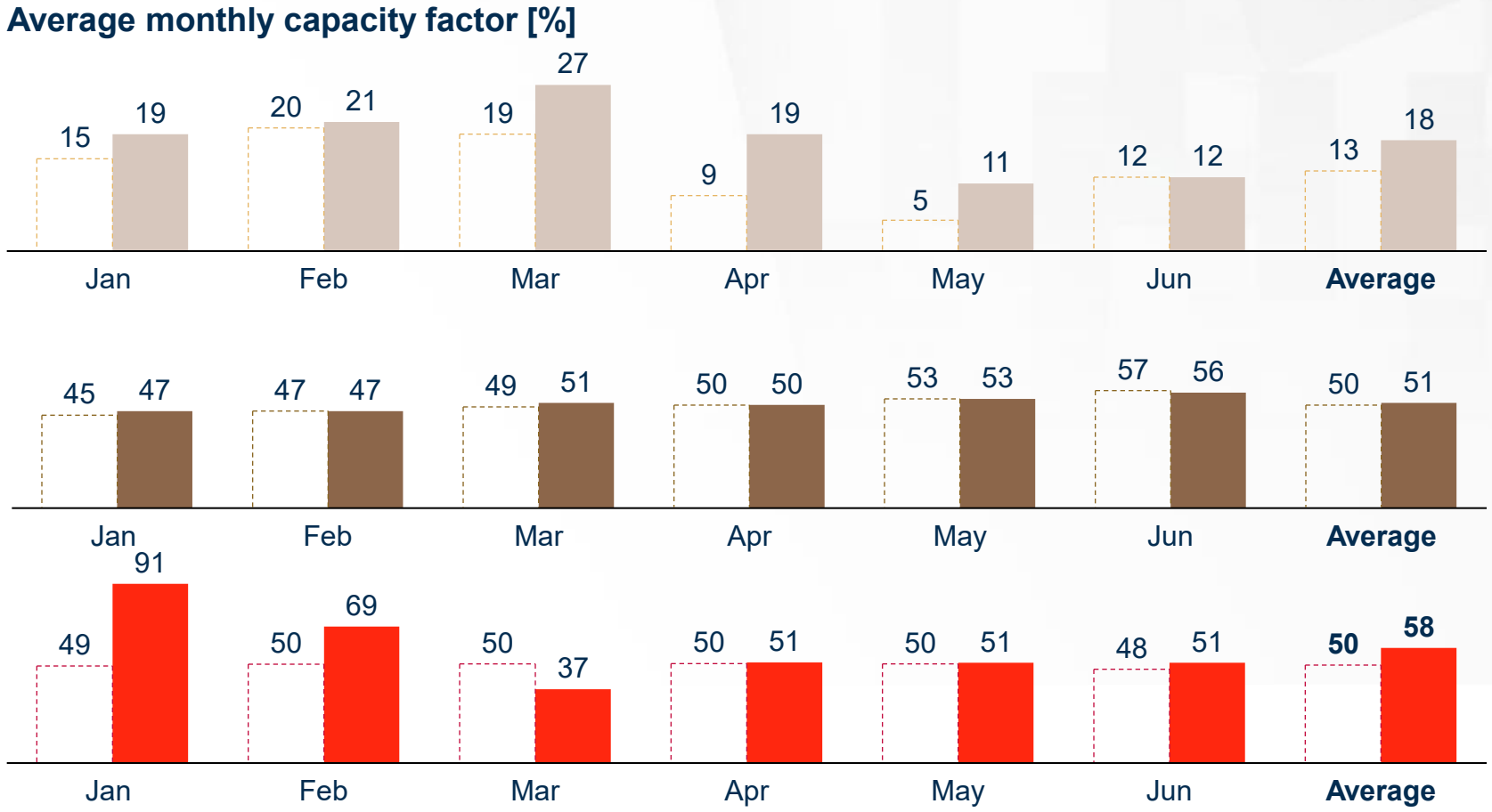
Sources: Eskom; CSIR analysis

Average monthly capacity factors for conventional power plants. Diesel and gas utilization peaked at 27% in March 2025 as nuclear utilization dropped to a low of 37%.



Capacity Operational (30 Jun)

3 414 MW

40 544 MW

1 860 MW

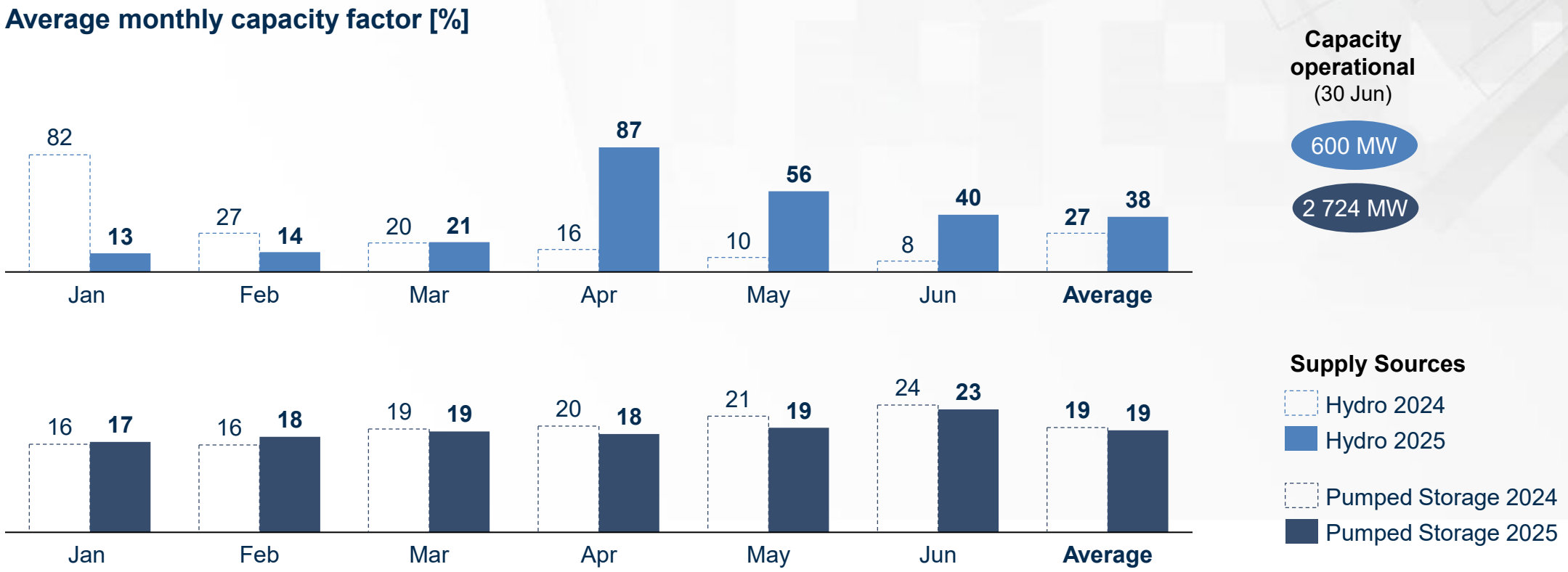
Supply Sources

- Diesel (incl. IPP)2024
- Diesel (incl. IPP) 2025
- Coal 2024
- Coal 2025
- Nuclear 2024
- Nuclear 2025

Sources: Eskom; CSIR analysis

Average monthly capacity factors for hydro and pumped storage plants

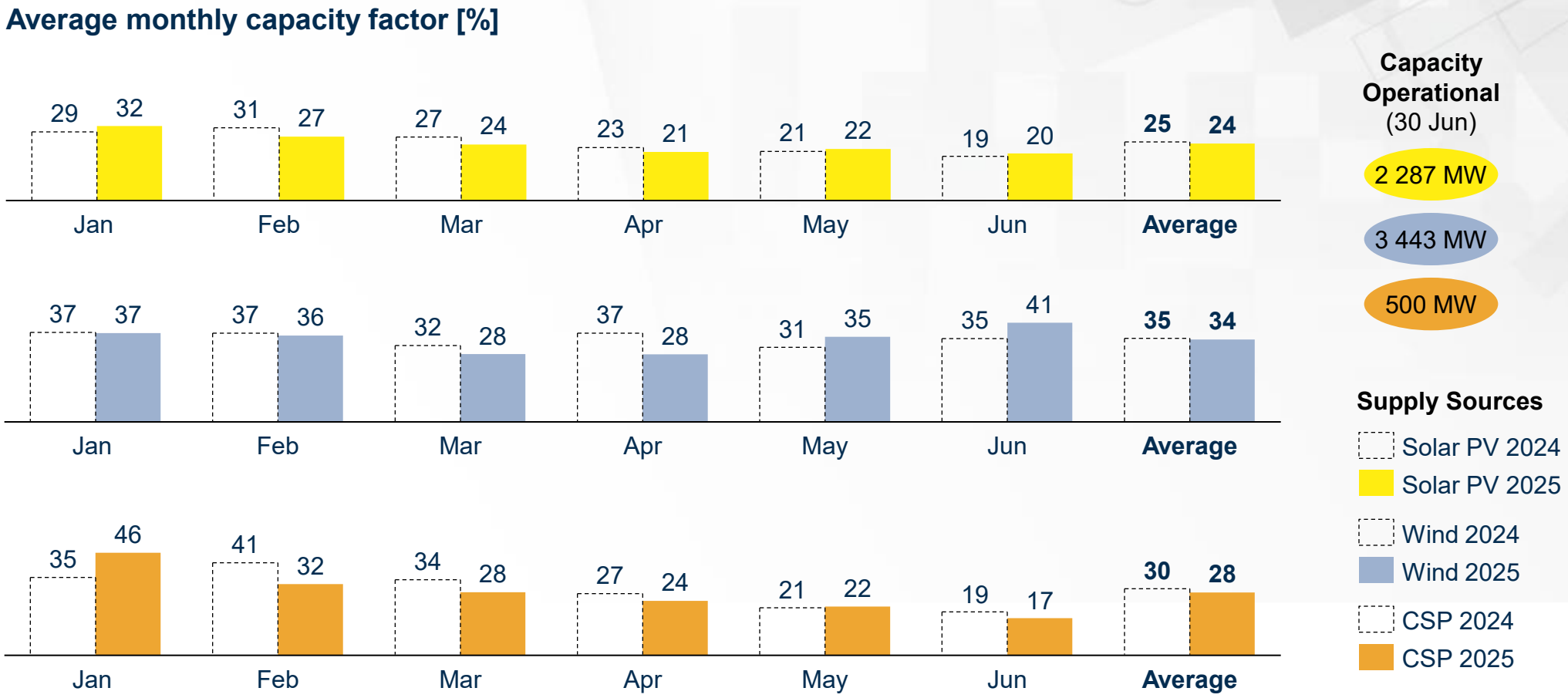
Hydro resources were utilised significantly more in 2025 compared to 2024. In contrast, the pumped storage capacity factor remained similar in 2025 relative to 2024.



Sources: Eskom; CSIR analysis

Average monthly capacity factors for solar PV, wind, and CSP.

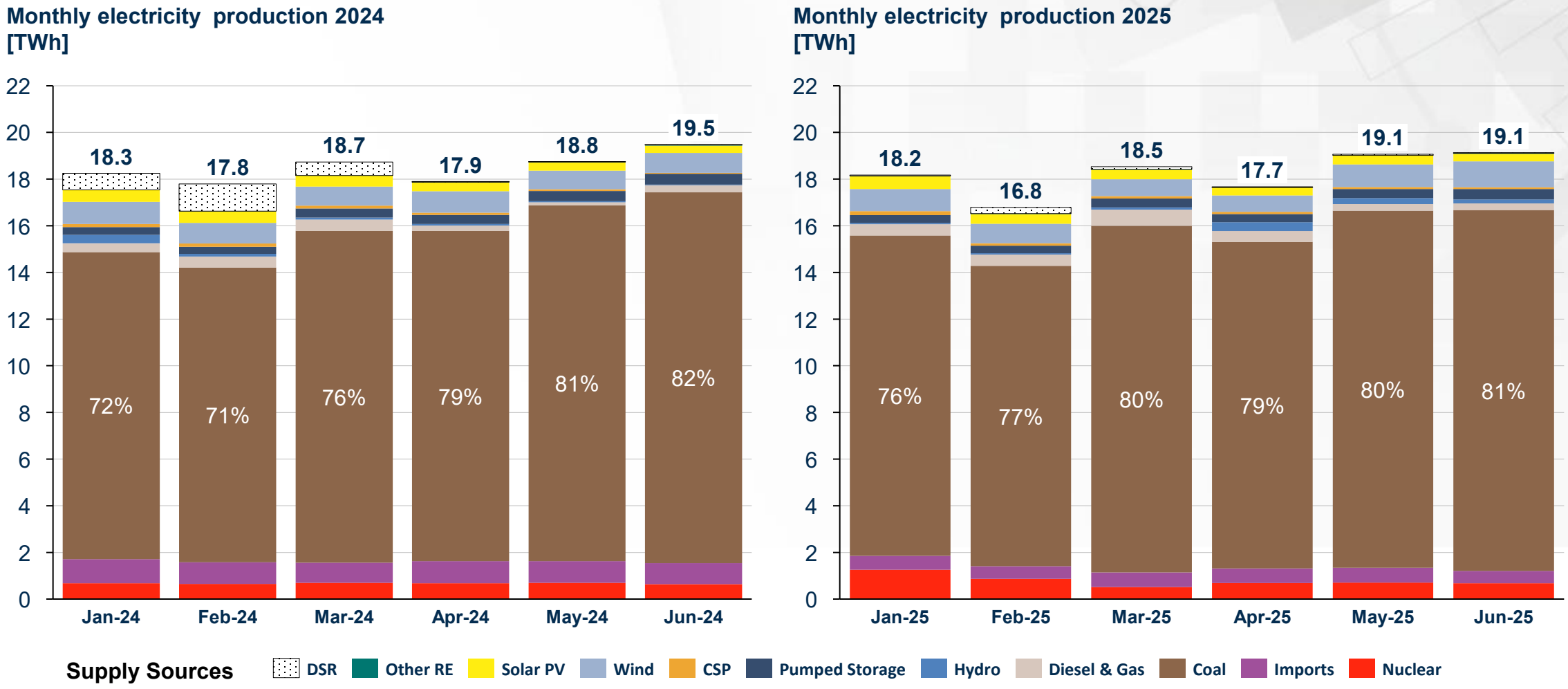
The monthly capacity factors for solar PV, CSP, and wind fluctuate throughout the year, reflecting seasonal variations. Solar PV, CSP, and wind energy production were slightly lower in the first half of 2025 compared to the same period in 2024.



Notes: Capacity operational as per the actual start of operation (can differ from REIPPP contracted date).
Sources: Eskom; CSIR analysis

Monthly electricity production from all power supply sources

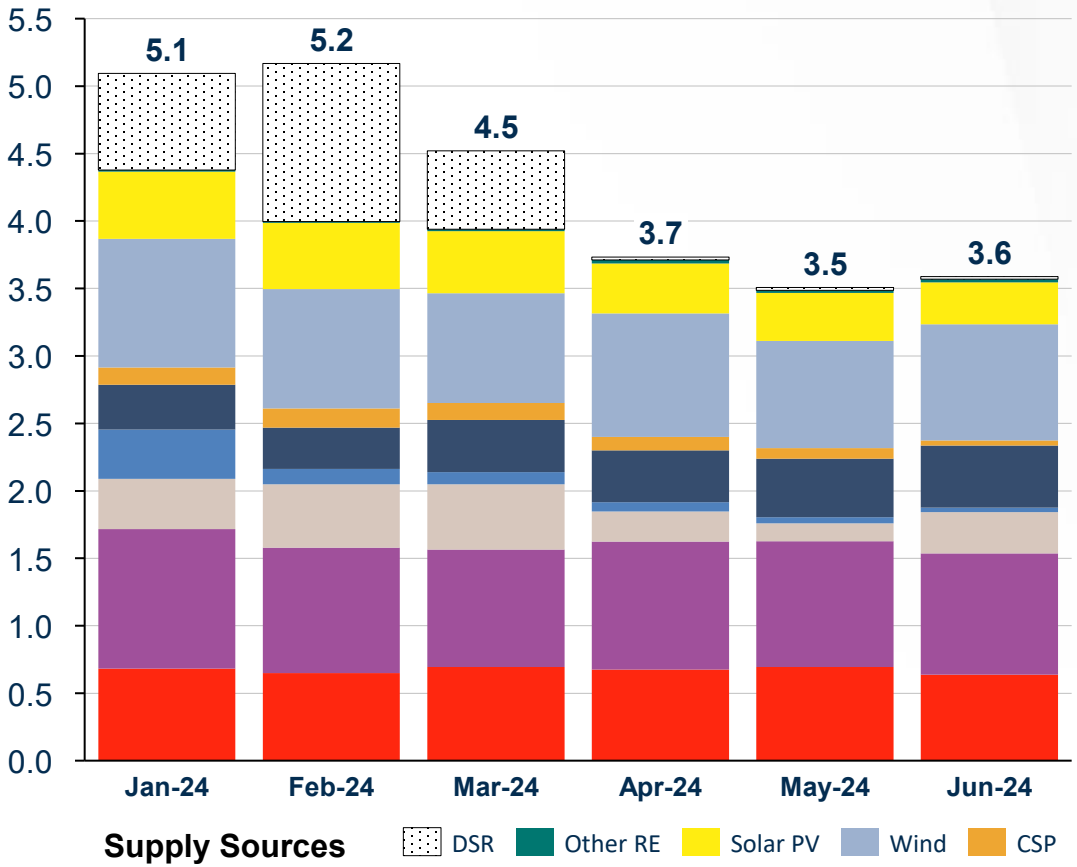
Diesel and gas generation surged sharply in the first quarter of 2025, peaking in March, despite an increase in coal generation.



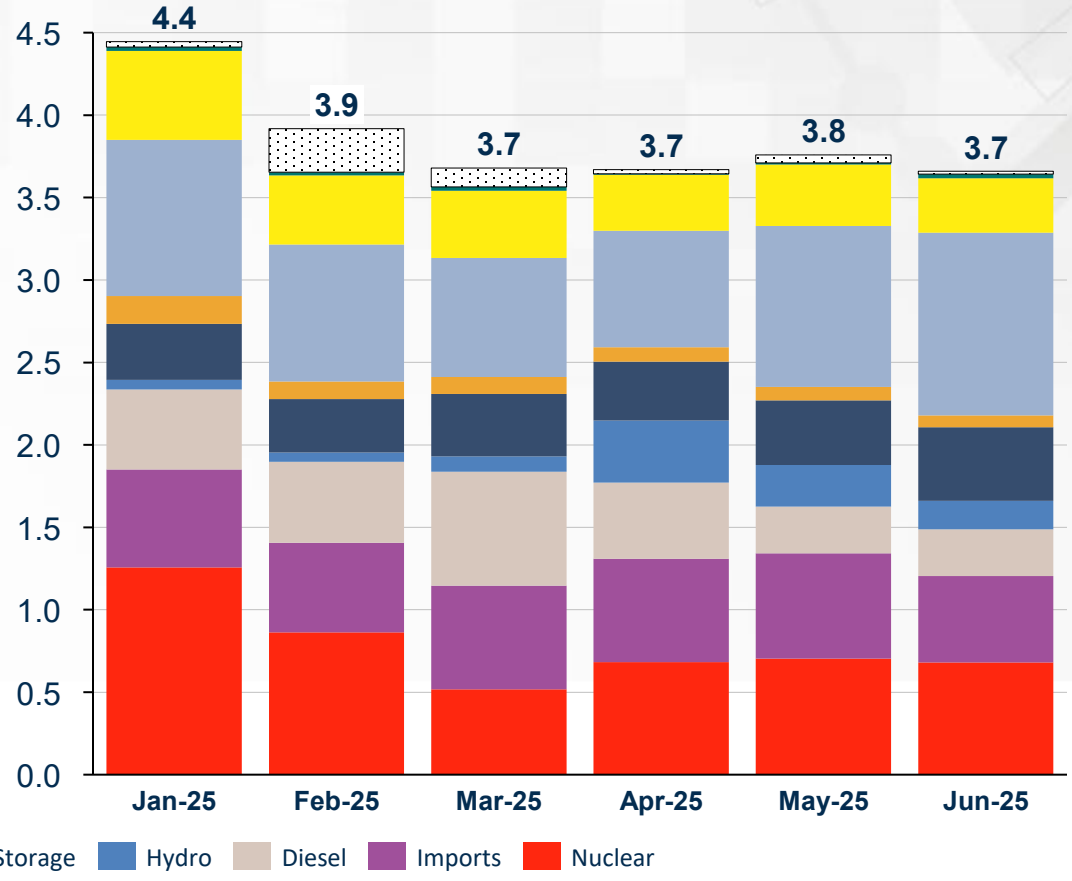
Notes: Demand Side Response (DSR) = Manual Load Reduction (MLR) + Interruptible Load Supply (ILS) + Interruption of Supply (IOS)
Sources: Eskom; CSIR analysis

Monthly electricity production from alternative supply sources, excluding coal, was lower in the first half of 2025 compared to the same period in 2024; DSR, on the other hand, was much lower in the first half of 2025 compared to 2024.

Monthly electricity production 2024 [TWh]



Monthly electricity production 2025 [TWh]



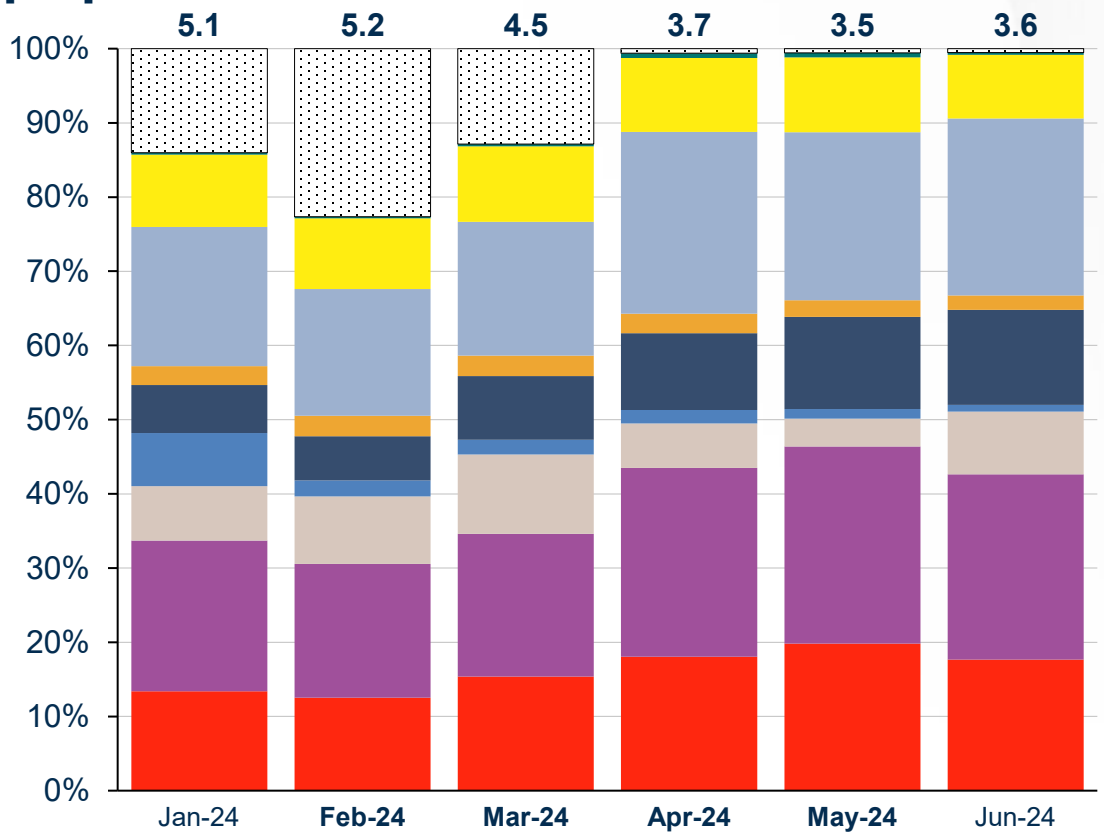
Supply Sources DSR | Other RE | Solar PV | Wind | CSP | Pumped Storage | Hydro | Diesel | Imports | Nuclear

Notes: Demand Side Response (DSR) = Manual Load Reduction (MLR) + Interruptible Load Supply (ILS) + Interruption of Supply (IOS)
Sources: Eskom; CSIR analysis

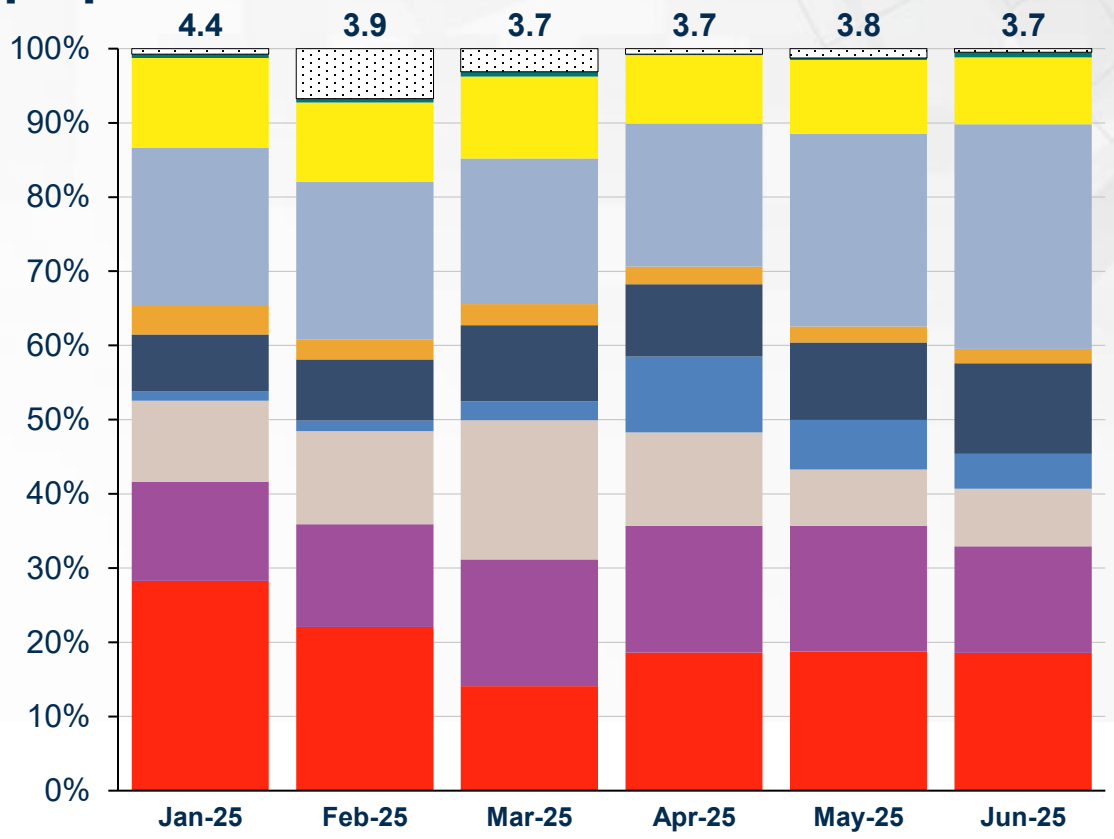
Monthly electricity production from power supply sources, excluding coal.

Actual monthly electricity production for the period shows that there was more energy production from diesel in the first half of 2025 compared to the same period in 2024, alongside a marked decline in DSR utilisation.

Monthly electricity production 2024 [TWh]



Monthly electricity production 2025 [TWh]

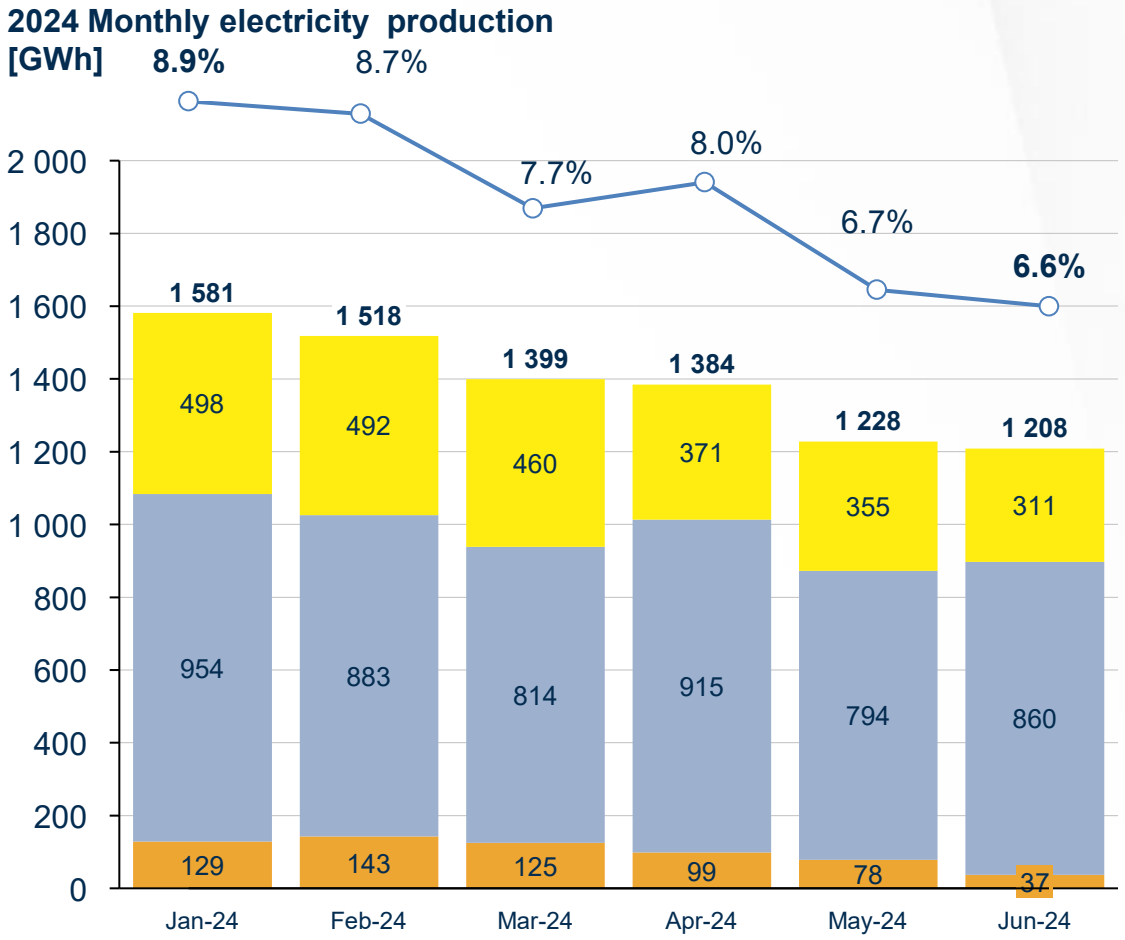


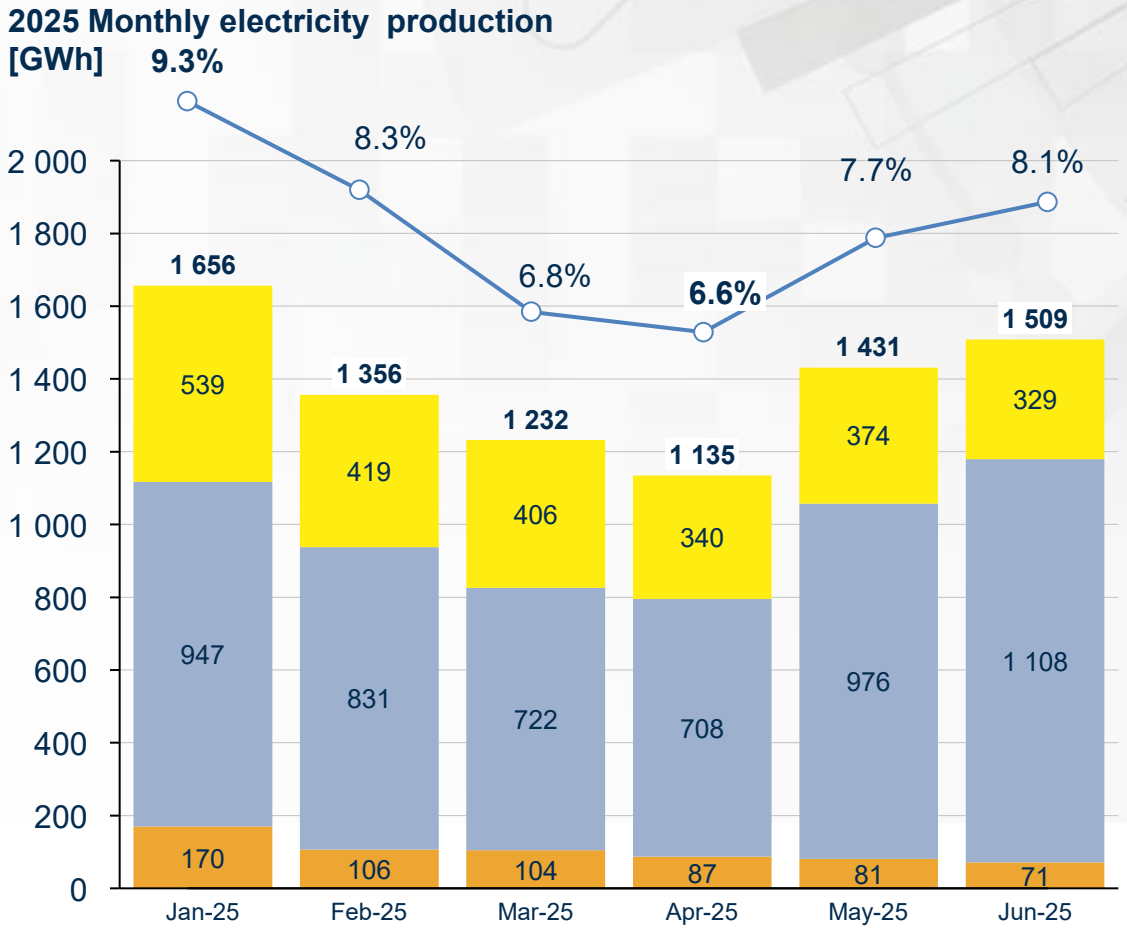
Supply Sources DSR | Other RE | Solar PV | Wind | CSP | Pumped Storage | Hydro | Diesel & Gas | Imports | Nuclear

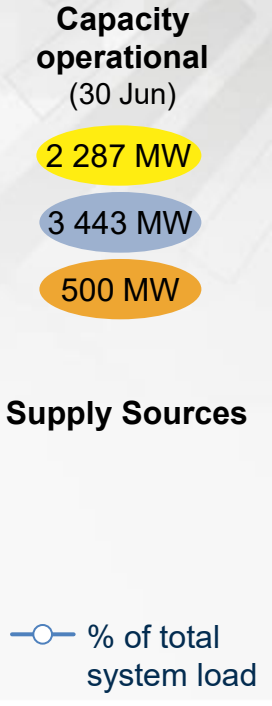
Notes: Demand Side Response (DSR) = Manual Load Reduction (MLR) + Interruptible Load Supply (ILS) + Interruption of Supply (IOS)
Sources: Eskom; CSIR analysis

Monthly electricity production of South Africa's REIPPP wind, solar PV, and CSP fleet.

Solar PV, wind, and CSP contribute the least to system load during the winter months and the most during summer; overall, the energy produced from wind in 2025 was significantly higher compared to the same period in 2024.







Notes: Wind and solar PV energy excludes curtailment and is thus lower than actual wind and solar PV generation.
Sources: Eskom; CSIR analysis

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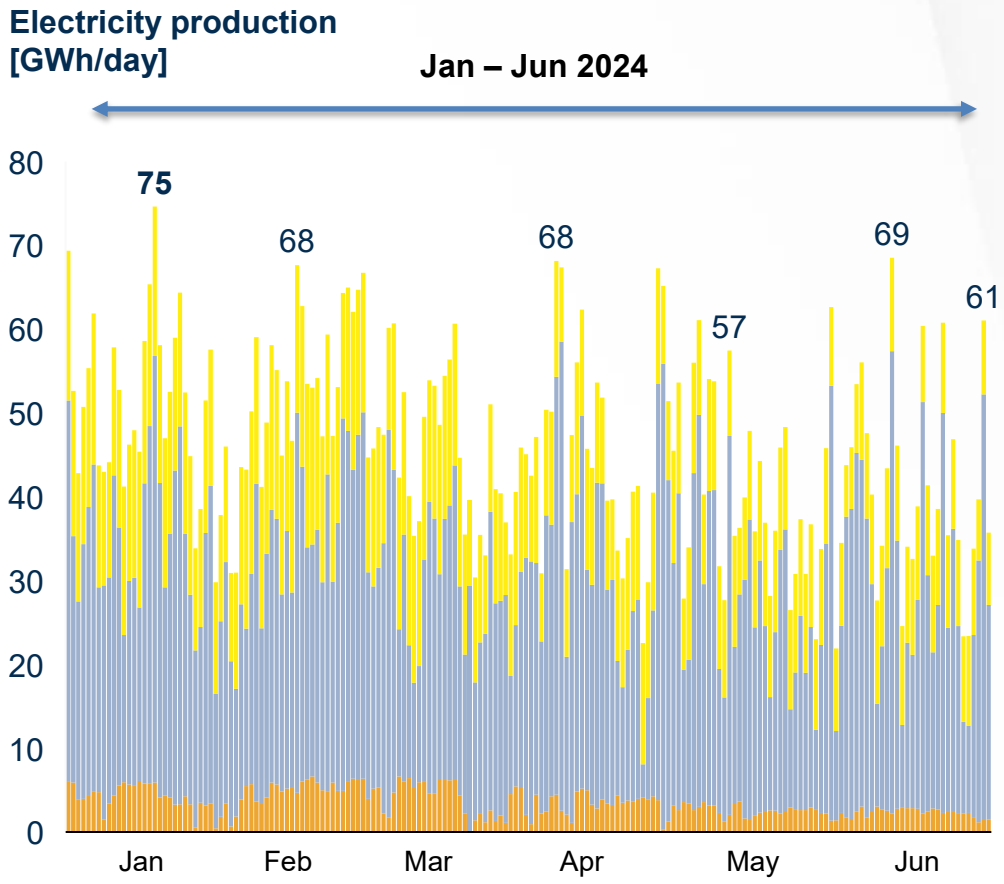
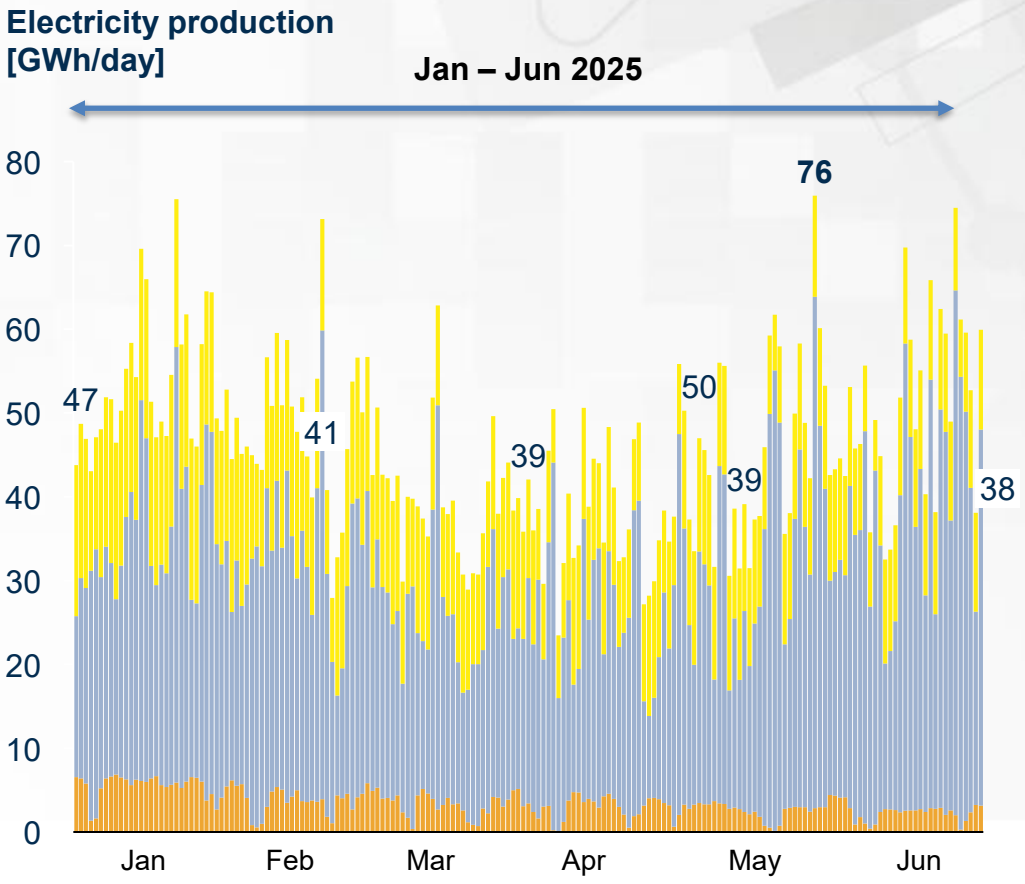
Daily electricity production of wind, solar PV and CSP fleet

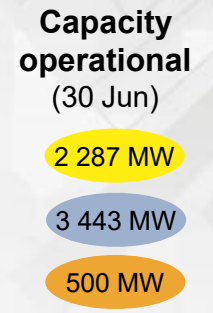
Maximum daily production from large-scale solar PV, wind, and CSP plants under the REIPPPP was recorded on 28 May 2025.

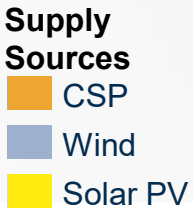


- Maximum daily production of 75 GWh on 18 Jan 2025 (Saturday)
- Minimum daily production of 22 GWh on 31 May 2024 (Wednesday)



- Maximum daily production of ~76 GWh on 28 May 2025 (Wednesday)
- Minimum daily production of 19 GWh on 07 Apr 2025 (Monday)





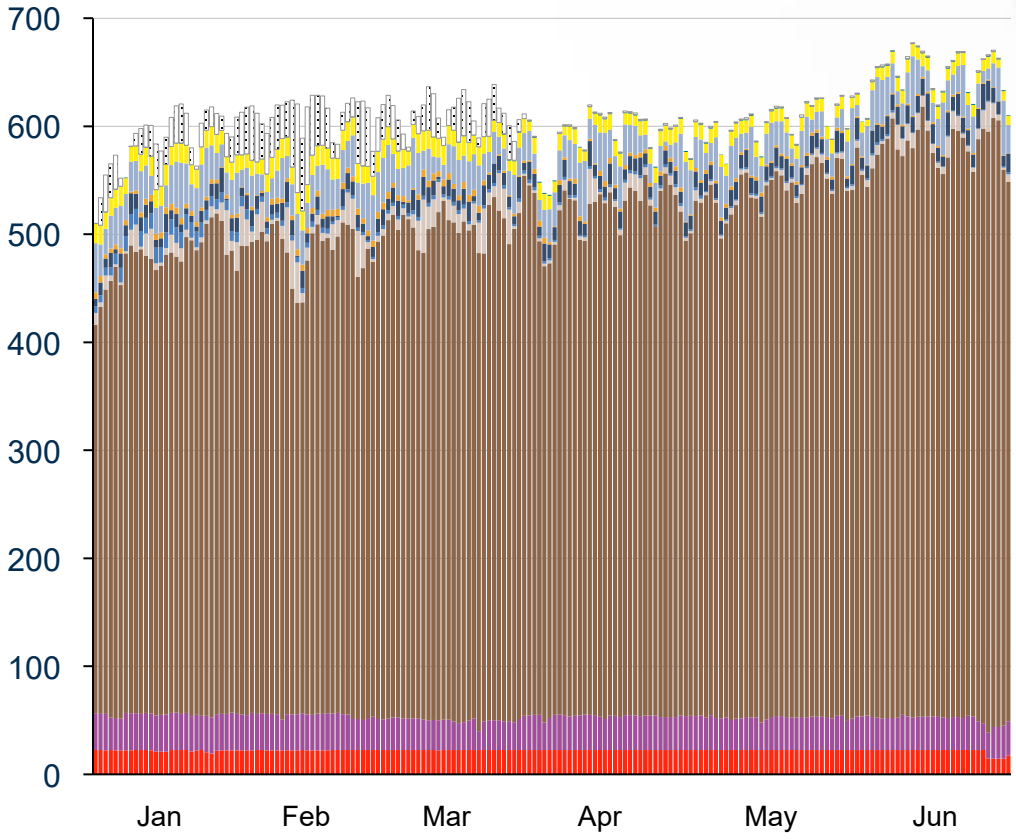
Sources: Eskom; CSIR analysis

Daily electricity production for all power supply sources

Baseload generation from nuclear decreased in March, leading to increased generation from diesel and gas to meet system load.

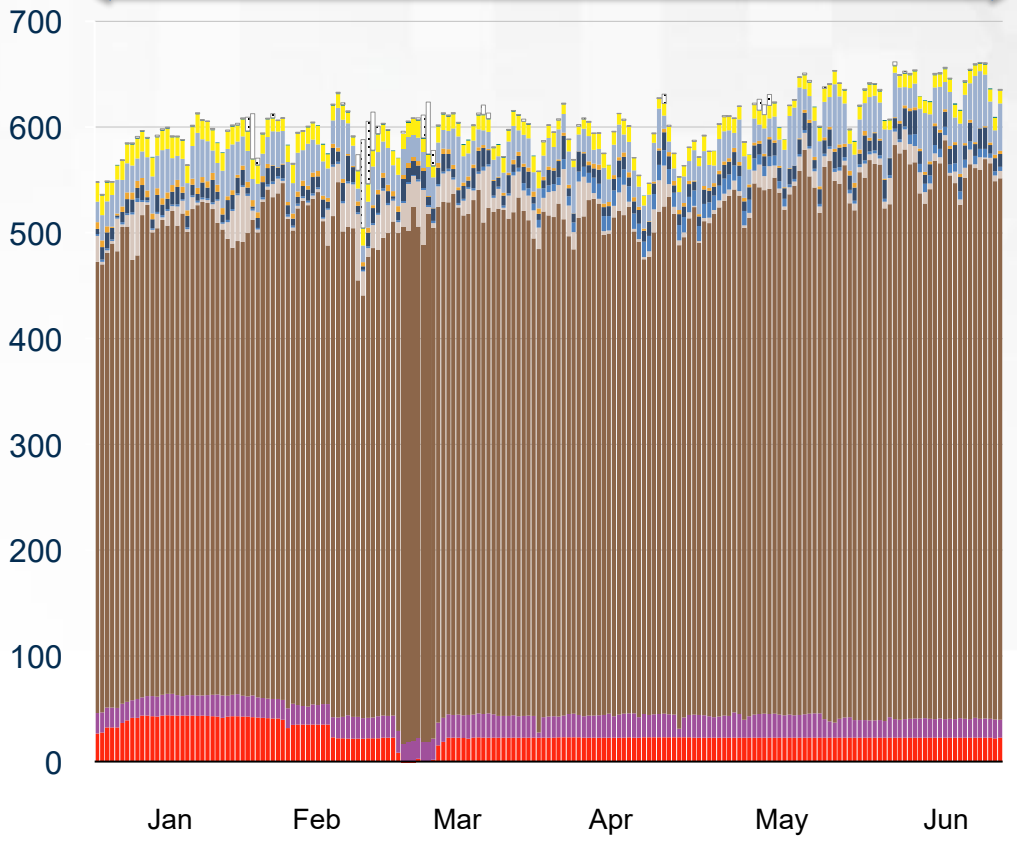
Electricity production [GWh/day]

Jan – Jun 2024



Electricity production [GWh/day]

Jan – Jun 2025



Capacity operational

2 287 MW	3 414 MW
3 443 MW	600 MW
500 MW	1 860 MW
40 544 MW	2 724 MW

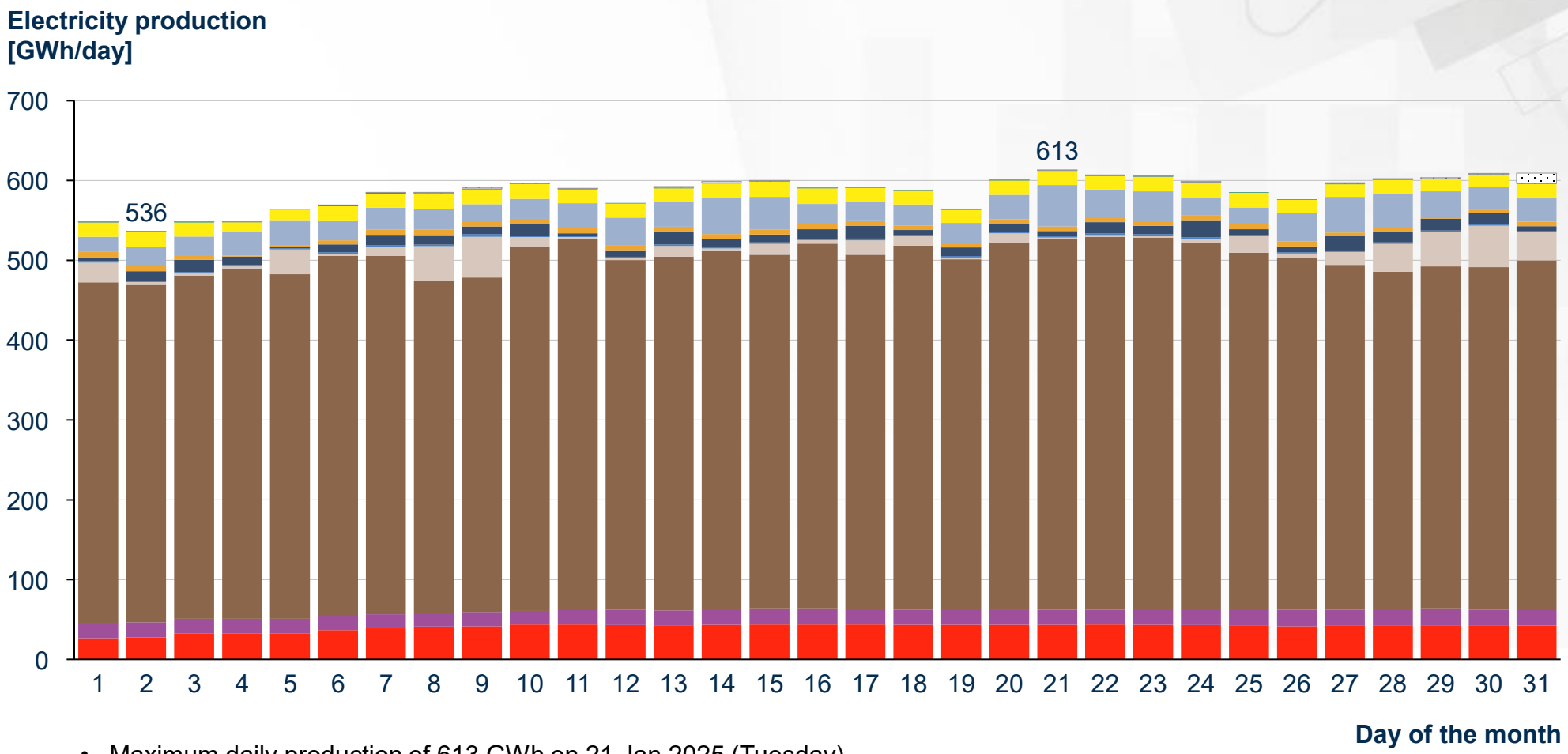
Supply Sources

- DSR
- Other
- Solar PV
- Wind
- CSP
- Pumped Storage
- Hydro
- Diesel & Gas
- Coal
- Imports
- Nuclear

Sources: Eskom; CSIR analysis

Daily electricity production ranged between 536 and 613 GWh in January 2025

Actual daily electricity production from all power supply sources in South Africa in January 2025.



- Maximum daily production of 613 GWh on 21 Jan 2025 (Tuesday)
- Minimum daily production of 536 GWh on 02 Jan 2025 (Sunday)

Capacity Operational (end of month)

2 287 MW	3 414 MW
3 443 MW	600 MW
500 MW	1 860 MW
40 544 MW	2 724 MW

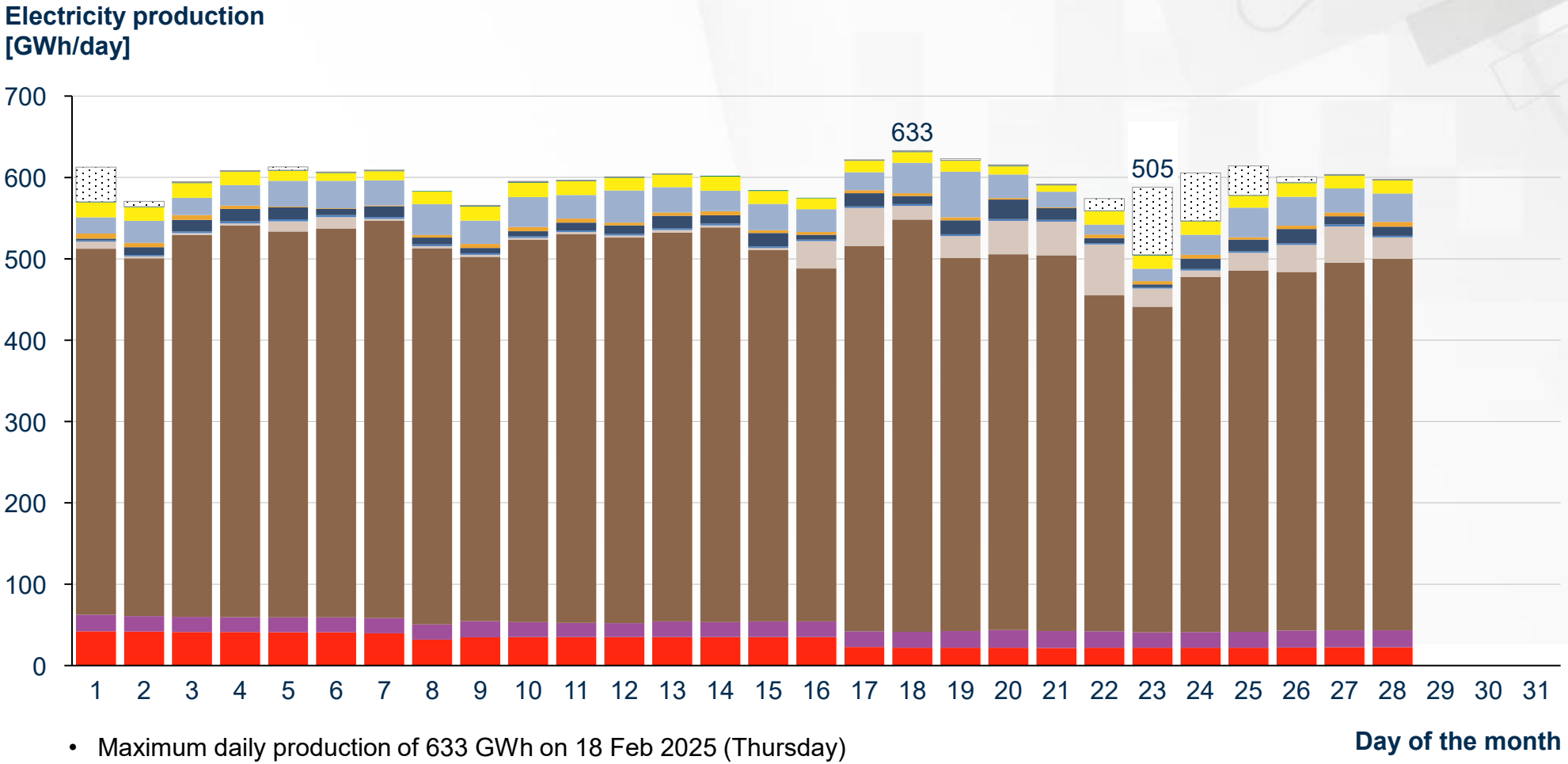
Supply Sources

- DSR
- Other RE
- Solar PV
- Wind
- CSP
- Pumped Storage
- Hydro
- Diesel & Gas
- Coal
- Imports
- Nuclear

Note: Daily production includes generation from pumped storage. Demand Side Response (DSR) = Manual Load Reduction (MLR) + Interruptible Load Supply (ILS) + Interruption of Supply (IOS)
Sources: Eskom; CSIR analysis

Daily electricity production ranged between 505-632 GWh in February 2025

Actual daily production from all power supply sources in South Africa in February 2025.



- Maximum daily production of 633 GWh on 18 Feb 2025 (Thursday)
- Minimum daily production of 505 GWh on 23 Feb 2025 (Sunday)

Capacity Operational
(end of month)

2 287 MW	3 414 MW
3 443 MW	600 MW
500 MW	1 860 MW
40 544 MW	2 724 MW

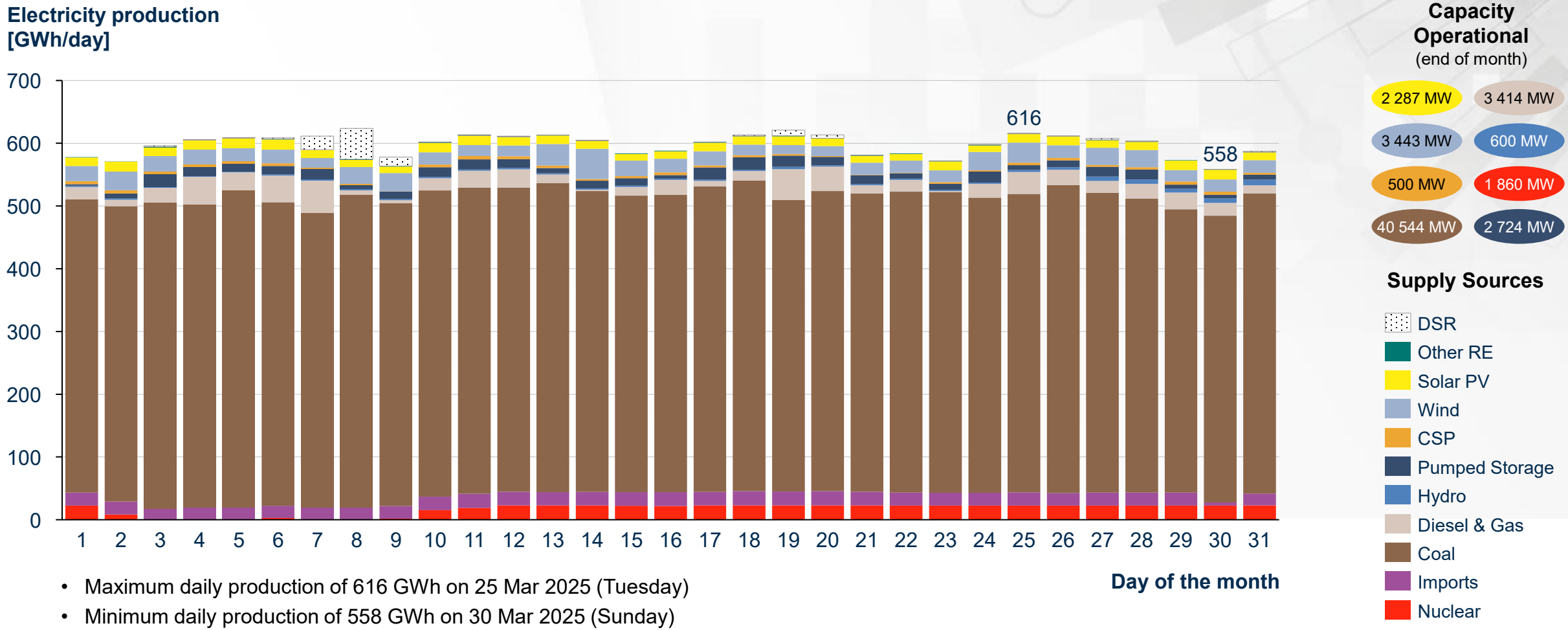
Supply Sources

- DSR
- Other RE
- Solar PV
- Wind
- CSP
- Pumped Storage
- Hydro
- Diesel & Gas
- Coal
- Imports
- Nuclear

Note: Daily production includes generation from pumped storage. Demand Side Response (DSR) = Manual Load Reduction (MLR) + Interruptible Load Supply (ILS) + Interruption of Supply (IOS)
Sources: Eskom; CSIR analysis

Daily electricity production ranged between 578-615 GWh in March 2025

Actual daily production from all power supply sources in South Africa in March 2025.

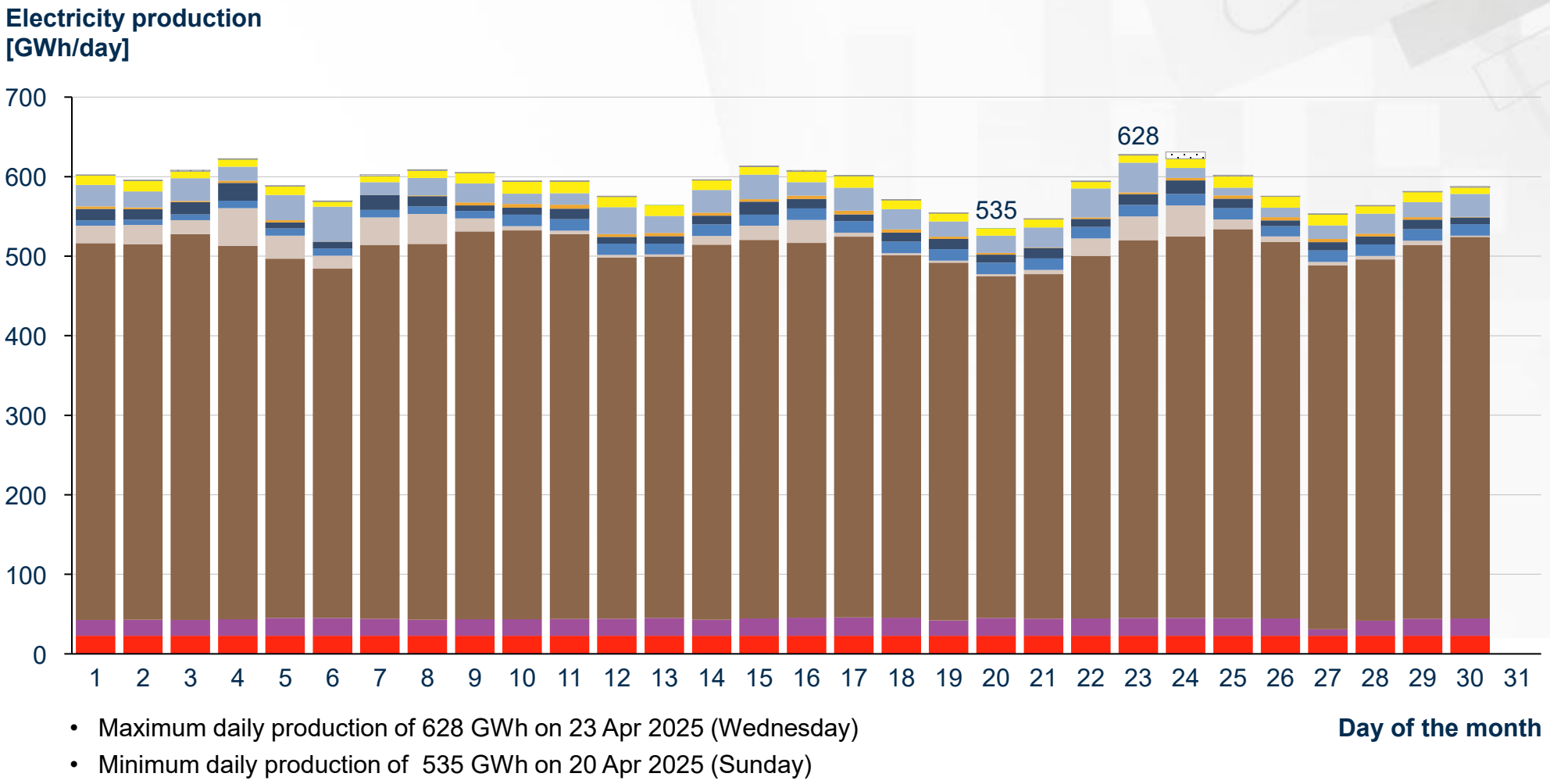


- Maximum daily production of 616 GWh on 25 Mar 2025 (Tuesday)
- Minimum daily production of 558 GWh on 30 Mar 2025 (Sunday)

Note: Daily production includes generation from pumped storage. Demand Side Response (DSR) = Manual Load Reduction (MLR) + Interruptible Load Supply (ILS) + Interruption of Supply (IOS)
Sources: Eskom; CSIR analysis

Daily electricity production ranged between 554-627 GWh in April 2025

Actual daily production from all power supply sources in South Africa in April 2025.



- Maximum daily production of 628 GWh on 23 Apr 2025 (Wednesday)
- Minimum daily production of 535 GWh on 20 Apr 2025 (Sunday)

Capacity Operational
(end of month)

2 287 MW	3 414 MW
3 443 MW	600 MW
500 MW	1 860 MW
40 544 MW	2 724 MW

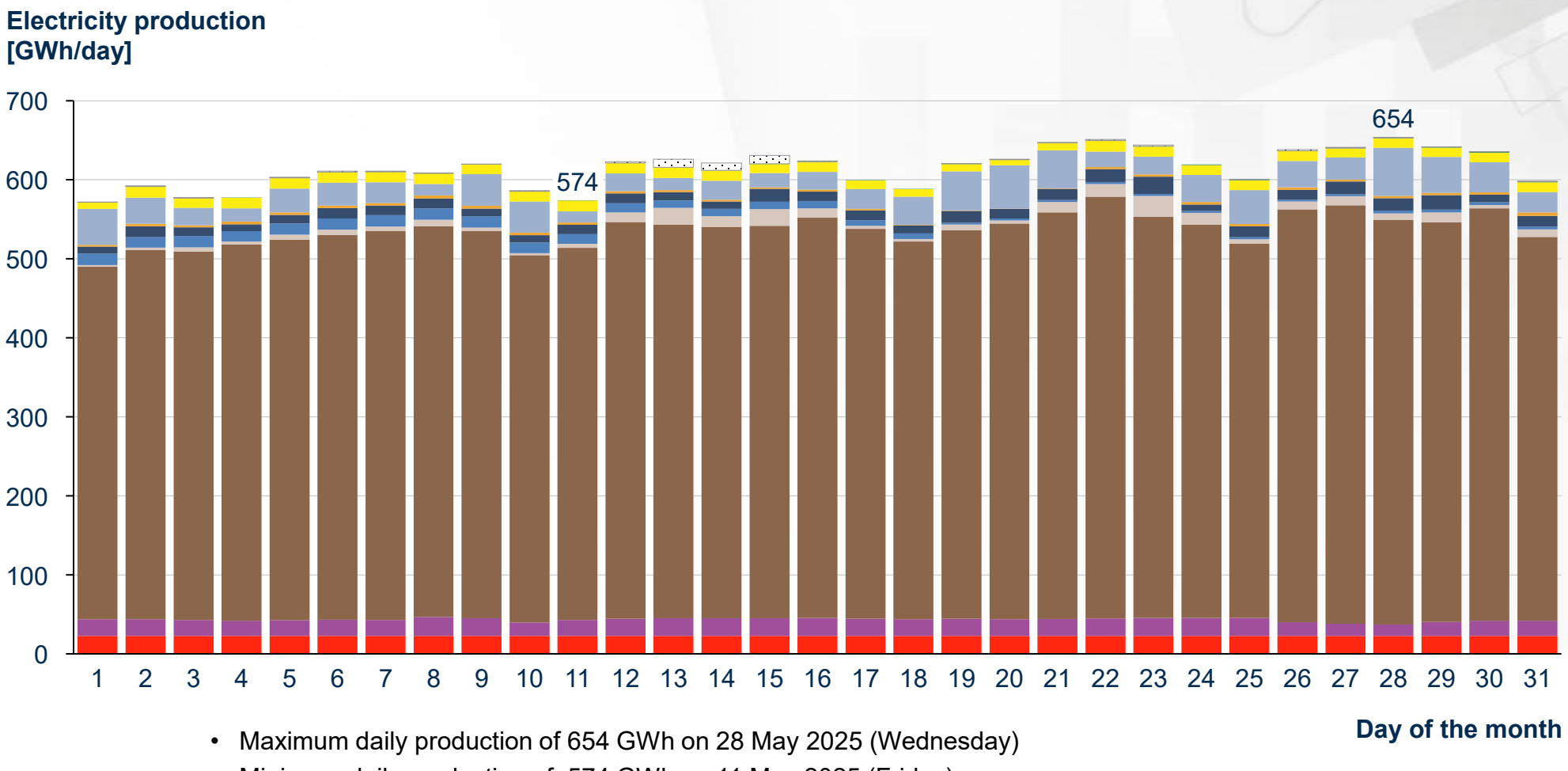
Supply Sources

- DSR
- Other RE
- Solar PV
- Wind
- CSP
- Pumped Storage
- Hydro
- Diesel & Gas
- Coal
- Imports
- Nuclear

Note: Daily production includes generation from pumped storage. Demand Side Response (DSR) = Manual Load Reduction (MLR) + Interruptible Load Supply (ILS) + Interruption of Supply (IOS).
Sources: Eskom; CSIR analysis

Daily electricity production ranged between 577-653 GWh in May 2025

Actual daily production from all power supply sources in South Africa in May 2025.



- Maximum daily production of 654 GWh on 28 May 2025 (Wednesday)
- Minimum daily production of 574 GWh on 11 May 2025 (Friday)

Capacity Operational (end of month)

2 287 MW	3 414 MW
3 443 MW	600 MW
500 MW	1 860 MW
40 544 MW	2 724 MW

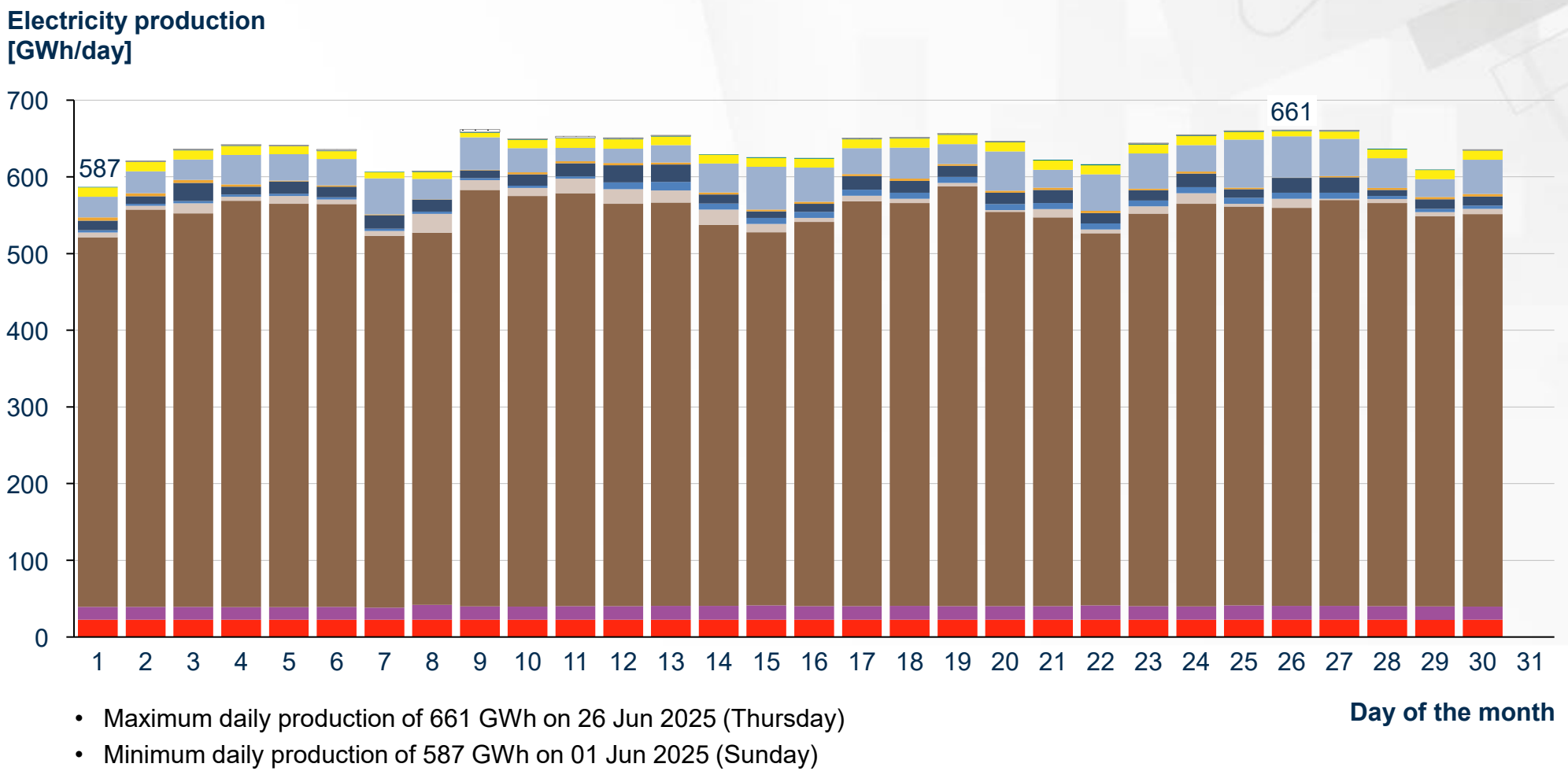
Supply Sources

- DSR
- Other RE
- Solar PV
- Wind
- CSP
- Pumped Storage
- Hydro
- Diesel & Gas
- Coal
- Imports
- Nuclear

Note: Daily production includes generation from pumped storage. Demand Side Response (DSR) = Manual Load Reduction (MLR) + Interruptible Load Supply (ILS) + Interruption of Supply (IOS).
Sources: Eskom; CSIR analysis

Daily electricity production ranged between 587-661 GWh in June 2025

Actual daily production from all power supply sources in South Africa in June 2025.



- Maximum daily production of 661 GWh on 26 Jun 2025 (Thursday)
- Minimum daily production of 587 GWh on 01 Jun 2025 (Sunday)

Capacity Operational
(end of month)

2 287 MW	3 414 MW
3 443 MW	600 MW
500 MW	1 860 MW
40 544 MW	2 724 MW

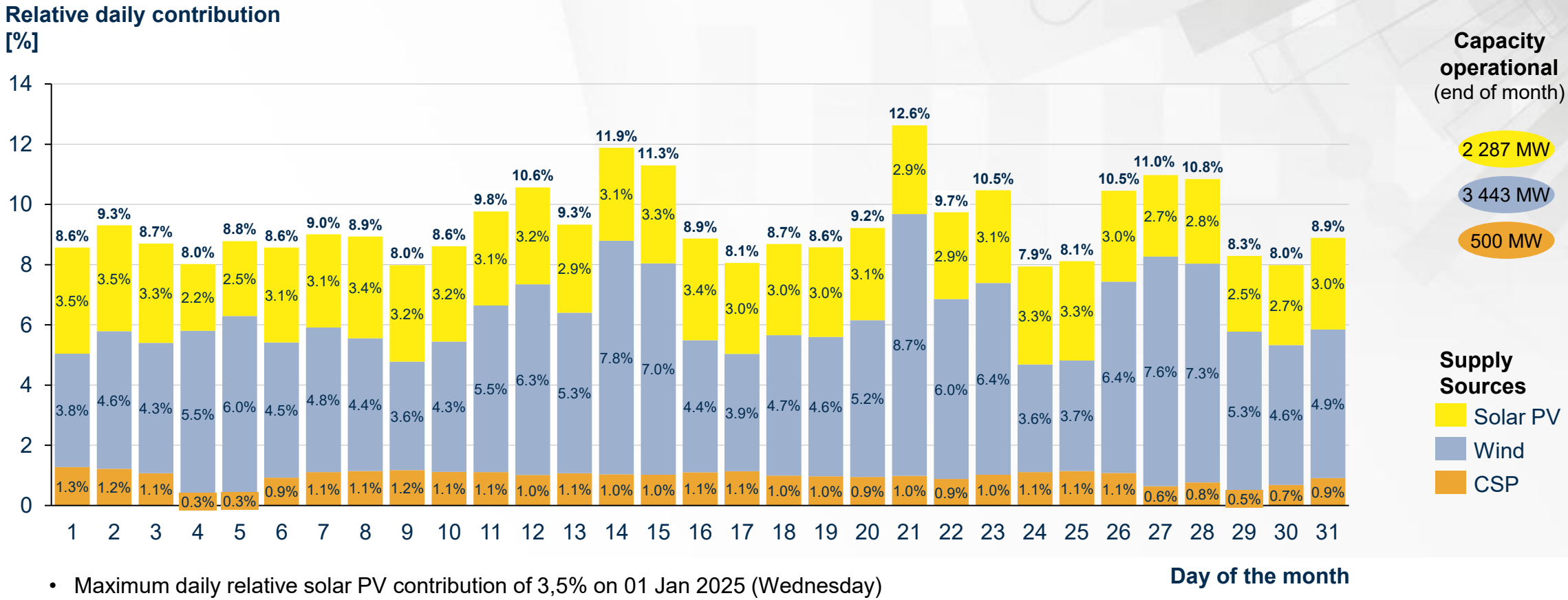
Supply Sources

- DSR
- Other RE
- Solar PV
- Wind
- CSP
- Pumped Storage
- Hydro
- Diesel & Gas
- Coal
- Imports
- Nuclear

Note: Daily production includes generation from pumped storage. Demand Side Response (DSR) = Manual Load Reduction (MLR) + Interruptible Load Supply (ILS) + Interruption of Supply (IOS)
Sources: Eskom; CSIR analysis

Daily solar PV, wind and CSP contribution of 7,9-12,6% in January 2025

Actual daily relative solar PV/wind/CSP contribution as a % of total supply in South Africa in January 2025.

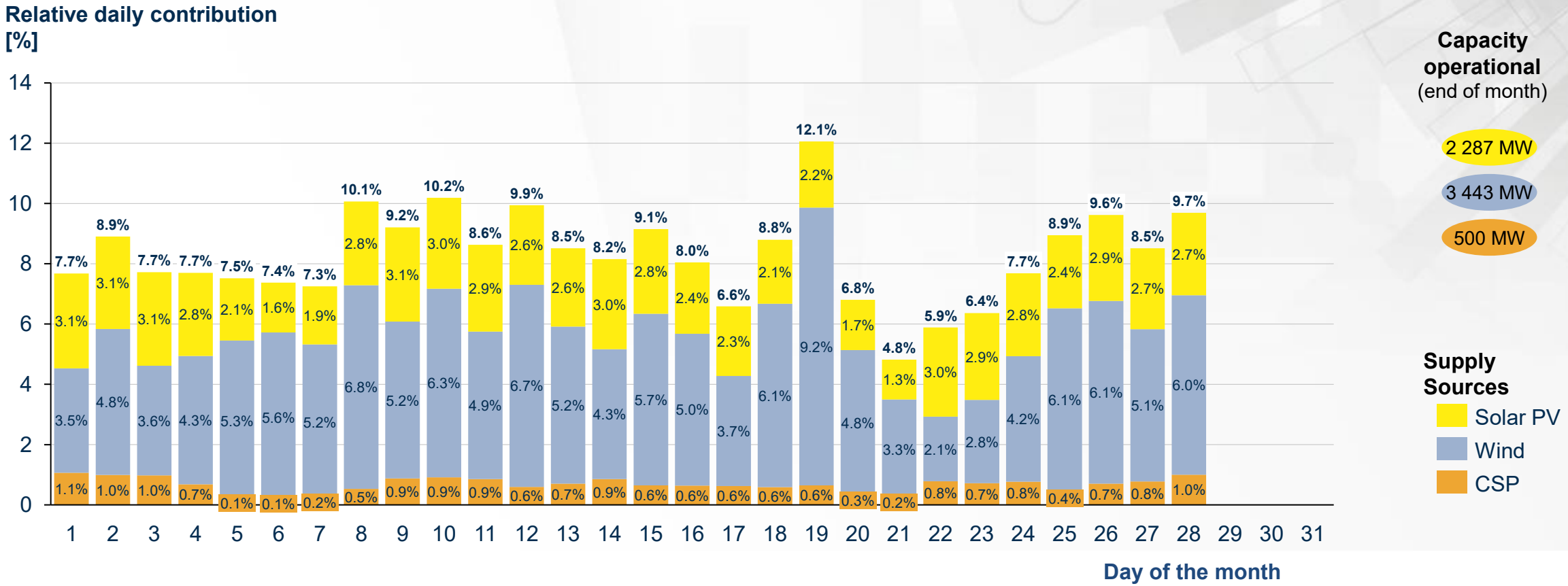


- Maximum daily relative solar PV contribution of 3,5% on 01 Jan 2025 (Wednesday)
- Maximum daily relative wind contribution of 8,7% on 21 Jan 2025 (Tuesday)
- Maximum daily relative CSP contribution of 1,3% on 01 Jan 2025 (Wednesday)

Note: Total supply includes generation for pumping load
Sources: Eskom; CSIR analysis

Daily solar PV, wind & CSP contribution of 4,8-12,1% in February 2025

Actual daily relative solar PV/wind/CSP contribution as a % of total supply in South Africa in February 2025.

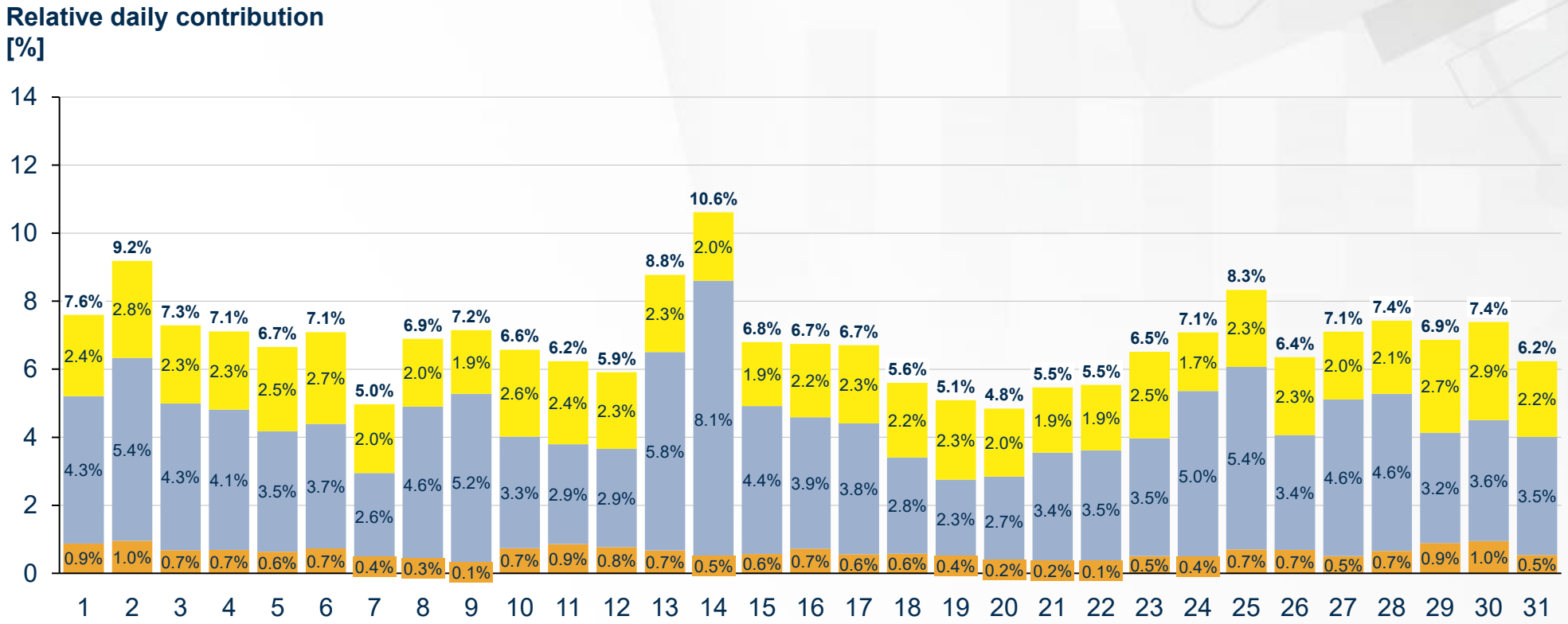


- Maximum daily relative solar PV contribution of 3,1% on 01 Feb 2025 (Saturday)
- Maximum daily relative wind contribution of 9,2% on 19 Feb 2025 (Wednesday)
- Maximum daily relative CSP contribution of 1,4% on 18 Feb 2025 (Tuesday)

Note: Total supply includes generation for pumping load
Sources: Eskom; CSIR analysis

Daily solar PV, wind and CSP contribution of 4,8-10,6% in March 2025

Actual daily relative solar PV/wind/CSP contribution as a % of total supply in South Africa in March 2024.

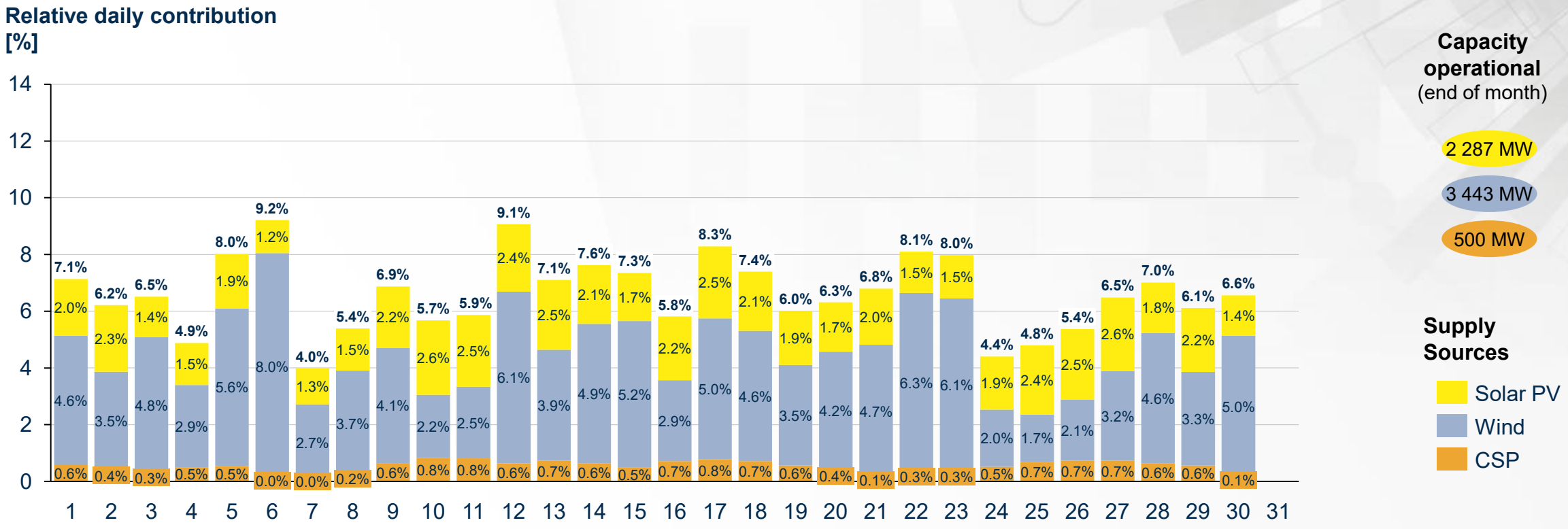


- Maximum daily relative solar PV contribution of 2,9% on 30 Mar 2025 (Sunday)
- Maximum daily relative wind contribution of 8,1% on 14 Mar 2025 (Monday)
- Maximum daily relative CSP contribution of 1,4% on 02 Mar 2025 (Sunday)

Note: Total supply includes generation for pumping load
Sources: Eskom; CSIR analysis

Daily solar PV, wind and CSP contribution of 4,0-9,2% in April 2025

Actual daily relative solar PV/wind/CSP contribution as a % of total supply in South Africa in April 2025.

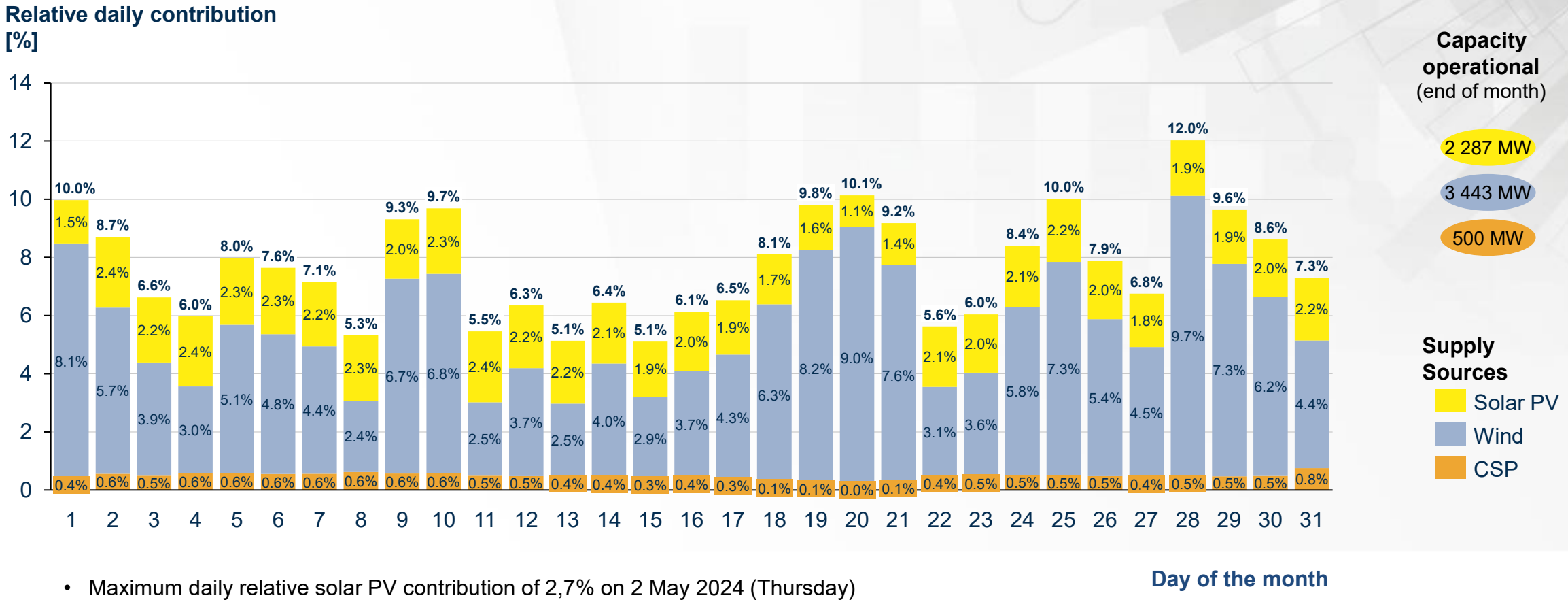


- Maximum daily relative solar PV contribution of 3,2% on 10 Apr 2024 (Wednesday)
- Maximum daily relative wind contribution of 11,4% on 7 Apr 2024 (Sunday)
- Maximum daily relative CSP contribution of 1,1% on 11 Apr 2024 (Thursday)

Note: Total supply includes generation for pumping load
Sources: Eskom; CSIR analysis

Daily solar PV, wind and CSP contribution of 5,1-12,0% in May 2025

Actual daily relative solar PV/wind/CSP contribution as a % of total supply in South Africa in May 2025.

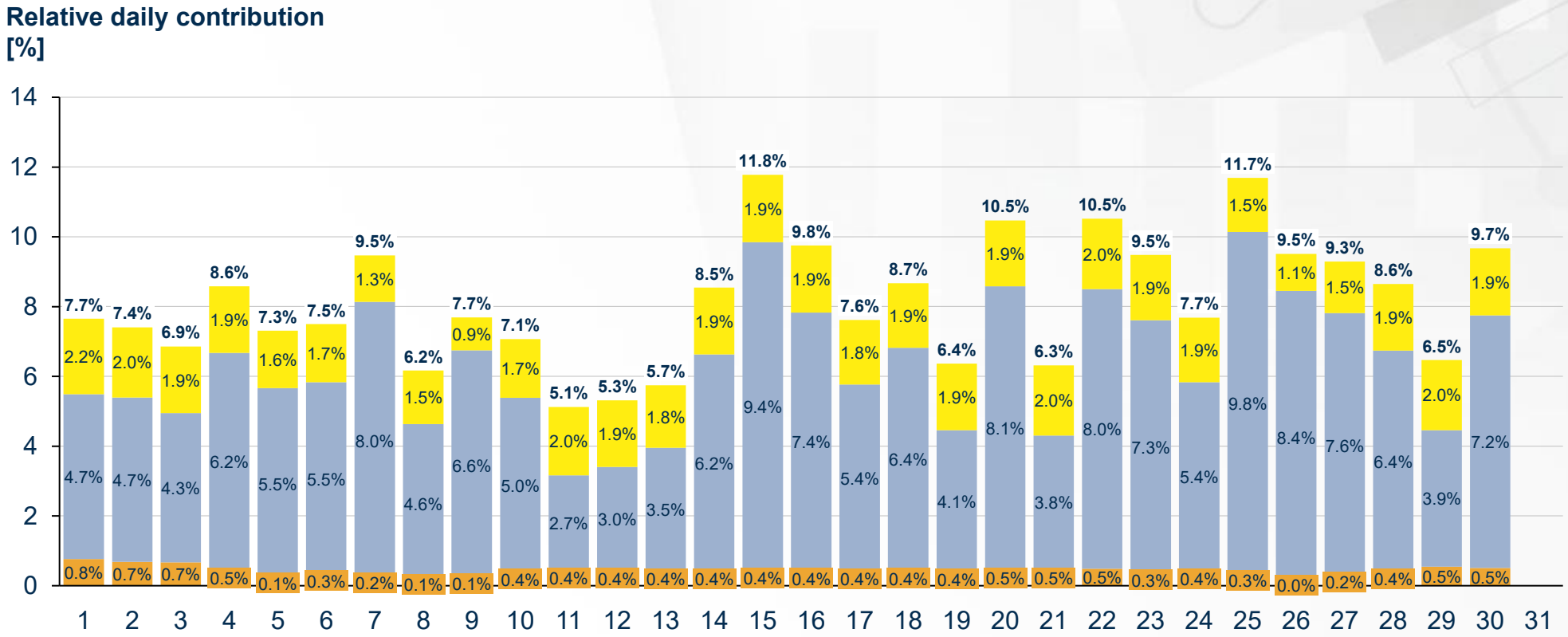


- Maximum daily relative solar PV contribution of 2,7% on 2 May 2024 (Thursday)
- Maximum daily relative wind contribution of 10,6% on 30 May 2024 (Thursday)
- Maximum daily relative CSP contribution of 0.7% on 12 May 2024 (Sunday)

Note: Total supply includes generation for pumping load
Sources: Eskom; CSIR analysis

Daily solar PV, wind and CSP contribution of 5,1-11,7% in June 2025

Actual daily relative solar PV/wind/CSP contribution as a % of total supply in South Africa in June 2025.



- Maximum daily relative solar PV contribution of 2,5% on 8 Jun 2024 (Sunday)
- Maximum daily relative wind contribution of 11,3% on 11 Jun 2024 (Wednesday)
- Maximum daily relative CSP contribution of 0,6% on 5 Jun 2024 (Sunday)

Note: Total supply includes generation for pumping load
Sources: Eskom; CSIR analysis

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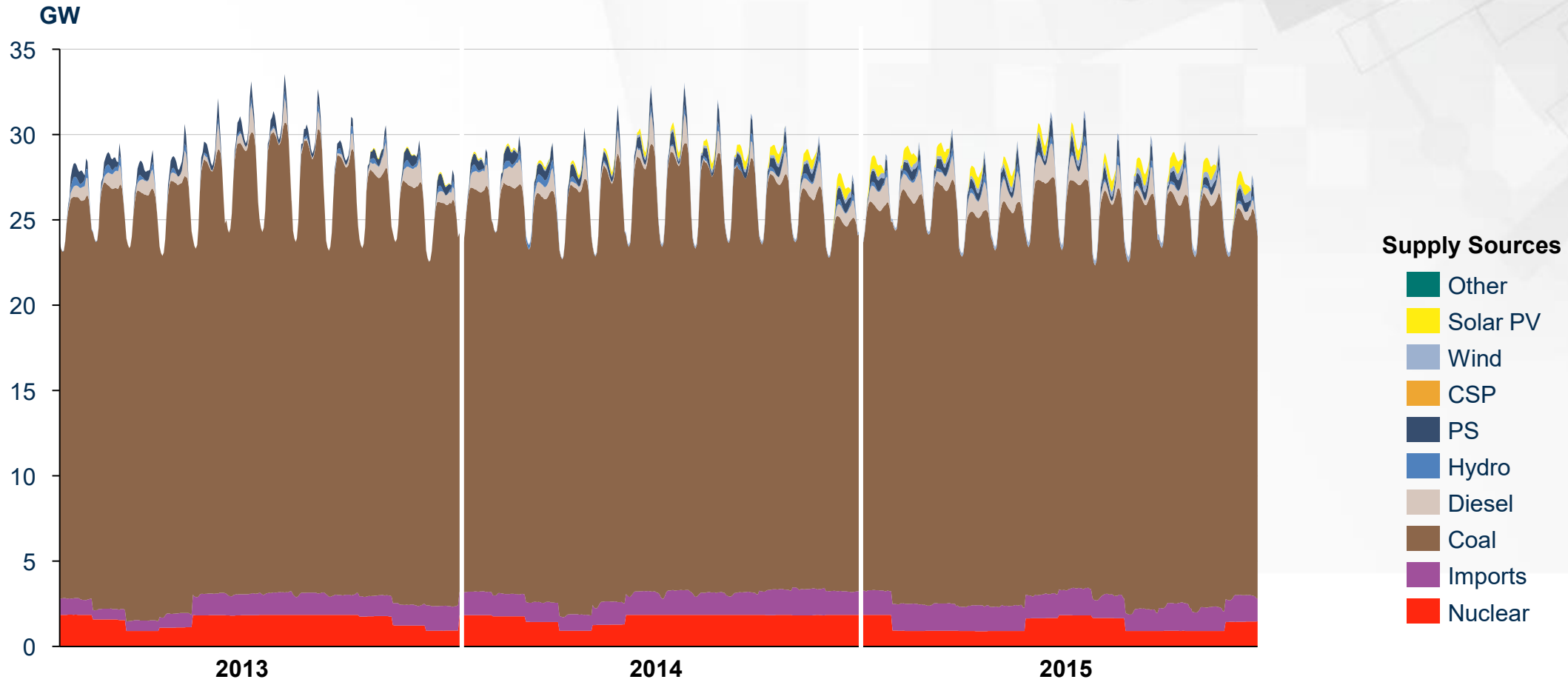
Diurnal courses of electricity supply sources in South Africa

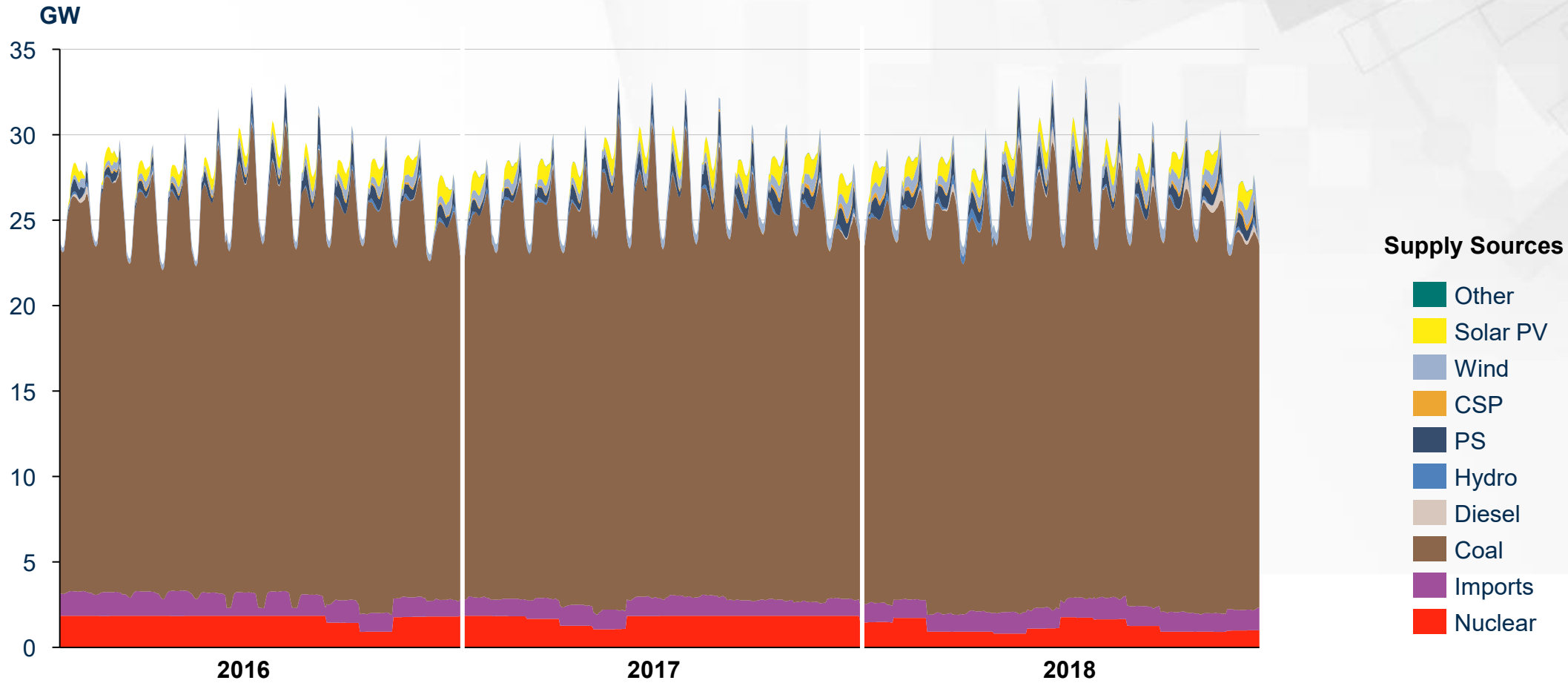
Actual monthly average diurnal courses of total power supply in South Africa between January 2013 - December 2015.



Note: Design as per Fraunhofer ISE.
Sources: Eskom; CSIR analysis

Diurnal courses of electricity supply sources in South Africa

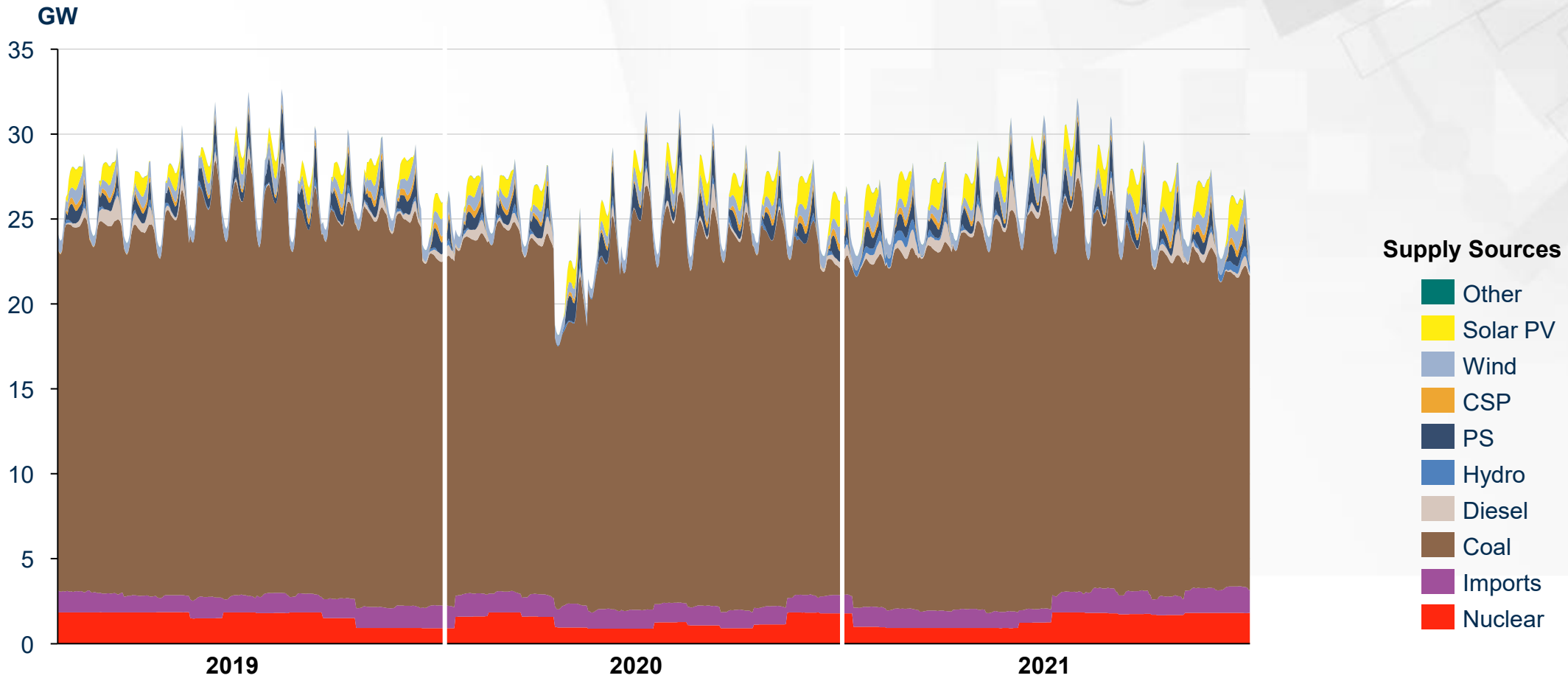
Actual monthly average diurnal courses of total power supply in South Africa between January 2016 - December 2018.



Note: Design as per Fraunhofer ISE.
Sources: Eskom; CSIR analysis

Diurnal courses of electricity supply sources in South Africa

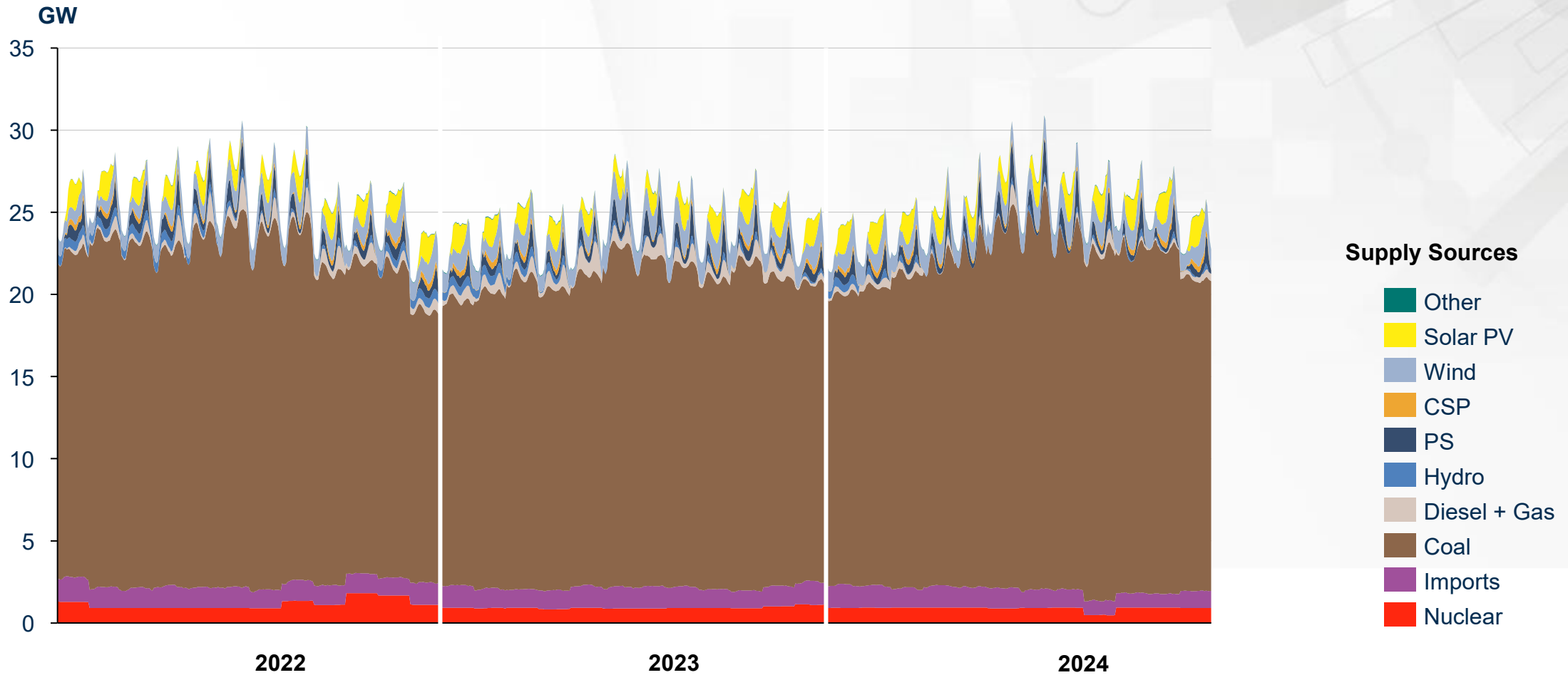
Actual monthly average diurnal courses of total power supply in South Africa between January 2019 - December 2021.



Note: Design as per Fraunhofer ISE.
Sources: Eskom; CSIR analysis

Diurnal courses of electricity supply sources in South Africa

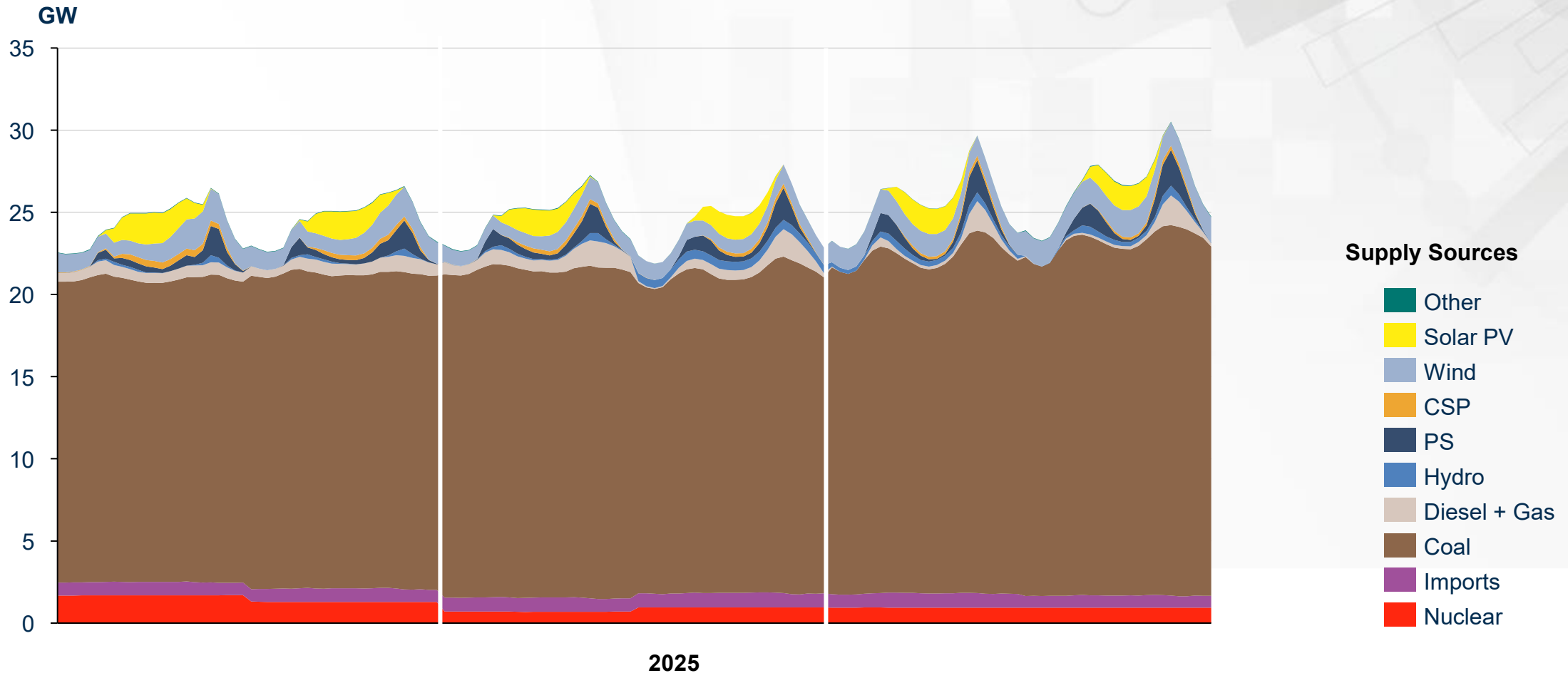
Actual monthly average diurnal courses of total power supply show high ramping rate for solar PV and wind relative to coal. There was significant wind capacity during evening peak hours. Coal capacity ramps down significantly during off-peak hours due to high production from wind.



Note: Design as per Fraunhofer ISE.
Sources: Eskom; CSIR analysis

Diurnal courses of electricity supply sources in South Africa

Actual monthly average diurnal courses of total power supply show high ramping rate for solar PV and wind relative to coal. There was significant wind capacity during evening peak hours. Coal capacity ramps down significantly during off-peak hours due to high production from wind.

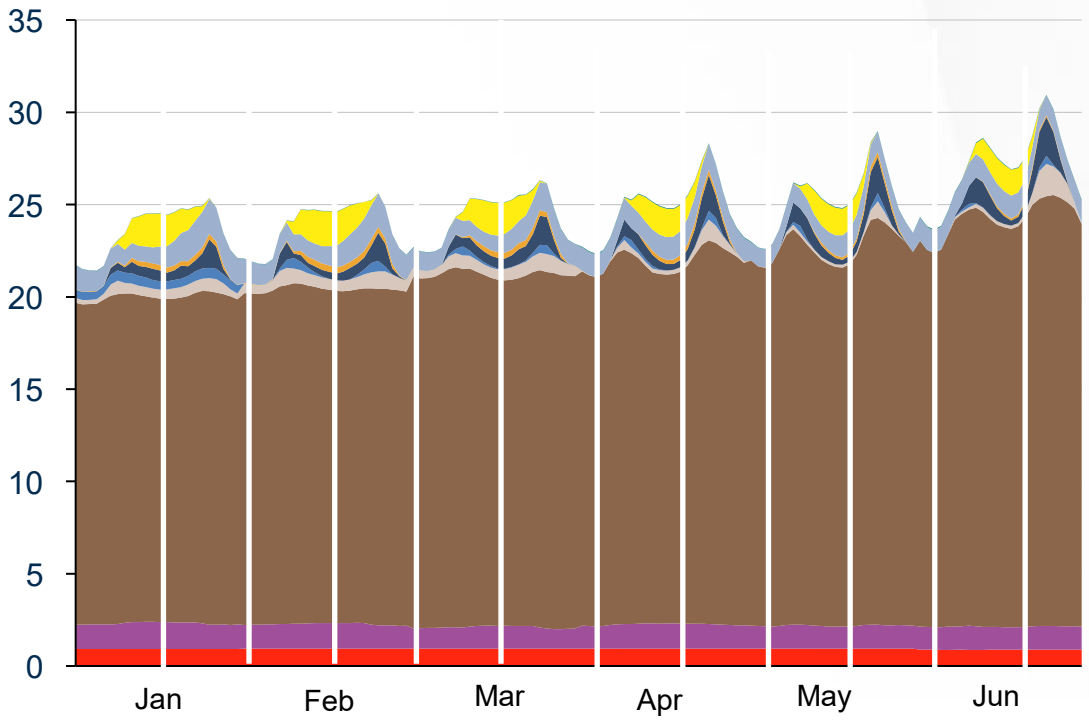


Note: Design as per Fraunhofer ISE.
Sources: Eskom; CSIR analysis

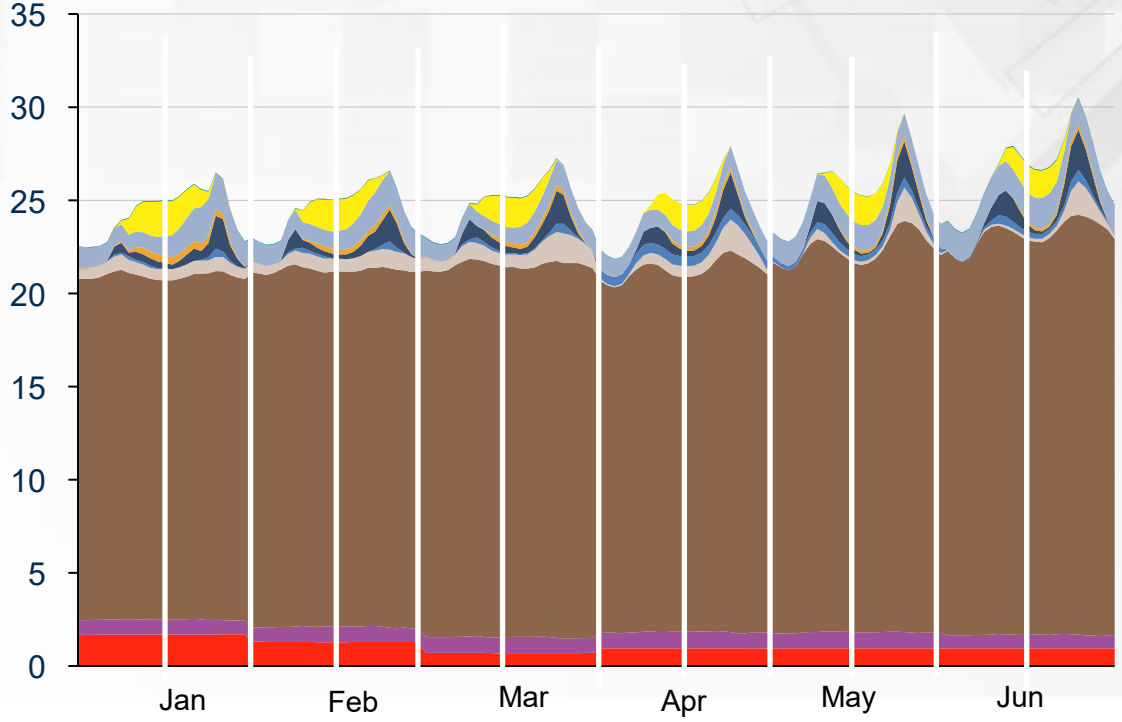
Diurnal courses of electricity supply sources in South Africa in 2024 vs 2025

Monthly average coal generation increased from March to June compared to the same period last year due to an improved energy availability factor. Diesel utilization was much higher in the first half of 2025 compared to the same period in 2024

2024 Diurnal course of electricity [GW]



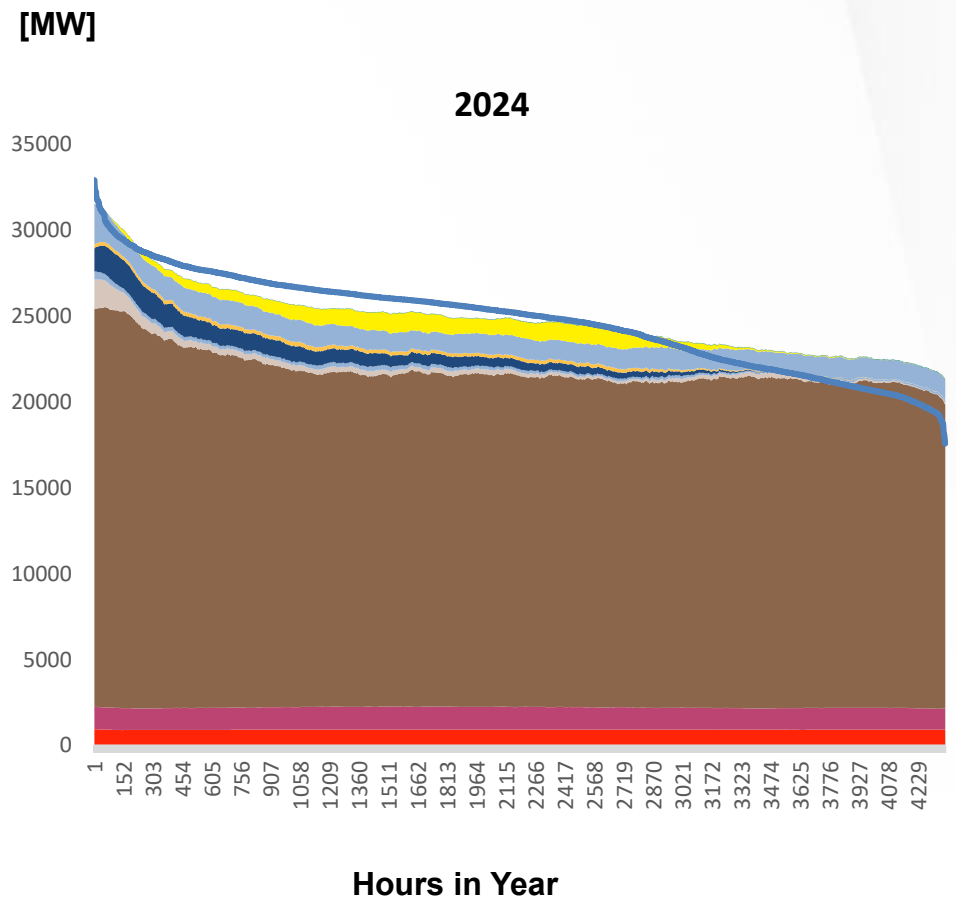
2025 Diurnal course of electricity [GW]

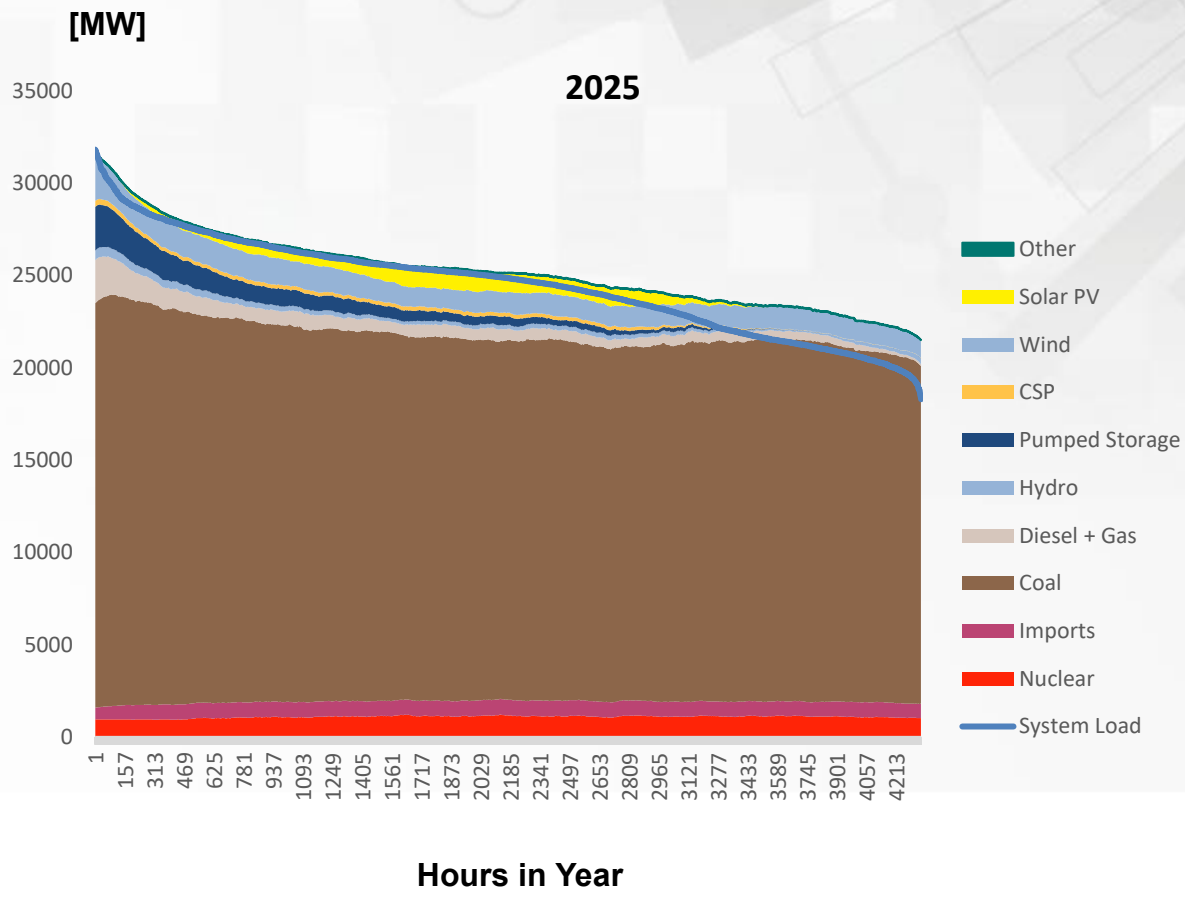


Supply Sources Nuclear | Imports | Coal | Diesel | Hydro | PS | CSP | Wind | Solar PV | Other

Sources: Eskom; CSIR analysis

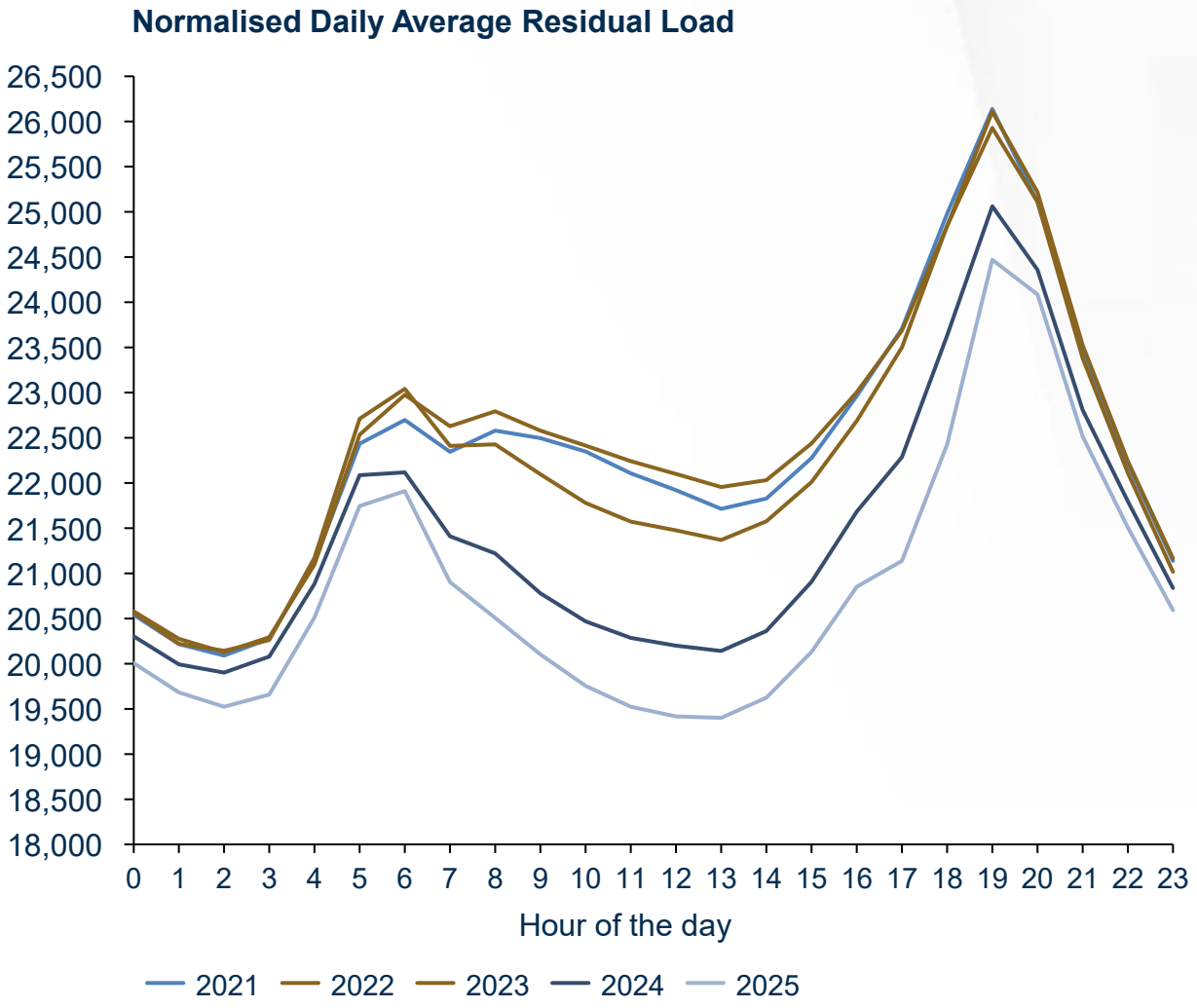
Approximately 2.8 TWh of electricity was produced in excess of the demand in the first half of 2025 compared to 2.0 TWh in 2024. This highlights flexibility limitations and an increasing opportunity for system cost optimisation.

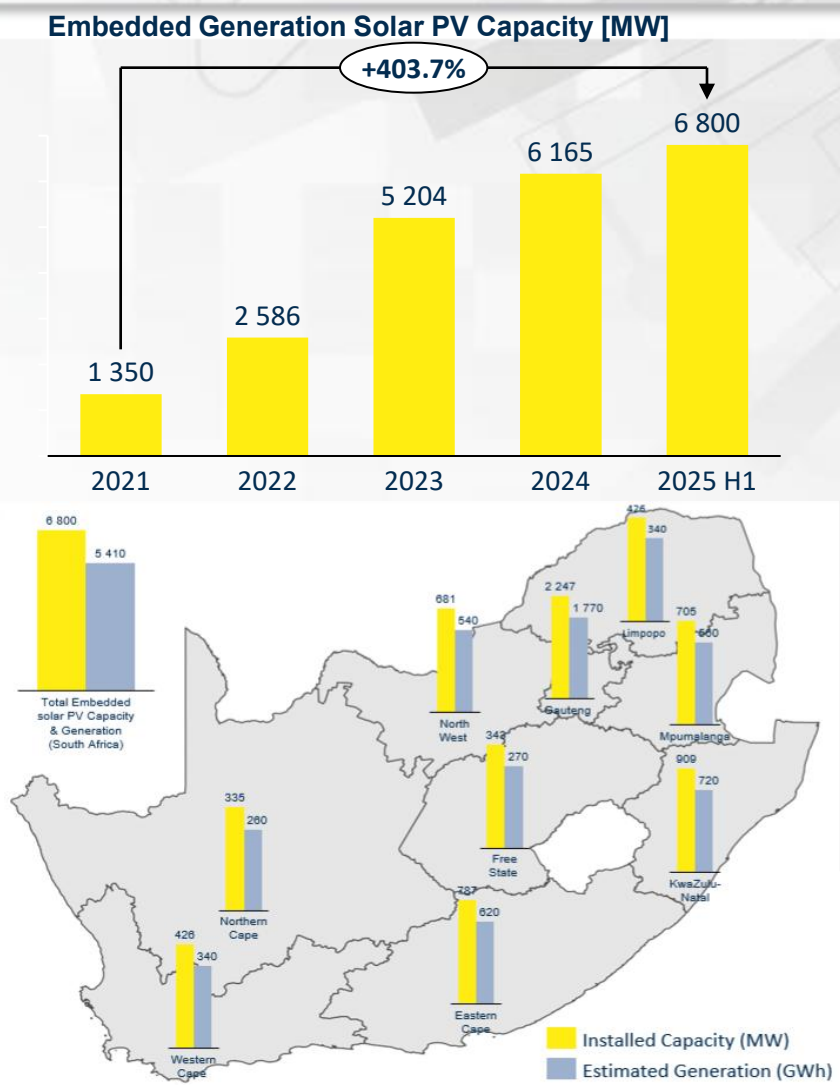




Notes. Eskom fleet in the context of residual load includes REIPPP generation resources. RSA Contracted demand includes pump load.
Sources: Eskom; CSIR analysis

Duck Curve in South Africa's summer residual load from 2021 to 2025: Midday troughs have deepened due to growing embedded solar PV generation, while evening peaks show steeper ramps. Embedded solar PV generation has increased by over 400% since 2021.

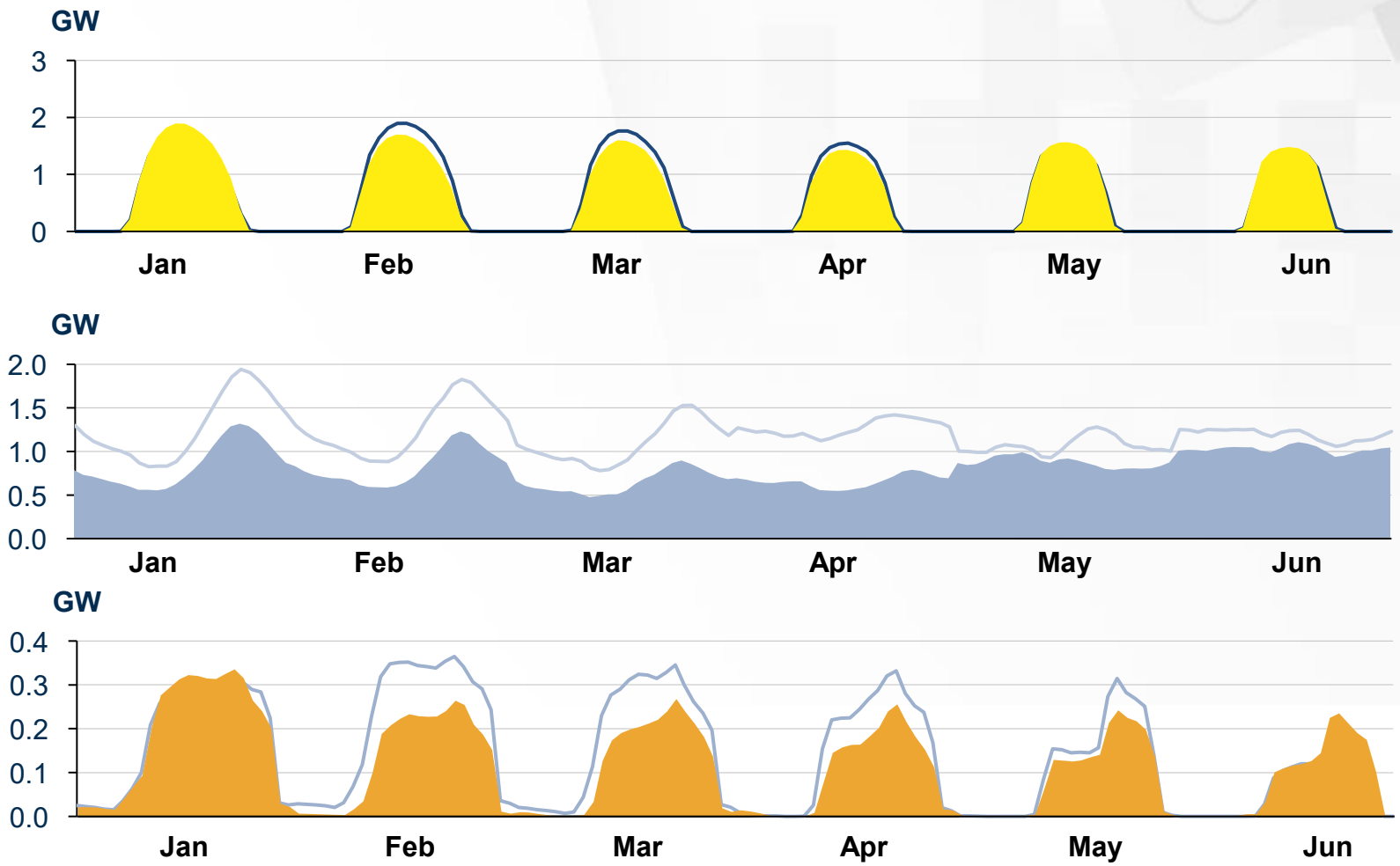




Notes: Residual load = Eskom hourly demand − utility-scale solar PV, wind and CSP; values normalised to each day's peak; summer window = Nov–Jan (2021–2025). Embedded-generation totals use Eskom SO Estimated Rooftop PV : Dec-2022 2 586 MW, Dec-2023 5 204 MW, Dec-2024 6 165 MW, 2025 H1 6 800 MW (as at Jun-2025) from Weekly System Status Reports. The 2021 value (~1 350 MW) is an evidence-based estimate triangulated from OECD (2025) and GreenCape (2021).

Diurnal courses for renewable energy supply in the REIPPP programme

The actual monthly average diurnal profiles of solar PV, wind, and CSP highlight seasonal generation patterns. The 2025 profiles alternate with those of 2024, with wind and CSP generation generally lower in 2025.



Capacity operational (30 Jun)

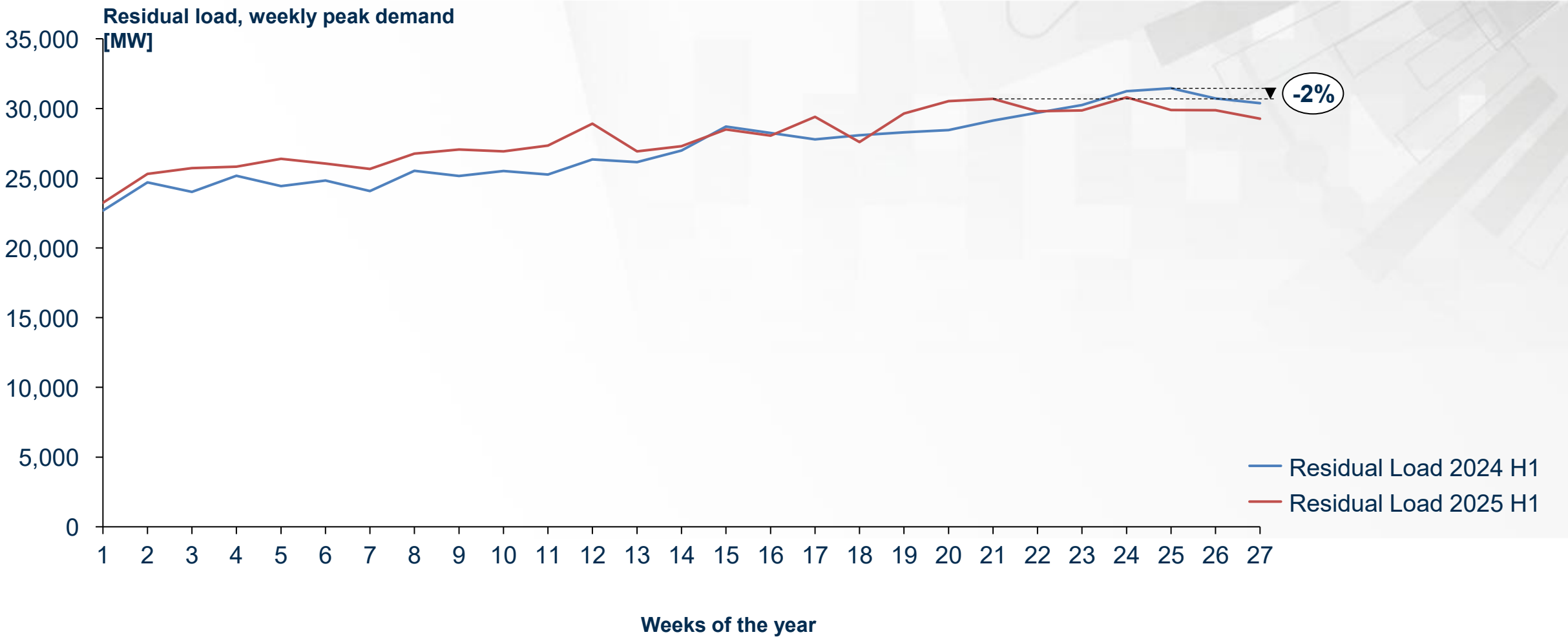
- 2 287 MW
- 3 443 MW
- 500 MW

Supply Sources

- 2024 Solar PV
- 2025 Solar PV
- 2024 Wind
- 2025 Wind
- 2024 CSP
- 2025 CSP

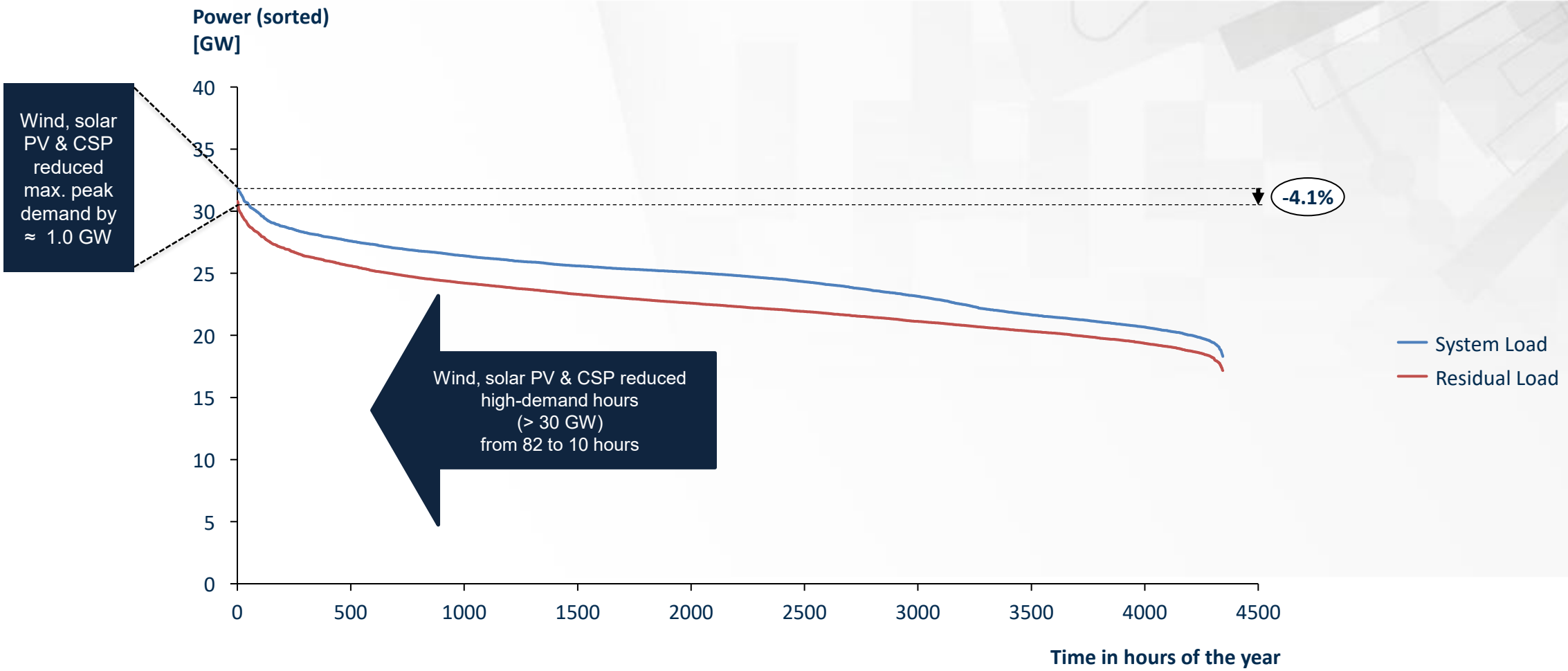
Note: Design as per Fraunhofer ISE
Sources: Eskom; CSIR analysis

The residual load (load met by Eskom fleet after accounting for REIPPPP generation) was 2% lower in 2025 compared to 2024.



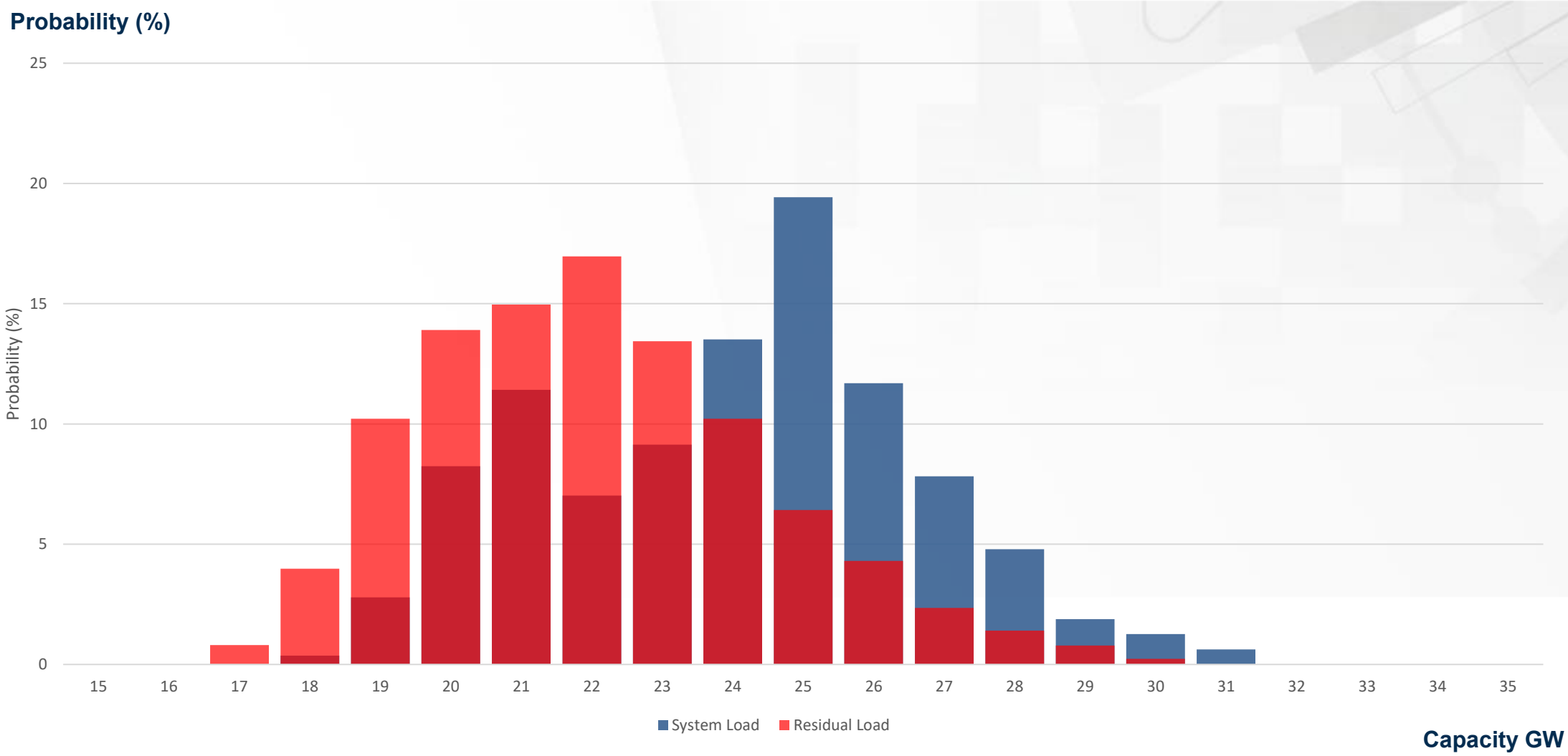
Notes: Residual Load = System Load - wind - Solar PV - CSP
Eskom fleet in the context of residual load includes REIPPP generation resources. H1 refers to the first half of the year.
Sources: Eskom; CSIR analysis

In the first half of 2025, wind, solar PV and CSP reduced the number of hours where demand is >30 GW total load by 157%.



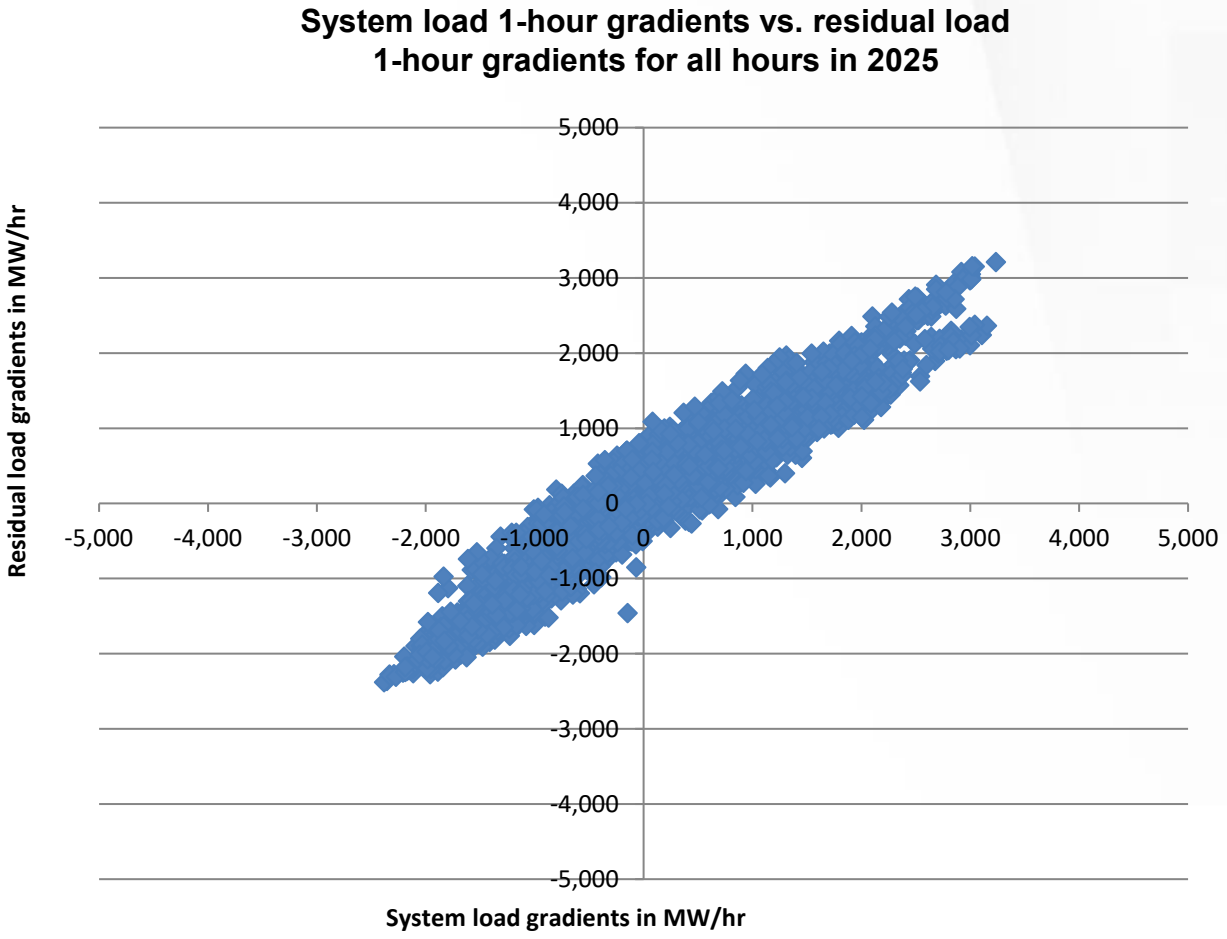
Notes: Residual Load = System Load - wind - Solar PV - CSP
Sources: Eskom; CSIR analysis

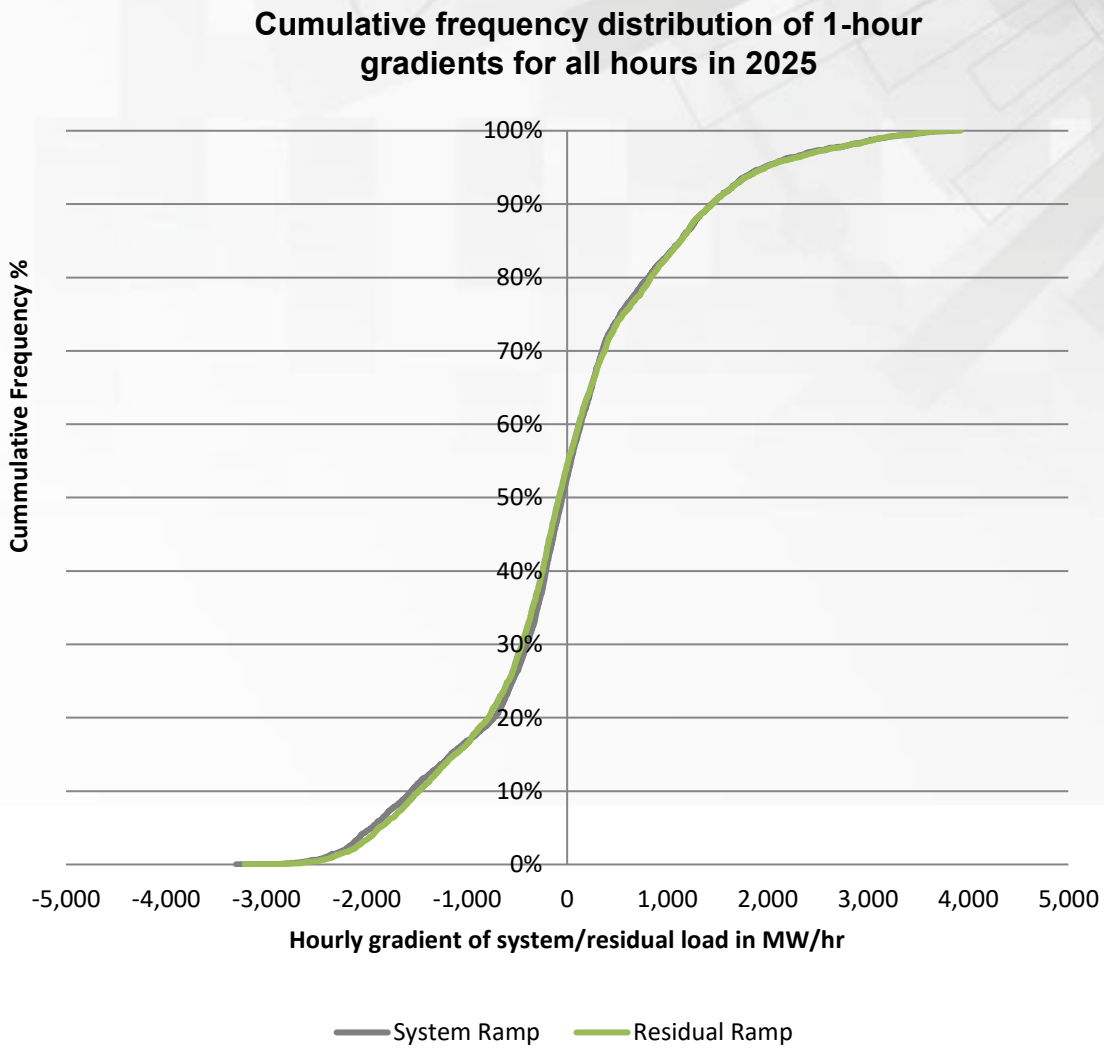
Residual demand is skewed towards lower system demand levels as VRE contributes during those demand hours.



Sources: Eskom; CSIR analysis

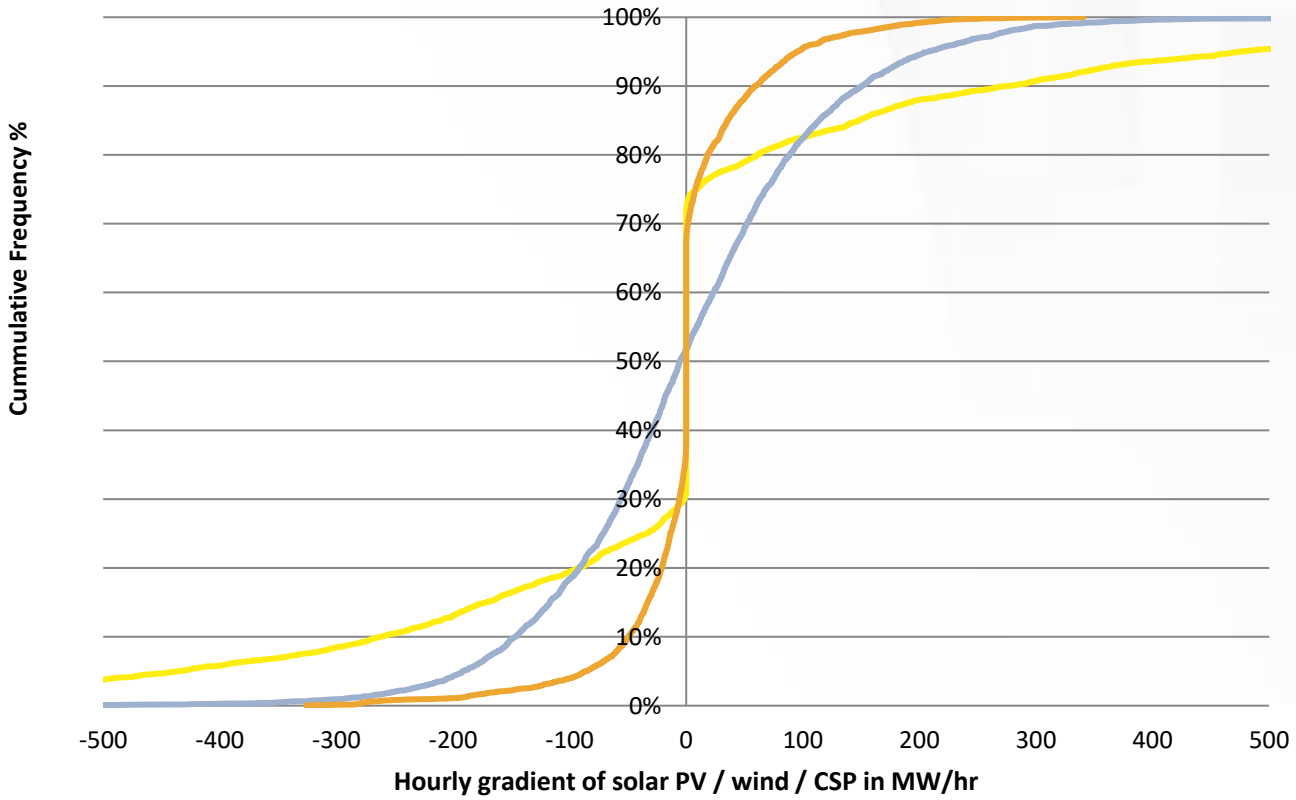
2025: One-hour gradients did not significantly increase due to a collective 6.7 GW of wind, solar PV, and CSP.





Notes: System and Residual load excludes pumping load for all data points throughout the year
Sources: Eskom; CSIR analysis

Wind, solar PV and CSP frequency distribution of one-hour gradients in 2025. There were no major changes in the variability of wind, solar PV and CSP.



Solar PV
Wind
CSP

Capacity operational (3o Jun)

2 287 MW

3 443 MW

500 MW

Sources: Eskom; CSIR analysis

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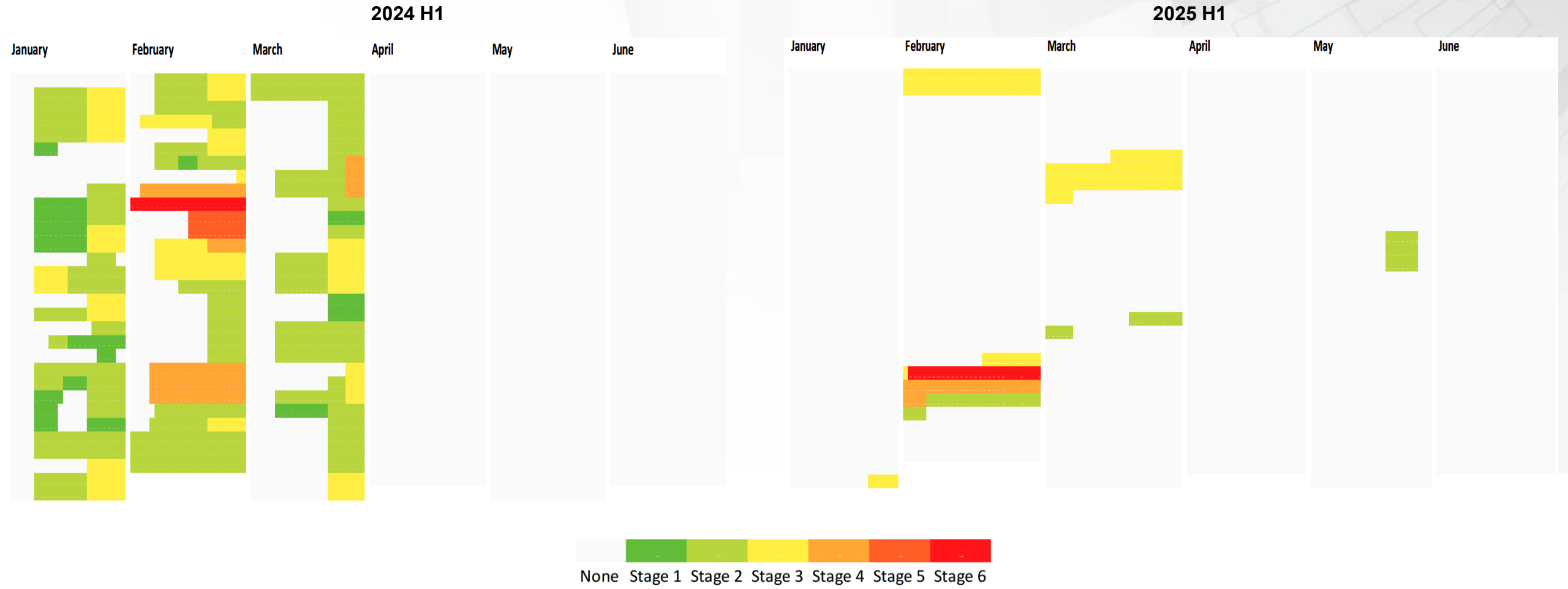
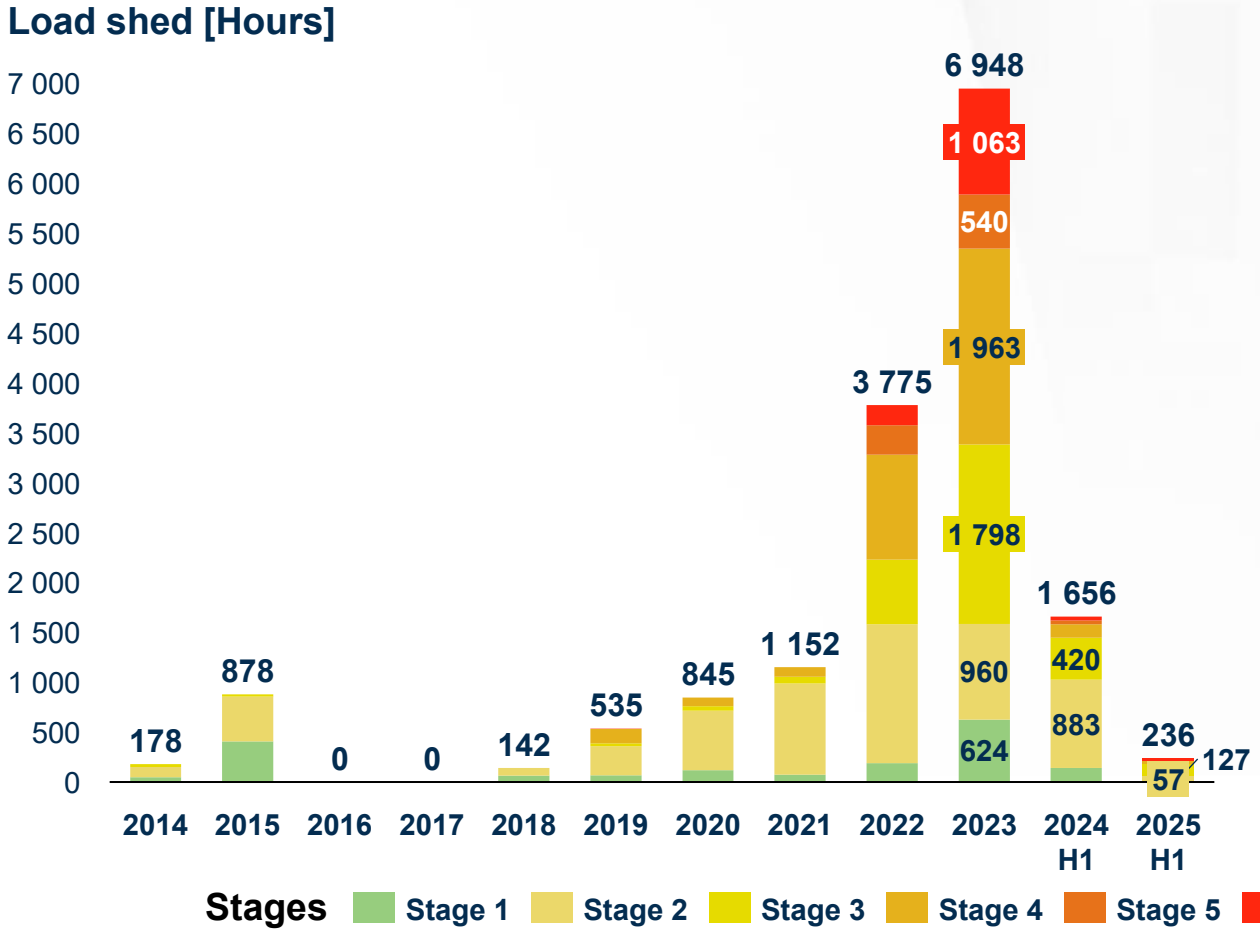
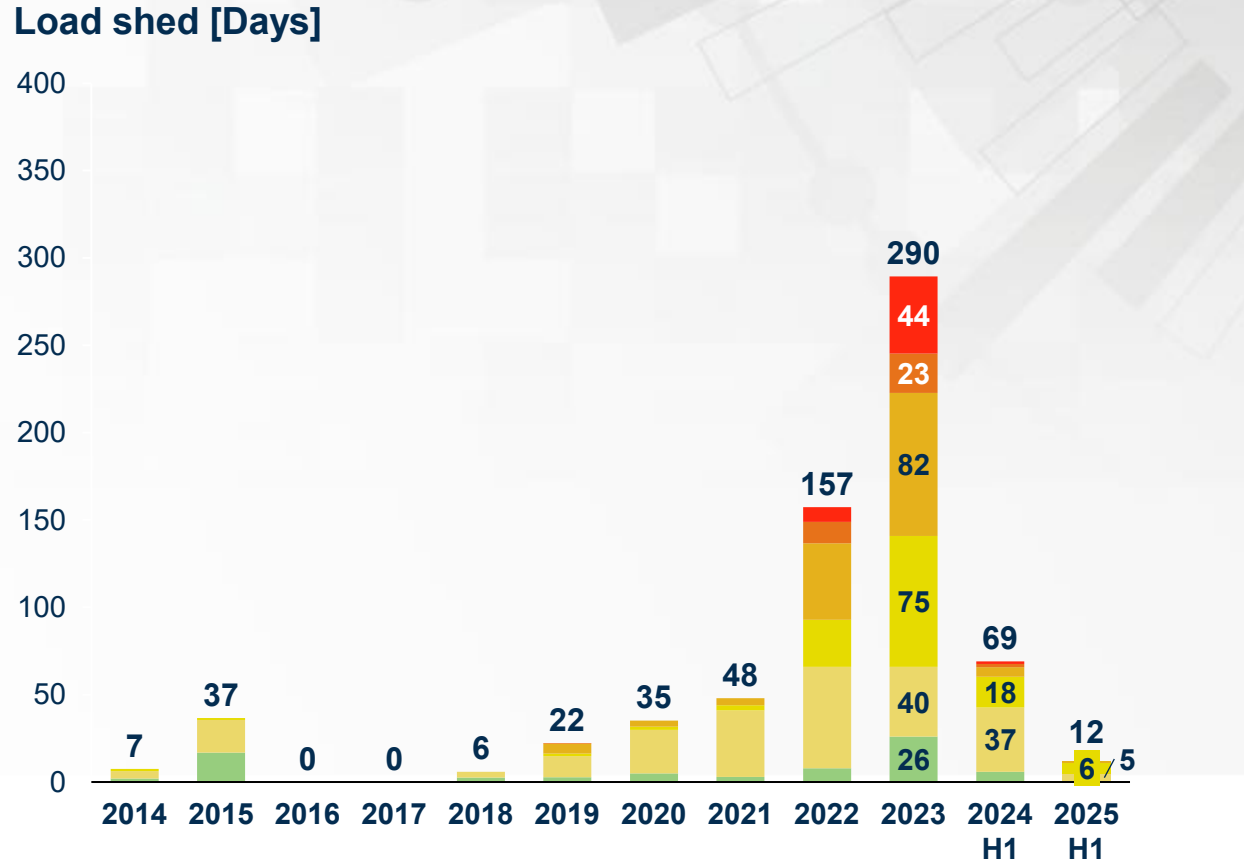
Monitoring days of uninterrupted power supply; South Africa reached 300 consecutive days without rotational load-shedding from 26 March 2024 to 21 January 2025,a milestone not seen since 2018. However, power cuts returned at the end of January and persisted into May 2025, with 13 load-shedding days across Stages 2–6 (stage 5 excluded) recorded in the first half of 2025.



Notes: Loadshedding assumed to have taken place for the full hours in which it was implemented. Practically, load shedding (and the Stage) may occassionally change/ end during a particular hour; Total GWh calculated assuming Stage 1 = 1 000 MW, Stage 2 = 2 000 MW, Stage 3 = 3 000 MW, Stage 4 = 4 000 MW, Stage 5 = 5 000 MW, Stage 6 = 6 000 MW. Demand Side Response (DSR) = Manual Load Reduction (MLR) + Interruptible Load Supply (ILS) + Interruption of Supply (IOS);
Sources: Eskom Twitter account; Eskom Hld SOC Ltd FaceBook page; Eskom se Push (mobile app); Nersa; The Outlier; CSIR analysis

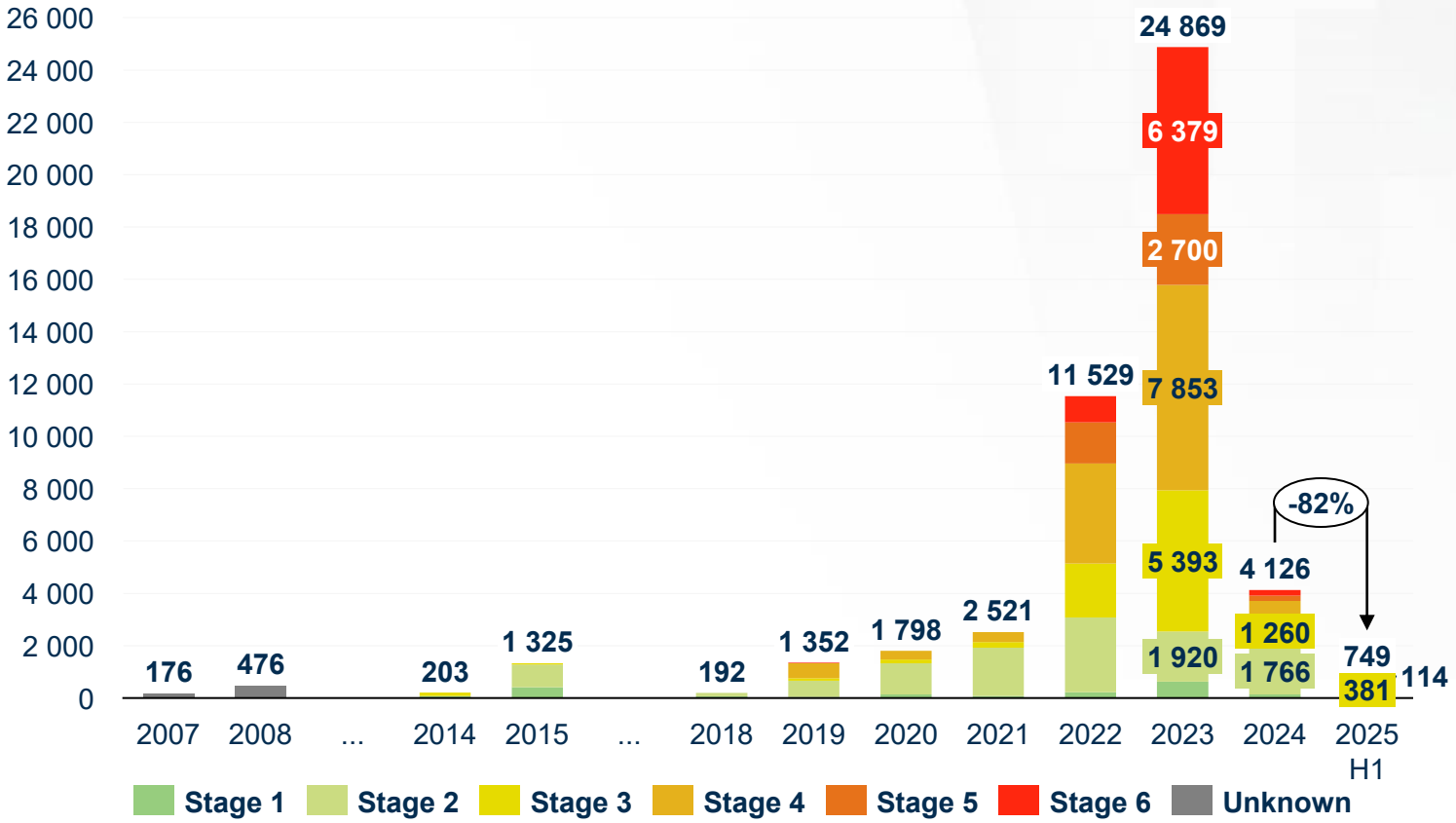
Continued Decline in Load Shedding Since 2023 Peak; South Africa's load shedding peaked in 2023 with 6,948 hours (290 days), the highest on record. In contrast, 2024 saw a major improvement, dropping to 1,656 hours (69 days). The trend continues in 2025 H1, with just 236 hours (12 days).





Notes: Loadshedding assumed to have taken place for the full hours in which it was implemented. Practically, load shedding (and the Stage) may occassionally change/ end during a particular hour; Total GWh calculated assuming Stage 1 = 1 000 MW, Stage 2 = 2 000 MW, Stage 3 = 3 000 MW, Stage 4 = 4 000 MW, Stage 5 = 5 000 MW, Stage 6 = 6 000 MW. Demand Side Response (DSR) = Manual Load Reduction (MLR) + Interruptible Load Supply (ILS) + Interruption of Supply (IOS);
Sources: Eskom Twitter account; Eskom Hld SOC Ltd FaceBook page; Eskom se Push (mobile app); Nersa; CSIR analysis

Volumes of loadshedding reduced by 82% to reach 749 GWh in the first half of 2025 compared to 2024, following the 2024 improvement driven by a higher EAF and lower residual load. Private sector embedded solar PV (6.8 GW) generated ~5.4 TWh, contributing to reduced loadshedding, with only 749 GWh shed in 2025 H1, a reduction of 82% compared to 2024.

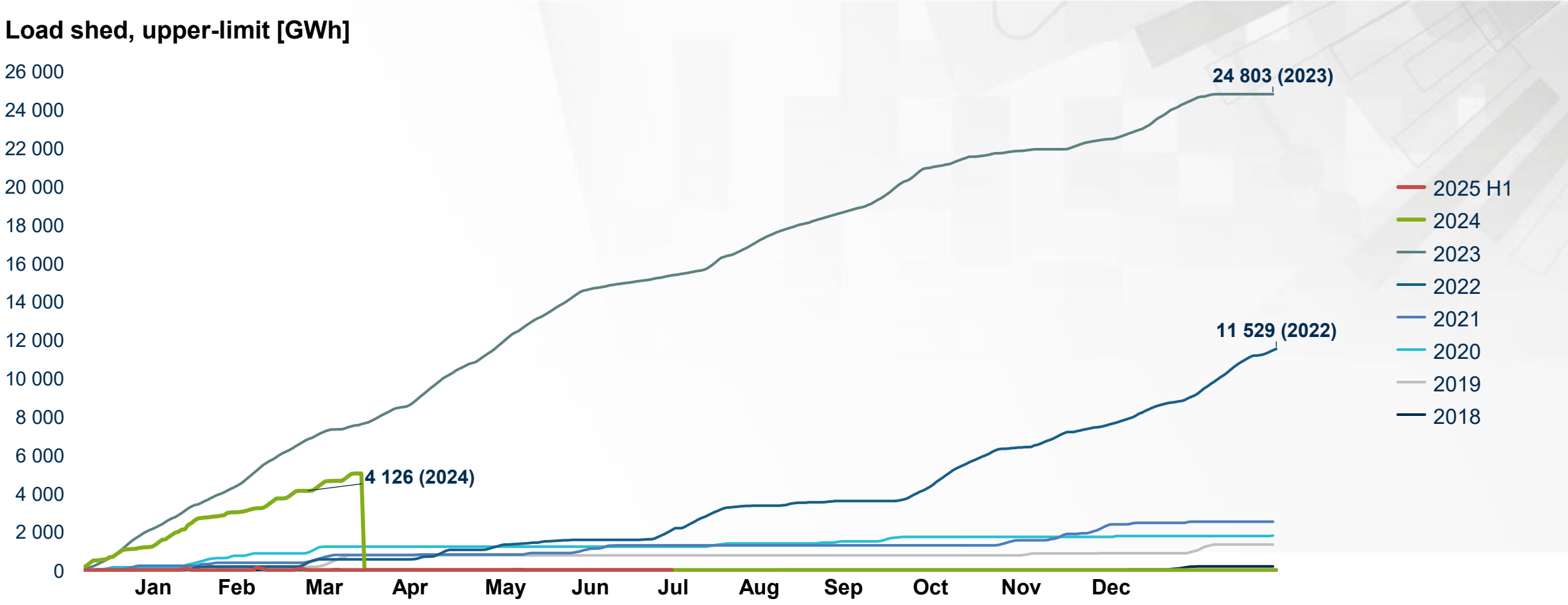


Year	Duration of Outages	Energy Shed	DSR
	(hours)	(GWh)	(GWh)
2007	-	176	Not Available
2008	-	476	Not Available
...	...	...	...
2014	121	203	Not Available
2015	852	1 325	Not Available
...	...	...	...
2018	127	192	392
2019	530	1 352	1 362
2020	859	1 798	1 426
2021	1 169	2 521	1 936
2022	3 773	11 529	8 301
2023	6 948	24 869	16 755
2024	1 656	4 126	2 530
2025 H1	236	749	504

Notes: Loadshedding assumed to have taken place for the full hours in which it was implemented. Practically, load shedding (and the Stage) may occassionally change/ end during a particular hour; Total GWh calculated assuming Stage 1 = 1 000 MW, Stage 2 = 2 000 MW, Stage 3 = 3 000 MW, Stage 4 = 4 000 MW, Stage 5 = 5 000 MW, Stage 6 = 6 000 MW. Demand Side Response (DSR) = Manual Load Reduction (MLR) + Interruptible Load Supply (ILS) + Interruption of Supply (IOS); CF assumption of 19% for Private sector Embedded Generation

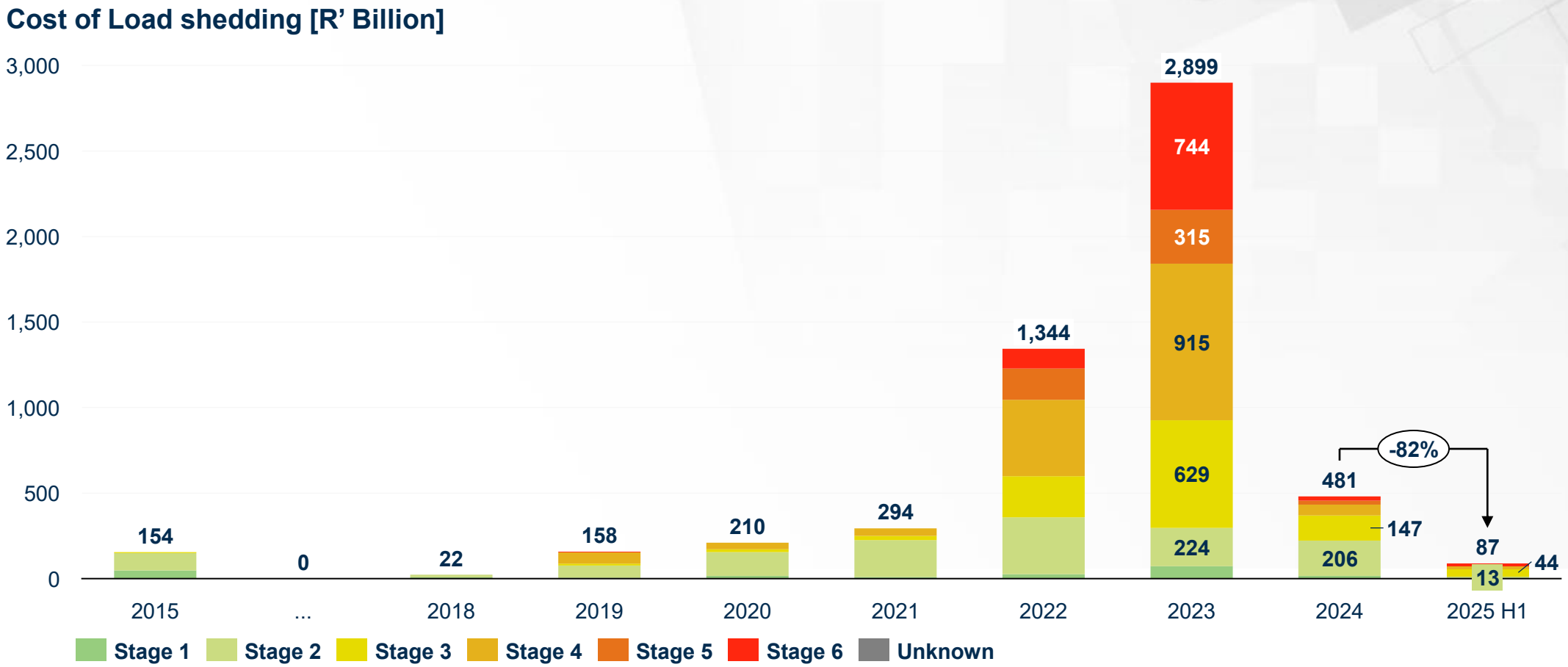
Sources: Eskom Twitter account; Eskom Hld SOC Ltd FaceBook page; Eskom se Push (mobile app); Nersa; CSIR analysis 2024* actuals are up to the end of June, The Outlier

2018–2025 H1: Upper limit of cumulative loadshedding; The last occurrence of load-shedding in the first half of 2025 was on 15 May 2025, after which uninterrupted supply resumed through to end-June.



Notes: Loadshedding assumed to have taken place for the full hours in which it was implemented. Practically, load shedding (and the Stage) may occassionally change/ end during a particular hour; Total GWh calculated assuming Stage 1 = 1 000 MW, Stage 2 = 2 000 MW, Stage 3 = 3 000 MW, Stage 4 = 4 000 MW, Stage 5 = 5 000 MW, Stage 6 = 6 000 MW;
Sources: Eskom Twitter account; Eskom Hld SOC Ltd FaceBook page; Eskom se Push (mobile app); Nersa; CSIR analysis

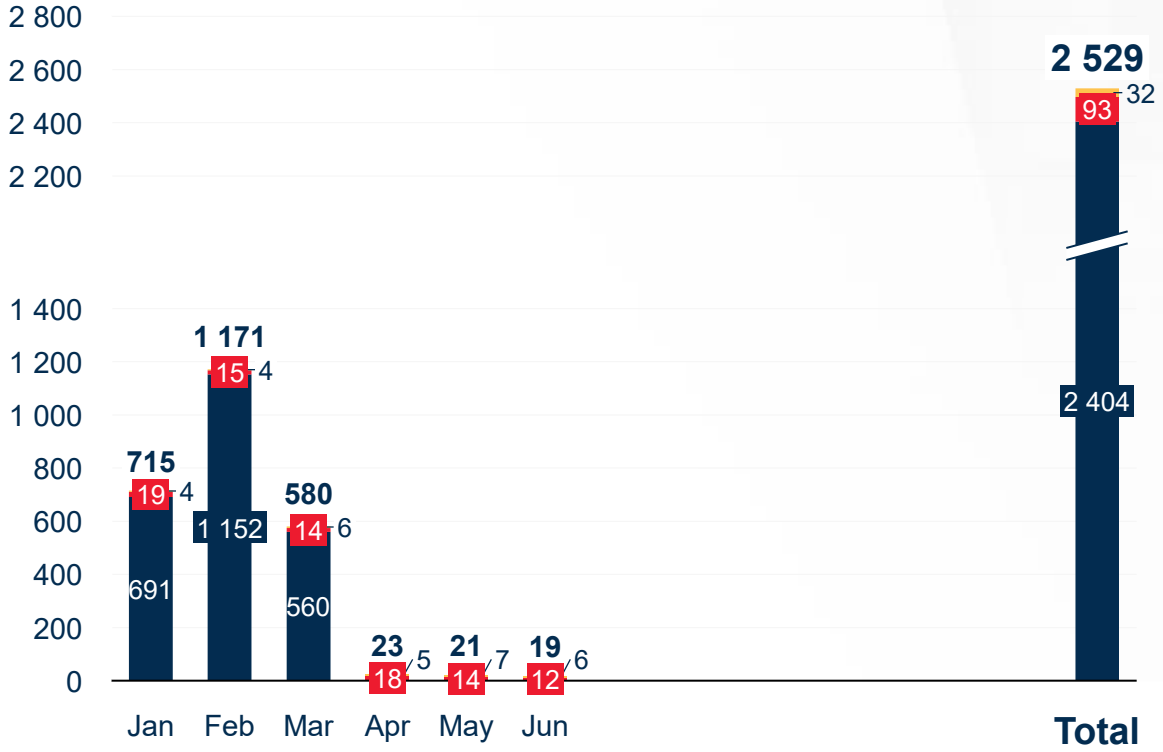
The South African economy lost approximately R’87 billion in 2025 as an upper limit due to rotational loadshedding. Due to additional capacity and improved performance at Eskom plants, the cost of load shedding dropped by ~82% in 2025.



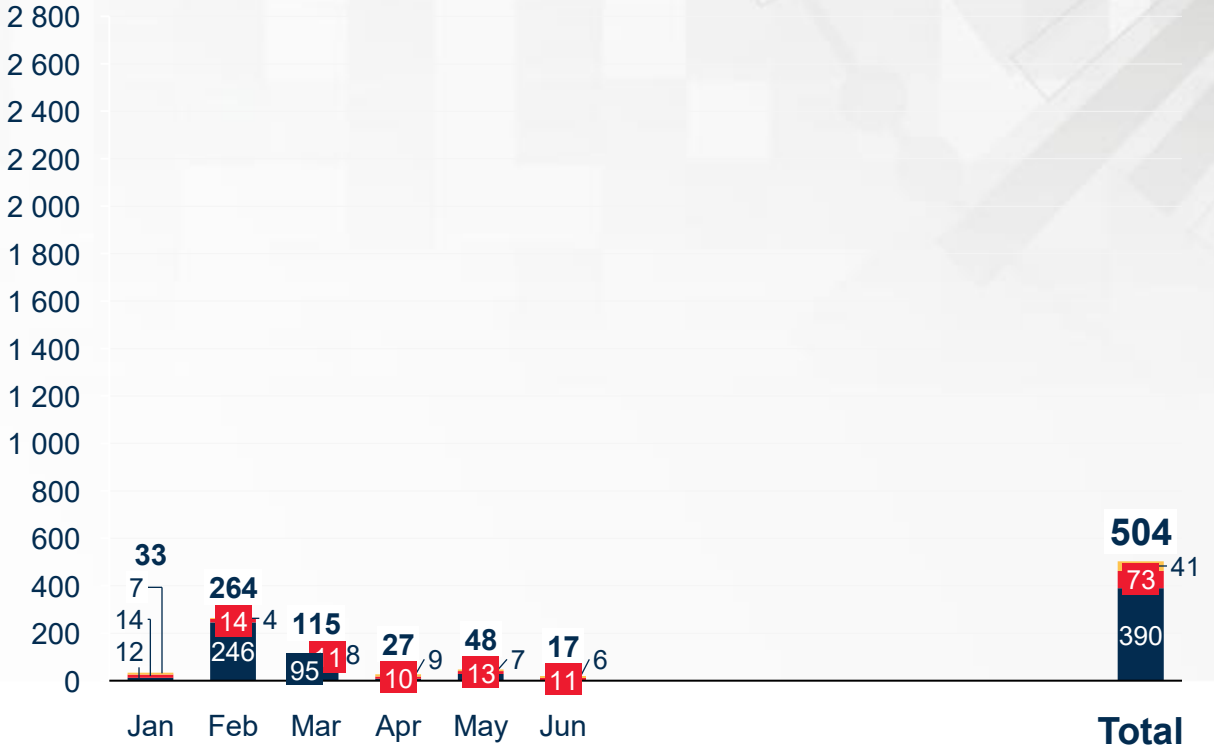
Notes: Loadshedding assumed to have taken place for the full hours in which it was implemented. Practically, load shedding (and the Stage) may occassionally change/ end during a particular hour; Total GWh calculated assuming Stage 1 = 1 000 MW, Stage 2 = 2 000 MW, Stage 3 = 3 000 MW, Stage 4 = 4 000 MW, Stage 5 = 5 000 MW, Stage 6 = 6 000 MW2024* actuals are up to the end of June. Cost of load shedding estimated using the high-level load shedding energy estimates Used the cost of unserved energy of 116 570 R/MWh, the cost of unserved represents a national average, the actual cost of power interruptions will vary for different sectors based on how electric utilisation is monetised and time of day of supply interruptions. H1 refers to the first half of the year.
Sources: Eskom Twitter account; Eskom Hld SOC Ltd FaceBook page; Eskom se Push (mobile app); Nersa; CSIR analysis

DSR volumes as reported by Eskom dropped significantly in 2025 H1; Manual Load Reduction (loadshedding) declined from 2 404 GWh in 2024 H1 to 390 GWh, with higher use of Interruptible Supply and IOS interventions.

2024 H1 Monthly demand side response (DSR) [GWh]



2025 H1 Monthly demand side response (DSR) [GWh]

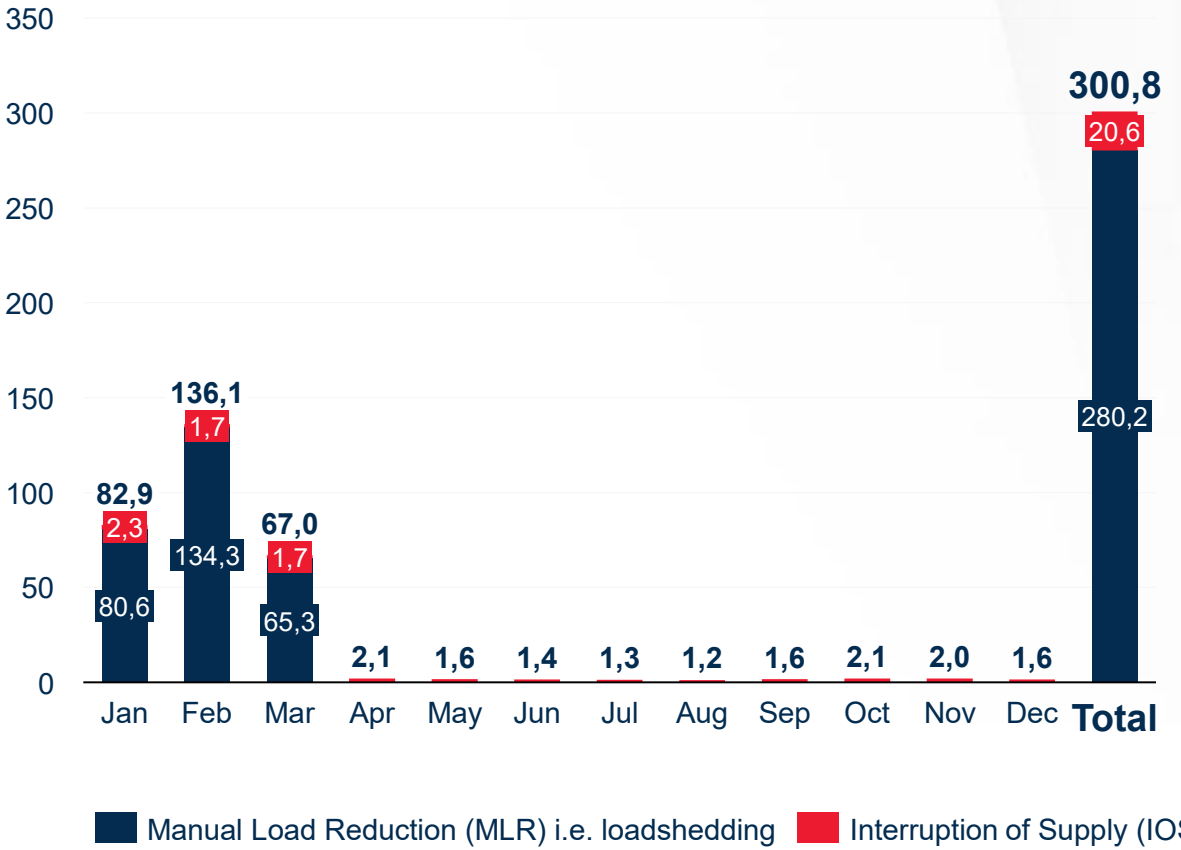


Manual Load Reduction (MLR) i.e. loadshedding | Interruption of Supply (IOS) | Interruptible Load Supply (ILS)

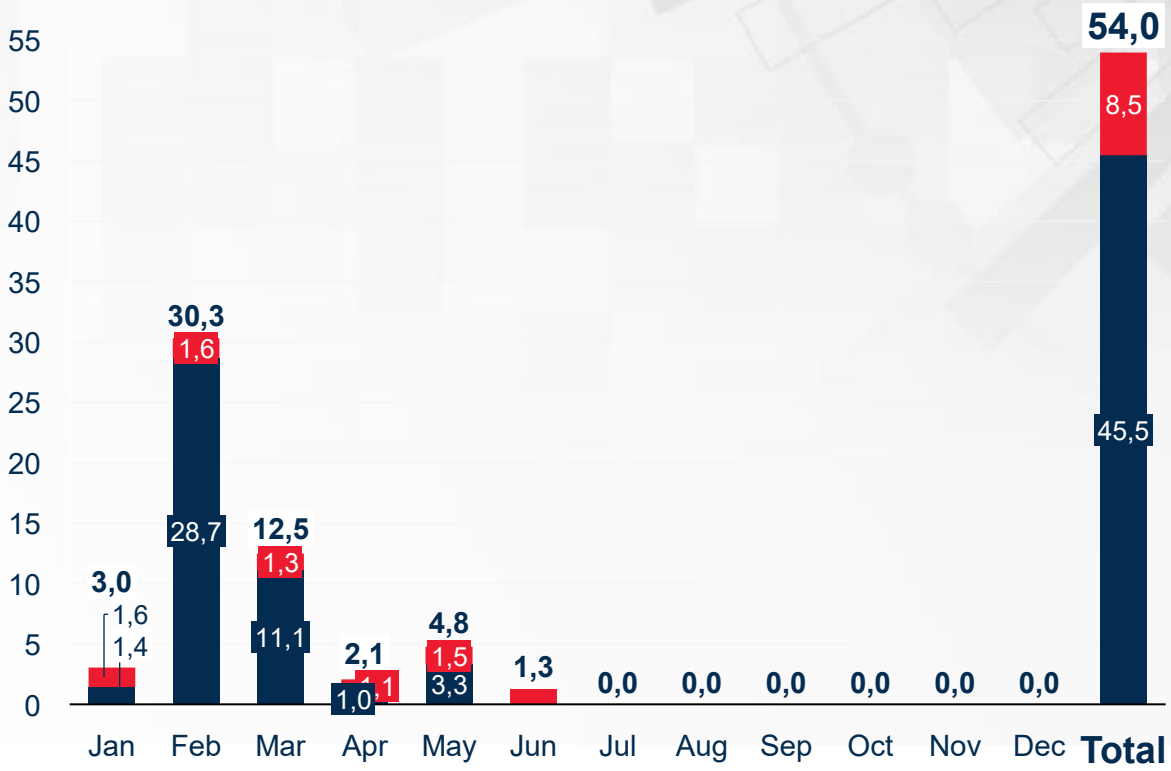
Notes:Demand Side Response (DSR) = Manual Load Reduction (MLR) + Interruptible Load Supply (ILS) + Interruption of Supply (IOS);
Used the cost of unserved energy of R/MWh of R 116 570, the cost of unserved represents a national average, the actual cost of power interruptions will vary for different sectors based on how electric utilisation is monetised and time of day of supply interruptions. H1 refers to the first half of the year.
Sources: Eskom; CSIR analysis

The actual cost of loadshedding based on Eskom's DSR data was ~R301 billion in 2024 and dropped to R54 billion in 2025 H1. This is significantly lower than the ~R1.25 trillion incurred in 2023.

2024 Cost of loadshedding (DSR) [R'Billion]



2025 H1 Cost of loadshedding (DSR) [R'Billion]



Manual Load Reduction (MLR) i.e. loadshedding Interruption of Supply (IOS)

Notes:actual cost of unserved energy excludes ILS since those participants are commercial contracted to be interrupted and receive financial incentives for each interruption
Used the cost of unserved energy of R/MWh of R 116 570. H1 refers to the first half of the year.
Sources: Eskom; CSIR analysis

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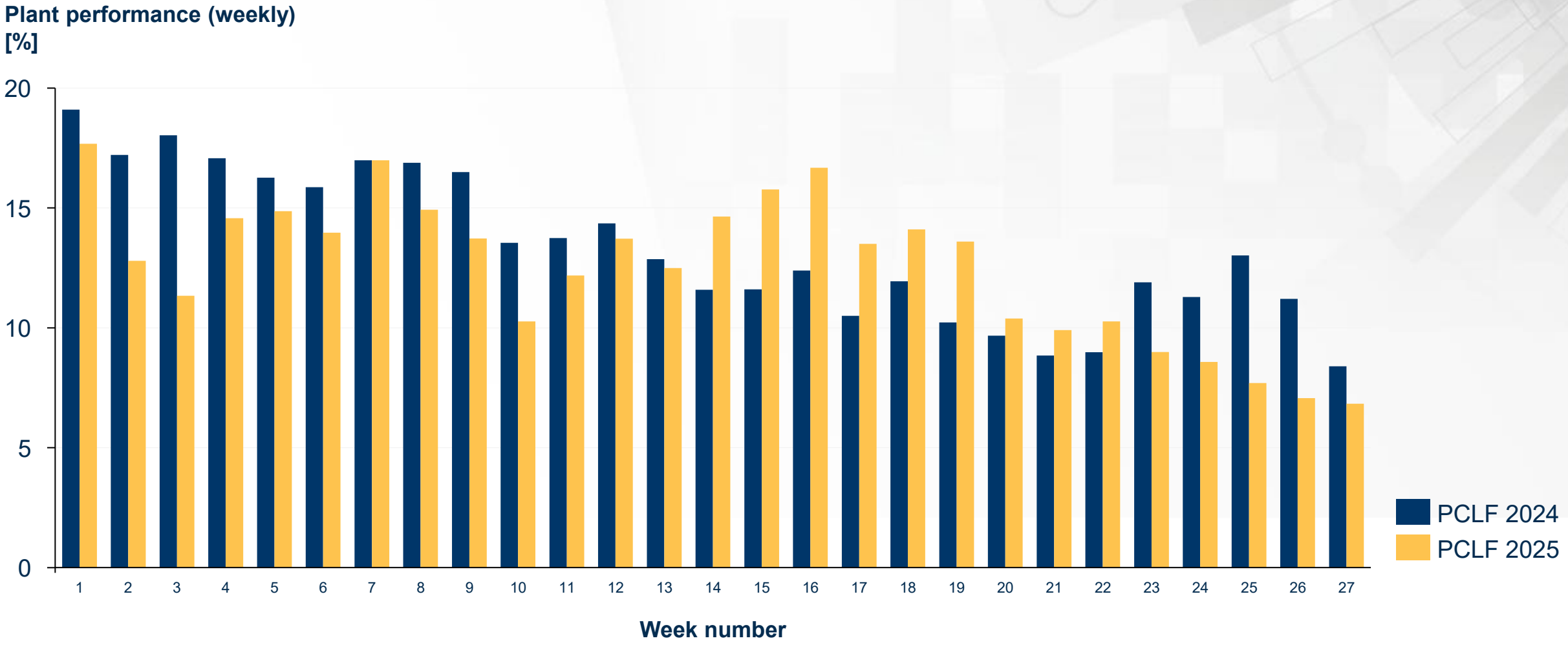
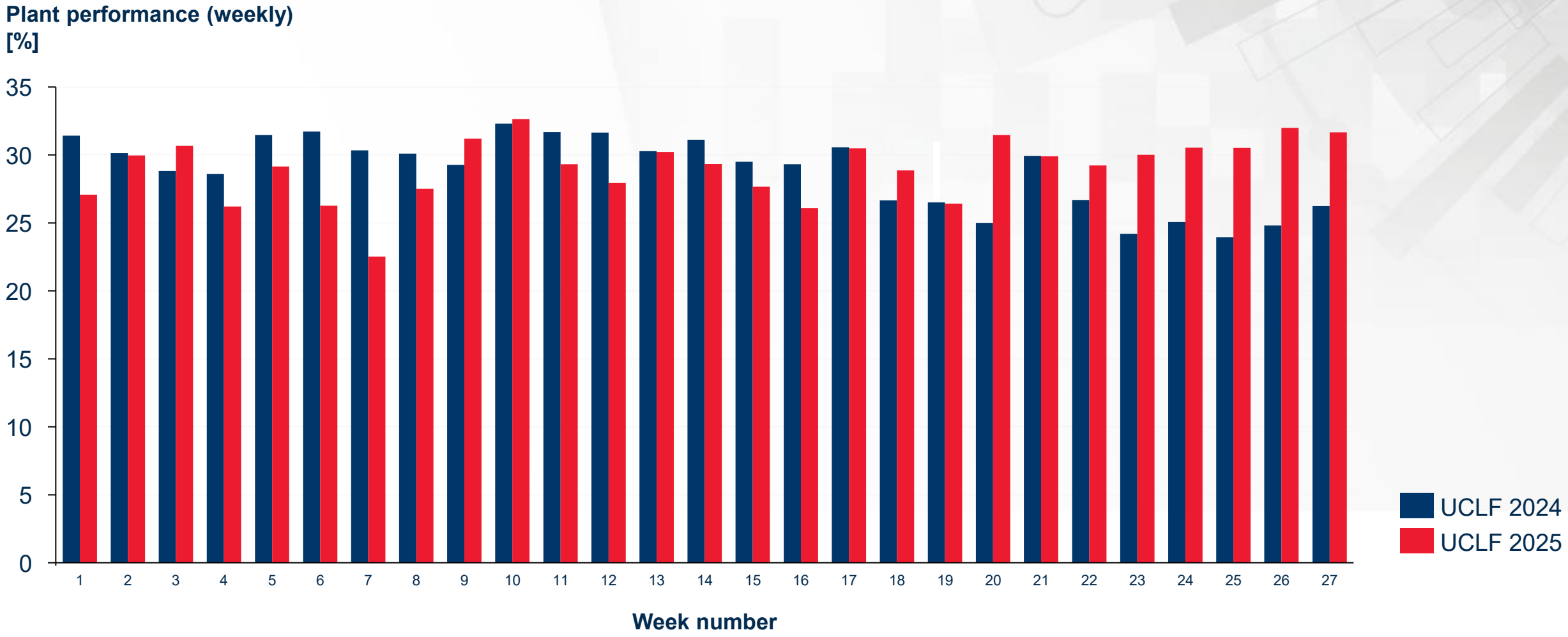
Planned capacity loss factor (planned maintenance) was lower in the first half of 2025 compared to the same period in 2024. The average PCLF from January to June 2025 was 12.5%, lower than the 13.5% recorded in the same period of 2024.



NOTES: EAF - Energy Availability Factor; PCLF - Planned capability Loss Factor; UCLF – Unplanned Capability Loss Factor; OCLF – Other Capability Loss Factor
Sources: Eskom; CSIR analysis

Unplanned capacity loss factor (unplanned outages) was slightly higher in the first half of 2025 compared to 2024.

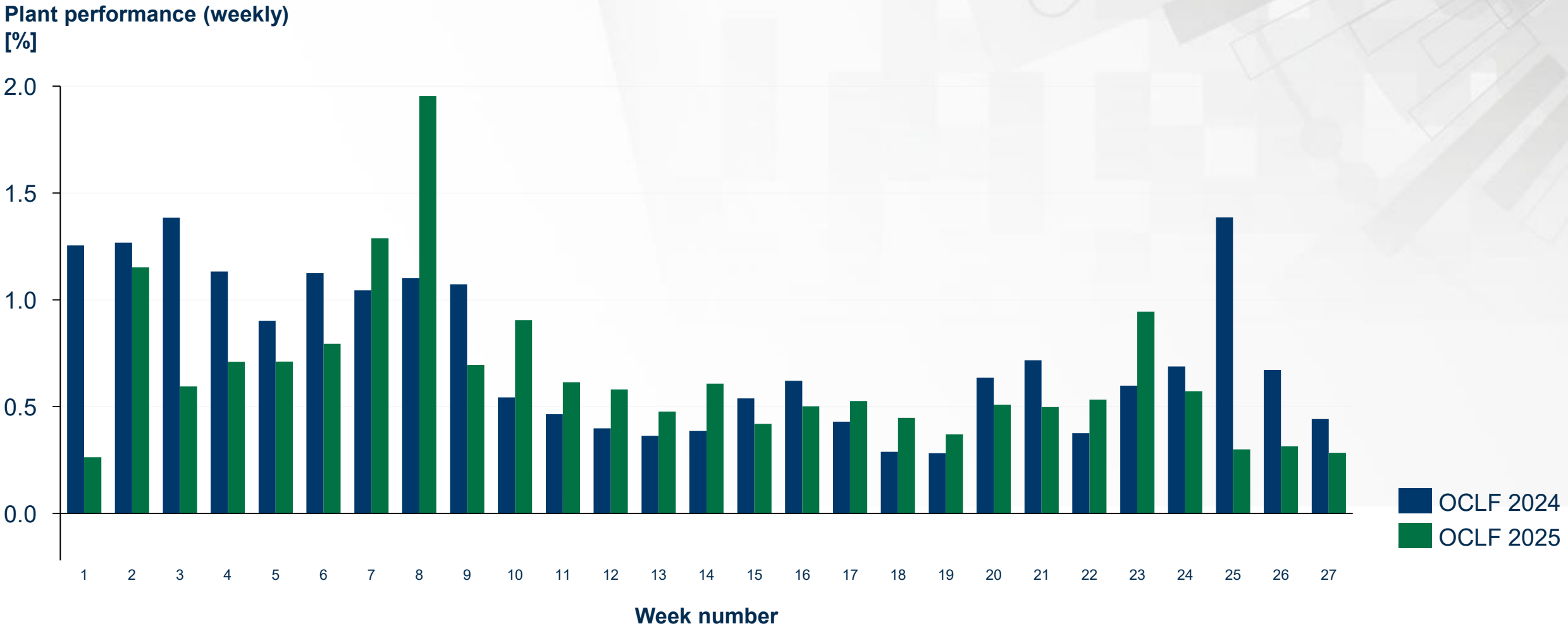
The average UCLF from January to June 2025 was 29.1%, marginally above the 28.9% recorded during the same period in 2024, with a noticeable increase from week 18 onwards.



NOTES: EAF - Energy Availability Factor; PCLF - Planned capability Loss Factor; UCLF – Unplanned Capability Loss Factor; OCLF – Other Capability Loss Factor
Sources: Eskom; CSIR analysis

Other capacity loss factor (OCLF) was slightly lower in the first half of 2025 compared to 2024.

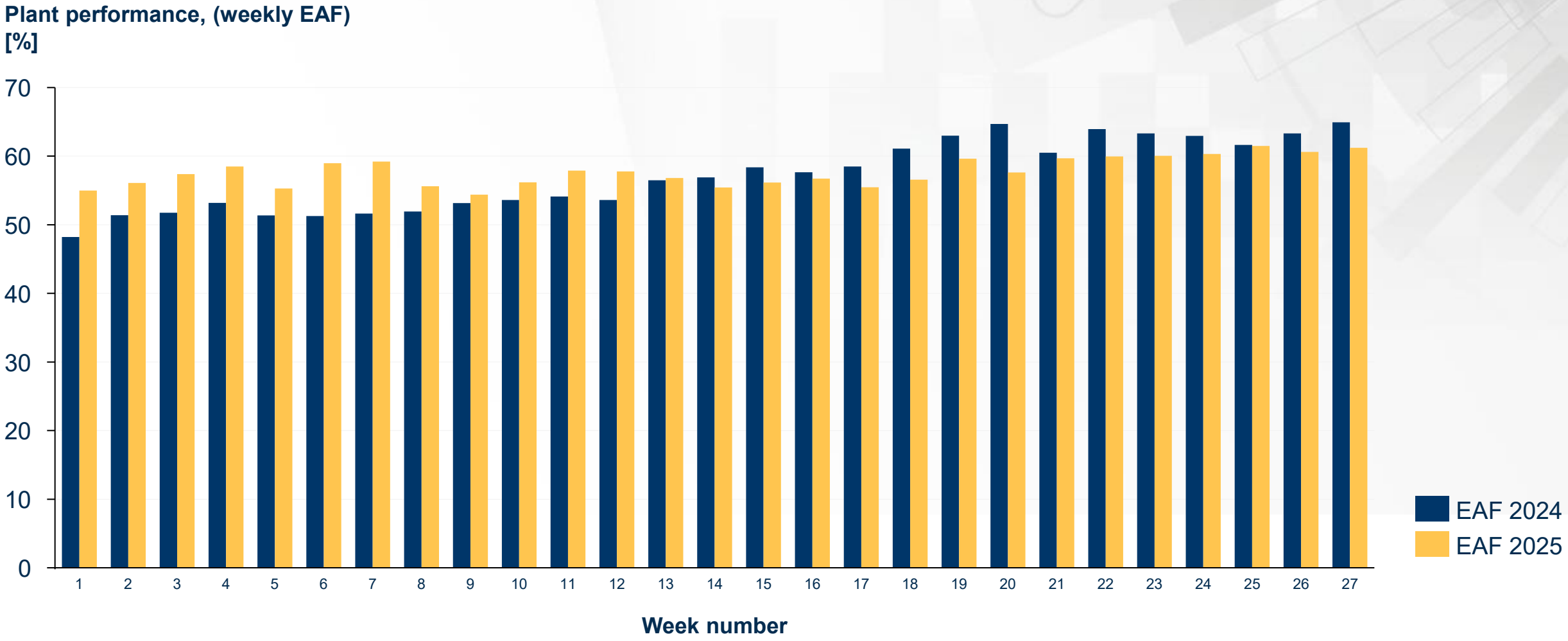
The average OCLF declined from 0.8% in 2024 to 0.7% in 2025, reflecting a marginal improvement in system availability under uncontrollable constraints.



NOTES: EAF - Energy Availability Factor; PCLF - Planned capability Loss Factor; UCLF – Unplanned Capability Loss Factor; OCLF – Other Capability Loss Factor
Sources: Eskom; CSIR analysis

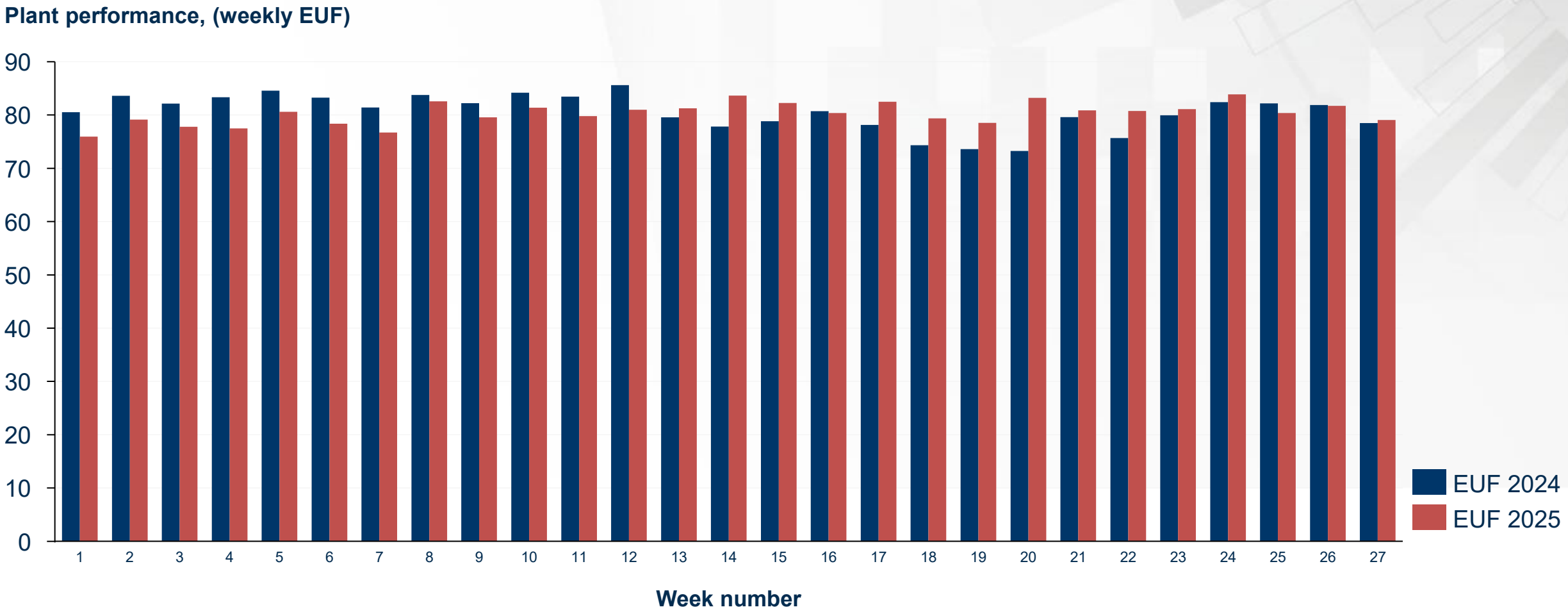
The EAF: Eskom fleet's availability improved due to reduced planned outages.

The weekly average EAF increased from 56.8% in 2024 to 57.6% in 2025, with performance reaching 60% from week 22 onwards and peaking at 61.5% in H1 2025.



NOTES: EAF - Energy Availability Factor; PCLF - Planned capability Loss Factor; UCLF – Unplanned Capability Loss Factor; OCLF – Other Capability Loss Factor, H1 refers to the first half of the year
Sources: Eskom; CSIR analysis

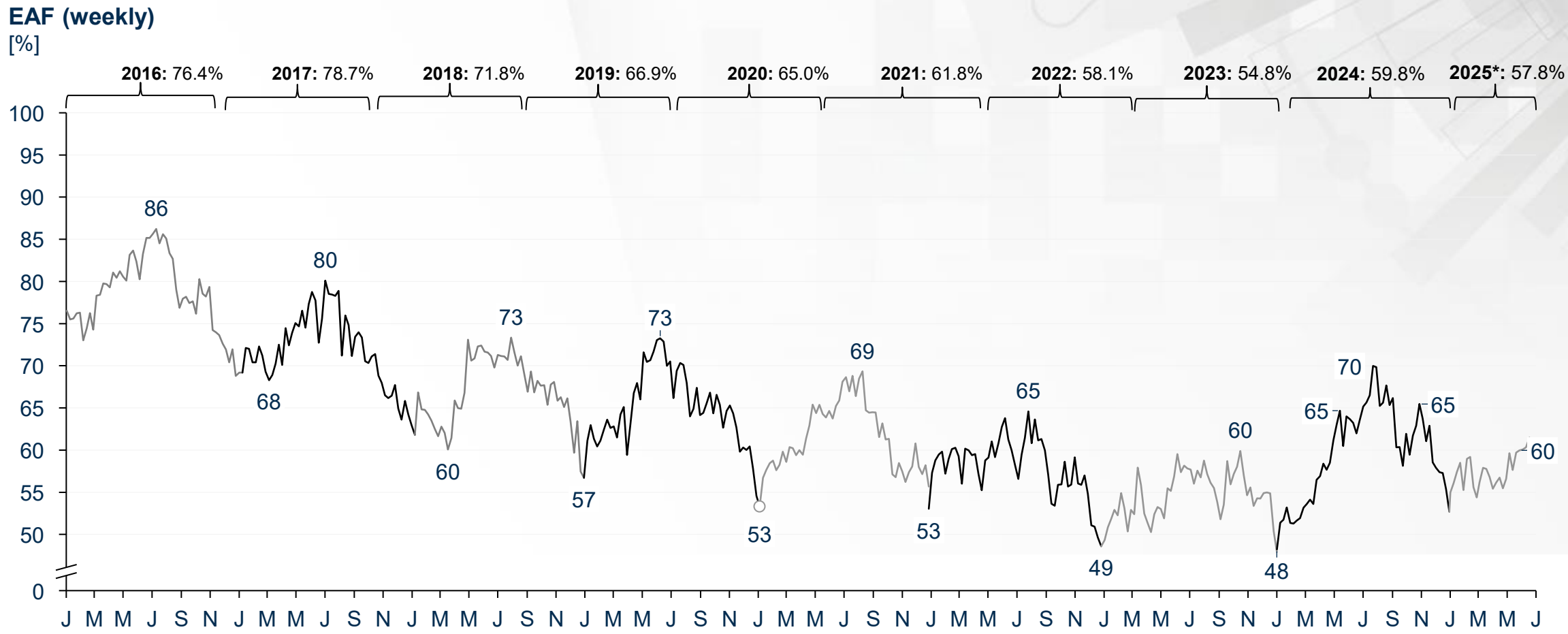
The Energy Utilisation Factor(EUF): Eskom's EUF had an average of 80.3% in the first half of 2025 compared to the 80.5% achieved in the first half of 2024.



Sources: Eskom; CSIR analysis
Note: Energy Utilisation Factor is for all Eskom power plants.

EAF trend in H1 2025 increased to an average of ~57.6 % and a peak of ~65%.

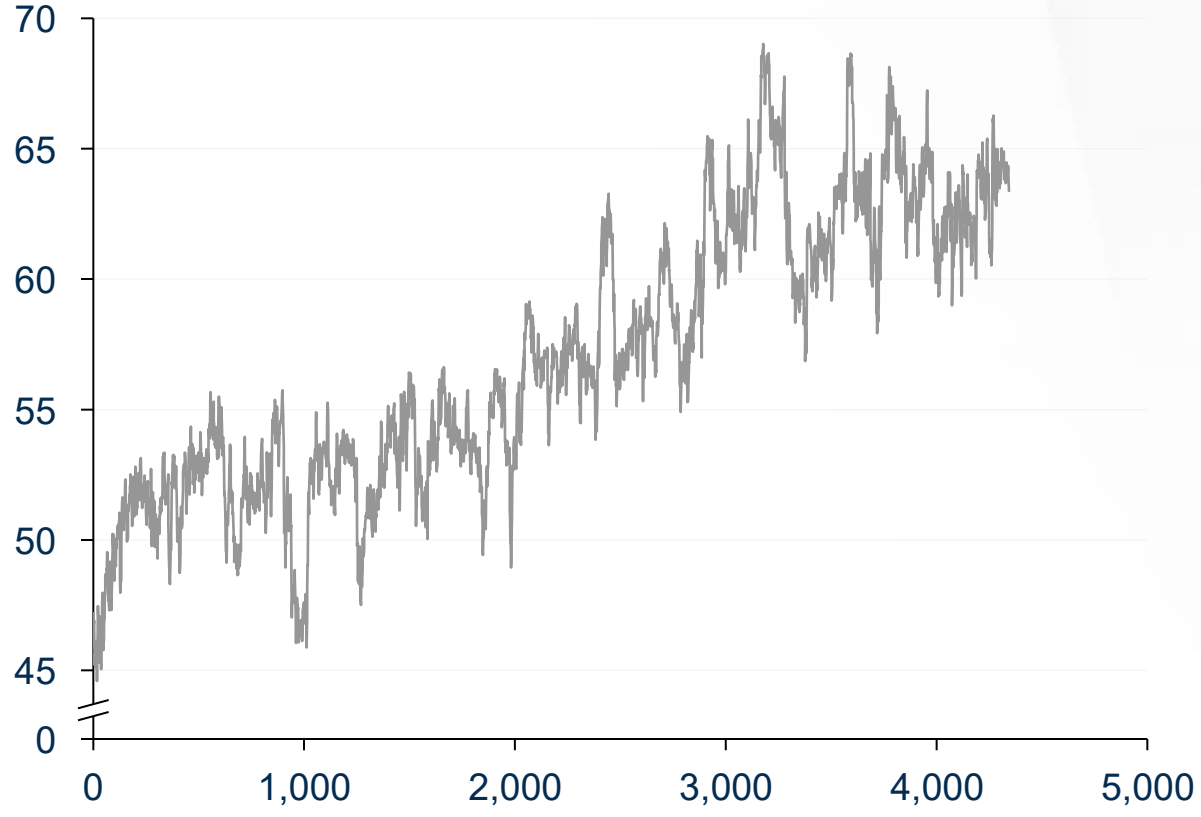
The weekly EAF reached a high of ~ 65% in H1 2025, lower than ~ 69% peak recorded in H1 2024.



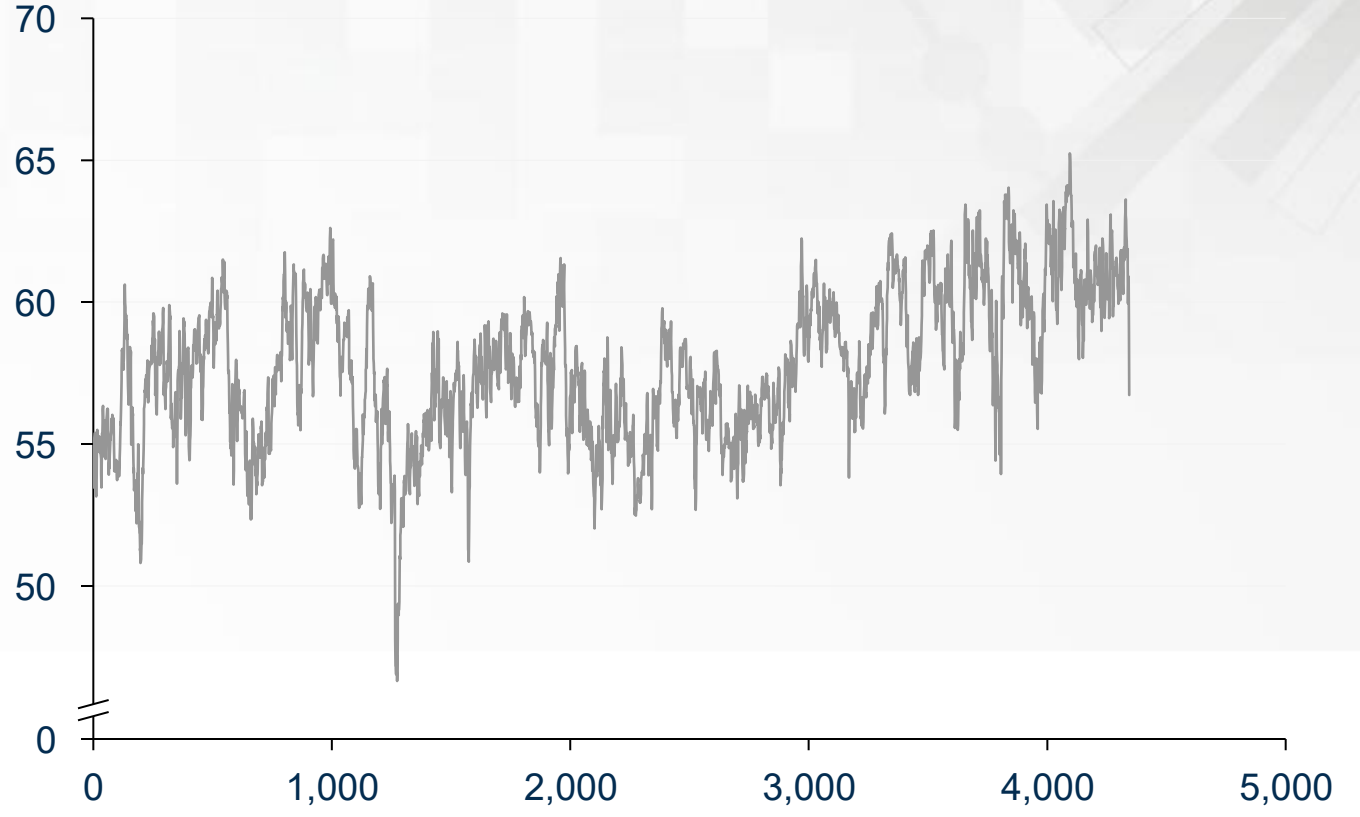
Notes: EAF - Energy Availability Factor. Average annual EAF is calculated as an average of the hourly EAF values.
Sources: Eskom; CSIR analysis

EAF exhibits consistent seasonal trends in first half of 2025, similar to the same period in 2024. In both years, the EAF ramps up ahead of the winter months to meet higher demand.

EAF (hourly)
[%] 2024 H1



EAF (hourly)
[%] 2024 H1



Notes: EAF - Energy Availability Factor. Average annual EAF is calculated as an average of the hourly EAF values.
Sources: Eskom; CSIR analysis

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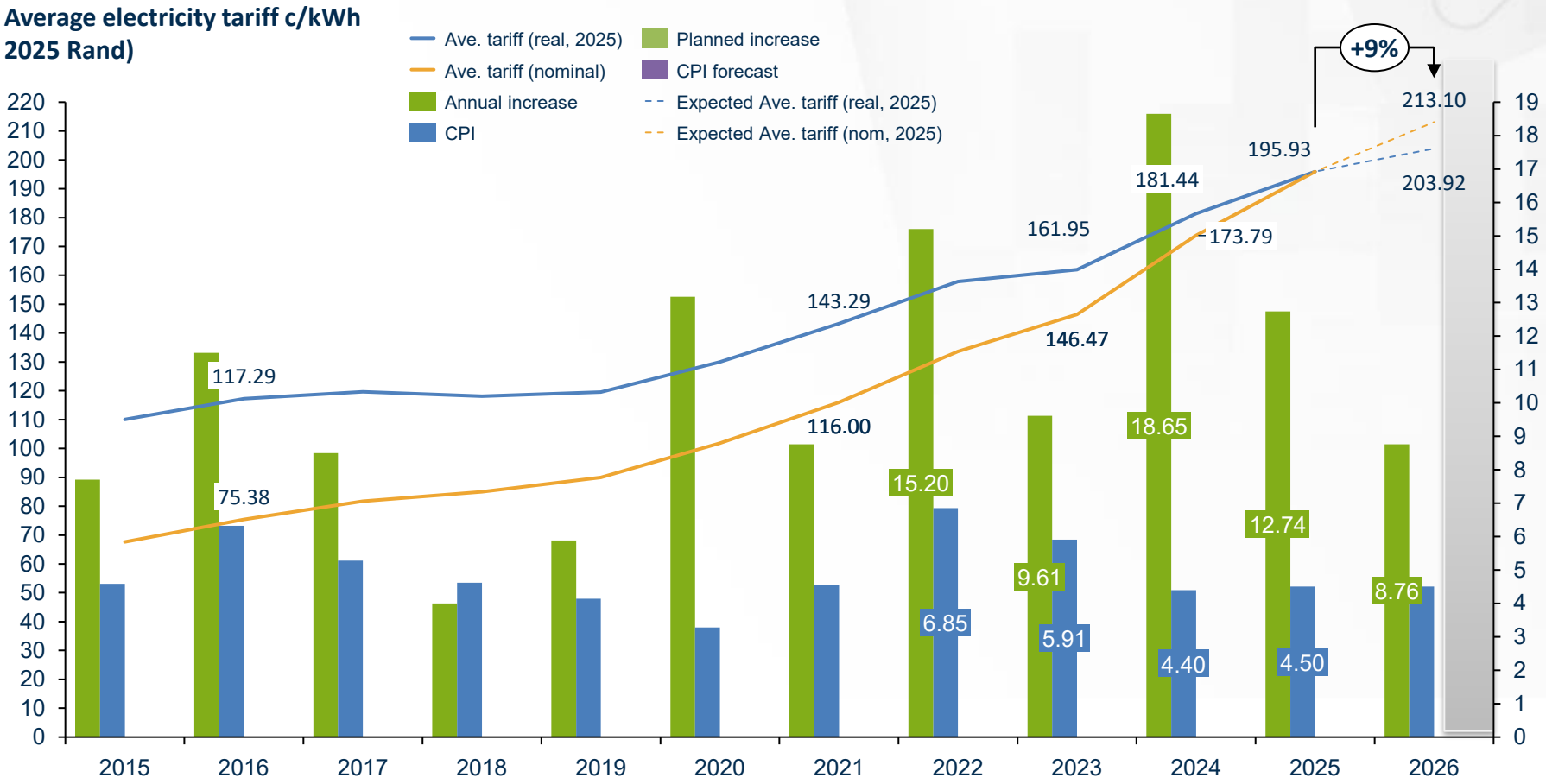
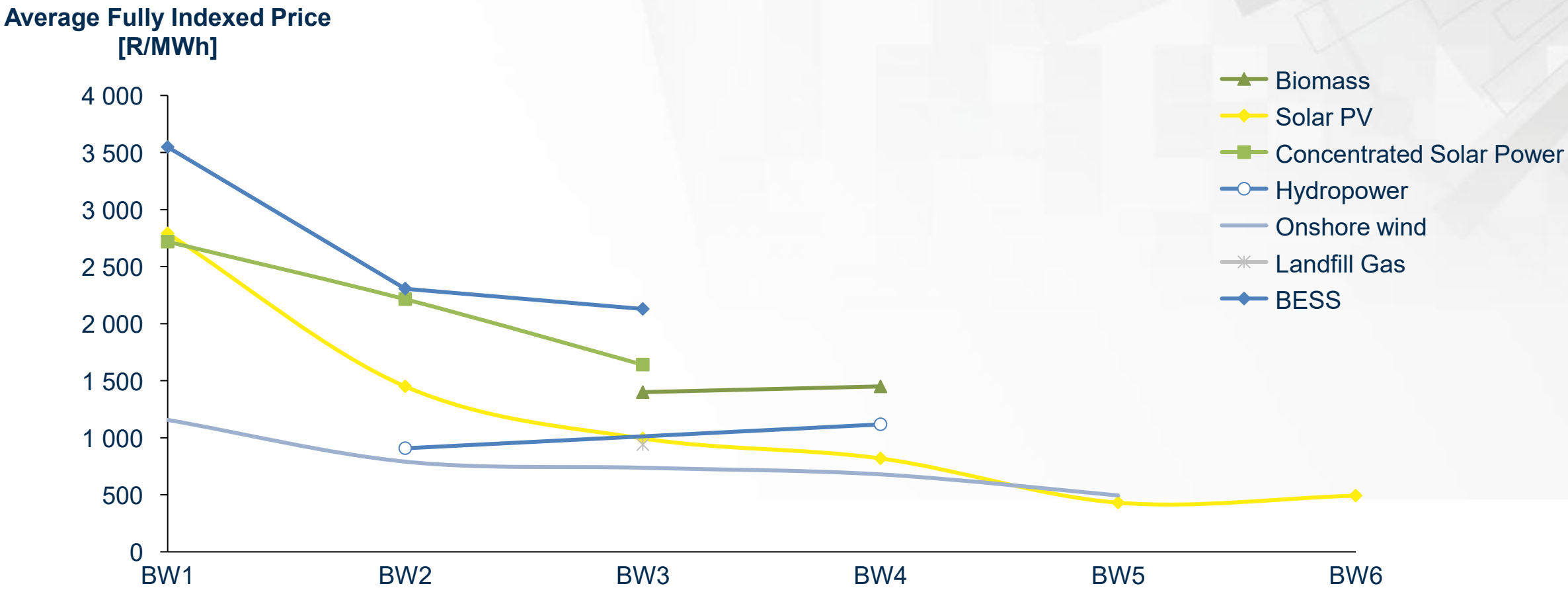
Eskom's aggregated tariffs are expected to increase by 8.76% in 2026, which is higher than the expected average annual inflation rate of 4.5%. Electricity prices are already above the utility-scale solar PV LCOE of 50 c/kWh; the proposed NERSA tariff escalation of 8.76%* will increase the national average tariff to 213.92 c/kWh in 2026.



- The graph on the left shows the national average electricity tariff, individual electricity prices will differ.
- The graph shows that increases in the price of electricity prior to 2008 were mostly below inflation.
- Electricity prices increased significantly in 2008, which coincided with the start of load shedding.
- The NERSA proposed electricity tariff increase of 12.74% is above the expected inflation of 4.4% for 2024.
- The national average price of electricity is now above the levelised cost of renewable generation resources, which range between 50 c/kWh and 60 c/kWh for solar PV and wind utility-scale power plants in the REIPPP programmes.

Sources: Eskom MYPD 5 and integrated reports 2022/2023, StatSA, poweroptimal.com/2021-update-Eskom-tariff-increases-vs-inflation-since-1988, Greencape's 2022 LARGE-SCALE RENEWABLE ENERGY MARKET INTELLIGENCE REPORT
Note: *The 8.76% tariff escalation for the year 2026 is in the process of being approved.

Grid-connected RE technology cost reduction trends – Fully indexed price according to Bid Windows 1-6.Solar PV, CSP, BESS, and onshore wind prices have decreased across bid windows, while biomass and landfill gas still face cost challenges.



Notes: BW=Bid Window, BESS=Battery Energy Storage System
Sources:DEE REIPPPP

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The addition of new generation capacity and a marginal improvement in EAF alleviates pressure on the power system amid declining energy demand in 2025.

The addition of new generation capacity from Eskom's Kusile and two wind REIPPPP plants enhanced energy output; the implemented NERSA tariff increase of 12.74% this year takes the average tariff to c/kWh 195.93.

Theme	Key insights
Demand Analysis	➢ Demand for grid electricity continues to trend down; peak demand is 3% lower in the first half of 2025 compared to the peak demand recorded in the first half of 2024, mostly due to recent growth in embedded generation and energy efficiency interventions amid constrained generation supply and steep electricity tariff increases.
Generation Capacity	➢ Eskom fleet installed capacity increased by 720 MW in the first half of 2025 compared to the same period of 2024; therefore, energy generated from coal is relatively higher. Additional capacity from wind plants of 364 MW from the REIPPPP bid window 5, and 100 MW of dispatchable CSP.
EAF Analysis	➢ The Eskom fleet EAF marginally improved in the first half of 2025 compared to the previous year and reached an annual average of 58% which is 1% higher than the 57% reached in the same period of 2024.
Loadshedding statistics	➢ Load shedding continued to decline in the first half of 2025, with only 749 GWh shed compared to 4 126 GWh shed in 2024 — a reduction of 82% — reflecting improved power system performance and supply availability.
Tariff Analysis	➢ National average tariffs have risen 190% since 2014, mostly above inflation, with the projected 2026 hike (8.76%) exceeding the 4.5% Consumer Price Index (CPI) forecast and now above utility-scale solar photovoltaic (PV) Levelised Cost of Electricity (LCOE).

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Thank you