Standard Bank
Corporate & Investment Banking

Cresco
ENABLING GROWTH

IRP2024 PUBLICATION AND ITS IMPACT ON **ENERGY MARKET PROJECTIONS**

Balancing coal decommissioning with new generation capacity additions will be critical in supporting and enabling economic growth and a robust power system.

SOUTH AFRICA'S ENERGY MIX DEVELOPMENT: **UPDATED PROJECTIONS**

The initial report **"Energy Market Projections",** prepared by Cresco in collaboration with Standard Bank Corporate and Investment Banking, published in July 2024, relied on IRP2023 assumptions, including the decommissioning plan as presented in the Just Energy Transition Partnership agreement. With the publication of the new draft IRP2024 in November 2024 and the recent notable and consistent improvements in Eskom generation performance that have enabled the continued suspension of loadshedding since 26 March 2024, Cresco's energy market projections have been revised and updated. These projections are updated on a 6-months basis based on actual projects implemented and operational data from the Eskom fleet.

Robert Futter, Executive Director, Cresco Group
Olga Suchkova, Senior Manager, Cresco Group
Rentia van Tonder, Head of Power, Standard Bank

In November 2024 the remodelled draft of South Africa's Integrated Resource Plan (IRP) for electricity was published for the key stakeholders' review. The remodelling work was conducted by the South African National Energy Development Institute (SANEDI) using a multi-nodal model which seeks to co-optimise generation and transmission infrastructure. Despite the thorough revision that was done, the general trends and preferences for the energy mix development remains similar to those laid out in IRP2023, which was published at the end of 2023.

Heavy reliance on gas-fuelled generation remains critical for the future South Africa's national energy balance. As per the new draft of IRP2024, in 2029 and 2030 a total of 6GW of new gas-fuelled capacity is planned to be added to the grid. Coupled with other new capacity additions (e.g. publicly and privately procured renewable energy generation), according to IRP2024, this would allow a seamless decommissioning of coal power plants (which was assumed to be delayed until 2030).

In June 2024 Eskom Board and the Cabinet approved the continued operation of Camden, Grootvlei and Hendrina power plants to 2030. This marked a departure from the original decommissioning schedule as presented in IRP2023. According to Eskom Generation, the extension was granted to ensure grid stability and to cater for the introduction of new capacity, which is experiencing delays.
It is essential to acknowlege the importance of the supply security whilst enabling economic growth.

REIPPPP 7 have indicated lower PV prices and Cresco hopes these projects can achieve financial close – within reasonable time periods. Delays in achieving financial close due to Grid constraints have hindered future MWs coming online in projected timelines. The increase need to support new wind capacity being introduced to the power system to support the additional solar power ranging from residential, C&I and utility scale will remain an important focus and consideration for a balanced system. Various delays in reaching financial close on new projects will impact future planning. These range from grid allocation and process delays to implementation of new aggregation and trading platforms.

"REIPPP has played an important role to support new generation but needs to be revised if continued, whilst private projects, especially supply to aggregators/traders are in high demand. Further delays in reaching Financial close will impact the investment case whilst grid allocation and process remain a key conern." –
Rentia van Tonder,
Head of Power, Standard Bank

The decision to delay decommissioning raises concerns that South Africa's climate commitments and the Nationally Determined Contribution (NDC) would be jeopardised. Despite that, with recent assent of the Climate Change Bill, South Africa has reinforced its commitments to decarbonization made under the international Paris Agreement. This, along with carbon-related targets of many of the South Africa's private electricity consumers (including mining and industrial majors), puts an increased emphasis on the integration of the Renewable Energy (RE) into the South African grid.

The updated Cresco's projections, as presented in this report, have relied on the most recent IRP2024 with adjustments made to reflect Cresco's expertise of the energy market. As such, new gas-fuelled capacity additions, for example, as presented in IRP2024 were questioned and deviate in Cresco's updated projections. Similarly, Cresco's view of RE rollout, especially that procured by the private market, also deviates from IRP2024. Adjustments were also made to the BESS rollout.

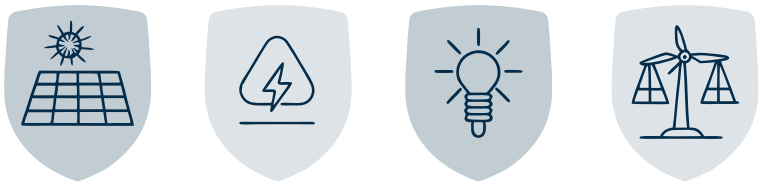
Energy storage is becoming increasingly important not only in South Africa but around the world. High reliance on RE sources calls for high reliance on storage to increase the much-needed flexibility of RE generation sources and to allow for their more efficient utilisation.

"Given the non-dispatchable nature of the RE generation, both utility-scale and smaller private-scale Battery Energy Storage Systems will become increasingly important to contribute to grid stability and RE generation dispatchability."

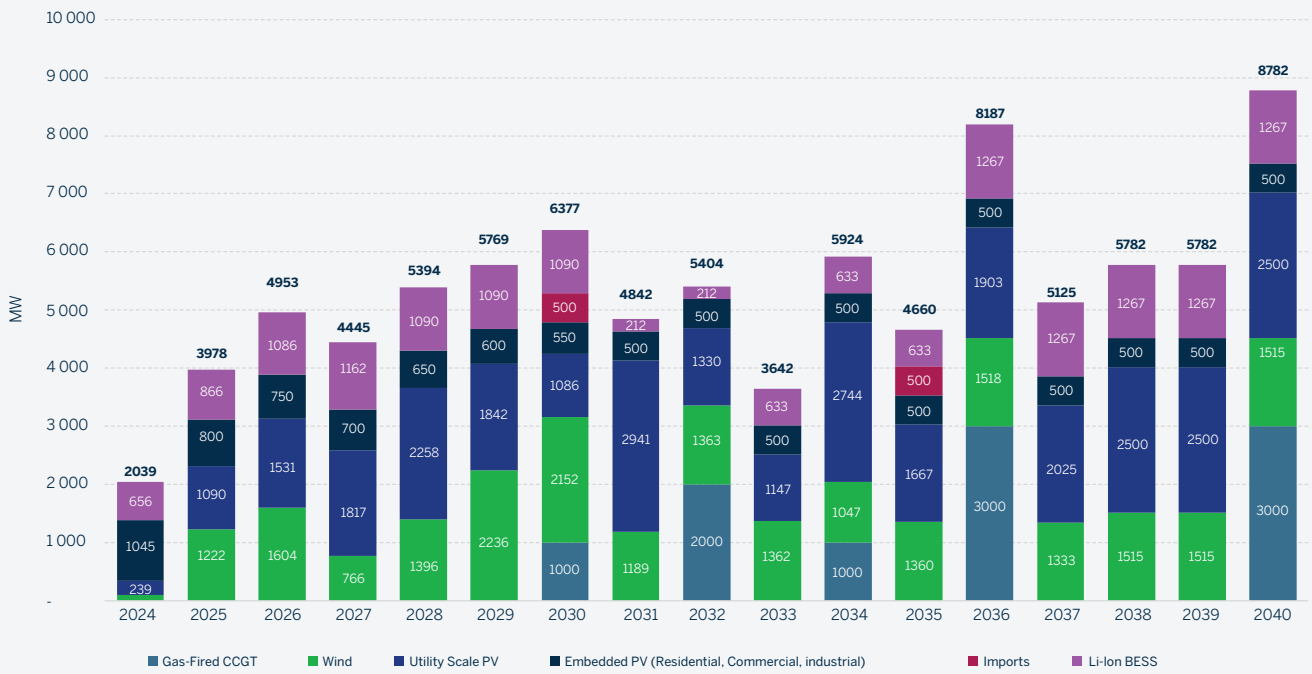
Robert Futter, Executive Director at financial advisory services firm Cresco Group.

Cresco also sees the implementation of the multi market model ("SAWEM") as driving visibility and direct demand from the market operator for ancillary services – primarily through BESS or dispatchable technologies.

The importance of timeous roll out of BESS solutions, through the government procurement program or private projects including renewables will remain important going forward. Standard Bank were MLA on 4 round 1 BESS projects reaching financial close in 2024.



NEW CAPACITY ADDITIONS (IN MW)

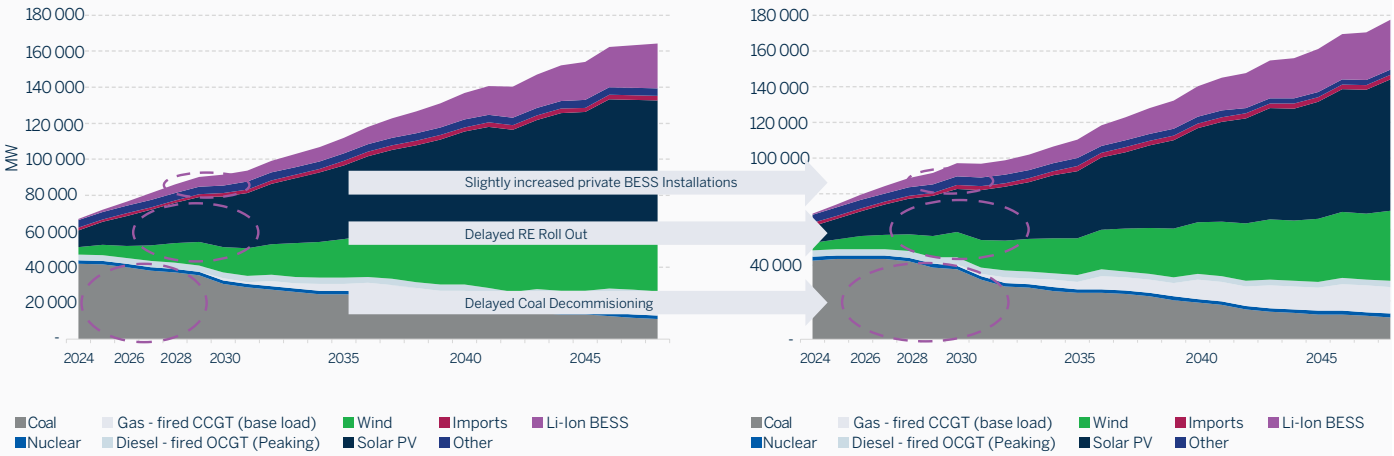


INSTALLED CAPACITY PER TECHNOLOGY (IN MW)-MAY 2024 VIEW

Total Net Installed Capacity per Technology (incl. Peaking)

INSTALLED CAPACITY PER TECHNOLOGY (IN MW)-DEC 2024 VIEW

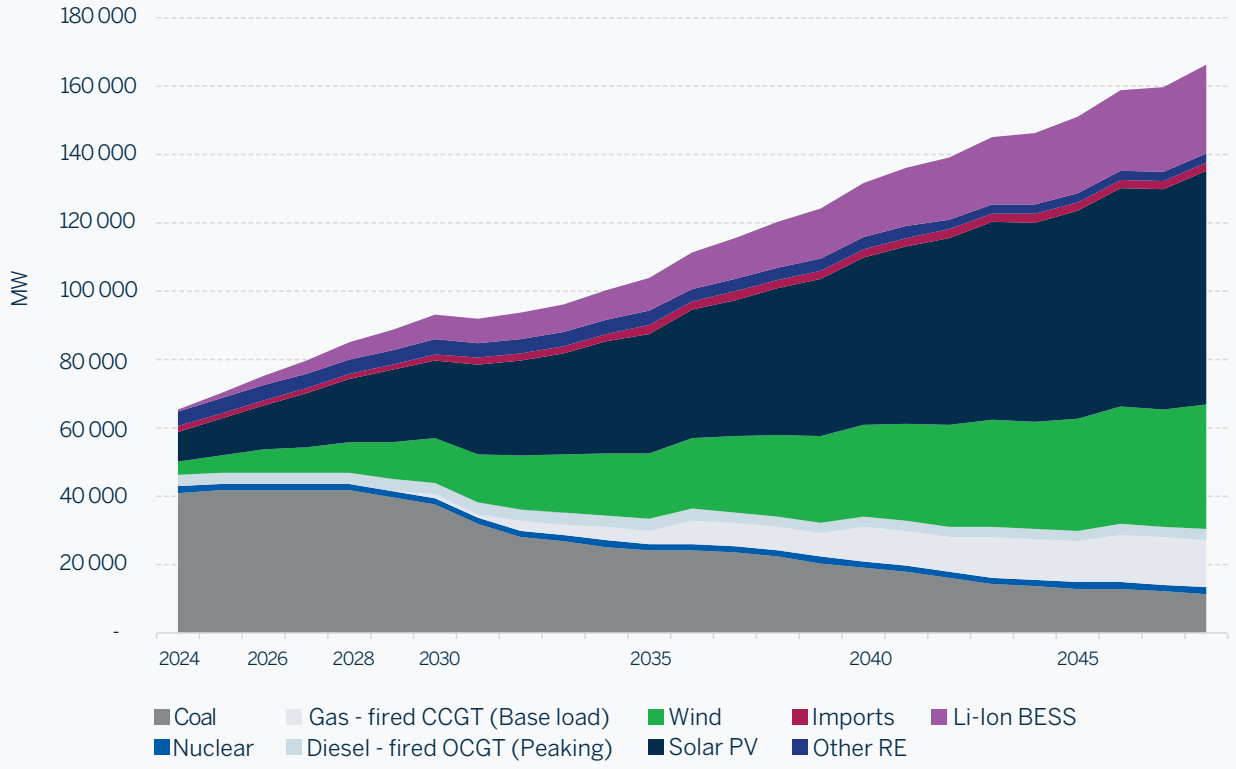
Total Net Installed Capacity per Technology



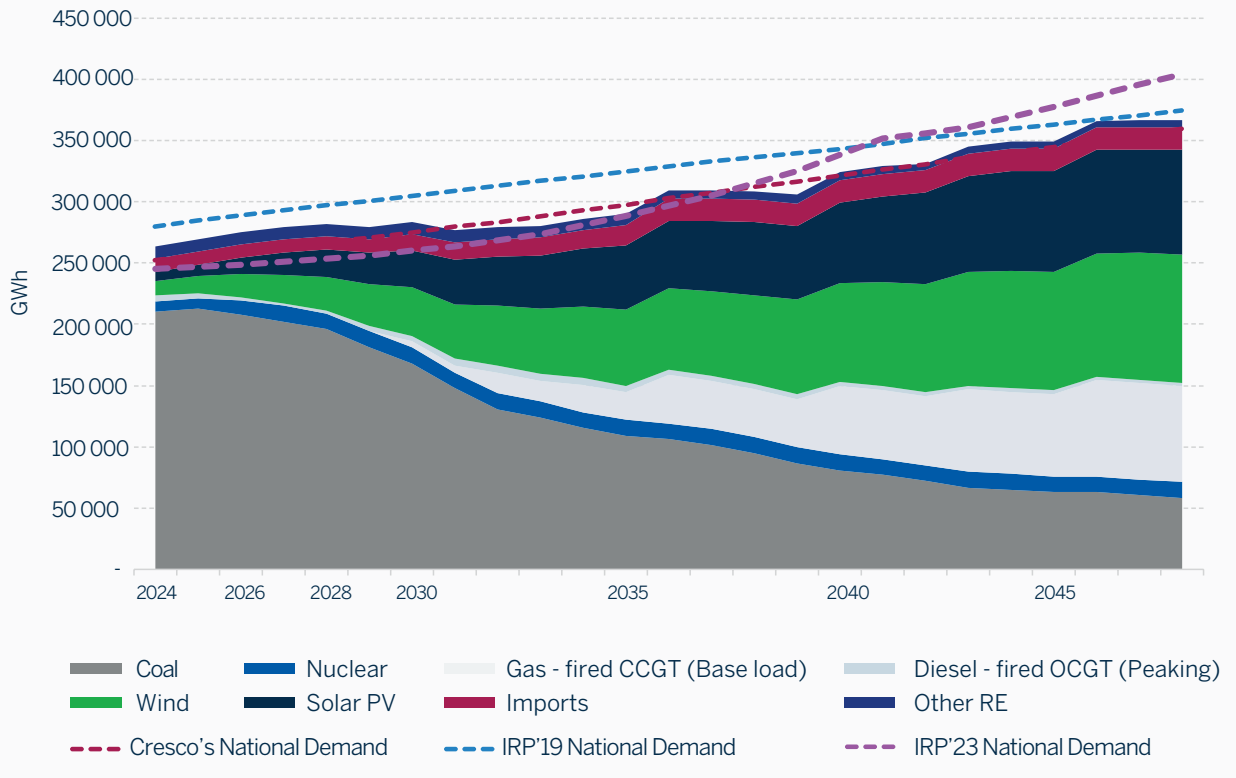
Source: Cresco's National Energy Balance Model

UPDATED ENERGY MARKETING PROJECTIONS.

TOTAL NET INSTALLED CAPACITY PER TECHNOLOGY



GROSS NATIONAL GENERATION PER TECHNOLOGY



Source: Cresco's National Energy Balance Model

ENERGY MIX EVOLUTION AND 24/7 CARBON-FREE **ENERGY CALCULATIONS**

"Cresco Group has developed a National Energy Balance model, which was used to create a forward-looking bottom-up assessment of the South Africa's national energy balance and the resulting Load Shedding (LS) outlook for South Africa," said Olga Suchkova, Senior Manager at Cresco Group.

As per the most recent IRP2024, the South Africa's energy mix is provisioned to rely on a combination of three technologies, that is, coal-fuelled (which is expected to remain albeit at reduced capacities), gas-fuelled (which is challenged by lack of local gas fields in advance stage of their development and limited gas infrastructure), and RE generation (which is to be combined with storage to ensure its dispatchability and efficient utilisation). Furthermore, to ensure grid reliability and resilience, presence of traditional base load technologies is required. Those normally include a combination of coal-fuelled, gas-fuelled, geothermal, hydroelectric, and/or nuclear power plants.

"The importance of a flexible power system combined with an objective to achieve a least cost value proposition will remain important in the context of South Africa. To date, access to storage technologies, gas and nuclear options remain a concern, with limited development, many due to slow implementation of policy enablers and investment case to enable the relevant infrastructure development (for example, gas)." Rentia van Tonder, Head of Power, Standard Bank.

Cresco also sees the implementation of the multi market model ("SAWEM") as driving visibility and direct demand from the market operator for ancillary services – primarily through BESS or dispatchable technologies.

The importance of timeous roll out of BESS solutions, through the government procurement program or private projects including renewables will remain important going forward. Standard Bank were MLA on 4 round 1 BESS projects reaching financial close in 2024.

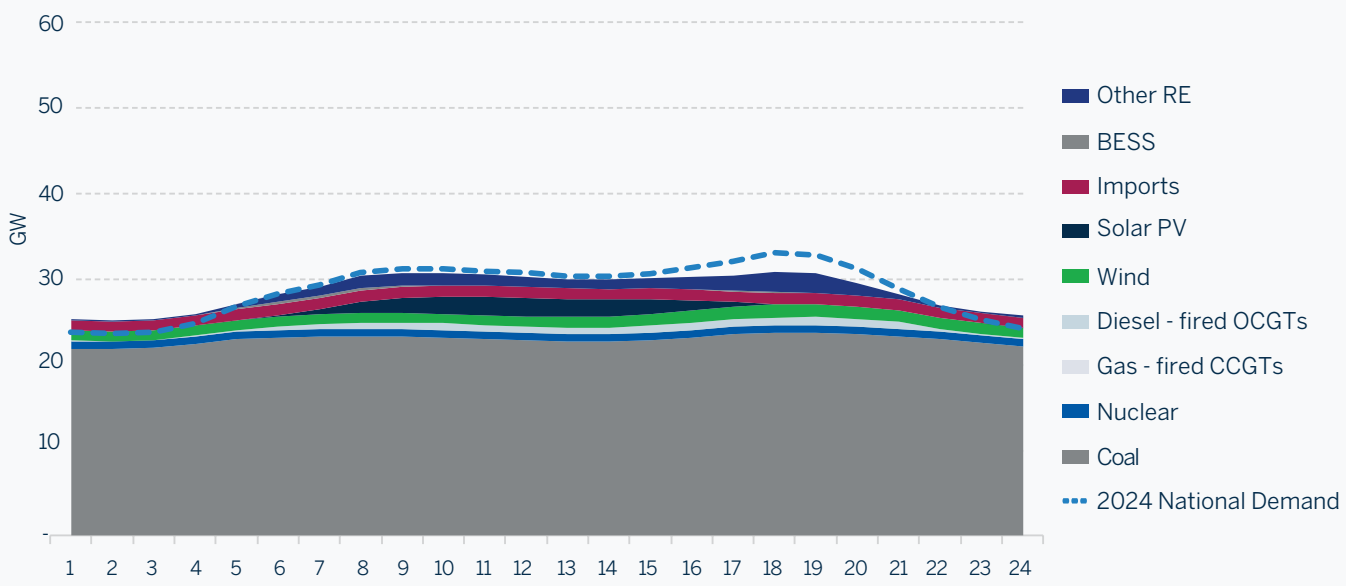
"Increase RE penetration need to be managed through an integrated smart power system to support system optimisation and efficiency. The Importance of BESS in the context of increased renewables. couldn't be emphasised more and should be a key priority." – Rentia van Tonder, Head of Power, Standard Bank.

The rest of this report focuses on the results of the base case analysis. Specific focus is made on a typical 24-hour day and the related 24-hour CFE or RE penetration graph.

24-HOUR DAY DISTRIBUTION **OF 2024 ENERGY**

To illustrate what these projected developments mean, let us look at the 24-hour day distribution of energy in 2024 on an average day, in an average city in South Africa.

2024 NATIONAL ENERGY BALANCE

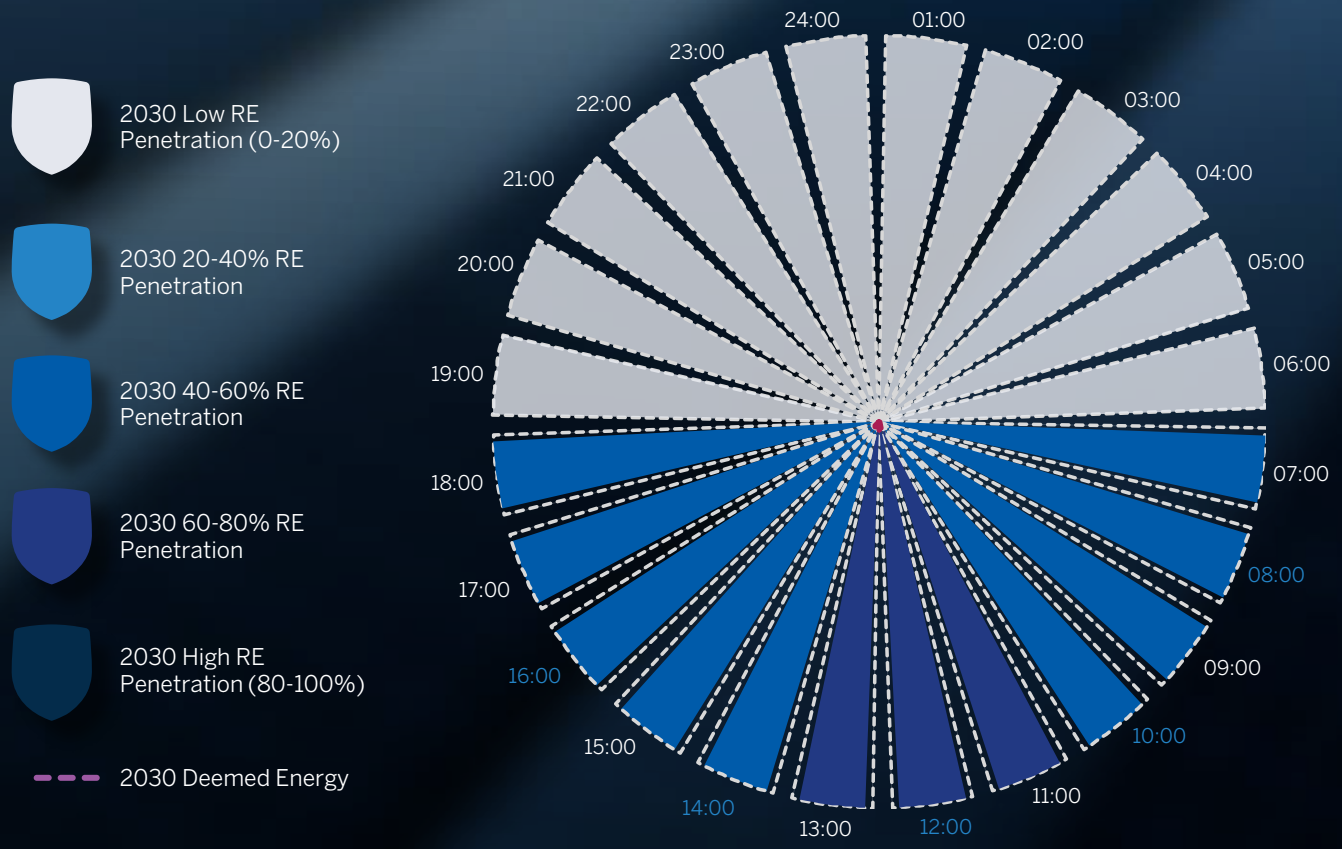


The current South African energy mix is driven by coal generation. The 2024 average EAF of Eskom's coal fleet was assumed at a level of 59%, which reflects the recent notable improvements in Eskom generation performance. Imports and diesel-fuelled generation were assumed to be balancing the demand during peak hours, as the percentage supplied by RE is still small.

The result is demonstrated in the graph by the dotted red line for 2024 national demand, which outstrips availability only in certain evening peak hours. The national deficit remains manageable in those evening peak hours (of around 2GW), which can be tackled by demand response.

Note: Cresco has used the current Eskom hourly demand actuals as reported on the Eskom interactive website to estimate the demand curve in an average day. This is also aligned with the Eskom MYPD application to change the time of use tariffs for peak periods.

2024 RE PENETRATION

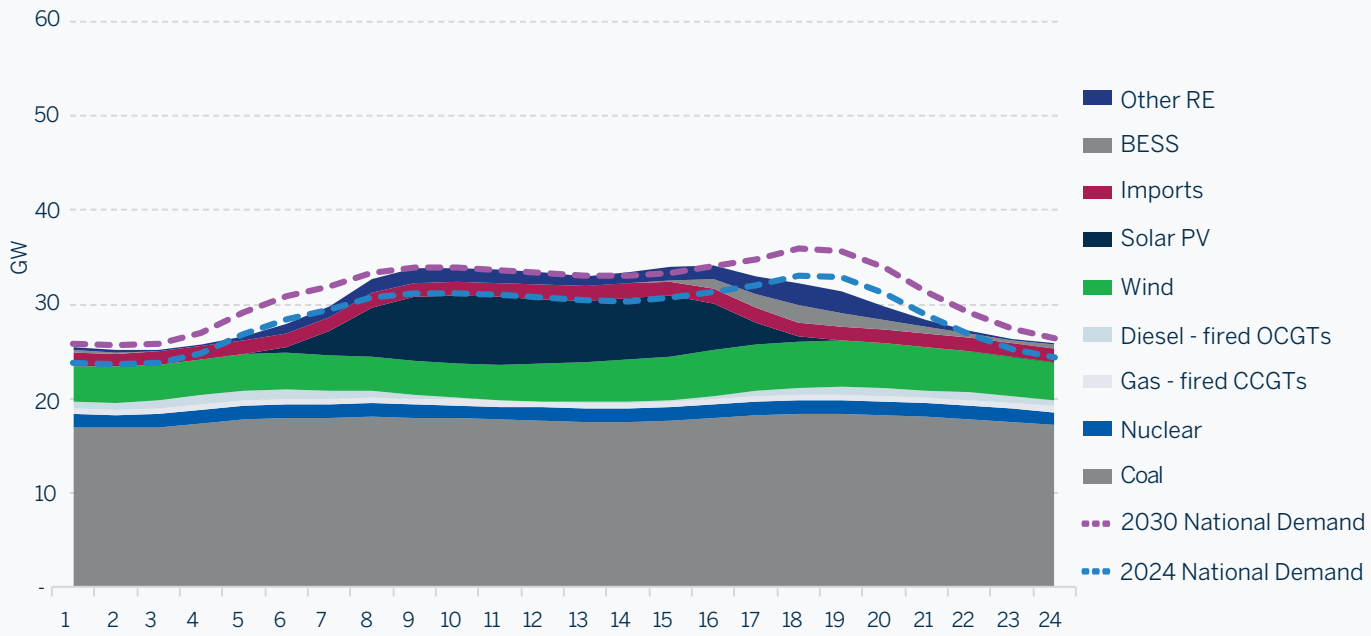


Looking at the same period, RE penetration is forecast to equal 8% (averaged over a year), with maximum RE penetration reaching 14% during the PV afternoon hours thanks mostly to existing REIPPPP. These trends are mostly impacted by implementation of new projects to address specific needs towards efficiency and less reliance on grid supply through a general shift towards cost-effective power solutions according to Standard Bank's client feedback.

24-HOUR DAY DISTRIBUTION **OF 2030 ENERGY**

Renewable energy generation is set to increase to 80 TWh (Terawatt Hours) – 30% of total generation – by 2030. Taking into account the increased demand projected for 2030 and the inevitable loss of productivity of Eskom's older coal plants coupled with delayed gas capacity additions, the 2030 balance for an average 24-hour day looks more challenged with deficits not only in the evening but also in the early morning.

2030 NATIONAL ENERGY BALANCE



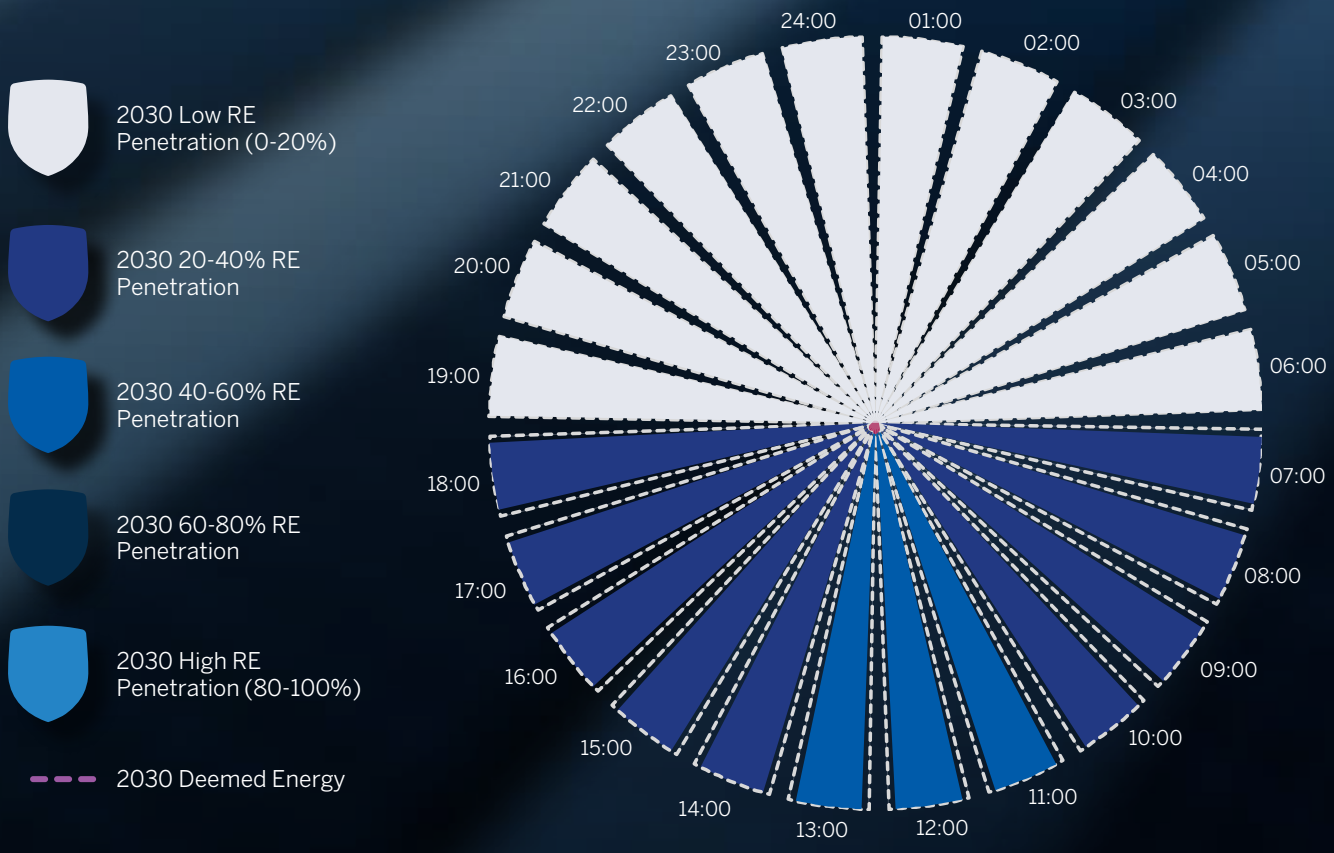
As per the Cresco's base case assumptions, circa 4GW of Eskom's coal-powered generation will become unavailable (either due to unplanned breakdowns or due to planned decommissioning), decreasing coal's generation share to 60% (from 80% in 2024).

RE generation is to increase by 23GW by 2030 (vs 2024), bringing its share to 28% (vs 11% in 2024). RE capacity additions are driven both by government and private procurement along with increased embedded generation.

The dotted black line indicates that demand will still outstrip supply during peak morning and evening periods – meaning that deficit management will need to continue, at least during those hours. Considering that deficit might reach the level of as high as 4GW in any given hour, energy deficit management might take the form of demand response programme, load curtailment, and load shedding.

Excess energy is produced in the middle of the day, primarily from solar PV and as wind assets typically increase generation. That energy would be best utilised to meet morning and evening peak demand, using long-duration energy storage solutions.

2030 RE PENETRATION



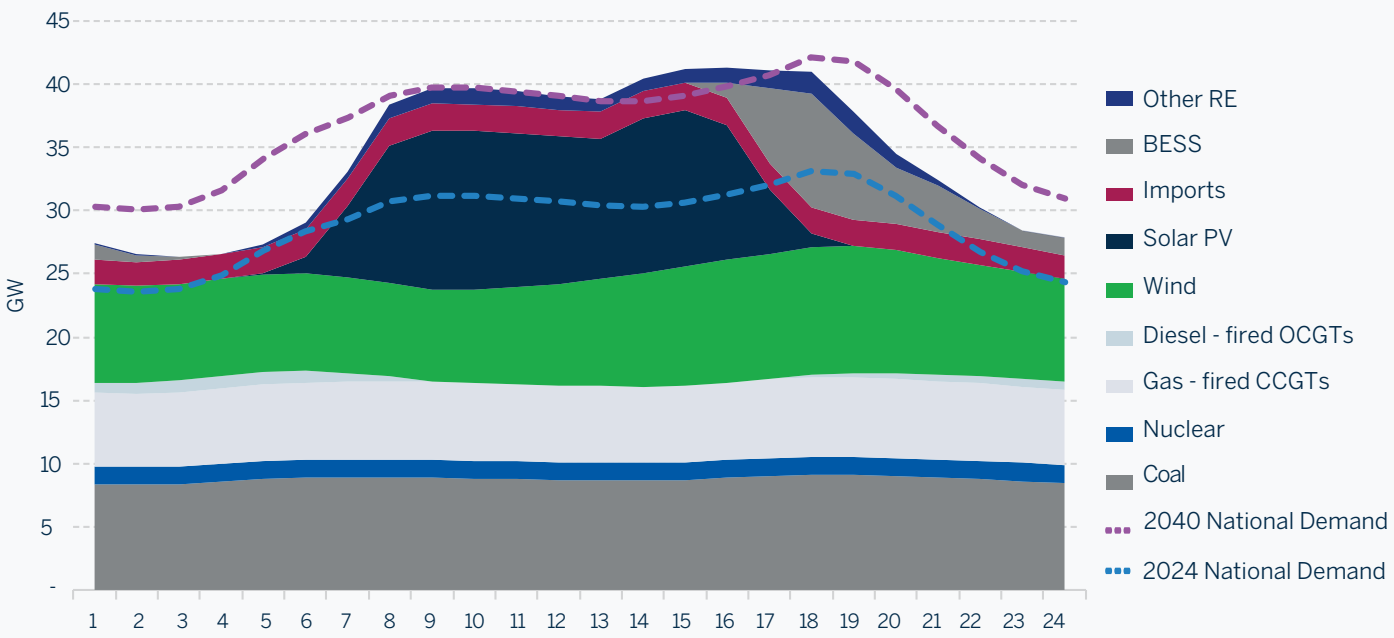
By 2030, RE penetration is forecast to equal 24% (averaged over a year). Maximum RE penetration reaches 47% during the afternoon hours, when both wind and PV are at maximum generation. This still leaves a significant requirement for balancing power from BESS and gas during evening hours.

More generally from a Standard Bank perspective we find our clients to be more educated towards their anticipated power needs and solutions with analysis like these assisting in unlocking additional solutions to promote growth. Sustainable power interventions with the ability to support growth across a 24/7 solutions beyond short-term solutions.

24-HOUR DAY DISTRIBUTION **OF 2040 ENERGY**

Taking into account the further projected RE progress by 2040, the mix leans heavily towards RE, but significant challenges remain.

2040 NATIONAL ENERGY BALANCE

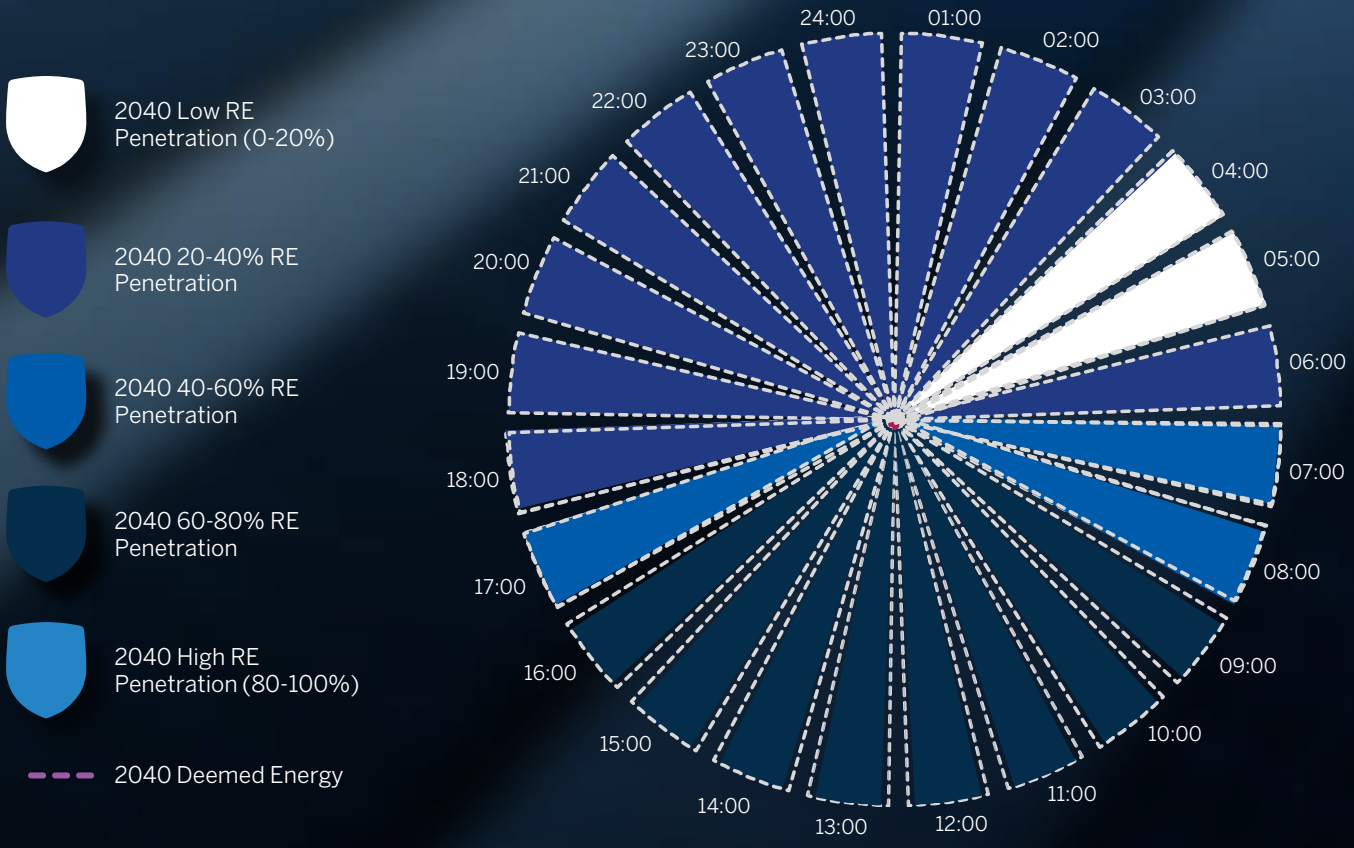


South Africa's 2040 energy mix is projected to be primarily driven by RE generation, in line with JET. In 2040 just five of Eskom's coal-fired power plants are expected to remain in operation (with two of those going through decommissioning). By that point, coal will represent only 25% of total energy annual generation, but that still leaves a significant reduction in fossil fuel reliance to achieve carbon neutrality by 2050.

Gas-fuelled generation capacity is projected to increase to 10GW by 2040. The Cresco projections note that peak-hour generation will still be insufficient to meet the 2040 demand, but will, ironically, be sufficient to meet 2024 demand, illustrating how far behind we are in today's terms from energy requirements.

There's a hope that larger-scale BESS will be able to be implemented at this stage, where bulk nickel or iron ore could lower the price of storage.

2040 RE PENETRATION



2040 RE penetration is projected to equal 41% (averaged over a year) with maximum RE penetration reaching 81% in the afternoon hours. Projected RE tariffs during midday hours could become low or negative, as seen in the EU, with the knock-on benefits.

The implementation of BESS as a key component of a holistic sector approach and client solution will remain important.

SA has proven viability through first procurement and bidding of BESS with Standard Bank leading on all awarded projects and proof points through first operational projects under RMIPPP commissioned late last year is essential after construction timelines.

CONCLUSION

Considering the looming risk of another energy crisis, which may materialise as soon as coal decommissioning is resumed, new capacity additions and RE implementation need to increase at a dramatic rate. There is no room for error in REIPPPP Bid Window 7, gas-fuelled generation capacity additions or delays in the private sector procurement.

The Just Energy Transition Partnership is a noble and essential effort, but total generation still needs to meet demand – both annually and also hourly, and as many as 28% of coal-fired power stations are still required to be part of the mix in 2040. Meeting the goal of carbon-neutrality in generation by 2050 seems challenging based on the projections – especially given the realities of getting projects into construction as experienced in South Africa at the moment. What exactly that means in terms of the country's obligations in terms of the $11.9 billion in concessional debt and grant funding allocated as part of the project is unclear.

Even with solar PV and wind projected to account for the majority of generation by 2040, there will still be a need to 'top up' with gas-fuelled, nuclear or other generation.

Large users in South Africa that are privately procuring energy sources could be forced to increase their generation capacity to meet their own needs and, potentially, to supplement national supply in the event of unforeseen circumstances like decreased Eskom EAF, RE supply chain challenges or REIPPPP integration challenges.

It is hard to measure the amount of embedded household solar PV capacity and its impact on the grid – and how that volume will change in the future. There is an awareness that it has lowered demand for Eskom, specifically during the day, but it has also added pressure on the system operator in terms of grid balancing. If the embedded market were to grow or if selling excess energy back into the grid became a reality, it could play a significant role in meeting national demand. Given the current drivers, Standard Bank is supporting its clients across various sectors and their intent to produce and feed back into the grid will support and optimise the value proposition in line with economies of scale.

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