Standard Bank
Corporate & Investment Banking

ENERGY MARKET PROJECTIONS

South Africa needs 2040's projected energy supply to meet 2024's current demand

SOUTH AFRICA'S CURRENT AND FUTURE ENERGY MARKET: **RISKS AND OPPORTUNITIES**

Underpinning the South African energy market – in 2024 and into the near future – is one of coal-fired plants trying to run efficiently to keep up with demand while private sector-led investments in solar and wind power enter the generation mix.

Robert Futter, Executive Director, Cresco Group
Vincenzia Leitich, Executive: Energy and Infrastructure, Standard Bank
Rentia van Tonder, Head of Power, Standard Bank

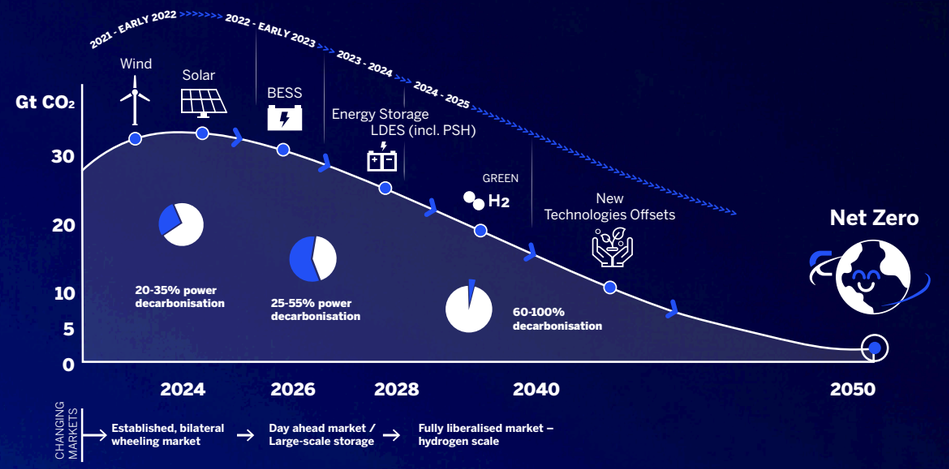
South Africa's privately procured energy market is currently planning to achieve a 20% to 35% decarbonisation target that will last until 2026 on the back of rapid increases in installation of utility-scale wind and solar photovoltaic (PV) generation. "From 2025 to 2030, power decarbonisation is projected to escalate above 50% as more solar photovoltaic and wind power is harnessed and Battery Energy Storage Systems (BESS) provide additional dispatch options during non-photovoltaic generation hours," said Robert Futter, Executive Director at financial advisory services firm Cresco Group.

"We anticipate that Green Hydrogen adoption will likely gain momentum closer to 2030 or beyond, rather than by 2025"

Rentia van Tonder, Head of Power, Standard Bank

Cresco provides transaction advisory services to large energy users to move towards net zero

Power sector decarbonisation technologies over time for Renewable Energy (RE) targets



Cresco's 5 points of view for 2024:

1. Large scale RE + BESS key viable vs. Eskom grid
2. SA Govt RFPs for gas to balance large-scale RE implementation
3. Over the counter energy trading – merge into Day Ahead market
4. Hydrogen feasibilities finalised – viable for diesel replacement
5. Implementation of Europe carbon adjustment mechanism to re-energise energy transition

Green Hydrogen generation is expected to enter the mix to increase energy diversity, but only post-2030. "Hydrogen to replace diesel generation could be viable before then," said Vincenzia Leitich, Executive: Energy and Infrastructure at Standard Bank, "but large electricity replacement is still in feasibility to be confirmed as fundable."

"Initially, Green Hydrogen's primary applications may not be for electricity generation but rather for export purposes or in industrial applications, potentially for fuel cells," said Rentia van Tonder, Head of Power at Standard Bank.

Gas has the potential to bolster a diversified energy mix in alignment with government priorities. Additionally, the procurement of transmission infrastructure could be further developed or funded by the private sector, which will be critical in driving new power generation."

From 2040 to 2050, power decarbonisation is forecast to rise from 60% to 100% thanks to new technology offsets, on the path to net zero in 2050.

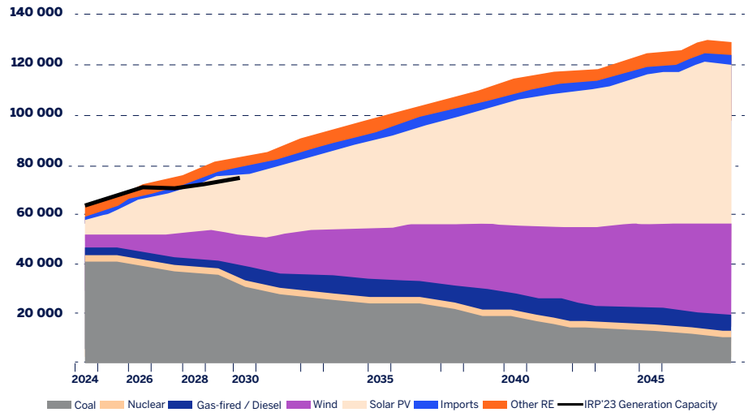
"As South Africa's energy market liberalises and the demand for balancing services increases, the focus of private procurement will shift towards longer-duration Battery Energy Storage Systems," said Futter. "With further development of hydrogen-related technologies and infrastructure and the emergence of new carbon-neutral technologies, higher levels of carbon neutrality can be targeted by all users of power."

2024–2040 ENERGY MARKET FORECAST

Cresco's market assessment indicates that solar photovoltaic and wind-installed capacity will increase from 10GW in 2024 to 37GW by 2030 and 77GW by 2040. This includes embedded solar photovoltaic and excludes previously commissioned Renewable Independent Power Producer Programme (REIPPP) projects.

Generation Capacity per Technology (in MWs)

Total Net Installed Capacity per Technology
(incl. peaking in MWs)



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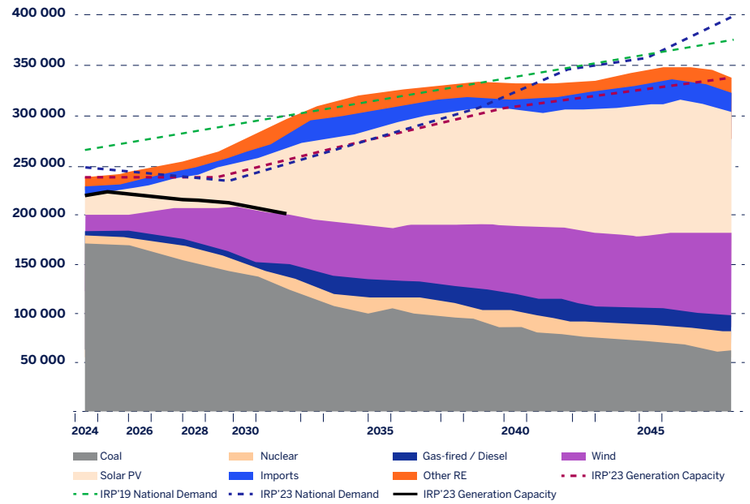
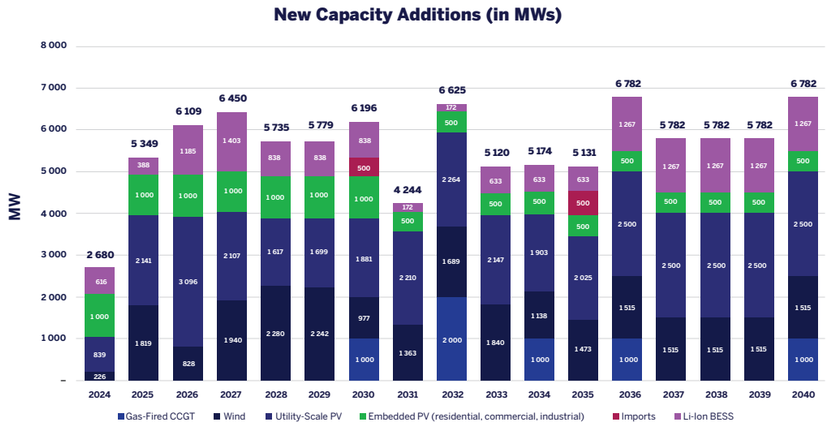
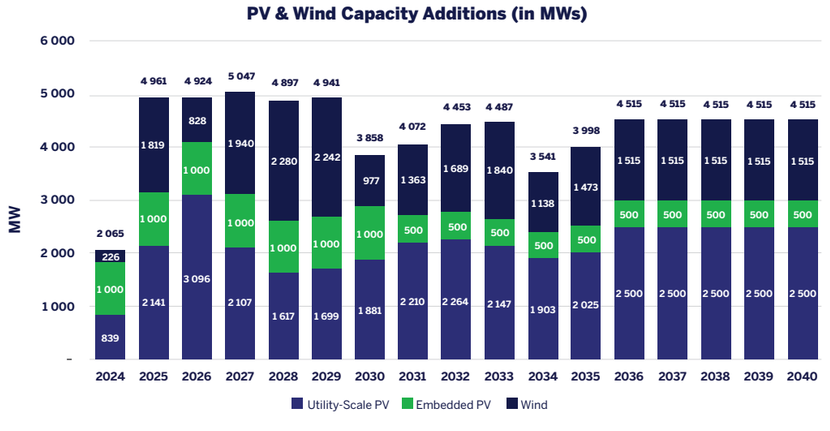


Solar photovoltaic and wind-installed capacity will increase over the next 20 years. Coal capacity, meanwhile, will decrease to 18GW by 2040. Cresco has used the decommissioning plan as presented in the Just Energy Transition Partnership agreement in this analysis. (Cresco notes that this decommissioning plan is under review. However, even with an optimistic delay, shortages in energy are still projected.)

Renewable energy generation is set to increase to 97 TWh (30% of total generation) by 2030 and to 179 TWh (50% of total generation) by 2040. "Unfortunately, demand will continue to outstrip supply even if the conservative 2023 Integrated Resource Plan (IRP) demand projections are realised," said Futter. "If the 2019 Integrated Resource Plan electricity-demand projections were to be achieved – which would support a growing economy and higher Gross Domestic Product (GDP) – there would still be significant energy shortages."

The bulk of the capacity additions will be driven by the addition of new solar photovoltaic and wind capacity coming online (both utility-scale and a large proportion of rooftop or behind-the-meter solutions). The graph below illustrates potential additional generation technologies procured both by Government and private sector up to 2030.





"In the next two to three years, the bulk of energy will be provided by government-procured projects, which started construction a few years ago, along with private sector projects which achieved financial close in recent months," said Futter.

In mapping solar photovoltaic and wind-capacity increases, Cresco's model assumes that the proportion of solar photovoltaic capacity in South Africa's energy mix is slightly higher than that of wind – based on our database of projects, which indicate a larger number of developed utility-scale solar photovoltaic projects. "In addition, rooftop or embedded capacity additions have grown exponentially in recent periods, which is likely understated in our analysis due to lack of data for this generation category," said Futter.

Standard Bank's own research confirms increased capacity and execution from renewables, mainly driven by a combination of solar photovoltaic utility-scale and embedded generation, including wheeled power. "Clients have adopted a greener and more cost-effective approach to address power needs with enhanced delivery and flexibility to drive implementation," said van Tonder.

"There is a projected slowdown in new capacity additions in 2030 and 2034 which is provisionally related to grid constraints linked to Eskom's Transmission Development Plan," said Futter.

"For many years, both private buyers and sellers of power have been waiting for the National Energy Regulator of South Africa (NERSA) gate to be unlocked," he added. "This happened with regulation changes, and we have seen an influx of renewable energy generation projects achieving financial close and increased focus on the development of renewable energy (RE) projects through the permitting phases. We've seen some level of optimisation and standardisation of decentralised power projects from a bankability view, with finance terms, risk allocation and acceptance becoming more optimal/standardised in driving execution."

Many Independent Power Producers (IPPs) and larger energy users are considering potential, the impact of large-scale Battery Energy Storage Systems, changes to generation tariffs, grid emission factors on a 24/7 basis and potential impact of the Day Ahead Market, building on the initial analysis above by Cresco.

BILATERAL TO AGGREGATOR TO **TRADER**

The development of the decentralised power market is currently driven by large energy-intensive users procuring power through processes including bilateral long-term Power Purchase Agreements (PPAs), as well as small-scale embedded generation. There is a need to unlock flexibility for off-takers and industry through new ideas and a model that allows shorter-term commitments and access to a combination of technologies through cost-efficient tariffs.

With the amendments to the Electricity Regulations Act (planned enactment by mid-2024) and the move towards private power, the opportunity for power aggregators has emerged.

"Previously, smaller power users were excluded from procuring private power through utility-scale, expensive Request for Proposals (RFPs)," van Tonder explained. "However, power aggregators now allow smaller-scale electricity users or users with limited 'balance sheet capacity' to underpin long-term Power Purchase Agreements to access private power without launching their own Request for Proposals."

Power aggregators source renewable energy from various generation assets (either through owning the generation asset themselves or procuring power from an Independent Power Producer) – in South Africa, largely only wind and solar – and sell it to multiple off-takers. Standard Bank has been mandated for four major aggregator projects in the market, with the majority targeting financial closure in the third or fourth quarter of 2024.

"The presence of power aggregators in the market may create a mismatch of Power Purchase Agreement tenor between the Independent Power Producer, the aggregator and their off-takers, as the tenors may vary," Leitich warned. "This requires funders to consider off-takers differently, as there will be a portfolio of off-takers purchasing power from a project. Initially, lenders may need to assess the aggregator's ability to deliver, and there may be a need to look at the ultimate off-takers for proof of concept. As the aggregator model develops, this may become less necessary."

When an off-taker procures renewable energy through an aggregator, there are added benefits such as flexibility in the Power Purchase Agreement, including terms, tariffs, security commitments and faster execution. "A significant move in the industry would be for Independent Power Producers or aggregators to sell renewable energy on a time-of-use basis, similar to what loads pay Eskom," said van Tonder. Seasonal tariffs may also be considered.

"On recent Requests for Proposals for private buyers, we are seeing Independent Power Producers starting to consider different tariff structures to align with buyers'needs, which is further developing the market," said Futter.

"Furthermore, since the aggregator sources renewable energy from different sources, there is an increased ability to match the energy demand of the off-taker more effectively compared to relying on a single renewable energy source as well as manage any potential curtailment risk," said Leitich. "However, it is important to note that this model relies on the power being transmitted through the grid and does not address the issue of load shedding. Solutions are needed to enable transmission across municipal and metro distribution networks.

"Additionally, investment in grid infrastructure is necessary to ensure that renewable energy projects in areas with limited grid capacity can connect and transmit power effectively."

ENERGY GENERATION **SHORTFALL**

"Given the way generation is projected to only meet 2024's demand by 2040, renewable energy implementation needs to increase at a dramatic rate," said Futter.

"There is no room for error in Renewable Independent Power Producer Programme Bid Window 7 or delays in the private sector procurement – or the Commercial Operation Date of projects which have been approved during current and past bid windows will not be achieved. This results in shortfalls in total generation, and not only in certain 24/7 time periods.

"The Just Energy Transition Partnership is a noble and essential effort," he added, "but total generation still needs to meet demand – both annually and on a 24/7 daily or 8 760 annual hourly basis.

"As many as 27% 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. Quite what 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 photovoltaic and wind projected to account for most MWh generation by 2040, there will still be a need to top up with hydroelectric power or other generation to allow for a 24/7 carbon-free system.

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 Energy Availability Factor, renewable energy supply chain challenges or Renewable Independent Power Producer Programme integration challenges.

"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."

Robert Futter, Executive Director, Cresco Group

"It's hard to measure the amount of embedded household solar photovoltaic capacity and its impact on the grid – and how that volume will change in the future," said Futter. "There is an awareness that it has lowered demand on Eskom, specifically during the day, but also added pressure on the grid when solar photovoltaic generation reduces in the early evening. If the embedded market were to grow or if selling excess energy back into the grid became a reality, it would continue to play a significant role in meeting national demand."

Given the current drivers, Standard Bank will support and optimise the value proposition in line with economies of scale by supporting its clients across various sectors and their intent to produce and feed back into the grid.