

A clean COVID-19 recovery: South Africa

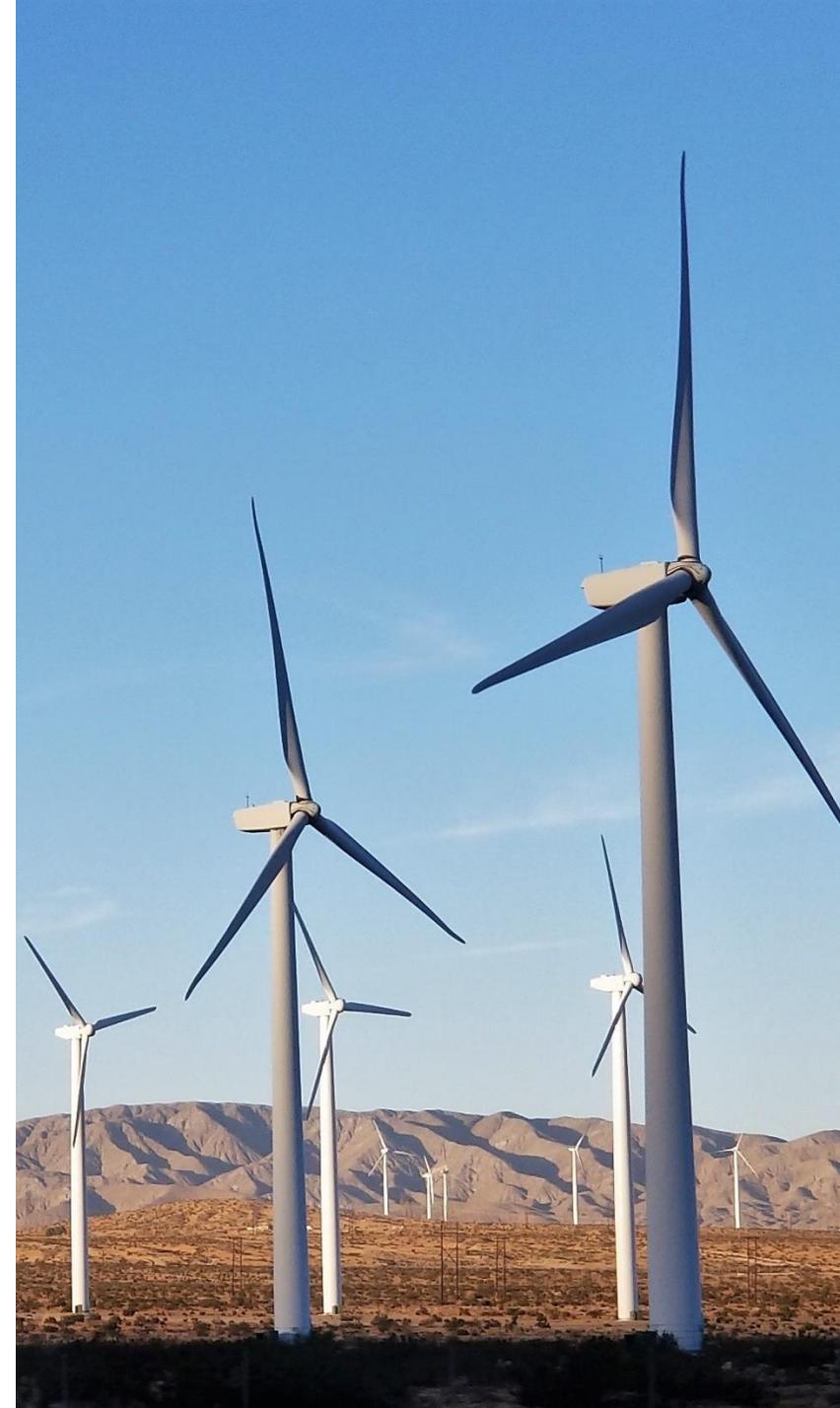
184 projects for a green recovery and resilience plan for South Africa

May 2021

Prepared by EY-Parthenon,
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- ▶ Scale of the opportunity
- ▶ Key policy recommendations
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South Africa has a unique opportunity to make a step-change on climate change mitigation and job creation through a green, post-COVID-19 economic recovery

1 The current pipeline of renewable energy, storage, transmission and distribution projects in South Africa has the potential to create 155,000 jobs, kick-starting a 'just' economic recovery and transition

- ▶ The visible pipeline has the potential to create 102,000 local jobs in construction, installation, operation and maintenance, and another 53,000 jobs in the supply chain.
- ▶ Beyond this, there is significant potential from small-scale and off-grid local projects.
- ▶ The scale of the recovery could help South Africa make substantial progress towards addressing structural employment challenges and achieving its NDP¹ 2030 ambitions by kick-starting employment growth in renewable energy.

2 Realising the pipeline of generation and grid projects will enable South Africa to substantially improve its energy security

- ▶ Deploying the available pipeline of renewable energy projects will enable South Africa to increase its total generation capacity by ca. 18%, substantially increasing the availability of reliable electricity and improving energy security.
- ▶ Increasing electricity production with renewables will also contribute to reducing energy costs, tariffs for end consumers and production costs for Eskom.

3 A green recovery can be executed with limited government funding, by unlocking private investment in renewable energy through supportive policy

- ▶ There is abundant capital available in the private sector and high appetite for investing in renewables, but additional policy measures are needed to unlock the full potential of private investment.
- ▶ Infrastructure upgrades are also required - in particular, increasing the capacity of transmission links connecting the Northern Cape region with major metropolitan areas is critical to unlocking the highest renewables resources.

4 Enabling the large existing pipeline of solar and wind will also help South Africa reduce emissions and meet climate goals

- ▶ Beyond the direct impact of decarbonising the power sector, a green recovery focused on renewable energy lays the foundation for decarbonising the broader economy.

We have identified a 10.3GW pipeline of 184 'shovel ready' projects that will support South Africa in improving its energy security whilst presenting a green recovery opportunity. Of 94 generation projects, 53 fall within the announced 100MW licencing exemption threshold.

There is a sufficient project pipeline to contribute significantly to South Africa's renewable energy and climate agenda and support the economy as a whole



184 projects in the pipeline



155,000 potential jobs



US\$37bn investment opportunity



US\$600mn recurring GDP impact



10GW of renewable generation capacity



40 Metric tons of carbon dioxide equivalent (MtCO₂e) avoided

The projects identified will require more than US\$37bn of private and public investment, and have the potential to support more than 155,000 jobs

- ▶ The low-carbon projects identified may make a major contribution to a green economic recovery in South Africa, and job creation would help kick-start employment growth post-COVID-19.
- ▶ The majority of jobs will require a low-to-medium skill level, and can facilitate upskilling through on-the-job learning.

The visible pipeline of projects has the potential to unlock positive environmental value and contribute significantly to South Africa's renewable energy and climate targets

- ▶ The deployment of the identified projects will contribute positively to progress towards the achievement of South Africa's ambition to be net zero by 2050.
- ▶ The project pipeline is estimated to contribute a reductions in CO₂ emissions of 40 MtCO₂e per year - this represents a 9% reduction in South Africa's total emissions.
- ▶ Additional benefits include improved air quality and health outcomes, as well as improved gender equality - a 2019 International Renewable Energy Agency (IRENA) report found that representation of women is 10% better in the renewables sector compared with traditional energy industries.

South Africa has several policy levers that can be pulled to unlock the potential in the visible renewable energy pipeline and accelerate broader renewables investment

- ① Increase size of allocation in future procurement rounds and ensure consistency in the timing of the REI4P bidding rounds; implement binding off-taker contracts to create greater certainty for developers and return confidence to the market

- ② Strengthen local supply chains: in particular, manufacturing capability for wind generation

- ③ Streamline the permitting process for smaller projects, including lifting the licensing threshold for distributed-generation projects from 1MW to 100MW and allowing for the wheeling of excess electricity, as announced by the President in June 2021.

- ④ Strengthen corporation with international finance institutions, such as the World Bank and European Bank for Reconstruction and Development (EBRD), to support guarantees as necessary for Eskom's off-taker agreements and increase investor confidence

- ⑤ Invest in expanding grid infrastructure to large-scale parks in the Northern Cape, and in upgrading existing grid infrastructure that is under pressure

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The green recovery is a once-in-a-generation opportunity to unlock South Africa's potential for sustainable job creation, economic growth and equitability.



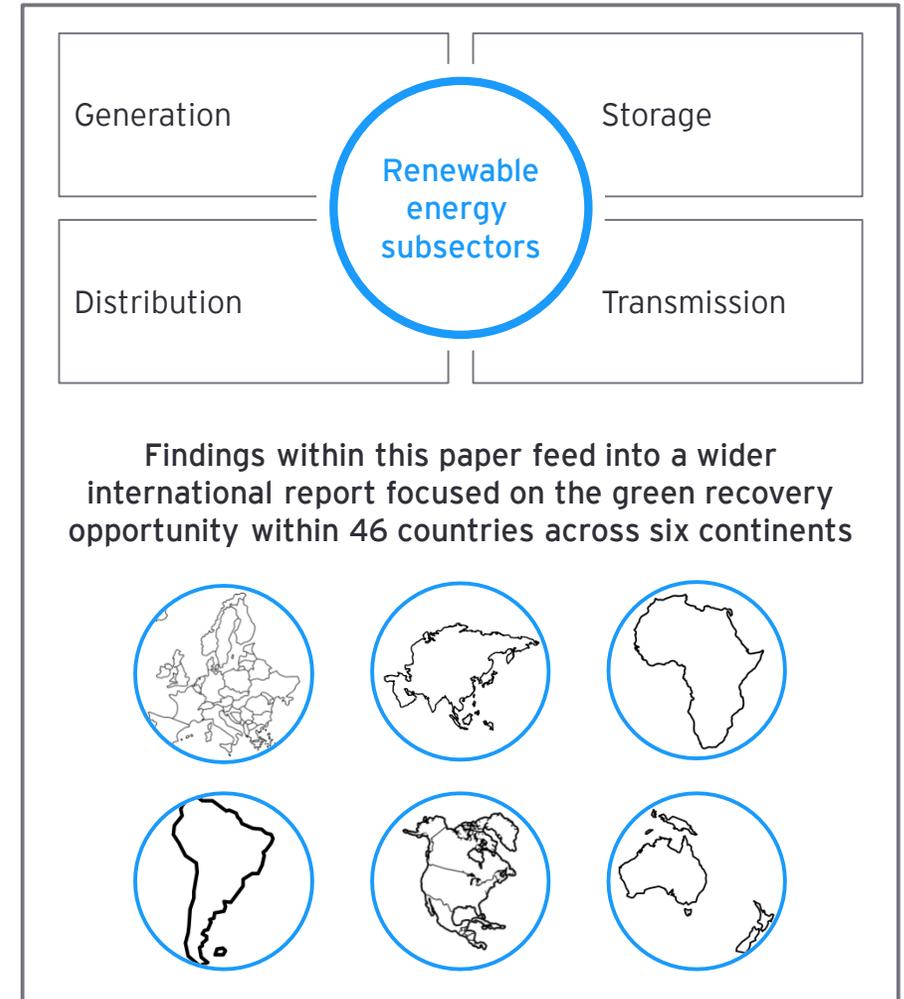
This report is focused on shovel-ready renewable energy projects within South Africa, and the key enablers and policy actions that will help fulfil the pipeline

The objective of this report is to support the development of green recovery plans by providing an overview of shovel-ready investment opportunities

- ▶ EY teams have identified projects that can support jobs in the short term and contribute to the South Africa's renewable energy and climate objectives. Projects were researched within four subsectors of renewable energy (generation, storage, transmission and distribution) primarily using secondary research (e.g., databases), and supplemented through interviews with seven local stakeholders (including project developers, investors, public organisations and academics)
- ▶ The 184 shovel-ready opportunities all have the potential to create environmental, economic and social value in the coming years. These opportunities are real, requiring some stimulus in order to be realised (which could be additional financing or overcoming other barriers)

The projects identified represent a subset of the green projects under development in South Africa

- ▶ This list of projects uncovered has been collated over a short timeframe, prior to the announcement by the President regarding the increase of the embedded generation licence exemption. It illustrates an initial view of the size of the project pipeline that exists within South Africa to underpin a green and resilient recovery from the COVID-19 economic crisis
- ▶ The list can only be seen as a subset of all projects with climate benefits under development in South Africa at various levels of maturity, as we have primarily focused on short-term opportunities, i.e., projects that will reach financial close in the next 24 months
- ▶ Furthermore, we have also only focused on renewable energy and not other forms of green projects such as electric vehicles or energy efficiency solutions



Agenda

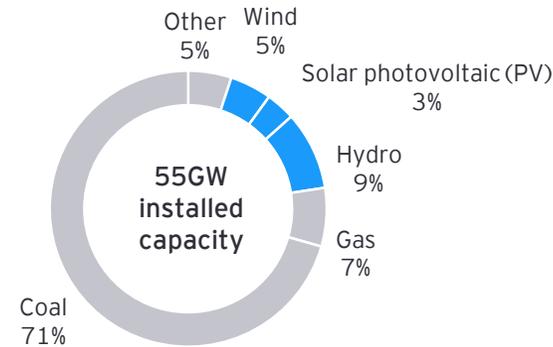
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The visible pipeline of renewable energy projects in South Africa contains 184 projects

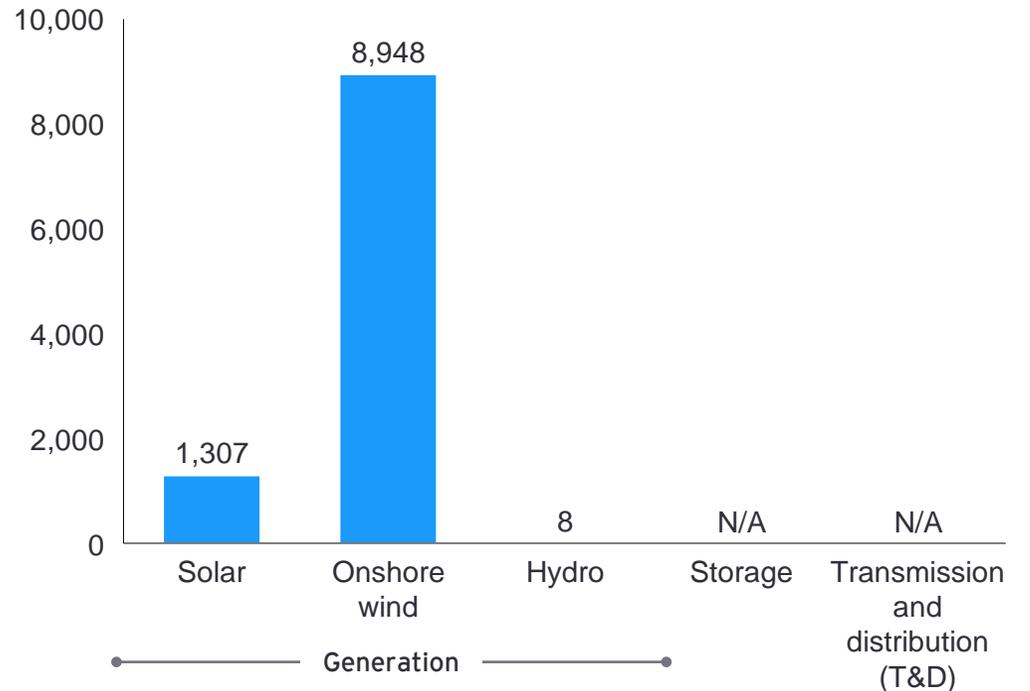
Country overview

GDP	US\$301bn
Population	59mn
GDP per capita	US\$5,065
Electricity consumption per capita	4.0MWh
Emissions per capita	7.4 tCO2
Unemployment	29.2%



Breakdown of the 184 projects identified by sub-sector

Total capacity (MW)



No. Projects	37	55	2	11	79

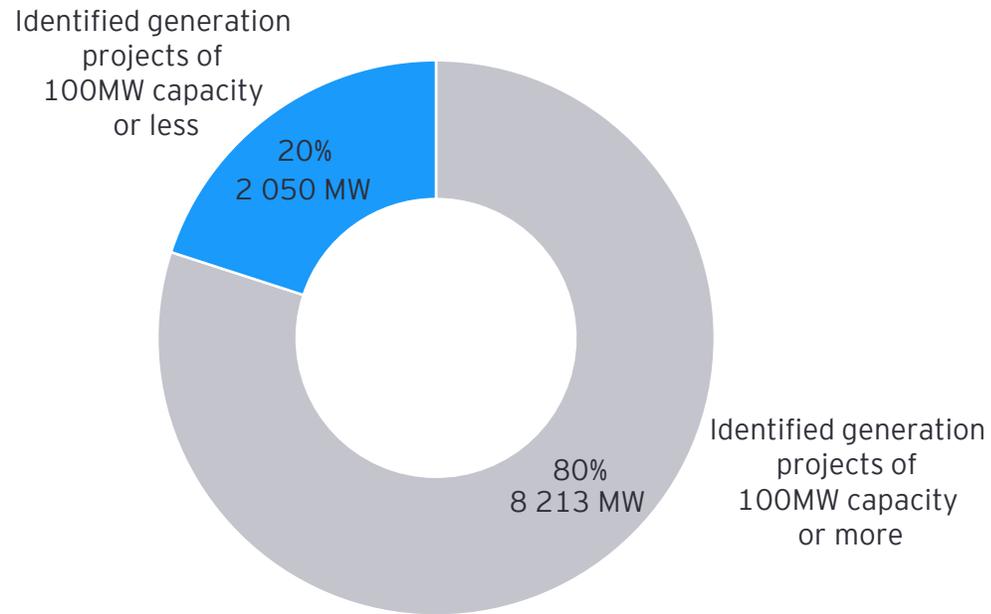
Key targets

- Net zero** emissions by 2050
- 17.8GW** renewable energy capacity by 2030
- 35GW** decommissioned coal generation capacity by 2050

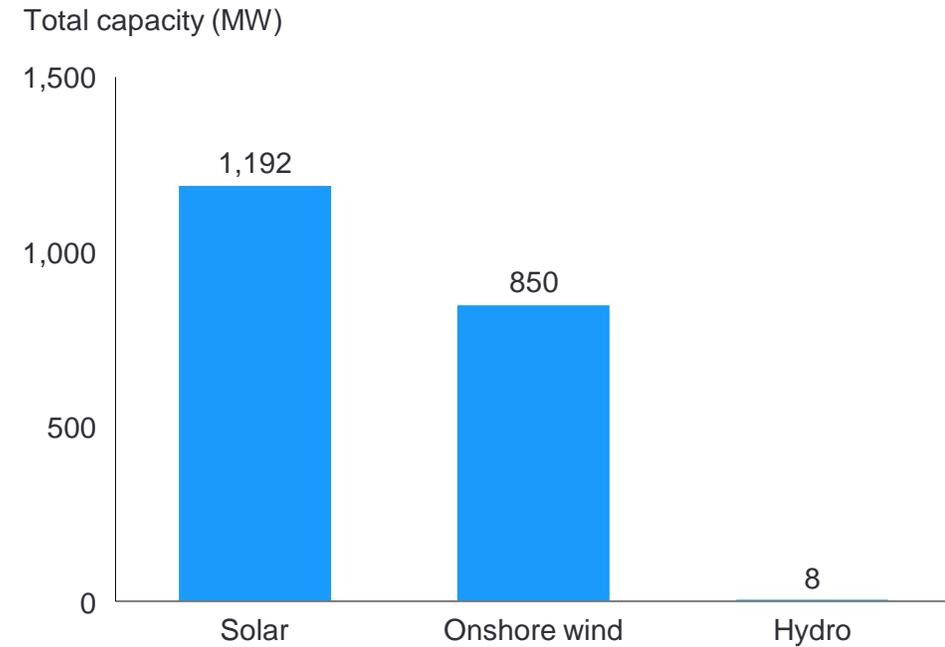
Scale of the opportunity

Out of the 94 generation projects identified, 53 fall within the 100MW threshold for license exemption

Breakdown of the 94 generation projects according to 100MW threshold



Breakdown of generation projects below 100MW threshold, by sector

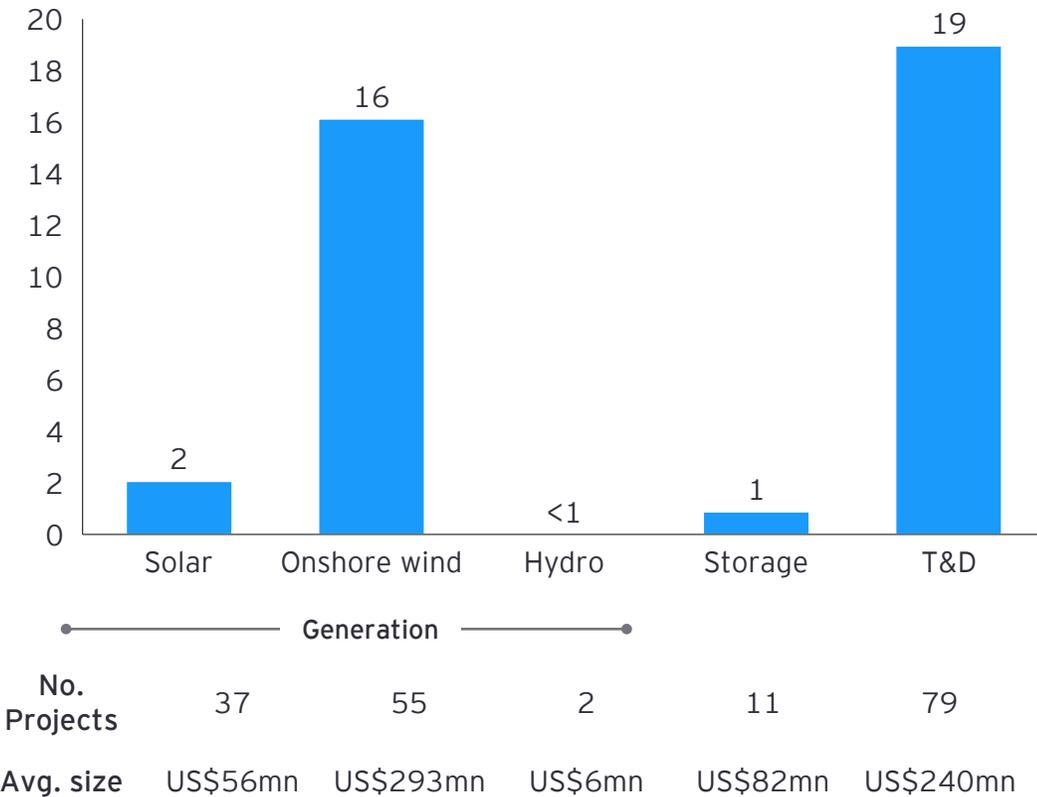


Scale of the opportunity

The visible renewable energy pipeline for South Africa represents a US\$37bn investment opportunity, the vast majority of which can come from the private sector

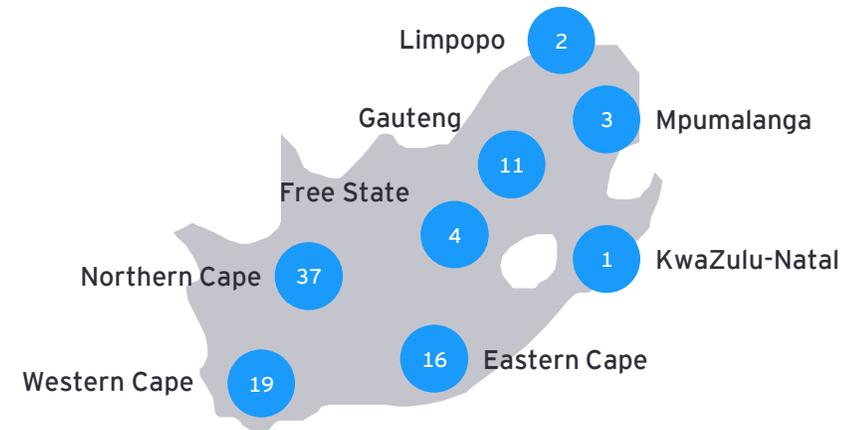
Breakdown of the potential investment need for 184 projects (US\$bn)

Investment opportunity (US\$bn)



Breakdown of the 94 generation projects by region (units, projects)

Note: additional 11 storage and 79 T&D projects are unspecified on map



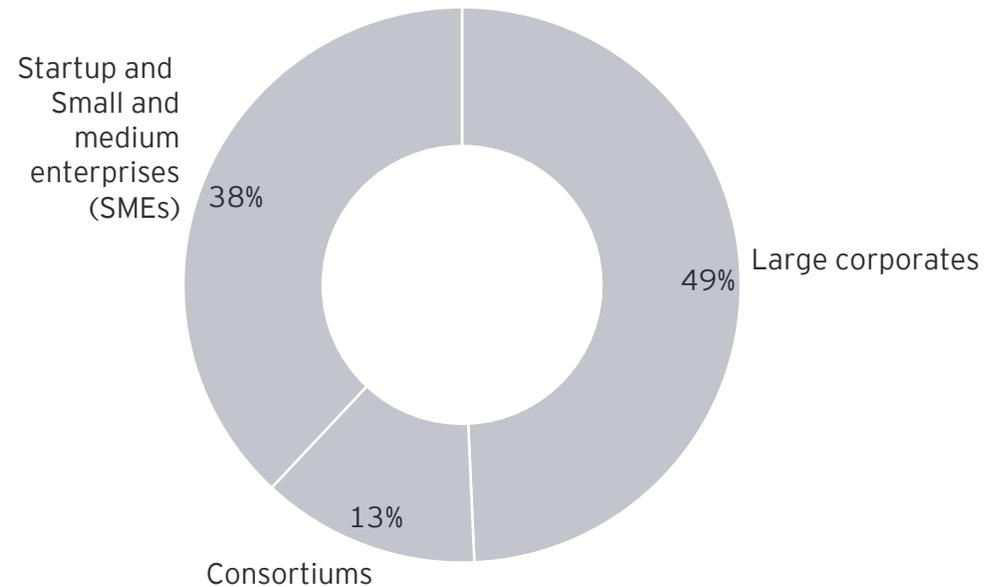
Breakdown of generation projects in top three regions:

Region	Solar	Onshore wind	Hydro
Northern Cape	25	12	-
Western Cape	18	1	-
Eastern Cape	12	4	-

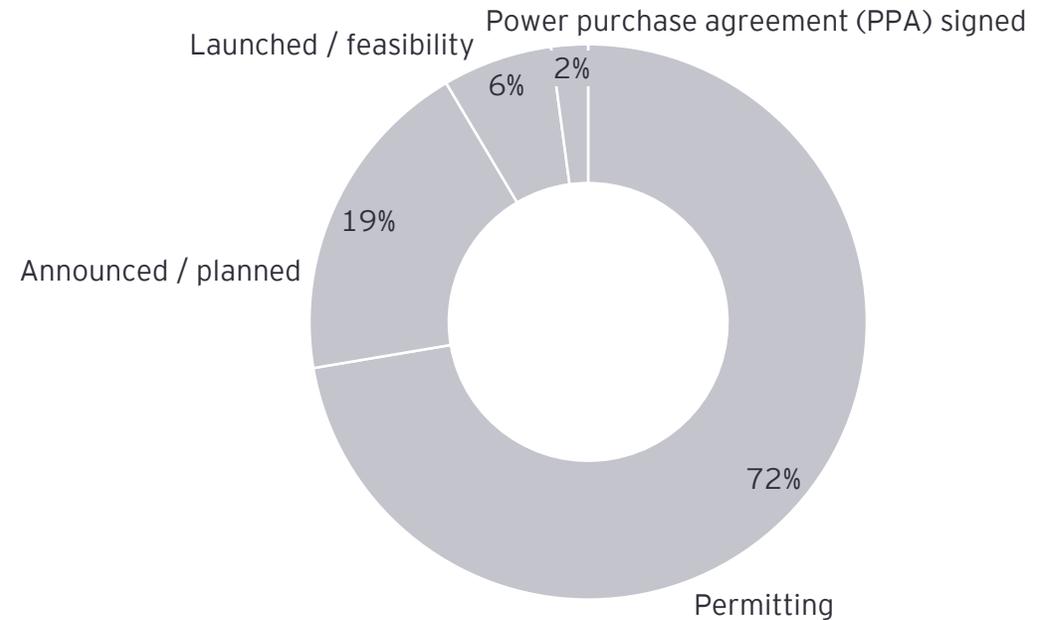
Scale of the opportunity

Private organisations are the primary driver behind the size of the project pipeline, with the majority of projects remaining in the early stages of maturity

Breakdown of the developer type for 94 generation projects (%)

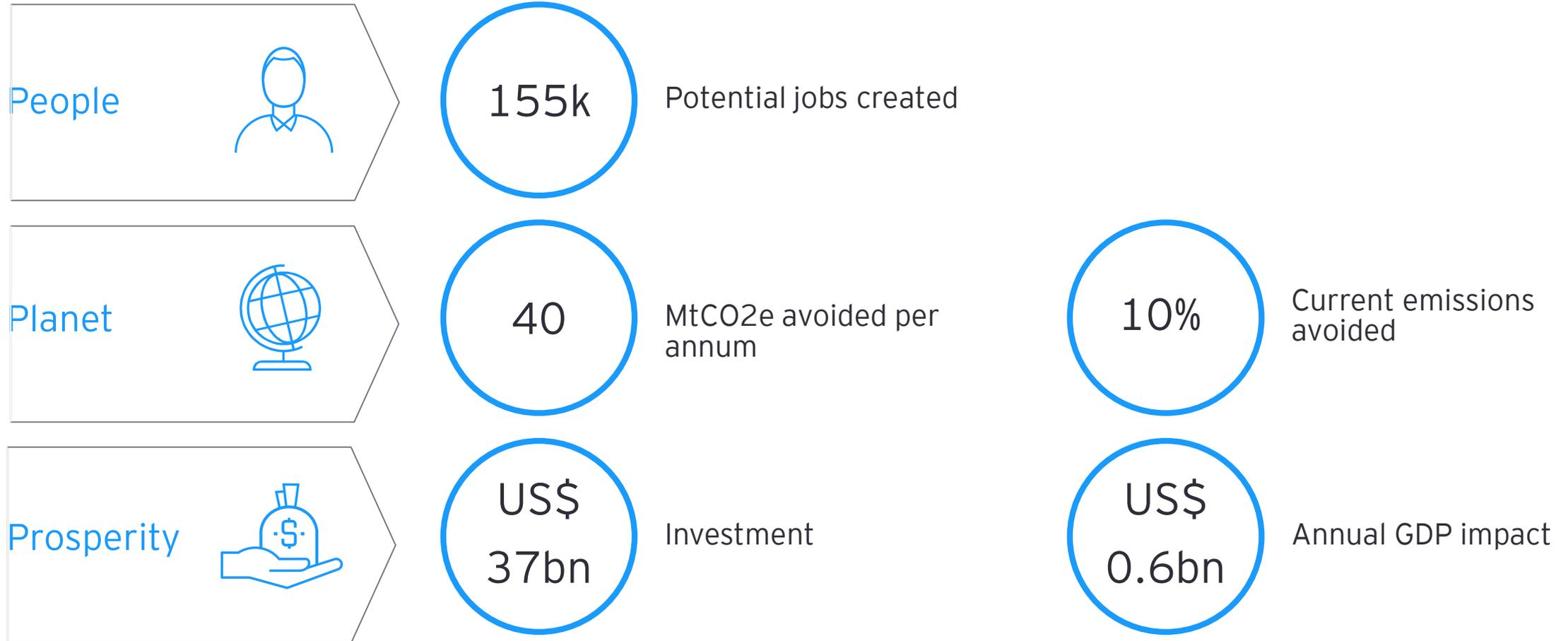


Breakdown of the maturity level for 94 generation projects (%)



A green post-COVID-19 economic recovery can have a massive positive impact on South Africa's jobs, emissions and economic growth

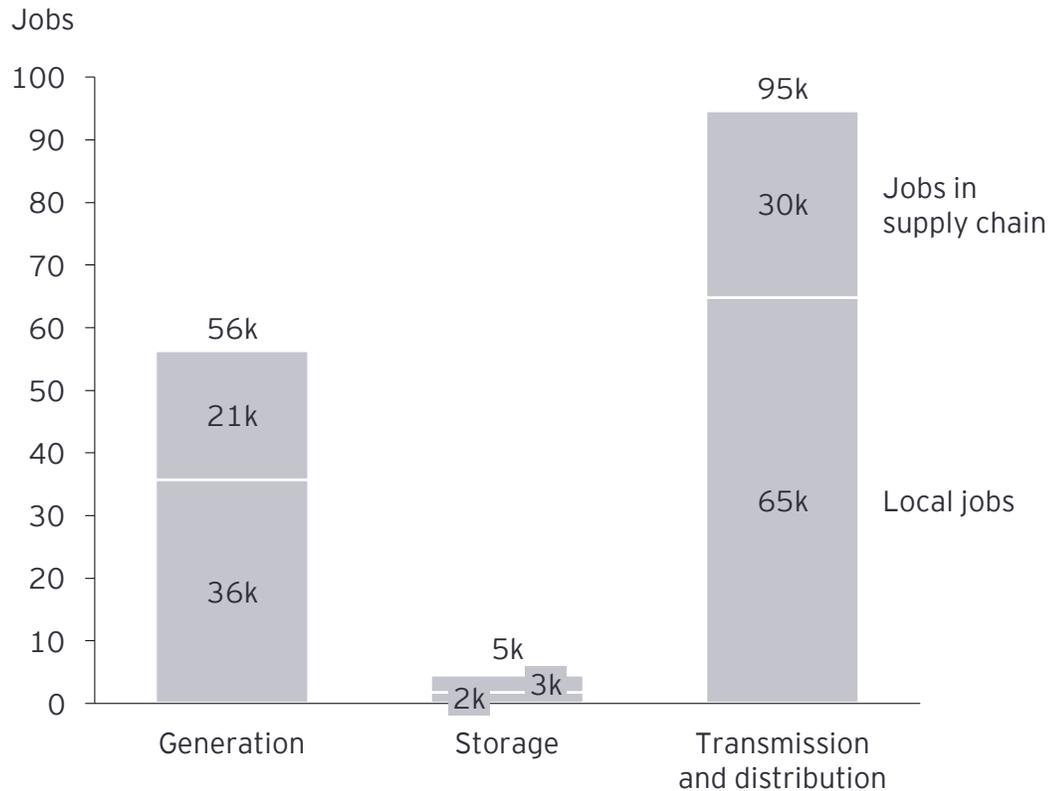
Potential impact from visible pipeline of renewable energy projects



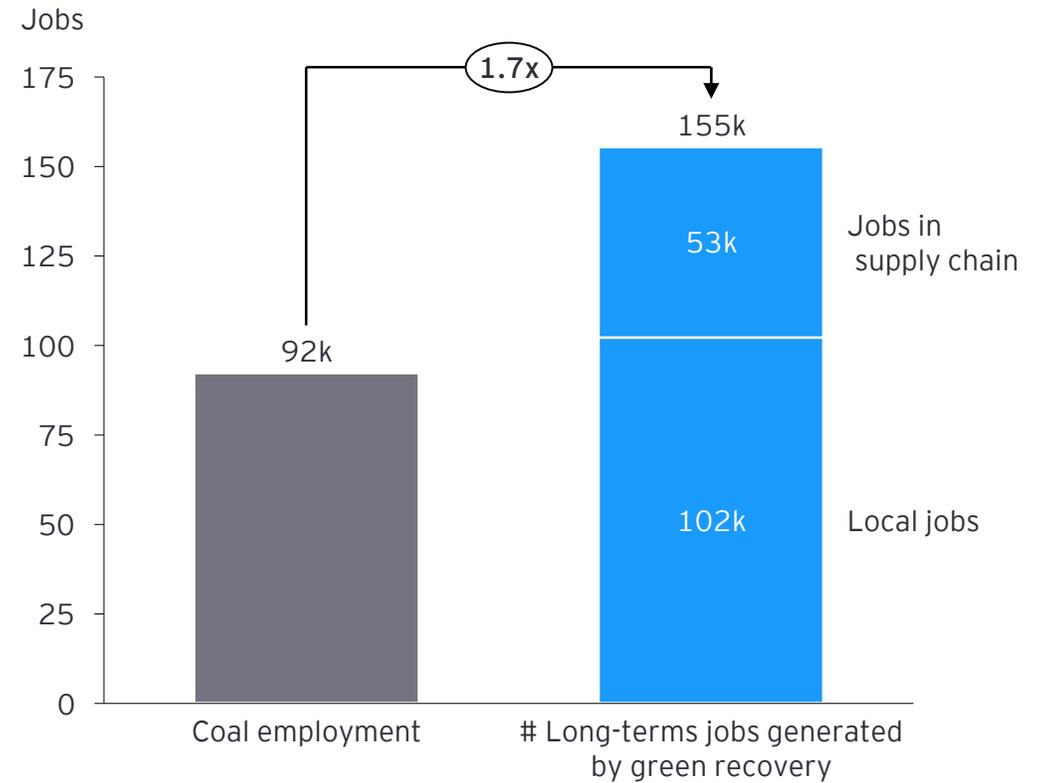
The visible renewable energy pipeline in could create up to 155,000 jobs

People
Planet
Prosperity

Job creation potential from projects in pipeline, by sector



Job potential from projects in pipeline vs. current employment in coal



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Strategically developing manufacturing capability for renewables will help South Africa realise a far greater proportion of the job potential in the supply chain

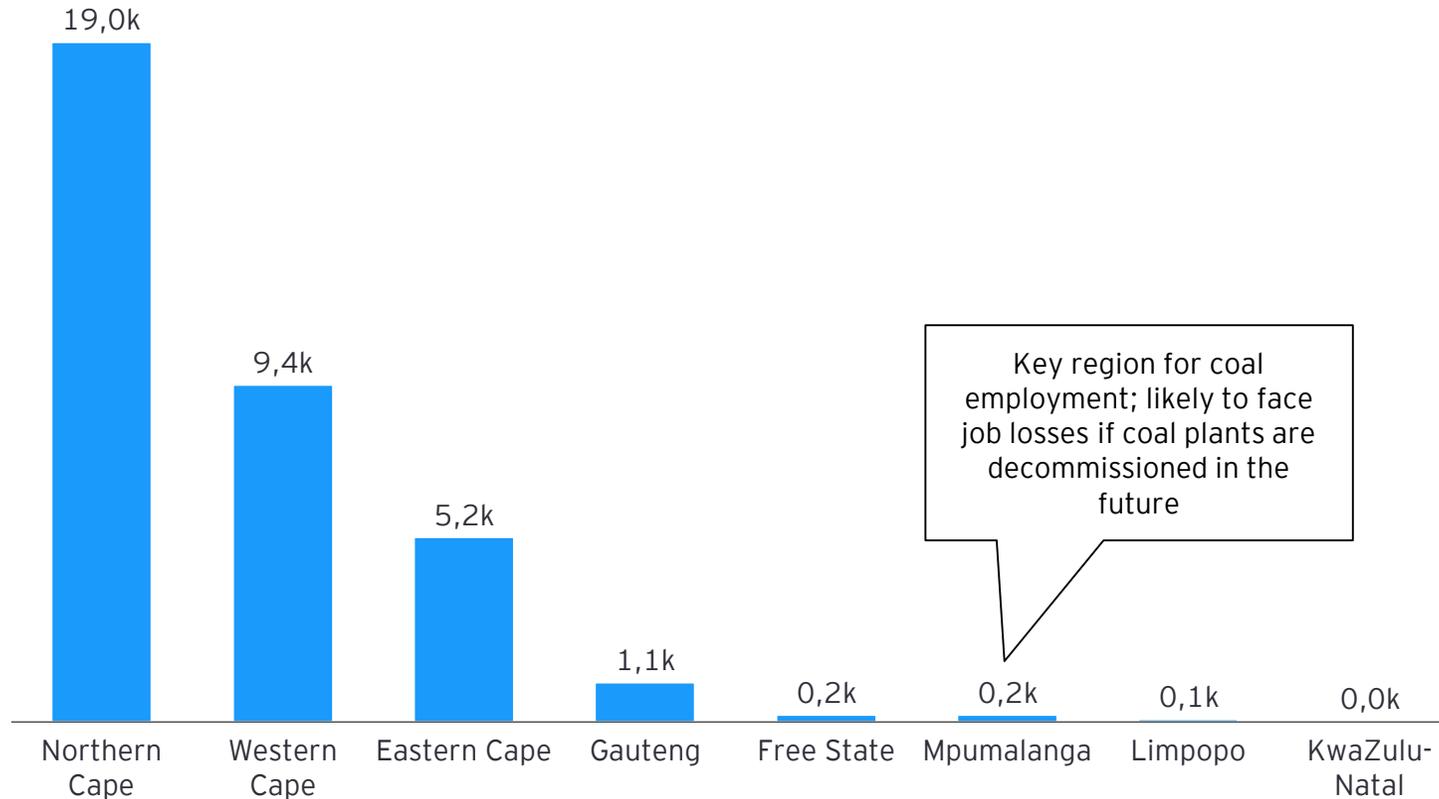


Scale of the opportunity

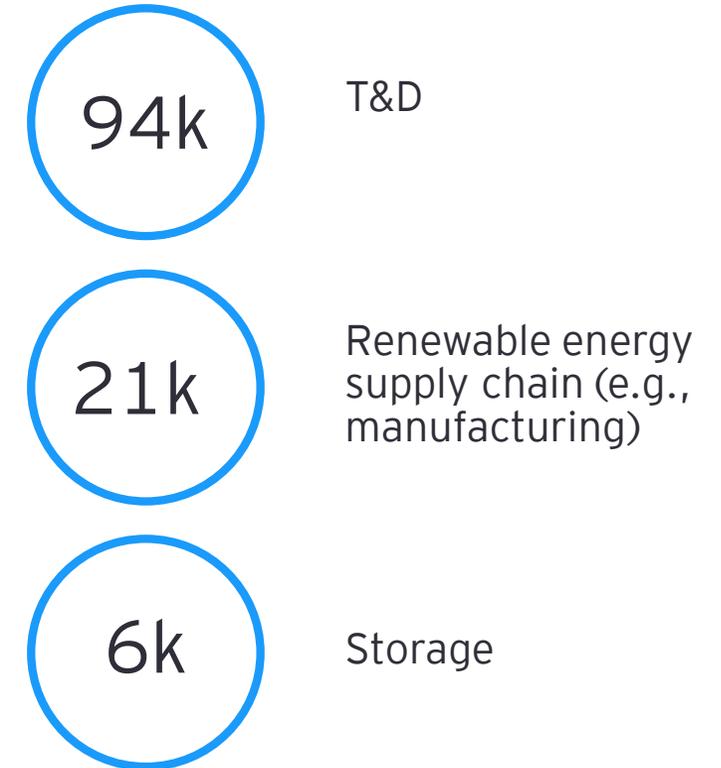
Local jobs in generation are highly uneven across regions; this can be mitigated by jobs in supply chain, storage and T&D

People
Planet
Prosperity

Local job potential from renewable energy generation, by region



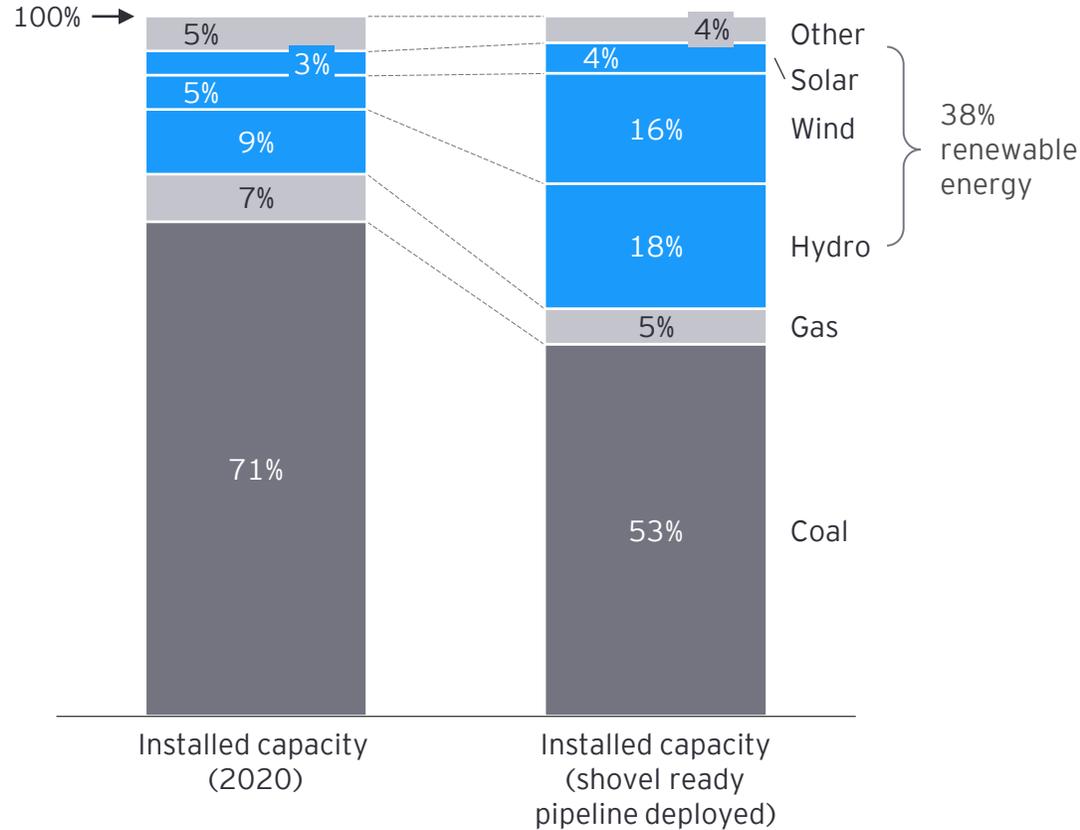
Cross-regional job potential from other sources



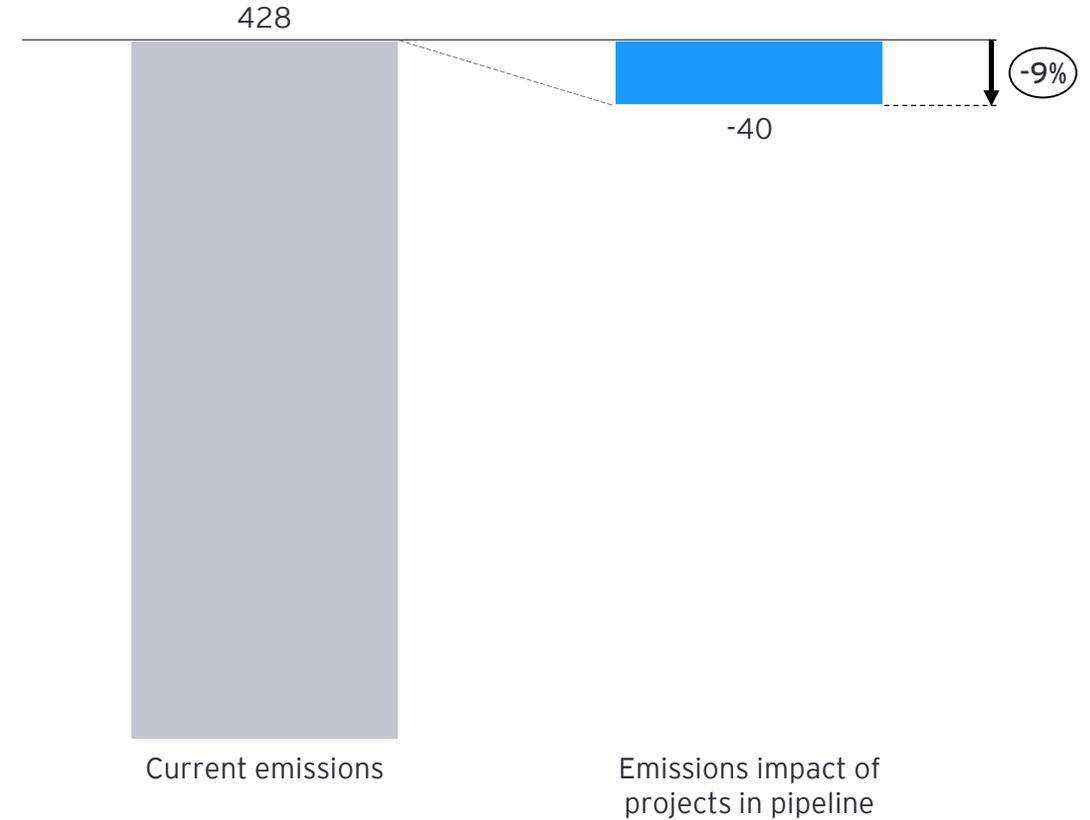
The visible project pipeline would allow South Africa to more than double the share of renewables and reduce emissions by 9%



South African installed capacity mix shift (% , GW)



Contribution of pipeline to South African Nationally Determined Contributions (NDC) reduction target (MtCO2e)



Note: lower-bound NDC target taken (South Africa's target is between 398 and 614 MtCO2e).
Source: : CSIR, UNFCCC, IEA, EY-Parthenon analysis.

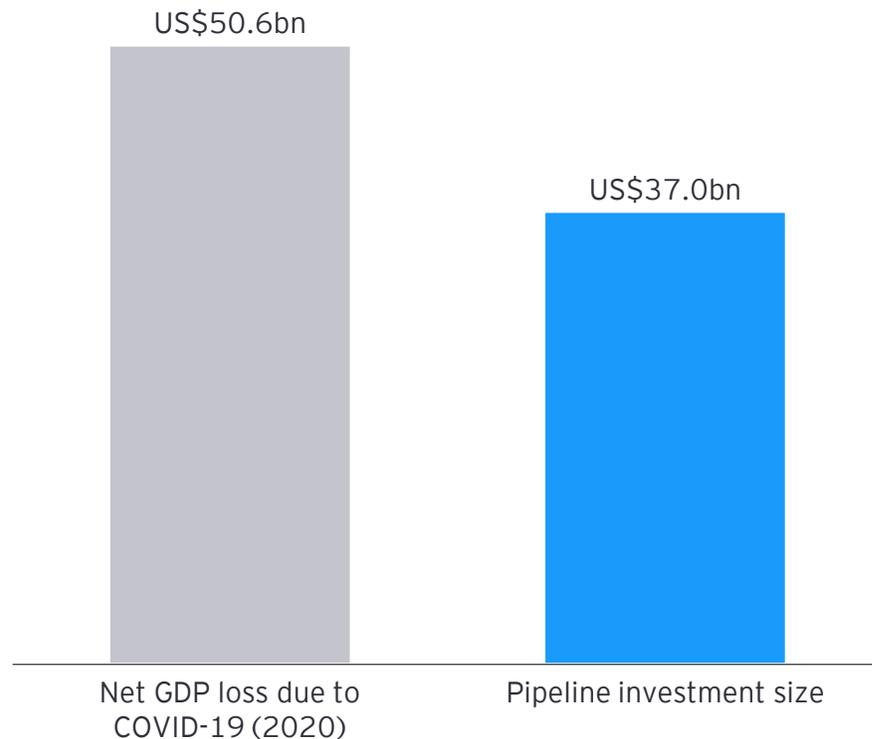
The investment opportunity in the visible pipeline is equivalent to two-thirds of 2020 GDP lost due to COVID-19

People

Planet

Prosperity

Contribution of pipeline to economic recovery (US\$bn)



- ▶ South Africa's GDP declined by an estimated 7.3% in 2020, largely due to the economic impact of COVID-19.
- ▶ The pipeline of shovel-ready projects in South Africa could provide an injection of US\$37bn into the economy, which is equivalent to two-thirds of the GDP lost.
- ▶ Through deploying the pipeline, we estimate a recurring GDP contribution of US\$0.85bn (£0.6bn) through operations and maintenance of assets.

There are several large transmission projects in the pipeline that could have a major positive impact

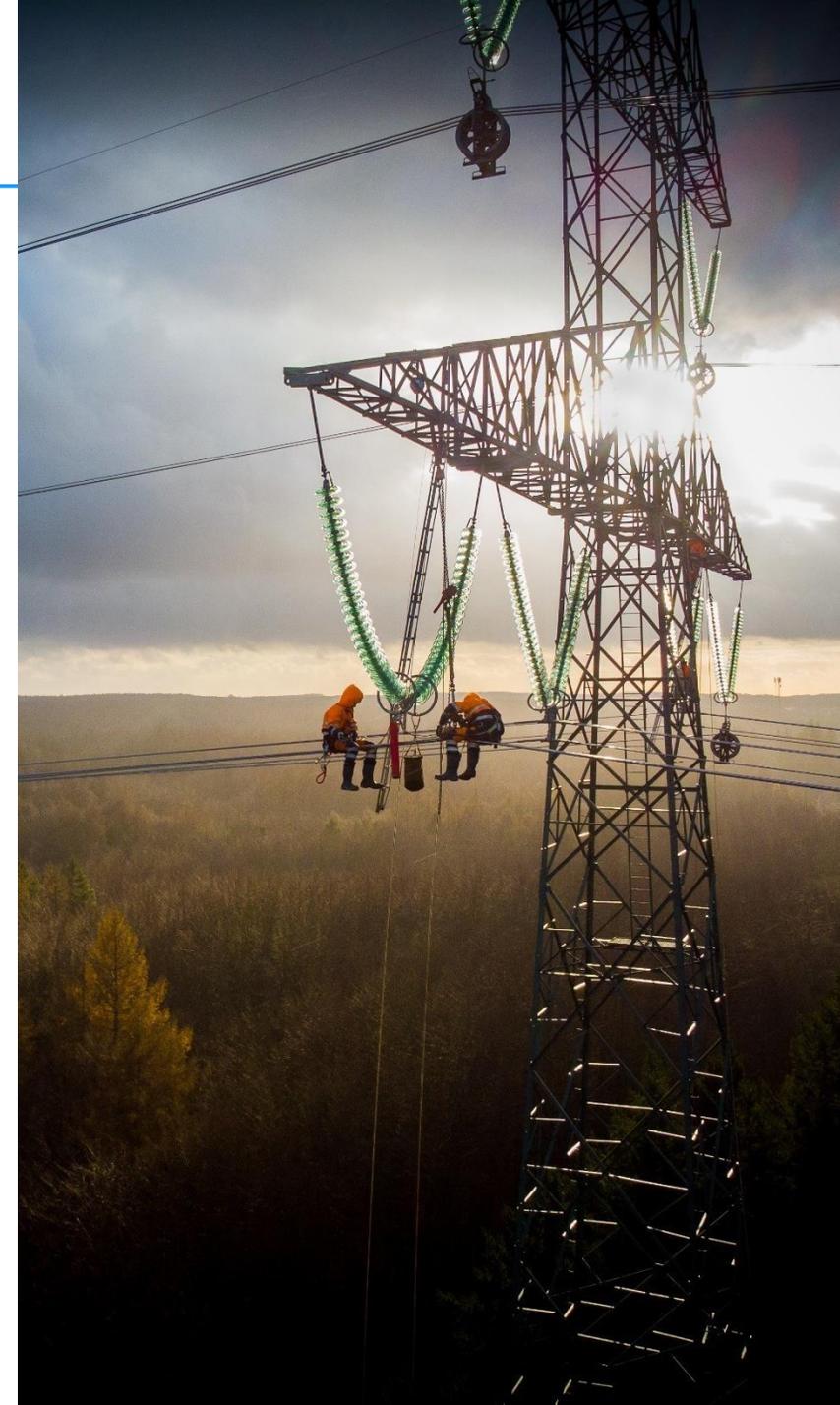
Example project: Empangeni Strengthening



Empangeni - Umfolozi - Theta
765kV line

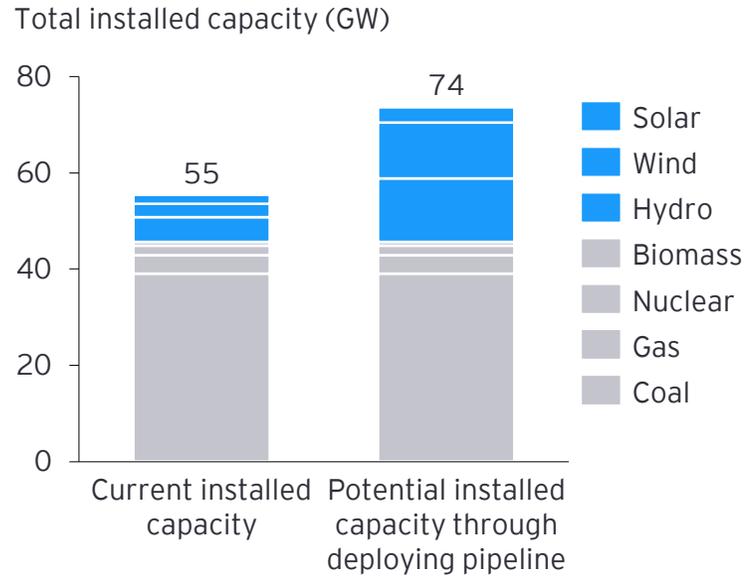


- ▶ Empangeni - Umfolozi - Theta is a 765kV line in the KwaZulu-Natal province.
- ▶ The line was commissioned by Eskom, with planned completion in 2022.
- ▶ The strengthening work presents a major upgrade to T&D infrastructure in the region.
- ▶ The resulting improvement in grid resilience and connectivity could have an enabling effect in accelerating renewables investment in South Africa.

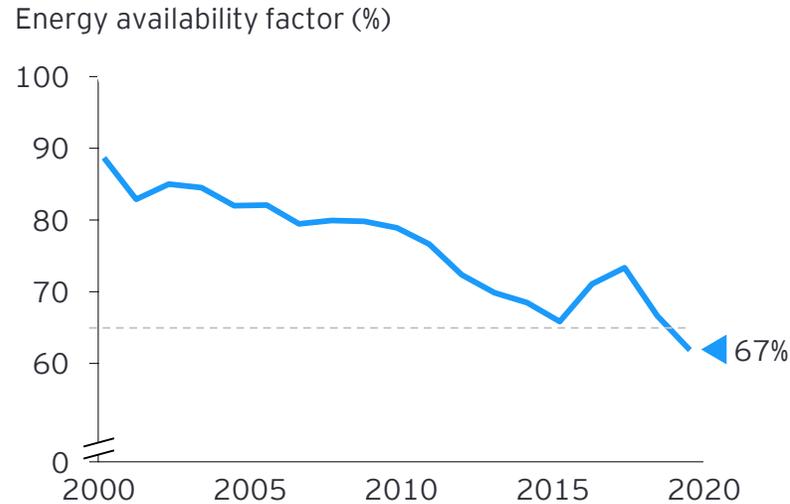


Deploying the pipeline of generation, storage and T&D projects will help South Africa regain energy security and build resilience for the future

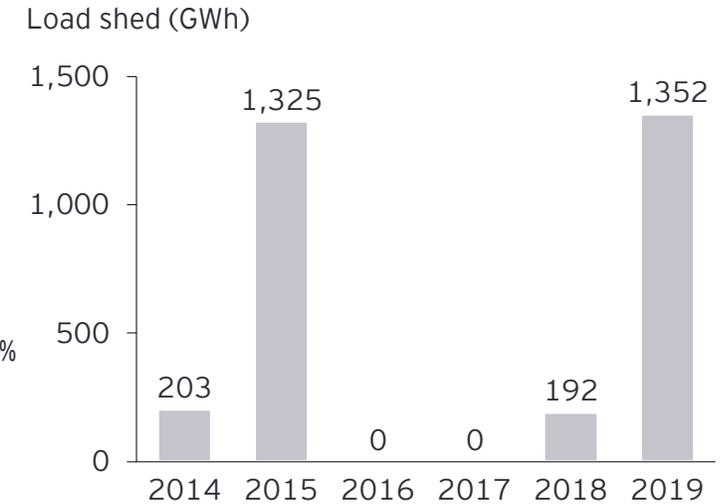
Increase in installed capacity (units, GW)



South African energy availability factor (%)



South African load shedding (GWh)



Deployment of the onshore wind, solar and T&D projects identified in this study have the potential to help South Africa improve its reserve margin and regain energy security - helping prevent blackouts and the need to ration power.

Insufficient investment into South Africa’s energy infrastructure and generation capacity has led to a significant loss in energy security over the last 20 years.

Lack of system adequacy is highlighted by the decline in South Africa’s energy availability factor to 67% in 2019.

South Africa had its worst year of load shedding on record, totalling 1,353 GWh with an outage duration of 520 hours.

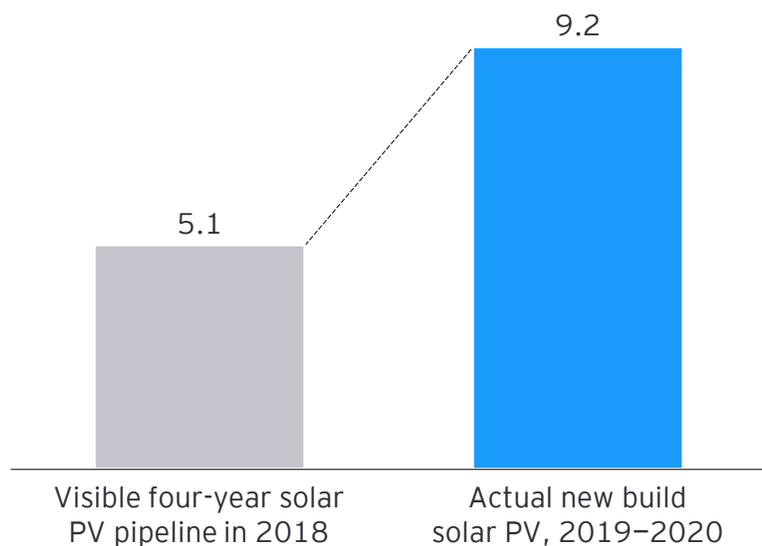
Scale of the opportunity

Beyond the visible pipeline, there may be a substantial additional opportunity in off-grid and micro-generation

Other developing countries have demonstrated that the potential for smaller scale projects not captured by the visible project pipeline can be a very significant source of growth in renewable energy, with local ownership and equity.

Rooftop, off-grid and micro-generation case study: Vietnam

Comparison of visible four-year solar PV pipeline in 2018 vs. actual growth in solar PV from 2019 to 2020, GW capacity

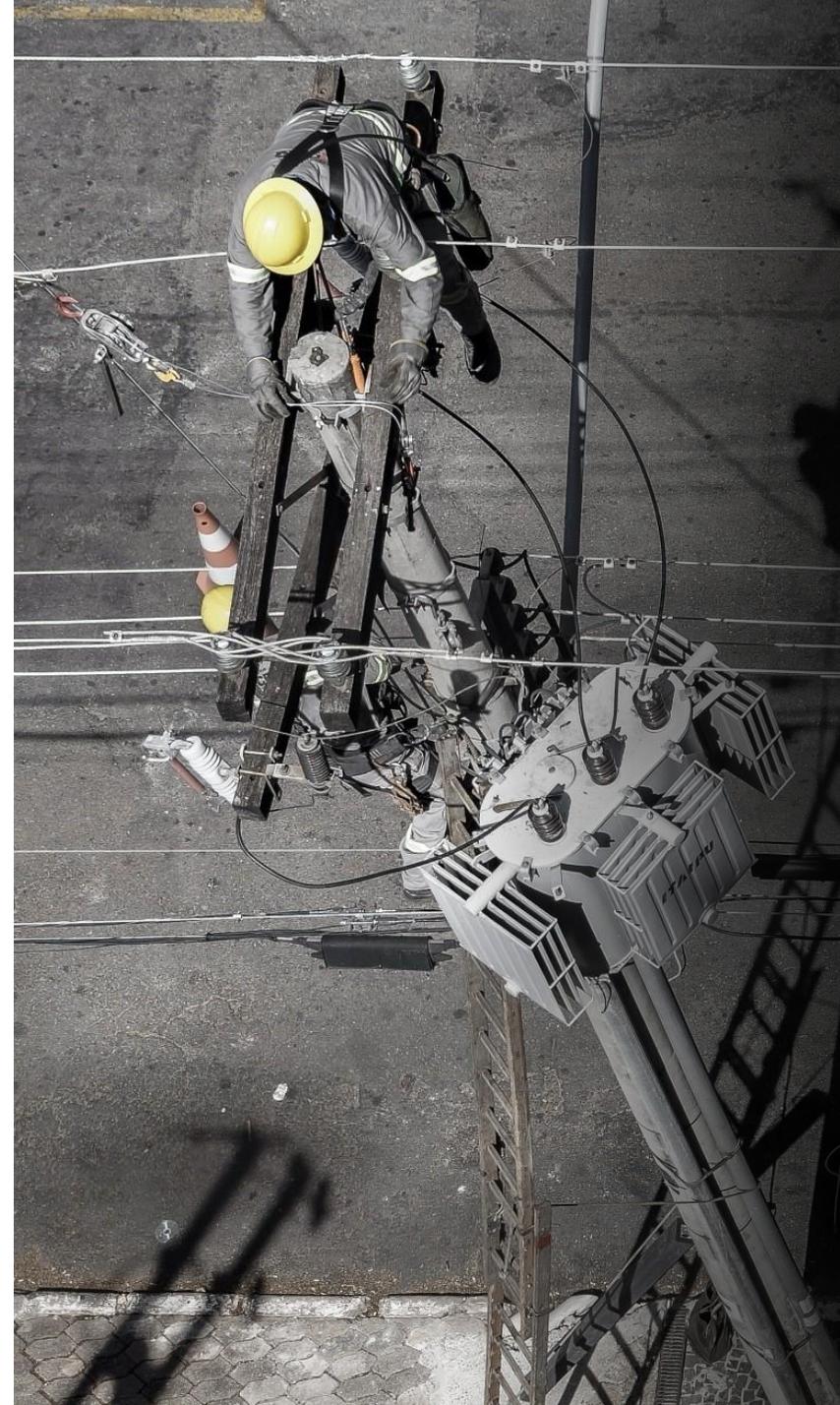


- ▶ In the case of Vietnam, the total solar capacity installed from 2019 to 2020 exceeded the visible four-year solar PV pipeline in 2018 by almost double.
- ▶ The majority of this growth was driven by behind-the-meter rooftop and other smaller-scale, local projects.



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Key policy recommendations

There are a number of blockers preventing the fulfilment of the extensive project pipeline identified within South Africa

● National ambition and targets

- ▶ Targets for renewable energy capacity and coal decommissioning set out in the IRP are ambitious given the current dependence on coal.
- ▶ A lack of political commitment and policy certainty around an energy plan has obstructed renewables growth.

● Supporting policy and market framework

- ▶ A lack of predictability and transparency with off-taker contracts has created uncertainty that is deterring investment and loans from banks.
- ▶ Eskom's prior unwillingness to sign independent PPAs with bidders has dampened investor confidence. The recent support of IPPs and embedded generation will restore confidence.
- ▶ However, the overall undersupply of electricity in South Africa means that there is significant pent-up demand.

● Land allocation and permitting

- ▶ Energy Information Administration (EIA) and generation licences create challenges for developers though extensive red tape and protracted timelines for approval.
- ▶ Land acquisition and servitudes for substation and line construction projects are key constraints for deep transmission upgrades.

● Availability of domestic capital

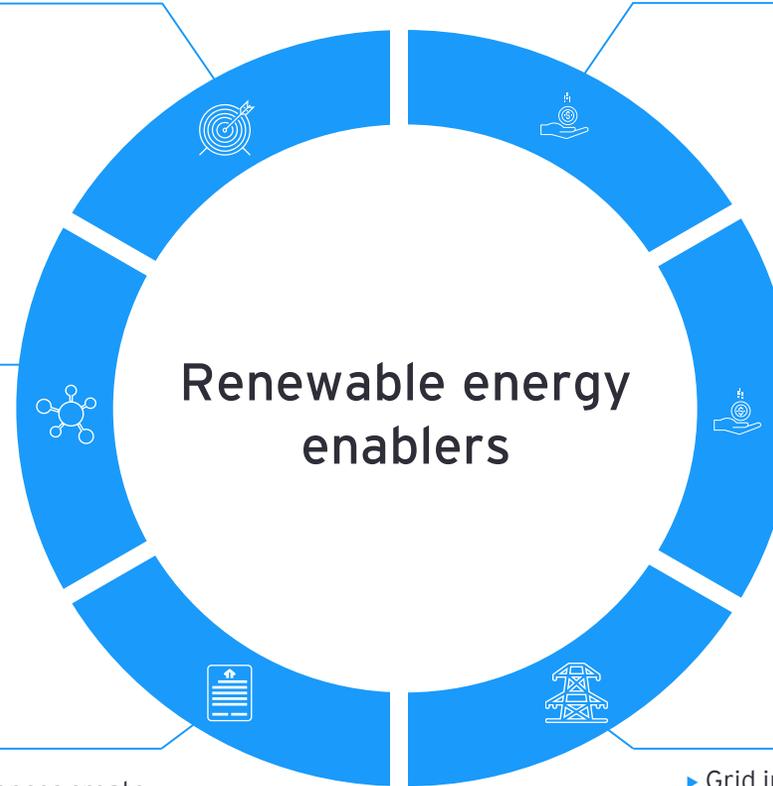
- ▶ There is strong willingness from national banks to provide financing for renewables projects.

● Availability of international capital

- ▶ Cooperation with international finance organisations such as the World Bank and the EBRD on renewables are currently limited.
- ▶ The South African market is considered risky by international private investors.

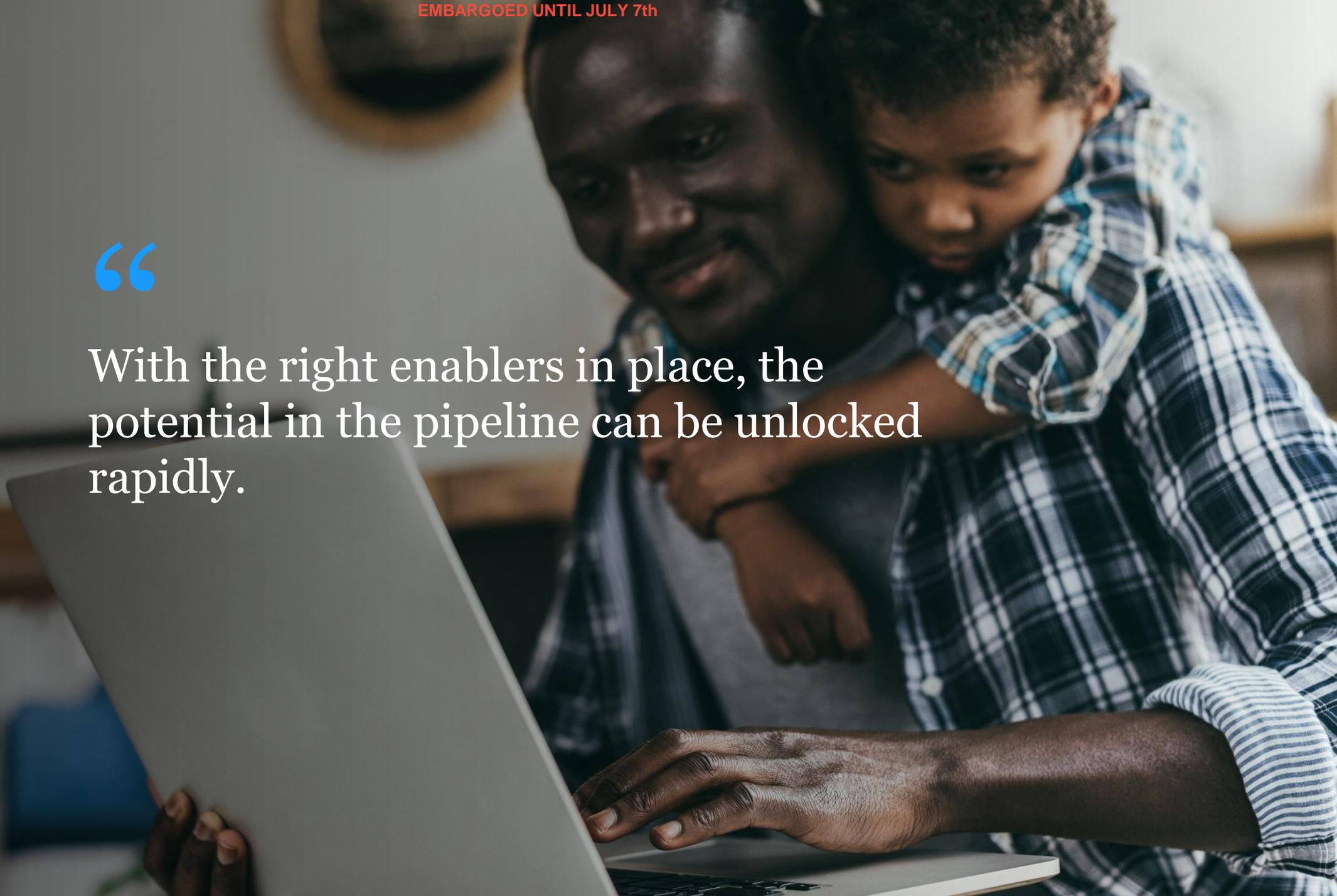
● Transmission infrastructure

- ▶ Grid infrastructure is old and poorly maintained, and a blocker of deployment of solar and wind developments across the country.
- ▶ In particular, a lack of transmission capacity is limiting the deployment of projects in areas best suited for renewables.
- ▶ There is a need for interconnectors linked to neighbouring countries to help the renewables market develop.



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With the right enablers in place, the potential in the pipeline can be unlocked rapidly.



Key policy recommendations

There are several policy levers that need to be pulled in order to overcome blockers and unlock the potential of the identified project pipeline (1/3)

Policy	Recommendations	Enablers impacted
<p>1 Increase size of allocation in future procurement rounds and improve consistency in timing</p>	<p>Increase the size of allocation beyond the 2.6GW target in upcoming rounds of the Renewable Energy Independent Power Producer Procurement Programme (REI4P) procurement programme, given that the visible pipeline stands at 10GW and these projects will find it relatively easy to secure financing with a PPA ('no regrets' action that stands to support growth of renewables as a baseload solution for South Africa)</p> <p>Ensure off-taker contracts are binding to create greater certainty for developers and financiers, as historical renegeing of contracts has knocked investor confidence</p> <p>Improve the consistency of allocation rounds: the 'stop-start' nature of the REI4P has historically been a blocker for private sector investment, and adhering to plans for upcoming procurement rounds in Q1 2021, Q3 2021 and Q1 2022 will send a strong market signal</p>	
<p>2 Strengthen local supply chains: in particular, manufacturing for wind and solar</p>	<p>Unlock a significantly larger proportion of the potential for job creation and economic growth by strengthening local supply chains: in particular, manufacturing capability for wind and solar equipment</p> <p>Use mechanisms such as combination of support for equipment producers that set up local capacity (e.g., as equipment purchase guarantees tied to future procurement round), local content requirements for developers, and public-private collaboration, for example on job training programmes</p>	



Key policy recommendations

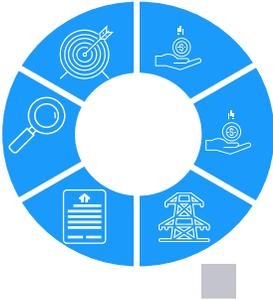
There are several policy levers that need to be pulled in order to overcome blockers and unlock the potential of the identified project pipeline (2/3)

Policy	Recommendations	Enablers impacted
<p>3 Streamline permitting for smaller projects</p>	<p>Streamline the permitting and environmental impact assessment process for smaller projects, cutting out unnecessary red tape that currently acts as a major blocker for development of renewable energy capacity.</p> <p>Amend Schedule 2 of the Electricity Regulation Act to increase the licensing threshold for embedded generation, as announced by President Ramaphosa in his February 2021 State of the Nation Address</p> <p>Lifting the upper limit for exemption from the generation licence requirement to 100MW, as announced by the President, will reduce the burden on small independent power providers, and increase uptake of Small Scale Embedded Generation (SSEG) in residential and commercial spaces</p>	
<p>4 Further strengthen relationships with International Financial Institutions (IFIs) to support investor confidence</p>	<p>Strengthen corporation with international finance institutions, such as the World Bank and the EBRD, to further de-risk projects through a multilayered risk mitigation framework (this could involve launching a package of guarantees to act as a backstop to Eskom's off-taker agreements)</p> <p>For example, the RenovAr programme in Argentina implemented this approach successfully, using World Bank guarantees to de-risk investments and encourage greater deployment of private capital into renewables. In particular, this programme was able to considerably reduce energy prices, suggesting that a similar approach could unlock significant cost reductions for ESKOM, which in turn will allow for larger and more frequent auction rounds.</p>	

Pipeline impact: ■ Supportive ■ Major blocker

There are several policy levers that need to be pulled in order to overcome blockers and unlock the potential of the identified project pipeline (3/3)

5

Policy	Recommendations	Enablers impacted
<p>Expand and upgrade grid infrastructure</p>	<p>Upgrade and expand grid infrastructure that is under pressure and has been poorly maintained over the last 20 years</p> <p>Stimulate investment to allow for an overall increase in electricity production, and accommodate a greater proportion of renewables</p> <p>Upgrade transmission in the areas that have the highest wind and solar potential in South Africa, and stimulate significant investment in connections between the rest of the country and the Northern Cape - where nearly half of the projects identified in this study are located</p>	



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Project pipeline summary – generation: onshore wind



55 projects in the pipeline



30,000 local jobs
15,000 jobs in the supply chain



US\$16bn investment required



9GW of renewable generation
capacity



36 MtCO₂e avoided

Onshore wind-based projects are the main driver of the shovel-ready project pipeline in South Africa in terms of quantity, investment required, full time employees (FTEs) created and MtCO₂e avoided

Project maturity

- ▶ The overall number of wind-based generation projects is 55, accounting for 59% of the total number generation projects and 87% of total generation pipeline capacity.
- ▶ Of these 55 projects, the majority are in early stages of maturity - 85% (7.1GW) are in the 'permitting' stage, 11% (1.6GW) are in the 'launched' stage and 4% (0.3GW) are in the 'PPA signed' stage.

Investment size and developers

- ▶ The aggregated investment requirement amounts to US\$16.1bn, accounting for 88% of the total investment identified for generation projects.
- ▶ The average investment size of projects is US\$293mn, ranging from large-scale projects over US\$800mn down to small-scale projects requiring less than US\$10mn funding.
- ▶ The type of financing required has been identified as a mix of project debt, project equity and support subsidy.

Environmental impact

- ▶ There is potential for 36 MtCO₂e to be avoided annually, which accounts for 92% of the total generation emission abatement potential.

Project pipeline summary – generation: solar



37 projects in the pipeline



6,000 local jobs
6,000 jobs in the supply chain



US\$2bn investment required



1GW of renewable generation
capacity



3 MtCO₂e avoided

Solar-based projects are an important driver of the shovel-ready project pipeline in South Africa in terms of quantity, investment required, FTEs created and MtCO₂e avoided

Project maturity

- ▶ The overall number of solar-based generation projects is 37, accounting for 39% of the total number generation projects and 13% of total generation pipeline capacity.
- ▶ Of these 37 projects, the majority are in early stages of maturity - 46% (0.6GW) are in the 'announced' stage and 54% (0.7GW) are in the 'permitting' stage.

Investment size and developers

- ▶ The aggregated investment required amounts to US\$2.1bn, accounting for 11% of the total investment identified for generation projects.
- ▶ The average investment size of projects is US\$56mn, ranging from large scale projects over US\$180mn down to small-scale projects requiring less than US\$2mn funding.
- ▶ The type of financing required has been identified as a mix of project debt, project equity and support subsidy.

Environmental impact

- ▶ There is potential for 3 MtCO₂e to be avoided annually, which accounts for 8% of the total generation emission abatement potential.

Project pipeline summary – generation: storage



11 projects in the pipeline

Storage projects are split across two technology types: battery and molten salt

Project maturity

- ▶ Of the 11 projects, the majority are in early stages of maturity - 10 are in the 'planned' stage and 1 is in the 'announced' stage.



2,000 local jobs
3,000 jobs in the supply chain

Investment size and developers

- ▶ The total estimated investment required amounts to US\$1bn, accounting for 2% of the total investment identified for projects.
- ▶ The average investment size of projects is US\$6mn, ranging from US\$1mn to US\$700mn.

Economic impact

- ▶ There is potential to create ~14,000 jobs which accounts for 3% of the total job creation potential from the pipeline.



US\$1bn investment required

Project pipeline summary – generation: T&D



79 projects in the pipeline

T&D projects connect to a number of plant types, including substations, wind and solar plants

Project maturity

- ▶ Of the 79 projects, the majority are in early stages of maturity - 39% are in the 'planned' stage and the remaining 61% are in the 'proposed' stage.
- ▶ The voltage levels of projects varies from 22kV to 765kV.



65,000 local jobs
30,000 jobs in the supply chain

Investment size and developers

- ▶ The estimated total investment required amounts to US\$19bn, accounting for 50% of the total investment identified for projects in the pipeline.
- ▶ The average investment size of projects is US\$240mn, ranging from US\$1mn to US\$2.7bn.



US\$19bn investment required

Economic impact

- ▶ There is potential to create 250,000 jobs, which accounts for 33% of the total job creation potential from the pipeline.

Opportunities identified - notable projects

Subsector	Technology	Developer	Capacity	Investment need (US\$m)	Project description
Generation	Onshore wind	Moyeng Energy (Pty) Ltd	552	813	Suurplaat Wind Energy Facility
Generation	Onshore wind	BioTherm Energy (Pty) Ltd	343	630	Golden Valley Wind Energy Facility
Generation	Onshore wind	G7 Renewable Energies (Pty) Ltd	325	597	Kudusberg wind farm Facility
Generation	Onshore wind	G7 Renewable Energies (Pty) Ltd	325	597	Rondekop Wind Energy Facility
T&D	Line	Eskom	N/A	116	Aries 400kV line, which will serve as an evacuation corridor for the large concentration of renewable energy in the province
T&D	Line	Eskom	N/A	96	Isundu-Mbewu 400 kV line, which forms part of eThekweni Electricity network strengthening

Climate energy policy overview

Selection of key national targets

- 
17.8GW
renewable energy capacity by 2030
- 
35GW
decommissioned coal-fired power capacity by 2050
- 
Net zero
emissions by 2050

Major policy

Integrated Energy Plan (IEP)

- ▶ The IEP outlines the objective of achieving a diversified energy mix across all of South Africa's future energy needs.

Integrated Resource Plan (IRP)

- ▶ The Department of Mineral Resources and Energy (DMRE) plans for a more diversified electricity mix by 2030, with increased RE capacity.
- ▶ The DMRE plans to decommission 35GW of existing coal power plants by 2050, as they reach the end of their design life.

REI4P

- ▶ This is South Africa's flagship programme for moving towards increasing renewable energy in the country's energy mix.
- ▶ REI4P is a competitive procurement framework, in which developers bid for PPAs.
- ▶ It is designed to contribute to broader national developmental objectives such as job creation, social upliftment and economic transformation.
- ▶ Since launching in 2011, over US\$16bn in private sector investment has been committed to 90+ renewable energy projects, with a combined capacity of 6GW+.
- ▶ The Small Projects Independent Power Producer Procurement Programme (SP-I4P) was launched as a subset for REI4P with the objective of procuring 200MW of generation capacity from small (1MW-5MW) projects.

COVID-19 recovery and resilience plan

COVID-19 recovery plan

As a result of the COVID-19 pandemic, the South African economy is estimated to have contracted by 7.3%. The South African Government put in place a stimulus package of ZAR500bn (US\$30bn) to stabilize the economy. The South African Government has subscribed to a green recovery, with sustainability as a key priority in rebuilding the economy.

Key actions

- ▶ The South African Government is cooperating with German-South African Energy Partnership (GIZ) to make greater use of green bonds to attract capital for sustainable investment.
- ▶ South Africa joined a partnership with the World Resources Institute and the Coalition for Urban Transitions to support a green, resilient and inclusive recovery for its hard-hit cities.
- ▶ Additional Strategic Integrated Projects valued at ZAR340bn were designated by the Government, of which the following are energy-related:
 - Emergency/Risk Mitigation Power Purchase Procurement Programme (2,000MW)
 - Small IPP Power Purchase Procurement Programme (100MW)
 - Embedded Generation Investment Programme (400MW)

Key figures

US\$30bn

Recovery package

2500MW

Additional energy Strategic Integrated Projects

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