Climate Action Tracker

# Scaling up climate action

## Key opportunities for transitioning to a zero emissions society

## EXECUTIVE SUMMARY

CAT Scaling Up Climate Action series

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NEW CLIMATE INSTITUTE

ECOFYS
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CLIMATE ANALYTICS

## CAT Scaling Up Climate Action series

The Climate Action Tracker (CAT) strives to support enhancing climate action in the context of the Paris Agreement implementation. This analysis contributes to the Talanoa Dialogue at COP24 and future revisions of mitigation targets, and aims at spurring an increase in climate mitigation actions, to close the gap between current emissions projections and required Paris-compatible pathways.

As part of this, we have been researching the potential for countries to scale up climate action in different focus areas. The analysis in this report is relevant to Parties considering revisions to their Nationally Determined Contributions (NDCs) to be submitted under the Paris Agreement by 2020, and also to their submission of long-term low greenhouse gas development plans, also due by 2020.

The result is our **Scaling Up Climate Action** country series, which identifies options for increased sectoral action that would move a country towards a pathway compatible with the Paris Agreement's long-term temperature limit and estimates the impact of those actions on emissions and other benefits.

The first round of our analysis covers **South Africa**, the **European Union**, **Indonesia**, **Turkey**, **Argentina**, and **Australia**.


The consistent method and similar structure for all six reports allows for country-specific insights, while enabling a cross-country comparison to draw general research findings and lessons learnt on global potentials.

www.climateactiontracker.org/publications/scalingup

# Executive summary

## Introduction and objectives

Under the Paris Agreement, governments have committed to limiting temperature increase to well below 2°C above pre-industrial levels and pursuing efforts to limit it to 1.5°C. Current efforts are insufficient: aggregate mitigation targets, according to Climate Action Tracker (CAT) estimates, result in global warming of about 3.2°C. Implementation of the targets is falling short, with greenhouse gas (GHG) emissions under implemented policies leading to an estimated warming of around 3.4°C.

To stay below the globally agreed limit, the IPCC Special Report on 1.5℃ finds that an increase in efforts is required to peak global GHG emissions as soon as possible, reduce $CO_2$ emissions to net-zero around 2050 and total GHG emissions shortly thereafter.

In recent years, measures to reduce GHG emissions have, in many cases, become more attractive to policy makers and private investors, both because of falling technology costs, as well as increased awareness for other benefits, such as air quality improvements and job creation in low-carbon-oriented sectors.

We no longer live in a world where climate change mitigation is a burden per se, but where it increasingly becomes the most feasible option when considering all socio-economic aspects. For cost-efficient global mitigation, it will be essential to make those mitigation actions accessible to, and overcome remaining barriers in, all countries.

**This report, the first country assessment in the Climate Action Tracker's Scaling Up Climate Action Series, analyses areas where South Africa could accelerate its climate action. The report illustrates GHG emissions reductions from such actions, along with other benefits.**

### KEY FINDINGS

- Scaling up climate action in South Africa's electricity supply, urban passenger transport, and residential buildings sectors which cover about half of South Africa's 2012 emissions can reduce the country's total greenhouse gas emissions by up to 96% below 2012 emissions in these focus areas by 2050.
- Actions in these areas alone would reduce economy-wide emissions by 17 % below 2012 levels, and bring South Africa close to meeting its 2050 emissions reduction target. While the three focus areas will almost fully decarbonise under our most ambitious scenario, additional action in other sectors and sub-sectors will be needed to decrease economy-wide emissions in line with the Paris Agreement's temperature limit.
- Research from South African institutes indicates that under least-cost scenarios, GHG emissions from electricity generation in South Africa could decrease by up to 83% below 2012 emissions levels by 2050.
- A fully decarbonised electricity sectors is critical for enabling low-carbon electrification trends in urban passenger transport and residential buildings in line with the Paris Agreement temperature limit.
- There is huge potential for (sub-)national actors to accelerate climate action by successfully decarbonising key areas such as urban passenger transport and residential housing, for example by shifting towards public modes of transport and increase electric mobility in Cape Town, Durban, and Gauteng.
- Changing from a high to a low-carbon electricity supply by 2030 is likely to create as many employment opportunities in South Africa as it would make obsolete, and provides jobs in technologies and sectors that are more likely to form the core of future electricity supply, both in South Africa and globally.

The analysis starts with an in-depth review of South Africa's current policy framework and sectoral developments, comparing them with the comprehensive policy packages and the progress of the kind of sector indicators required under Paris-compatible pathways.

The report then focusses on three areas with potential to increase mitigation efforts, selected based on their share of GHG emissions and considering national and even local circumstances: electricity supply, urban passenger transport, and residential buildings. CAT emphasises that other sectors must take similarly ambitious actions to decrease economy-wide emissions in line with the Paris Agreement

It identifies different options of accelerated climate action in each sector informed by insights from three categories: (1) national research and country-specific studies, (2) practices implemented by regional or international frontrunners, and (3) sectoral developments in line with the Paris Agreement's long-term temperature limit.


## Sector transitions towards zero-carbon

**In South Africa, there is tremendous potential to scale up climate action, including in the focus areas of this study: electricity supply, urban passenger transport, and residential buildings. Increasing climate action now would initiate technically-feasible sectoral transitions towards a zero-emissions society while directly benefiting South Africa's sustainable development agenda.**

Our findings confirm that ambitious decarbonisation efforts for the selected sectors at the national and sub-national levels in South Africa are feasible. They would significantly reduce greenhouse gas (GHG) emissions and foster co-benefits such as low-carbon-oriented employment generation, supporting sustainable development goals by reducing the adverse pollution effects of conventional modes of transport and electricity generation, and promoting modern housing facilities.

## Electricity supply

A swift energy transition in South Africa is essential for it to be compatible with efforts to limit global warming to 1.5ºC below pre-industrial levels, as established in the 2015 Paris Agreement.

The IPCC Special Report on 'Global Warming of 1.5°C' found that limiting warming to 1.5°C will reduce the impacts on vulnerable populations and ecosystems in the South African region, compared to 2°C warming, and that the energy transition required to limit warming to this level will have significant benefits for the access to clean and affordable energy and poverty eradication goals. It also re-emphasised that, globally, the power sector needs to have virtually exited coal by 2050, a finding that has important implications for short- and medium-term policy in South Africa.

**Under least-cost scenarios from South African research organisations, the share of renewable energy in electricity generation could increase to 85%, and GHG emissions for electricity generation in South Africa could be reduced by up 83% below 2012 levels by 2050. Our Paris-compatible scenario leads to an almost complete decarbonisation by 2050.**

The proposed update of the Integrated Resource Plan (IRP) in August 2018, if implemented, could constitute a first step moving to a zero-carbon energy system. Additional action to phase out expensive and inefficient coal-based electricity generation, update the grid infrastructure, and ramp-up renewables deployment is needed to ensure a successful transition by mid-century.

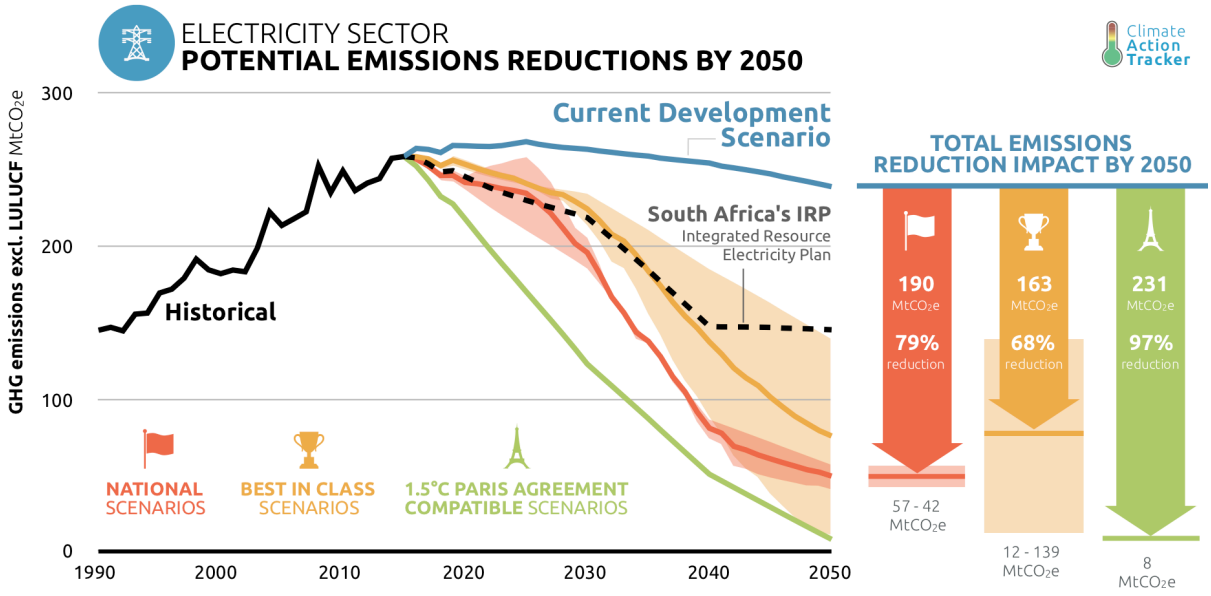


*Figure 1: Overview of sectoral emission pathways under current policies and different levels of accelerated climate action in the South African electricity supply. All sectoral projections towards 2050 done in the CAT PROSPECTS South Africa scenario evaluation tool.*

Shifting South Africa's electricity supply to renewable forms of generation further enables low-carbon electrification trends in urban passenger transport and residential buildings.

## Urban passenger transport and residential buildings

There is huge potential for national and sub-national actors to accelerate climate action by successfully decarbonising key sub-sectors such as urban passenger transport and residential housing.

**In the most ambitious scenario compatible with the Paris Agreement temperature goal, the urban passenger transport in three urban areas of Cape Town, Durban, and the Gauteng province, including Johannesburg and Pretoria, fully decarbonises by 2050 through shifting towards public modes of transport and increased electric mobility.**

Achieving this critically hinges on the electricity supply sector decarbonising in line with the Paris Agreement temperature goal. Although these three major urban areas cover only about 25% of ground transportation emissions in 2012, ambitious policies in these areas alone can stabilise the total emission levels of the South African ground transportation sector (including freight transport) at around today's emission levels, by 2050. Although not quantified in this study, it is expected that translating such measures to the entire ground transportation sector would result in substantial emission reductions compared to recent levels by 2050.

**Similarly, energy efficiency gains through tighter building codes for new residential buildings, increased rates of thermal retrofits, and more efficient appliances can fully decarbonise the residential buildings sector by mid-century if the electricity were to be decarbonised in line with the Paris Agreement temperature goal.**

If the electricity supply sector continues current trends of policies implemented today, increased action in residential buildings in South Africa could still reduce GHG emissions associated with the sub-sector by up to 35% below today's levels by 2050.

These transitions entail key opportunities to advance socially-just urban mobility and housing, while generating local employment opportunities and attenuating the adverse health effects of conventional forms of passenger transport and inappropriate housing.

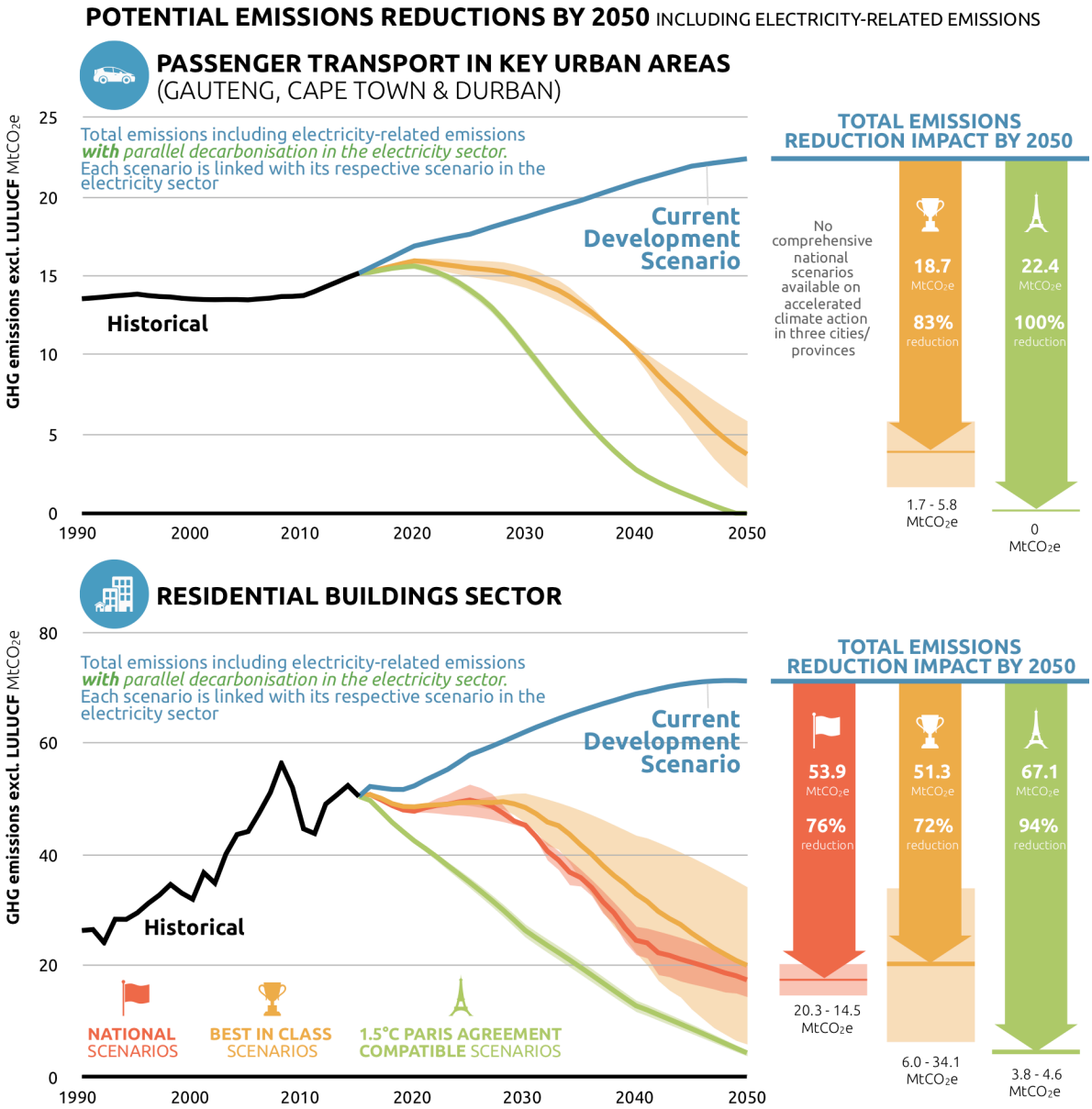


*Figure 2: Overview of sectoral emission pathways under current policies and different levels of accelerated climate action in the urban passenger transport in Gauteng, Cape Town and Durban (upper graph), and residential buildings sector (lower graph). All historical data and sectoral projections towards 2050 from the CAT PROSPECTS South Africa scenario evaluation tool. Data includes electricity related emissions.*

## Accelerated climate action and South Africa's emission reduction targets

**Scaling up climate action in South Africa's electricity supply, urban passenger transport, and residential buildings sector alone can reduce South Africa's total greenhouse gas emissions by up to 17% below 2012 levels by 2050.**

While this still leaves South Africa short of achieving the upper bound of its emissions reduction target range in 2050, it would allow the nation to reach its 2030 targets and be within range of reaching its 2040 targets. In the Climate Action Tracker's country assessment, the upper end of the reduction target in 2030 falls into the "Highly insufficient" rating category, for 2050 in the "Insufficient" category. The lower end falls in the 2°C compatible range in all years. To be Paris compatible, the ambition of the target would need to increase further.

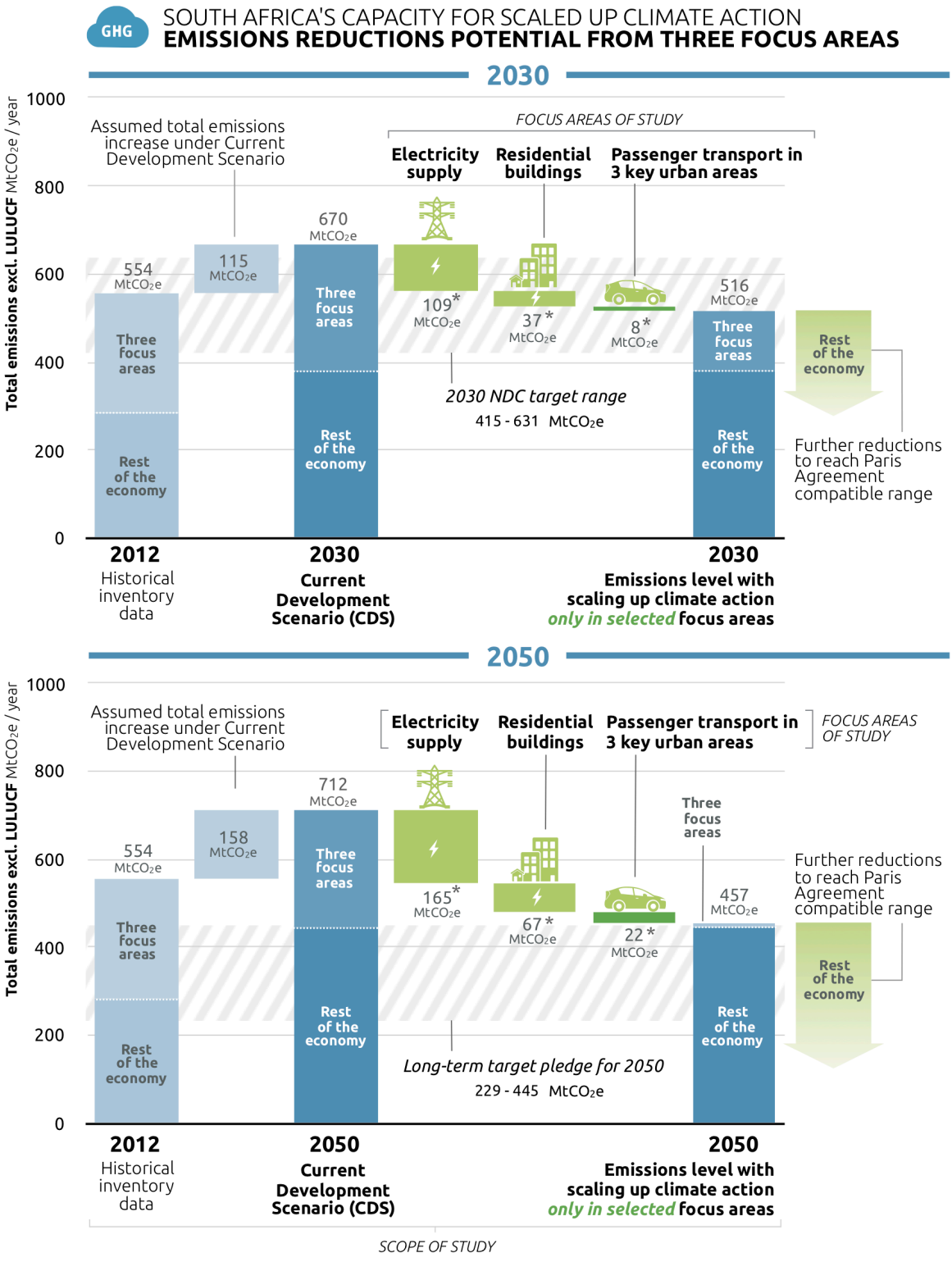


*Figure 3: Overview of total emission levels (excl. LULUCF) under historical inventory data in 2012 (left bar), under a current development scenario in 2050 (middle bar), and most ambitious levels of accelerated climate action by 2050 in the electricity supply, the residential buildings sector, and the urban passenger transport in Gauteng, Cape Town and Durban (right bar). All electricity-related emission reductions from the residential buildings and urban transport sectors are allocated as emissions reductions under these two end-use sectors.*

These findings emphasise that for South Africa to reach its 2050 targets means it must also undertake more ambitious climate action in sectors other than the three analysed in this study, even more so to achieve an economy-wide decarbonisation by mid-century or shortly thereafter.

## The status of sectoral transitions: opportunities for accelerating climate action

*Table 1: Summary table for sectoral policy activity and gap analysis in South Africa for electricity supply, road transport and buildings sector. 1.5°C compatible benchmarks relate to most important short-term steps for limiting global warming to 1.5°C identified by the Climate Action Tracker (Kuramochi et al., 2018). Percentages in the first column indicate the share of national GHG emissions in 2012, calculated based on the Draft Inventory Report of 2016.*

| Sector | 1.5 °C-consistent benchmark | Overall evaluation based on policy activity and gap analysis | Policy rating |
|---|---|---|---|
| **Electricity supply sector** (45% of GHG emissions) | Sustain the global average growth of renewables and other zero and low-carbon power until 2025 to reach 100% by 2050 | • Projected share of low-carbon electricity generation is 23%-26% by 2030Ẅthis deviates from a transition pathway to 100% low-carbon by 2050.<br>• Uncertainty about future capacity extension of renewables and future energy planning with proposed update of Integrated Resource Plan (IRP) of August 2018 still pending<br>• Significant untapped potential for renewable electricity generation and positive cost developments for renewable technologies in South Africa |  |
| | *No new coal plants, reduce emissions from coal power by at least 30% by 2025* | • New coal capacity of 6.35 GW currently under construction with an additional 3.24 GW in the pipeline with no intention of revising their construction in proposed IRP update of August 2018<br>• Up to 12% reduction in emissions from coal combustion by 2030 compared to 2014 (based on recent forecasts), which is not in line with the world average 1.5°C compatible benchmark of 30% by 2025<br>• High historical importance of coal in the electricity mix and for socio-economic development, which necessitates a socially just transition |  |
| **Road transport sector** (8% of GHG emissions) | Last fossil fuel car sold before 2035 | • Overarching Green Transport Strategy (GTS) defines policy priorities for each area of transport until 2050, but no overarching 1.5°C compatible vision for transport sector<br>• Low projected growth in electric vehicle uptake, similar at best to projections for Rest of World in BNEF 2017 with around 1% EV share in new car sales by 2020 and share of 40-50% by 2040<br>• Several policies in transport sector aim to reduce emissions from passenger vehicles and freight transport, however, relatively low level of expected impact (e.g. for biofuel quota programme) |  |
| **Residential buildings sector** (4% of GHG emissions) | All new buildings fossil free and near zero energy by 2020 | • No expectation of tightening of building efficiency standards to levels beyond those currently implemented until 2050<br>• Improvements in emissions intensity per m² over last years, but buildings emissions intensity/capita continues to increase<br>• Several positive policy developments (e.g. mandatory labelling for household appliances or to*ols to measure and certify near zero energy buildings), but lack of enforcement of existing regulation* |  |
| | *Increase building renovation rates from <1% to 5% by 2020* | • *No country-specific forecast available, but roughly estimated to be around 1-2% per year*<br>• *Significant barriers for renovation rate uptake such as high upfront costs, high borrowing rates, long payback periods, and restricted access to financial incentives/support for retrofitting*<br>• *Demand for buildings retrofit is still comparatively low given split incentives* |  |

**The transitions towards zero-emissions in the South African electricity supply, urban passenger transport, and residential buildings sectors have all shown slow progress or have barely started.** Given the status in the three focus sectors, more accelerated and stringent climate action is required to initiate meaningful sectoral transitions.

Table 1 is an overview of this study's evaluation for the three sectors compared with sector-specific benchmarks. These benchmarks represent the most important short-term steps for limiting global warming to 1.5°C identified by the Climate Action Tracker (Kuramochi et al., 2018). The full results of this analysis for all sectors are detailed in the full report.

## Co-benefits of upscaled climate action: employment

**Accelerated climate action in South Africa can generate significant socio-economic co-benefits that help promote the national sustainable development agenda. Such co-benefits comprise low and high-skilled employment in low-carbon-oriented sectors, a reduction in adverse health impacts from air pollution, and increased participation and social justice in mobility and housing.**

These co-benefits directly enable South Africa to progress towards key national sustainable developments goals (SDG) such as ensuring access to affordable, reliable, sustainable and modern energy for all (SDG 7) or making cities and human settlements inclusive, safe, resilient and sustainable (SDG 11). For example, the study's findings on employment generation in low-carbon-oriented sectors from scaled up climate action in electricity generation (see below) supports South Africa's aim to promote inclusive and sustainable economic growth, full and productive employment, and decent work for all as anchored in SDG 8.

**The findings emphasise the employment potential of accelerated climate action in the electricity generation sector, particularly in low-carbon-oriented fields, while at the same time highlighting the need for a "just transition" for those communities affected by diminishing mining jobs by 2030 and beyond. This study's quantification of employment impacts for several electricity supply sector scenarios indicates that changing from a high to a low-carbon electricity supply by 2030 is likely to create as many employment opportunities in South Africa as it would make obsolete.**

Under a current development scenario, approximately 106,000 people a year are directly employed in the development of new electricity supply capacity and the operation and maintenance of both existing and new capacity on average over the period between 2016 and 2030. We estimate that these investments would stimulate a further 180,000 indirect and induced jobs on average a year, for example jobs in the production of cement for the concrete foundations of wind turbines.

The estimated employment impact across all other scenarios is of a similar order of magnitude. They range between approximately 100-130,000 direct jobs a year and 275-350,000 jobs when considering the wider indirect and induced impacts of the investments.

**Electricity supply sector scenarios with accelerated renewables deployment gradually substitute most coal mining jobs with jobs in manufacturing, and construction of renewables, combined cycle gas and peaking generation capacity. These jobs are in technologies and sectors that are more likely to form the core of future electricity supply, both in South Africa and globally.**

**Scenarios where renewable capacity is expanded to meet the increase in electricity demand generate equivalent levels of more sustainable employment, such as under the 1.5°C Paris Agreement compatible scenario. Investing today in growing the value chain of low carbon electricity supply technologies will allow South Africa to manage a gradual, just transition away from coal sector employment.**

The current development scenario with high coal dependence continues to support significant local employment, particularly in coal mining throughout the period to 2030 (see upper right graph in Figure 4). If South Africa and the world implement the Paris Agreement, jobs in coal mining and fossil fuel-based electricity generation will be reduced everywhere, including in South Africa. The challenge in this context is to develop "just transitioning" frameworks that enable the workforce and dependent communities to affect a sustainable and positive transition to a sustainable economy.

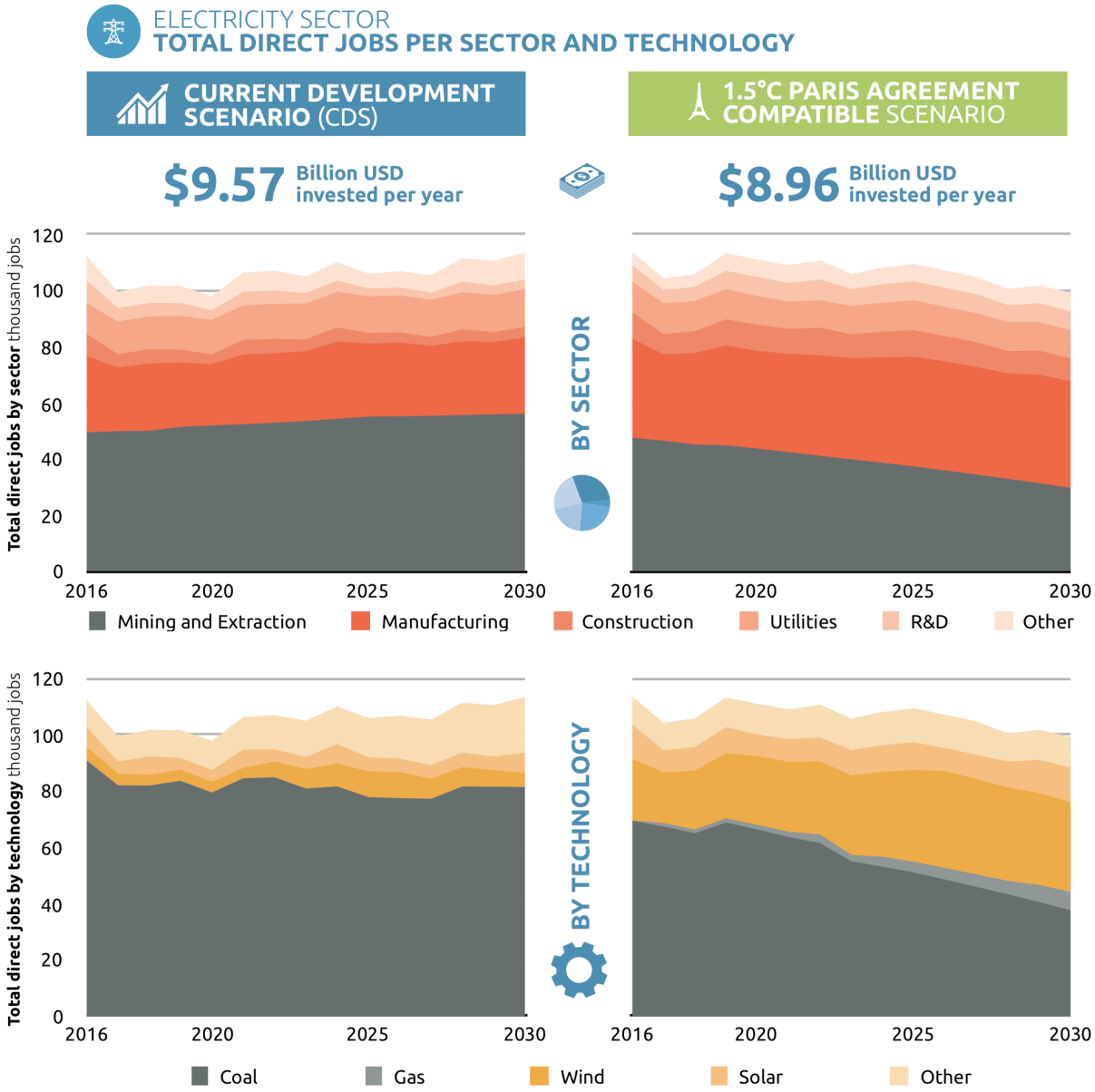


*Figure 4: 'Total direct jobs per employment sector' and 'Total direct jobs per generation technology' between 2016-2030 for the Current Development Scenario (CDS) (graphs on left) and the 1.5°C Paris Agreement compatible scenario for the South African electricity supply sector (graphs on right). Direct employment estimates reflect energy supply sector investments linked to planning, construction, the manufacturing of component parts, operation (including fuel supply such as coal mining, where relevant) and maintenance of power plants.*

Estimates of direct job creation under different electricity generation scenarios in Figure 4 do not consider overall productivity improvements in the South African (coal) mining sector. Our findings remain conservative in nature as they do not account for 'natural' job loss in coal mining related to such productivity improvements in the current development scenario.

Overall investment under different scenarios critically links to employment generation. Investment requirements per unit of electricity generation is lowest in scenarios with high shares of wind and solar PV through the entire period until 2030 and beyond. Heavily coal-based scenarios such as the current development scenario or the upper bound of the national scenario range are more expensive per unit of output. These differences might critically enable South Africa to promote access to affordable, reliable, sustainable and modern energy for all in the nearby future (SDG 7), especially when considering that these differences might further substantiate beyond 2030.

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Climate Action Tracker

The Climate Action Tracker (CAT) is an independent scientific analysis produced by three research organisations tracking climate action since 2009. We track progress towards the globally agreed aim of holding warming well below 2°C, and pursuing efforts to limit warming to 1.5°C.

**climateactiontracker.org**

## The Consortium

Ecofys, a Navigant company, is a leading international energy and climate consultancy focused on sustainable energy for everyone. Founded in 1984, the company is a trusted advisor to governments, corporations, NGOs, and energy providers worldwide. The team delivers powerful results in the energy and climate transition sectors. Working across the entire energy value chain, Ecofys develops innovative solutions and strategies to support its clients in enabling the energy transition and working through the challenges of climate change.

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NewClimate Institute is a non-profit institute established in 2014. NewClimate Institute supports research and implementation of action against climate change around the globe, covering the topics international climate negotiations, tracking climate action, climate and development, climate finance and carbon market mechanisms. NewClimate Institute aims at connecting up-to-date research with the real world decision making processes.

**newclimate.org**

Climate Analytics is a non-profit climate science and policy institute based in Berlin, Germany with offices in New York, USA, Lomé, Togo and Perth, Australia, which brings together interdisciplinary expertise in the scientific and policy aspects of climate change. Climate Analytics aims to synthesise and advance scientific knowledge in the area of climate, and by linking scientific and policy analysis provide state-of-the-art solutions to global and national climate change policy challenges.

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