GreenCape

INDUSTRY BRIEF

# Enabling large-scale renewable energy development in Mpumalanga

# Main insights

## 01 Mpumalanga has been proactive in exploring opportunities in the green economy.

- The Province has driven initiatives which works to advance a sustainable and inclusive green economy and create shared value in the Mpumalanga province.
- At the heart of this green economy will be the growth of the renewable energy market.

## 02 There are a host of enabling factors that are expected to be key to locating key renewable energy projects in the province.

- Mpumalanga has 3.3GW of grid capacity available and is one of the few provinces with the available capacity to host large-scale renewable energy projects. 14GW of grid capacity will be available from the planned/ scheduled decommissioning of power stations by 2030.
- Strategic positioning near energy-intensive industries and large-scale operations seeking to transition to sustainable practices, along with its strategic proximity to Gauteng, South Africa's energy demand hub and industrial centre.

## 03 To capitalise on this potential for renewable energy development in the province, businesses have to navigate a few challenges particularly associated with mining and environmental considerations:

- Accessing data on land parcels, such as ownership and mining rights data is made difficult due to a lack of a mining cadastre.
- Selecting suitable locations for wind farm projects is complicated by the scarcity of data regarding bird flight patterns, particularly within an environment marked by rich biodiversity and a significant number of endangered bird species in the province.
- The Section 53 application process of the Mineral and Petroleum Resource Development Act, Act no. 28 of 2002 experiences extended delays attributed to the high concentration of mining activities and the sheer volume of rights applications within the province.

## 04 Short-term solutions are available to renewable energy developers to navigate the challenges related to mining and environmental considerations:

- Developers can register with the InvestSA Energy One Stop Shop to fast-track the development approval process.
- Developments can register as Strategic Infrastructure Projects for both the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) and private projects.
- The Section 53 application process can be used to obtain rights and permitting data on a land parcel if not readily available.
- Research for bird flight paths can be funded to avoid the risk of projects not receiving approval due to data uncertainty.

# Context

The share of renewable energy technologies, especially wind energy and solar PV, continues to grow across South Africa. By 2022, it reached a total of 6.3 GW installed capacity (IPP Office, 2023) and 11% of the country's total installed capacity.

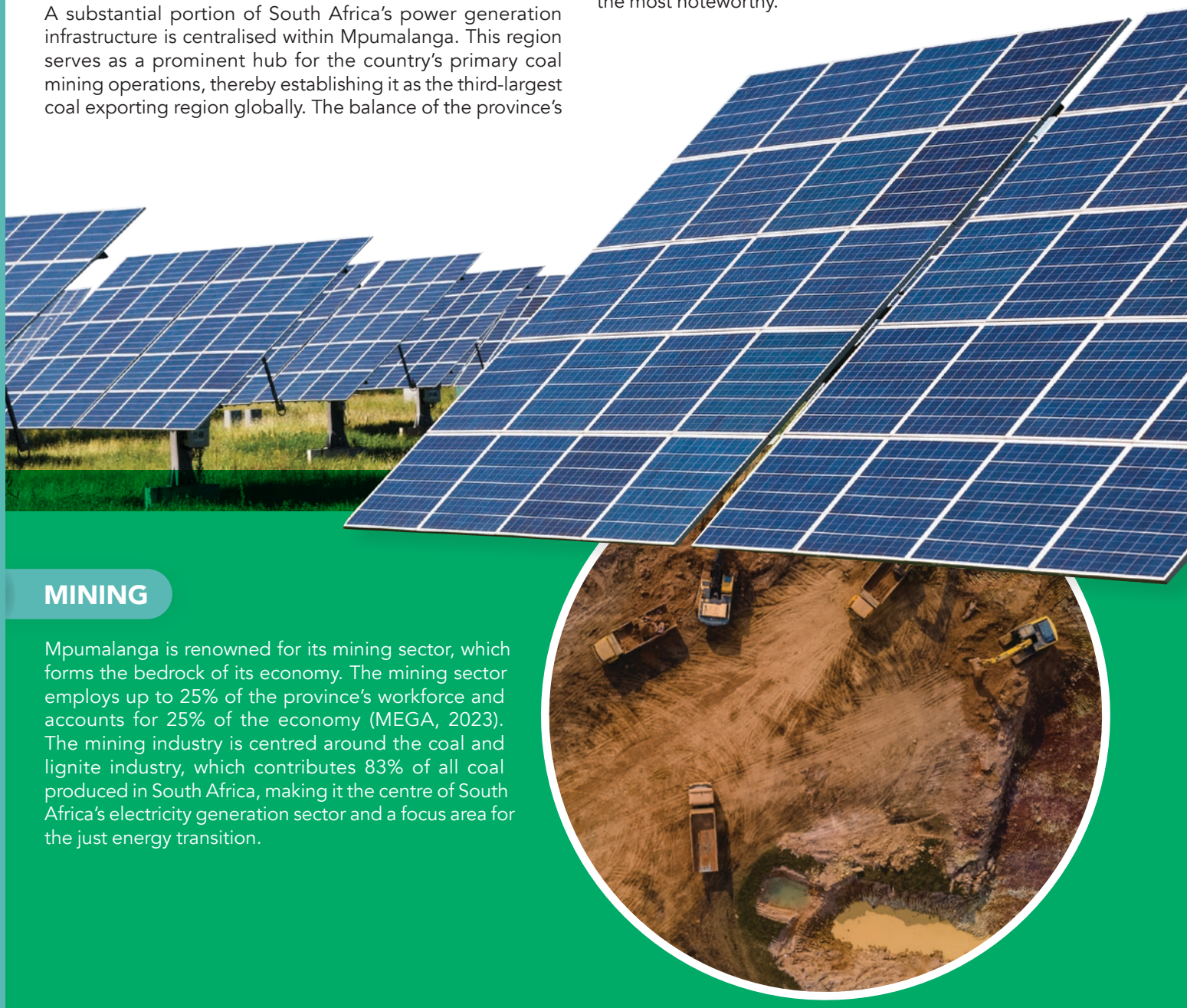
Mpumalanga has been proactive in exploring opportunities in the green economy. The Province has driven various initiatives to advance a sustainable and inclusive green economy and create shared value in the Mpumalanga province. The priority areas listed by the Province include energy security, green economy, industrialisation through localisation and export promotion, agriculture and food security, rollout of infrastructure, employment stimulus, tourism, and cultural and creative industries.

This opportunity-focused approach has the potential to unlock the job creation and investment potential of the South African just energy transition. At the heart of this transition will be the growth of the renewable energy market.

A substantial portion of South Africa's power generation infrastructure is centralised within Mpumalanga. This region serves as a prominent hub for the country's primary coal mining operations, thereby establishing it as the third-largest coal exporting region globally. The balance of the province's economic landscape is defined by a mix of agriculture, plantation forestry, mining, and ecotourism.

Bid Window 6 of the REIPPPP revealed a significant constraint to the connection of new projects in the Northern Cape, Western Cape and Eastern Cape, where the bulk of current renewable energy projects have been developed. The recently launched Bid Window 7, increased the demand for grid capacity in the country. These constraints highlighted the need to develop new projects in areas with more suitable grid capacity, such as Mpumalanga. Despite the available infrastructure, throughout the REIPPPP programme, there were no large-scale wind or solar PV projects proposed in Mpumalanga.

There is an increase in the number of private renewable energy projects in the early stages of development within Mpumalanga. However, these projects face several unique barriers, with mining and environmental considerations being the most noteworthy.



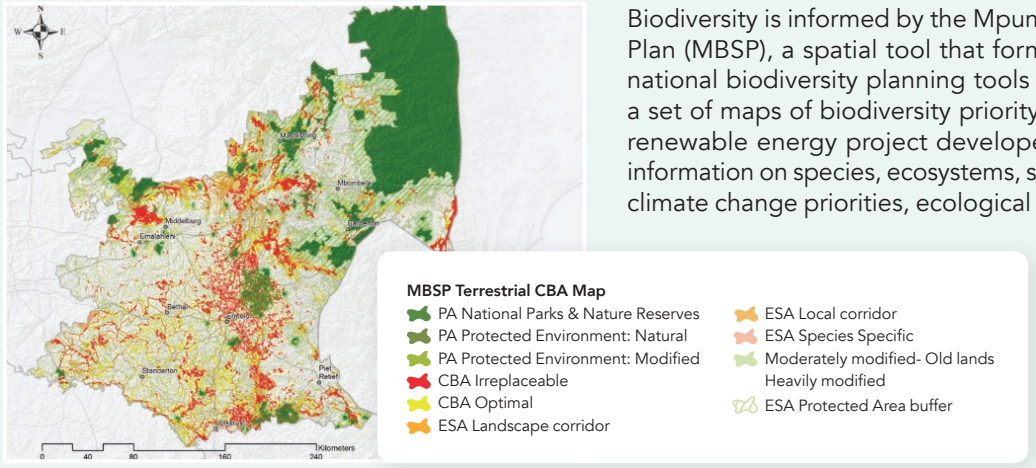
## MINING

Mpumalanga is renowned for its mining sector, which forms the bedrock of its economy. The mining sector employs up to 25% of the province's workforce and accounts for 25% of the economy (MEGA, 2023). The mining industry is centred around the coal and lignite industry, which contributes 83% of all coal produced in South Africa, making it the centre of South Africa's electricity generation sector and a focus area for the just energy transition.

## ENVIRONMENT

Mpumalanga is well known for its globally important biodiversity, its wealth of natural resources and natural vistas. Its ecosystems are characterised by high levels of both plant and animal diversity and a significant number of unique species that are not known to occur anywhere else but within Mpumalanga.

Figure 1: Mpumalanga critical biodiversity assessment map




Biodiversity is informed by the Mpumalanga Biodiversity Sector Plan (MBSP), a spatial tool that forms part of a broader set of national biodiversity planning tools and initiatives, comprising a set of maps of biodiversity priority areas available for use by renewable energy project developers. MBSP includes all our information on species, ecosystems, spatial ecological processes, climate change priorities, ecological infrastructure and more.

*Source: ArcGIS*

Link to MBSP: **mpumalanga.com/our-provincial-parks/biodiversity-sector-plan**

# The challenges

Renewable energy development with a focus on wind projects has to navigate the land use challenges of mining, agriculture and environmental protection. Although some of the challenges are found in other parts of the country, the scale and density of mining and environmental conservation activities are unique to Mpumalanga. In both cases, information asymmetry is a challenge that project developers need to navigate.

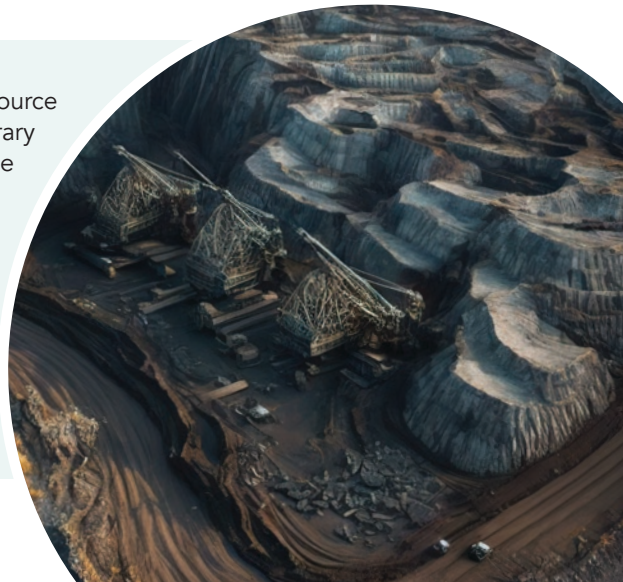
## MINING

Historical and ongoing mining activities within the province present challenges in land use and policy for renewable energy developers. These activities carry inherent project development risks, and the uncertainty surrounding land use permitting introduces significant delays to the development process.

For the development of large-scale renewable energy projects, it is necessary to submit a Section 53 application to the Department of Mineral Resources and Energy (DMRE).

Section 53 applications refer to Section 53 of the Mineral and Petroleum Resource Development Act, Act no. 28 of 2002, which states that the use of land contrary to the Act, such as for renewable energy development, must apply to the Minster for approval.

The process involves applying to the regional DMRE office, whereby the regional manager will acknowledge it. The application will then be referred to the Mine Health and Safety Department for comment before a final letter is issued. There is currently no minimum feedback period for Section 53 applications, therefore applications are treated with less urgency than mining or prospecting rights applications.

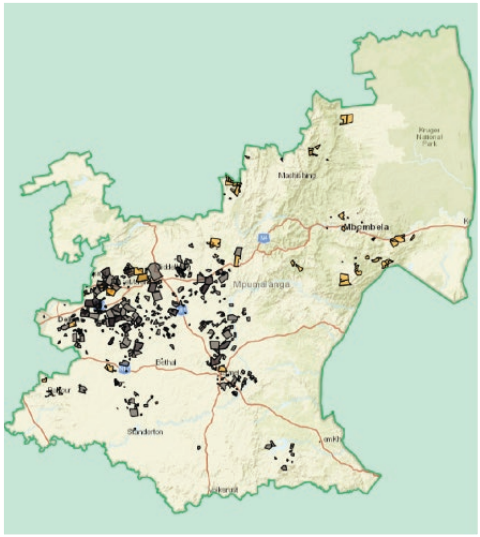


The application process is challenging since there are no publically available mining cadastre for the province or South Africa. Developers are unable to identify the location and existence of mining and prospecting rights on a parcel of land before engaging with the department. This challenge is exacerbated by the reality that the majority of all land available for development has had applications submitted for prospecting or mining rights, or mining permits for it and that there is a backlog of applications for the department to work through. In May 2023, the DMRE indicated that there is a backlog of 1 584 mining permits, 58 mining rights and 433 prospecting rights applications (Kobe, 2023). The DMRE is constrained in its capacity to process the application backlog, new applications, queries and Section 53 applications.

Section 53 applications will be impacted by the surrounding mining activities and the availability of resources in the area. It is unlikely that Section 53 applications will be issued on resource-rich deposits, since the Act requires the DMRE to prevent the sanitation of natural resources. Furthermore, surrounding mining activities, such as blasting and undermining may create a safety risk to the development.

Identifying the rights and applications for rights on a property is challenging. Landowners are not necessarily aware of mining rights ownership on their property. Although it is a requirement for mining rights, developers' experience has shown that awareness is lacking. In many cases, contact details are not available and the landowners are unreachable. The regional DMRE office can attempt to facilitate communication, but a more comprehensive database is needed to identify land ownership and mining rights, as well as to track applications.

Figure 2: The location of active mines, according to the DMRE database



*Source: DMRE*

## Exploring solutions for the highlighted challenges associated with mining

The challenges associated with mining highlighted in the previous section are known by the Presidency, which has set up the **Energy One Stop Shop (EOSS)** initiative through InvestSA as a priority action of the **National Energy Crisis Committee (NECOM)**, to act as a conduit between developers and decision-making authorities. The EOSS can reduce the challenges encountered and fast-track the approval process by removing blockages.

Large-scale renewable energy developers will also be requested to register their projects as Strategic Infrastructure Projects (SIPs) to be fast-tracked through **Infrastructure SA**, irrespective of the off-taker (private or REIPPPP). By following these steps, developers will receive governmental support in resolving development challenges.

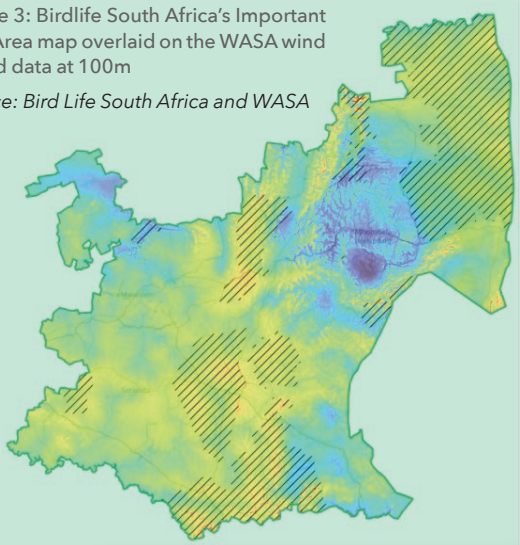
In the long term, a mining rights cadastre that is publically accessible will be beneficial. According to the DMRE, a tender process for the development of the mining cadastre is progressing. In a workshop hosted with industry and government stakeholders, the following recommendations were presented: a more sustainable solution is required, such as enabling the DMRE office with the resources to process all the applications and incentivise the processing of section 53 applications. The Mineral and Petroleum Resource Development Act, Act no. 28 of 2002, does not currently provide a turnaround time for Section 53 applications. Adding a turnaround time to the regulations will reprioritise the current approach to resolving applications and ensure commitment by the department.

## BIRD FLIGHT PATHS

The flight paths of large bird species, many of which are endangered, are not known for Mpumalanga due to additional research required on the topic. An Important Birds Area (IBA) map was created by Birdlife South Africa (thatched area in the image below) with limited research or data inputs, that guide environmental decision-making for bird species. The consequence is that large land areas are indicated as potential bird flight paths that are in direct conflict with suitable wind energy resources, highlighted with warm colour schemes from the Wind Atlas of South Africa (WASA) in the image below.

Figure 3: Birdlife South Africa's Important Bird Area map overlaid on the WASA wind speed data at 100m

*Source: Bird Life South Africa and WASA*




Bird flight path tracking and mapping can improve the understanding vulnerable bird species, which will enable improved decision-making by commenting authorities about the location of wind farms. Furthermore, the protection of bird species can greatly improve with relevant data which may reveal previously unknown areas of importance.

Without the relevant data, the relevant departments will evaluate environmental applications from a position of caution. The uncertainty will thus pose a risk to new project development because applications might get rejected due to a lack of data.

The proposed bird studies aim to determine the movement, behavioural patterns and important flyways, using GPS tracking through collars placed on vulnerable bird species. The main output of the study is to develop collision risk maps, species flight characteristics, mitigation considerations, recommendations on wind farm applications, and identification of no-go areas for wind farm development. **The key bird species identified are:**

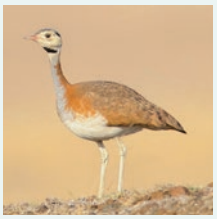
Secretary bird

Grey Crowned Crane

Blue Crane

Denham's Bustard

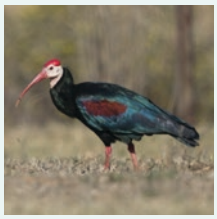
Greater Flamingo



White-bellied Korhaan

African Marsh Harrier

Lesser Flamingo



Southern Bald Ibis

Blue Korhaan

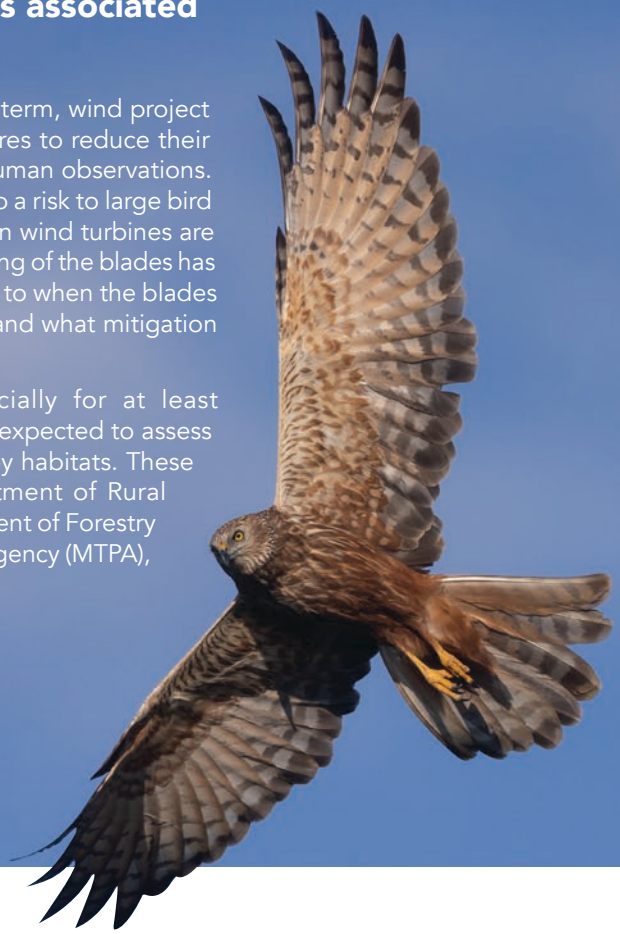
Cape Vulture

Jackal Buzzard

## Exploring solutions for the highlighted challenges associated with mining bird flight paths

Bird flight paths mostly affect wind energy developments. In the short term, wind project developers must be aware of the risks and develop mitigation measures to reduce their impact, such as Shut Down on Demand (SDoD) either using radar or human observations. The impact is not only limited to wind turbines, since power lines are also a risk to large bird species. There is a pressure on the industry to ensure that the blades on wind turbines are painted to reduce the collision fatality of large daytime active birds. Painting of the blades has been proven to be cheaper during the construction phase as compared to when the blades are operational. There is a need to study bird species that fly at night and what mitigation measures may be taken to protect them.

In the long term, bird monitoring studies are required, especially for at least 12 endangered bird species known in Mpumalanga. These studies are expected to assess provincial-specific factors like bird migration routes, flyways and nearby habitats. These studies require financial support and coordination with the Department of Rural Development Land and Environmental Affairs (DARDLEA), the Department of Forestry Fisheries and the Environment (DFFE), Mpumalanga Tourism and Parks Agency (MTPA), the Endangered Wildlife Trust and Academic institutions.



# Unique opportunities in Mpumalanga for renewable energy

Taking these challenges into consideration, Mpumalanga offers unique opportunities for the development of renewable energy projects. Solar PV technology, in particular, stands out as having significant potential within the province. This is attributed to the fact that the primary environmental concerns in the region are related to bird species, which are predominantly impacted by wind turbines.

The Department of Forestry, Fisheries, and the Environment (DFFE) has taken proactive steps to facilitate solar PV development in environmentally non-sensitive areas. They have announced a reduction in environmental requirements for such projects, eliminating the need for an Environmental Impact Assessment (EIA) for areas that are classified as previously modified. Moreover, the proposed expansion of the Renewable Energy Development Zone (REDZ) further underscores the commitment to fostering sustainable energy development in the region.

Another promising avenue for renewable energy lies in mine rehabilitation. Mines can integrate renewable energy into their rehabilitation and closure plans, leveraging existing infrastructure to undertake projects once mining activities have concluded. This dual-purpose approach not only aids in environmental restoration but also maximizes the utility of the land and infrastructure.

Eskom's significant presence in the province plays a pivotal role in the renewable energy landscape. As more coal plants are phased out, the existing generation infrastructure can be repurposed for large-scale renewable energy projects. This strategic transition offers a solution to grid constraints encountered in other regions of South Africa, further positioning Mpumalanga as a hub for sustainable energy development.

# Next steps

The challenges identified in this document relate specifically to mining and avian protection from wind turbines. Short-term solutions are suggested, but the long-term solutions will require continuous multi-stakeholder engagements. Changes to the existing legislation should be considered with consideration to align the needs of energy, environmental conservation, agriculture and mining.

**There are also less specific challenges to Mpumalanga that could become more prominent as the first large-scale wind farms start construction, including:**

- Data sharing and centralisation, including the development of a mining cadastre.
- Coordinate grid connection for renewable energy plants to facilitate infrastructure planning.
- Logistical challenges for large components (such as wind turbines) through capacitating logistical hubs such as the Port of Richards Bay.
- Addressing skills shortages for project implementation.
- Mapping of geological risks caused by mining.

Further collaborative efforts will better coordinate these activities, considering that the opportunities facing Mpumalanga are subject to change with the changing energy landscape. Preparedness and responsiveness will be crucial to ensure a just energy transition.

# Glossary

1. **Bird monitoring studies:** Research initiatives to assess and understand bird species, migration routes, and habitats, are crucial for informing wind energy project planning.
2. **Coal plants decommissioning:** The planned shutdown or retirement of coal-based power plants, often part of efforts to transition to cleaner energy sources.
3. **Energy One Stop Shop (EOSS):** An initiative to facilitate communication between renewable energy developers and decision-making authorities, aimed at reducing challenges and expediting approval processes.
4. **Environmental Impact Assessment (EIA):** A systematic process to identify, predict, and evaluate the environmental effects of proposed projects, helping to make informed decisions.
5. **Grid capacity:** The maximum amount of electricity that a grid can handle, representing the potential for hosting large-scale renewable energy projects.
6. **Important Birds Area (IBA):** Designated areas critical for the conservation of bird species, providing a framework for environmental decision-making.
7. **Infrastructure SA:** An organisation that oversees and coordinates infrastructure development in South Africa, including renewable energy projects.
8. **Just energy transition:** A movement towards a more sustainable and equitable energy system, often involving a shift from fossil fuels to renewable energy sources, with people at the centre.
9. **Mine rehabilitation:** The process of restoring a mining site to a state that is environmentally and socially acceptable, potentially incorporating renewable energy as part of the rehabilitation plan.
10. **Renewable Energy Development Zone (REDZ):** A designated area with favourable conditions for renewable energy development, subject to reduced environmental requirements for solar PV projects.
11. **Renewable Energy Independent Power Producer Procurement Programme (REIPPPP):** A national power procurement program in South Africa aimed at encouraging private investment in renewable energy projects.
12. **Shut Down on Demand (SDoD):** A mitigation measure for wind energy projects involving the temporary shutdown of turbines to prevent collisions with large bird species.
13. **Strategic Infrastructure Projects (SIPs):** Projects identified by the government as crucial for national development and given priority for streamlined approval processes.
14. **Wind Atlas of South Africa (WASA):** A comprehensive dataset providing information on wind speeds and patterns across South Africa, essential for wind energy project planning.

**For further information and support please contact Collins Nyamadzawo or Ulrich Terblanche for assistance:**


**COLLINS NYAMADZAWO**
Senior Analyst: Energy (Mpumalanga focus)
Email: collins@green-cape.co.za

**JACK RADMORE**
Programme Manager: Energy
Email: jack@green-cape.co.za

**ULRICH TERBLANCHE**
Senior Analyst: Energy (Large-scale RE focus)
Email: ulrich@green-cape.co.za

# References

DFFE, 2023. Renewable Energy EIA Application Database for SA. [Online]
Available at: **egis.environment.gov.za/renewable_energy**
[Accessed 12 December 2023].

Kobe, M., 2023. Portfolio Committee on Mineral Resources and Energy in the National Assembly [Interview] (23 May 2023).

MEGA, 2023. MEGA. [Online]
Available at: **mega.gov.za/mega-key-sectors/mining**
[Accessed 12 December 2023].

## Bird photography by:

Nicholas Fordyce, Michael Buckham, Dominic Rollinson, Daniel Engelbrecht & Ian Rijsdijk

# Useful resources

**BirdLife South Africa**: A valuable resource for bird conservation and research in South Africa.

**Infrastructure SA**: The official organization overseeing and coordinating infrastructure development initiatives in South Africa, including renewable energy projects.

**Invest SA Energy One-Stop-Shop**: An initiative aimed at streamlining communication between renewable energy developers and regulatory authorities, facilitating project development.

**Mpumalanga Economic Growth Agency**: An agency focused on promoting economic growth and development in Mpumalanga, including support for renewable energy initiatives.

**Mpumalanga Green Cluster Agency**: A key organization dedicated to fostering sustainability and green initiatives in the Mpumalanga province, including renewable energy projects.

**Mpumalanga Tourism and Parks Agency**: Information on tourism and environmental conservation in Mpumalanga, potentially relevant for renewable energy projects in the area.

**NECOM (National Economic and Development Labour Council)**: Information on NECOM's role in shaping South Africa's economic development policies, which may impact renewable energy initiatives.

**Wind Atlas South Africa**: A comprehensive resource providing wind speed and pattern data essential for planning wind energy projects in South Africa.

**These resources offer valuable information and support for individuals and organizations interested in renewable energy and related initiatives in South Africa, particularly within the Mpumalanga province.**



Developed by GreenCape, supported by Agora Energiewende.

GreenCape
Supporting the business of green