



SOUTH AFRICA

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TOWARDS AN EQUITABLE TRANSITION TO A LOW-CARBON CLIMATE-RESILIENT ECONOMY

OPPORTUNITIES IN SOUTH AFRICA'S WIND ENERGY VALUE CHAIN

The push for more electricity generation in South Africa, especially more renewable energy (RE), is likely to result in a significant increase in wind energy projects across the country. This could in turn drive the local demand for wind turbine components and related services needed for development and operation of wind plants.

WHAT IS NEEDED TO PRODUCE WIND TURBINES?

Natural minerals and man-made materials include aluminium, cement and steel to name but a few of the items that go into the different components in a wind tower. The infographic (on the next page) shows the stages of the value chain and where the opportunities lie for job creation and developing a local wind energy industry.

WHAT IS THE STATE OF SOUTH AFRICA'S WIND ENERGY MARKET?

Wind energy does not have a small-scale embedded market, so the potential for rapid off-take relates to large private projects or the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP).

Of the main components in a wind turbine, only the towers, transformers and some cabling are currently made in South Africa.

HOW CAN SA SUPPORT LOCAL WIND ENERGY GROWTH?

1. Configure industrial support to better support local manufacturers. This may include improved access to carefully structured concessional finance.
2. For tower manufacturing, where precast concrete is at a distinct advantage over steel, consider a local precast concrete facility close to a cluster of wind plants to reduce transport and logistic costs.
3. Explore the development of toll manufacturing facilities that could produce towers for several original equipment manufacturers (OEMs).
4. Produce local steel and aluminium products with correct specifications.
5. Pursue local production of gearboxes and sub-componentry, building on existing capabilities and experience in fixing gearboxes.
6. Upskill and professionalise local staff to fulfil technical roles in the value chain.

WIND ENERGY UPTAKE

The Integrated Resource Plan (IRP) provides that by 2030 the electricity generation mix is to comprise 21% – 17 742 MW – of wind energy. A more ambitious IRP would result in an increase in wind energy demand.

Through the REIPPPP, by December 2021:

- More than 6 000 MW has been allocated to private sector bidders across a variety of RE technologies, principally in wind and solar.
- 3 357 MW of wind energy had been procured through 34 projects, of which 31 were operational.
- The average project size is 98,7 MW.

To meet the 14 000 MW of new capacity indicated in the 2019 IRP, by 2030, South Africa will need approximately 5 000 new large wind turbines with about 15 000 blades.

From August 2021 and the amendments to the Electricity Regulation Act (lifting the licensing exemption threshold from 1 MW to 100 MW), to the end of September 2022, a total of 149 MW of wind-based generation capacity had been registered with the National Energy Regulator of SA. With the July 2022 announcement of the total removal of the licensing threshold for distributed generation, these numbers are expected to increase dramatically.

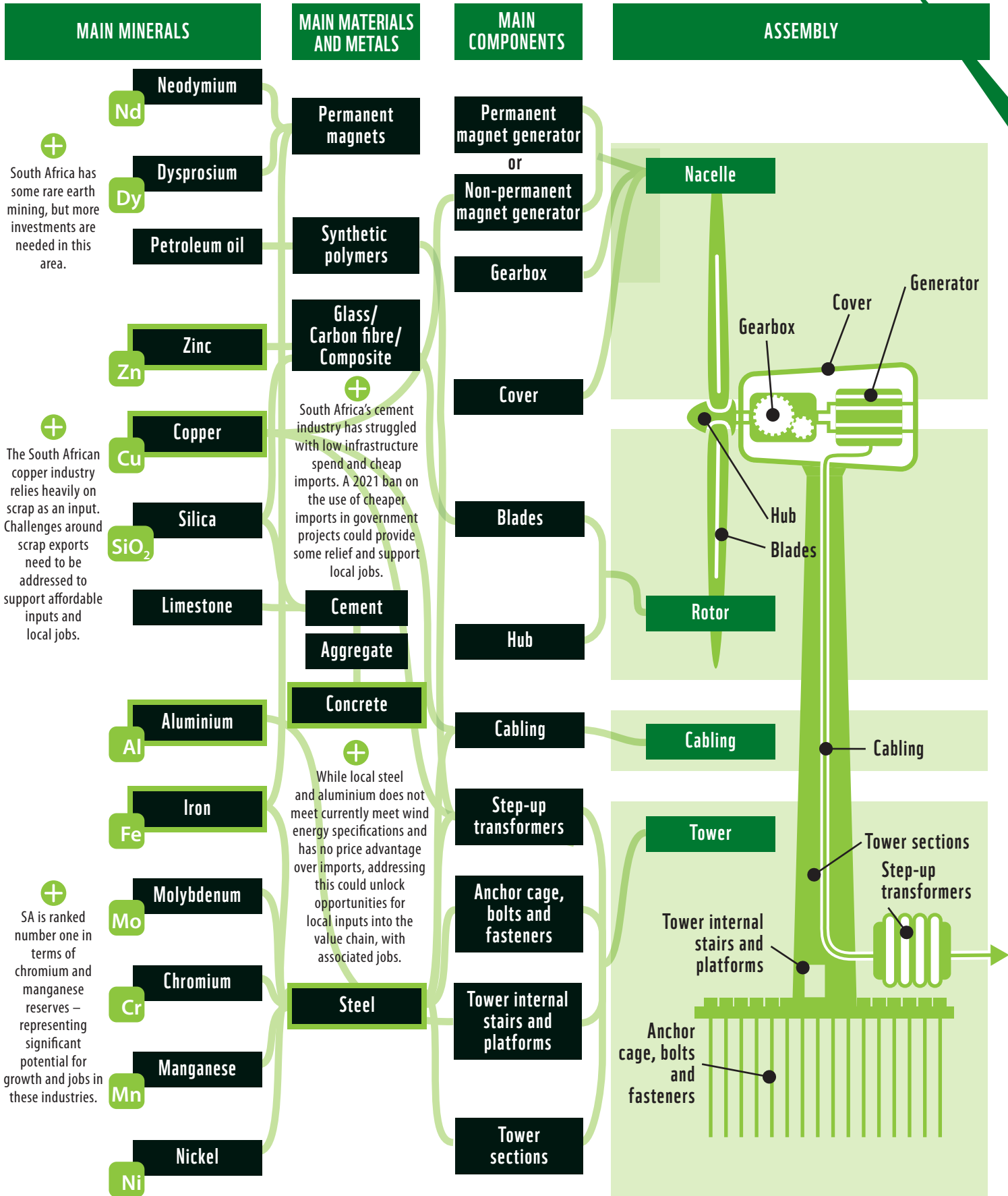


Explore further insights into South Africa's wind energy manufacturing value chain at <https://www.tips.org.za/research-archive/sustainable-growth/green-economy-2/item/4442-insights-into-the-wind-energy-value-chain-in-south-africa>





MATERIALS AND MANUFACTURING VALUE CHAIN FOR WIND ENERGY: OPPORTUNITIES FOR SOUTH AFRICA





≤2%

of water required by nuclear or coal generation

Water and energy are used in all the conversion processes throughout the value chain. On average, in terms of litres per megawatt hour, wind electricity generators use only 1,8% to 2% of the water required by nuclear and coal electricity generators.

ASSEMBLY

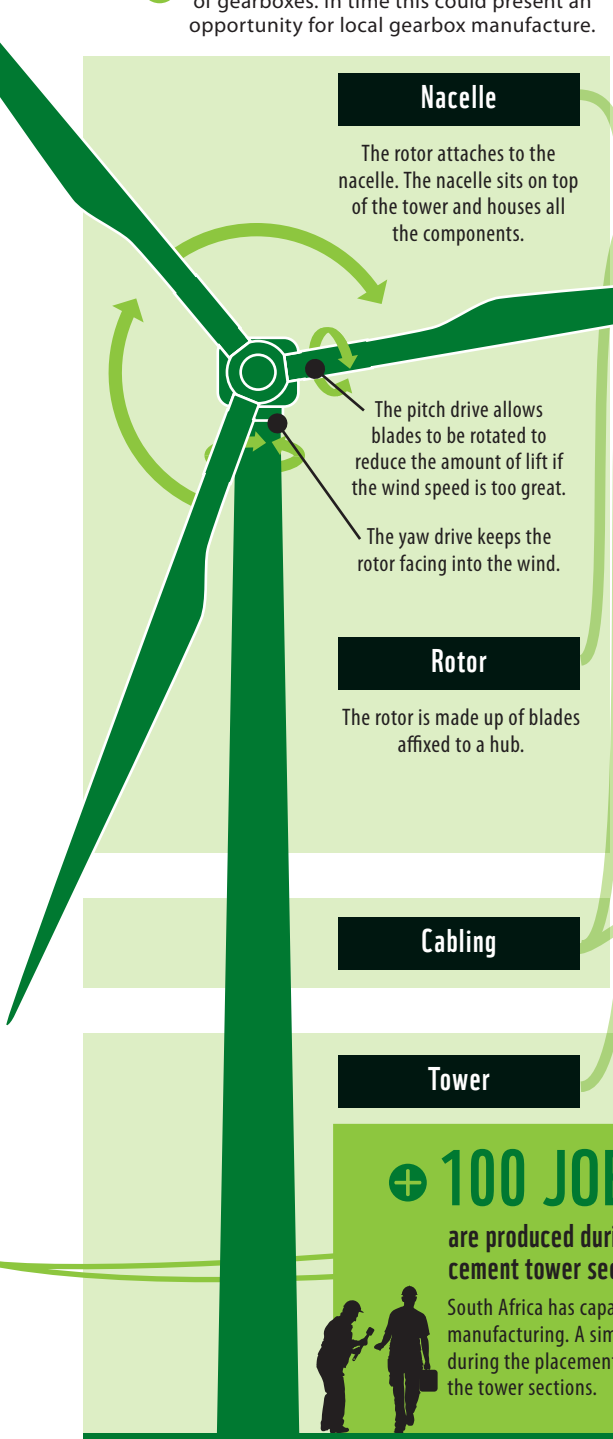
INSTALLATION

OPERATIONS & MAINTENANCE

DECOMMISSIONING AND END-OF-LIFE

+ Local capabilities already exist in the repair of gearboxes. In time this could present an opportunity for local gearbox manufacture.

+ Globally 14 000 blades could be decommissioned by 2023, equivalent to between 40 000 and 60 000 tonnes. Most of South Africa's wind plants will only reach their end-of-life in more than a decade.



Nacelle

The rotor attaches to the nacelle. The nacelle sits on top of the tower and houses all the components.

The pitch drive allows blades to be rotated to reduce the amount of lift if the wind speed is too great.
The yaw drive keeps the rotor facing into the wind.

Rotor

The rotor is made up of blades affixed to a hub.

Cabling

Tower

Wind turbines

Civil balance of plant

Electrical balance of plant

Lubricants

Parts repair

Parts replacement

Grid control and monitoring

Repair

Reuse

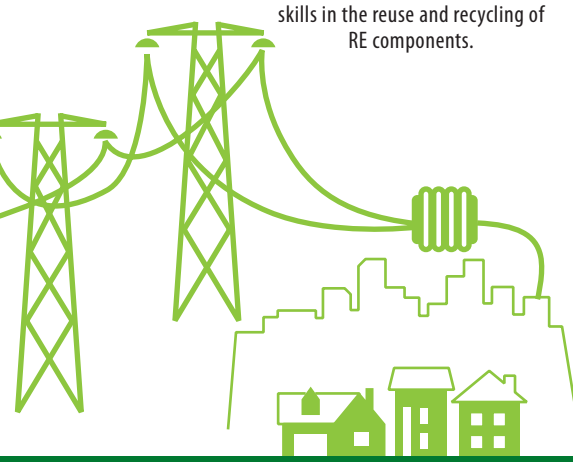
Recycle

Safe disposal

+ 100 JOBS

are produced during manufacture of cement tower sections of each plant

South Africa has capabilities in cement tower manufacturing. A similar number are created during the placement of steel that goes into the tower sections.



+ Wind blades are large and made of composites that are almost impossible to recycle. South Africa needs to consider possible future uses for blades and develop the industrial capabilities to repurpose or reuse them. South Africa could become a regional hub for building skills in the reuse and recycling of RE components.



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