

Alternative sources of energy for South Africa in various shades of green

by Danie Smit

While it is essential to ensure that the country has a reliable source of base-load energy to fuel economic developments, such as mining, as well as for residential and commercial purposes, this should not be at the expense of the country's natural resources and biodiversity. Over the years, cheap energy from coal-fired power generation facilities has taken its toll on the quality and quantity of the country's water resources, as well as on the biodiversity that has made South Africa such a sought-after tourist destination.

Coal is not only a non-renewable resource, but also plays a major role in climate change. Due to the huge amounts of CO₂ and other gases that are emitted during combustion, the generation of electricity through coal has a large carbon footprint and impacts negatively on the country's water resources, air quality and biodiversity.

Over many decades, substantial areas of Highveld grassland and bushveld have been scarred by open-cast coal mining, accompanied by large ash and waste dumps. There has also been limited success at rehabilitation to restore the ecological potential of the area.

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Alternative sources of energy

As a result of the negative impact of coal-based power generation, alternative (renewable) sources of energy, such as the sun, wind and water, need to be considered. Such alternatives are also more sustainable and have come to be regarded as green energy sources. However, they do not come without a cost to the environment.

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With its long, cloudless sunny days (especially in the Karoo and the Northern Cape), South Africa has one of the highest solar irradiation levels in the world. This makes solar power an attractive source of

alternative energy. Solar energy is generated when the sun shines on special photovoltaic cells that use the sun's radiation energy to generate an electric current. The main benefit of solar power is that



→ Open-cast coal mining has scarred large areas of natural vegetation.



→ A wind farm has a significant visual impact on the surrounding area, which can affect tourism.

it can supply remote areas with reasonably inexpensive power. It is a clean source of energy with no direct emissions. In order for solar energy to make a meaningful contribution, however, a large battery bank is required that is capable of storing energy during the day and feeding it into the national grid. The solar plant itself will cover large areas of agricultural land or natural vegetation. These areas would have to be cleared of all large trees and buildings to ensure maximum radiation. Such a solar park would be visible over long distances and would impact negatively on several other economic sectors, such as tourism, agriculture and conservation.

The use of wind turbines to generate electricity is another source of alternative energy that is under investigation. Electricity is generated when the wind turns a set of blades attached to a generator that is situated on a mast about 80 metres above the ground. South Africa has a very long coastline with strong winds. Unfortunately, the areas that are

most suitable for the development of wind energy overlap with prime tourism areas, like the West Coast. In order for wind energy facilities to be economically viable, several units need to be placed together in a wind farm development. These farms have a significant visual impact on the surrounding area. Although wind energy is regarded as a form of green energy, the footprint of a wind farm, which entails the construction of terraces for the wind turbines, is a matter of concern to the agricultural sector, as it represents a substantial loss of agricultural land.

Another alternative source of clean energy is that of hydropower. Hydro-energy is generated when gravity feeds water from a large dam or river through a tunnel into the propellers of a generator, which turns and creates an electrical current. For South Africa, this source of energy is not as desirable an alternative as one might imagine, due to the fact that South Africa does not have that many large rivers. The construction of a hydropower facility, with dams and water transfer schemes, will

therefore have a significant impact on the receiving environment. The cost associated with constructing such a facility also has an impact on its feasibility, especially in a country with limited resources and sites to develop hydropower facilities.

Green alternatives

The research that is being conducted on alternative means of energy production, including nuclear energy and renewable sources of energy (the sun and wind), will also need to ensure that the impact of these sources of energy on the environment is minimised and that they do not have a negative effect on other sustainable economic sectors. ☺

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