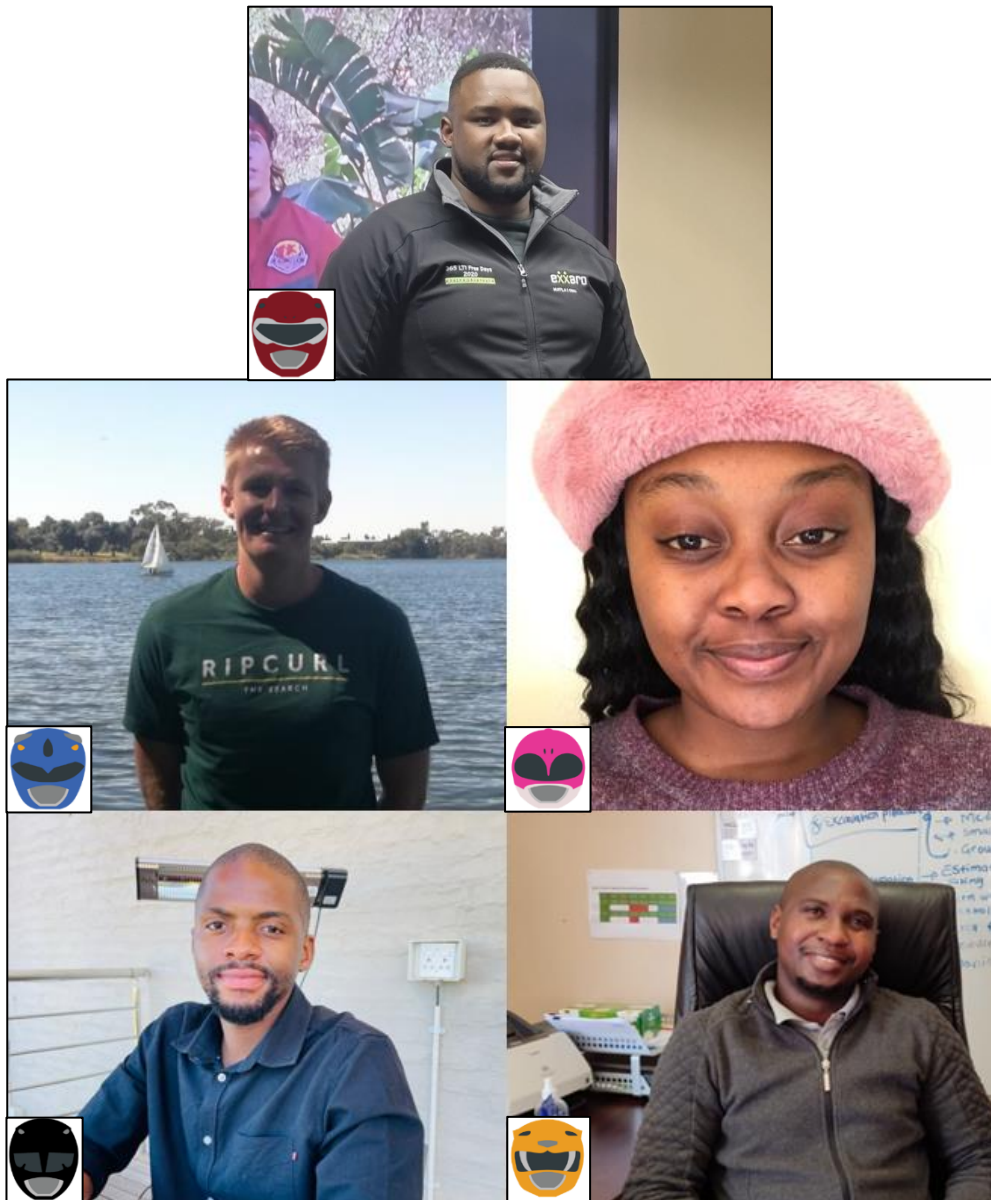


Renewable Energy Technology (Wind & Solar) Overview & Trends

The Power Rangers

ABSTRACT



Top: Mmangaliso Ntshangase (CIVIL)

Middle: Shaun La Cock (ELEC), Naniwe Kodisang (MINE)

Bottom: Lesolo Molepo (MSURV), Sizwe Mabilisa (ENV)

Introduction

The Power Rangers were tasked to investigate the overviews and trends in renewable energy with a specific focus on solar and wind energy. This investigation included the identification of limitations that are prohibiting the growth of solar and wind energy. The Power Rangers then developed solutions that will prove to overcome these limitations. The adoption of these solutions would not only benefit Exxaro as a business, but it will also allow for Exxaro to take further steps in contributing into a sustainable future for Africa and Beyond.

Problem Statement

Solar and wind energy have been gradually penetrating the electricity generation market for the last 30 years but has not seen a rapid adoption rate. The Power Rangers have identified limitations in regulation, location, capital cost, capacity, intermittency, and in the electricity grid. The Power Rangers are committed to providing sustainable solutions to overcome these limitations.

Solutions

The Power Rangers aim to provide solutions to the existing limitations of solar and wind energy. These solutions will enable Exxaro to remain relevant and competitive in the global transition from a fossil fuel dominated industry, to a clean and sustainable industry. These solutions include:

Regulatory Opportunities

As regulations trend towards the allowance of Independent Power Producers and self-generation in South Africa. Exxaro has an opportunity to offset its carbon emissions and reducing energy costs by installing solar or wind energy where it operates. Furthermore, the organisation will be allowed to submit proposals to supply the national electrical grid with solar and wind energy.

International regulations in Australasian and European countries have shown a rapid adoption of renewable energy which can serve as a precursor to African countries, learning from their lessons.

Adoption of New Technologies

Solar and wind energy is dependent on large areas of land for utility scale facilities. To ensure the most optimal use of solar and wind energy, Exxaro must adopt new solar and wind technologies that will reduce the land requirement by transitioning to innovative technology trends such as bifacial solar panels and variable induction electric generator (VIEG) wind turbine generators. The capital cost for these technologies may be high at this stage but the trends indicate that they will become cheaper as the years go by. The Power Rangers have proven that these technologies contribute to a lower levelized cost and will play a major role in the future grid.

Future Grid

With the various limitations of the current electricity grid, which is dominated by fossil fuel generated electricity, the Power Ranges proposed a future grid. This grid allows for the integration of solar and wind generation and allows for intercommunication of devices within the grid. This enables the grid to incorporate clean energy, it provides reliable electricity free of blackouts, consumer participation, real-time data visibility and proactive maintenance.

Conclusion

The Power Rangers will be in the forefront of implementing creative technologies that will optimise the way in which solar and wind energy is harvested. Furthermore, by overcoming these limitations that prohibit the growth of solar and wind energy, Exxaro stands a good chance to maintain their relevance in this changing energy market. We will achieve this by exploiting regulatory opportunities, adopting innovative solar and wind technologies, and applying these solutions into Exxaro's business model.