

ABSTRACT

HYDROGEN ENERGY ECONOMY

The Bomb Squad



From left to right: Thembinkosi Zulu, Chervania Naidoo, Altus Bisschoff, Dineo Buthelezi, Katlego Mokwena

Introduction

Our economy is built on the strength of our diverse resources. With the effects of climate change becoming more visible each day, governments and the private sector are looking into alternatives for fossil fuels to power our world. Hydrogen is seen as an attractive solution.

Considering the *Hydrogen Energy Economy*, which the Bomb Squad was tasked to investigate, it deals with the large set of production, consumption and exchange activities related to hydrogen gas. The rapidly changing world led us to relook at where we are and where innovation can take us in the future. Hydrogen will empower future generations to live a sustainable life that does not negatively impact our societies and environment.

Vision to Transition

The problem we face is simple, how can we as Exxaro take advantage of the opportunities that are available to us in the *Hydrogen Energy Economy*? We live in a world that is moving away from fossil fuels and transitioning into renewable resources. As a coal mining company, this is of great concern and we need to be proactive to ensure the sustainability of our company. We need to live out our vision of powering better lives in Africa and beyond by responsibly investing in commodities that will sustain life on the continent.

Opportunities

The Bomb Squad evaluated various opportunities within the *Hydrogen Energy Economy* and identified three opportunities that can greatly benefit the company. The benefits do not only consider the financial aspects, but also the impact on the environment and the communities in which the projects will be implemented. We propose that Exxaro takes advantage of the opportunities presented in the spheres of hydrogen fuel cell haul trucks, hydrogen production and fuel cell production.

Hydrogen fuel cell haul trucks

The primary equipment at Grootegeluk and Belfast used more than 65 million litres of diesel in 2020. Haul trucks is responsible for 55 million litres. Instead of optimising the diesel usage and trying to make the haul trucks more efficient, we propose Exxaro do away with diesel entirely. By converting our current haul truck fleet to run on hydrogen fuel cells, we can decarbonise our operations and realise massive cost savings. Considering Grootegeluk and converting the haul truck fleet to hydrogen fuel cell powered trucks, we can save R 225 million on fuel cost annually.

Hydrogen production

The market demand for hydrogen will expand eightfold by 2050 as governments and companies move towards more sustainable solutions. Exxaro can benefit from this growth by producing hydrogen from renewable energy through the process of electrolysis. The hydrogen will be used in our operations to power our fleets but will also be sold to the local market and exported globally. The production plant will be built in the Durban Hydrogen Hub and it is expected that an annual revenue of R 765 million at full production capacity can be achieved.

Fuel cell production factory

The transient nature of our renewable energy sources creates a challenge when it comes to grid stabilisation. By introducing fuel cells that can operate as energy storage solutions, the transient

effect can be eliminated. By partnering with Mitochondria Energy Company and building a factory that specialises in the production of fuel cells for energy storage solutions, Exxaro can empower energy generators to produce clean energy that is stable and reliable. An expected annual revenue of R 67 million will be achieved at full production capacity.

Conclusion

The world has begun a new age. Companies are moving away from fossil fuels and transitioning into more sustainable alternatives. The *Hydrogen Energy Economy* presents a promising alternative and Exxaro can leverage on the opportunities available to ensure the future of our company and contribute to decarbonising our operations. In the end, the only thing that sustains our economy is the promise of tomorrow and the possibilities it holds.