

Hydrogen South Africa

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1. Introduction

1.1 Global perspective

The World is currently concerned with the sustainability of current energy sources due to industrial and infrastructural growth. This rapid growth has led to an increased demand for energy to match the global economic growth. Hydrogen and fuel cells are seen as energy solutions for the 21st century, enabling clean efficient production of power and heat from a range of primary energy sources. The transition to hydrogen is expected to greatly reduce dependency on oil and gas, and reduce carbon dioxide emissions especially when used in efficient fuel cells. Global drivers underpinning the increasing international effort in R&D for the emerging Hydrogen Economy are:

- Concerns over global warming and climate change and the contribution of the present energy system to global warming; and
- Energy security

1.2 South African Perspective

The drivers for South Africa in participate in the emerging hydrogen economy are its dominating position in platinum reserves (more than 75% of the world's known reserves), the key catalytic material used in hydrogen fuel cells, her leading role in high temperature gas cooled nuclear reactors such as the Pebble Bed Modular Reactor technology, which is key in production of industrial scale process heat that could be used in thermo-chemical splitting of water with the generation of hydrogen for use in fuel cells, and her leading role in the coal gasification to liquid fuels technology. Therefore participation in the emerging hydrogen economy would enable South Africa to develop a knowledge base that can participate at the forefront of an emerging industry, creating socio-economic opportunities for the whole economy.

The Government of South Africa, through the Department of Science and Technology (DST), developed a national hydrogen and fuel cell technologies research, development and innovation strategy, to stimulate and guide innovation along the value chain of the Hydrogen and Fuel Cell Technologies in South Africa. This strategy was approved by Cabinet in May 2007.

2. Strategic Goals

The primary goals of the Strategy are wealth creation through high value-added manufacturing of Platinum Group Metal Catalysts, with the aim of supplying 25% of catalysts demand for the global fuel cell industry by 2020, development of local cost-competitive hydrogen generation solutions by building on existing knowledge of high-temperature gas-cooled nuclear reactors and Fischer-Tropsch coal gasification technology, and also to promote equity and inclusion in the economic benefits from South Africa's natural resource by the creation of downstream industries..

3. Implementation Plan

The Department has established National Research Flagship Projects under the Hydrogen and Fuel Cell Technologies Research, Development and Innovation Strategy over a 15 year period. These will aim to increase scale and focus of

Research, Development and Innovation effort and bring together complementary expertise towards a common strategic goal. Three Competence Centres, namely Hydrogen Catalysis, Hydrogen Infrastructure and Systems Integration and Validation, have been established in each of the National Research Flagship Projects as an initial effort towards the implementation of the strategy. The Competence Centres function in a Hub and Spoke collaborative mode to enable partnerships of leading South African scientists, research institutions, commercial companies, and selected international partners in the research effort. Calls for project proposals will be issued by the Hub at least twice a year and project proposals will be presented to the Technical Steering Committee for evaluation and recommendations for approval to the DST Advisory Board.

4. Expected Outputs

The 15-year programmes focuses on the development of locally manufactured components based on South African minerals, primarily PGMs, but with high added-value, for export to the envisaged future "hydrogen economy". The strategic objective is the creation of intellectual property that can serve as the basis of sustainable manufacturing enterprises and jobs, with a view to maximising and spreading the benefit derived from exploitation of the country's mineral endowment. Another major purpose of the 15-year programme is to develop the country's skills base in this area. In the event that the "hydrogen economy" does not emerge as expected, the skills and human resource capital developed in the programme should nevertheless stand as an important deliverable against the crucial national need for technologically skilled people.