

Symposium on the Hydrogen Economy

BETWEEN SOUTH AFRICA AND JAPAN

日本・南アフリカ 水素社会シンポジウム

H₂

JETRO IBSC Hall on 7F
Japan External Trade Organisation (JETRO)
日本貿易振興機構 (JETRO) 本部 7 階 IBSC ホール

Ark Mori Building 5F, 2-32, Akasaka 1-chome,
Minato-ku, Tokyo 107-6006
港区赤坂 1-12-32 アーク森ビル

August 25th, Tuesday 2015 | 9:00am – 1:00pm

SYNOPSIS

概要

Hydrogen and fuel cell technologies hold the promise of a cleaner, more environment-friendly, and oil-independent future.

While Japan had already started to create a hydrogen society, the 'triple disaster' that devastated Japan in 2011 rapidly accelerated the commercialization in this field under the Science and Technology Basic Plan 2011. Japan is currently a leader in cutting-edge hydrogen technology and holds the largest share of patents in this field. South Africa, on the other hand, has a significant competitive advantage in developing hydrogen and fuel cell technologies, as it is endowed with considerable deposits of platinum, which is a key catalytic material used in fuel cells. As part of the global agenda to integrate energy systems, South Africa has positioned itself as a significant player to developing these technologies. Against this backdrop, the developmental stages of South Africa and Japan are different. Despite the differences in the systems, there are niche areas where collaboration could be enriched in the field of hydrogen and fuel cells. This Symposium will provide an open platform to initiate a dialogue for possible collaboration between the two countries in the respective fields.

水素燃料電池技術は、石油依存から脱却した、より環境にやさしい未来を約束する。

日本は早くから水素社会実現に向けた取り組みを始めていたが、2011年に日本を襲った東日本大震災以降この分野の商業化に拍車がかかっている。日本は現在、最先端水素技術のリーダー国のひとつであり、この技術分野における特許登録数は世界一のシェアを占めている。一方、南アフリカは、燃料電池の触媒として使用されるプラチナが膨大に埋蔵されているという強みを持ち、水素燃料電池技術開発の重要な競争において有利な立場にある。水素燃料電池技術は、エネルギーシステムを統合するというグローバルな検討課題の一環であり、南アフリカはこの技術開発における重要なプレーヤーとして自国を位置付けている。日本と南アフリカのエネルギーシステムの発達段階は異なるが、両国が協力することによって水素燃料電池の分野が発展する余地は大いにある。このシンポジウムは、両国の協力実現に向けた対話のきっかけを作るため、開かれた議論の場を提供する。

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南アフリカ・サイエンスフォーラムのご紹介 (2015年12月8-9日)

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Department:
Science and Technology
REPUBLIC OF SOUTH AFRICA

**South African Embassy
Tokyo, JAPAN**

在日南アフリカ共和国大使館



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PROGRAMME

プログラム

- 08:30 – **Registration**
- 09:00 – 09:05 **Welcome** by Dr Velaphi Msimang, Mistra
- 09:05 – 09:20 **Keynote Address** by Minister of Science and Technology, H.E. Mrs Grace Naledi Pandor
- 09:20 – 09:30 **Opening Remarks** by Ministry of Economy, Trade and Industry, Mr Masashi Hoshino

Presentations

- 09:30 – 09:45 **Activities Towards a Hydrogen Society – Past and Future**
Mr Eiji Ohira, New Energy and Industrial Technology Development Organisation (NEDO)
- 09:45 – 10:00 **Activities for Commercialisation**
Mr Tetsufumi Ikeda, Research Association of Hydrogen Supply Utilisation Technology (HySUT)
- 10:00 – 10:15 **Latest Challenge of Electrocatalyst**
Mr Fumiaki Ogura, Tanaka Kikinzoku Kogyo K.K.
- 10:15 – 10:30 **“Energy Carrier” from the Cross-Ministerial Strategic Innovation Promotion Programme (SIP)**
Dr Shigeru Muraki, Tokyo Gas
- Break (10:30 – 10:45)*
- 10:45 – 11:00 **Strategic Role of South Africa's PGM's in the Hydrogen Society**
Mr Alfred Tau, Department of Trade and Industry
- 11:00 – 11:15 **HySA: A National Initiative towards a Knowledge Economy**
Dr Cosmas Chiteme, Department of Science and Technology
- 11:15 – 11:30 **Fuel Cell Research & Technology Development within HySA**
Dr Cordellia Sita, Hydrogen South Africa (HySA)

Discussion

- 11:35 – 12:35 **How can South Africa and Japan create platforms for collaboration with regards to Hydrogen Society?**
Discussion by all presenters and participants
- 12:35 – 12:40 **Closing Remarks** by Mr Jun Shiomitsu, Ideologie International
- 12:40 – 12:50 **Group Photo**
- 12:50 – 14:00 **Lunch Reception**

プログラム Programme

- 08:30 - **参加登録開始、開場**
- 09:00 - 09:05 **開催挨拶** | 南アフリカ共和国 ミストラ ムシマン ヴェラピ
- 09:05 - 09:20 **基調講演** | 南アフリカ共和国 パンドール科学技術大臣
- 09:20 - 09:30 **開会挨拶** | 経済産業省 資源エネルギー庁 星野 昌志

講演

- 09:30 - 09:45 **水素社会に向けて - 過去と現在**
新エネルギー・産業技術総合開発機構 (NEDO) 大平 英二
- 09:45 - 10:00 **商業化に向けて**
水素供給・利用技術研究組合 (HySUT) 池田 哲史
- 10:00 - 10:15 **電解触媒の現状と挑戦**
田中貴金属工業株式会社 FC 触媒開発センター 小椋 文昭
- 10:15 - 10:30 **戦略的イノベーション創造プログラム (SIP)・エネルギーキャリア**
東京ガス株式会社 村木 茂

休憩 (10:30 - 10:45)

- 10:45 - 11:00 **水素社会における白金族の戦略上の役割**
南アフリカ共和国 貿易産業省 タウ アルフレッド
- 11:00 - 11:15 **南アフリカ水素経済社会研究開発拠点 HySA(ハイサ)- 知識社会にむけての国家戦略**
南アフリカ共和国 科学技術省 チラメ コスモス
- 11:15 - 11:30 **HySA 拠点内の燃料電池研究開発の挑戦**
南アフリカ水素経済開発拠点(ハイサ) シタ コーデリア

パネルディスカッション

- 11:35 - 12:35 **どのように日本と南アフリカは水素社会への協力基盤を構築できるか?**
講演者 並びに 会場全員
- 12:35 - 12:40 **閉会挨拶** | アイディオロジー・インターナショナル 塩光 順
- 12:40 - 12:50 **写真撮影**
- 12:50 - 14:00 **昼食会**

MODERATORS



Jun Shiomitsu

Ideologie International

Mr. Jun Shiomitsu founded Ideologie International in Cambridge, UK in 2012. The firm is a thought leadership consultancy that helps differentiate and brand its clients as the most advanced thinkers of their industry via high quality content (e.g. research, papers, press, social media, video) created in partnership with the world's top universities, including Oxford, Cambridge, and UC Berkeley. Prior to this, Shiomitsu was a founding member of Deutsche Bank Group's Global Financial Institute in Switzerland, before which he was AVP of the treasury department of Citibank Japan Ltd. He has an MBA from Cambridge University and is president of the African Business Institute in Uganda.



Velaphi Msimang

Mapungubwe Institute for Strategic Reflection (MISTRA)

Dr. Velaphi Msimang is head of Knowledge Economy & Scientific Advancement (KESA) at MISTRA and is the former Chief Director of Hydrogen and Energy Subprogram at the Department of Science and Technology. Prior to that, he was a senior researcher at the Natural Resources and the Environment division at the Centre for Scientific and Industrial Research. He has held positions at Sasol, where he was a process engineer, and at the Centre for Scientific and Industrial Research (CSIR) where he was a chemical engineer in the Biosciences division. Dr. Msimang holds a PhD in Chemical Engineering from the University of Cape Town, as well as a Masters in Engineering Science from Texas A&M University, where he was a Fulbright scholar.

PRESENTORS



Eiji Ohira

*New Energy and Industrial Technology
Development Organization (NEDO)*

Mr. Eiji Ohira joined NEDO in 1992 and currently is the Director of Fuel Cell and Hydrogen Technology Group of the New Energy Technology Department. Prior to this, he was a visiting researcher at International Research Institute of Massachusetts Institute of Technology from 1997-1998, and also seconded to the Research and Development Division, Industrial Science & Technology Policy and Environment Bureau at Ministry of Economy, Trade and Industry in 2001-2003. He was assigned to the office of NEDO Bangkok, in 2008-2011 and was director of Energy Storage Technology Development Division, Smart Community Division at NEDO in 2011-2012. He is an alumnus of Tokyo University of Science and holds a master's degree from Japan Advanced Institute of Science and Technology.



Tetsufumi Ikeda

*The Research Association of Hydrogen
Supply/Utilization Technology (HySUT)*

Mr. Tetsufumi Ikeda is Director General of HySUT and responsible for Fuel Cell Vehicle and Hydrogen Infrastructure National Programs in Japan. Prior to that, he was General Manager of FCV/Infrastructure Demonstration Project Department at HySUT. He joined JX Nippon Oil & Energy Corporation in 1980 and was responsible for the development of stationery fuel cell systems since 2003 after being involved in several R&D projects related to carbon fiber composite materials for 20 years. In 2005, he was appointed General Manager of Hydrogen & New Energy Research Laboratory of JX Nippon Oil & Energy Corporation and, in 2008, Associate Director of Technology & Planning Department at Japan Petroleum Energy Center. He is an alumnus of University of Tokyo with a master's degree in engineering in industrial chemistry.



Fumiaki Ogura

Tanaka Kikinzoku Kogyo K.K.

Mr. Fumiaki Ogura has been General Manager of Fuel Cell Catalyst Development at Tanaka Kikinzoku Kogyo since joining the firm in 2001, in charge of fuel cell electrode and hydrogen-related catalysts. Prior to this, he worked with Electroplating Engineers of Japan Ltd, a group company of Tanaka Kikinzoku Group, upon his graduation from from Nagoya University's chemical engineering department.



Shigeru Muraki

Tokyo Gas

Mr. Shigeru Muraki has been Program Director of Energy Carriers for SIP (Cross-ministerial Strategic Innovation Promotion Program) since May 2014. He joined Tokyo Gas Co. Ltd. in 1972 after graduating from the Applied Chemistry Department of the University of Tokyo. He started his career with the firm at the Research & Development Institute, and was appointed Chief Representative in New York from 1989 to 1994. From 1996 through 2004, he worked with the Gas Resources Department. He was promoted to the position of Senior Executive Officer and CTO in 2004. In 2007, he moved to the Energy Solution Division, in charge of marketing in commercial and industrial markets and power businesses. In 2014, he was appointed Vice Chairman. Since April 2015, he has been Executive Adviser for Tokyo Gas.

PRESENTORS (continued)



Alfred Tau

Department of Trade & Industry

Mr. Alfred Tau is an economic development professional involved in a broad range of economic development fields including industrial and sector development, enterprise development, investment promotion, special economic zones, cluster development, and regional development. His work involves support and research projects for regions, industries and enterprises of all sizes. Over the years, he has contributed to the design and implementation of various instruments and tools to provide support for key initiatives and programmes including special economic zones, supplier development programmes, cluster development, business incubation, industrial parks, enterprise hubs, and the Regional Industrial Development Strategy. He has an MBA from the University of Wales and a Master of Science in Investment Promotion and Economic Development from Edinburgh Napier University.



Cosmas Chiteme

Department of Science & Technology

Dr. Cosmas Chiteme is Director: Hydrogen and Energy at the Department of Science and Technology (DST), and is responsible for hydrogen and fuel cell technologies under the HySA Programme. Prior to this, he worked in the Research and Technology Development unit at CBI-Electric as a Senior Research Scientist, and as a Senior Scientist in the Advanced Materials Division at Mintek. His research work in both academia and industry has covered areas of renewable energy, environment-friendly materials and precious metal alloys. He is a certified Energy Manager and has worked on energy efficiency projects managed by the National Cleaner Production Centre (NCPC) and holds a doctorate in Experimental Condensed Matter Physics from the University of the Witwatersrand. He is the official South African representative in the International Partnership for Hydrogen and Fuel Cells in the Economy (IPHE).



Cordellia Sita

HySA Systems

Dr. Cordellia Sita was appointed Director: HySA Systems on 1 May 2015, and is responsible for the day-to-day operations of the HySA Systems Competence Centre. Dr. Sita holds a PhD in chemical engineering from the University of Pretoria. During her 17-year career, she has had the privilege to work in academia, private and public sectors on various projects.

PARTICIPANTS FROM SOUTH AFRICA



Dmitri Bessarabov

HySA Infrastructure Center of Competence

Dr. Dmitri Bessarabov joined DST HySA Infrastructure Center of Competence at NWU and CSIR in 2010. His current responsibilities include leadership in the National Hydrogen and Fuel Cell Programme (HySA) and HySA Infrastructure Business Plan development and implementation. He also leads PEM electrolyser development projects with HySA Infrastructure. Prior to this, he worked with Ballard Power Systems in Canada (subsequently Automotive Fuel Cell Cooperation Corp) where he led an R&D group on MEA Integration and Evaluation and CCM development. Before this, he worked on membrane technology for chlor-alkali at Aker Kvaerner Chemetics in Vancouver, Canada. He holds a number of international patents and has published over 100 papers. He is a holder of SA NRF rating, has a PhD from the Institute for Polymer Science, University of Stellenbosch in South Africa, and was awarded the "SASOL Medal for the best PhD in the field for the year" in 1997.



Sharon Blair

HySA Infrastructure Center of Competence

Dr. Sharon Blair is Director: HySA/Catalysis Competence Centre. The Centre is co-hosted by UCT and Mintek and responsible for fuel cell and fuel processing materials, as well as component and stack development for low temperature fuel cells. The Centre also delivers prototypes/products up to 5kW with a mandate to support development of the fuel cell supply chain in South Africa, including beneficiation of platinum group metals. She is also CEO of HyPlat, a spin-off company that commercialises technologies emanating from HySA/Catalysis. Prior to this, Dr. Blair has over 15 years of experience as an entrepreneur, executive and consultant in the fields of nanomaterials, batteries and fuel cells.



Kwanda Modise

Department of Science & Technology

Ms. Kwanda Modise is the Director for Global Projects at the South African Department Of Science & Technology. She is responsible for coordinating policy and strategy development and implementation for promoting foreign direct investment into Science, Technology & Innovation (STI) projects, promoting science, technology and innovation projects to international companies, managing a portfolio of strategic relationships with international companies, and supporting South Africa's participation in global STI infrastructure projects.



Malesela Jones Papo

MINTEK

Dr. Malesela Jones Papo is the Manager of the Advanced Materials Division (AMD) at Mintek, and also a member and coordinator of the Strong Metallic Alloys Focus Area at the DST/NRF Wits Centre of Excellence in Strong Materials at the University of the Witwatersrand. He joined Mintek in 2004, initially as Chief Scientist in the AMD, and then as Head of Physical Metallurgy. He earned his PhD from the University of Alabama at Birmingham (UAB) as a Fulbright Scholar, and also holds a M.Sc in Applied Science in Materials Engineering from the University of Cape Town. Upon completion of his M.Sc degree, he joined De Beers Research Labs (Pty) Ltd as a Junior Technical Research Officer in the Composites Division. Also, after earning his PhD, he held a joint appointment at UAB and Vista Engineering as a Post-Doctoral Research Fellow/Research Engineer, where he worked on a Metals Affordability Initiative (MIA) consortium project.

Hydrogen and Fuel Cell Roadmap

- Japan -

Significance of realizing a hydrogen society

1

Energy conservation

Making use of fuel cells to realize high energy efficiency, leading to achievement of dramatic energy conservation

2

Energy security

Hydrogen is a resource that could enhance energy security if the following advantages are leveraged and the applicable scope of the resource is expanded: [i] the ingredients of hydrogen are highly interchangeable with other materials, and hydrogen can be manufactured with various methods from many kinds of substitute materials, such as various primary energy sources including unutilized energy resources (e.g., by-product hydrogen, crude oil associated gas and lignite) and renewable energy; and [ii] in the future, such energy may be procured inexpensively from regions with low geopolitical risk, and utilizing hydrogen manufactured from renewable energy in Japan may also increase the energy self-sufficiency rate in the future.

3

Reducing environmental burdens

When used as an energy source, hydrogen does not emit carbon dioxide. Taking advantage of this characteristic, combining the technology for manufacturing hydrogen with a carbon capture and storage (CCS) process, or with making use of hydrogen derived from any renewable energy, will lead to the reduction of environmental burdens and even to the full elimination of carbon dioxide.

4

Promoting industries and revitalizing regional economies

Japan has strong global competitiveness in the field of fuel cells. For example, Japan has filed the world's largest number of patent applications for the technology—five times the number of those filed by second or lower-placed countries—, leaving other countries far behind. In addition, Japan's regional resources, e.g., renewable energy, can be utilized to manufacture hydrogen for fuel cells.

Future direction for the measures for realizing a hydrogen society

To realize a hydrogen society, related systems will be formulated on a large scale, which may be accompanied by changes in the current social structure, and long-term, continuous measures for realizing such a society will be taken. In addition, the imbalance between supply side and demand side issues will be resolved, while academia, government and industry will collaborate to proactively engage in measures for utilizing hydrogen.

To achieve this goal, Japan will aim to achieve a hydrogen society through the following step-by-step process:

Phase 1 (Dramatic expansion of hydrogen use) :

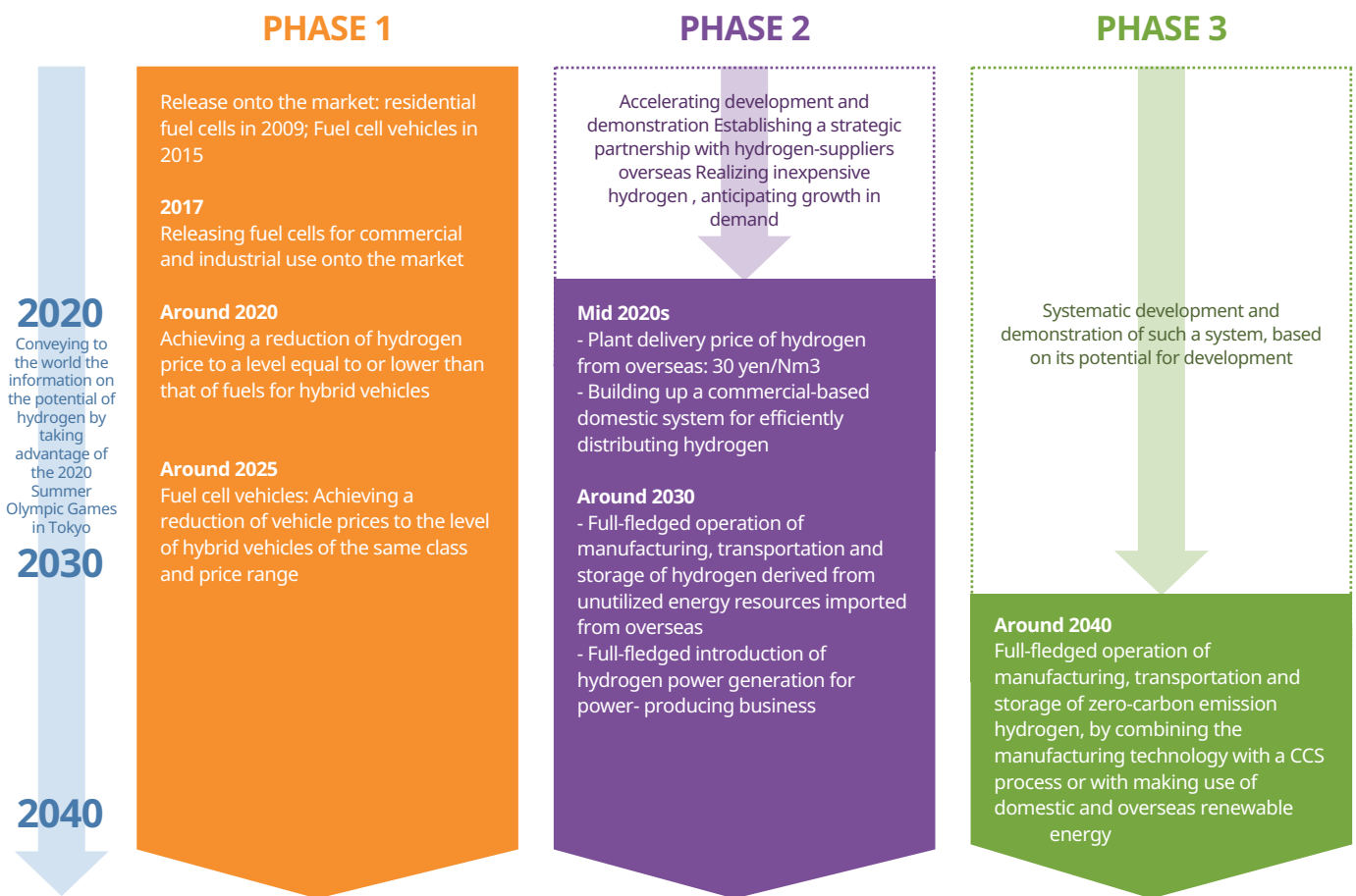
Dramatically expanding the use of stationary fuel cells and fuel cell vehicles, which are in the process of being realized, leading to the successful acquisition of a global market in the field of hydrogen and fuel cells, in which Japan leads the world;

Phase 2 (Full-fledged introduction of hydrogen power generation/Establishment of a large-scale system for supplying hydrogen) :

Further expanding the demand for hydrogen, while widening the scope of hydrogen sources to include unutilized energy, so as to establish a new secondary energy structure in which hydrogen will be added to existing resources, namely electricity and heat (gas); and

Phase 3 (Establishment of a zero-carbon emission hydrogen supply system throughout the manufacturing process) :

Combining the technology for manufacturing hydrogen with a CCS process, or with making use of hydrogen derived from a renewable energy resource, so as to establish a zero-carbon-emission system for supplying hydrogen throughout the manufacturing process.



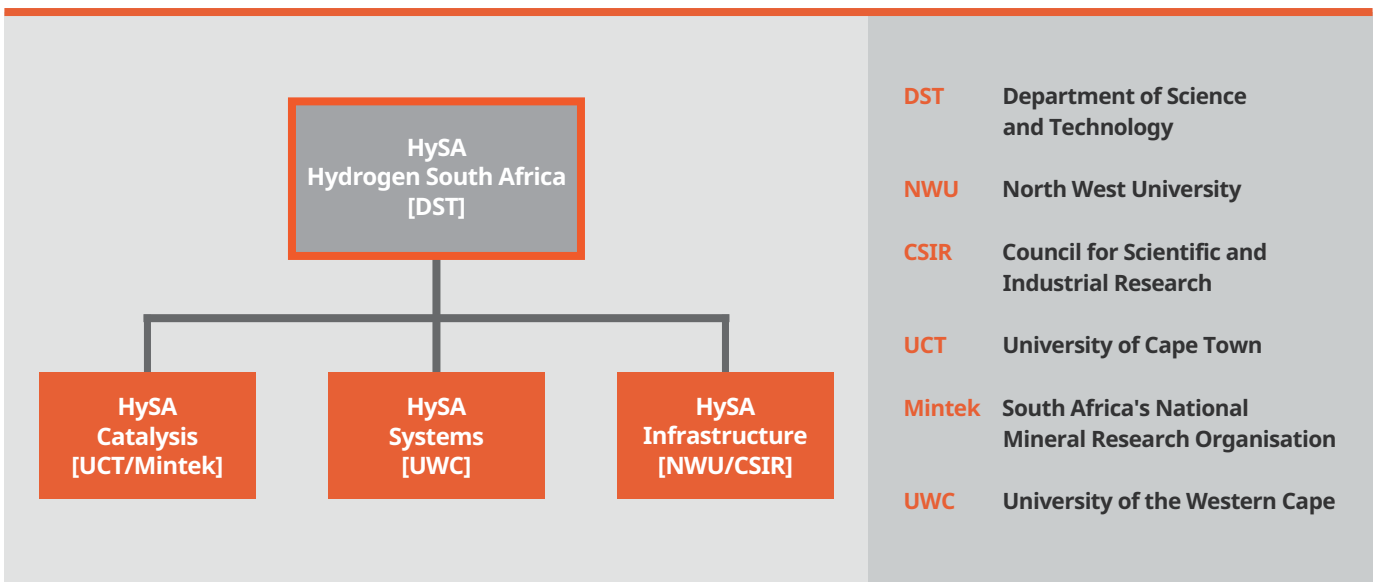
Market scale of the equipment and infrastructure businesses related to hydrogen and fuel cells in Japan
Approx. 1 trillion yen in 2030 – Approx. 8 trillion yen in 2050

Overview of Hydrogen South Africa



Initiated by the Department of Science and Technology (DST) and approved by the Cabinet in May 2007, Hydrogen South Africa or HySA is a long-term (15-year) programme within their Research, Development, and Innovation (RDI) strategy, officially launched in September 2008. This National Flagship Programme is aimed at developing South African intellectual property, knowledge, human resources, products, components and processes to support the South African participation in the nascent, but rapidly developing international platforms in Hydrogen and Fuel Cell Technologies. The programme strives towards a knowledge-driven economy meaning that innovation will form the basis of South Africa's economy; this includes an aggressive capacity-development programme's approach. HySA also focusses on (i) the "Use and Displacement of Strategic Minerals" , (ii) ways of harnessing South Africa's mineral endowments to promote both the hydrogen economy and renewable energy use, and (iii) seeking the most cost-effective and sustainable ways of incorporating PGM-based components in hydrogen fuel cell and other technologies, in turns resulting in commercialisation ventures and a viable industry around mineral beneficiation.

Indeed, HySA has been implemented in the context of the DST's various innovation strategies, the Department of Mineral Resources' (DMR) minerals beneficiation strategy, the Department of Energy's (DoE) Integrated Resource Plan and the Department of Trade and Industry's (DTI) industrial development strategies. The principal strategy of HySA is to execute research and development work, with the main aim of achieving an ambitious 25% share of the global Hydrogen and Fuel Cell market using novel Platinum Group Metal (PGM) catalysts, components and systems since South Africa has more than 75% of the world's known PGM reserves. In order to achieve this, the structure is aimed at the parallel development of knowledge and technology across all areas of the Hydrogen and Fuel Cell value chain, allowing for the establishment of a strong R&D Hydrogen and Fuel Cell Technology exporting added value PGM materials, components and complete products. Each Centre has a unique responsibility, but all three are complementary within the common vision of fostering proactive innovation and developing the human resources required to undertake competitive R&D activities in the field of Hydrogen and Fuel Cell Technologies. The first five years of funding focused on developing infrastructures at each Centre with a major emphasis upon Human Capacity Development (HCD). Relevant international expertise was recruited by each Centre to access technical support and well-established implementation networks, and to ensure the programme and its deliverables remain market related and world-class. Furthermore, to achieve the HySA strategy objectives, the three HySA Centres of Competence (see below) form a national network of research 'Hubs' and 'Spokes' through collaboration with institutions and partners from the R&D sector, higher education, as well as industry.



SCIENCE FORUM

South Africa

8-9 December, 2015
Pretoria, South Africa

In the footsteps of ESOF, AAAS, and the Japan Agora, the **Science Forum: South Africa** is going to be the first major public science meeting.

ユーロサイエンス・オープン・フォーラム(ESOF)、アメリカ科学振興協会(AAAS)、Japan Agoraに続き、Science Forum South Africaは科学をめぐる主要な公開討論の新たな場となります。

Everyone from all over the world is invited to come participate in this enticing conference which will comprise of several parallel sessions, addressing a diverse range of science and science policy orientated themes.

会議はいくつかのセッションから成り、様々な科学および科学政策志向のテーマについて話し合います。世界中から参加者を募っています。

For more details on how to participate, register on the link below: www.sfsa.co.za.

会議の参加と登録方法の詳細はこのリンクから:
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Societal challenges

African eyes on the sky

Knowledge economy

Africa's science agenda

Showcasing SA's best

What do the scientists say?



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