



Australian Academy of
Technology & Engineering

Hydrogen Futures

SUMMARY REPORT

ATSE – NAEK Workshop
3 March 2020
Melbourne, Australia





HYDROGEN FUTURES NAEK-ATSE WORKSHOP

The global effort to reduce greenhouse gas emissions has prompted a resurgence of interest in the role hydrogen can play in creating cleaner energy, transport and industrial sectors.

To explore pathways to creating a hydrogen economy, the Australian Academy of Technology and Engineering (ATSE) recently joined forces with the prestigious National Academy of Engineering Korea (NAEK), bringing experts from both nations together for a one-day 'Hydrogen Futures' workshop in March 2020.

Fifty leading Korean and Australian experts from government, industry, research and academia gathered at the Melbourne workshop to discuss the challenges and opportunities presented by this important component of the clean energy mix.

The workshop helped build crucial linkages and enabled knowledge sharing between Australia and Korea to create new opportunities for research and commercial partnerships.

The Australian Academy of Technology and Engineering was delighted to welcome a senior delegation from the Republic of Korea, including the President of NAEK Professor Oh-Kyong Kwon.

The Hydrogen Futures workshop was supported by the Australian Korea Foundation (through the Department of Foreign Affairs and Trade), Woodside Energy, and the Melbourne Energy Institute at the University of Melbourne.

This report summarises the major findings and discussion.



SPEAKER LIST

Dr Bruce Godfrey FTSE
Vice President, ATSE

Professor Oh-Kyong Kwon
President, NAEK

Ms Vanya Kumar
Executive Director, Commercial & Investment
Attraction, Victorian Department of Environment,
Land, Water and Planning

Professor Chinho Park
School of Chemical Engineering, Yeungnam
University

Professor Hongki Lee
Chairman, Hydrogen and Fuel Cell Regional
Innovation Center, Woosuk University

Dr Hyangsoo Jeong
Senior Research Scientist, Korea Institute of
Science and Technology

Dr Fiona Beck
Research School of Electrical, Energy
and Materials Engineering, ANU

Dr Patrick Hartley
Leader, CSIRO Hydrogen Industry Mission,
CSIRO Energy

Dr Sarah Ryan
Director, Woodside Energy

Professor Hongki Lee
Chairman, Hydrogen and Fuel Cell Regional
Innovation Center, Woosuk University

Mr Rupert Maloney
Head of Hydrogen Investment, Clean Energy
Finance Corporation

Professor Woong-Seong Chang
President, Platform Institute of Science and
Technology for Industrial Applications,
Inha University

Dr Wonchul Cho
Senior Researcher, Korea Institute of Energy
Research

Dr Bo Ki Hong
Fuel Cell Research Fellow of Hyundai Motor
Company (transport)

Ms Gabrielle Henry
Director, Industry Engagement and Development,
Victorian Department of Environment, Land, Water
and Planning

Mr Peter Cleary
Board of Australia Korea Business Council,
Principal of Glenoak Energy

Ms Andrea Galt
New Energy Partnership Program Director,
Woodside Energy



1. TIME TO ACT

Just two or three years ago, international discussions around a possible hydrogen industry were focused on technology development and nascent investment opportunities. It's clear from the workshop that the narrative has now shifted to one of market activation.

Patience has been required: a national hydrogen study written by an Australian participant in 2003 recommended that Australia prepare a national hydrogen strategy; another noted that the first hydrogen roadmap was completed for COAG in 2008.

The time to act has finally come.

A commercially viable hydrogen industry comprising both domestic and export value chains can be up and running by 2030. Australia is uniquely positioned to drive the global shift to clean hydrogen energy due to its extensive renewable energy resources, expertise and infrastructure. Korea is keen to engage with Australia in this effort.



H 국회 수소충전소
Hydrogen Station

2. WHAT COLOUR HYDROGEN?

While green hydrogen (produced using renewable energy) is seen by some as the ultimate goal, it is currently relatively expensive. Grey, black or blue hydrogen (produced from natural gas or coal, with or without carbon capture and storage) will therefore have an early role to play, at the very least in helping to establish the feasibility of a hydrogen supply chain.

Regardless of the primary energy source, in the longer term potential importers will require Australian hydrogen with little or no emissions resulting from its production, and planning should focus on this goal.

Carbon capture and storage can be deployed to lower emissions for fossil fuel-based hydrogen generation but it has significant costs, and high capture rates also need to be ensured.



3. THE LONG VIEW

Korea's dependence on energy imports is stark, equaling about 94% of its domestic consumption. The country has a strong commitment to the deployment of hydrogen and new energy technologies more broadly. However whether it is from renewable or non-renewable resources, Korea's hydrogen will have to be largely imported.

Korean workshop participants clearly view Australia as a source of clean hydrogen, essentially continuing Australia's role as a reliable supplier of fuels.

One of the Korean speakers put it as 'Bottling Australian Sunshine'.

It is critical that a new hydrogen industry does not significantly increase more greenhouse gas emissions or jeopardise Australia's and the world's ability to meet the Paris Targets to reduce emissions.





4. THE ROLE OF TECHNOLOGY

The technical challenges in realising a hydrogen industry in Australia are mainly those of scaling and deployment- new technology or significant increases in technology performance aren't needed to get started. Improving the efficiency of hydrogen production and finding lower cost production technologies also remain important contributions to maximising learning curve outcomes.

However, this is not a small challenge. There is a need for coordinated development of supply lines and markets.

There is also a need for focussed and intensive hydrogen-related research, development and demonstration projects to ensure Australia can leverage its competitive advantage and position its industry as a major player by 2030.

Fully renewable hydrogen generation (eg electrolysis with renewable energy) is still expensive relative to the current steam methane reforming in widespread commercial use, but it is likely that capital costs will reduce as we move down the experience curve.

5. HOW TO DRIVE UPTAKE?

There may be a need to develop a government-to-government agreement to nurture industry development where Australia is an obvious supplier and Korea is a keen purchaser of hydrogen. It will be private companies that will make the very significant investments in establishing the industry, but governments have a role too.

Investments in hydrogen demonstration projects, several of which are already in operation or planning across Australia, are key to hydrogen value chain validation and technology deployment. These demonstrations will provide the enabling skills and infrastructure which will underpin a large-scale hydrogen export industry in Australia.

Federal and State governments and national institutes such as CSIRO have a role in coordinating this development. The Australian National Hydrogen Strategy provides a good starting point for helping to coordinate hydrogen development in Australia

Establishing a domestic market for hydrogen is also important. Such a market will help Australia reduce its own national emissions, ensure that it can properly service an export industry and capture as much benefit from those exports as possible.



6. NEXT STEPS

The two Academies are committed to assisting our economies and governments to forge a cooperative partnership towards building the hydrogen economy. A future meeting is planned for follow-up work towards this end – and will involve key players from across governments, industry, and academia.

Our ongoing work, and future meetings, will seek to further advance the immense potential for a shared green hydrogen future.





Above: Professor Chinho Park giving workshop keynote address



Above: Dr Bruce Godfrey, ATSE Vice-President, welcome function address



Above: Dr Bruce Godfrey and guests, workshop dinner

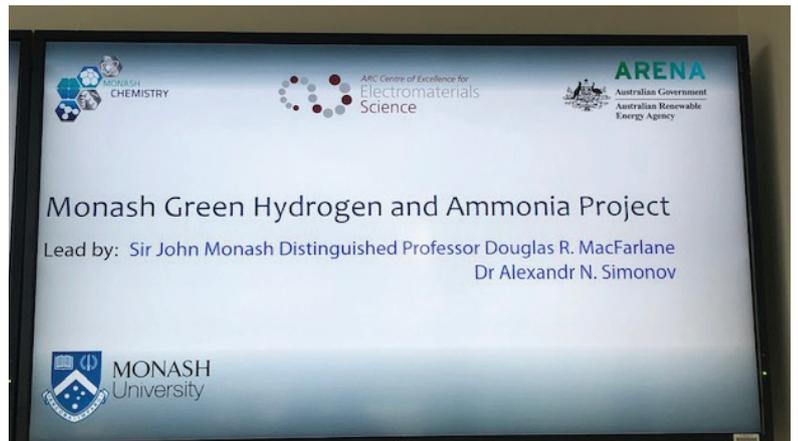


Above: Professor Oh-Kyong Kwon, NAEK President, welcome function address



Above and below: Exchange of gifts

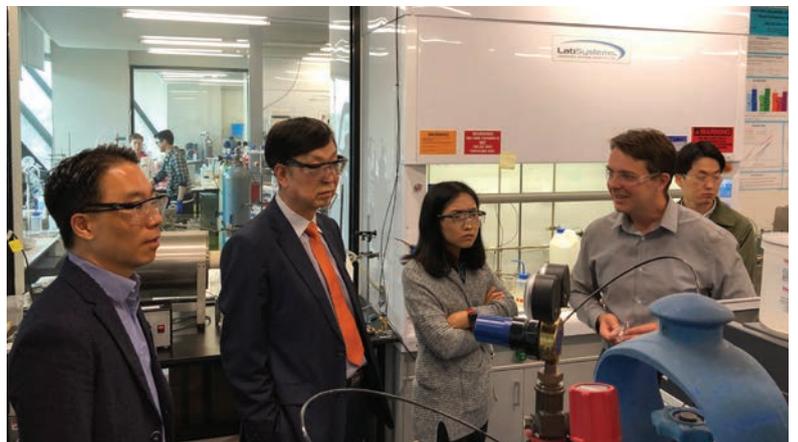




Above: Presentation and site visit at Monash University



Above: Site visit at CSIRO



Above: Site visit at Monash University



Above: Site visit at Monash University



Above: Presentation at CSIRO



Above: Presentation at Monash University



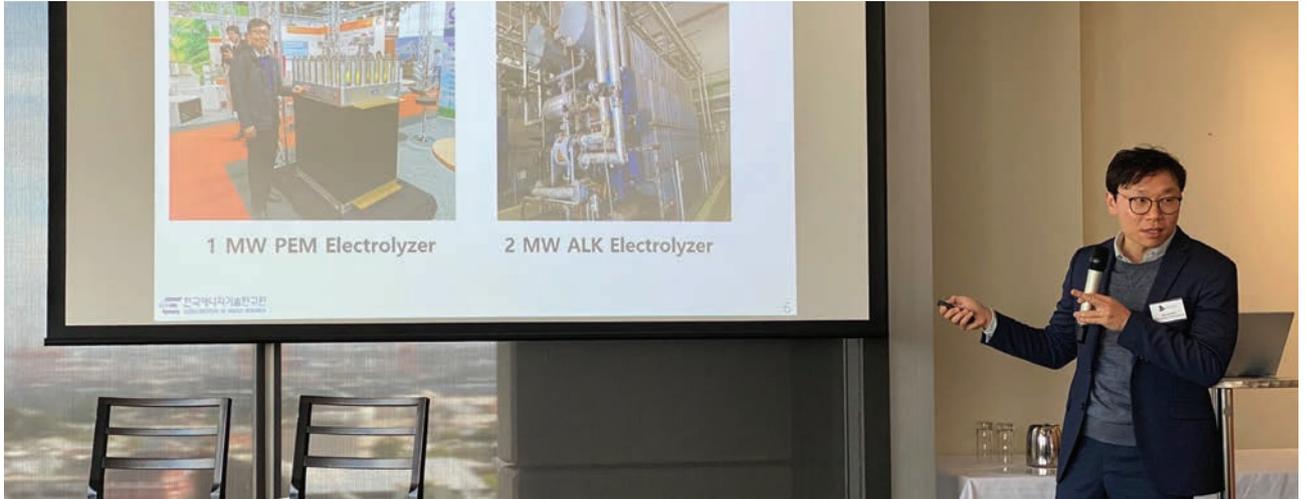
Above: Dr Fiona Beck, workshop presentation



Above: Dr Patrick Hartley, workshop presentation



Above: Professor Hyangsoo Jeong, workshop presentation



Above: Professor Hongki Lee workshop presentation



Above: Workshop in full swing



Above: Session 4 - Panel session (Gabrielle Henry speaking)



Above: Group photo - Welcome function



Above: Group photo - Workshop

Hydrogen Futures

ATSE – NAEK WORKSHOP

3 March 2020

Woodward Centre
The University of Melbourne Law School
10th floor, 185 Pelham Street
Carlton VIC 3053



Australian Academy of
Technology & Engineering



Australian Government



Australia-Korea FOUNDATION

The Hydrogen Futures Workshop was supported by the Commonwealth of Australia through the Australia-Korea Foundation, which is part of the Department of Foreign Affairs and Trade.



Melbourne
Energy
Institute

Woodside Energy and the Melbourne Energy Institute at The University of Melbourne were also supporters of the Hydrogen Futures Workshop.

CONTACTS

Dr Carolyn O'Brien
Senior International Relations Associate
Australian Academy of Technology & Engineering
D. 03 9864 0904
M. 0411 423 095
carolyn.obrien@atse.org.au

Hyerinne Hahn
The National Academy of Engineering of Korea
hahn@naek.or.kr

atse.org.au

The Australian Academy of Technology and Engineering (ATSE) is a Learned Academy of independent experts that helps Australians understand and use technology to solve complex problems. We bring together Australia's leaders in applied science, technology and engineering to provide impartial, practical and evidence-based advice on how to achieve sustainable solutions and advance prosperity.