Country Presentation – Australia

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Summary

This presentation covers:

Australian Government's Climate Change Policy

Clean Energy Initiative :

- Australian Centre for Renewable Energy
- Solar and Carbon Capture and Storage Flagships
- Renewable Energy Future Fund

Hydrogen: Roadmap, AAHE

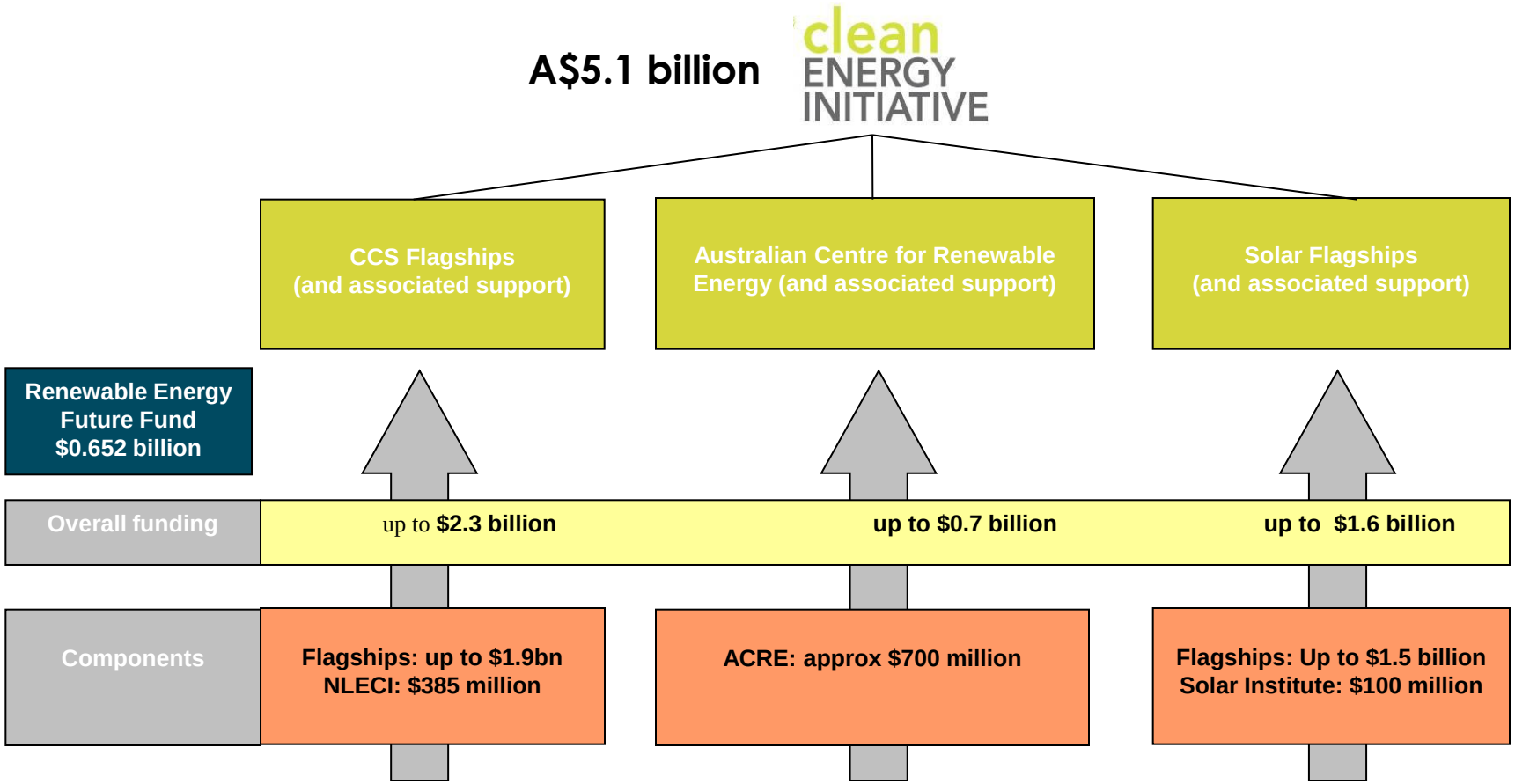
Australian Government: Policy

- Climate change: committed to reducing GHG emissions, with target of 5-25% below 2000 levels by 2020.
- Promote Renewable and Clean Energy Technologies to assist in the transition to a low-carbon economy
  - Assisted by the RET, legislated 20% of RE by 2020, includes targets for large and small scale installations
- Recently formed Australian Government recognises that reducing GHG emissions by 2020 will require a price on carbon, and has established a multi-party parliamentary Climate Change Committee to be formed by the end of September 2010

Clean Energy Initiative

- Three major components:
  - Australian Centre for Renewable Energy:
    - Around $700m to promote the development, commercialisation and use of renewable energy;
    - Includes venture capital
- Solar Flagships and Carbon Capture and Storage Flagships programs:
  - Up to $1.5b for large-scale PV and CST solar
  - Up to $1.9b to fund the non-commercial costs of eligible CCS projects
- Renewable Energy Future Fund: $652 million to support renewable energy projects.

Clean Energy Initiative – a visual



Hydrogen in Australia

- Australian Government launched Hydrogen Roadmap in 2008, with a vision to ensure that well informed and credible decisions be made by 2020.
  - One goal was to establish an advocacy group.
- Australian Association for Hydrogen Energy (AAHE) launched in Sydney, 6 September 2010
  - We will consult with AAHE to explore possibilities for progressing hydrogen as a technology for integrating into Australia's energy mix.
- Potential uses for hydrogen in Australia:
  - Energy storage for network support
  - Refining
  - Alternative energy carrier
- Ian Plumb will now talk about R&D

Hydrogen and fuel cell RD&D in Australia: Current Status

- Overview
- University sector
- Government laboratories
- Commercial activities

Overview

- There is no clearly identified RD&D program in hydrogen and fuel cells in Australia
- Universities conduct research largely funded through the Australian Research Council national competitive grants program
- The Government laboratory CSIRO maintains a watching brief on technology developments, provides independent advice to Government, and conducts a limited amount of targeted strategic research in hydrogen technologies
- Ceramic Fuel Cells Limited is developing SOFC products and technologies and Hydrexia P/L is developing novel magnesium-based hydrogen storage technologies

University-based research

Substantial research programs in **hydrogen storage** based on:

- Lithium (Griffith, Curtin)
- Magnesium and other light metals (UQld, Griffith, Curtin, UNSW, Monash, RMIT)
- Carbons (Monash, Curtin, UQld, UNSW, RMIT, UWollongong)
- Porous materials (Curtin, Griffith, UNSW, Sydney)

Craig Buckley (Curtin) and Evan Gray (Griffith) participate in IEA/HIA Task 22, Hydrogen Storage

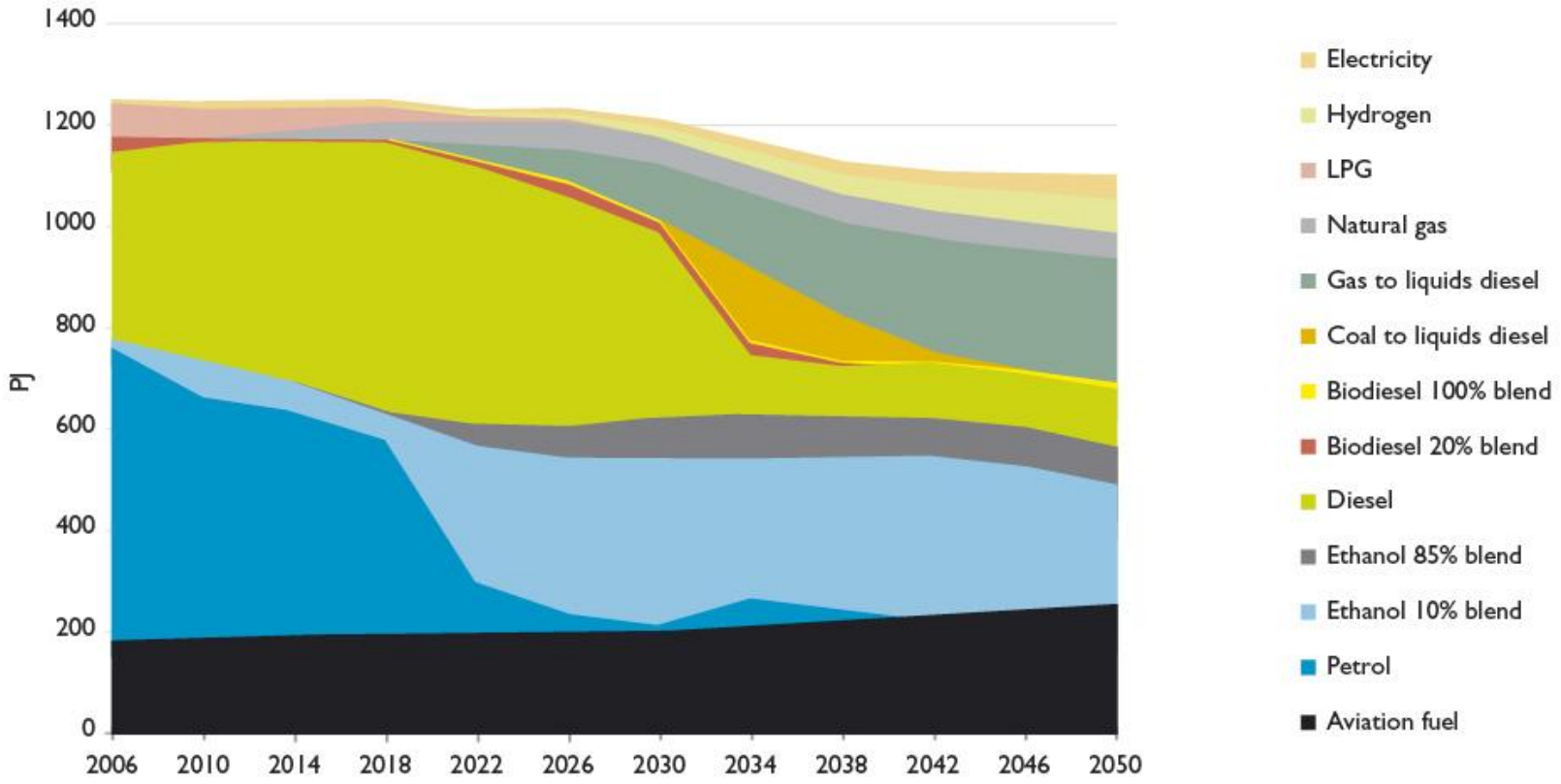
University-based research (contd)

- Catalysts for fuel cells and steam reformers
  - U Qld (Dicks), UNSW (Smith, Trimm), Newcastle (Moghtaderi)
- Integration of electrolyser, hydrogen storage and utilization
  - RMIT (Andrews)
- Photo-electrochemical hydrogen production
  - UWS (Nowotny, Sheppard), QUT (Will), Sydney (Maschmeyer), UNSW (Sorrell), Monash (Spiccia)

CSIRO

- Energy Futures program and Future Fuels Forum are modelling and decision-support programs examining different energy technologies and transport fuels, including hydrogen (http://www.csiro.au/org/Energy-modelling-and-decision-support.html#B1)
- National Hydrogen Materials Alliance (NHMA) provided funding and co-ordination for hydrogen R&D during the period 2006-2009 (http://www.csiro.au/partnerships/National-Hydrogen-Materials-Alliance.html)
- Commissioned study "A Technology Roadmap for Australia's Hydrogen Delivery Infrastructure" (2010)
- Conducts strategic research on hydrogen technologies, including micro fuel cells and PEM electrolysis (S Badwal), thermochemical cycles (J Hinkley) and solar-assisted steam reforming (W Stein)

Figure 19: Consumption of transport fuels under slow decline in oil supply, fast technology response, fuel cell cars available and 60% below 2000 levels by 2050 emission target scenario.



Source: Fuel for Thought (CSIRO, 2008)

Demonstration/Commercialization

- **Ceramic Fuel Cells Limited** (http://www.cfcl.com.au/)
  - Formed in 1992 by CSIRO and a consortium of energy and industrial companies
  - Listed on Australian Stock Exchange in 2004
  - Ceramic powder plant in UK and manufacturing plant in Germany
  - Modular co-generation system BlueGen introduced in 2009
- **Hydrexia Limited** (http://www.hydrexia.com.au/)
  - Hydrogen storage systems company commercialising technology based on novel magnesium alloys
  - Spun off from University of Queensland in 2006
  - Specializing in large-scale industrial hydrogen storage and hydrogen fuelling infrastructure for transport