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IPHE Steering Committee meeting 5 – 8 May, Uluru Hydrogen and Complimentary Technologies in Australia

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CSIRO

International Partnership *for the* Hydrogen Economy



National Research
FLAGSHIPS



Australian Energy

- Plentiful reserves of high quality, available black and brown coal
- Increasing proven gas reserves – natural gas and coal seam methane
- Declining indigenous oil
- High solar, wind and geothermal potential
- No nuclear power
- Limited hydro power
- ➡ • Cost-effective energy supply sector
- ➡ • High GHG emissions intensity
- ➡ • Awareness of the need for a “low emissions” response



Australia's Energy Sustainability Targets

- Ratified the Kyoto Protocol
- National GHG reduction target of 60% over 2000 levels by 2050
- Carbon Pollution Reduction Scheme in 2011
- Reduce our GHG emissions between 5 and 25%(?) over 2000 levels by 2020
- Produce 20% of our power from renewable energy sources by 2020



Facilitate a shift to hydrogen use?

Major Low Emission Incentives

- The Global Carbon Capture and Storage Institute (\$100M pa)
- The National Low Emission Coal Initiative (\$500M over 5 years – with \$1 billion industry contribution)
- The Australian Solar Institute (\$100M over 5 years – for PV and solar thermal R&D)
- Renewable Energy Fund (\$500M)
- Energy White Paper (due end 2009)



Hydrogen Energy Planning

Three documents were released in 2008!

- Towards Development of an Australian Scientific Roadmap for the Hydrogen Economy

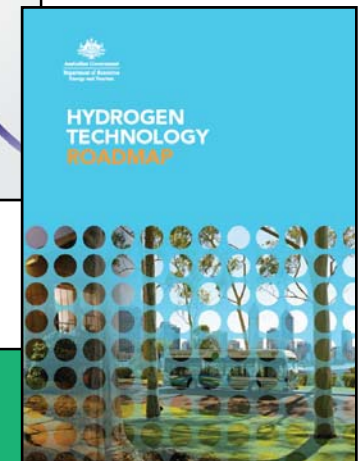
www.science.org.au/reports/hydrogen.pdf

- Australian Hydrogen Activity

www.ret.gov.au

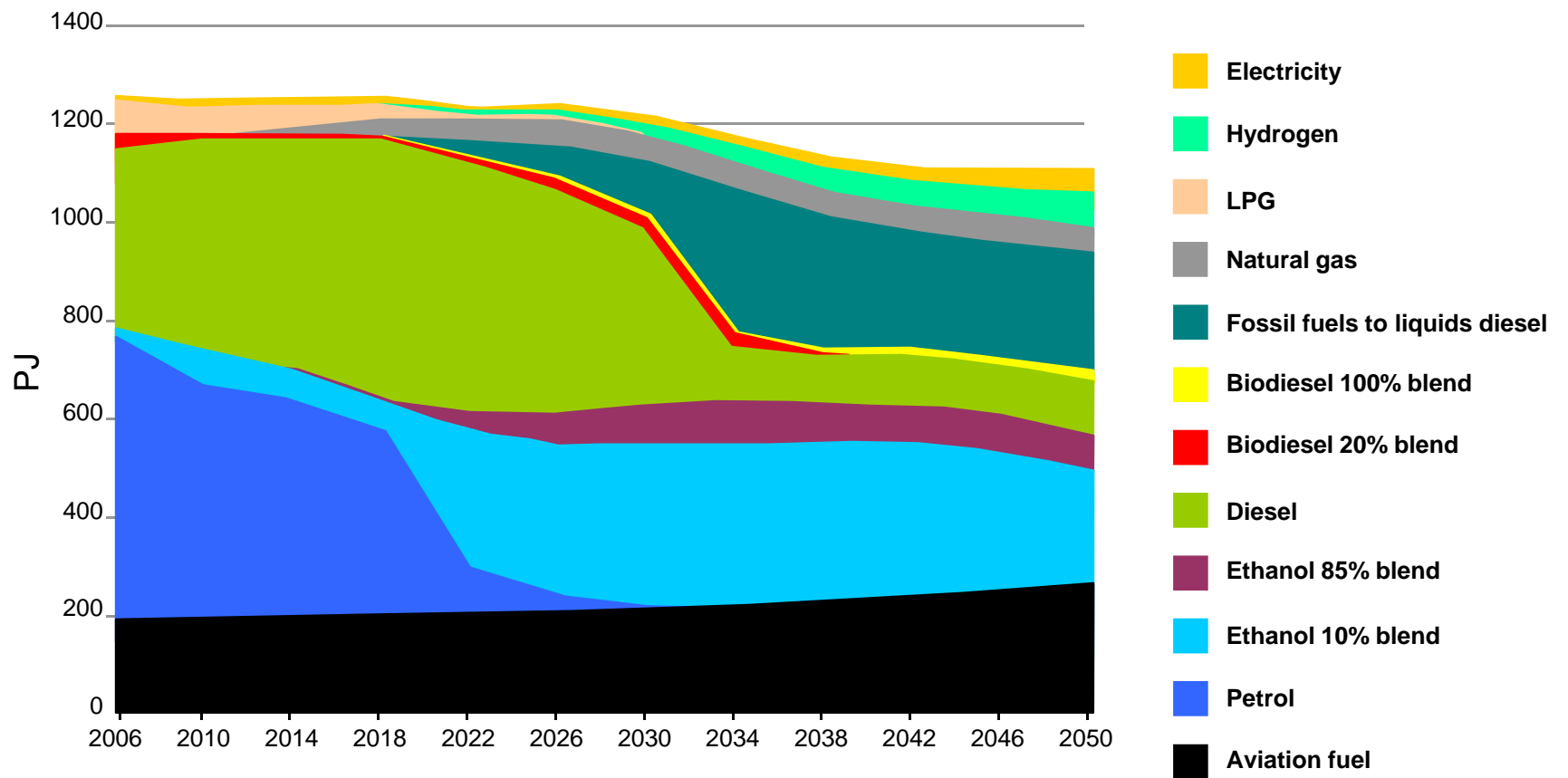
Hydrogen Technology Roadmap

www.ret.gov.au



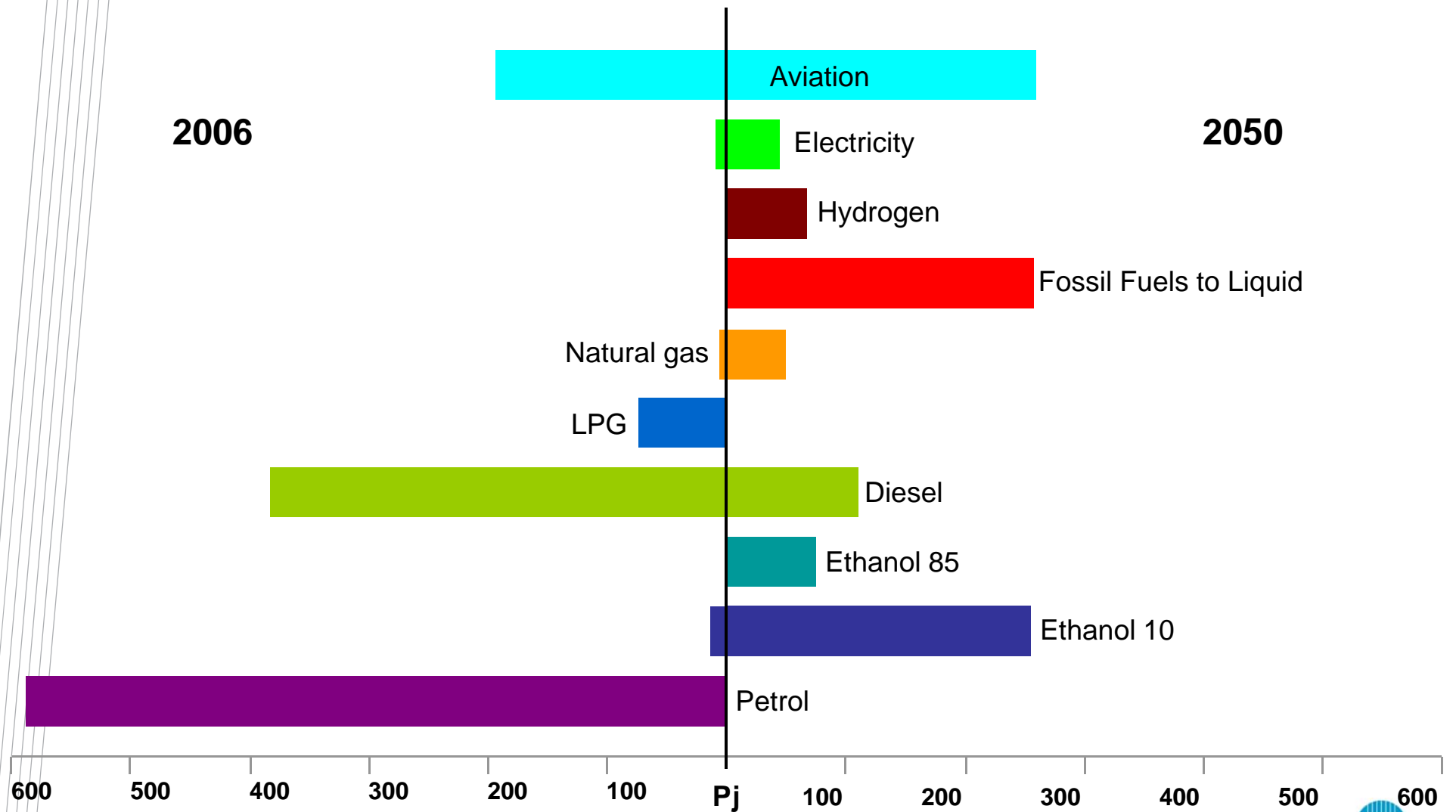
One Possible Transport Fuel Mix

Low cost fuel cell vehicles available, EIA high oil price, 60% below 2000 levels by 2050 emission target scenario



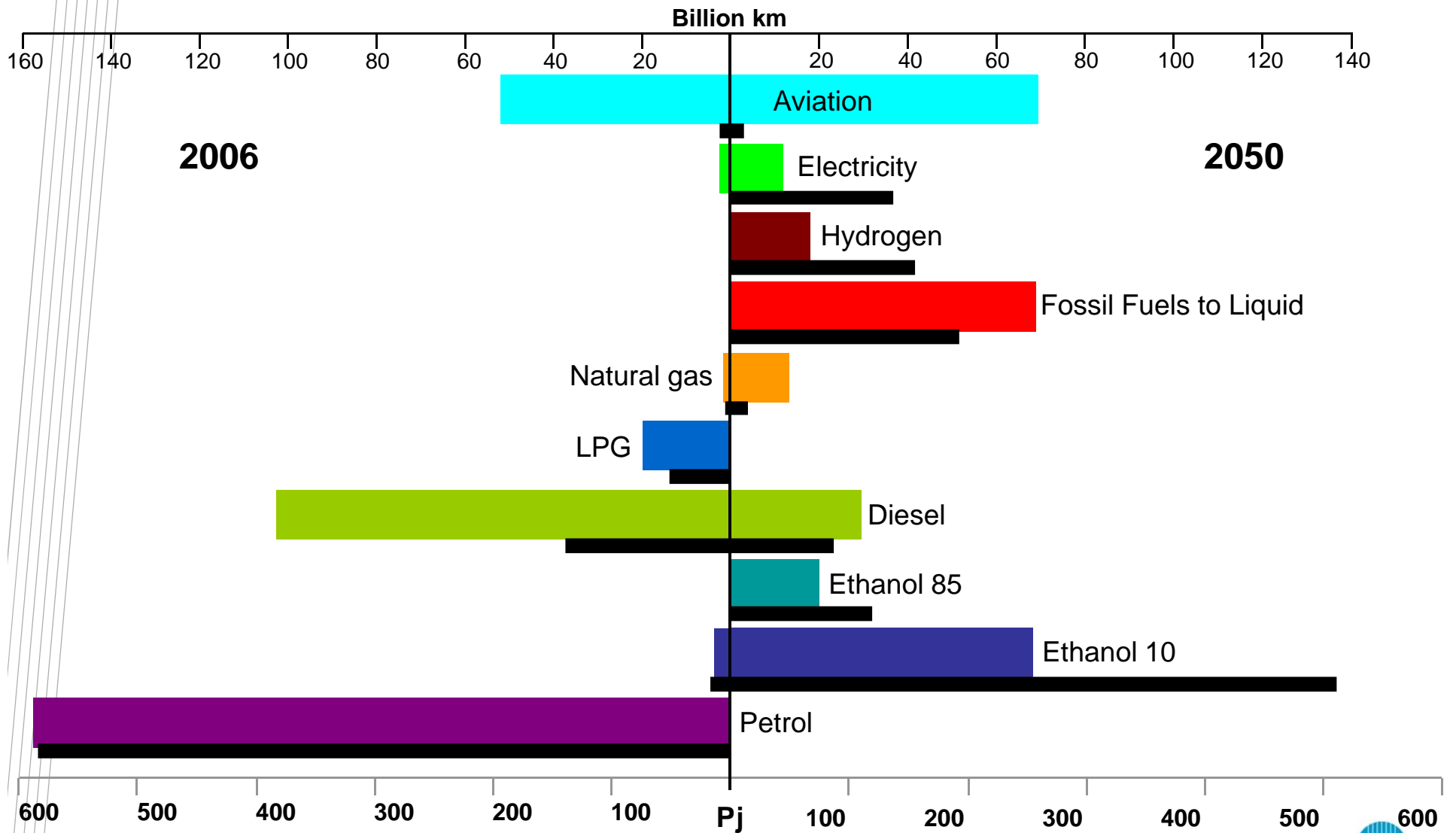
Note, ethanol blends contain petrol

Summary of Major Alternate Fuel Changes



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Hydrogen Research (1)

Gasification

QLD

- Zerogen
- Gasification with CCS
- Demonstration then commercial plants

Victoria

- Loy Yang - IDGCC

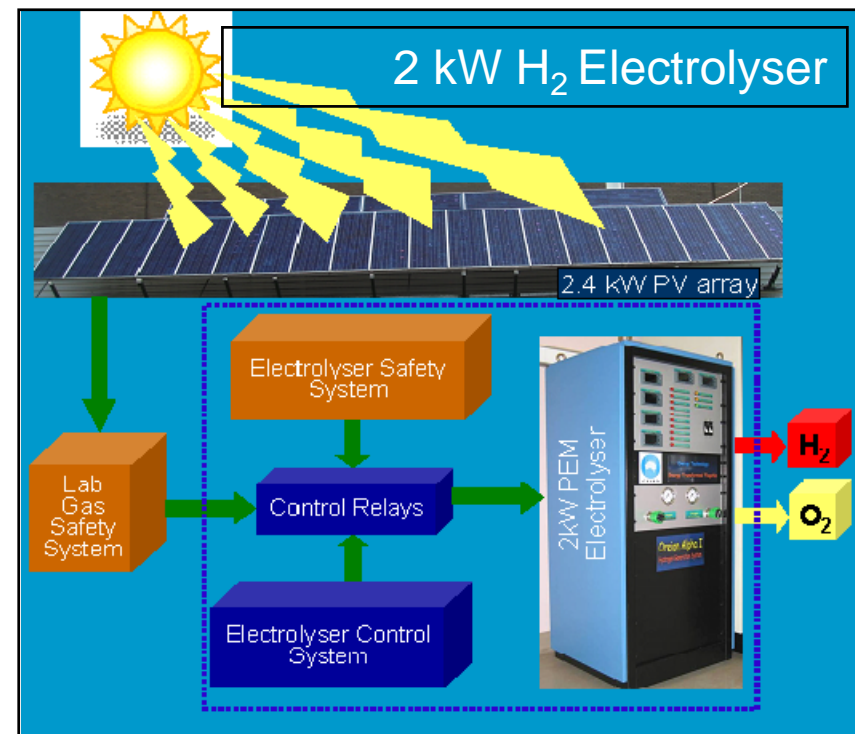
CSIRO:

- Coal gasification with CCS
– development of lower cost membranes for hydrogen separation from synthesis gas



Hydrogen Research (2)

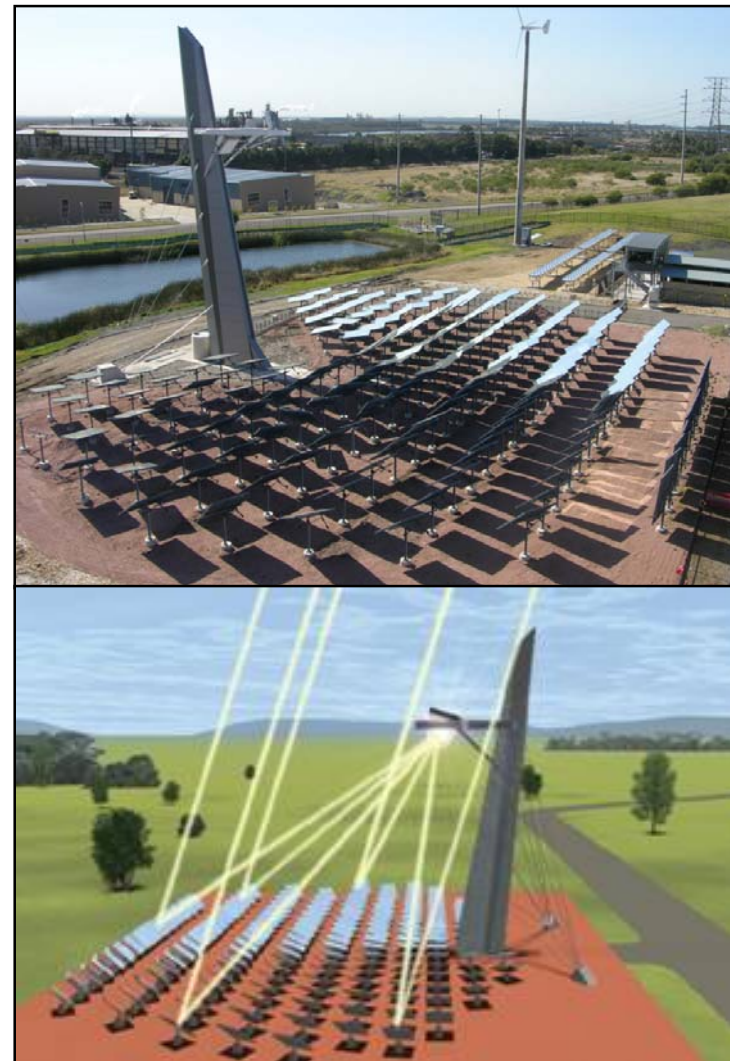
- Hydrogen production
 - Electrolysis
 - Development of a compact PEM electrolysis system for high pressure, small scale H₂ generation



Hydrogen Research (3)

- Solar reforming
 - Use of solar energy to reform natural gas to hydrogen
 - 500kW solar field constructed
 - Planning for the installation of a 5MW demonstration

➔ IPHE Recognised project



Other Relevant Australia Hydrogen Activities

- Social Research
- Distributed Energy (SmartGrid?)
- Alternative Fuels
- Learning's from other low emission sectors

Concluding Remarks

- Australia acknowledges that the importance of hydrogen, particularly in transport, will grow
- Hydrogen will need to compete economically, technically, socially, sustainably with other low emission technologies
- Australia will be largely a “technology taker” in this area
- There are significant “complimentary” opportunities with other low emission technologies
- It is important for Australia to keep abreast and well-informed of international hydrogen activity so that we can comply with the vision of the Hydrogen Technology Roadmap



By 2020 Australia is effectively exploiting emerging hydrogen and fuel cell market and supply-chain opportunities, locally and globally

Australia Hydrogen Activities

- **IEA participation**
 - Task 18, Integrated Systems Evaluation
 - Task 21, Biohydrogen
 - Task 22, Fundamental and applied H₂ storage materials development
 - Task 25, High temperature production of H₂
 - Task 24, Wind Energy and Hydrogen Integration
 - Task 26, Advanced materials for H₂ Waterphotolysis
- **National hydrogen Materials Alliance**
 - 12 universities, ANSTO and CSIRO
- **The H₂ activity report (2005) identified 120 projects**
 - 29 in H₂ production from fossil fuels
 - 26 in H₂ production from water
 - 17 in H₂ storage and distributed generation
 - 26 in H₂ use
 - 22 in Standards and implementation