



## THE HYDROGEN PROJECT

PART OF THE ANU GRAND CHALLENGE:

*ZERO-CARBON ENERGY FOR THE ASIA-PACIFIC*

## Our Team

GC Fellows and ANU Discipline experts in Chemistry, Economics, Engineering, Governance, Law, Physics, Policy



# HYDROGEN IN A ZERO-CARBON ENERGY ECONOMY



Long term energy storage and export



Long-haul transport



Feedstock and fuel for industry

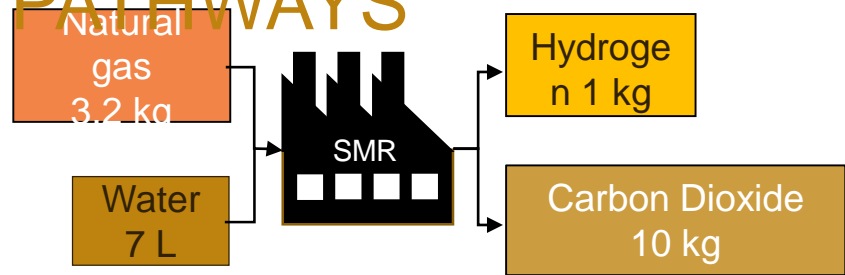
*Fertilizer (ammonia)*

*Metal refining*

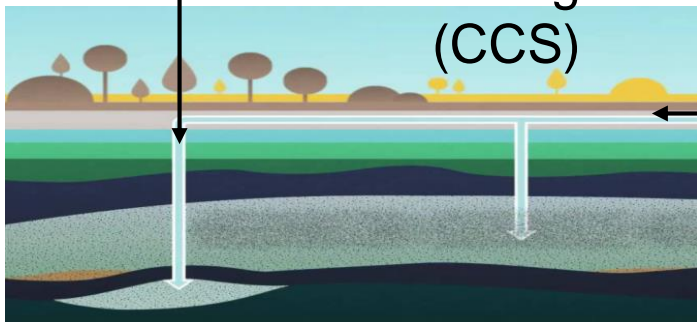
*Mining*



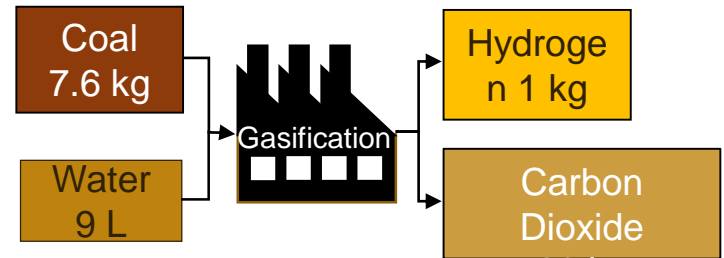
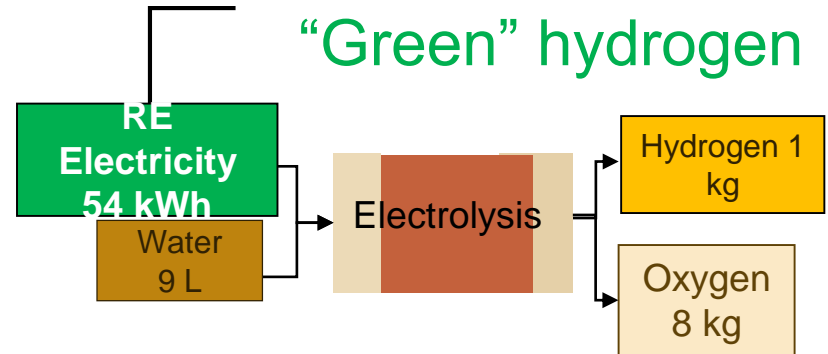
# HYDROGEN PRODUCTION PATHWAYS



Carbon capture and storage (CCS)



Renewable or "Green" hydrogen



Low emissions fossil fuel based or "Blue" hydrogen

# EMISSIONS INTENSITY IS CRITICAL

Mature CCS avoid between 50-90% process emissions

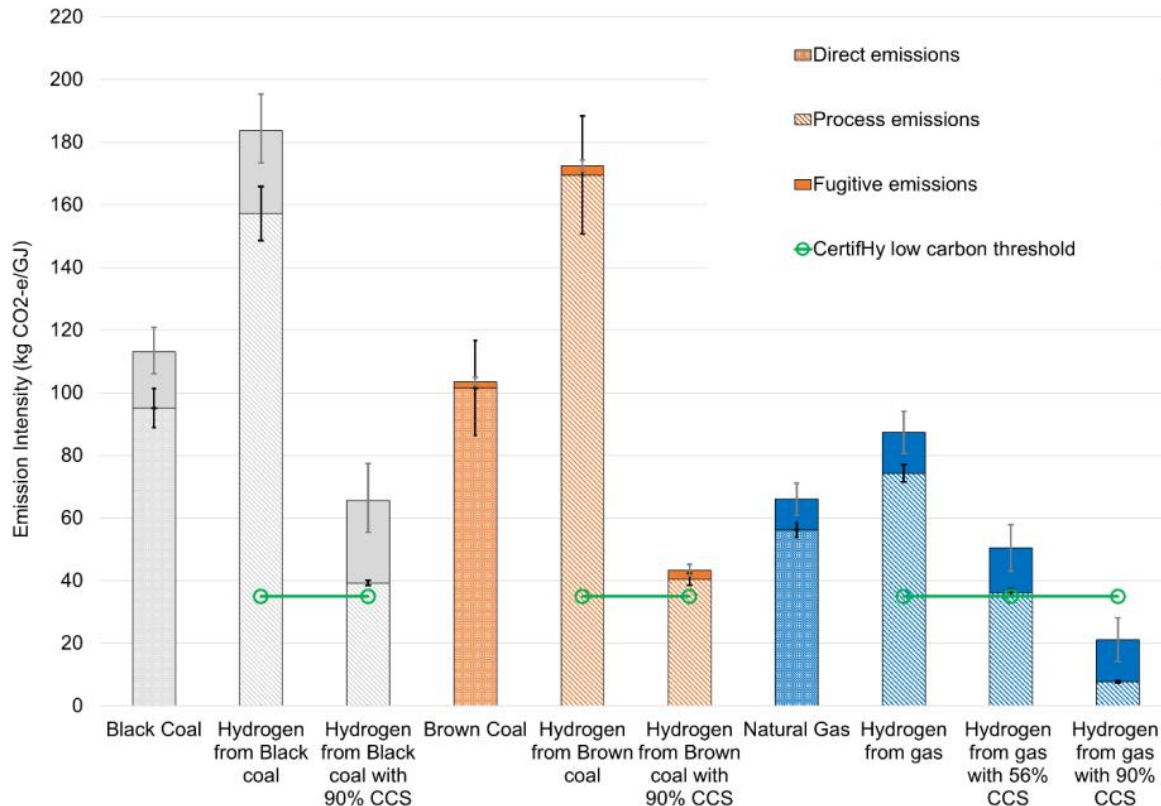
'Fugitive emissions' are methane leaks that occur during fossil fuel extraction

Fugitive emissions rates shown are IPCC defaults

Rates are higher for unconventional gas

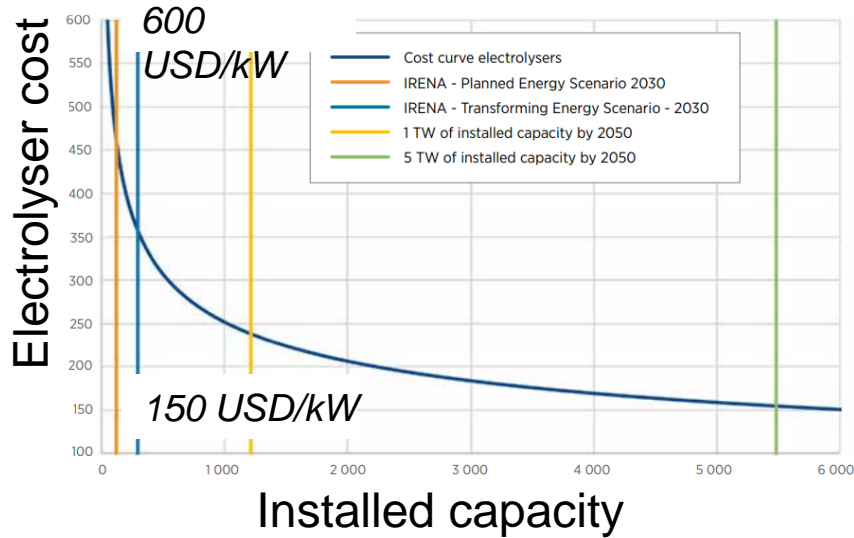
Longden et al., 2021, Applied Energy

Figure 1: Emissions intensity of different fuels



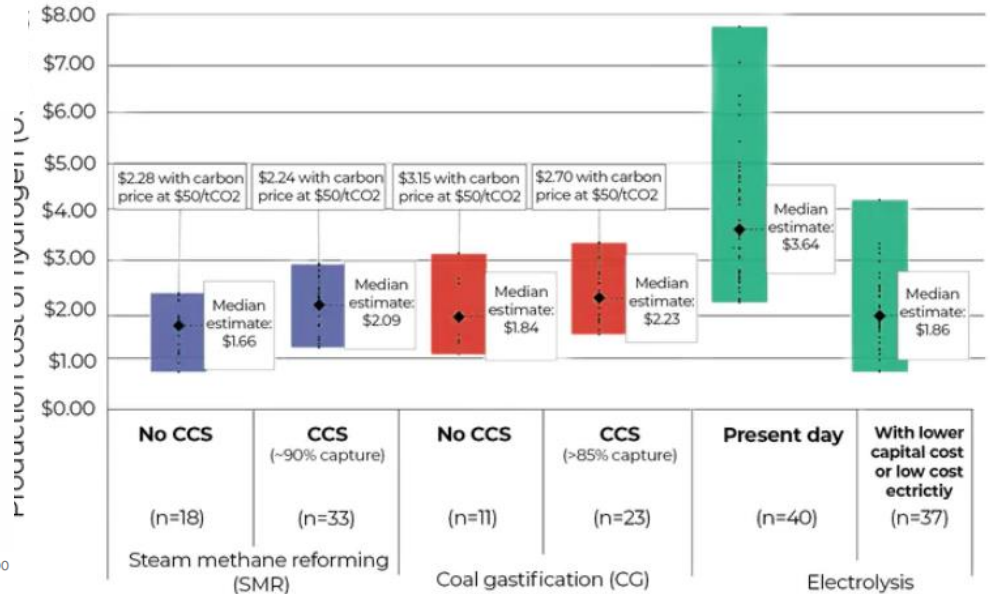
Renewable energy costs are falling, and will continue to

Electrolysers will decrease in cost as they scale up



## Production cost of hydrogen by type (estimates from 16 studies)

Range of estimates (Maximum to minimum)  
 ♦ Median (or central) estimate



<https://theconversation.com/australia-is-at-a-crossroads-in-the-global-hydrogen-race-and-one-path-looks-risky-157864>





## SOME TAKE AWAYS:

- Renewable hydrogen can help decarbonize a range of hard-to-abate sectors
- Developing a new, large-scale, low emission (blue) hydrogen industry based on fossil-fuel could undermine global efforts to reduce methane emissions
- Renewable (green) hydrogen has a clear pathway to cost reduction and could out-compete fossil-fuel based low-emissions hydrogen in the (near?) future
- The Australian National Hydrogen Strategy and the Low-Emissions road map includes both renewable and fossil-fuel based hydrogen with CCS in its definition of 'clean' hydrogen

