Ammonia Energy Conference 2022 – Australia

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AMMONIA ENERGY ASSOCIATION

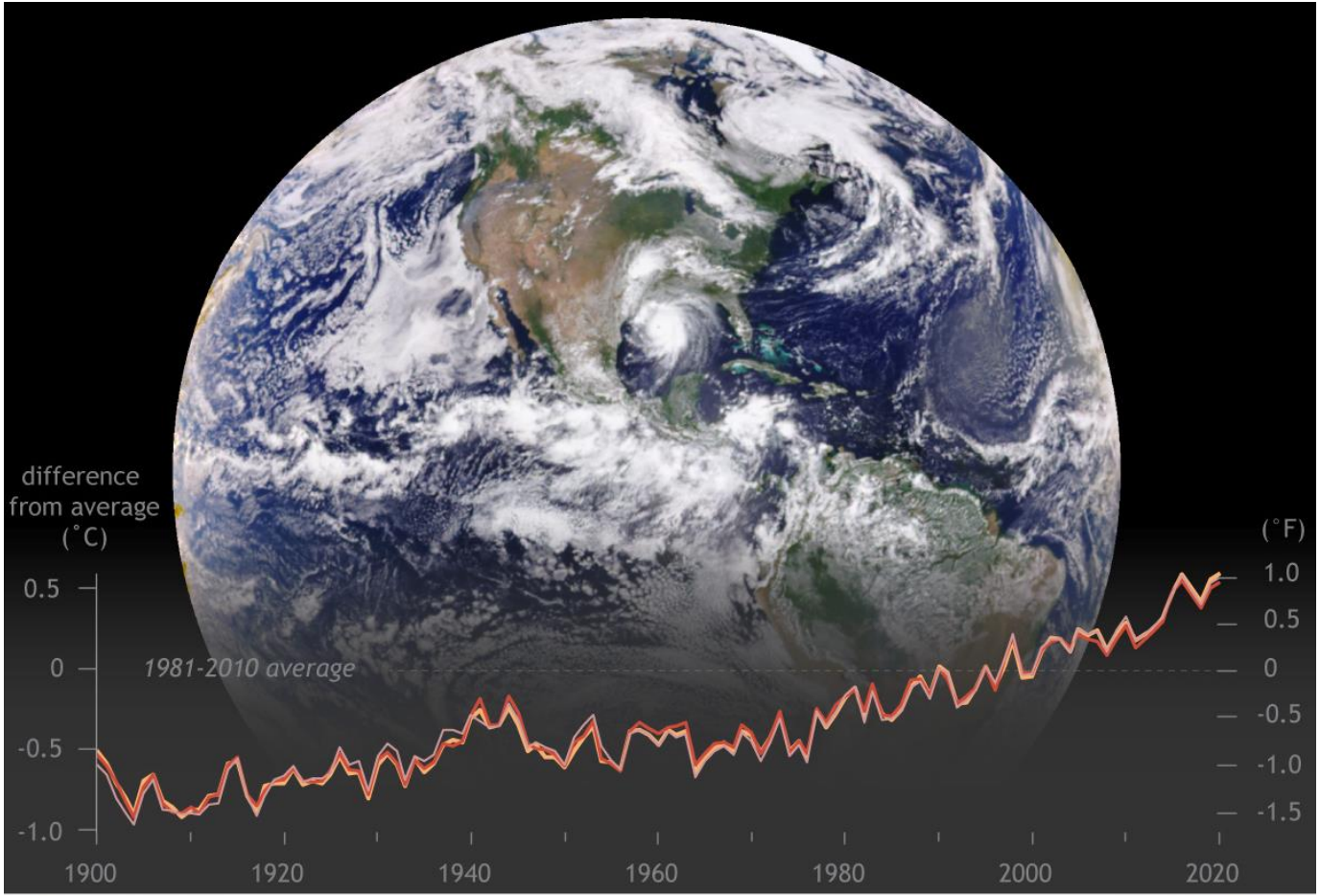
GLOBAL EMISSIONS IMPLICATIONS FROM CO-COMBUSTING AMMONIA IN COAL FIRED POWER STATIONS: AN ANALYSIS OF THE JAPAN-AUSTRALIA SUPPLY CHAIN

Reza Fazeli, Matt Stocks, Llewelyn Hughes, and Fiona Beck

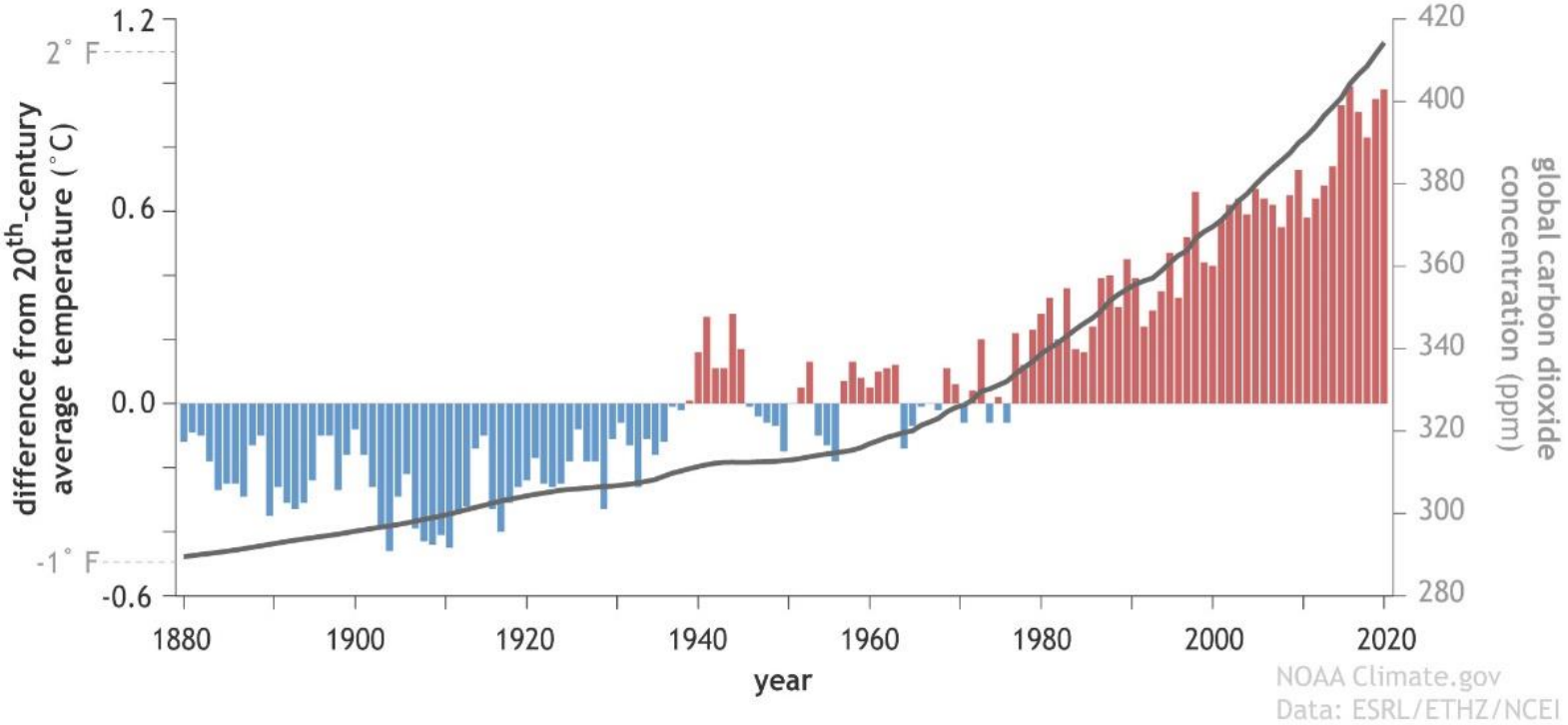
August 25th, 2022

ZERO CARBON ENERGY FOR THE ASIA-PACIFIC

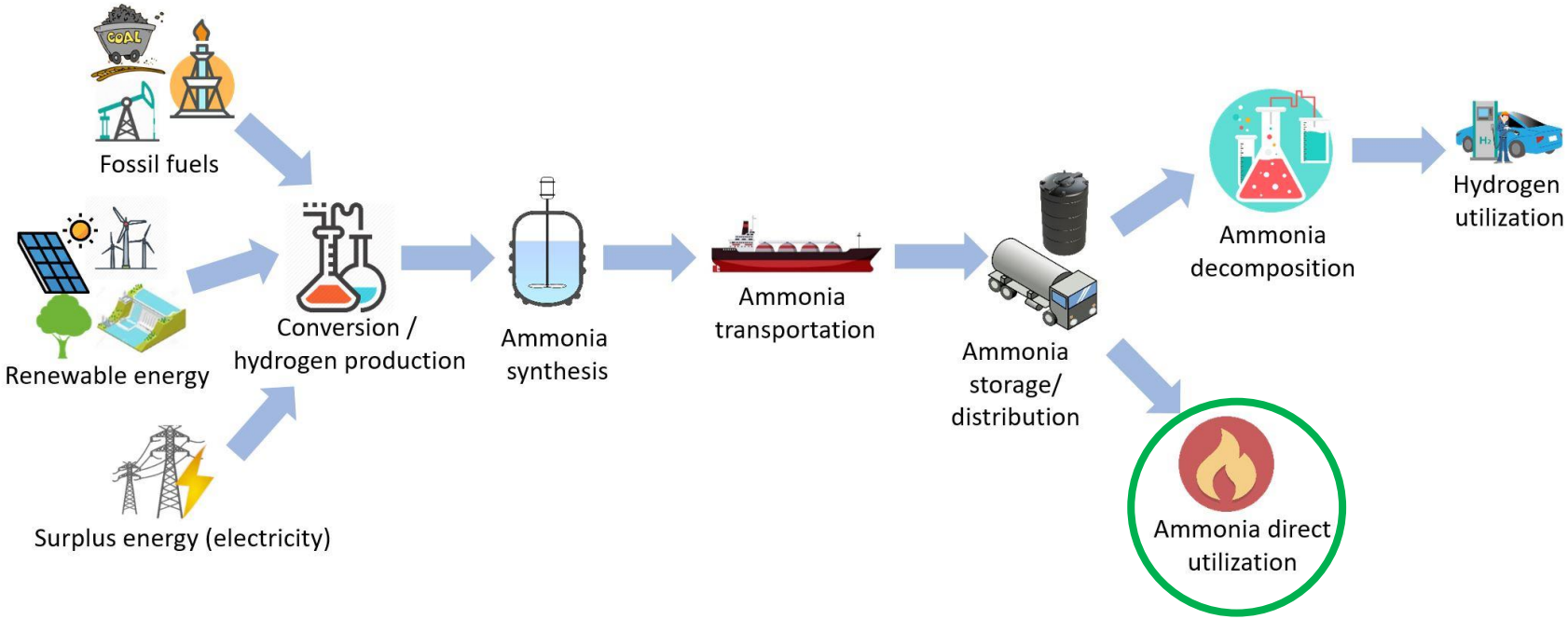
Australian National University


difference
from average
(˚C)
0.5
0
-0.5
-1.0
1981-2010 average
1900
1920
1940
1960
1980
2000
2020
(˚F)
1.0
0.5
0
-0.5
-1.0
-1.5
NOAA DISCOVR/EPIC
August 26, 2020
NOAA
Univ. East Anglia (HadCRUT5)
NASA
NOAA Climate.gov
Data: SOTC 2020

Global atmospheric carbon dioxide and surface temperature (1880-2020)

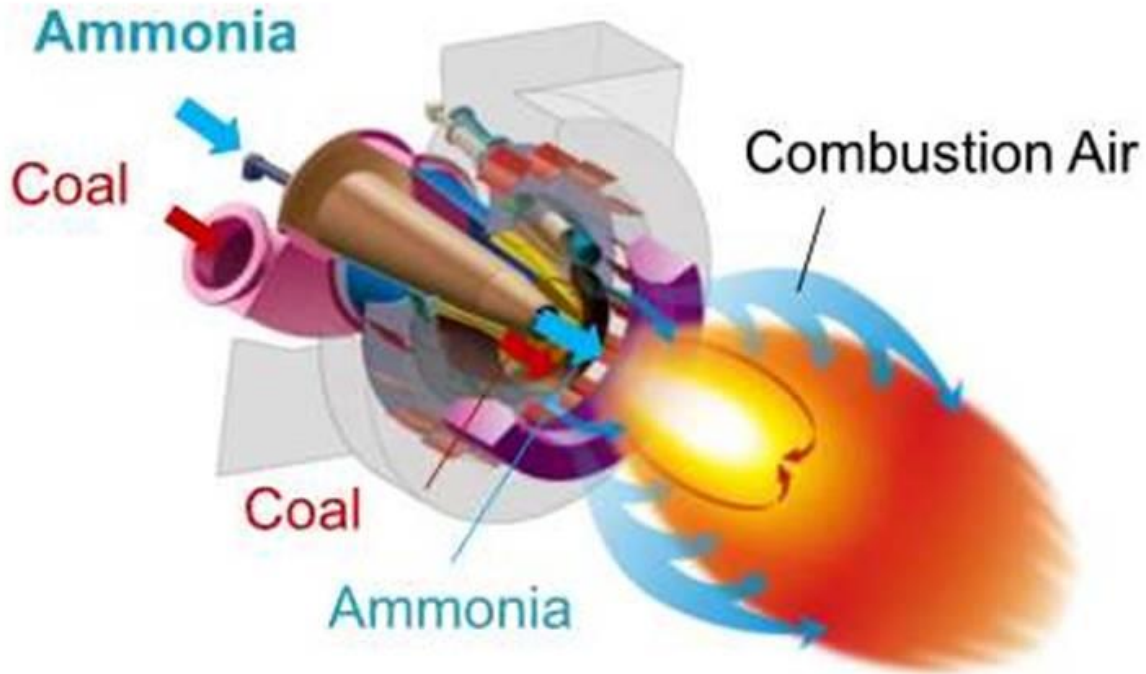


Ammonia as an attractive hydrogen vector



Source: Aziz, et al 2020

Co-combustion of ammonia



Source: IHI Corporation

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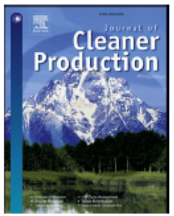

Global emissions implications from co-combusting ammonia in coal fired power stations: An analysis of the Japan-Australia supply chain

Matthew Stocks [a,*], Reza Fazeli [b], Llewelyn Hughes [c], Fiona J. Beck [b]

[a] College of Engineering and Computer Science, The Australian National University, Australia
[b] School of Engineering, The Australian National University, Australia
[c] Crawford School of Public Policy, The Australian National University, Australia

Australian National University

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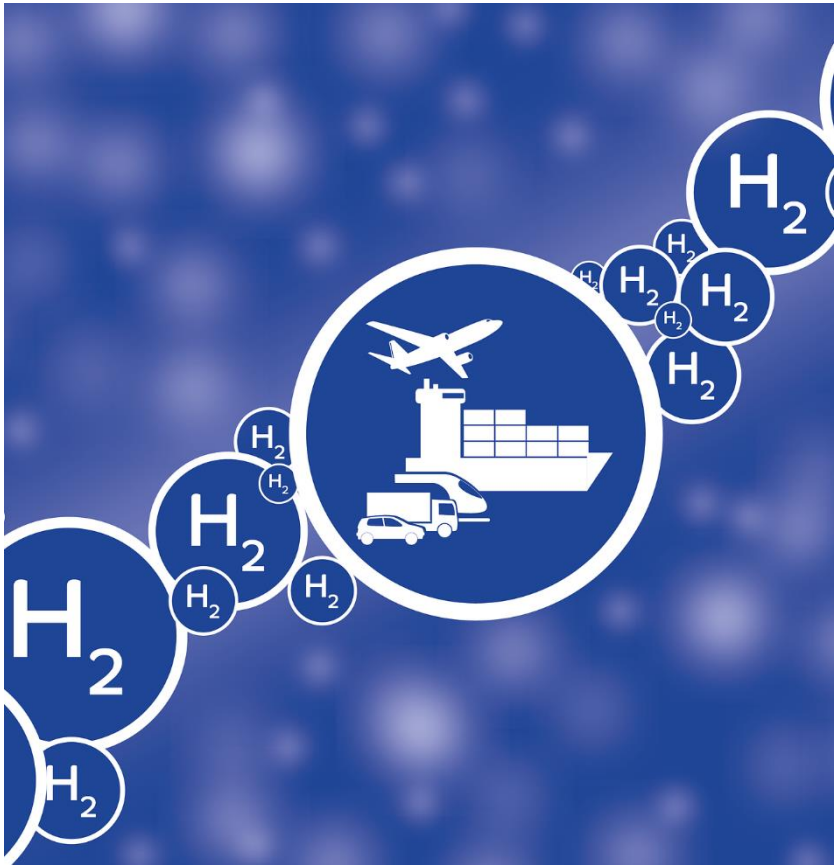
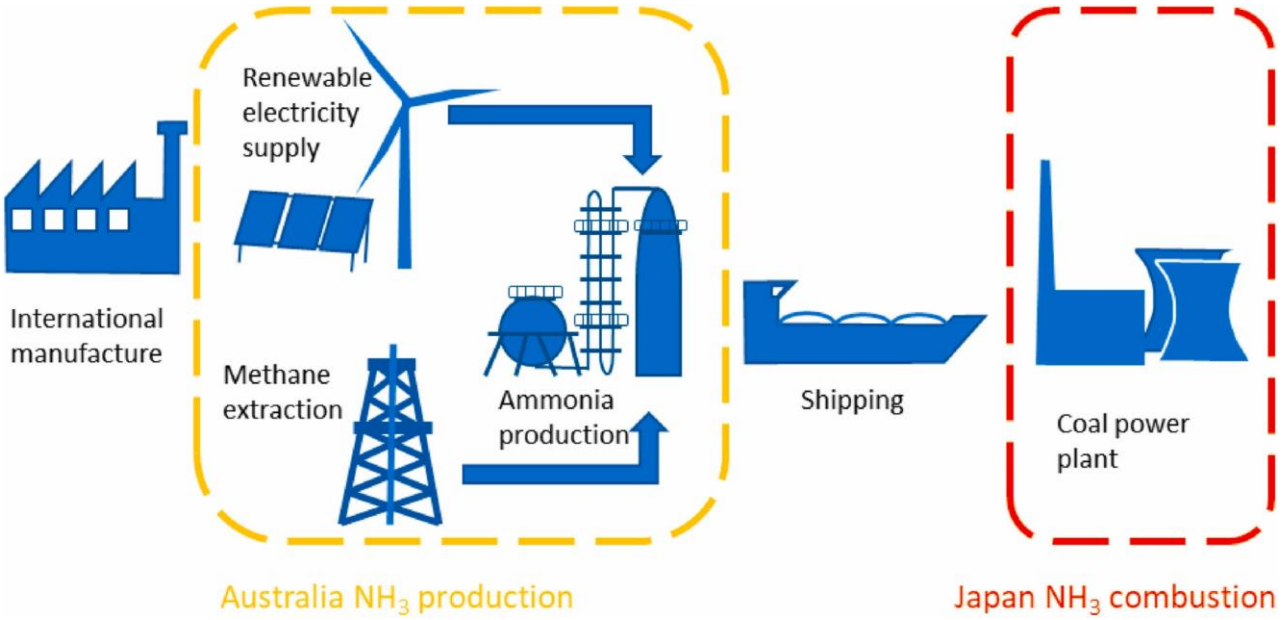
Research Question

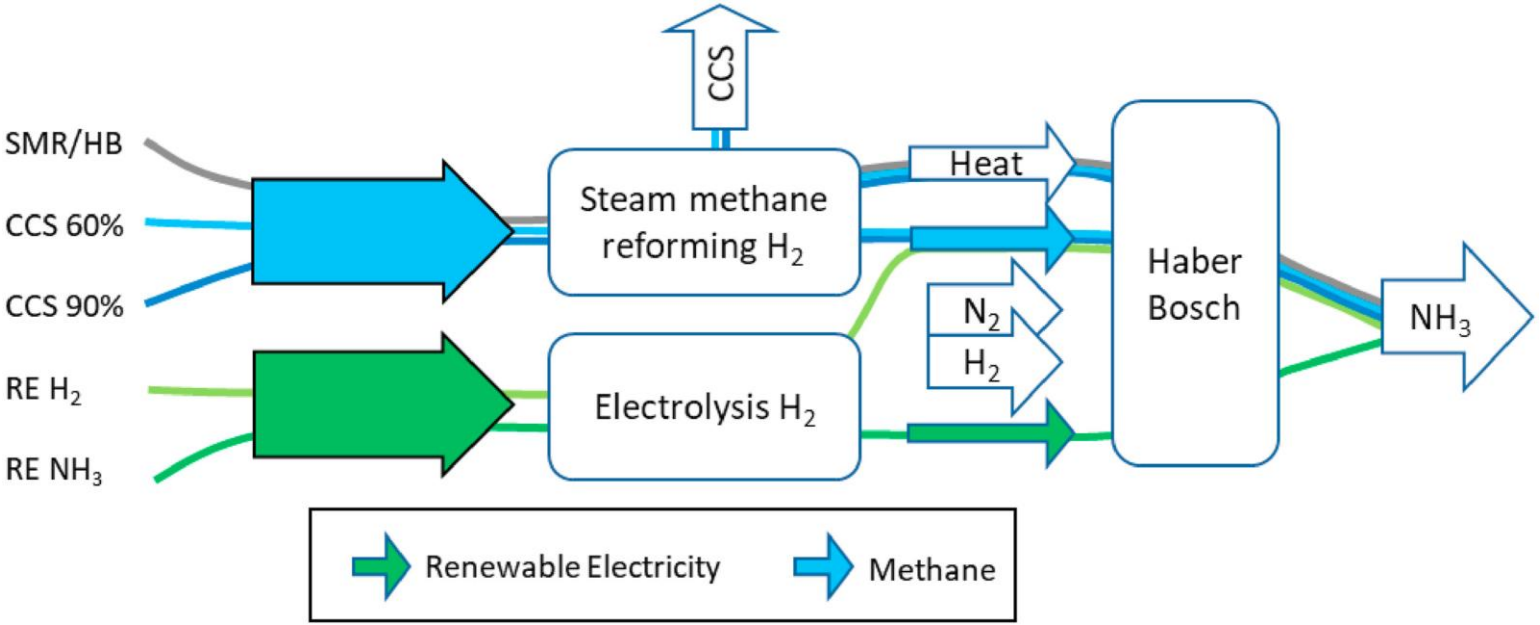
1. What are the global emissions implications from co-burning of ammonia in coal fired power stations?
2. What policy measures should be utilized to ensure global environmental benefits?



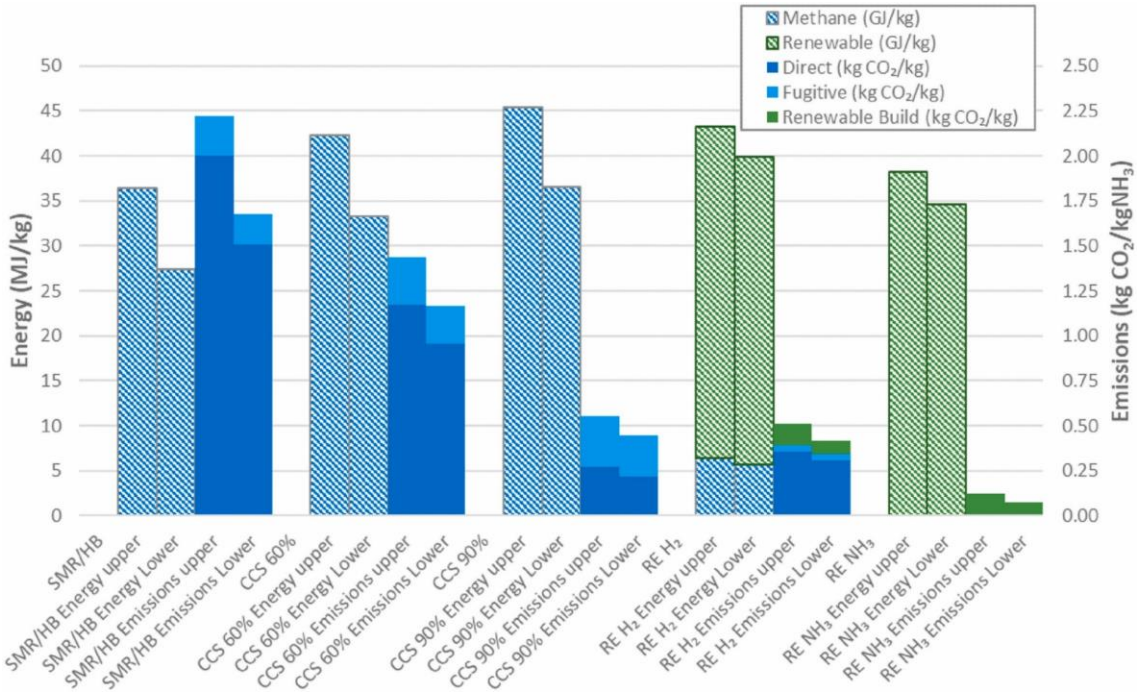
Boundaries for emissions accounting



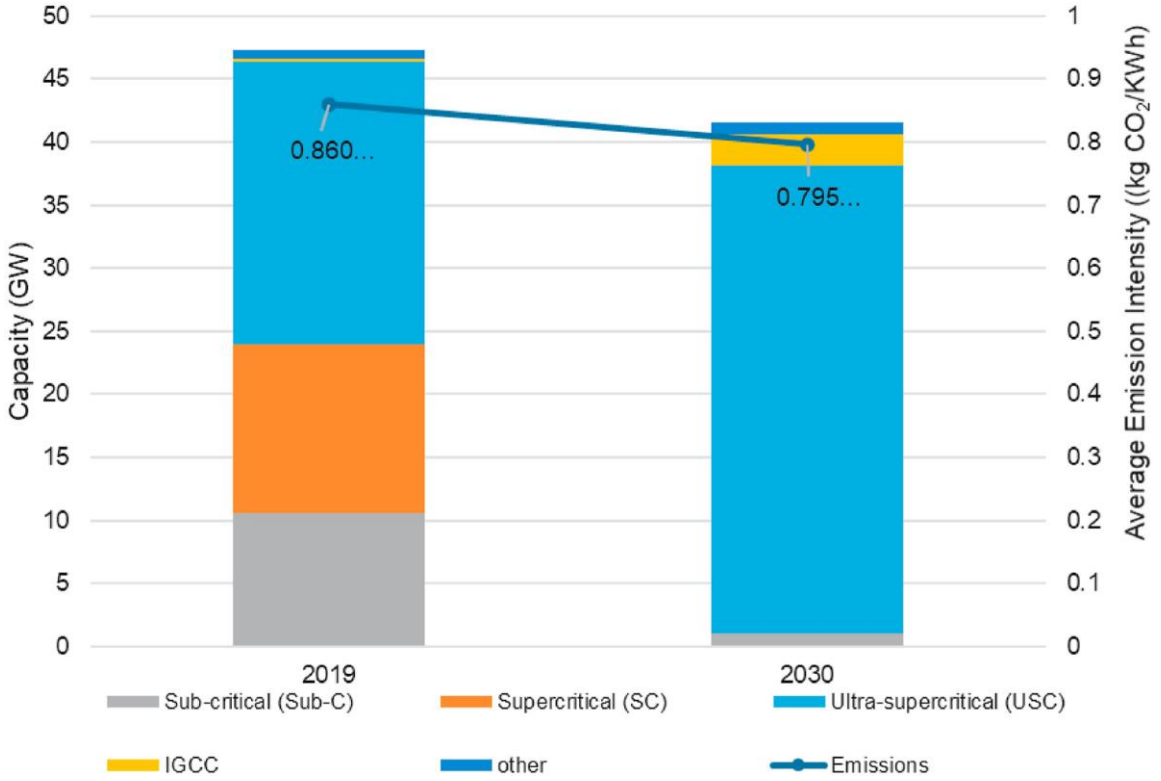
Ammonia Production Pathways



Energy and emissions intensity per kg of ammonia for production pathways

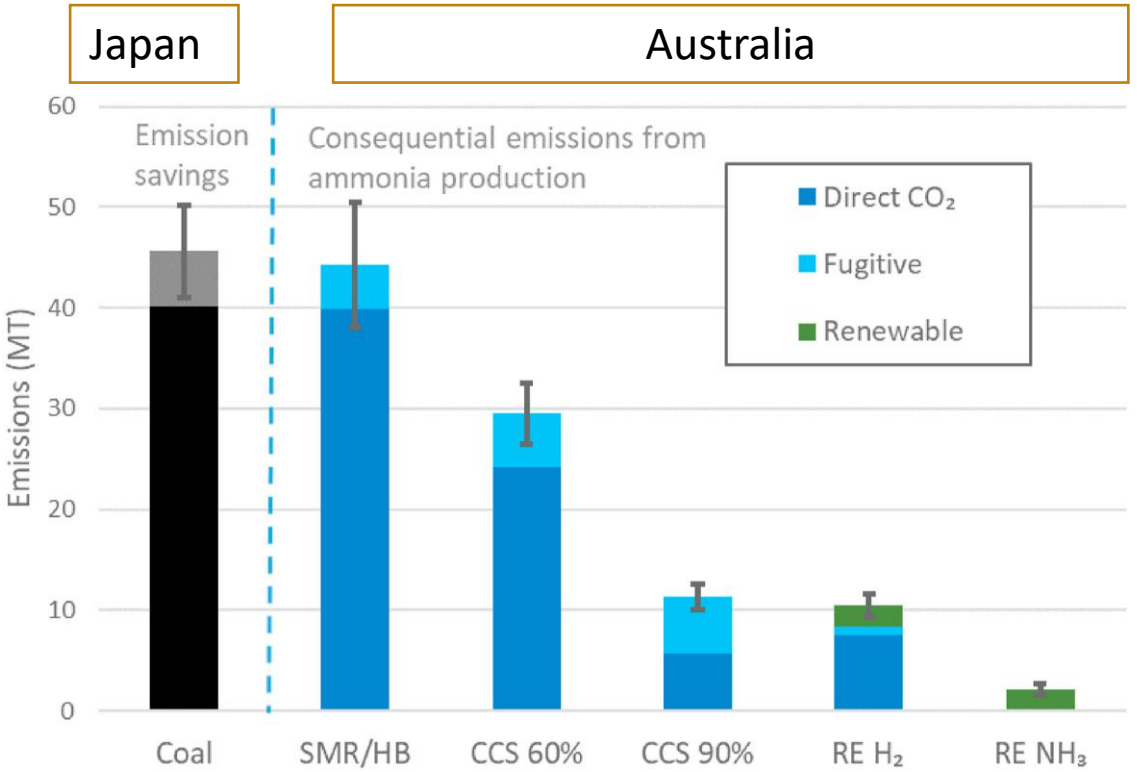


Results



Capacity mix of thermal coal power generation technology and emissions intensity for 2019 and ANRE 2030 proposal.

Results



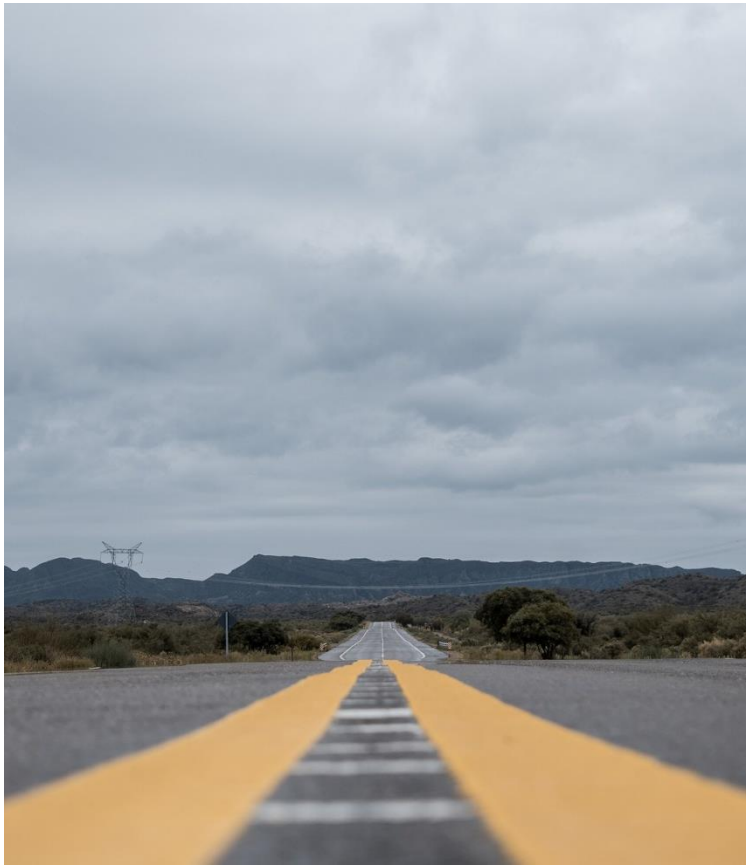
Annual emissions savings due to 20% ammonia/coal co-combustion in Japan's 2030 coal fleet, consequential emissions from ammonia production in Australia.

KEY TAKEAWAYS

- The analysis demonstrates the potential for significant emissions reductions in Japan through the use of ammonia co-combustion in coal power generation
- It highlights the importance of the choice of ammonia manufacturing technology for reducing emissions on a Global Supply Chain basis.

Next Steps

- Is the co-combustion of Ammonia in the long-run consistent with national carbon budgets?
- What are the implications if the technology is adapted across the ASEAN?



THANK YOU

Reza Fazeli
Research Fellow
Zero-Carbon Energy for the Asia-Pacific
Email reza.fazeli@anu.edu.au

Australian National University

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