HOW ECONOMICS AND PUBLIC POLICY SUPPORT A TRANSITION TO 'FUTURE FUELS'

University of Adelaide specialists with policy and economics expertise have been considering practical issues such as who is going to fund these technologies or new resources, how they will compete in the marketplace, and how they will be adopted by Australian consumers.

IMER initially approached the University's Faculty of the Professions in 2019 to collaborate on the Future Fuels Cooperative Research Centre (CRC). The work of this collective is centred on 'green hydrogen' and 'biogas' research and development, as well as contributing to the National Hydrogen Strategy.

Led by Steve Whetton, Deputy Director of Economic Studies in the South Australia Centre for Economic Studies and Liam Wagner, Associate Professor of Energy and Environmental Economics for the Centre for Global Food and Resources, researchers have brought expertise that IMER recognised was essential.

"Traditionally IMER's focus has been on engineering and scientific skillsets contributing to the technical side of research into hydrogen and modern energy systems, but IMER also saw the need for a policy and economics focus," said Deputy Director Whetton.

"Since beginning our involvement with the Future Fuels CRC, we've expanded into other related energy research to complement IMER's technical focus."

A big win during 2020 was The University of Adelaide's adaptation of Victoria University's 'regional model', which is now fully functioning to predict to 2050 the Australian impact of decarbonisation.

The Centre for Global Food and Resources also completed a systematic review of hydrogen as a decarbonising fuel, work that fed into the National Hydrogen Strategy. We considered what the important economic and policy components are for hydrogen to be successfully adopted as a 'green fuel' solution.

University recruits top expert in economic, environmental and policy modelling

Another win was the appointment in October 2020 of Liam Wagner from Griffith University as the University's first Associate Professor of Energy and Environmental Economics.

IMER benefits from Associate Professor Wagner's expertise in the ongoing Future Fuels CRC, expanding the University's energy economics and policy capabilities to create a critical mass of expertise. "In the past, we've looked at the regulatory side of how greener energy systems are introduced for consumers, and the appropriate financial structures," said Deputy Director Whetton.

"The Centre for Global Food and Resources now has strong expertise around how to manage transitions into these new technologies, including how to bring industry and consumer stakeholders along with you."

Associate Professor Wagner and the Centre are now considering operations research modelling into market competition, cost structures, and the impact of decarbonisation through whole economy, not just electricity, which accounts for only 35% of carbon emissions.

"We're adjusting models for the Australian economy and considering how to deal with industry cost factors," said Associate Professor Wagner.

Collaboration combines expertise for bids

IMER also collaborated with the Faculty of the Professions for the Heavy Industry, Low Carbon Transition (HILT) bid to address heavy industry's decarbonisation options, specifically the economics and policy behind decarbonising hydrogen.

"This deals with community and social change to manage the transition, for example whether workers in these carbon-intense industries have to be retrained or employed elsewhere in the sector," he explained.

"There is also a geographical factor – aluminium and steel plants are traditionally located near coal power plants for accessible fuel. Will new environmental resources be viable there? They'll also be very exposed to changes in emission controls. Program 3 is about giving people in these industries hope – giving regional workers and coal industry workers a future."

There is already a shift in demand for copper and lithium, which Australia has in abundant resources. These are examples of resources our country will transition to extracting for a more sustainable future.

Future projects combining areas of expertise

Forthcoming bids that IMER and the Centre will collaborate on include both copper and hydrogen CRCs. Economics and policy experts will consider the structures and industry issues in these industries.

> "A well-known example is electric cars – we know that in five or six years, these 'greener' vehicles will match conventional cars for whole-of-life costs," Associate Professor Wagner explained.

"An example of what is *not* well understood, in contrast, is how we will use hydrogen and other greener energies in housing and construction. This means heating, cooling, cooking and water, and what decarbonising could mean for consumers along with the industries that support construction and housing."

Challenges include how to transport hydrogen, potentially through repurposing the 120,000 kilometres of gas pipelines across Australia, and finding solutions to the problem of current household appliances not functioning with hydrogen. Researchers, policymakers and governments need to consider the costs and implications of alternative energy sources.

"We're examining the ongoing production costs so that Australia can meet emissions targets, while also properly understanding the cost factors of this transition to greener energy. A previous logistical transition occurred in the 1950s, when whole suburbs transferred from what was known as 'town gas' to natural gas," he said.

The newly appointed Associate Professor Wagner and his team are also considering the policy mechanisms needed to encourage new technologies, and how this will impact on utilities regulations – charges to the public and pricing structures and net costs of energy.

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