Biofuels in Australia - the rewards and the risks

In its 2018 review, the International Energy Agency described Australia's energy situation as "paradoxical". While the country is rich in energy yielding resources, in recent years neither its policies nor its infrastructure have translated to robust energy security.

Biofuels offer the potential to resolve this paradox, not just through supporting the nation's energy needs but also through generating jobs in the energy sector, reducing pollution and improving public health. Maximizing Australia's biofuel potential will be a scientific, social and political balancing act.

Striking an environmentally-aware balance

From a greenhouse gas emissions perspective, biofuels offer significant benefits. According to a CSIRO report on biofuels, greenhouse gas emissions from pure biodiesel are approximately 90% lower than regular diesel.

This might seem to indicate that from an environmental perspective, the more biofuels we produce the merrier. But it's not that simple. The challenge lies in understanding how much expansion into energy-yielding crops Australia's delicate ecosystem will allow.

Adding to the complexity, the environmental impacts are also affected by where the production takes place and what crops are used to produce the biofuel. A number of promising research efforts are underway in Australia to identify sustainable, ecologically appropriate crops with a sufficient energy yield. Two of the most promising non-traditional feedstocks are pongamia (a tropical tree legume) and mallee eucalyptus (an abundant native Australian eucalypt).

Realizing the social benefits

Biodiesel fuel has the potential to significantly improve Australians' respiratory health. Health savings from improved air quality resulting from biodiesel

adoption are estimated to reach up to A$90.4 million, annually. However, when it comes to Ethanol, the benefits are not so clear-cut. While ethanol does reduce particulate emissions, evaporative emissions from ethanol are smog-forming. This exposes the Australian population to different health risks, which at this stage are difficult to quantify. The health impacts will depend on continued technological improvements and which biofuels are most used.

Then there are the economic implications. Continued investment in the biofuels industry within Australia has the potential to create an estimated 8600 new jobs. This represents a revenue injection of up to A$1.1 billion. Notably, these benefits are concentrated in remote regional Australia and could rejuvenate many poorer, rural communities. However, as can be observed in the international energy arena, the rise of the renewable energy sector inevitably signals a decline of the traditional fuel industry.

Minimizing economic and social disruption will require politicians and thought-leaders from both the biofuels and fossil fuels industries to devise strategies for gradual structural shifts along the entire production chain. To date, these conversations have not consistently happened, resulting in considerable volatility and missed opportunities in the energy industry. Encouragingly, this strategic and policy vacuum has been recognized and is in the process of being addressed. In March 2018, Bioenergy Australia announced it was working with industry leaders and academics to develop a strategic plan for commercial production of biofuels in Australia in the coming years. The plan focuses on creating a supportive policy framework to ease the structural economic transition to biofuels.

Delivering energy security without compromising food security

The International Energy Agency's 2018 review of Australia's energy policies identified a growing vulnerability in energy security. The report found that if imports of fuels were withheld, Australia would run out of oil in just 49 days.

Australia's current export wheat and grains could be converted to biofuels to provide up to 22% of the nation's petrol requirements. However, through

increasing dependence on crops to generate energy, the Australian economy loses a vital buffer of grain to protect from drought. As drought vulnerable as Australia is, exchanging energy security for food security is a short-sighted solution.

The challenge is to find alternative crops which can both be grown on agriculturally non-viable land and be modified to produce harvestable quantities of oil. The CSIRO's recent research into genetically modifying grasses and rapeseed to produce up to five times its normal oil yield is one such example of how Australian research may resolve the food / energy security balance.

Maximizing the rewards, minimizing the risks

Biofuels offer a means to bring significant environmental, social and geopolitical benefits to Australian society. However, across all these areas of potential gains there are significant risks which need to be carefully managed. Addressing these risks will require forward thinking policy, an incremental approach to economic restructuring and a continued commitment to biofuels research.