Towards a roadmap for a socially just energy transition within the agricultural sector

An ANU ICEDS Seed Funding project

ANU Battery Storage and Grid Integration Program (BSGIP)

ANU Centre for Entrepreneurial Agri-Technology (CEAT)

ANU School of Cybernetics

ANU Research School of Politics and International Relations

Australian National University

What is the challenge?

Climate change

- Agriculture will be one of the sectors most affected by the impacts of climate change.

- The agricultural sector has a significant emissions profile and is considered a hard-to-abate sector of the economy.

Industry commitments to carbon neutrality

- Industry has identified where it wants to be

- Need to identify potential pathways to get there

- Limited technical knowledge in energy systems within agricultural industries compared to other emissions sources (soils, enteric methane)

Aims of the project

Understanding the challenge

- Engagement to understand the complexity of the challenge from a stakeholder perspective

Identifying stakeholder needs

- Asking what stakeholders want to get out of the project

Validate the need for a transition roadmap

- Confirming the need for a transition roadmap, and the identifying key elements it should have

Understanding how ANU can help

- How can we deploy the world class capability at ANU and its wider networks to support an energy transition in the agricultural sector

Approach

Interdisciplinary

- A project team comprised of collaborators from 4 ANU entities across 3 ANU colleges

Systems

- Assessing the challenge at a systems level to understand the complex, dynamic and interconnected nature of various components and flow-on implications of system change
- Identifying the flow of benefits and costs of system change to different stakeholders

User-centric

- Engaging early and often with stakeholders to co-design and co-create solutions.
- Diversity of stakeholder groups including:

   - farmers, energy providers, industry groups, government, academia and local communities
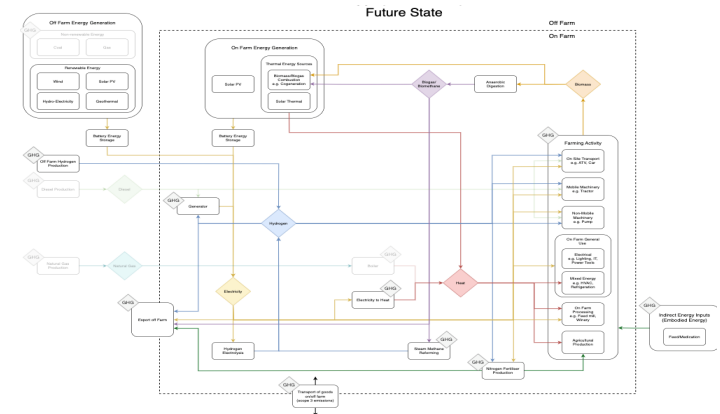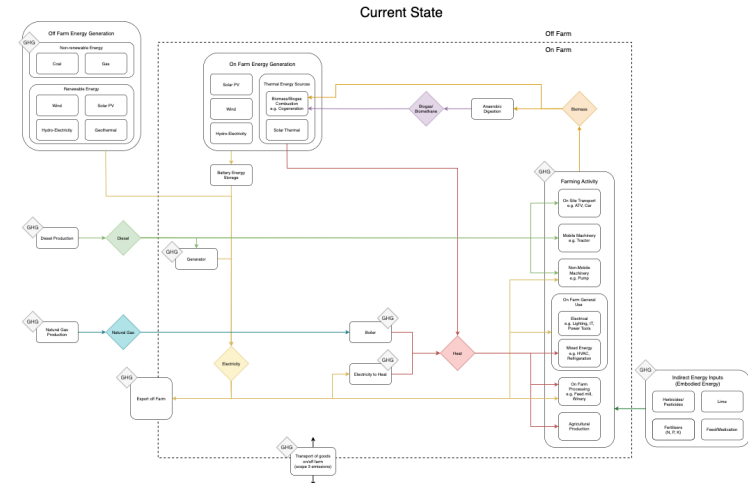
Process

Literature review

Developed a conceptual model of the current energy system

Stakeholder feedback on model

Future State

(Transition Opportunities)

Current State

Future State

Key Findings

Information gathering stage

- Stakeholders felt they needed to know more about the transition opportunities before they could engage in a meaningful discussion about viable transition pathways

Multiple pathways and tools required

- Each industry and farm has its own unique operating environment, and will require a broad toolkit of transition options to develop their own bespoke transition pathway

It is a transition and will take time

- Acknowledgment that there are long-term solutions which may not be technically or economically feasible for decades, and intermediate solutions may be required in the short-medium term.
  - Direct transition: pumping water, Diesel (current) – Solar (future)
  - Indirect transition: combine harvester, Diesel (current) – Biogas (intermediate) – Battery electric (future)

Key Findings

Importance of the policy and regulatory environment

- Barriers to on-farm production and use of renewable energy need to be addressed

Broader energy infrastructure requirements

- Access to fit for purpose energy distribution infrastructure will be critical to match production supply to demand

Opportunities for the agriculture to support broader economy wide transition

- As the agricultural sector builds on-farm energy assets, it has significant potential to provide generation, storage and grid stability services to other businesses and households in the economy

Next Steps

Agri-energy transition symposium

- Bring together stakeholders to discuss the findings of this project and workshop a plan for developing a transition roadmap

Building scenarios in BSGIPs *echo* modelling framework

- Having case-studies available for stakeholders to engagement with at the symposium will be important in understanding the impacts of different transition pathways.
- The ability of the *echo* to model multi-commodity energy systems will be critical in developing these scenarios

Second phase of stakeholder engagement

- The project team will take the draft report out to stakeholders for additional feedback before working with stakeholder to design the symposium