

2025 consultation

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Submission – Net Zero Commission

Farm Renewables Consulting – Karin Stark

16 April 2025

Farm Renewables Consulting is an Australian-owned business, rooted in the heart of the Central West NSW. Director, Karin Stark is a recognised leader in the agriculture and clean energy space, holding a unique position living on a farming property on the edge of the country's first Renewable Energy Zone. She founded the National Renewables in Agriculture Conference and has strong networks in regional Australia, seeking to facilitate the adoption of on-farm renewables as a practical way to reduce costs and emissions while building resilience. In recognition of her work, she was named in the 2023 and 2024 *Top 100 Green Energy Players* in National newspaper 'The Australian'.

Karin works to deepen the understanding of the broader energy transition within rural landscapes, ensuring that communities not only comprehend but actively participate in shaping meaningful, long-term outcomes. She has co-authored several reports including Farm Powered, Pursuing an Agrivoltaics Future in Australia and will be releasing, alongside EnergyCo NSW, a handbook about how to successfully implement agrivoltaics in large scale solar farms, and also combine horticultural crops and solar closer to city centres. Karin is currently part of a consortium, with Acclimate Partners, developing a roadmap for transitioning agriculture away from fossil fuels, an Agrifutures Australia funded project.

Question - What specific actions or policies could increase uptake of emissions reduction strategies in agriculture, both in the short and long term?

The below forms part of a collective submission

Collective Submission

Karin Stark (cotton, wheat and barley farm NSW/Director, Farm Renewables Consulting and Convener National Renewables in Ag Conference)

- Sandra Jefford (dairy farmer Victoria)
- Steven Hobbs (grain and sheep farmer Victoria)
- Chris Freney, (poultry farmer Victoria)
- Stephen Soutar (Alternate Energy Innovations, Victoria)
- Mike Cains (Pecora Dairy, NSW)
- Stephen Todd (Volt Farmer, Victoria)

Thank you for the opportunity to provide input into the Net Zero Commission's work. This paper serves as a collective submission from several farmers across different States and farming systems along with two businesses who work in the agricultural sector.

Themes that emerged from previous work are listed below.

- Farmers are interested in the use of renewables to replace diesel and electricity but need targeted support and more peer to peer learning opportunities.
- Farmers are keen to be part of the solution in a net zero economy with many technologies available now, however a lack of knowledge, regulations or high costs impede uptake.
- The distribution network and regulations don't enable opportunities for sharing power within a farm business or trading with neighbours.
- Microgrids are seen as a strong local solution however legislative change is required to unlock their potential.
- Australian policy hasn't supported on-farm bioenergy production, as it has in places like Europe.
- Regional expertise and skills are lacking, impeding successful implementation of renewable energy solutions on farms.
- Better coordination between Government departments and between farmers, industry and Government will accelerate adoption of on-farm renewables.
- Creating a higher national feed in tariff across the NEM changes the economics and return on investment for farmers wanting to invest in renewables. This would increase farmers contributing clean energy to the grid and recognize the environmental and social benefits of these renewables in addition to the market-based energy value.

Challenges:

Distribution issues

- Multiple meters (NMI) on a farm, some on different titles and inability to share power across the NMIs or across property boundaries. Technically it can be done, but not legislatively.
- Microgrids are difficult to implement due to regulatory barriers.
- Costs of transmitting energy a roadblock to viable projects, costs of buying power isn't reflective of the distance that power has travelled (e.g. power generated on the farm and used elsewhere on the farm pays a blanket transmission/network cost).
- Large Gentailers (Generators and Retails like Origin Energy) are difficult to engage with.

- Electrification on farms won't happen with existing distribution network – skinny lines and SWER unable to carry power required in some areas. Investment in on farm power generation is needed.

Technology

- Technology not there yet e.g. for off grid solar, diesel hybrid pump the blending of solar and diesel causing glazing and the system to switch off (solution yet to be found four years on), electric side by side not fit for purpose for farm operation and Inverters for on-farm wind turbines are not performing properly.

Expertise

- Audits are useful but auditors need to understand the energy use and operations of farms, most aren't across the complexity of different farming systems and commodities.
- Not enough regional businesses, skills and expertise to help farmers with energy solutions.
- Farmers are busy people, it's a 7 day a week job. They don't have the time to look into energy issues and the industry at times finds it hard to reach out to farmers.
- Lots of sales people are happy to sell solar panels, but they don't offer a system developed for unique farm operations and energy profiles.

Bioenergy and biofuels

- Bioenergy projects face cost challenges, inconsistent EPA requirements across States, long time frames for approvals from the EPA and a lack of supportive Government policy.
- Producing biofuel on farm from oilseeds crops grown on farm, faces the same testing costs and excise as large refineries making it un-viable. No recognition of smaller farm producers who want to reduce emission and improve fuel security.

Economics

- High upfront costs for renewable energy projects when farmers face thin margins and climate variability creating uncertainty about future income and yield.
- Battery storage is expensive at the scale farmers require it, but could have multiple benefits for energy reliability, reducing pressure on the grid and making the most of solar assets.

Solutions:

White paper and nurturing partnership

- Develop a comprehensive White Paper for agriculture and energy, fostering collaboration between farmers and industry to address challenges and promote

sustainable solutions. Include issues such as fuel security in Australia and how local biofuel production could assist.

- Building partnerships between scientists, Governments, industry and farmers will bridge the gaps in understanding the needs, creating market linkages and delivering capacity and finance within a broader food systems transformation strategy that includes renewables as a key pillar. Once this foundation is established, cross-sector partnerships, actions and investments will easily mobilise at scale.

Knowledge sharing

- Provide targeted one on one support for farmers, helping them to understand renewable energy solutions on their farm. The one-on-one support could be for whole farm emissions calculations and include energy.
- Create and promote additional case studies and fund field trips/demonstration days to share knowledge.
- Fund and support knowledge sharing through peer-to-peer opportunities, including establishing long term funding for the National Renewables in Agriculture Conference.
- Farmers' advisors need to be educated, e.g. dairy company reps, consultants etc so they know how to guide farmers with the right expertise.
- A collective-owned piece of software similar to (<https://www.orquestra.energy/>) designed to optimise both carbon and renewable energy options for Australian farmers. The people who knock on farmer's doors do not understand systems-based thinking and many consultants have very narrow areas of expertise. Software is a great way to analyse opportunities and present options.

Research and Development

- Invest in more R&D needed for integrating renewables on farm and enhance extension and outreach services.
- A technical resource centre, perhaps at CSIRO, where persistent problems such as the diesel, solar pump and inverter technical integration Karin is experiencing on her property, could receive assistance from experts.

Funding

- Establish an agricultural arm within ARENA to fund smaller, innovative and high risk projects on farm, incorporating a knowledge sharing component.
- Fund battery storage on the weaker parts of distribution network, that can solve issues for the grid and on farms.
- On the broader energy transition - LGCs could broaden to include transmission towers – Large Scale Generation and Transmission Certificates, to enable farmers hosting transmission infrastructure to be compensated at a much higher

rate than they currently are. This would reduce inequity seen between farmers hosting wind turbines and those hosting transmission.

Bioenergy

Government policy encouraging/ supporting Anaerobic Digestion (AD) in Australia could have greater benefits than Governments realise. German emissions are 655 MtCO₂ and AD offsets about 21 MtCO₂, about 3% of the total.

A similar amount is achievable here, without technology risk, but not in the absence of policy and incentives.

1. A national strategy be adopted for Anaerobic Digestion (AD).

The strategy needs to incorporate;

- a. Electrical energy
- b. Thermal energy
- c. The role of AD in the pathway to net zero, particularly for the meat chicken industry.

Chris Freney's AD system will offset 10 times more CO₂ than he emits through electricity use, namely 12,000 tonnes of CO₂ per annum. A theoretical offset for Australian meat chicken growers, adopting AD, is 2 million tonnes of CO₂ pa.

As well as electrical emissions, abatement of CO₂ from AD can also occur via:

- Using green thermal energy.
- Diversion of organic waste from landfill.
- Value adding nitrogen to produce "green" protein (algae).
- Biogas used as fuel for farm vehicles/ tractors.
- Organic fertiliser replacing synthetic.

e. Environmental benefits. Putting chicken litter into AD serves biodiversity and environmental protection. The diversion of nitrogen away from the environment (water course) as well as precise recovery and application of other nutrients (phosphorus and potassium) is available through AD. This is an area of policy the EPA has already identified, but hasn't recognised AD as a technology that can help solve these issues.

2. Agriculture User Guidelines (Government Planning policy. Planning Code) to approve on-farm AD. Guidelines needs to be developed for easy adoption from farmers.

3. Other country examples

Germany and Denmark supply circa 7% of their national electrical energy demand via AD. Australia has greater potential.

Dairy farmers cannot supply products to major buyers in Europe (Coles or Woolworths equivalent) without on-farm AD to demonstrate compliance with environmental standards.

‘Biogas plants across Germany are expected to produce 33.56 TWh in electricity this year and supply heat enough to meet the demand of 1.5 million households. This will offset about 21.2 million tonnes of carbon emissions.’

4. AD can act like a battery.

If Australia achieved a similar ambition to Denmark and Germany, and the electrical supply was incentivised to be delivered in a time when the sun is not shining, AD can play a significant role in the stability of the grid at a much cheaper rate than batteries. The cost of AD electrical energy relative to batteries is much cheaper.

Biofuels

With the production of ethanol and biodiesel only making up one percent of the overall use of petrol and diesel, the scale of the opportunity is immense.

Economic

- Capital cost are likely to be high for low emission tractors and farm vehicles, creating a likely barrier to uptake. Providing tax offsets, grants, rebates, or co-investment initiatives will increase adoption.
- Government funding, target subsidies to low emission farm vehicles.
- Better depreciation and tax incentives (150% instant tax write-offs) for landholders to use renewable diesel and low emission vehicles.
- Government diesel fleet to use renewable diesel.
- Removal of Excise on Biodiesel.
- Provide incentives for renewable industry diesel take up; providing incentives for industry to develop in NSW (as they are doing in QLD); mandates (e.g. govt owned diesel fleet to convert); tax incentives for landholders to switch etc

Cultural

- Confidence key to transition – knowledge sharing between farmers, industry and distributors will be vital and should be well resourced and wide spread.
- Fund training via networks, for farmers and building skills of regional mechanics.

Market maturity

- Provide Research, Development & Demonstration funding.

Policy

- Create a new licencing category for on-farm production (farmers shouldn't be required to adhere to the same testing regimes as large biofuel refineries).
- Mandate vehicle emission standards for new vehicles entering Australia - *this could provide certainty for suppliers to bring vehicles to the Australian market*. In order for farm vehicle makers to prioritise electric or alternative fuel tractors for Australia, Australia's fuel emissions legislation has to be at least as strong as legislation overseas, sending a signal that manufacturers need to seriously put work into lowering emissions in their production lines.

Agrivoltaics – the co-existence of farming with solar developments.

One of the greatest risks to our energy transition stems from land use conflict, where solar developments are contested over claims of reduced food security and the use of prime ag land for energy production. Opponents also raise concerns about stranded irrigation equipment, loss of top soil from grading, visual impacts, weed banks, erosion risks to neighbours and impacts on local economies and supply chains from loss of agricultural productivity.

Agrivoltaics (or Agri-solar) refers to co-locating agricultural activities with large scale solar developments. This could be grazing sheep or cattle between panels, cropping, horticultural crops, creating pollinator habitat or free range chicken farming.

However, adoption has been slow in Australia. Knowledge gaps, technical and economic impediments, poor planning and a lack of clear policy guidance at development stage have hindered uptake. Two workshops held in October helped inform policy recommendations for Governments, these are listed below.

- Where development is occurring on agricultural land, state planning instruments require development proposals to outline specific plans for co-locating agricultural production within large scale solar facilities as part of the EIS process.

- In advance of impending large scale developments, facilitate knowledge transfer to and between stakeholders.
- The Australian government collaborate with the renewables industry to fund ongoing essential research and analysis into agrivoltaics across key strategic production environments.
- The Australian Government provide \$215,000 to fund knowledge sharing through the development of the ARC including 0.1FTE to manage and update the resource over the subsequent three years
- The Australian government develop a coherent framework of carbon and biodiversity incentives to maximise best practice agrivoltaics adoption, across both broadacre and horticultural systems.
- Fund the 10 year Agri-Solar CRC currently being applied for.
- There is an intergovernmental agreement between Commonwealth and State Governments to ensure consistent framework across Energy and Agricultural agencies for:
 - Determinations of the extent to which agrivoltaics may be allowed to impair agricultural activity.
 - Establishment of appropriate thresholds for land use, yield, soil, construction, water, synergies, system thinking, that may be referred to for receiving subsidies.
 - The development of a framework that links agrivoltaic economic development with broader regional growth, decentralization and job creation.

Distribution networks

A distribution grid that's fit for purpose and delivering value across regional areas through the provision of new services and opportunities, will aid in unlocking benefits for farmers.

- Eliminate export limits which prevents farmers from exporting excess power to the grid and replace with dynamic export limits which only prevents export when absolutely necessary.
- Revise the AER framework to consider factors beyond population density in determining areas for upgrades to the distribution network (as this disadvantages rural communities).
- Assess if the current energy market is fit for purpose.
- Enable sharing of energy across NMIs on a farm property.
- Large Gentrifiers need to be held to account and incentivized to be more open to innovation such as microgrids.
- Establish Community and Farmer REZs / Mid-scale informal 'REZs' in the regions outside of declared REZs.

- DNSPs should identify under-utilised areas on the distribution network in regional areas and nominate these as mid-scale REZs or Farmer REZs, encouraging farmers to initiate and install small to mid-scale solar with the main purpose of exporting to the grid. Governments could under write these developments, providing a guaranteed floor price, as is done with large scale solar, wind, pumped store hydro and battery investments in REZs.
- Trial the carving out of a community energy component within a large-scale REZ, on the distribution network, for example 300MW out of the 3,000MW in the Central West Orana REZ. The 300MW, on the distribution network, a social licence measure, would enable Councils, farmers, LALCs or community groups to connect mid-scale renewables into the grid. There is a role for Governments to shape the market for more equitable access in the energy transition. Government may need to subsidize (how much) for distribution network upgrades that deliver for local communities within a REZ.
- Fund an entity (see Helen Haines 'Local Power Plan') to facilitate and encourage the community to take up the opportunity.
- Develop and trial Local Energy Markets models and then roll out more broadly, encouraging the supply and use of energy to happen to occur locally, reducing waste in the system. This has been a market failure that Governments need to step into, acknowledging that these models call for significant reform to existing regulatory arrangements, and may potentially need to be supported by new poles and wires ownership models.
- Investigate and develop understanding of how the role of DNSPs will evolve with a changing energy market.
- Secondary value streams such as added resilience, benefits to the network and reduced emissions should be factored into the business case to make microgrids become more viable for DNSPs to support their implementation.
- Outside of Victoria, the DNSP's need access to smart meter data from the Retailers (at moderate cost) in order to better manage DER, distributed batteries and manage the coming EV disruption.
- Undertake business cases for the role of small and midscale renewables as an alternative to infrastructure upgrades, share any cost savings with the farmer (NFF recommendation). Upgrade deferral payments – microgrid participants could also receive annual payments.
- An assessment is needed to determine how equitable the current network access system is for farmers, community groups, local Councils or Local Aboriginal Land Councils. Investigate how diversified ownership models could share the benefits of dispersed energy more widely. There should be fair national standards set for grid

connections, and audit network companies for accountability and transparency.¹

- Higher levels of data visibility and transparency on the residual distribution network hosting capacity for renewable energy. This could be done through existing public data platforms such as the Network Opportunity Maps but with more granularity for the distribution network².
- Create Local Use Of System (LUOS) tariff structures trials. The networks / Government /ARENA could undertake economic modelling for LUOS tariffs to assess;
 - the impact of changing the transmission and network fees on bills.
 - understand what uptake would occur when local generators are preferenced.
 - identify retailers interest in LUOS; what would buying power from a local generator then supplying into the local community area look like?
 - whether DNSPs can cover their costs, retailers can make a profit and consumers buy power for less.
- Create a fair national feed in tariff across the NEM. These tariffs should reward farmers for contributing clean energy to the grid and recognize the environmental and social benefits of these renewables in addition to the market-based energy value.
- Encourage flexible export limits (otherwise known as dynamic operating envelopes) for improved management of the customers feed-in to the grid . All DNSPs should be required to adopt this reform, which is currently being evaluated by the AER as part of the Post-2025 Market Design project. This needs to be regulated otherwise there is a risk that DNSPs will unnecessarily invest in new infrastructure if capacity limits are exceeded.
- In order for controls and automated products and services to work effectively, improved internet connectivity needs to be prioritised for rural areas.
- Where dynamic management fails, upgrade physically constrained areas where growth in population or agricultural needs are predicted. The NSW Department of Primary Industries commissioned engineering consultancy CutlerMerz to conduct the Energy Infrastructure for Future Farming project which included analysis to estimate clusters of energy-intensive agricultural industries and the capacity of the electricity distribution network in those regions, highlighting where network limits are being approached. The findings from this project should guide where upgrades to lines and transformers may be needed in the near future. This analysis could be extended to other states.

¹

[https://d3n8a8pro7vhmx.cloudfront.net/solarcitizens/pages/1202/attachments/original/1461023115/Homegrown Power Plan Full Report.pdf?1461023115](https://d3n8a8pro7vhmx.cloudfront.net/solarcitizens/pages/1202/attachments/original/1461023115/Homegrown_Power_Plan_Full_Report.pdf?1461023115)

² <https://www.energynetworks.com.au/projects/network-opportunity-maps/>

- Better alignment of water quotas and electricity - Essential Energy recognizes the issue that irrigation and pumping can cause peaks in demand that cost irrigators money and require a grid that can deliver for those peak times. River irrigation schemes and those pumping could flatten their loads on the grid, if timings were coordinated and managed differently. There could be potential for aggregating over time.
- Essential Energy has identified the growing need for collaboration between networks, Governments and farmers for addressing the electrification of farms. Future electric tractors will have large power requirements and big batteries. There is a lack of clarity and discussion on how to enable electrification with most farmer's on SWERs. There could be a role for powering tractors and farm equipment by solar, hydrogen and bioelectricity, but there needs to be work done now to address these future issues. Future agtech relies on a grid that can deliver the electricity needs of farmers and Essential Energy sees that the Government is well placed to chair and steer collaborations between farmers, industry and networks.