AUSTRALIAN WATER SCHOOL

Webinar Q&A

Decarbonising Irrigation Regions in the Basin

Webinar: 4 November 2026 **Questions:** 14

Questions from attendees, with written answers from the presenters. Questions marked Answered live were answered during the webinar – watch the recording for the answer.

#	QUESTION	ANSWER	ANSWERED BY
1	What are the current values of carbon that are being used?	Australian carbon credits (ACCUs) fluctuate, but currently sit a little below AU$40.	Andrew Merchant
2	In irrigation regions, how do you identify and quantify the largest sources of greenhouse gas emissions across the entire water delivery system, from water storage and pumping to distribution and on-farm irrigation? And how do you prioritise decarbonisation interventions while maintaining water security and agricultural productivity?	Arezoo may answer some of these questions in a moment. I can also highlight that her methodology is published in the journal *Environmental Research Letters* and is open access. Anything unresolved, let us know.	Andrew Merchant
3	Under what groundwater-balance constraints can solar-powered pumping and alternate wetting–drying (AWD) irrigation be jointly deployed in a basin's irrigation region to achieve verifiable net greenhouse gas reductions – and how should the water–energy–carbon trade-off be quantified to ensure that carbon abatement is not offset by rebound pumping or expanded irrigated area?	That's a very interesting question. Solar pumping can reduce emissions, but we also need to make sure it doesn't lead to increased groundwater use. In our current research so far, we haven't specifically explored this combination, but it's definitely an important area for future research, particularly to better understand the trade-offs between water use, energy and carbon emissions. FOLLOW-UP QUESTION **Given that groundwater use is regulated in Australia, how would moving to solar cause an increase in water use? Growers can't use more than their allocation.** You're right that where groundwater allocations are strictly enforced, growers cannot simply increase their total water extraction beyond their entitlement. However, groundwater management varies across Australia. As reported by Cook et al. (2022), only 136 of Australia's 288 groundwater management areas had volumetric extraction limits in 2016. So, the concern is mainly about two scenarios where cheaper solar-powered pumping could potentially encourage greater groundwater use: 1. In areas where extraction limits, metering or monitoring are less comprehensive.	Reihaneh Bandari

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		2. Where growers hold 'latent entitlements' (sleeper licences) and choose to fully maximise their legal allocation because free solar power removes the high cost of diesel or grid electricity. In both cases, cheaper solar-powered pumping could potentially lead to a significant increase in actual groundwater extraction.	
4	Did you validate your estimates of on-farm energy consumption using estimated regional electricity use or data from environmental accreditation programs (e.g. Sustainable Winegrowing Australia)?	We adopted a top-down approach for the estimation due to the limited availability of granular farm-level data. For further details on the methodology, please refer to this paper: https://iopscience.iop.org/article/10.1088/1748-9326/aea7b7/pdf	Arezoo Boroomandnia
5	Did you consider irrigators that directly pump water from the Murray for pressurised systems?	Yes, these participants were included in the analysis where possible. Access to data in this space was challenging but achievable.	Andrew Merchant
		Yes, both RIT and CIT pump water directly from the Murray for pressurised systems.	James John
6	Is the carbon potentially sequestered by farming practices also taken into consideration, or only emissions?	Our project focuses specifically on irrigation systems and their associated energy use and greenhouse gas emissions. So far, we haven't considered carbon sequestration from farming practices, as that's outside the current scope of our research.	Reihaneh Bandari
7	I have seen work showing a surprisingly large variation in water pumped per unit of power used between pressurised irrigators – have you investigated these opportunities for efficiency improvement?	Yes, we recognise that energy efficiency can vary significantly between pressurised irrigation systems, depending on factors such as pump efficiency, operating pressure and irrigation practices. This is an important area we are currently exploring through case studies in each state, with a focus on identifying opportunities to reduce energy consumption and emissions through improved pump efficiency, better system design and optimised operation.	Arezoo Boroomandnia
8	Arezoo, you mentioned that converting from surface irrigation to pressurised systems can improve water efficiency but significantly increase energy consumption. Does this mean that some irrigation modernisation projects could actually increase carbon emissions?	Answered live	Arezoo Boroomandnia
9	In the view of the experts here, what are the "easiest" wins, or low-hanging fruit so to speak, when it comes to decarbonising production?	Thanks for the question. Short answer is yes, but it's context-specific for the MDB. I will address this in question time if time permits, but also welcome you getting in touch. Arezoo's research is also published in the journal *Environmental Research Letters* and is open access.	Andrew Merchant

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10	Has anyone quantified the value of the produce coming out of each of the regions as part of the efficiency equation?	That's a very good point. The economic value of agricultural production is an important factor when assessing irrigation efficiency. While our current analysis focuses mainly on energy consumption and carbon emissions, the value of agricultural output will be considered in the scenario analysis, which is the next phase of our project. This will help us better understand the economic value generated per unit of water, energy consumed and emissions produced across different regions.	Arezoo Boroomandnia
11	Optimising existing systems for energy use before replacing or upgrading any infrastructure is a good move. Has any thought been given to optimising the overall irrigation productivity performance? Just as purely reducing water use might actually reduce water productivity, simply reducing energy use per ML moved might do the same. Auditing of irrigation systems to me is an essential activity, but it must be an audit of the overall irrigation performance, not only one parameter such as energy.	That's a really good point, and I completely agree. We shouldn't focus only on reducing energy use, but also on overall irrigation performance, including water efficiency, crop productivity and reliability. In our research so far, we've identified system optimisation as an important first step before investing in new technologies. A more comprehensive assessment of irrigation performance is definitely something we'd like to explore further as the project progresses.	Reihaneh Bandari
12	Reihaneh, what challenges have you faced in your stakeholder engagement activities?	Answered live	
13	The demonstration of installation and implementation of new technologies, including irrigation decarbonisation technologies, can often provide confidence for others in the industry to commit to a similar investment on their farms. You mention that the performance of such technologies can vary greatly between farms. As such, how useful are demonstration sites as a vehicle for demonstrating the effectiveness of decarbonisation investments?	Answered live	Andrew Merchant
14	Are markets really 'enforcing' information, especially noting that the EU doesn't apply CBAM to agriculture? And are they paying any premium for that information?	Answered live	Julian Marchant

Useful links

Resources shared in the webinar chat.

Energy assessment tools for irrigation	Excel tools from Agriculture Victoria and NSW DPI to benchmark the energy efficiency of centre pivot and travelling irrigators https://extensionaus.com.au/irrigatingag/energy-assessment-tool-for-centre-pivot-and-travelling-irrigation-systems/
Queensland Ag Energy Hub: case studies	130+ farm energy-efficiency case studies, including irrigation, some measured and verified https://www.qldagenergyhub.com.au/case-studies
Irrigation Australia: certified auditors	Directory of Certified Irrigation System Auditors for on-farm system evaluation https://irrigationaustralia.com.au/directory?mtype=Certification%20Directory