The Size of the Prize

Decarbonising Irrigation in the MDB

The Murray–Darling Basin (MDB) uses around 62% of all irrigation water in Australia, making it the heart of irrigated agriculture. To move this water, farms rely heavily on electricity for pumping, with diesel still used in some locations. This energy use makes irrigation a significant source of greenhouse gas emissions. It also leaves farm businesses highly exposed to rising and volatile energy prices.

Key Points

- **Australia's climate targets:** 43% emissions reduction below 2005 levels by 2030, and net zero by 2050 — yet agriculture emissions are expected to remain largely flat, with irrigation's role in decarbonisation often overlooked.
- **Energy-intensive sector:** Irrigation pumping accounts for roughly **40–80%** of agricultural energy use, depending on the agribusiness, and relies mainly on electricity, with diesel used in off-grid and fringe-of-grid locations.
- **Emissions footprint:** Irrigation across the Basin generates an estimated **4.5–9 Mt CO_2e** per year **(0.53–1.06 t CO_2e/ML),** equivalent to **~1–2%** of Australia's territorial emissions.
- **Evidence-based estimate:** Results are derived entirely from public, national datasets (ABS, MDBA, DCCEEW, AEMO, ABARES), providing a transparent and repeatable baseline for policy and investment decisions.
- **Actionable opportunity:** Proven technologies like on-farm solar, batteries, microgrids and small-scale hydro can cut emissions, reduce operating costs, and improve energy reliability today.

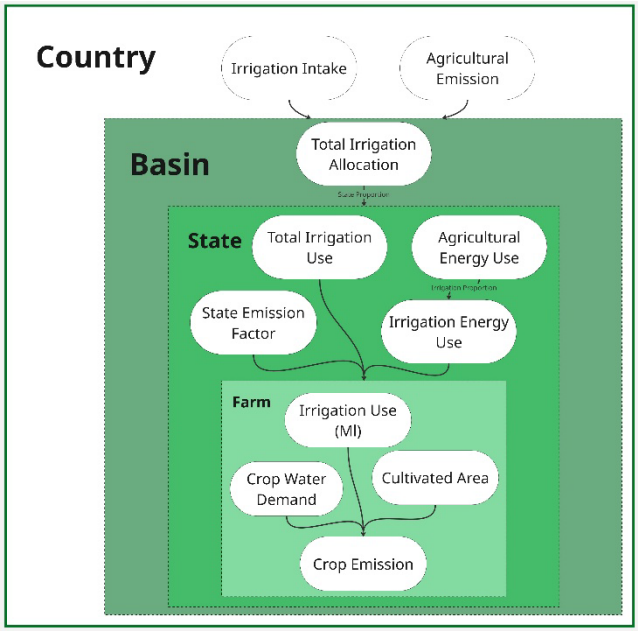
Our Research

This research draws on a Basin-wide assessment using transparent, publicly available data to estimate irrigation-related emissions across the MDB. The analysis focuses on stationary energy used for irrigation pumping and water delivery, which accounts for energy use in irrigated agriculture.

Using a top-down method, national agricultural energy data were combined with irrigation water-use statistics to estimate irrigation energy use and associated emissions across the Basin. Due to limited granular datasets, three scenarios were applied, assuming irrigation accounts for 40% (low-use), 60% (medium-use), and 80% (high-use) of total agricultural energy use. Electricity and diesel use were allocated by state, and emissions calculated using state-specific electricity factors and standard diesel emission factors.

The analysis indicates that irrigation emissions range from 4.5–9 Mt CO_2e per year, equivalent to 0.53–1.06 t CO_2e/ML of irrigation water. International comparisons suggest the lower end of this range best represents typical irrigation systems, with higher values reflecting more energy-intensive operations or conservative assumptions.

Emission Estimation Method



Overview of the analytical Top-Down method

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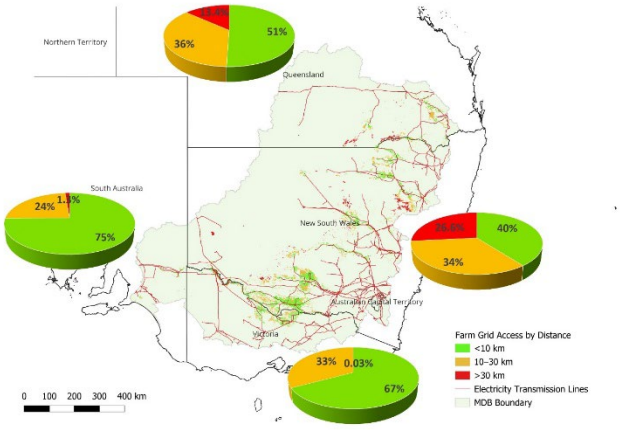
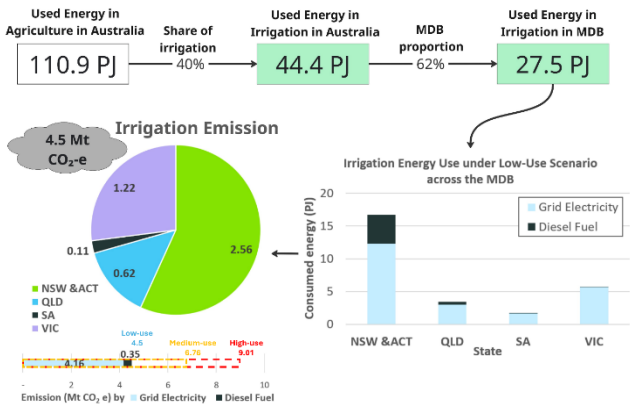


Grid accessibility of irrigated lands across the MDB, shown by distance to electricity transmission infrastructure (<10 km, 10–30 km, >30 km)



Breakdown of irrigation energy use and associated emissions across the MDB

The Challenge

Every megalitre of water pumped requires electricity or fuel. While improving hydraulic performance and energy efficiency can deliver significant benefits, opportunities vary widely between farms due to differences in crops, system design, water sources, infrastructure, and state-based regulations. This diversity means there is no one-size-fits-all solution.

Accessing incentives such as Australian Carbon Credit Unit and government green finance schemes can support decarbonisation, but often requires local expertise, specialist advice, and targeted training. Without coordinated, place-based support, irrigation businesses remain exposed to rising energy prices, grid constraints, fuel supply risks, and increasing pressure to demonstrate credible emissions reductions.

Why Stakeholders Should Care

Decarbonising irrigation in the MDB offers a practical, investable pathway to reduce emissions while lowering energy costs and risk. Irrigation is highly energy-intensive, but proven solutions—solar-powered pumping, electrification, storage, microgrids, and selective small-scale hydro—are already delivering strong results across the Basin.

In some systems, on-farm solar has reduced electricity bills by 60–70%, while replacing diesel pumping has cut fuel costs and improved reliability. Where conditions allow, small-scale hydro can provide firm, low-carbon energy using existing irrigation infrastructure.

Together, these investments deliver measurable emissions reductions, strengthen ESG performance, improve resilience to energy price volatility and grid disruptions, support access to government incentives and green finance, and help irrigated producers meet growing sustainability requirements in global markets, protecting long-term competitiveness and export access.

Next Steps

This project will develop a decarbonisation roadmap for irrigation to 2050, aligned with Australia's net zero targets, setting out a practical pathway to reduce irrigation-related emissions across the MDB while maintaining reliable water delivery. At this stage, emissions are estimated using publicly available datasets and early stakeholder input. Data gaps remain particularly around pump-level energy use, diesel versus electricity shares, network operations, and on-farm renewables, so results should be treated as indicative and will be refined as more granular data become available. Ongoing collaboration with growers, irrigation operators, industry, policymakers, and investors will support future updates. For detailed methodology, assumptions, data sources, and access to the extended report, please email the project team using the contact details provided below.

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