Queensland Decarbonisation Hub

Policy Brief

An outstanding opportunity: Using solar farms for biodiversity preservation

Practical measures to improve biodiversity outcomes in renewable energy developments

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Queensland Decarbonisation Hub

About the Hub

The Queensland Decarbonisation Hub brings together knowledge, people and innovation to co-create solutions to accelerate Queensland's clean growth future. We connect Queensland universities, industry, communities, First Nations people and government to build and share the knowledge needed to reduce emissions. The Hub's vision is for Queensland to become a leading decarbonised economy in which communities, industry and the environment thrive.

About this policy brief

In 2024, the Queensland Decarbonisation Hub initiated a funded research stream, inviting proposals for research that could contribute to understanding and supporting Queensland's decarbonisation transition. The Hub's Advisory Committee, which brings together representatives from industry and other sectors, helped inform the selection process by identifying areas where research could add value to emerging policy and practice. Eight projects were selected across a diverse range of topics, including the research featured in this brief.

Each project has produced a detailed technical report, which is undergoing review prior to publication. Alongside these reports, the Hub has worked with the research teams to consider a different question: what does the research mean for policy and practice?

This question was explored through a series of workshops and the Hub's Research Showcase, where researchers presented their findings to an audience drawn from government, industry, research and the wider community. These policy briefs build on that process. They are intended as short, accessible companions to the technical reports, highlighting the findings that matter most beyond the research itself and the questions and opportunities they raise for Queensland and Australia more broadly.

About this research

Renewable energy development is often discussed in terms of the potential trade-offs between climate action and biodiversity conservation. This research examines how faunal biodiversity outcomes can be better incorporated into the planning and management of solar developments.

The study shows that, while large-scale solar developments inevitably change landscapes, their biodiversity impacts are not fixed. Site design, habitat structure and vegetation management can influence biodiversity outcomes, creating practical opportunities to improve habitat value for native fauna while continuing to generate renewable energy.

As Queensland's renewable energy footprint expands, these findings raise an important question about how new energy infrastructure can contribute to broader environmental objectives. The research provides an evidence base for considering faunal biodiversity alongside energy generation, regional development and emissions reduction in the planning, approval and ongoing management of renewable energy developments.

Dr Liz Young

Research Director, Queensland Decarbonisation Hub

From the Showcase Session Facilitator

The research, *An outstanding opportunity: Using solar farms for biodiversity preservation*, highlights what should be considered an important trade-off (sometimes overlooked) in the renewable energy transition. That is, solar farms and other renewable energy projects contribute significantly to decarbonisation goals, but at the same time, they can alter habitats and adversely affect local biodiversity. The key opportunity identified by the study is that these impacts are not fixed outcomes. Through thoughtful site selection, vegetation management, and habitat enhancement measures, renewable energy projects can deliver both clean energy and manage the biodiversity outcomes that would otherwise result.

Although the study focuses entirely on the Ross River solar farm, the methodology used for the study could certainly be applied to other locations or other renewable energy projects. It would likely require that the interventions are different, but the method combining “passive acoustic monitoring, combined with camera trapping and field surveys” could assist other researchers who are seeking to better understand biodiversity impacts and to test potential interventions. Ultimately, this research is an excellent start to ensure renewable energy projects maximise both climate and ecological outcomes rather than prioritising one objective at the expense of the other.

Professor Felicity Dean

School of Law, Queensland University of Technology

1. Why this research matters

Queensland is undergoing a rapid expansion of renewable energy infrastructure as part of the transition to a low-carbon economy, with large-scale solar developments becoming an increasingly common feature of regional landscapes. While these projects provide important climate and energy benefits, their expansion has generated community concern regarding land use, habitat loss, and impacts on agriculture and biodiversity. Solar farms typically occupy large areas of land, however, planning and management frameworks have largely focused on energy generation as the primary objective, with relatively little consideration of how these landscapes might simultaneously contribute to other societal goals.

Internationally, there is growing interest in the concept of "conservoltaics", the integration of biodiversity conservation into solar energy developments through habitat restoration and wildlife-friendly management practices. Although promising results have been reported overseas, there is limited evidence regarding the feasibility and effectiveness of conservoltaic approaches in Australian ecosystems. Understanding how solar farms affect native faunal biodiversity, and how they can be designed and managed to support conservation outcomes, is therefore critical to ensuring Queensland's renewable energy transition delivers climate, societal and environmental benefits.

2. Key findings

A faunal biodiversity assessment of the Ross River Solar Farm near Townsville compared vertebrate communities within the solar farm to adjacent habitats containing mature native vegetation and cleared easement areas. More than 14,450 hours of passive acoustic monitoring, combined with camera trapping and field surveys, recorded 165 vertebrate species in the solar farm area.

Key findings from this assessment include:

- Native vegetation containing mature trees supported substantially higher biodiversity than either the solar farm or adjacent cleared easements.
- Bird and mammal diversity was significantly lower in the solar farm than in the other two habitats, largely due to habitat simplification and exclusion of larger mammals by perimeter fencing.
- The solar farm supported very few unique species, indicating that it currently functions as a simplified subset of the surrounding landscape.
- Solar infrastructure, nevertheless, provided valuable habitat features for some species, including hunting perches for raptors and thermal refuges for reptiles and amphibians.
- Retained vegetation beneath solar panels supported high abundances of some frogs and reptiles, demonstrating that management practices can positively influence ecological outcomes.

3. Why the findings matter in practice

The study shows that biodiversity outcomes at solar farms are determined primarily by habitat structure and vegetation management rather than the solar infrastructure itself. Without intervention, solar farms are likely to support lower biodiversity than surrounding native habitats. However, relatively simple habitat enhancement measures could transform these sites into multifunctional landscapes that contribute to both renewable energy production and biodiversity conservation.

As Queensland expands renewable energy infrastructure, there is an opportunity to incorporate biodiversity-positive design principles into planning, approval and operational frameworks.

4. Who should pay attention

Government agencies responsible for renewable energy, planning, environment, and biodiversity conservation should consider these findings when developing policies, approval frameworks and management guidelines for renewable energy developments. The research demonstrates practical opportunities to improve biodiversity outcomes without compromising energy generation goals.

Renewable energy developers and operators can use these results to inform solar farm design, vegetation management practices, and habitat enhancement strategies that improve environmental performance, address community concerns, and support regulatory approvals.

Local governments and regional planning bodies can use the findings to guide land-use planning decisions and ensure that renewable energy developments contribute positively to regional environmental objectives and landscape connectivity.

Environmental regulators and natural resource managers can apply the findings when assessing energy development proposals, establishing approval conditions, and evaluating the effectiveness of biodiversity offset and habitat management programs.

Conservation organisations and community groups have an interest in ensuring that renewable energy expansion delivers positive outcomes for both climate and biodiversity. The study provides evidence that solar farms can potentially contribute to conservation goals if appropriate management interventions are implemented.

Electricity infrastructure providers and landholders involved in renewable energy projects may benefit from understanding how vegetation management and habitat enhancement can increase the ecological value of solar developments while maintaining operational requirements. This is particularly relevant in agricultural contexts.

Collectively, these stakeholders play a critical role in determining whether Queensland's expanding renewable energy footprint becomes solely an energy-producing landscape or evolves into a network of multifunctional sites that support both renewable energy generation and biodiversity conservation.

5. What could happen next

This study provides an initial assessment of biodiversity outcomes at a Queensland solar farm and identifies several opportunities for further investigation and application. One logical next step would be to trial habitat enhancement measures within existing solar developments, such as native vegetation restoration, installation of nesting structures, increased ground-level habitat complexity, and wildlife gates, monitoring whether these interventions improve biodiversity outcomes over time. Such pilot projects would help determine which approaches are most effective and operationally practical under Australian conditions.

The findings could also inform the development of biodiversity guidance for renewable energy projects, particularly where proponents and regulators are seeking approaches that balance energy generation with environmental objectives. Additional studies across a broader range of solar farms, regions, and habitat types would help determine whether the patterns observed at the Ross River farm are representative of other solar developments and identify factors that most strongly influence ecological outcomes.

Finally, further collaboration between government agencies, renewable energy developers, researchers, and conservation organisations could support the development of evidence-based conservoltaic practices suited to Queensland landscapes. While more testing is required, the results suggest there is scope to incorporate biodiversity considerations more explicitly into the planning, design, and management of future Queensland solar energy developments.

6. Points to note

This study was conducted at a single solar farm in north Queensland, and, therefore, may not fully represent biodiversity outcomes at solar developments in other regions, climates, or habitat types. The observed patterns are also influenced by historical land use and pre-existing habitat condition, meaning that some differences between sites cannot be attributed solely to the presence of solar infrastructure, although these effects are important. While the study demonstrates well-known ecological associations between habitat complexity and biodiversity, further research across multiple solar farms and over longer timeframes would help identify which habitat enhancement measures are most effective in improving conservation outcomes on specific farms in specific landscapes.

7. Contact

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