

Australian PhD scholarship:

Overcoming market barriers for a thriving circular nutrient value chain: A market feasibility and perception study

Institute for Sustainable Futures

An exciting opportunity for a PhD scholarship is available at UTS, investigating barriers and enablers to creating viable markets for renewable fertilisers derived from urban organic wastes like urine. The successful candidate will be based at the Institute for Sustainable Futures (ISF), University of Technology Sydney (UTS), in Sydney and will have the opportunity to collaborate with a team of academic and industry experts around Australia. This project represents an excellent opportunity to develop industry networks and conduct research to help address the global food security and the nutrient pollution challenge in a circular economy.

Background

The PhD project is part of the high-profile ARC NiCE Hub (Nutrients in a Circular Economy www.nicehub.org); a four-year research collaboration between 7 universities and 23 industry partners across NSW, QLD and VIC, funded by the Australian Government. The NiCE Hub aims to *transform the wastewater industry with an unprecedented, city-scale circular economy based on the recovery of nutrients from urine, and other types of waste, and processing at the building level, to produce safe, and effective liquid fertilisers.*

We will always need access to the nutrient phosphorus to produce our food. However geopolitical events like the current war in Ukraine have [highlighted the serious risks to our global food system of relying on imported fertilisers](#). These phosphate fertilisers are derived from non-renewable sources that are becoming increasingly scarce and expensive. At the same time, mismanagement of phosphorus is leading to serious toxic algal blooms in our rivers, lakes and oceans. We need to be a lot smarter about where we source that phosphorus from (such as local renewable sources like food waste and human excreta) and how efficiently we use it, due to the serious risks threatening our long-term access to phosphate for food security, coupled with widespread environmental pollution.

However, transitioning to a thriving circular nutrient value chain creates a new set of challenges (and opportunities). It requires the establishment of new products, new markets, integration of knowledge flows, social connections and governance. However, these dimensions are often not given the same attention as technical aspects like optimising material flows. For example, ensuring waste managers and fertiliser companies of waste-derived fertilisers are aware of market demand and end-user needs before developing their technology. Further, fertiliser companies from Australia to the UK to Africa advise researchers that a barrier to their use of organic waste in fertiliser production is the lack of sufficient raw material (like food waste and wastewater) at scale. This project will focus on understanding and overcoming the key barriers to forming a circular market that supports a viable circular nutrient value chain.

PhD Project

The PhD project sits within an interdisciplinary research program, the UTS-led [ARC NiCE Hub](#), spanning the technical, social, institutional, economic, and policy enablers to advance a circular economy for nutrients. The student will be located at UTS's Institute for Sustainable Futures (ISF).

The PhD project will contribute to this program by investigating the enablers and barriers to creating viable markets at scale.

Specific project objectives include:

1. Identify the profile and availability of local, reliable and appropriate raw materials as a potential feedstock for manufacturing renewable fertilisers to support a circular nutrient value chain (e.g. the volume, concentration, high-level geospatial distribution of AD digestate, food waste, urine, manures, etc.).
2.
 - a) Investigate the key bottlenecks to ensure viable markets for a circular nutrient value chain in Australia, including where these bottlenecks are occurring in the value chain and opportunities to overcome them.
 - b) Understand how a sustainable supply of renewable raw materials can be assured for processing and production to support a circular nutrient value chain, that is: reliable volumes, contaminant-free, consistent product, acceptable to end-users and other value chain stakeholders.
3. Analyse key potential end-use markets, trends, needs, and preferences; and develop initial recommendations for marketing, including tensions and trade-offs between short-term market viability and long-term sustainability goals.

PhD support

ISF is a leading transdisciplinary research centre with a mission of creating change towards sustainable futures. Established more than twenty years ago, ISF has worked across Australia and internationally with numerous governments, industry and community organisations to incorporate sustainability into their processes and practices through high-quality interdisciplinary research.

Our renowned postgraduate program supports students working at the leading edge of complex societal problems and sustainability challenges. The program includes retreats, peer support groups, workshops and professional development seminars to help create a supportive community of scholars. The successful applicant will also benefit from the wider scholarly environment provided by the NiCE Hub and its' national partners.

The student will be jointly supervised by A/Prof Dana Cordell and Prof Jason Prior at ISF along with NiCE industry partner Gary Leeson, Director of organic fertiliser company OCP, at Yates Australia. The scholarship stipend is AUD\$32,500 tax-free per annum for 3.5 years, and there are additional funds for travel and project work up to \$9,500. The successful applicant can begin from July 2023.

How to apply

The application process has two stages. For stage 1, please send a copy of your CV, including details of educational attainment, employment history, publication activities, and citizenship, together with a cover letter and a sample of your writing (as per guidelines below) to ISF-LearningLC@uts.edu.au by 22 March 2023.

Shortlisted applicants will be interviewed on 28 March 2022. The preferred candidate will then work with the supervisory panel to prepare a research proposal for submission to ISF Learning Development Leadership Committee by 6 April 2022.

Initial closing date: 22 March 2023

Open to: Australian citizens and current Permanent Resident visa holders.

If you require further information on the position, contact Assoc. Prof Dana Cordell by email on Dana.Cordell@uts.edu.au.

Stage 1 – Cover letter, CV and sample of writing

Ideally, you will have an educational and/or professional background in sustainable business and supply chains, marketing or economics, circular economy or related fields.

The cover letter should explain your experience and activities in three areas:

1. **Professional experience:** The strength of the professional experience will be assessed relative to the candidate's opportunities, including the stage of career. The term 'professional experience' should be interpreted broadly; for example it may include paid employment and volunteer roles.
2. **Research output:** Research outputs will be assessed on their quality and impact relative to the candidate's opportunity. Research outputs include publications (e.g. research reports, contributions to industry publications, conference papers, academic journal papers, etc.), and presentations (e.g. seminars, conferences, digital media, etc.). Applicants should include documentation of their research outputs in their CVs. A sample of the applicant's research writing should be provided, such as a report, section of their thesis, conference paper, or journal article.
3. **Academic merit:** Academic merit will be assessed on the:
 - I. Extent of successfully completed studies (e.g., Bachelor's degree, Honours degree, Masters primarily undertaken by coursework, Masters undertaken mainly by research, etc.)
 - II. Demonstrated and verified level of attainment in those studies.

Stage 2 - Shortlisted applicants: Research proposal and interview

After an initial assessment by the recruitment panel, applicants will be shortlisted, and the preferred candidate will be asked to develop a research proposal. ISF staff will provide further information and assistance to the applicant progressing to the second step.

For reference, the template for an ISF research proposal is provided in Appendix 1. The quality of the research proposal will be assessed using our critical thinking scale (Appendix 2) and the University of Adelaide's Research Skills Development Framework – <https://www.adelaide.edu.au/rsd/framework/rsd7/> Generally, successful ISF applicants will be expected to demonstrate 'good' to 'excellent' critical thinking skills (see Appendix 2), and the Level 4 or 5 research skills.

Summary timetable for the application process

Stage 1 applications close (CV, cover letter, sample of writing)	22 March 2023
Notification of shortlisted applicants for Stage 2 process	24 March 2023
Interviews with shortlisted applicants	28 March 2023
Preferred applicant research proposal due	6 April 2023
Selection of candidates	20 April 2023

The successful applicant must complete a UTS postgraduate application form in addition to this scholarship application process. The UTS application deadline is 30 April 2023.

Relevant web links

About ISF's postgraduate program: <https://www.uts.edu.au/isf/learning/graduate-research-program>

UTS postgraduate applications: <https://www.uts.edu.au/future-students/postgraduate/essential-info/applying-uts>

ARC NiCE Hub: <https://www.nicehub.org/>

Appendix 1 – Stage 2 requirement only

Research Proposal: ISF Guidelines

ISF requires prospective students to prepare a Research Proposal. The purpose of Appendix 1 is to provide guidance about what ISF expects to see in a Research Proposal.

Aim for about 5 pages. You will need to work hard to be pithy and concise while demonstrating excellence in your critical thinking and communication skills, consistent with entry-level requirements for research higher degree students.

Introduction and Significance (½ page):

- State your understanding of the research problem first. (i.e. not the general issue, but your piece of the pie)
- Make a case for the significance and importance of the research. Why does it matter? To whom? What use will it be?

Background (1-2 pages):

- Explain the background to the research problem through a review of relevant literature that demonstrates a sound knowledge of past and recent work in your domain of interest. Be sure to include peer-reviewed literature in your reading and analysis, and popular and/or industry material if relevant.
- Summarise and critique the main findings reported by others

Proposed Research Questions and Contribution (½-1 page):

- Link your findings from the literature review with your interpretation of the program's objectives. That is, specifically, what will you ask and answer?
- What are the expected outcomes? What do you see as your contribution to the topic under study? What use will it be? To whom? In what ways?

Preliminary Research Design (1 page):

- Theoretical Framework: What are your preliminary ideas about theoretical frameworks that might guide your study?
- Methodology: What methodology fits well with the research questions and your theoretical framework?
- Data: What type of data will help you answer the questions? Where and how will you collect the data?

Budget (½ page):

- Think through the costs of your study and specify how you plan to cover them. Distinguish between your project costs (e.g., travel, fieldwork, software, etc.) and your personal costs for undertaking postgraduate study (living allowance, tuition fees, etc.).

References (½-1 page):

- List your readings

Appendix 2 - Critical Thinking Assessment Frame

This frame has been adapted from material developed by the Centre for Critical Thinking in the USA. It provides a useful starting point for assessing Research Outputs and Outlines of Intended Research developed by prospective research students at ISF. Generally, candidates should demonstrate 'good' or 'excellent' critical thinking skills.

Excellent	Good	Sound	Shaky	Poor
<p>Clear</p> <p>Well-reasoned</p> <p>Insightful</p> <p>Self-evaluation evident</p> <p>Raises important questions</p> <p>Recognises important assumptions</p> <p>Clarifies key concepts</p> <p>Identifies competing points of view</p> <p>Reasons from a clearly stated premise</p> <p>Shows sensitivity to important implications and consequences</p> <p>Shows that basic concepts and principles are internalised</p> <p>Gives an in-depth analysis of questions and problems</p>	<p>On the whole is clear, precise and well-reasoned, but without depth of insight</p> <p>Comprehension of basic concepts and principles.</p> <p>Demonstrates competence in self-evaluation</p> <p>Often raises questions and issues</p> <p>Recognises some questionable assumptions</p> <p>Sometimes identifies competing points of view.</p> <p>Demonstrates commitment to reason from clearly stated premises.</p> <p>Sound reasoning and problem-solving within a field</p>	<p>Mixed thinking and performance</p> <p>Inconsistently clear, precise and well-reasoned</p> <p>Doesn't display depth of insight.</p> <p>Inconsistent comprehension of and internalisation of basic concepts and principles</p> <p>Sometimes raises questions and issues</p> <p>Sometimes recognises key assumptions</p> <p>Inconsistently uses language in accordance with educated usage</p> <p>Sometimes identifies competing points of view</p> <p>Does not demonstrate a commitment to reason from a clearly stated premise.</p> <p>Inconsistent reasoning and problem solving within a field</p>	<p>Acquisition of knowledge by memorising rather than comprehension</p> <p>Thinking is typically unclear, imprecise and poorly reasoned</p> <p>Superficial or mistaken comprehension of basic concepts and principles.</p> <p>Does poorly in self-evaluation</p> <p>Superficially analyses questions and problems</p> <p>Only partially clarifies concepts</p> <p>Rarely identifies competing points of view</p> <p>Does not recognise his/her assumptions</p> <p>Insensitive to important implications and consequences</p> <p>Poor reasoning and problem-solving</p>	<p>Acquisition of knowledge by memorising rather than comprehension</p> <p>Regularly unclear, imprecise and poorly reasoned</p> <p>Basic terms and distinctions are regularly incorrectly used</p> <p>Mistaken comprehension of basic concepts and principles</p> <p>Does not raise questions and issues</p> <p>Does not recognise his/her assumptions</p> <p>Does not clarify concepts</p> <p>Does not use language in keeping with educated usage</p> <p>Confuses his/her point of view with the truth</p> <p>No understanding of a commitment to reason from clearly stated premises</p> <p>Oblivious to important implications and consequences</p> <p>Incompetent reasoning and problem-solving</p>