



NiCE: Nutrients in a circular economy

**Australian Research Council Research Hub Prospectus
Invitation to Partners
University Technology Sydney**

2021



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Program Background

NiCE - Nutrients in a Circular Economy ARC Hub

Increasing population growth and rapid urbanisation is placing increasing pressure on existing water infrastructure and agricultural food productivity to meet future supply and demand. The World Bank predicts that by 2050, the global population will be nine billion, placing a 50% increase in agricultural food productivity and 15% increase in water withdrawals. With these fertiliser shortages, there is a strong market driver for bioavailable nutrients through a renewable approach. The project falls directly within a number of Sustainable Development Goals, especially in 'making our cities and human settlements more safe, resilient and sustainable' (SGD 11) and 'ensuring sustainable consumption patterns' (SDG 12).

Current sewage networks are an untapped nutrient resource. The ARC Hub, via the right market drivers, is poised to unlock the nutrient economy in urbanised environments; reduce infrastructure upgrade and management costs and environmental waste at the source, and create a high-value agricultural resource through a circular economy approach to sustainable resource management.

A circular economy built on urban wastewater

The Nutrients in a Circular Economy ARC Hub will be the key partnership to transform the wastewater industry and build confidence for a market in re-using urine separated and collected at building level as the source of productive fertilisers for agriculture, horticulture and/or parklands. We will transform the wastewater industry through urine diversion and decentralised treatment:

- To make removal, transport, and treatment of sewage adaptable to fast-changing cities
- to better protect waterways from the harms of excess nutrients (e.g. nitrogen and phosphorous), pharmaceuticals and hormones
- to secure a new sustainable source of fertiliser for agriculture and horticulture.

We are delighted to extend an invitation to key partners to continue this important work by collaborating in the largest Australia-wide research project on sustainably managing '*Nutrients in a circular economy*'. By taking a systems-wide view of the the nutrient cycle from 'toilet to field', this project will engage with the most advanced technologies in nutrient management to produce a safe fertiliser for farmers and horticulturalists while identifying the key issues both enabling and challenging the large scale recovery, and productive re-use of processed urine to land. In addition for water industry professionals potential benefits also include minimising infrastructure upgrades and management costs and environmental waste at the source.



Outlining the opportunity

Nitrogen management

In October 2019, United Nations member states endorsed a proposed roadmap for action on nitrogen challenges called the *Colombo Declaration on Sustainable Nitrogen Management*.

The target – to halve reactive nitrogen discharge into the environment by 2030. Thus, a new opportunity has been created to mobilise innovation for the nitrogen circular economy.

Upcoming investments in wastewater infrastructure

Australian cities are facing twin issues: ageing wastewater infrastructure and urban intensification. These require major investments in infrastructure replacement and upgrades—including sewer networks and wastewater treatment plants—as well as newly capable residential and commercial buildings. This wave of infrastructure renewal provides an opportunity to address the need to manage nitrogen and other pollutants, while delivering more flexible and adaptable solutions to transport and treat wastewater in fast-changing cities.

Much of the wastewater infrastructure in Australian capital cities today was built over fifty years ago. Legacy infrastructure is put under pressure by high density urban developments. Legacy sewage treatment plants, for example, can struggle to cope with increasing loads of nitrogen from dense urban environments.

Dependency on imports

Australian agriculture relies on fertiliser imports, making it exposed to the risks of geopolitical instabilities, especially for resources in limited supply like phosphorus. A nutrient circular economy will provide resilience and make Australia an even stronger food exporter.

Key Benefits of the NiCE ARC Hub:

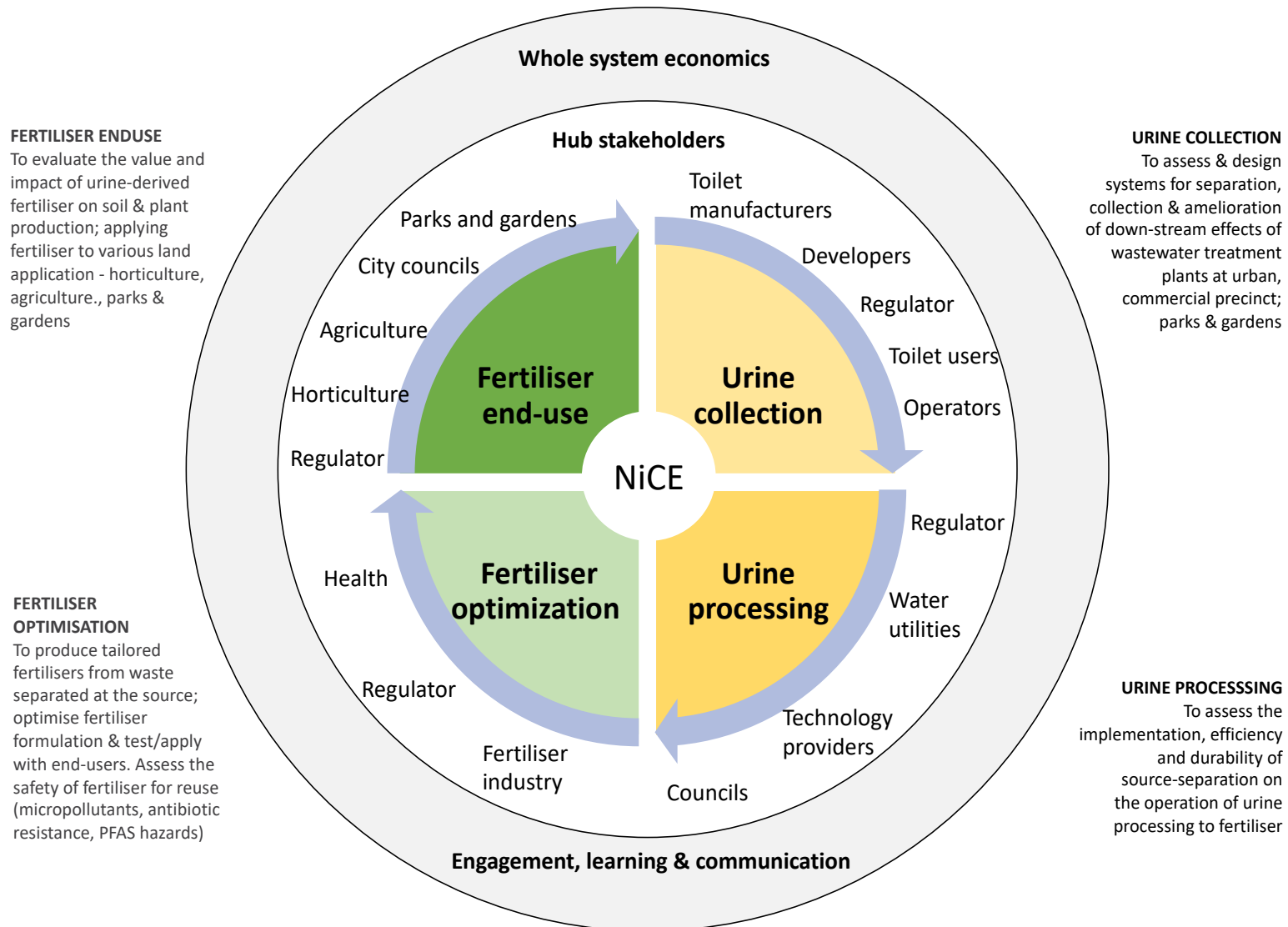
- Economic - know-how for a new manufacturing industry
- Commercial - decreased dependency on fertiliser imports to Australia
- Environmental - healthier waterways and ecosystems
- Societal - flexible and more resilient wastewater management



Research Themes summary

Fertiliser production & application

Urine collection & processing



Industry Partnership Benefits

Following the successful award of the Hub by the ARC in July, we are now inviting new parties to join our growing number of industry partners who will enjoy the benefits of this exciting Hub partnership.

Partner types and funding

- Partner investment – financial and inkind – is required as part of the membership to the Hub.
- Industry Partner
- Government Partner
- Research Organisation Partner

Applications from the following organisations are invited to apply:

- Water utilities
- Government departments
- Energy and resources companies
- Property Developers
- Agricultural and horticultural businesses and networks
- Fertiliser producers
- Water and resource industry consultancy companies
- Universities and research organisations
- Regulators

Benefits

- **Innovation and commercialisation** – ARC Hub is proven model of innovation and commercialisation stemming from ‘at scale’ collaborations
- **Leverage plus** – partners maximise their return on investment through leverage of ARC Hub program funding and ‘in-kind’ investments
- **Tailored R&D** – you set the research agenda, ensuring research relevance to your organisation’s needs
- **Effective circular economy related policy** – the outcomes from the research, technology and pilot studies will be used to develop and implement policies for the advancement of resource-recovery and reuse projects
- **Access to R&D excellence** – the NiCE ARC Hub will link your organisation with the right people, skills, knowledge and capability in institutions that have a proven track record of world-class research and industry appropriate technology development
- **Technology head start** – partners receive primary access to IP and research outputs
- **Research and Development and tax offset opportunities**

Current Industry Partners

