

## PROJECT DETAILS

<b>Full Title</b>	ARC Nutrients in a Circular Economy (NiCE) Hub – Diverting nutrients from sewers via urine diversion and processing into fertilisers
<b>Short Title</b>	ARC NiCE Hub
<b>Industry Need</b>	<p>Increasing population growth and rapid urbanisation are placing escalating pressure on existing water infrastructure and agricultural food productivity to meet future supply and demand. Particularly, water utilities in Australia are faced with aging sewage transfer and treatment infrastructure, which will require replacement or upgrades in the near future to transport and process sewage from increasingly densely populated urban catchments. Separation of urine at the source can lead to a reduction of nutrient loads on sewage treatment plants, with consequent reduction in energy demand and capacity to process larger volumes of wastewater.</p> <p>At the same time, growing food productivity will place pressure on available fertilisers, which in Australia are mostly imported and produced using highly unsustainable methods. Human urine is a potential source of untapped nutrients which could feed into an increasing demand of renewable fertilisers made locally to support local agricultural activities such as urban farming.</p> <p>The NiCE Hub will bring together the water and agriculture industries, along with manufacturing industries, regulators, councils and citizens to demonstrate a value chain for a circular economy of nutrients based on urine.</p>
<b>Objectives</b>	<p>The ARC NiCE Hub aims to:</p> <ul style="list-style-type: none"> <li>• make removal, transport, and treatment of sewage adaptable to fast-changing cities by creating and demonstrating decentralised, precinct-scale nutrient recovery opportunities;</li> <li>• secure a new sustainable source of fertiliser for agriculture and horticulture through urine separation and processing at the source;</li> <li>• better protect waterways from the harms of excess nutrients (e.g. nitrogen and phosphorous), pharmaceuticals and hormones;</li> <li>• Investigate the scalability, durability and resilience to variable field conditions of urine processing technologies for harvesting safe fertiliser with varying environmental and social challenges.</li> </ul>
<b>Deliverables</b>	<p>The research will deliver:</p> <ul style="list-style-type: none"> <li>• whole-of-system economics across the value chain of nutrients separated at the source</li> <li>• two major scale-up demonstration (Brisbane and Sydney) of technologies for source-separation, decentralised urine treatment and nutrient recovery</li> <li>• an understanding of the preferences, perceptions and acceptance of source separation and reuse of urine in collection, transport, application to land and the changes in everyday practices across the system</li> <li>• an assessment of the effect of source-separation on the operation of sewer networks and wastewater treatment plants</li> <li>• a review of novel and cost-effective decentralised technologies for the recovery of nutrients from wastewater separated at the source, with a strong focus on urine</li> <li>• understanding of production of fertilisers from urine separated at the source; optimisation of fertiliser formulation &amp; testing application to target crops with farmers/end-users</li> </ul>

	<ul style="list-style-type: none"> <li>• assessments of safety for reuse (micropollutants, antibiotic resistance, PFAS and biological hazards)</li> <li>• an evaluation of the performance and impacts of urine-derived fertiliser on soil and plant production while trialing the fertiliser in different land applications i.e. horticulture, agriculture and parks and gardens</li> <li>• a life cycle assessment of the technologies based on greenhouse gas emissions, energy consumption, eutrophication potential and freshwater saving.</li> </ul>
<b>Benefits</b>	<p>The Key Benefits of the ARC NiCE Hub will be:</p> <ul style="list-style-type: none"> <li>• Economic - know-how for a new manufacturing industry</li> <li>• Commercial - decreased dependency on fertiliser imports to Australia</li> <li>• Environmental - healthier waterways and ecosystems</li> <li>• Societal - flexible and more resilient wastewater management</li> </ul> <p>Participation will provide partners with additional benefits including:</p> <p>Innovation and commercialisation – The ARC Hub scheme is a proven model of innovation and commercialisation stemming from ‘at scale’ collaborations</p> <ul style="list-style-type: none"> <li>• Leverage plus – partners maximise their return on investment through leverage of ARC NiCE Hub program funding and ‘in-kind’ investments;</li> <li>• Tailored R&amp;D – you set the research agenda, ensuring research relevance to your organisation’s needs;</li> <li>• Choosing from a menu of 12 approved projects, encompassing urine collection, urine processing to liquid fertilisers, scale-up feasibility, fertiliser optimisation, fertiliser end-use, whole-of-system economics, and engagement, learning and communication;</li> <li>• 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;</li> <li>• Access to R&amp;D excellence – the ARC NiCE 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;</li> <li>• Technology head start – partners receive primary access to IP and research outputs;</li> <li>• Research and Development and tax offset opportunities.</li> </ul>
<b>Stakeholders</b>	<p>Current partners include:</p> <ul style="list-style-type: none"> <li>• University of Technology Sydney</li> <li>• University of Melbourne</li> <li>• Griffith University</li> <li>• Western Sydney University</li> <li>• University of Southern Queensland</li> <li>• Urban Utilities</li> <li>• The Royal Botanic Gardens, Sydney</li> <li>• CMS Innovations</li> <li>• Originwater International</li> <li>• Chumdan Spatial Information</li> <li>• AJJA Technologies</li> <li>• Nutri-Tech Solutions</li> <li>• Buildland Australia</li> <li>• Duluxgroup Australia</li> <li>• Blakthumb</li> <li>• City of Sydney</li> </ul> <p>Other possible stakeholders include:</p>

	<ul style="list-style-type: none"> <li>• City councils</li> <li>• Utilities</li> <li>• Agriculture</li> <li>• Horticulture</li> <li>• Regulators</li> <li>• Manufacturers</li> <li>• Developers</li> <li>• Fertiliser industry</li> </ul>
<b>Knowledge Transfer</b>	<ul style="list-style-type: none"> <li>• Webinar + presentations</li> <li>• Reports</li> </ul>
<b>Research Approach</b>	<p><b>Invited scheme</b> The ARC Hub for Nutrients in a Circular Economy (NiCE) research team</p>
<b>Funding</b>	
<b>Budget Estimate</b>	The ARC Hub for Nutrients in a Circular Economy (NiCE) was recently announced as successful. It is valued at approximately \$3.8M cash and \$4.6M in-kind when all contributions are added up. Additional funding will increase the quality of the output and could lead to introduction of additional projects.
<b>Funding Model</b>	The NiCE Hub is funded by the ARC with substantial contributions from the Partner Organisations.
<b>Contributions</b>	NiCE is seeking additional cash and in-kind contributions from prospective partner organisations to increase resilience, improve output quality and expand the scope of the Hub. Hence, WaterRA is forming a consortium of water and health industries to join the Hub.
<b>Potential Funding Partners</b>	Current partners are listed above.
<b>Timeframes</b>	<input type="checkbox"/> <6 months <input type="checkbox"/> 6-18 months <input checked="" type="checkbox"/> >18 months <b>Envisaged Start Date: January 2022</b>