POSITION DESCRIPTION

Position Title: PhD Scholarship – Mapping the Water-Energy Nexus and Urban Metabolism.

Organisation Unit: School of Chemical Engineering

Position Number: 3018201

Type of Employment: 3 Year, Full-time scholarship

Classification: The scholarship is top-up funding to $35,000 per annum for Australian Postgraduate Award students, or international scholarship recipients.

THE UNIVERSITY OF QUEENSLAND

The University of Queensland (UQ) contributes positively to society by engaging in the creation, preservation, transfer and application of knowledge. UQ helps shape the future by bringing together and developing leaders in their fields to inspire the next generation and to advance ideas that benefit the world. UQ strives for the personal and professional success of its students, staff and alumni. For more than a century, we have educated and worked with outstanding people to deliver knowledge leadership for a better world.

UQ ranks well within the top 100 universities worldwide, measured through a number of major independent university rankings: the Academic Ranking of World Universities, Times Higher Education World University Rankings, US News Best Global Universities Rankings, QS World University Rankings and Performance Ranking of Scientific Papers for World Universities, and is indeed in the top 50 in some of these rankings. Over the past 3 years for which audited data are available UQ has attracted the highest (2013) or second highest (2012, 2014) amount of research funding of any Australian university.

UQ has an outstanding reputation for the quality of its teachers, its educational programs and employment outcomes for its students. Our students remain at the heart of what we do. The UQ experience – the UQ Advantage – is distinguished by a research enriched curriculum, international collaborations, industry engagement and opportunities that nurture and develop future leaders. UQ has a strong focus on teaching excellence, winning more national teaching excellence awards than any other in the country and attracting the majority of Queensland’s highest academic achievers, as well as top interstate and overseas students.

UQ is one of Australia’s Group of Eight, a charter member of edX and a founding member of Universitas 21, an international consortium of leading research-intensive universities.

Our 50,000-plus strong student community includes more than 13,000 postgraduate scholars and more than 12,000 international students from 144 countries, adding to its proud 230,000-plus alumni. The University has about 7,000 academic and professional staff and a $1.7 billion annual operating budget. Its major campuses are at St Lucia, Gatton and Herston, in addition to teaching and research sites around Queensland and Brisbane city.
The University has six Faculties and four University-level Institutes. The Institutes, funded by government and industry grants, philanthropy and commercialisation activities, have built scale and focus in research areas in neuroscience, biomolecular and biomedical sciences, sustainable minerals, bioengineering and nanotechnology, as well as social science research.

UQ has an outstanding track-record in commercialisation of our innovation with major technologies employed across the globe and integral to gross product sales of $11billion+ (see http://uniostream.com.au/our-track-record).

UQ has a rapidly growing record of attracting philanthropic support for its activities and will have further success in this area as an important strategic aim going forward.

Organisational Environment

The School of Chemical Engineering is an international leader in the chemical engineering field and has an excellent international reputation which has been built over four decades at the University. With 35 academic staff, including 17 professors, the School provides quality programs and leadership in chemical engineering education, research and development, and expert consulting to support the process industries.

UQ Chemical Engineering was ranked in the top 16 worldwide in the 2012 QS subject rankings for chemical engineering and was the top ranking school in Australia. It was also given the highest score awarded for chemical engineering in Australia in the recent ERA study.

Information about the Faculty and the School may be accessed on the Faculty’s web site at http://www.uq.edu.au/eait.

Information for Prospective Staff

Information about life at UQ including staff benefits, relocation and UQ campuses is available at - http://www.uq.edu.au/current-staff/working-at-uq.

DUTY STATEMENT

Primary Purpose of Position

Opportunities exist for one or more PhD students to contribute to a set of exciting projects focused on understanding how water and energy are interconnected in cities and economies. We are seeking PhD candidates to join a unique multi-disciplinary team at the School of Chemical Engineering at UQ http://www.chemeng.uq.edu.au/water-energy-carbon. Applicants will develop skills in modelling, data management and analysis, scenario and policy formulation and least cost strategy development.

Managing urban water-energy-carbon links is a key to achieving sustainable and metabolically-efficient cities. The research has wide potential implications for water and energy security, and utility governance.

Duties

The student/s will be expected to develop and conceptualise their own research work in a way which connects with an ARC Discovery (DECRA) project: “Mapping the water-energy nexus: new knowledge for resources security” running from 2016 to 2019.
Specifically, the PhD student/s will be expected to undertake comprehensive literature and data reviews. They will compile, concord, and allocate satellite accounts, collect, update and integrate superior data, and (ideally) write and implement code for automation of selected data feeds and/or project outputs. They will develop and use (and eventually develop) related conceptual and analytical frameworks including urban metabolism and industrial ecology theory. They will be active in the planning, analysis and writing associated with the project’s policy applications for water and energy. They will publish high quality research articles and communicate the work in national and international conferences.

The overall DECRA project extends a novel framework to systematically evaluate energy impacts of urban water security across three inter-connected systems: (i) the direct consequences of water supply, (ii) the indirect influence of water use in industry and homes, and (iii) the remote implications of water security on supply chains. The project generates fundamental new knowledge by using, as the method, a new, high-resolution, multi-university, open-access, multi-regional input-output model of the Australian economy and its resources use: the Industrial Ecology Virtual Laboratory. It will help address escalating energy demands and costs for urban water by identifying alternative and optimal pathways for addressing energy impacts of water supply.

By creating a new framework and accounting for the energy impacts of urban water in detail, this project enables the water-sector and policy-makers to move well beyond energy neutrality. It increases certainty for water and energy infrastructure policy, planning and management by illustrating system-wide interconnections, impacts and risks. Such knowledge will reduce problem-shifting and progressively transition regions and industry to more water and energy efficient forms.

**Research**

The DECRA project aims to develop a conceptual and analytical framework of the energy effect of water spanning three interconnected systems: (1) urban water utilities such as pumping and treating water (2) water use in cities for example for heating and cooling in homes, industry and commerce and (3) flows of water embodied in products. A multi-boundary framework is essential to quantify and compare the water and energy impacts of options such as infrastructure, water conservation and recycling or water allocation changes, in multiple regions. The second aim of the project, and the major analytic output of the project, is to quantify, and spatially map, water-related energy (a) in industry and commerce and (b) in the supply-chain of major goods and services which flow to cities.

While relatively well developed tools exist for assessment of systems (1: utilities) and (2: water use), until recently, it has been extremely difficult and time-consuming to consistently quantify flows of water, energy and water-related energy within and between industry sectors and geographic regions. Recent creation of the Industrial Ecology Virtual Laboratory (IELab) [http://www.isa.org.usyd.edu.au/ielab/ielab.shtml](http://www.isa.org.usyd.edu.au/ielab/ielab.shtml) (now hosted with UNSW) is a major step forward in enabling this.

The research is supported by strong collaborations with The University of New South Wales (Associate Professor Tommy Wiedmann), University of Sydney and other IELab users.
Other
Ensure you are aware of and comply with legislation and University policy relevant to the duties undertaken, including:

- the University’s Code of Conduct
- requirements of the Queensland occupational health and safety (OH&S) legislation and related OH&S responsibilities and procedures developed by the University or Institute/School
- the adoption sustainable practices in all work activities and compliance with associated legislation and related University sustainability responsibilities and procedures
- requirements of the Education Services for Overseas Students Act 2000, the National Code 2007 and associated legislation, and related responsibilities and procedures developed by the University

Organisational Relationships
The position reports to Dr Steven Kenway s.kenway@uq.edu.au, School of Chemical Engineering.

*The University would encourage applicants who do not currently hold a PhD.

SELECTION CRITERIA

Qualifications

Essential
- An Honours or Masters degree, or equivalent in engineering, science or a relevant discipline – and so eligible for an APA or equivalent international scholarship (eg UQi).

Knowledge and Skills

Essential
- High level of written and oral presentation.

Experience

Desirable
- Experience in data management or analysis of water and/or energy, modelling (e.g. MATLAB), input-output methods, spatial analysis (e.g. GIS).

Personal Qualities

Essential
- High level of independence and self-motivation

The University of Queensland is committed to equity, diversity and inclusion.