



Centre for Petroleum & Energy Research

The Centre for Petroleum & Energy Research at the University of Western Australia currently has **four** Australian Postgraduate Award (Industry) (APAI) scholarships available for PhD research projects commencing in 2008.

Each of these scholarships is worth **\$31,627 p.a. tax free** (2008 rate). This stipend has a three year duration and is indexed annually. A successful applicant for one of these scholarships will also have the opportunity to apply for one of the many top-up scholarships that exist in this field of research. For applicants outside Western Australia a contribution will be made towards relocation costs. Recipients of these APAI scholarships will conduct research within one of two projects, described below, which have received substantial industry funding from Chevron Australia, the Western Australian State Government and the Australian Federal Government. Students will also receive industrial mentorship with the opportunity for placement in Chevron's US facilities.

Applicants must have an Honours degree (2nd class minimum) or equivalent in a quantitative science or engineering discipline. Permanent residents of Australia and New Zealand are eligible for APAIs. Applications will be accepted until all four scholarships are filled. For further information, please contact:

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Promoting the production and use of Liquefied Natural Gas

Natural gas should be the primary energy source of the near future. It is the most environmentally benign of the hydrocarbon fuels and, in contrast to alternative energy sources, there is sufficient existing infrastructure for its widespread use. However, compared to oil and coal, natural gas is a difficult resource to harness. It is only through the development of technologies like liquefied natural gas (LNG) production that natural gas can effectively assume the dominant role in global energy supply. The production of LNG is crucial to Australia, in particular, as it is the only way we can participate in the global gas trade.

Through the WAERA Gas programme, the University of Western Australia is leading two multi-institution research initiatives to promote and facilitate the use of natural gas by increasing the efficiency and reducing the costs of LNG production. The two initiatives are:

- 1. Increased LNG production efficiency through nitrogen and carbon dioxide capture using high-pressure cryogenic adsorption onto tailored nanopore substrates.**

Advanced pressure swing adsorption (PSA) technologies will be developed to improve the efficiency and decrease the cost of LNG production. This project will explore the potential use of novel molecular sieve materials to remove N₂ and CO₂

from natural gas using PSA at near-cryogenic conditions. Two APAI scholarships are available to support two PhD research projects. One of these will be in chemical engineering, with the focus being on sorption thermodynamics and the design of cryogenic PSA systems. The second PhD student will study the development of novel adsorbents and will be trained in both deposition-controlled pore sizing and in calixarene synthesis. One or both PhD students will also be trained in the relevant techniques used to characterise the adsorbents. The results of these experiments will improve models of sorption processes at conditions for which little data exists. The research outcomes will be used to improve the design of LNG production trains and to treat contaminated gas reserves.

2. Fundamental Data and Thermodynamic Modelling for Cryogenic LNG Fluids to Improve Process Design, Simulation and Operation.

Process plants and the equipment required for LNG production are over-engineered because the predictions of process simulators are unreliable. This project will generate fundamental data and develop new models to substantially improve LNG processing. Significant industry funding has been committed to measure VLE, volumetric and calorific properties in two-phase multi-component hydrocarbon mixtures at high pressures and cryogenic temperatures. These new data will form a basis for the development of advanced thermodynamic models which can better describe crucial processes within the LNG production train. Two APAI scholarships are available to support two PhD research projects. One PhD will focus primarily on the experimental thermodynamic measurements required. The wide range of conditions and quantities to be studied will provide this student with a unique and highly valued skill-set. The second PhD will investigate the development of the new thermodynamic models anchored to the new data, the incorporation of these models into process simulation software, and the improved simulation of LNG production using this software.