

AINSE's Research and Education Roles in the Context of the 2006 Australian Parliament/Government Reports on Aspects of the Nuclear Fuel Cycle

1. Background

AINSE's possible roles in the development of action planning with reference to the nuclear fuel cycle derive from:

- (i) Its charter as determined by the Australian Cabinet (1957) in agreeing to the formation of AINSE which would be "*a joint organisation between the Australian Universities and the Atomic Energy Commission, for furthering the training of scientific and technical personnel in atomic energy work.....*"
- (ii) Its current principal roles in serving as a research facilitator for staff and students seeking access to ANSTO facilities, and in the education of graduate and undergraduate students in nuclear-related science. .

The nexus between research and education in nuclear-related fields is highly important in terms of AINSE's possible roles in contributing to national initiatives pertaining to the nuclear fuel cycle.

This options discussion paper considers some prospective roles for AINSE with particular reference to the reports:

Australia's Uranium – Greenhouse Friendly Fuel for an Energy Hungry World. House of Representatives Standing Committee on Industry and Resources. The Parliament of the Commonwealth of Australia. November 2006. ISBN 0 642 78865 0. [AU Report]

Uranium Mining, Processing and Nuclear Energy – Opportunities for Australia? Department of the Prime Minister and Cabinet. Commonwealth of Australia. December 2006. ISBN 0-99803115-0-0. [UMPNER Report]

Recommendations and comments from the reports pertinent to AINSE include –
AU Report

Recommendation 13 on steps to be taken in rebuilding Australia's nuclear skills base and expertise by:

This recommendation is being implemented.

UMPNER Report

Findings on research, development, education and training (Chapter 10) which include:

Given the relatively long lead times to develop and Australian nuclear industry, our own national training and educational resources could be mobilised to provide the next generation of nuclear engineers and technologists in a timely fashion. In doing so, Australia should take advantage of existing opportunities for international collaboration on nuclear education and training. The attraction of interesting, well-paid jobs would encourage universities to create suitable courses and students

to enrol in these courses. Increased support for nuclear R&D would undoubtedly also stimulate student enrolments in nuclear energy related courses.

2. AINSE Strategic Planning in 2006 Related to Nuclear Education

Professor John White as AINSE President initiated discussions with the AINSE membership during 2006 on the role which AINSE might play in the development of masters level degrees in the nuclear field. Meetings attended by representatives of AINSE members considered two models under which AINSE might contribute to nuclear education in Australia:

Model 1 - The Federal Model

1. AINSE encourages individual universities to mount courses in this area.
2. AINSE will facilitate the complementarity between these courses and offer a nationwide suite of modules for education in nuclear matters.
3. Courses are at masters / grad dip level and will be of 1-2 years in duration.
4. AINSE will hold regular meetings between participants as a ‘governing body’ and pay travel costs for one meeting per year.
5. To encourage the best students into this area, AINSE will offer four student bursaries valued at \$3000 pa. per student. The students will be selected by the AINSE Executive as with AINSE Postgraduate Scholarships (PGRAs awards) at present.
6. AINSE would service this structure and track studentships in the same way that we administer PGRAs at present
7. The courses should contain a practical component at a nuclear facility e.g. ANSTO, ANU etc

Model 2 - The Governed Model

1. AINSE would establish a steering committee to define national needs from time to time and to guide AINSE Council in both policy and financial outlays to ensure Australia-wide program of instruction in nuclear science meeting Australian needs as these develop and also international needs in the Asia/Pacific region.
2. The steering committee will be composed of ANSTO and AINSE nominees with DVCs or their nominees of member universities, wishing to participate in the program by providing courses into the national structure
3. AINSE will hold regular meetings between participants as a ‘governing body’ and pay travel costs for one meeting per year. AINSE will service the meetings and their actions.
4. The finance for the courses – both from the point of view of teaching staff; practical work; student travel to facilities and scholarships would be met from a financial pool decided from time to time by the steering committee and to which contributions from AINSE, the universities, the Australian government and landmark facilities in the nuclear science area would be attracted

5. A responsibility of the steering committee would be to define the 'markets' for the courses and to make arrangements between the universities and participating institutions for the sharing of income attracted by the school.
6. To encourage the best students into this area, AINSE will offer four student bursaries valued at \$3000 pa. per student. The students will be selected by the AINSE Executive as with AINSE Postgraduate Scholarships (PGRAs awards) at present.
7. AINSE would service this structure and track studentships in the same way that we administer PGRAs at present
8. The courses should contain a practical component at a nuclear facility e.g. ANSTO, ANU etc

Following discussion at AINSE Council meetings it was agreed that the Federal Model would be preferable.

3. Nuclear Education and Training Initiatives in Australia – Current and Proposed

The following Australian courses are on offer or under development

- ANU. Master of Nuclear Science. Being offered by the Department of Nuclear Physics & Department of Physics in the College of Science from Semester 1 2007. The course is designed so that graduates acquire skills and renew or extend understanding of the current issues in nuclear science and technology. The program is also intended to inform the policy debate.
- University of Sydney. Master of Applied Nuclear Science (and Graduate Diploma). To be offered by the School of Physics from 2008.
- ATN Universities. Master of Nuclear Engineering. To be offered from 2008. University of Wollongong, Bachelor of Nuclear Technology Degree (undergraduate) will be offered from mid-2007.
- The Australian Institute of Radiochemical Engineering (AIRE) which is run by a consortium of WA universities plans to develop master degrees in radiochemical engineering. Currently AIRE offers short courses in radiopharmaceutical chemistry.
- Additionally, ANSTO has announced a Graduate Development Program. The aim of the ANSTO Nuclear Futures Graduate Development Program is to skill graduates in order to provide Australia with the next generation of nuclear expertise.

It is a four year program for high potential graduates in areas such as science and engineering. The initial two years will be working at ANSTO and the final two years either working at ANSTO or on an overseas placement with a leading international nuclear organisation.

It is anticipated that 15 top science and engineering graduates will be recruited in 2007.

Nuclear-related courses offered internationally include:

- The World Nuclear University (WNU)
http://www.world-nuclear-university.org/html/wnu_prospectus/index.htm
 which was established in 2003 to foster cooperation among its participating institutions, which includes facilitating distance learning so that courses at any WNU university are available to students throughout the WNU network. The

WNU consists of 30 nations represented by universities and research centres. Currently ANSTO is the sole Australian member.

- Dalton Nuclear Institute (DNI)
<http://www.dalton.manchester.ac.uk/>
The DNI based at the University of Manchester coordinates a consortium of universities and research institutes to address the nuclear skills shortage in the United Kingdom. The DNI offers a masters degree in nuclear science and technology. It is linked to the WNI.
- The French Institute for Nuclear Science and Technology (INSTN) and the French Atomic Energy Commission (CEA)

<http://www-instn.cea.fr/>

INSTN and the Nuclear Energy Division of CEA are opening a new international school in nuclear engineering. Doctoral-level courses in advanced nuclear science are being offered in 2007, from July – September.

4. Prospective AINSE Initiatives in Nuclear-related Research and Training

The following initiatives are being considered by AINSE. The research initiatives are highly important in the context of the nexus between research and education.

4.1 AINSE Research Awards and PGRA Awards Scheme

AINSE to strongly promote the submission of proposals through its current specialist committee system which relate to the nuclear fuel cycle, e.g. in materials science and engineering and in environmental impacts. This recommendation is being implemented.

4.2 Nuclear Technology Specialist Committee

It has been proposed that AINSE should establish a Nuclear Technology Specialist Committee which will be responsible for reviewing nuclear fuel cycle related Research Award applications which are not readily accommodated within the existing specialist committee system.

4.3 Australian Nuclear Education Council

It has been proposed that the AINSE Council should assume responsibility for establishing an Australian Nuclear Education Council (ANEC) which will coordinate the development of nuclear education and training in Australia, according to *Model 1 - The Federal Model* (Section 2 above).

The role of ANEC role in nuclear education would include facilitating cooperation with international bodies such as WNU and the DNI.

ANEC would be responsible for holding an annual national forum on cooperation in nuclear education.

4.4 Dissemination of Information on Nuclear Science and Technology

AINSE's responsibilities include the web-based provision of information on Australian nuclear-related degrees. This recommendation is being implemented.

Professor Brian O'Connor
AINSE President

30 June 2007