Economics Legislation Committee
ANSWERS TO QUESTIONS ON NOTICE
Industry, Innovation and Science Portfolio
2016-17 Supplementary Budget Estimates
20 October 2016

AGENCY: AUSTRALIAN NUCLEAR SCIENCE AND TECHNOLOGY ORGANISATION

TOPIC: Capital works

REFERENCE: Written Question – Senator Carr

QUESTION No.: SI-78

a. Has ANSTO recently completed any capital works?
b. Are further capital works underway?
c. What facility construction or upgrades are currently being planned?
d. How is this program of work being funded?
e. What is happening with the Synroc manufacturing plans?

ANSWER

a. As the scientific and technical questions faced by Australian researchers and industry increase in complexity, recent and current capital upgrade projects at Lucas Heights are ensuring that ANSTO remains at the forefront, providing domestic access to some of the world's leading scientific facilities and capabilities.

Education Investment Fund projects

The $38 million Centre for Accelerator Science (CAS) capital construction project was completed in 2015, with support from the 2009 Super Science Initiative, an initiative of the Australian Government.

CAS is now Australia's leading accelerator science facility, providing the Australian research community with world class facilities for Accelerator Mass Spectrometry and Ion Beam Analysis, supporting research areas of national importance including medical science, water resource sustainability and national security.

In addition to ANSTO's added accelerator capabilities, three new neutron beam instruments originally funded by the Super Science Initiative are providing industry and researchers with unparalleled opportunities to investigate the structure and dynamics of future industrial materials, devices and systems, right here in Australia.

The three new neutron beam instruments – EMU, BILBY and DINGO – at the Australian Centre for Neutron Scattering (ACNS), at ANSTO, are helping Australian and international researchers address scientific challenges across the breadth of Australia's National Science and Research Priorities. For example, these instruments are:

- helping Australian researchers better understand the biological mechanisms involved in diseases of the brain, such as Alzheimer's and Parkinson's;

- improving scientific understanding of the growing problem of food allergies, through the observation of interactions between biological molecules such as proteins, viruses and cell membranes;

- improving industrial productivity through the mapping of water damage in industrial machine components, allowing for extended operating lives;

- inspecting critical welds in the pipes used to transport energy resources around Australia, enhancing energy security;

- ensuring aircraft safety through the internal examination of parts for structural flaws or defects;

- investigating the internal features of objects such as rare fossils or valuable ancient artefacts without destroying the object;

- creating more efficient and effective hydrogen fuel cells for clean energy systems; and

- characterising new battery materials with greater storage capacity and discharge capabilities, essential to improving energy efficiency and security.

Both the CAS and the new neutron beam instruments at the ACNS are supported by the Australian Government's National Collaborative Research Infrastructure Strategy.

ANSTO Electron Microscopy Facility

ANSTO's new Electron Microscopy Facility, opened in July 2015, is playing a major role in ANSTO's research and development of high-tech materials for industrial and medical applications. The $6 million facility has been purpose-built to allow ANSTO's electron microscopes to operate at their full performance capabilities, and uses advanced architectural design to mitigate external influences.

Electron microscopes use beams of electrons to create high magnification images, but external influences such as electromagnetic fields, vibrations, and temperature variation can compromise performance. Amongst many applications, electron microscopy assists in maintaining the safety and reliability of the world class OPAL research reactor, which is vital to ANSTO's production of nuclear medicines.

While electron microscopes are found in many universities and science labs, the new environment in which ANSTO's electron microscopes are housed has created a shielded laboratory that maximises microscope performance.

Interim waste storage facility

In order to fulfil Australia's obligation to take back the residual radioactive waste from HIFAR reactor fuel reprocessed in France, ANSTO constructed a new interim waste storage facility, which was commissioned in 2015. The HIFAR reactor, which operated into its 60th year in 2007, was Australia's first nuclear reactor, used for nuclear medicine production and a range of research applications. The fuel used over the life of the reactor was sent to France and the United Kingdom for reprocessing, to be returned at a later date under treaty-level government to government agreements.

The French waste returned to Australia in December 2015, and is now housed in the interim waste storage facility. The waste will be transported to the National Radioactive Waste Management Facility once operating.

Construction of the interim waste store was funded as a component of the funding of the overall return of waste from France.

b. *ANSTO Nuclear Medicine project*

The ANM project continues to make good progress, with construction of the export scale nuclear medicine facility building essentially complete and the building now connected to mains electricity. The facility is now in the final stages of the fit-out phase, with eight out of the ten specialised, US-manufactured hot cells having already been installed.

ANSTO recently wrote to the Public Works Committee advising that operations are planned to commence in the third quarter of 2017, with full scale production achieved by about the end of 2017.

The new nuclear medicine facility will enable ANSTO to supply up to 25% of the global demand for molybdenum-99. This will ensure Australians have reliable access to nuclear medicine into the future, helping to diagnose cancer, heart disease and other illnesses.
The facility will also position Australia as a primary source of, and global leader in, the high-end manufacturing of nuclear medicines.

The co-located Synroc waste treatment plant is now anticipated to be operational in the fourth quarter of 2019. This timing aligns with the need for waste processing that will arise from the new nuclear medicine facility, as wastes will need to be held for decay for up to two years before they can be processed.

The Synroc plant is a first-of-a-kind project. Accordingly, ANSTO chose to establish a full scale front end process demonstration plant in an existing building to ensure optimal design. The demonstration plant will be complete by mid-2017.

c. ANSTO maintains its position as a world leader in nuclear science and research through a rigorous program of scheduled maintenance and capital upgrades to its landmark, national and institutional research infrastructure facilities and capabilities.

ANSTO is currently developing a funding proposal for beamline expansion at the Australian Synchrotron. Ownership of the facility transitioned to ANSTO following the Australian Government's announcement of a $520 million financial commitment under the National Innovation and Science Agenda, to fund operation of the facility for the next ten years, to 2026. At present, the Australian Synchrotron is operating below capacity, with space for several more beamlines. The installation of new beamlines will address priority research areas, and will allow the Australian Synchrotron to reach its full potential as an internationally significant piece of landmark research infrastructure. ANSTO intends to seek funding for new beamlines from a diverse range of contributors, including state governments, Australian universities and industry.

ANSTO is also developing a proposal for an Innovation Precinct which would be home to a proposed Graduate Institute, a nuclear science and technology innovation hub and a broader innovation and technology park. Consultations are currently being held with stakeholders from the higher education and industry sectors, with formal planning expected to commence in financial year 2017-18.

The Graduate Institute proposal aims further strengthen links with universities, with approximately 300-400 graduate and postgraduate students undertaking research studies at ANSTO in Sydney and Melbourne. At any time, there are currently 120 postgraduate researchers from over 30 universities conducting research at ANSTO. The overarching aim of the Innovation Precinct is to strengthen links with industry and foster innovation.

Detailed design of ANSTO's new hot cell manipulator and handling workshop facility is nearing completion, and preparation of technical specifications necessary for the procurement of construction contractors and equipment has commenced.

d. New capital projects at ANSTO are financed by a diverse range of funding sources. For example, funding for the installation of new beamlines at the Australian Synchrotron is being sought from a diverse range of contributors, including state governments, Australian universities and industry. As the Innovation Precinct proposal is still in the early stages of planning, funding sources are yet to be identified.

   Construction of the ANSTO Nuclear Medicine facility was funded by a $168.8 million loan provided by the Australian Government, to be repaid by ANSTO from profits generated by exports once the facility becomes operational.

e. Synroc, an Australian innovation, is a cost-effective, low risk solution for treatment of radioactive waste. Synroc will deliver a permanent, safe and economical way of treating waste from past, current and future manufacture of nuclear medicines. It mimics some minerals' natural ability to contain radioactivity, and reduces volumes by up to 90 per cent, on average, compared to traditional waste treatment methods such as cementation.

   As described above, the Synroc waste treatment plant is now anticipated to be operational in the fourth quarter of 2019. This timing aligns with the need for waste processing that will arise from the new nuclear medicine facility, as wastes will need to be held for decay for up to two years before they can be processed.

   The Synroc plant is a first-of-a-kind project. Accordingly, ANSTO chose to establish a full scale front end process demonstration plant in an existing building to ensure optimal design. The demonstration plant will be complete by mid-2017.