NEW ZEALAND SYNCHROTRON GROUP LIMITED

Submission on the Te Ara Paerangi - Future Pathways Green Paper

This submission addresses the section of the Te Ara Paerangi - Future Pathways Green Paper relating to Research Infrastructure. New Zealand Synchrotron Group Ltd (NZSG) is a small Crown Entity owned by 12 major research institutions (8 universities, 3 CRIs and Callaghan Innovation). It was established to manage New Zealand's investment in the Australian Synchrotron and coordinate ongoing access of users from New Zealand to this facility. The Australian Synchrotron is one of the largest items of research infrastructure in Australia. Its initial cost was A$350 million and it is currently undergoing a A$114 million expansion. It produces powerful beams of light that are used at individual experimental facilities to examine the molecular and atomic details of a wide range of materials across the spectrum of physical and biological sciences. The advanced techniques are applied to research and technology in many important areas including health and medical, food, environment, biotechnology, nanotechnology, energy, mining, geology, agriculture, advanced materials and cultural heritage.

NZSG has served the research community well. It has ensured New Zealand has a strong presence in decisions on the operation and future development of the facility, arranged favourable access rights for New Zealand users and has fostered the development of a vibrant research community able to undertake research of the highest international standard.

The company was established in 2006 and in essence was a partnership between the research sector and the Crown. While there was a strong (and necessary) push from the research community for New Zealand to join a consortium of Australian entities investing in the Synchrotron, the catalyst for the eventual arrangement was the Crown (through MoRST at the time) declaring New Zealand's participation as a national priority for research infrastructure investment. MoRST arranged the Crown's share of the funding and encouraged the universities and CRIs to come together to collectively provide the sector funding. The vehicle chosen to represent the sector was a company, owned by the institutions with an independent secretariat to manage its operations.

There have been two periods of capital investment; A$5 million in the 2006-2008 period and more recently A$12 million (in the 2017-2023 period). An annual fee is paid to the operator of the Australian Synchrotron (ANSTO since 2017), the cost of which is shared on a 50:50 basis between the Crown and the research sector. In addition to the capital and operating funding, there have been two phases of capability build funding to train and develop new users. This has maximised the value obtained from the investment by ensuring that the Synchrotron could be used effectively by New Zealand researchers ($525k in 2008-2009 funded by TEC and $400k in 2020-2024 co-funded by MBIE and the research sector).

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Observations from NZSG's experience relevant to future investment in large scale research infrastructure are:

- The NZSG model of broad institutional membership in an entity that is managed independently of any one stakeholder has delivered significant benefits for New Zealand research. This includes:
  - wide participation across the research sector
  - substantial leverage of sector funding with funding from government
  - highly favourable access conditions to a world-class research facility
  - ability to provide an overlay of national importance to research selected to use the facility
  - ability to provide capability development to generations of new users
  - enabled research output of international standard (in the 2020/21 year New Zealand researchers published 54 papers from their previous work at the Australian Synchrotron, 28 of which were in high impact journals (impact factor > 7))

- Some of the factors that were important for NZSG being able to become established and function so successfully are:
  - participation in the Australian Synchrotron programme being considered of national importance (although this was an *ad hoc* decision at the time rather than one selected from a centralised coordinated assessment)
  - having an established (although informal) network of researchers with a common interest in access to synchrotron facilities who helped develop the science case for investment
  - strong leadership from the Ministry of Research, Science and Technology in pulling together institutional participation
  - NZSG being seen as speaking for New Zealand in negotiations with Federal and State governments in Australia on funding and access conditions
  - being included in the government's Science, Research and Innovation Cooperation Agreement with Australia
  - being able to establish a secretariat to support the NZSG Board and to manage operations independent of any one stakeholder
  - having access to explicit funding to undertake capability development both of emerging researchers and to new users of the technologies available at the Australian Synchrotron
  - significant co-funding from government so that institutional participants obtained greater benefit from their investment compared with "going alone"

The benefit of international collaboration and investment in science between countries cannot be stressed more highly. There are numerous examples of shared investment in major items of infrastructure between countries, e.g. space and CERN, and those relationships are important. Other opportunities for New Zealand, akin to the Australian Synchrotron, should be explored.

- Issues that NZSG has faced which should be addressed in future decisions on structures for ownership of large-scale research infrastructure or coordination funding and access to overseas facilities are:
  - The weaknesses in the club model that favours users of scale and limits the ability of minor users to participate, irrespective of the merit of their research. Some CRIs were reluctant to join NZSG and some CRIs that were infrequent users have suspended their participation because they did not have the security of long-term funding to meet their investment criteria. This is a barrier to entry that needs to be addressed.

- The scale of investment means costs are typically picked up at institutional level by the partners in NZSG. While this is an excellent outcome for researchers in those institutions, it leaves NZSG exposed to any participant withdrawing from the company and raising the cost of access for all other participants.

For these reasons and acknowledging that the "club" model is attractive, NZSG would support a model which makes such leading-edge research infrastructures more accessible to the whole of the New Zealand research community on a merit and strategic basis. This moves away from the "club" model and implies a rigorous process to decide national priority research infrastructure requirements, but that these facilities are then largely centrally funded, as is standard practice globally for synchrotrons and other large items of science infrastructure. Ownership can then be vested either with the Crown, or with an arms-length entity such as NZSG.

Directors
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