Please note: the substantive content of the 2026 NRI Roadmap Survey begins at Question 20 (with prior questions dealing with administrative and other information).

As such all submissions that are published include the responses submitted from Question 20 onwards only.

Q20.

Part 2: Research themes

2.1 NRI comprises the assets, facilities and associated expertise to support leading-edge research and innovation in Australia and is accessible to publicly and privately funded users across Australia and internationally. We are seeking your input on possible directions for future national-level investment - i.e., where the requirements are of such scale and importance that national-level collaboration and coordination are essential.

The 2021 Roadmap used a challenge framework to support NRI planning and investment. With this in mind, consider likely future research trends in the next 5 - 10 years, and with respect to one or more of the 8 challenge areas identified in the 2021 Roadmap as listed below:

- describe emerging research directions and the associated critical research infrastructure requirements that are either not currently available at all, or not at sufficient scale and
- describe current national infrastructure requirements that you anticipate will no longer fit the definition of NRI in 5-10 years.

Do not limit your commentary to NCRIS funded capabilities.

Q21.

Resources Technology and Critical Minerals Processing

Q22.
Food and Beverage

Q23.
Medical Products

Q24.
Defence

Q25.
Recycling and Clean Energy

Q26.
Space

Q27.
Environment and Climate

DCCEEW anticipates that very high-resolution climate modelling, observations and model data storage and access and machine learning will drive much of Australia's national climate science computational needs. Over the next ten years, new climate models will be developed that provide much more detailed information. These models will include extra features like ice sheets and carbon cycle processes, which will help us better predict and adapt to future weather, climate, and ocean conditions. In addition, the models will provide much higher spatial resolution. These improvements rely heavily on creating and improving software, storing data, and using powerful computers. Australia's global and regional climate models need to be able to integrate new process-based understandings in order to enhance national prediction and projection capability. Computational infrastructure must also be able to connect observational datasets with prediction and projection capabilities. The infastructure needs to also provide the means to develop, test and benchmark process-based models reliably and reproducibly. To support Australia's climate projections modelling needs, the HPCD system must: -Be flexible and scalable -Facilitate collaborative learning -Be secure and reliable -Be financially and environmentally sustainable. The modelling community has determined that Australia's global climate model (ACCESS) requires a Tier-1 peak high-performance data (HPD) system, currently lacking in Australia. This is also recommended in the Australian Academy of Science's DECADAL PLAN FOR AUSTRALIAN EARTH SYSTEM SCIENCE 2024–2033. The AAS DECADAL PLAN also recommends that Australia establishes an integrated, standardised and curated observational data system, including national and global reanalyses and satellite data, co-located with nationally significant computing facilities to support understanding and modelling, artificial intelligence and machine learning based applications.

Q28.

Frontier Technologies and Modern Manufacturing

Q29.

2.2 The 2024 statement of National Science and Research Priorities (NSRPs) includes outcomes linked to each priority to assist in identifying critical research needed in the next 5 to 10 years.
Consider the priority statements and, with respect to one or more of the 5 priority areas as listed below:

- describe emerging research directions and the associated critical research infrastructure requirements that are either not currently available at all, or
- not at sufficient scale and describe current national infrastructure requirements that you anticipate will no longer fit the definition of NRI in 5-10 years.

Do not limit your commentary to NCRIS funded capabilities, and where relevant, refer to the underpinning outcomes and research identified in the NSRPs document.

Q30.

Transitioning to a net zero future

Computational infrastructure for climate modelling input into integrated assessments (socio and economic considerations) will be required to better understand transition pathways, transition risks and climate risks to Australia's net zero transition.

Q31.

Supporting healthy and thriving communities

Research in the climate-health nexus is growing and will require better coordination of data and computational resources. Increased use of IoT, apps and trackers and bottom-up collection of data will likely create a demand for collocation, storage and access to data as well as computational capabilities for analysis, modelling and simulation at larger scales or higher resolution.

Q32.

Elevating Aboriginal and Torres Strait Islanders knowledge systems

Q33.

Protecting and restoring Australia's environment

Global climate models developed by other countries, do not appropriately represent Australia's unique landscape. Australia needs its own climate modelling capabilities to support our national climate-related priorities. High resolution modelling is required to better understand climate risks to Australia's environment to guide place-based climate adaptation and conservation. This includes exploration of slow changing climate variables and chronic events (e.g., changes in humidity, aridity) and tipping points in the climate system. This will need to be integrated with environmental, ecosystem and other modelling and observations to adequately inform decision making.

Q34.

Building a secure and resilient nation

High resolution modelling is required to inform place-based climate adaptation including understanding extreme events, tipping points and slow changes such as sea level rise. Activities in this space include climate downscaling to develop more granular and fine (km) scale resolution output and integrated with other data such as socio-economic status or property characteristics relevant for decision making. Demand for this will increase.

Q35.

2.3 The case for a new NRI capability, or enhancements to existing capabilities, typically emerges through advocacy from research communities clustering around rigorously identified needs and goals. Such a concept could respond to a requirement for novel or expanded capacity within a domain, or across domains, and must be such that it could only be made available with national-level investment.
If you have identified such a requirement, briefly describe the need, the proposed infrastructure capability, the medium-term goals, impacted research communities, and the timeframe over which you advocate its establishment. Your response can include links to relevant existing reports.

Australia requires access to high-performance computational and data storage capabilities to support the development and delivery of climate projections for public good science in the national interest. Climate projections in Australia already represent the largest current use of Australia's HPCD but the existing system is not sufficient to meet the needs. Australia's current HPCD system for projections science is centred around the Tier 1 National Computing Infrastructure (NCI), with computations and data largely performed on the supercomputer Gadi. The service life of this computer is coming to an end in 2025 and it will not be able to support the ongoing climate projections needs for Australia. An urgent refresh of HPCD is required to support immediate needs such as data storage for the current models, hosting of international reference datasets, and to feed the next wave of artificial intelligence / machine learning (AI/ML) and data-driven science. To provide the best information base for climate-related decisions requires a plausible range of likely climate futures which in turn requires many model runs to generate. Producing these runs at a resolution that is relevant for decision making calls for significant high performance computing resources and associated data storage. Without adequate investment in this infrastructure, and the people to develop and run the models, we risk not being able to inform decisions in response to climate change and protecting our natural and built environments, economy and people. In order to maintain an efficient and effective climate projections modelling capability that is able to support future demands requires: -A strategic framework or roadmap to provide the vision for a HPCD system and steps to implement that vision. This would encompass hardware; software, data and the people required to develop, provide input to and support that system. -A single integrated HPCD system (i.e. Tier 1 or 0 facility). This will avoid Australia falling behind by: ----Supporting collaboration and enable sharing of data, analysis techniques, knowledge and information both within Australia and internationally with peer climate and weather centres. ----Enabling production of an ensemble of models that create a range of plausible futures and massive storage of associated data. ----Supporting publication processes and provenance to trusted data sources (e.g., Australian observations and simulation results). -Staff with hybrid scientific and technical skills that can harness new technologies and capabilities, to ensure strategic infrastructure is fit-for-purpose into the future -Software that integrates the technology and data, and the people that develop this. -Communities of climate experts to maintain and grow our sovereign projections science capability and support the multi-institutional and cross-domain learnings.

Q36.

Part 3: Industry perspectives

This section is seeking input specifically from industry-based respondents. Other respondents can skip this section.

Recommendation 6 of the 2021 Roadmap related to improvements in industry engagement with NRI. To complement work on this topic that has occurred since then, we are seeking additional advice on NRI requirements as perceived by current or potential industry-based users.

Q37.
3.1 Have you (or your organisation) interreacted with or used Australia's NRI?

- ○ Yes
- ◉ No

Q38.
3.2 If so, please briefly outline the NRI capabilities you (or your organisation) have interacted with or used. Do not limit your response to NCRIS capabilities.

This question was not displayed to the respondent.

Q39.
3.3 Please indicate your (one or more) primary reasons for interacting with NRI:

This question was not displayed to the respondent.

Q40.
3.4 If you answered no, please indicate your (one or more) primary reasons:

- ☐ I did not know about it
- ☐ Other facilities suit my needs better
- ☐ I would like to, but cannot get access due to geographical location
- ☐ I would like to, but believed that access was only available to academic researchers
- ☐ I am not aware of any capability that meets my needs
- ☐ Other (please specify) [ ]

Q41.
Part 4: Other comments
4.1 Please elaborate on any of your above responses or add any other comments relevant to the development of the 2026 Roadmap. Your response can include reference or links to existing reports that you recommend be considered during the 2026 Roadmap development process.

DCCEEW recognises that the NRI are critical enabling components of our ability to use research and development funding to achieve environment and climate science outcomes in caring for Australia's environment. Given the numerous linkages between a healthy environment and a prosperous, secure Australia, we consider that continued access to, and development of, NRI that deliver services for environment and climate science is critical to progressing Australia's national priorities. Case study The National Environmental Science Program (NESP) brings scientists together with Traditional Owners, government, community and industry to care for Australia's environment. NESP is administered by DCCEEW and funds four research hubs which are hosted by Australian research organisations, and all hubs make use of NRI facilities to some extent. Several of these projects would simply not happen without the ability to access NRI, for example: -The Climate Systems Hub, hosted by CSIRO, uses and contributes to ACCESS as a critical research tool in climate and earth system modelling. Having an Australian-owned climate model ensures CSIRO is able to provide science to support climate policy that is appropriately tailored to Australia. -The Marine and Coastal Hub, co-hosted by the Reef and Rainforest Research Centre and University of Tasmania, uses IMOS for data collection and management, and uses ship time on MRV Ngerin (part of the Southern Coastal Research Vessel Fleet) to make observations of the marine environment. -All four hubs are working with the Australian Research Data Commons to ensure that NESP data is easily accessible, uses shared standards and can be readily used to inform programs and policy.

Q49.

4.2 Optional Document Attachment.

Note: Our strong preference is that answers are provided against the relevant questions in the survey. However, this file upload option is available for submissions in file format, where needed. Please ensure the document includes your name or organisation.