

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

Transition towards net zero greenhouse gas emissions and appropriate adaptation to a warming climate urgently need a national scale, distributed atmospheric composition observation facility to better inform policy. Atmospheric measurements can help validate anthropogenic emissions estimates that are internationally reportable and trace the response of the biosphere to a significantly warming climate. The climate system comprises the atmosphere (wherein the climate forcing resides), the oceans and the terrestrial biosphere. Currently, NCRIS facilities support observations only in the oceans (IMOS) and terrestrial biosphere (TERN). Australia urgently needs to support our climate science with a national network of atmospheric composition observations. I expect in the coming decade Australia will need to grapple more directly with two key issues: 1) defensibility of emissions reporting, as internationally funded satellites target emissions hot spots on the Australian continent. 2) response of the terrestrial biosphere to climate forcing. Australia's current capacity to measure atmospheric composition across the continent is consists of only two observatories (kennaook/Cape Grim, Tas and Gunn Point, NT). Work at CSIRO suggests (and this is reflected by the extraordinary density of observational infrastructure across Europe and other parts of the world) a dozen or more observing sites across the continent would be required to delivery rigorous estimates of CO2 and methane emissions from atmospheric data. Measurement of other greenhouse gases, ozone depleting substances, short-lived climate forcers (aerosols and reactive gases) and other pollutants could also leverage new infrastructure. Expansion of current observations to meet the science need will require investment in infrastructure and collaboration across the research and tertiary sector.

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

Verification of emissions reductions, and validation that carbon farming initiatives are working will become critical questions that national atmospheric composition infrastructure can address.

Q31.

Supporting healthy and thriving communities

Q32.

Elevating Aboriginal and Torres Strait Islanders knowledge systems

Q33.

Protecting and restoring Australia's environment

Understanding the impacts of a warming climate on Australia's terrestrial ecosystems (their capacity to absorb atmospheric CO2) will be critical to managing our environment.

Q34.

Building a secure and resilient nation

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 currently does not have a genuine national facility for measuring the essential climate variables in the atmosphere that the Global Climate Observing System identifies as fundamental and critical for climate adaptation and mitigation planning. CSIRO, in collaboration with the Australian Bureau of Meteorology and some universities undertakes some of this work, but it is currently inadequate to address the nation's needs in planning for the transition to net zero and adapting to the committed warming. A national scale, spatially distributed network of atmospheric observing stations, positioned to cover Australia's main ecosystem types and regions of large greenhouse gas emissions coupled to atmospheric modelling techniques could produce routine estimates of continental and regional scale greenhouse gas emissions at annual and monthly time resolution. As a priority, this would address CO2 and methane, but could also be leveraged to monitor nitrous oxide, and other climatically relevant species. Key to the success of this facility would be a central calibration facility and standardised quality assurance procedures along with a data centre for processing and computing fluxes from the atmospheric data. I would expect that development of such infrastructure to take 5-7 years to scale up across the continent, with key new observational sites implemented within the first few years and a gradual scale up over time.

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) interacted 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:

This question was not displayed to the respondent.

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.

I have previously advocated for such a facility (see attached). Since that time, there has been a strong focus on methane (as evidenced by The Superpower Institute's National Emissions Monitoring Roadmap). Investment in NRI around atmospheric composition is critical for many of the challenges the nation is facing in the coming decades.

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.

[AuScope Atmosphere final.docx](#)

625.7KB

application/vnd.openxmlformats-officedocument.wordprocessingml.document