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

Australia really needs a national co-ordinated approach to measurement of atmospheric composition. The composition of the atmosphere is driving climate change and air quality is the greatest environmental hazard of the modern age but there is no National plan for developing the tools to understand the changing chemistry and composition of the atmosphere. Given its utmost importance to humanity this is a huge gap in Australia's infrastructure and National capacity.

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

Australia needs to develop better tools to be able to measure and monitor emissions (and validate the efficacy of intervention measures). This requires critical research infrastructure for atmospheric composition measurements and inverse modelling.

Q31.

Supporting healthy and thriving communities

Q32.

Elevating Aboriginal and Torres Strait Islanders knowledge systems

Q33.

Protecting and restoring Australia’s 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.

The world urgently needs to slow the progression of climate change. To this end, Australia recently set emissions reduction targets to reach 43% of 2005 levels by 2030 and net zero by 2050[1]. Much of the focus of abatement strategies has been on reducing carbon dioxide emissions, since these have the greatest long-term impact on climate[2]. However, methane (CH_4) has a higher global warming potential (28–36 times that of carbon dioxide over a 100-year period[2]) and with its shorter atmospheric lifetime of ~12.4 years, provides the opportunity for emissions reductions to have a faster impact on global temperatures[3]. Thus, in October 2022, Australia joined the Global Methane Pledge - a voluntary commitment with 122 signatories, working collectively to reduce global methane emissions across all sectors by at least 30% below 2020 levels by 2030[4]. A significant barrier to progress is that our ability to estimate methane emissions has uncertainties that are often greater than reductions expected from the mitigation strategies being trialled[5]. It has been shown that inventory methods underestimate emissions from cattle by at least 33%[6] and from wastewater treatment plants by 50%[7] whilst over-estimating emissions from landfills by 30%[8]. At a current price of $35 per tonne this uncertainty represents a large financial risk to Australian businesses. Understanding anthropogenic emissions on a regional scale can be further complicated by natural emissions (such as those from bushfires and wetlands), which are poorly characterised and subject to potential positive feedback loops for climate warming[9, 10]. The crux of the problem is that currently Australia cannot meet its emission reduction goals without: 1. A better understanding of its current methane emissions 2. Better tools to validate the effectiveness of sectorial interventions and the veracity of emissions reductions claimed under abatement schemes. A roadmap has been proposed to address these issues: https://www.superpowerinstitute.com.au/work/national-emissions-monitoring-roadmap REFERENCES 1. Australian Government Department of Industry Science Energy and Resources. 2022.; 2.Intergovernmental Panel on Climate, C. 2023, Cambridge: Cambridge University Press. ; 3. Balcombe, P., et al., Environmental Science: Processes & Impacts, 2018. 20(10): p. 1323-1339. ; 4. The Hon Chris Bowen MP Minister for Climate Change and Energy, A.j.G.M. Pledge, Editor. 2022. 5. Saunois, M., et al., Earth Syst. Sci. Data, 2020. 12(3): p. 1561-1623. ; 6. Vechi, N.T., J. Mellqvist, and C. Scheutz, Agriculture, Ecosystems & Environment, 2022. 330: p. 107885. ; 7. Moore, D.P., et al., Environmental Science & Technology, 2023. 57(10): p. 4082-4090. ; 8. De la Cruz, F.B., et al., Environmental Science & Technology, 2016. 50(17): p. 9432-9441. 9. Peng, S., et al., Nature, 2022. 612(7940): p. 477-482. ; 10. Pitman, A.J., G.T. Narisma, and J. McAneney, Climatic Change, 2007. 84(3-4): p. 383-401.

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.

Marine National Facility

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

- [ ] For expertise or advice
- [ ] Access to research resources or products
- [x] Access to equipment for research
- [ ] Access to equipment for operational reasons
- [ ] Help in translating research
- [ ] Access to data
- [ ] Support for clinical trials
- [ ] Other (please specify)

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 used methane as an example of the need for a National coordinated approach to atmospheric composition measurements, modelling and emissions estimates but there are many other needs that could be met by a National Infrastructure for Atmospheric Composition.

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.