

NESP 2 hub research scope overview

Climate Systems Hub

The Climate Systems Hub form, function and high-level research requirements are outlined below to assist applicants prepare collaborative consortia that can deliver the objectives of the next phase of the National Environmental Science Program. This document is supplementary to the Grant Opportunity Guidelines and should be read in conjunction with the overarching description of the program.

The 'Climate Systems' Hub will:

- maintain our world-class capability in multidisciplinary Earth system science and modelling
- advance understanding of Australia's climate variability, extremes and associated drivers, including the fundamental drivers of bushfires, drought and rainfall in the Australian region
- develop applied decision-making tools and information to inform policy and programs to prepare Australia to manage emerging risks and opportunities
- cross-hub coordination for the 'climate adaptation' functional mission to support climate information to program hubs to drive integrated adaptation research across the program to support evidence-based decision-making and improve Australia's climate resilience.

See the high-level research requirements outlined below for a guide to potential research needs.

Form

Regional Nodes

The Climate Systems Hub should have a national presence and capability. Applications should consider both regional and urban communities, and where appropriate this capability should be delivered via regional centres.

Applicants are encouraged to provide a 'Diagram of proposed hub organisational structure' (this is an optional attachment referred to under Section 7.1 of the Grant Opportunity Guidelines) to assist with the assessment of collaborative partnerships.

Indigenous Participation

Indigenous leadership is embedded throughout the program. The Climate Systems Hub must have at least one senior Indigenous Facilitator who will sit on all senior hub leadership committees to build trusted relationships and ensure engagement with Indigenous Australians. The senior Indigenous Facilitator will form part of the cross-hub Indigenous Facilitation Network, which will be supported by the department to drive Indigenous inclusion at the program level.

Appropriate advice and engagement should be sought from traditional owners and Indigenous communities when designing the Climate Systems Hub governance structure. This will ensure the cultural safety of the Indigenous Facilitator and other advisors, and culturally appropriate governance processes that meet the research interests and needs of Indigenous people.

Applicants for the Climate Systems Hub must be able to demonstrate an ability from the start of the program to establish or maintain long-term, two-way partnerships with traditional owners and Indigenous communities. This means Indigenous knowledge must be treated with respect and reciprocated in culturally appropriate ways in the form of shared practical research outcomes for traditional owners, communities and land managers, and capacity building for Indigenous communities. The Climate Systems Hub must include mechanisms to nurture the next generation of Indigenous researchers including in remote regions.

NESP 2 hub research scope overview

Applications for the Climate Systems Hub that do not have Indigenous representation and true on ground-partnerships with Indigenous people will not be competitive.

Functions

The national Climate Systems Hub will deliver applied scientific products and advice to meet end-user requirements as agreed by the department including:

- synthesis reports of current and emerging knowledge for senior decision makers
- applied science research, analysis, process studies and models to support policy makers, program managers and regulators
- integrated management decision tools inclusive of scalable state of the environment monitoring and evaluation systems
- long-term foundational science to support end-users understand and adapt to our climate.

The Climate Systems Hub must have a Mission Leader for climate adaptation research. The Mission Leader should have the expertise in the mission and the capability to lead mission research within and across the hubs. The new mission setup is designed to facilitate cross-hub collaborations and consideration of the environment as an integrated whole. Applicants must also ensure that their consortia have individual specialists and the broad capacity to support the other cross hub missions led by the other national hubs as outlined in the Grant Opportunity Guidelines and summarised below.

Mission	Lead Hub
Protected place management	Marine and Coastal
Threatened and migratory species and ecological communities	Resilient Landscapes
Waste impact management	Sustainable Communities and Waste
Climate adaptation	Climate Systems

Requirements

The high-level research requirements outlined below provide a guide to potential research needs to assist applicants. However, detailed research plans will be co-designed with successful applicants and end-users at the start of the program and then on an annual basis.

Hub Research:

The Climate Systems Hub will:

- maintain our world-class capability in multidisciplinary Earth system science and modelling
- advance understanding of Australia's climate variability, extremes and associated drivers, including the fundamental drivers of bushfires, drought and rainfall in the Australian region
- develop applied decision-making tools and information to inform policy and programs to prepare Australia to manage emerging risks and opportunities.

These objectives will be achieved through:

- Leading the further development of Australia's global climate model, ACCESS:
 - Lead and progress development of Australia's world-competitive, national Earth system and climate modelling capability, the Australian Community Climate and Earth System Simulator, (ACCESS) to deliver enhanced experimental capability and improve weather predictions and climate projections for the Australian communities and businesses.
- Advance understanding of Australia's climate systems and processes:
 - Research on changes in ocean circulation, temperature, acidification and carbon uptake

NESP 2 hub research scope overview

- Region-specific information on climate variability, extremes and associated drivers (including the fundamental drivers of rainfall, drought, bushfires and cyclones)
- Understand the state and function of terrestrial carbon sinks as they respond to the pressures of increasing temperature, drought, grazing and fire and emission's abatement measures
- Contribute to the development of the next generation of climate projections:
 - Contribute to the development of the next generation of national climate projections, incorporating observational datasets, reanalyses and model simulations including Climate Model Inter-comparison Project 6 (CMIP6) products.
 - Contribute to research on downscaling and high-resolution modelling for specific applications, such as modelling and predicting extreme events, rainfall and urban climate, in coordination with the States and Territories research programs and through public and private partnerships.
- Progress the development of national climate services capabilities and systems:
 - Take steps towards delivering a climate service capability for Australia that captures data, science products, decision support tools and services to meet public, private and government end-user needs.
 - Develop evidence using social science methods on how to best engage the community in climate and adaptation literacy and how to best capture the climate service needs of different sectors.

Mission Research:

The Climate Systems Hub will ensure the delivery of **Climate adaptation Mission** via a focus on:

- Support integrated research across the program to improve the evidence base for adaptation decision making for climate resilience;
- Marine and coastal ecosystem management for sea-level rise and ocean acidification; and
- Building traditional cultural knowledge into climate understanding and working with indigenous communities to help them adapt to the changing climate

The Climate Systems Hub will also provide the following support for the:

- **Protected place management Mission** (coordination led by the Marine and Coastal Hub)
 - Develop evidence to support decision-making and the development of adaptation measures for Protected places management, including National Parks, National and World Heritage sites and Ramsar listed wetlands
- **Threatened and migratory species and ecological communities Mission** (coordination led by the Resilient Landscapes Hub)
 - Develop evidence to support decision-making and the development of adaptation measures for Threatened species (including migratory species), and threatened ecosystems management
- **Waste impact management Mission** (coordination led by the Sustainable Communities and Waste Hub)
 - Develop evidence to support decision-making and the development of adaptation measures for Air quality, pollution and waste management

All research products will be made publicly available and in a form that can be integrated with relevant open information management systems to build knowledge for future stakeholders unless specifically agreed at the start of a research project.

NESP 2 hub research scope overview

Applicants must be able to demonstrate flexibility and adaptability to respond to emerging priorities. This should include the ability to rapidly scale output via applied research in regional and urban areas if additional resources are made available – this should include mechanisms to bring in external researchers as required.