



Climate change remains an unresolved collective challenge. Actions to address its causes and consequences are needed. These actions can also give rise to major societal benefits and development opportunities. The 2014-2020 period is central to advancing actions on climate change.

Targeted climate change research is needed in Ireland to inform practical response to, and strategic engagement on, climate change.

The Climate Change Research Programme

The Climate Change Research Programme (CCRP) 2007-13 advanced four thematic areas and earth observations. The programme was guided by a coordination committee hosted by the EPA which included representatives from government departments and state agencies that funded or used climate change research. Research Specialists facilitated engagement with the research community. The thematic research areas were:

- Greenhouse Gas (GHG) emissions and sinks.
- Climate change impacts and adaptation.
- Socio-economic solutions and technologies.
- Air pollutants/short life climate forcers.

Its outputs have informed national thinking, contributed to EU analysis and have been presented and used in UN forums including the Intergovernmental Panel on Climate Change (IPCC) and the United Nations Framework Convention on Climate Change (UNFCCC)

Building on achievements

The 2014-2020 programme is framed by the vision of Ireland's transition to a carbon-neutral, low emission and climate-resilient society and economy by 2050, and being a source of climate change information and solutions.

It builds on the success of the previous programme and responds to developments and emerging issues. It is shaped around two concepts; "Towards 2050" and "Laboratory Ireland".

"Towards 2050" encapsulates research that informs the transition to a carbon neutral, low emission climate resilient Ireland by 2050.

"Laboratory Ireland" promotes an experimental approach to analysis of solutions and technologies and promotes Ireland as a key location for innovation. Together these aim to leverage action and support sustainable economic growth.

The goal for the 2014-2020 period is to enable an effective research programme that is practical, solutions-focused and strategic.

Objectives include:

- To provide essential information and analysis to inform actions on climate change.
- To maintain and develop research capacity and expertise
- To inform innovation and sustainable economic growth.
- To support and inform engagement with national and international organisations.



Context

The Climate Action and Low Carbon Development Bill and the National Climate Change Adaptation Framework provide the national policy agenda for the programme. The EU Climate and Energy Package, the Adaptation Strategy and the Commission's "A Roadmap for Moving to a Competitive Low Carbon Economy in 2050" provide the EU context. Engagement with the work of the IPCC and the UNFCCC are seen as essential elements of the use of research.

The UNECE Convention on Long Range Trans-boundary Air Pollution (CLRTAP) and the EU CAFÉ programme provide the context for air pollution research. The recently formed Climate and Clean Air Coalition (CCAC), of which Ireland is a member, provides linkages between responses to climate change and air pollution.

Collaborative research opportunities include the national prioritisation exercise, the Prioritisation Action Group (PAG) and investments by Science Foundation Ireland. At EU level opportunities include Horizon 2020, JPI Climate as well as European Strategy on Research Infrastructures (ESFRI) projects such as the Integrated Carbon Observation System (ICOS), the Group on Earth Observations Global Earth Observation System of Systems (GEO-GEOSS), Copernicus, the European programme for the establishment of a European capacity for Earth Observation, and the World Metrological Association (WMO) on climate services.

Responding to change

Wider stakeholder engagement is needed including with the business community, NGOs, civic society and the public. Greater exploration of practical mitigation and adaptation solutions is also required. Cross-cutting, multi-disciplinary research is central to this approach and where possible should be realised through projects and pilot studies. Engagement will be facilitated through broadening the coordination structure and advancing communication processes including engagement with communities and practitioners.

Theme 1: Carbon Stocks, GHG Emissions, Sinks and Management Options

Vision: A holistic analysis of carbon stocks and GHG emissions and removals in Ireland.

Thematic goal: Advanced analysis of GHG emissions and removals, enabling improved policy development and decision making.

Research objectives include:

- To improve national GHG inventories and projections including more accurate reporting of Irish circumstances.
- To develop independent measurement and verification systems.
- To enable effective mitigation of GHG emissions.
- To improve understanding of the feedback of Climate Change on emissions and removals.
- To provide analysis of alternative metrics and approaches to accounting of emissions.

This area is focused on-going improvement of national GHG inventory and projections. Improved analysis of the Agriculture, Forestry and Other Land Use (AFOLU) sector is central to this.



Flooding photo courtesy of Irish Examiner



Theme 2: Ireland's Future Climate, its Impacts, and Adaptation Options

Vision: Informing transition to a climate resilient Ireland.

Thematic Goal: Provision of research based information in support of risk and vulnerability analysis and adaptation actions in Ireland.

Research objectives include:

- To provide analyses of on-going and projected changes in Ireland climate system.
- To provide analyses of responses of managed and natural systems to climate change.
- To provide information on impacts, risks and vulnerabilities.
- To identify adaptation options and solutions for Ireland.

Improved information and analysis is needed to manage the transition to a climate resilient Ireland. This will inform decision making on adaptation and planning. It will include information from climate services and initiatives being developed at EU levels e.g. European Environment Agency CLIMATE-ADAPT, and the European Centre for Medium-Range Weather Forecasts - Monitoring Atmospheric Composition and Climate (ECMWF MACC) projects.

Theme 3: Climate Solutions, Transition Management and Opportunities

Vision: A carbon neutral Ireland by 2050, which is a source for climate information and solutions.

Thematic Goal: Achievement of 2020 targets and to identify and test solutions for achievement of societal and economic low carbon transformation to 2050.

Research objectives include:

- To advance socioeconomic modelling of cross-sectoral greenhouse gas emissions to 2050.
- To promote cross disciplinary analysis of effective options for behavioural change in businesses and households and, for each sector, to identify and assess current and future mitigation options including technologies.
- To bring together diverse research outputs to form a coherent picture of analysis for Ireland and in so doing, to identify green economy and other opportunities from international trends in policy and economics.

Models helps us assess transformation pathways at sectoral and cross-sectoral levels. Ex-post analysis of mitigation policies informs development of future options. Mobilising expertise through cross-disciplinary analysis, involving stakeholders, capturing and advancing know-how and practice in the traded and non-traded sectors, are crucial to successful mitigation strategies.



Theme 4: Air Science

Vision: Achievement of clean air and co-benefits for climate, health, environment and society.

Goal: To inform pathways for achievement of highest air quality standards in Ireland and advance integrated assessment of air pollution, short life climate forcers, and other wider environmental issues.

Research objectives include:

- To advance analyses of emissions, transport and removal of air pollutants and increase understanding and awareness of the impacts of air pollutants.
- To improve national inventories and projections of emissions over a wide range of pollutants including heavy metals and persistent organic pollutants (POPs).
- To identify and promote emissions abatement options which can enable Ireland to achieve the highest air quality standards.

Topic areas include attribution of air pollutant emissions to economic sectors in order to inform effective actions and improvement of inventory and Projections of emissions under National Emissions Ceilings Directive (NECD) and CLRTAP/Gothenburg.

Smart systems are increasing providing information at a range of temporal and spatial scales across key terrestrial, atmospheric and oceanic domains and at city and local scales. These challenge data processing and management systems. However, they can provide information that is essential to better decision making or in warning or alert systems. This aim is to further develop Ireland as a platform for advanced observation systems which are integrated via systems models into decision support and management systems.

Observation Systems, Big Data and Systems Models

Vision: Ireland as a leader in advanced observations and systems models.

Goal: To use advantages that arise from Ireland's size geography and location to develop it as a platform for advanced observations/systems models.

Research objectives include:

- To used advanced in-situ and space based observation systems to enhance current systems and integrate observational data with domain and systems models.
- To provide information, analysis and forecasts/projections to support decision making.
- To link to EU and global initiatives that are developing observation systems and downstream services.

Conclusion

Climate change and air quality research will respond to on-going challenges and emerging issues.

The aim is to identify, inform and enable actions, and to provide timely and innovative research and analysis that supports policymakers and other stakeholders.

The programme will address issues specific to Ireland, complementing other Irish work, EU Horizon 2020 and work under the JPI. It will build on Ireland's strengths and enable economic and societal opportunities and solutions.