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AMOC Preparedness for Ireland: From North Atlantic Observation to National Resilience

Policy Brief

This policy brief was prepared by the Risk Governance Initiative following a high-level invitation-only Ireland–Iceland expert and policy dialogue held on 4 June 2026 and convened in partnership with the Reykjavík Institute. The dialogue brought together invited experts and practitioners from climate science, ocean observation, public policy, diplomacy, resilience, emergency management and systemic risk.

Executive Summary

The Atlantic Meridional Overturning Circulation (AMOC) is a major ocean circulation system that transports heat northwards through the Atlantic and plays a critical role in maintaining Ireland's relatively mild climate. Scientific evidence indicates that AMOC is likely to continue weakening during this century as a result of climate change. The timing, magnitude and regional consequences remain uncertain, and a long-term shutdown remains a low-likelihood but high-impact possibility in mainstream assessment. This uncertainty is itself a policy problem: Ireland needs preparedness arrangements that can work under uncertainty rather than wait for certainty. Furthermore, the impacts of the long-term shutdown and the limited gradual decline are similar, just of different magnitude. Even the high-likelihood scenario of a limited gradual decline can have severe impacts on Ireland with increased seasonality both for temperature and rainfall. This means the differences between winter and summer rainfall and temperature will become stronger, and extreme events such as storms will become both stronger and more likely.

This brief is intended to complement, not duplicate, existing research in Ireland. The 2025 Ryan Institute Policy Brief on AMOC Research in Ireland identifies urgent research, observation and communication gaps. The Environmental Protection Agency's 2025 National Climate Change Risk Assessment provides a national evidence base for adaptation planning but explicitly does not assess low-likelihood high-impact events such as AMOC collapse. This brief therefore focuses on the governance gap between AMOC science and national preparedness.

A policy dialogue convened by the Risk Governance Initiative Ireland in partnership with the Reykjavik Institute brought together experts and stakeholders from Ireland and Iceland to examine AMOC as a climate, resilience and risk-governance challenge. Iceland is a useful comparator for Ireland because it is a small North Atlantic island state with long experience integrating environmental hazards into national security and emergency-management thinking.

Why AMOC Matters for Ireland

Ireland shares with Iceland a relatively high temperature anomaly given its high latitude and mild climate, and AMOC contributes significantly to this climate system. Scientific presentations during the dialogue highlighted several risks associated if substantial AMOC weakening were to occur:

- Drier summers and increased pressure on water resources.
- Changes in precipitation patterns affecting agriculture and food security.
- Increased storminess and impacts on critical infrastructure.
- Regional sea-level changes affecting coastal communities.
- Wider economic and societal disruptions linked to fisheries, transport, energy systems and supply chains.

While the majority of climate models differ regarding the magnitude and timing of these impacts, there is broad agreement that a gradual weakening of AMOC is likely during the twenty-first century, with a risk of total shutdown during the 22nd century .

Key Messages from the Scientific Community

Participants emphasised several important findings:

1. **AMOC observation capacities are under critical pressure.**
   AMOC monitoring is relatively new with detailed observations only in place for a couple of decades. Therefore, it is vital that current monitoring remains in place to ensure a continuous dataset, though as repeatedly highlighted, budget cuts and political will mean this is far from guaranteed, with the Ocean Observatories Initiative descoping a stark current example.
2. **Limited gradual AMOC weakening is much more likely than long-term shutdown.**
   Current evidence suggests that a gradual decline is the most probable scenario, although low-probability high-impact outcomes cannot be excluded.
3. **Monitoring and modelling must advance together.**
   Improved ocean observation data and enhanced climate modelling are both required to reduce uncertainty and improve early warning capabilities. In particular, the unintuitive lack of effect from exacerbated freshwater inflows in current climate models was mentioned multiple times.
4. **Preparedness should address uncertainty through early-warning system and pre-event planning.**
   Policymakers should not wait for complete scientific certainty before considering resilience measures. Risk management approaches are appropriate where consequences could be severe. Drawing lessons from other disaster preparedness scenarios could help inform Ireland's own response, since the characteristics of risk around AMOC collapse are not in themselves novel, though the combination and scale are.

Lessons from Iceland

Iceland has long experience in managing natural hazards and environmental risks, including volcanic activity, earthquakes, extreme weather, glacial outburst floods and coastal hazards. More recently, Iceland has treated the potential collapse of the AMOC as a national security and existential risk, formally bringing the issue before its National Security Council in 2025. An October 2024 open letter to the Nordic Council of Ministers, signed by 44 climate scientists, helped raise political attention to the possibility that AMOC collapse risks may be underestimated.

The Icelandic Government has:

- Elevated AMOC risk to its National Security Council.
- Established a dedicated task force on climate tipping points.
- Increased cooperation between scientific institutions, government agencies and emergency management authorities.
- Prioritised international cooperation and ocean monitoring.

Importantly, Iceland's approach is not based on predicting imminent collapse. Rather, it reflects the view that responsible governance requires preparation for credible high-impact risks before certainty becomes absolute. It also emphasised that no national system can handle AMOC collapse alone, and that international cooperation is vital.

Policy Recommendations for Ireland

1. Establish a National AMOC Risk Assessment

Ireland should undertake a cross-government assessment of potential AMOC-related risks, including impacts on:

- Water security
- Agriculture and food systems
- Coastal infrastructure
- Energy systems
- Emergency management and civil protection

2. Strengthen Ocean Monitoring Capacity

Ireland should continue its support of national and international observation programmes such as GOOS and explore deeper engagement with emerging initiatives such as OceanEye and related North Atlantic monitoring efforts. EU law requires Member States to monitor the environmental status of their marine waters through the Marine Strategy Framework Directive, but it does not yet provide a dedicated legal mandate for sustained, long-term ocean observation of large-scale climate systems such as AMOC. Ireland should consider supporting stronger EU-level commitments to fund, coordinate and maintain long-term ocean observation capacity.

3. Integrate AMOC Scenarios into Adaptation Planning

Existing climate adaptation frameworks should incorporate AMOC-specific scenarios, including low-likelihood but high-impact outcomes. Ireland could also draw lessons from disaster risk-reduction approaches in countries such as Japan, Indonesia and Nepal, where planning for rare but severe seismic and tsunami risks has shaped preparedness, public education and emergency management.

4. Develop an Irish AMOC Preparedness Framework

Ireland should consider creating a structured national preparedness process, drawing on international examples while adapting approaches to Irish circumstances.

5. Integrate AMOC risk into national security and resilience planning

Ireland should consider how AMOC disruption and other high-impact climate risks can be better integrated into national resilience, emergency management and security planning. This would help ensure that climate-related threats are assessed not only as environmental concerns, but also as cross-government risks with implications for infrastructure, food systems, energy security, coastal communities and civil protection.

Conclusion

AMOC weakening represents a long-term risk for Ireland and a near-term governance challenge. Ireland already has strong AMOC expertise and a developing national climate-risk architecture. The next step is to connect that scientific expertise to preparedness planning, critical-infrastructure resilience and cross-government decision-making.

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Note: This brief reflects themes and policy-relevant insights emerging from the dialogue. It should not be read as a formal consensus statement or as representing the views or endorsement of any individual participant or institution.

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