Joint Oireachtas Committee on Climate Action – 16th Jan 2019

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Opening remarks: I would like to thank the committee for the invitation to Met Éireann to give evidence here. I would also like to mention that it was also a great honor for Met Éireann to present at the Citizen's assembly in 2017.

Role as Ireland's National Meteorological Service: Met Éireann is the Irish National Meteorological Service as recognised by the UN Convention of the World Meteorological Organisation (WMO), which is a specialized agency of the United Nations.

Established in 1936, Met Éireann's mission is to monitor, analyse and predict Ireland's weather and climate and to provide a range of high quality meteorological and related information to the public. This is focussed on supporting public safety and promoting wider societal and economic wellbeing through the delivery of timely, actionable and reliable science-based weather and climate information.

In December 2017 Met Éireann put in place our 10 years strategy[1] to help Irish society to be ready for and responsive to Weather and Climate risks – with the vision of "*Making Ireland Weather and Climate Prepared*".

International nature of weather and climate: Weather and Climate science is intrinsically international in nature. The global network of National Meteorological Services collaborates internationally to share information and to build the expertise and knowledge needed to support and develop the global predictive capability available today for weather and climate systems. Met Éireann, Ireland's National Meteorological Service, represents Ireland and actively contributes to the WMO, EUMETSAT (the European Organization for Meteorological Satellites) and ECMWF (the European Centre for Medium-Range Weather Forecasts - responsible for the implementation of the EU COPERNICUS Climate Change Service).

Met Éireann's public services are based on knowledge-leading, scientific expertise and capacity, developed in cooperation with a wide range of leading international scientific collaborative networks including the EC-EARTH Climate modelling research consortium, the HIRLAM numerical weather prediction consortium and EUMETNET the European Meteorological Services Network.

Met Éireann places a major focus on our international collaborative partnerships as they allow us to successfully build strategic national capacity and capabilities, whilst providing Ireland with the best possible weather and climate services based on world-leading expertise.

Global context of climate change: Climate change is a reality. It is likely that the world is now warmer than any time during the last 125,000 years. The last 4 years were the warmest on record globally with most pronounced warming in the Arctic. Latest indications show that the average

temperature of the last 5 years was 1.1°C above the pre-industrial era[2]. 2018 was more than 0.4°C warmer than the average temperature from 1981-2010. This warming is directly linked to increases in anthropogenic greenhouse gases, which are also higher in concentration now than any time in last 800,000 years. Further warming is inevitable due to forcing from the continuing rapid and record rise in human produced green-house gases[3]. This global warming is now impacting global weather patterns[4]. This includes changes in circulation patterns leading to for example changes in the Asian monsoon[5], changes to the behaviour of the jet stream[6], more heatwaves and droughts worldwide, increased flood events[7] and slower moving and more moisture bearing hurricanes/typhoons[8]. The frequency, severity and probability of extreme weather has also increased globally[9]. Indeed if we look to recent extreme events in Ireland such as the flooding of 2015/16 including storm Desmond, storm Ophelia, storm Emma and the recent summer drought of 2018 all are consistent with, and part of, the trend of more frequent high impact weather events.

Effects of global warming on weather patterns in Ireland: Ireland currently benefits from a temperate, oceanic climate with abundant rainfall, in a predominantly westerly atmospheric circulation, moderated by the north Atlantic drift with little in the way of temperature extremes. It is worth noting that we have always had extreme weather in the past (downpours, flooding, droughts, cold spells and windstorms). However with increased global warming, Ireland is likely to experience a less dependable, less stable climate with more frequent and intense extreme weather events. In general modelled projections show the Irish climate is trending towards a reduction in overall rainfall, particularly in spring and summer and more heavy rainfall events in autumn and winter[(11,12)]. Heatwaves and droughts are becoming more probable and all seasons will be warmer with more hot days and less frosts[11]. The overall number of storms affecting Ireland is likely to decrease. However, the number of extreme damaging storms could increase[11] and this coupled with expected sea level rise is likely to lead to an increased risk of coastal erosion and storm surges[(13,14)].

National Climate Modelling capability: Ireland's response to Climate Change is informed by national predictive capability. Met Éireann's key role in meeting the challenge of climate change has been the development of national climate modelling capability. Table 1 in the Annex, shows the development of this predictive capacity over the last 15 years. This strategic national resource has supported the formulation of climate change adaptation and mitigation strategies in Ireland over that period.

In 2003 our climate modelling effort began with *C4i*, a joint project between Met Éireann and UCD, which successfully produced the first regional climate projection for the country. In 2008 Met Éireann joined the international *EC-EARTH* climate modelling consortium working with leading experts from 12 European countries to develop and run state-of-the-art climate projections which were then accepted and used in the IPCC 5th Assessment Report (AR5). In 2009-2015 Met Éireann with ICHEC developed the most recent regional model of Ireland's projected climate change.

Currently Met Éireann is engaged in the next phase of EC-EARTH global model projections and Regional climate model projections for Ireland, the outputs of which will be available for use by the wider climate change research community. Met Éireann's analysis of the EC- EARTH global model

output will be available during 2020, the findings of which are expected to be used by the IPCC in its 6th Assessment Report (AR6).

Climate Services: How do we unlock this information and use it to promote climate action?

As part of *Making Ireland Weather and Climate Prepared,* Met Éireann is expanding its range of operational, high quality user-orientated *Climate Information and Prediction Services* to support understanding and decision making in relation to managing climate-dependent risks for Ireland.

This enhanced service will build on Met Éireann's existing Climate Services. These include the management of Ireland's National Climate Archive of quality controlled reference climate observations; the dissemination of climate products based on historical, and current climate data; publication of synthesis reports on climate projections for Ireland; the development and dissemination of the award winning *MÉRA* climate re-analysis which provides an enriched, detailed record of how Ireland's weather and climate has changed over time, and also other sector-specific climate products e.g. agro-meteorological products.

The enhanced *Climate Information and Prediction Services* will involve providing climate information to citizens, decision makers and policy makers *via* an interactive, integrated national Climate information hub equipped with interpretative tools to contextualise expected states of Ireland's future climate and to enable understanding of climate risks at a local level. The information provided will be user-driven and support decision making for specific sectors (e.g. agriculture, health, transport and energy) to help further develop the understanding of climate-dependent risks.

Met Éireann is also building capacity in event attribution and is actively involved in the development of a state-of-the-art, pilot event attribution service as part the *EUPHEME* European research project.

To support adaptation, Met Éireann is also developing flood forecasting capability in conjunction with the OPW.

Leveraging the latest developments in meteorological science, Met Éireann is also developing local-scale services, from monthly forecasts and seasonal projections through to climate projections and analysis, based on state-of-the art *ECMWF*, Copernicus and *EC-EARTH* data.

Communications of Climate information to the Citizen: Met Éireann's primary motivation when communicating with the Irish people is to help protect life and property and to promote economic and social wellbeing on the basis of the best available, evidence-based information.

Met Éireann's existing communication channels include our work with RTÉ and other TV and radio broadcasters; our new web-site and app and extensive social media reach; our public outreach via our citizen-science climate observer network; seminars; workshops; conferences and through our partnership with the Irish Meteorological Society; our work with print media; our educational resources; our participation in the BT Young Scientist exhibition; the national ploughing championship; science week; maths week among others. Met Éireann is now building on our extensive experience of communication and engagement with the Irish public to raise awareness and understanding of how the Irish climate is changing. This work will include expanding our

network of citizen scientists through the *WOW* (Weather Observations Website) which is an interactive digital platform which will be launched during 2019. *WOW* will allow for more community involvement in directly contributing to our understanding of our changing climate and weather patterns.

Met Éireann is planning to expand its capacity for media engagement and to increase its contributions to scientific programming, on the topic of weather and climate, primarily with the public broadcaster RTÉ but also a wider engagement with commercial broadcasters. This involves developing climate-specific educational segments for TV, web and social media. In particular these segments could be used when educational opportunities arise, such as in the aftermath of an extreme weather event or when weather or climate related news items occur.

While recognising DCCAE's responsibility for climate action and their overall national coordination role in the communication of climate change information, these communication initiatives by Met Éireann are intended to support the wider national climate action agenda through enhanced public awareness and understanding of the causes and impacts of climate change, founded on evidence based scientific information. This information will support Ireland's national adaptation and mitigation plans by aiding citizens in making informed choices in relation to the realities of climate change impacts.

I again thank the Committee for this opportunity to provide evidence and I am happy to provide any further clarifications as required.

References:

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[14] Falaleeva M., Gray S., O'Mahony C., Desmond M., Gault J., (2008) Coastal Climate Adaptation in Ireland: Assessing current conditions and enhancing the capacity for climate resilience in local coastal management, Environmental Protection Agency, (2008-CCRP 3.6)

Annex:

	Modelling	Details of Development	Collaborators
2003	C4I	First Regional Climate Prediction for Ireland	Met Éireann UCD EPA SEAI SFI/HEA ICHEC
2008	EC-EARTH	Ireland's modelling Contribution to IPCC AR5 State-of-the-art Global Climate Model Capability Collaboration with 12 European Countries	Met Éireann EPA ICHEC
2009	Irish Regional Climate Model	Regional Climate Prediction for Ireland Use of ensembles	Met Éireann EPA UCD ICHEC
2017	MÉRA	Enriched, detailed reference record of how Ireland's weather and climate has changed	Met Éireann
2019	EC-EARTH + Irish Regional Model	Ireland's modelling Contribution to IPCC AR6 State-of-the-art Global Climate Model Capability Local-scale Regional Climate Predictions for Ireland	Met Éireann EPA Marine Institute ICHEC

Table 1: High-level summary of development of national climate modelling predictive capacity over the last 15 years

C4I: Community Climate Change Consortium for Ireland

EC-EARTH: European Climate model research consortium

EPA: Environmental Protection Agency

HEA: Higher Educational Authority

ICHEC: Irish Centre for High-End Computing

MÉRA: Met Éireann Re-Analysis, provides a more detailed record based on enriched climate data for climate scientists to further study and elucidate the changes that are underway in the Irish climate.

SEAI: Sustainable Energy Association of Ireland

SFI: Science Foundation Ireland