

# TRANSLATE

STANDARDISED DATA FOR DECISION MAKING

## INTRODUCTION

The TRANSLATE initiative follows international best practice to provide robust, high resolution and standardised future climate projections for Ireland. These bias-corrected, standardised datasets will help decision makers plan for the future and become more resilient to climate change.

Climate change is a global challenge that will impact everyone. It will result in altered weather patterns, with different parts of the Earth affected in different ways. Ireland can expect changes in rainfall patterns resulting in more flooding and summer droughts, warmer temperatures, higher sea levels and an increased likelihood of severe weather events such as storms with increased intensity. This will have implications across all locations and for all sectors in Ireland. [1]

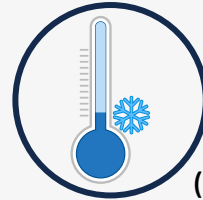
## IRELAND'S CURRENT CLIMATE & WHAT EFFECTS IT



Warmest month:

July

Mean temperature: 15.2 °C  
Average daily max: 19.1 °C  
(Record: 33 °C, 18th July 2022\*)



Coldest month:

January

Mean temperature: 5.3 °C  
Average daily min: 2.3 °C  
(Record: -18.8 °C, 2nd January 1979\*)



Wettest month:

December:

Mean Rainfall: 141.9mm  
(Record: 943.5 mm @ Gernapeka, Cork, 2015\*\*)



Driest month:

May:

Mean Rainfall: 79.4  
(Record: 0.0 mm @ multiple locations\*\*)

\*20th Century record \*\*Since 1941

The dominant influence on Ireland's climate is the Atlantic Ocean. The AMOC - Atlantic Meridional Overturning Circulation, is a large system of ocean currents - including the Gulf Stream - characterised by a northward flow of warm water and a southward flow of cold water. Consequently, Ireland does not suffer from the extremes of temperature experienced by other countries at a similar latitude. Winters tend to be cool and windy, while summers, are mostly mild and less windy. [2]

Recent studies have projected that the AMOC could decline by 30 - 40 % by 2100, resulting in cooler North Atlantic sea surface temperatures (SST)s [3]. Ireland is nevertheless projected to continue to warm, although the influence of the cold influence may lead to reduced warming compared with our continental European neighbours. AMOC weakening is expected to lead to additional sea level rise around Ireland.



ENSO - El Niño-Southern Oscillation, refers to a recurring climate pattern involving SST changes in the central and eastern tropical Pacific Ocean. It oscillates between a warm phase known as "El Niño", (above-average SSTs in the region), and a cold phase known as "La Niña", (below-average SSTs in the region). An in-between transitional neutral phase between the warm and cold phases is also observed. El Niño events cause short-term warming in global average surface temperature while La Niña events cause short-term cooling.

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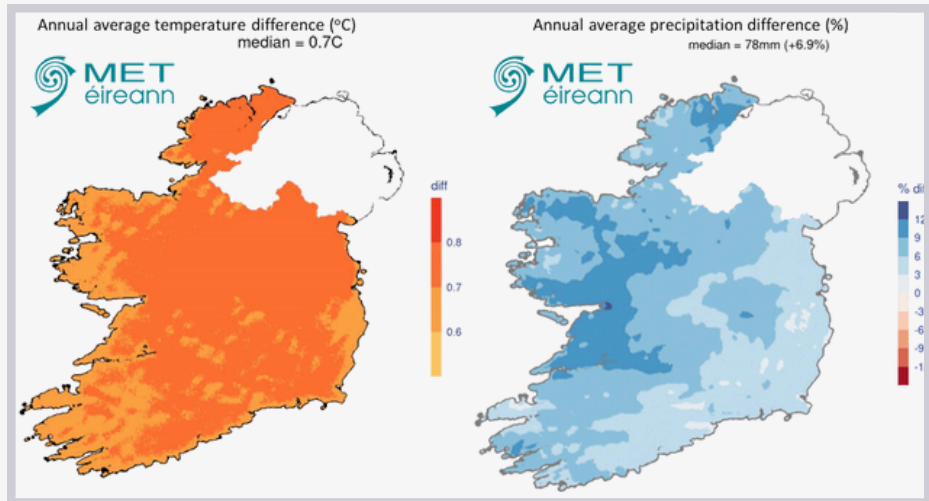
### HOW HAS IRELAND'S CLIMATE CHANGED?

#### OBSERVED CHANGES

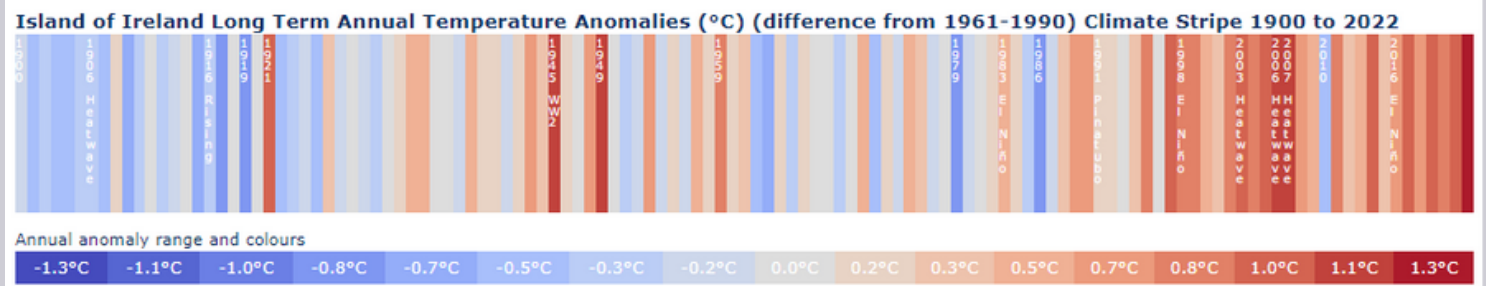
These maps show changes in historical annual average temperature and rainfall difference between the 1961 - 2010 and 1991 - 2020 baseline periods. [4]

We can see that temperatures have increased in all areas across Ireland.

We can also see that all of the country has become wetter, with the biggest increases concentrated in the western part of the Ireland.



Difference in annual average temperature (left) and annual average precipitation (right) between the 1991 - 2020 and 1961 - 1990 time periods



Observed change in annual average temperature (°C) 1900 - 2022 relative to the 1961 - 1990 baseline [5]

Concept: Ed Hawkins

These stripes show how average annual temperature for Ireland has changed compared to the period of 1971 - 2000. It is clear from these stripes that the majority of the warmest years this century have occurred since 2000.

#### IMPACTS

All people, locations and sectors across Ireland are already impacted by climate change and will continue to be impacted. Some of the adverse impacts of climate change may include:



##### HEALTH

Increased risk from heat related illness



##### FLOODING

Increased risk of river & surface water flooding



##### TRANSPORT

Increased risk to infrastructure from heat & flooding



##### DROUGHT

Increased risk to water supplies



##### SEA LEVEL RISE

Increased risk of coastal flooding and erosion



##### ENVIRONMENT

Increased risk to indigenous biodiversity

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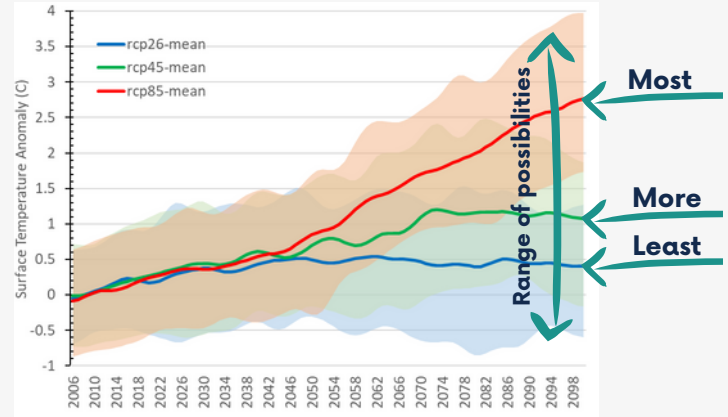
## STANDARDISED DATA FOR DECISION MAKING

### SCIENCE BACKGROUND – An Introduction

This information sheet uses standardised climate projections developed specifically for Ireland [6]. These projections are available at a resolution of 1.5 km.

They are created from a selection of internationally reviewed and accepted models from both CORDEX [6] and CMIP5, [7], that are most sensitive to temperature changes over Ireland. Together they demonstrate a range of possible futures for Ireland based on assumptions of global human activity resulting in "least", "more" or "most" climate change.

Historical climate data is evaluated against the observational record and corrected to remove any model bias. This correction is then applied to all future data. This allows us to present information on how the variables change (difference) as well as actual values (absolute).



### EMISSION SCENARIOS

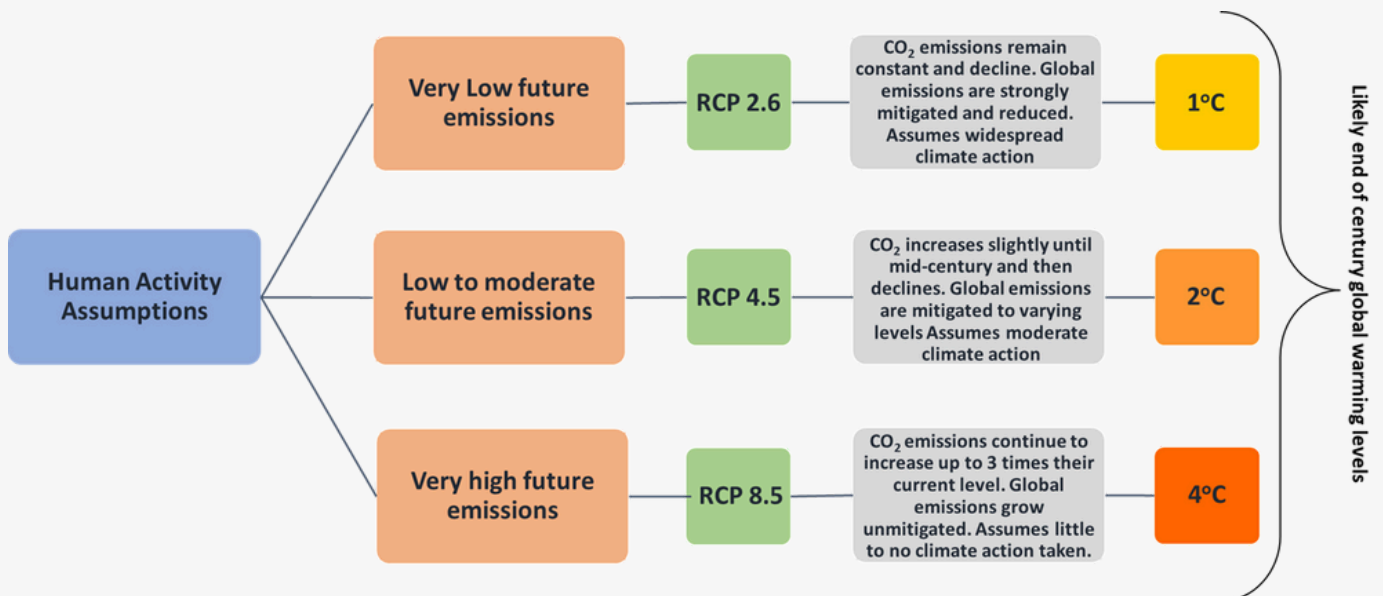
The future climate of Ireland is uncertain. It will be determined by a combination of human activity and greenhouse gas emissions. To capture this uncertainty, we use emission scenarios, such as Representative Concentration Pathways (RCPs).

RCPs are not forecasts, but they do provide a broad range of possible futures based on assumptions of human activity. The more we know about future global human activity, through policy changes for example, the more likely certain scenarios become.

### GLOBAL WARMING LEVELS (GWLs)

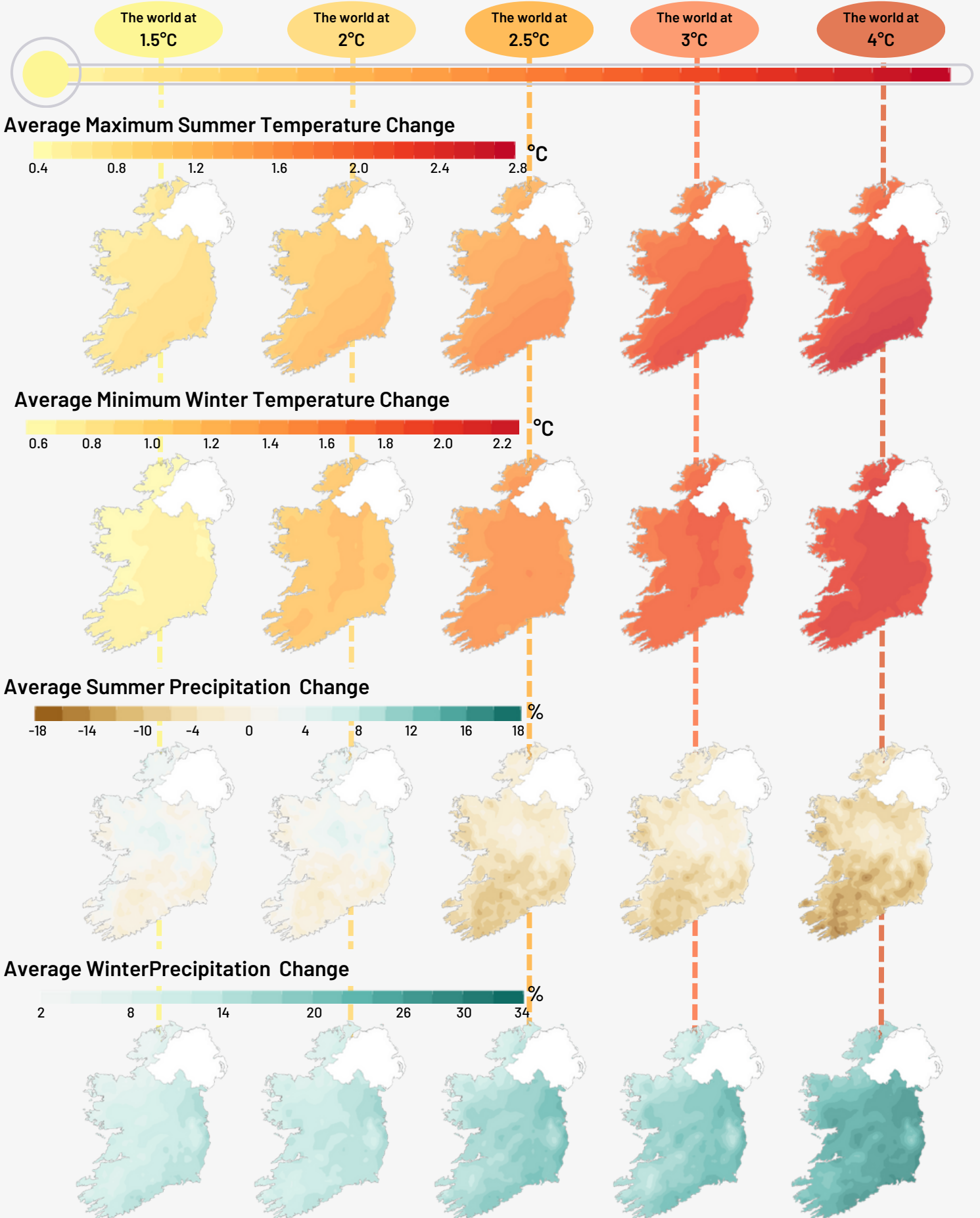
Global warming refers to the change of global surface temperature relative to a baseline. Specific global warming levels, such as 1.5°C, 2°C etc., are defined as when the global average temperature rises 1.5°C or 2°C above pre-industrial levels (1850 -1900). It is uncertain if and when global average temperatures will cross these thresholds. Crossing specific thresholds becomes more likely and predictable as we become more certain of future human activity.

Current estimates from the IPCC AR6 report, [8], place the past decade as 1.1°C above pre-industrial levels, with the next 20 years expected to reach or exceed the 2°C threshold resulting in increasing heat waves, longer warm seasons and shorter cold seasons. Heat extremes could more often reach critical tolerance thresholds for agriculture and health.



## HOW COULD IRELAND'S CLIMATE CHANGE - part 1

With every increment of global warming, changes in mean climate and extremes become more widespread and pronounced. The following figure demonstrates what this means for Ireland relative to 1976 - 2005 baseline.



### HOW COULD IRELAND'S CLIMATE CHANGE - part 2

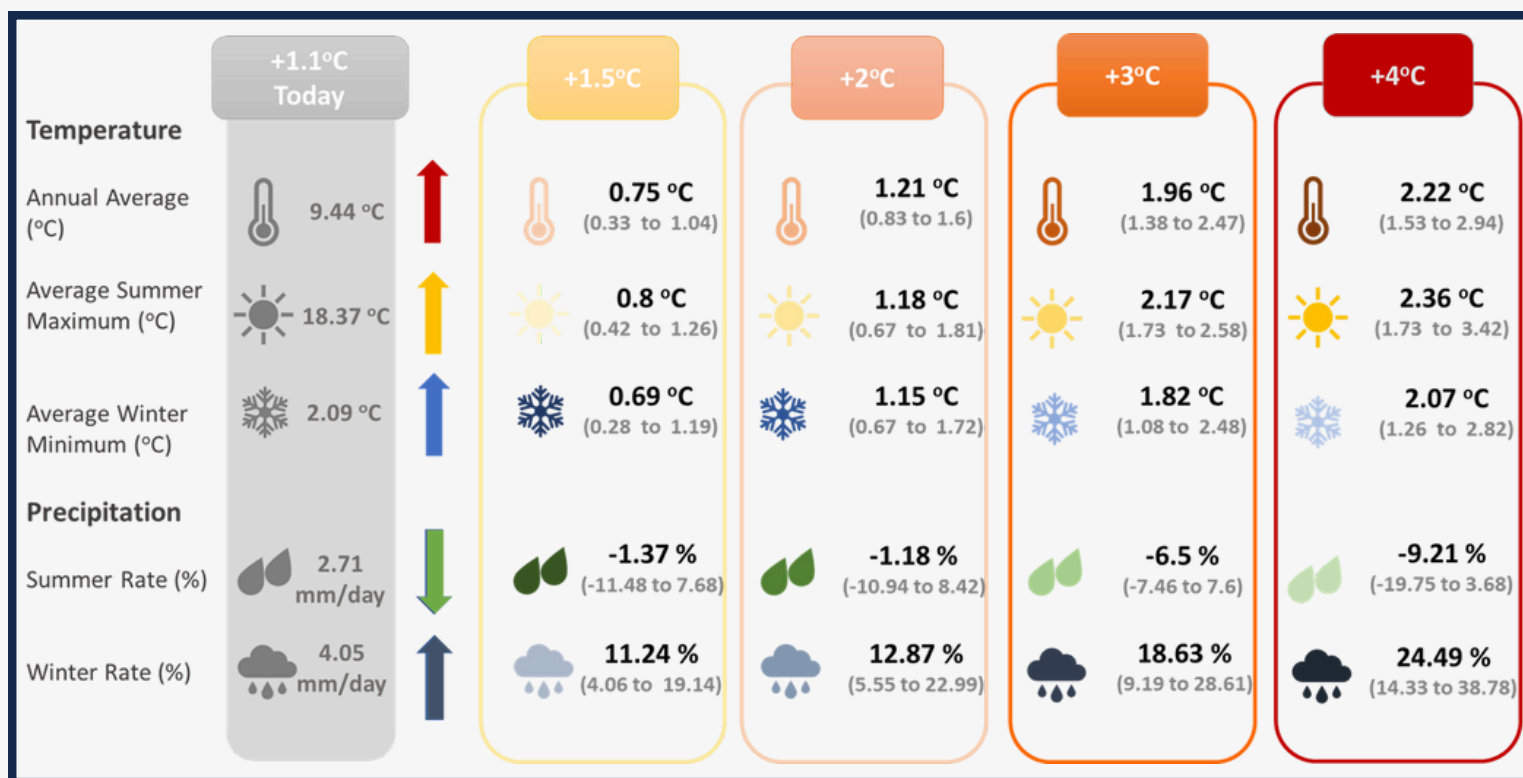
#### Uncertainty

The most recent IPCC report states unequivocally that the world's climate is changing as a result of human induced global warming. Ireland's climate is also changing, albeit at a slightly slower rate than the global average. How much the world's (and Ireland's) climate will change depends on a number of factors such as how intensive global mitigation and adaptation actions will be, how quickly this will happen and how the Earth system responds to these actions.

The climate projections presented here are not forecasts of the future under different global warming thresholds. Instead they offer a range of plausible future scenarios based on assumptions of global climate action and possible earth system responses. The more certain we become about the level of global action and carbon emissions the more certain we become of the expected level of global warming and the resulting impact of climate change.

Many aspects of the climate system react quickly to temperature change. Here we look at how some of Ireland's key climate variables could change as the global average temperature reaches and crosses critical thresholds.

#### Change of climate variables for Ireland for different global warming thresholds



The table above demonstrates how key climate variables for Ireland could change under different global warming thresholds. The world has currently warmed to 1.1°C above pre-industrial levels and so the grey box represent Ireland's current climate. The arrows represent the directions of change - increasing with up arrows and decreasing with down arrows. The average change across all models are the central figures in bold in each column. The range (or spread) across all models is presented in grey in brackets beneath it. The first value - the lower limit in the range is the 10th percentile (90% chance of being greater than this value) while the second value - the upper limit in the range is the 90th percentile (90% chance of being less than this value) of the ensemble.

As the world warms it is clear that Ireland's temperature and rainfall undergo more and more significant changes, for example on average Summer temperature could increase by more than 2°C, Summer rainfall could decrease by 9% while Winter rainfall could increase by 24%.

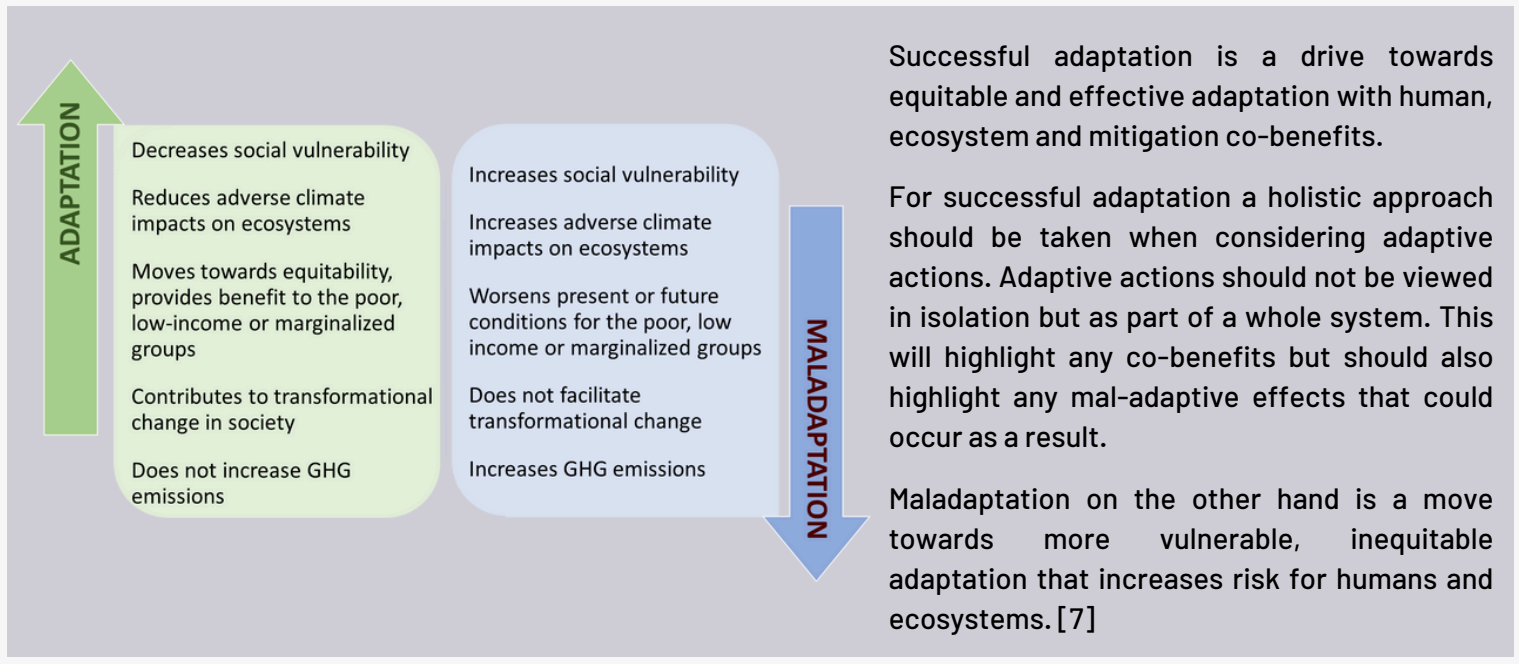
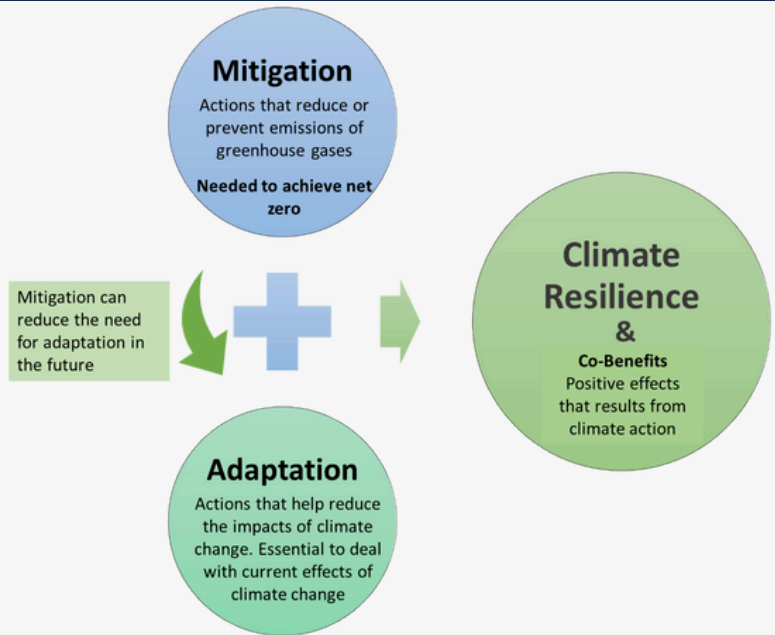
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### ADAPTATION, RISK & VULNERABILITY

It is clear that in the coming decades the climate of Ireland will change, by how much remains uncertain. What is certain is need to build resilience to climate change across all locations, sectors and services to reduce the adverse impact any climate change may have.

Mitigation and adaptation both help to build resilience to and reduce the risk Ireland will face from climate change. Mitigation efforts focus on how to limit the hazard (weather and climate events) while adaptation helps reduce exposure and vulnerability.



**Risk:** The potential for adverse consequences for human or ecological systems. In the context of climate change, risks can arise from potential impacts of climate change as well as human responses to climate change.

**Hazard:** The potential occurrence of weather and climate events which may have adverse effects. The frequency, duration and intensity of which may change due to climate change.

**Exposure:** The presence of people; assets or ecosystems in places relative to the hazard that could be adversely affected.

**Vulnerability:** The likelihood of the exposed people, assets or ecosystems suffering adverse effects from the hazard. Vulnerability is a measure of both adaptive capacity and sensitivity

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### WHAT IS IRELAND DOING?

We are currently experiencing impacts of a global average temperature rise of about 1.1°C.

Without concerted global action to limit emissions, by end of century we may exceed 4°C of warming.

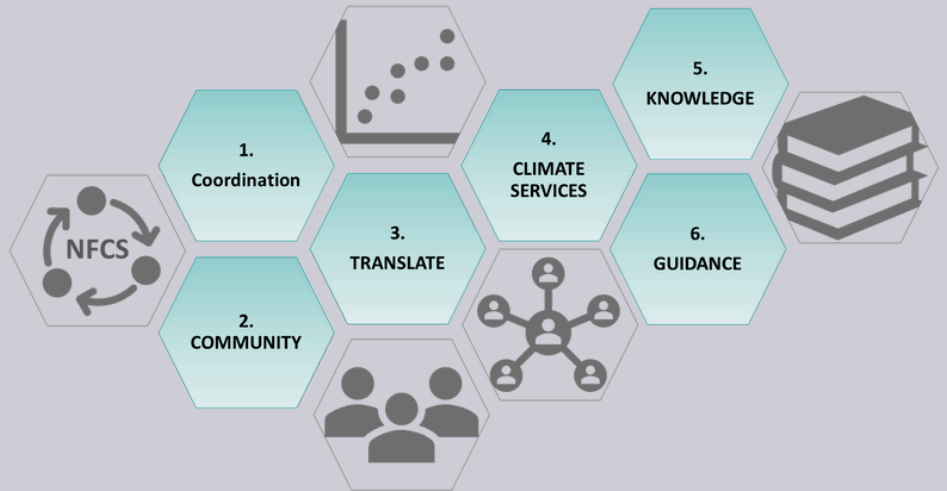
The Paris Agreement says, we must keep global warming below 2°C, aiming for 1.5°C.

European and subsequent Irish policy, national and local frameworks and planning reflect this goal to keep global warming below 2°C.

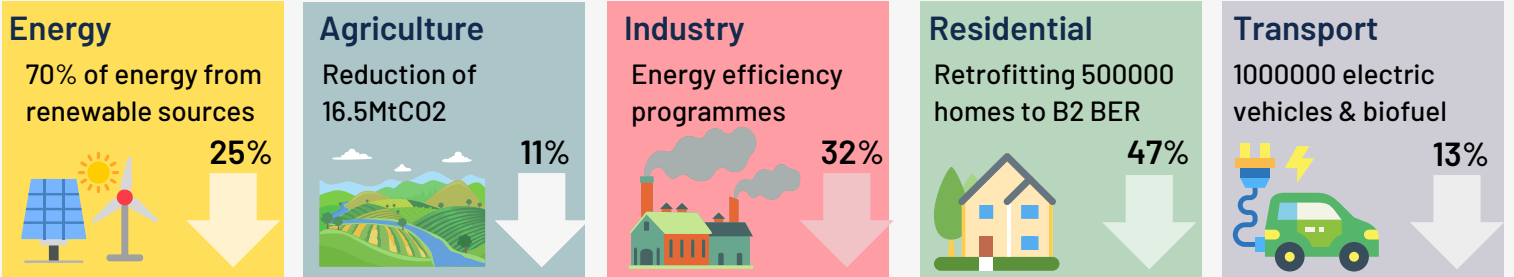


### National Framework for Climate Services (NFCS)

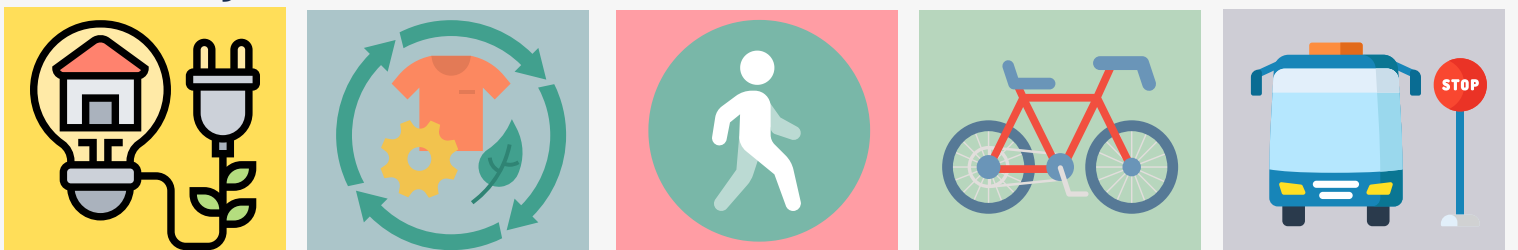
The NFCS will enable a permanent national climate service forum. It will identify sectoral climate information needs, co-develop tailored climate information products and provide these latest climate products to all, providing standardised, Irish specific, climate information to support an all of government response to climate change.



### By 2030



### What can you do?



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## FURTHER INFORMATION

Further Information on the TRANSLATE project can be found here:



## References

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10. Intergovernmental Panel on Climate Change (IPCC) AR6, WG2, chapter 17, figure 17-010

## Acknowledgements

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