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A scenic landscape photograph featuring a large body of water in the foreground, a range of mountains in the middle ground, and a sky filled with large, white, fluffy clouds. The foreground shows some dry grass and a small island or peninsula in the water.

Periodic Review Report 2017



Periodic Review Report 2017

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Climate Change Advisory Council

The Climate Change Advisory Council is an independent advisory body tasked with assessing and advising on how Ireland can achieve the transition to a low carbon, climate resilient and environmentally sustainable economy.

The Climate Change Advisory Council was established on the 18th January 2016 under the Climate Action and Low Carbon Development Act 2015.

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Executive Summary

Introduction

This is the Climate Change Advisory Council's first Periodic Review Report. As required under the legislation establishing the Council, this report assesses progress being made in meeting emissions reduction targets to 2020 and in furthering the achievement of the national transition objective. It also provides advice to government on climate change policy, in particular on the National Mitigation Plan[†] and the National Adaptation Framework.

In relation to mitigation actions the Council considers that:

- ▲ Ireland is unlikely to meet its 2020 targets for reducing greenhouse gas emissions by a substantial margin.
- ▲ This will have implications not only for 2020, but also for compliance with 2030 targets.
- ▲ It is urgent that effective additional policies are implemented to place the economy on an environmentally sustainable pathway to a low-carbon Ireland in 2050.
- ▲ While the draft National Mitigation Plan identified a range of policy options, the introduction of, and commitment to new, cost-effective emission reduction policies and measures is essential.

International Climate Policy

The Paris Agreement represents a major step forward in tackling global climate change. It is in Ireland's interest that the Agreement is fully implemented and that we play our part by introducing new measures to decarbonise the economy. It is also essential that Ireland engages in the implementation of the Paris Agreement and in the development of its rules and processes in order to ensure they are informed by national insights, issues and experiences.

Progress Towards 2020 Targets

Official greenhouse gas emission projections indicate that Ireland will fail to meet its 2020 targets by a substantial margin. Additional policies and measures, even if implemented rapidly, may not be enough to ensure that Ireland's 2020 emissions reduction target is met. However, they are essential for Ireland to meet future targets including to 2030, and to decarbonise the economy by 2050.

While compliance with the 2020 target can be achieved through the purchase of emission units, this is not a cost-effective long-term solution and will not generate any co-benefits. In addition, delaying action will make the required adjustment in the period to 2030 more costly.

[†] This report was finalised before the National Mitigation Plan was published. As a result, the comments here are based on the draft National Mitigation Plan, published in March 2017. However, most of the comments will also apply to the final version of the National Mitigation Plan as published.

Transition to a Low-Emission Economy and Society

The Council reiterates its view that Ireland should aim to have no further negative impacts on the climate system by the middle of this century. The Council considers it urgent that:

- ▲ A target for emissions reduction to 2030 is adopted in the context of a roadmap for achievement of 80% reduction in carbon dioxide emissions by 2050.
- ▲ An approach to neutrality in the agriculture and land use sector by 2050 is defined and advanced.
- ▲ The scope and nature of the 2050 national resilience goal is determined.

The pathway for low-carbon transition to 2050 should include key sectoral goals. These could include decarbonisation of electricity generation, deep retrofit of the existing building stock to near zero emission levels, and the phase out of fossil energy use in transport systems and enhanced public transport provision. While some of these policies will require significant investment, there are likely to be co-benefits from implementation, including benefits for health.

Approaches to achieving neutrality within the agriculture and land use sectors require that greenhouse gas emissions are reduced while removals are greatly enhanced. This requires actions to address emissions of key greenhouse gases from this sector and enhanced land management.

The Council considers that development of a comprehensive land use strategy, with inclusion of all land uses, is essential. Ireland should be at the forefront of international efforts to determine a scientifically and environmentally robust pathway for neutrality in the agriculture and land use sector and for the global balance of emissions and removals.

The National Mitigation Plan

The Council considers that the National Mitigation Plan should reflect the ambition of the National Policy Position and clearly signal the direction of travel for the main sectors, with sectoral goals that are consistent with the achievement of the 2030 targets and low-carbon transition by 2050.

The National Mitigation Plan should provide a transparent and coherent framework for economy-wide actions towards the 2030 and 2050 targets and objectives. In doing so it should identify near-term policies, measures and actions and ensure their coherence with the long-term objectives. The National Mitigation Plan should inform development of related cross-sectoral policies such as the National Planning Framework and the review of the Capital Expenditure Plan.

An effective price signal for carbon emissions is required to guide actions to meet the mitigation component of the national transition objective in the most cost-effective manner. The existing carbon pricing mechanisms have, to date, failed to deliver an adequate price signal to advance the required decarbonisation. The Council has recommended reform of the European Union Emissions Trading Scheme, including the establishment of an adequate price-floor. A clear signal from Government on the further development of the carbon tax is also required. Consistent with this approach, the subsidy for use of peat in electricity generation should be ended, while making provision for communities that may be adversely affected.

The Council welcomes the announcement that the Public Expenditure Code is being revised to

take account of the challenge of climate change. This revision should include an appropriate trajectory for the shadow price of carbon dioxide emissions, as well as a revised approach to discounting future benefits of emissions reduction. It should address co-benefits such as air quality and health.

The distributional effects of climate change policy need to be fully assessed and measures taken need to ensure a fair and equitable transition to a carbon-free economy and society.

National Adaptation Framework

The impacts of global climate change are projected to increase over the coming decades. The National Policy Position identifies the achievement of a climate resilient economy and society by 2050 as a key objective. The National Adaptation Framework, to be published in the coming year, should provide a structure and process to implement this objective, including criteria that can be used to identify what a climate resilient Ireland would look like in 2050. This would provide a framework for the responsible sectors to develop their own resilience goals.

The National Adaptation Framework should include a national assessment of the vulnerability of critical infrastructure. It is imperative that clarity on governance and ownership of implementation is included in the National Adaptation Framework. In addition, adaptation actions should be informed and supported by authoritative information for Ireland.

Conclusions

There needs to be concrete commitment to new measures in the National Mitigation Plan.

The Council recognises that climate change provides a unique challenge for public policy. A co-ordinated response from Government is essential in the future to ensure that all Departments implement appropriate policies to manage the low-carbon transition to 2050. This should be based on the National Mitigation Plan and National Adaptation Framework, together with the underlying sectoral and local plans. An integrated strategy should be developed by Government in 2018.

Importantly, societal and behavioural issues and responses need to be understood and addressed to achieve transition by 2050, while co-benefits such as the effects on health and wellbeing that arise from decarbonisation, need to be fully taken into account. The planned National Dialogue on Climate Change can be a key component in addressing these issues.

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1. Introduction and Overview

The Climate Action and Low Carbon Development Act 2015¹ established the “national transition objective”[†] of a low carbon, climate resilient and environmentally sustainable economy by 2050. It takes account of the objective of the United Nations Framework on Climate Change (UNFCCC), obligations of the State under European Union (EU) law and any related international agreement and Government policy on climate change. The transition process will be based on the National Mitigation Plan and National Adaptation Framework provided by Government in 2017. These will be revised, updated and approved every five years in order to achieve the national transition objective.²

The Act also established the Climate Change Advisory Council. The Council’s role is to provide advice to Government on climate change policy. Specific Council roles include reviewing progress on the achievement of the national transition objective and reviewing progress on meeting targets agreed at international level. The Council is also required to provide recommendations to Government on the national responses to the challenges of climate change and to provide Periodic and Annual Review Reports to Government.

1.1. Statement of the Reason for Conducting the Periodic Review

This report fulfils the Council’s legislative mandate, under Section 13 of the Climate Action and Low Carbon Development Act 2015, to produce a Periodic Review Report within 18 months of its establishment.

In addition, the Council notes the entry into force of the Paris Agreement under the UNFCCC on the 4 November 2016. This constitutes a major development in international law on climate change. Aspects of the Paris Agreement are considered in this report.

Under the legislation the Council was required to submit this Report to Government by 17 July, the day the National Mitigation Plan was published. As a result, the Council could not comment on the published National Mitigation Plan in this Report. Instead, the Council, at the request of the Minister, provided its views and advice on the draft National Mitigation Plan, which was published on 16 March 2017. These are included in this report along with further commentary. In line with its mandate, the Council also provides its consideration of progress in achievement of Ireland’s commitments on climate change to 2020, as agreed under EU law, and on progress in relation to furthering the achievement of the national transition objective.

It is expected that a draft National Adaptation Framework will be published later this year for consultation, with a final version provided to Government by the 10 December. Advice and recommendations on the ongoing development of the National Adaptation Framework are provided. The Council’s responses to the draft sectoral adaptation plans that have been published up to the end of May 2017 are included in Appendix 7 of this report.

[†] The national transition objective is outlined in the Climate Action and Low Carbon Development National Policy Position 2014 and is defined in the Climate Action and Low Carbon Development Act 2015 as “the transition to a low carbon, climate resilient and environmentally sustainable economy by the end of the year 2050”. The national transition objective as defined in the legislation is the definition that is used throughout.

1.2. The First Report

The Council published its First Report on 4 November 2016.³ It outlined the challenges of climate change based on the scientific understanding provided by the Intergovernmental Panel on Climate Change in its Fifth Assessment Report. This Periodic Review Report builds on the material contained in the Council's First Report. In that report the Council recognised the compelling scientific messages on climate change (Appendices 1 and 2). It welcomed the national, European and international policy responses aimed at preventing dangerous climate change in line with the objective of the UNFCCC. The Council expressed its view that by the middle of this century, Ireland should have no further negative influence on the Earth's climate system.

In its First Report the Council identified key issues for Ireland and provided views on options to address these challenges. It acknowledged that the transformation required in Ireland's economy and society to meet this objective represents a different and more difficult task than any other area of public policy. It further noted that the costs of inaction will fall much more heavily on future generations. The current generation in Ireland, and elsewhere, will have to be leaders in transforming the economy and society to halt the rise in global temperature, which is the most well-known measure of climate change. For convenience the key messages and recommendations of the First Report are provided in Appendix 3.

2. Developments in International Climate Policy

This chapter provides an initial perspective on the Paris Agreement,⁴ including the background to its key mitigation goals, related EU policy, and implications for Ireland. The Paris Agreement was adopted by the Parties to the UNFCCC in December 2015. After meeting the ratification criteria, it entered into force on 4 November 2016. The central aim of the Paris Agreement is to strengthen the global response to the threat of climate change. To date 151 of the 197 Parties to the UNFCCC have ratified the Paris Agreement. These include the EU on 5 October 2016 and Ireland on 4 November 2016.

The detailed rules and processes for implementation of the Paris Agreement have yet to be fully agreed. The first meeting of signatories to the Agreement took place at the UNFCCC meeting in Marrakech, Morocco, in November 2016, where it was decided that these rules should be finalised in 2018. Effective implementation of the Paris Agreement is essential for prevention of dangerous global climate change.

2.1. Background

The adoption of the Paris Agreement followed protracted negotiations. These were initiated at the 2010 Cancun meeting of the UNFCCC, which followed the failure of the 2009 Copenhagen meeting to agree a comprehensive global agreement. The Copenhagen meeting did result in the Copenhagen Accord, which included the objective to keep the global temperature increase below 2 degrees Celsius (2°C) and a process to review its adequacy. The Copenhagen meeting also established a goal to mobilise US\$100 billion annually by 2020 to assist developing countries to respond to climate change through adaptation and mitigation actions. These issues were developed in Cancun and became important elements in the wider negotiation of the Paris Agreement. The information provided by the Intergovernmental Panel on Climate Change in its Fifth Assessment Report was also central to the Paris Agreement, particularly for its temperature goal and associated mitigation ambition.

2.2. The Paris Agreement and its Goals

The Paris Agreement builds on the UNFCCC, which has the objective “to stabilise atmospheric concentrations of greenhouse gases at a level that would prevent dangerous interference with the global climate system”.⁴ The Agreement aims to strengthen the ability of countries to deal with the impacts of climate change. The ‘long-term goals’ of the Agreement are captured in Article 2, paragraph 1 as follows:

- ▲ “Holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change.
- ▲ Increasing the ability to adapt to the adverse impacts of climate change and foster climate resilience and low greenhouse gas emissions development, in a manner that does not threaten food production.
- ▲ Making finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development.”

Regarding mitigation of greenhouse gas emissions, the Paris Agreement also specifies that countries collectively aim to “peak global greenhouse gas emissions as soon as possible” and “undertake rapid reductions thereafter in accordance with the best available science, so as to achieve a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century”.⁴

The Paris Agreement also represents the first international agreement to adopt global goals for adaptation and finance flows. The Council considers that the National Policy Position on adaptation (discussed in Chapter 5) is consistent with the global adaptation goal. As yet there is no national policy or objective on the transformation of finance flows.

Progress towards implementation of the Paris Agreement and on achievement of its long-term goals will be subject to regular assessment under the global stocktake process. The first global stocktake will take place in 2023 and every five years afterwards. The modalities for this have not yet been fully agreed, but it will take account of the latest findings from the Intergovernmental Panel on Climate Change in the Sixth Assessment Report to be published in 2022.

2.3. Nationally Determined Contributions

The Paris Agreement requires all signatory countries to put forward their best efforts through “Nationally Determined Contributions” which are nationally legislated commitments. Over 160 such Contributions have been submitted to the UNFCCC. Parties are required to update their Nationally Determined Contributions every five years, in a process which is linked to the global stocktake. Updates are expected to represent a progression of efforts. For developed countries, their contributions must include economy-wide greenhouse gas emissions reduction targets. All countries are required to report regularly on their emissions and implementation efforts. As a Member State of the EU, Ireland’s contribution to the Paris Agreement is captured in the EU’s Nationally Determined Contribution which was based on the EU’s 2050 emissions reduction roadmap.^{5,6}

2.4. The EU 2050 Roadmap

The aim to limit the global temperature increase to 2°C has been a central pillar of EU climate policy since its adoption in 1997 ahead of the negotiation of the Kyoto Protocol to the UNFCCC. This position has subsequently been reaffirmed and elaborated based on findings of the Intergovernmental Panel on Climate Change, and most recently ahead of the negotiation of the Paris Agreement.

The 2°C limit provides the rationale for the EU’s long-term emission reduction ambition as outlined in the 2011 European Commission communication ‘A Roadmap for Moving to a Competitive Low-Carbon Economy in 2050’. It states that “the transition towards a competitive low-carbon economy means that the EU should prepare for reductions in its domestic emissions by 80% by 2050 compared to 1990”.⁶ The 80% goal has been adopted by the EU’s Environment Council and reaffirmed in the EU Nationally Determined Contribution. The 2050 Roadmap sets out potential technologies and measures for achieving emissions reductions across the different sectors and makes estimates of how much can be achieved by the different sectors. How and when various sectors are envisaged to contribute to achievement of the roadmap for the required emissions reductions in the period to 2050 are shown in Figure 2.1.

Under its Nationally Determined Contribution, the EU is committed to reduce its emissions by at least 40% relative to 1990 levels by 2030. This builds on commitments made under the 2020 Climate and Energy Package to reduce greenhouse gas emissions by 20% from 1990 levels by 2020 and it is also consistent with the 2050 Roadmap. The 40% emission reduction target will be met through:

- ▲ A 43% reduction in the Emissions Trading Sector from 2005 levels.
- ▲ An aggregate 30% reduction from 2005 levels in the non-Emissions Trading Sector from all Member States.

The 2016 Effort Sharing Regulation (ESR) proposal set out proposed Member State Effort Sharing Regulation targets for 2030.⁷ It also identified a number of flexibility options to meet these targets, including the contributions from removals by land based sinks. The proposed headline target for Ireland is a 30% reduction in emissions relative to 2005 levels by 2030, with some limited access to “flexibilities” towards meeting these targets. These flexibilities include use of certain removals, for example, forest sinks and Emission Trading Scheme credits. However, Member State targets and flexibilities remain the subject of negotiation and have not yet been finalised.

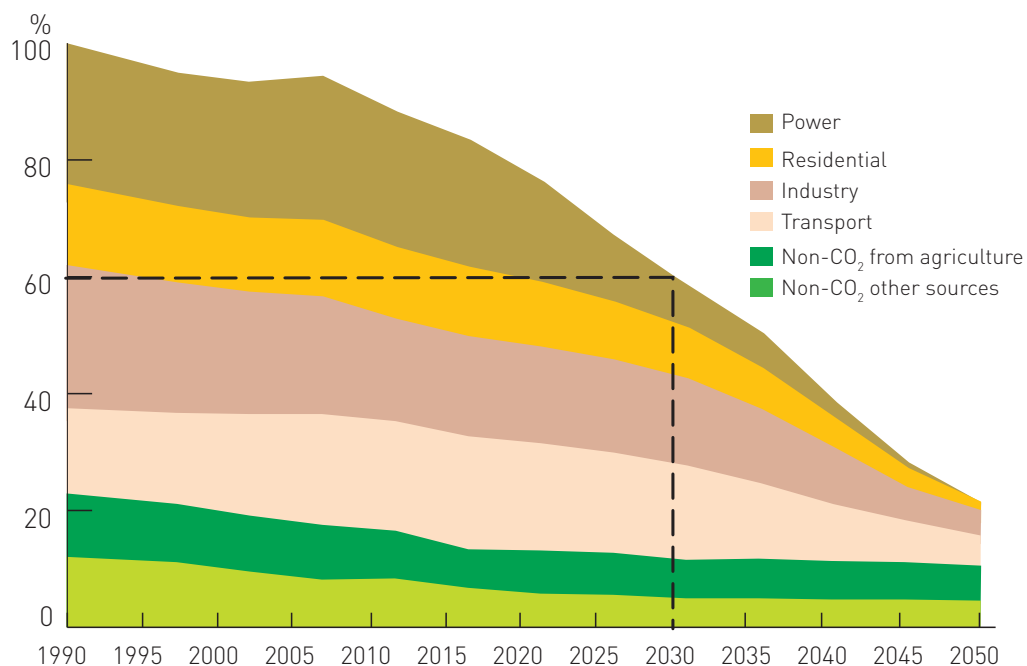


Figure 2.1: EU greenhouse gas emissions reductions necessary across all sectors to transition towards an 80% reduction relative to 1990 levels. **Data source:** European Commission – EU 2050 Roadmap 2011.⁶

Clean Energy for All Europeans

A significant development to help achieve the EU 2050 Roadmap was the publication of the “Clean Energy for All Europeans” package in 2016.⁸ This package of measures aims to provide leadership on the clean energy transition. The proposals from the Commission have three main goals: putting energy efficiency first, achieving global leadership in renewable energies and providing a fair deal for consumers.

In this regard, the legislative proposals cover energy efficiency, renewable energy, the design of the electricity market, security of electricity supply and governance rules for the Energy Union.

In addition, the Commission proposes a new way forward for eco-design as well as a strategy for connected and automated mobility. These proposals, once finalised, will underpin and support Ireland's, and other Member States', transition to a cleaner energy system across heat, electricity and transport.

2.5. Potential Implications

Prevention of dangerous climate change, through implementation of the Paris Agreement, is in the interest of Ireland, the EU and of the whole world. As noted in the Council's First Report, the impacts and costs of inaction will fall much more heavily on future generations. It is the current generation of leaders who are responsible for transforming the economy and society to ensure that the rise in global temperature is kept within the limits identified in the Paris Agreement. Stabilisation of the global temperature will occur before stabilisation of sea-level rise. As an island nation with considerable coastal assets and vulnerabilities, it is important that Ireland adapts its economy and wider society to the impacts of sea-level rise and the other effects of climate change which are already inevitable.

The Paris Agreement has initiated a shift in climate policy, from a backward-looking focus on emissions reductions relative to a historic baseline in 1990 to a forward-looking objective of balancing emissions and removals in the second half of this century. It provides challenges for current reporting and accounting systems, including those established under the Kyoto Protocol. This reframing of the challenge also offers opportunities for more effective global actions by encompassing the diversity of circumstances that exist across developed and developing countries. It is essential that the systems and processes that are agreed to progress implementation of the Paris Agreement reflect and enable this potential.

The EU will itself have to assess the implications of the Paris Agreement. The reduction targets contained in the EU's Nationally Determined Contribution will be subject to scrutiny in 2018 when the Intergovernmental Panel on Climate Change publishes its Special Report on warming of 1.5°C. Consideration of this report will be initiated by the UNFCCC in 2018. A more comprehensive EU policy and approach to both greenhouse gas emissions and removals by sinks is essential for achievement of the Paris Agreement. This would be expected to chart how an EU "balance" of emissions by sources and removals by sinks can occur.

2.6. Ireland's Engagement with EU and International Policy

The Council recognises that the Paris Agreement provides a unique opportunity for effective global actions to prevent dangerous climate change which is in our collective interests. Achievement of its goals requires effective implementation to enable the required global transition. The development of rules, structures and processes for advancing the Paris Agreement will be critical for its implementation. The Council considers it essential that Ireland strongly engages with the EU and UNFCCC in implementation of the Paris Agreement, including in the development of its rules and processes in order to ensure that these are informed by national insights, analysis and experiences including those gained through working with our global partners in developing countries.

3. Progress on 2020 Emissions Reduction Targets

In this chapter Ireland's progress towards meeting its 2020 targets under the EU Effort Sharing Decision is considered. A brief context for the 2020 emission reduction targets, which were agreed as part of the EU Climate and Energy Package, is provided. The Council's consideration is based on Ireland's greenhouse gas emissions data for the period from 2013 to 2015 as provided in the National Inventory Report 2017 and on official emissions projections published in the same year. The analysis is presented in the context of Ireland's annual targets for the period 2013 to 2020, and the cumulative emissions budget for this period.

3.1. EU Climate and Energy Package

In the run-up to the UNFCCC meeting in Copenhagen in 2009, the EU agreed to reduce its greenhouse gas emissions by 20% by 2020. As part of this process, in 2008 Ireland agreed to the EU Climate and Energy Package,⁹ which was adopted in 2009 through four directives:

- ▲ Emissions Trading Scheme Directive¹⁰ which considered a single EU wide cap for the third Emissions Trading Scheme allocation period 2013 to 2020.
- ▲ Effort Sharing Decision¹¹ which set national reduction targets for sectors not covered by the EU Emissions Trading Scheme.
- ▲ Renewable Energy Directive¹² which set national targets[†] in electricity, heating and cooling and transport.
- ▲ Carbon Capture and Storage Directive¹³ which promotes the role of carbon capture and storage in reaching the EU's long-term emissions reduction goal.

The Emissions Trading Scheme Directive established a single EU cap which limits emissions from participating installations.[‡] The cap is reduced by 1.7% annually in the period from 2013 to 2020. From 2021 onwards, the rate of reduction will be increased to 2.2% (an outline of the EU Emissions Trading Scheme is included in Appendix 4). Participating installations in Ireland include large installations such as power generation, cement, lime and aluminium production and large companies in the food, drink and pharmaceutical sectors. Approximately 100 industrial and institutional sites in Ireland are included in the Emissions Trading Scheme, which accounted for 28% (16.8 million tonnes of carbon dioxide equivalent) of greenhouse gas emissions in Ireland in 2015. The Emissions Trading Scheme accounted for 41% of greenhouse gas emissions in the EU in 2015.

Under the Effort Sharing Decision Ireland agreed to a national target to reduce greenhouse gas emissions by 20% by 2020, relative to 2005 levels, for the sectors covered by this decision. This includes annual targets and a cumulative target for this period. It effectively established an emissions budget of 338 million tonnes of carbon dioxide equivalent for the period 2013 to 2020. The Effort Sharing Decision addresses emissions from a range of sectors. These include agriculture, transport, the built environment, waste and non-energy intensive industry.

† The Renewable Energy Directive requires that Ireland's final energy consumption comprises of 16% renewable energy by 2020. This is made up of 40% of electricity supply, 12% of heating and 10% of transport.

‡ The Emissions Trading Scheme also includes participation of European Economic Area countries, that is, the EU plus Norway Liechtenstein and Iceland

3.2. Greenhouse Gas Emissions Inventory

Official greenhouse gas emissions inventory data for Ireland are provided annually by the Environmental Protection Agency (EPA).¹⁴ These are reported to the EU, where they are used to determine compliance with the Effort Sharing Decision targets, and the UNFCCC where they are used to determine compliance under the second commitment period of the Kyoto Protocol. The inventory is subject to in-depth international review by the EU and UNFCCC. The current inventory, which provides annual emissions data for the period from 1990 to 2015, was reported to the EU on 15 March 2017 and the UNFCCC on 12 April 2017.

In 2015, Ireland's total greenhouse gas emissions increased by 3.7% (2.1 million tonnes of carbon dioxide equivalent) relative to 2014 levels. This comprises annual increases of 5.5% (0.88 million tonnes of carbon dioxide equivalent) under the Emissions Trading Scheme and 3.0% (1.2 million tonnes of carbon dioxide equivalent) under the Effort Sharing Decision. Emissions in 2015 had increased by 4% (2.3 million tonnes of carbon dioxide equivalent) relative to 2011 levels, which was the year of the lowest emissions since the emissions peak in 2001. These increases have been linked to Ireland's return to economic growth. Breaking the link between greenhouse gas emissions and economic growth is essential if current and future targets are to be achieved.

The inventory data show that Ireland is compliant with its annual emissions targets in the period from 2013 to 2015. In that period emissions covered under the Effort Sharing Decision were below the annual targets by a total of 10.1 million tonnes of carbon dioxide equivalent (see Figure 3.1). These accrued emissions reductions may be used towards compliance with annual targets and the cumulative target to 2020.

3.3. Greenhouse Gas Emissions Projections

Official greenhouse gas emissions projections are provided annually by the EPA.¹⁵ They are reported to the EU every two years under the Monitoring Mechanism Regulation¹⁶ and to the UNFCCC every four years. The projections are produced in line with reporting obligations under the Monitoring Mechanism Regulation. The Monitoring Mechanism Regulation requires the projections of two scenarios referred to as "with existing measures" and "with additional measures". Similar to the inventory data they are subject to in-depth international review. The projections inform understanding of expected progress towards meeting future annual targets and the cumulative target.

The projections for the two scenarios indicate that Ireland's greenhouse gas emissions will exceed the annual targets from 2016 onwards (see Figure 3.1 and Table 3.1). Over the period from 2013 to 2020 greenhouse gas emissions are projected to exceed annual limits by a cumulative total of between 11.7 and 13.8 million tonnes of carbon dioxide equivalent (see Table 3.1).

All projections are subject to uncertainties. The projections cannot fully predict, for example, the level of growth in the Irish economy or global energy prices. As a consequence actual greenhouse gas emissions will differ from the projections. Such considerations should be factored into measures that are included in the National Mitigation Plan.

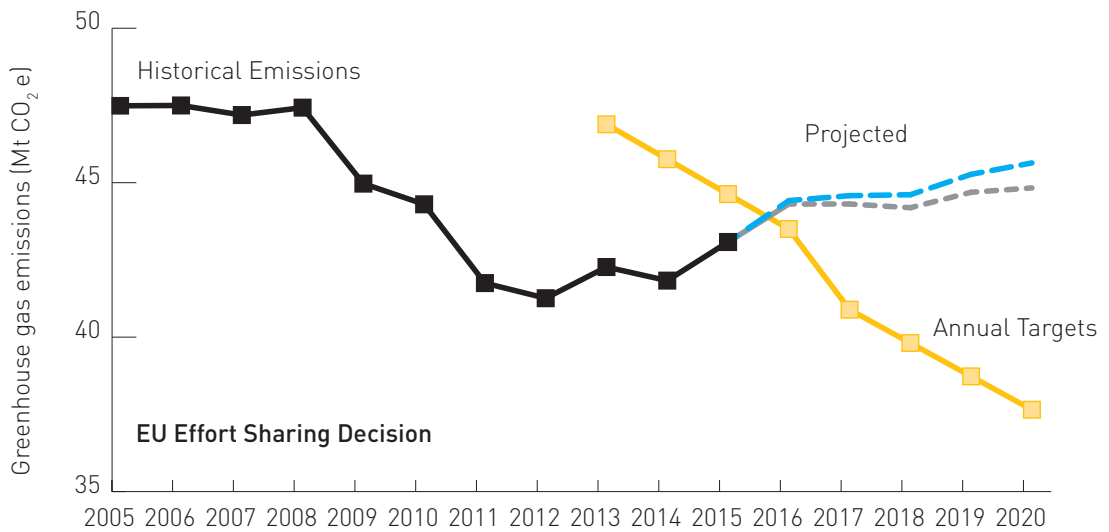


Figure 3.1: Ireland’s greenhouse gas emissions as included under the Effort Sharing Decision (black line) from 2005 to 2015. Annual targets (yellow line) for the period 2013 to 2020 and emissions projections for “with existing measures” (dashed blue line) and “with additional measures” (dashed grey line) are presented here. **Data source:** EPA National Emissions Inventory 2017⁴ and Ireland’s Greenhouse Gas Emissions Projections 2016-2035.¹⁵

Table 3.1: Actual (black italics) and projected (blue and grey text) greenhouse gas emissions, covered under the EU Effort Sharing Decision targets, relative to annual totals and total cumulative emissions targets. Discrepancies may arise because of rounding. **Data source:** EPA National Emissions Inventory 2017⁴ and Ireland’s Greenhouse Gas Emissions Projections 2016-2035.¹⁵

Year	Targets Mt CO ₂ e	Emissions Mt CO ₂ e		Distance to target Mt CO ₂ e	
		With Existing Measures	With Additional Measures	With Existing Measures	With Additional Measures
2013	46.9	42.3	42.3	4.6	4.6
2014	45.8	41.8	41.8	3.9	3.9
2015	44.6	43.1	43.1	1.6	1.6
Cumulative to date	137.3	127.2	127.2	10.1	10.1
2016	43.5	44.4	44.3	-0.9	-0.8
2017	40.9	44.6	44.3	-3.7	-3.4
2018	39.8	44.6	44.2	-4.8	-4.4
2019	38.7	45.3	44.7	-6.6	-6.0
2020	37.7	45.6	44.8	-7.9	-7.1
Remaining	200.6	224.5	222.3	—	—
Total	337.9	351.7	349.5	-13.8	-11.7

3.4. EU Emissions Inventory and Projections

Collectively the EU has surpassed its annual emission reduction targets. The 2015 greenhouse gas emissions were reduced by 22% relative to 1990 levels.¹⁷ In 2015 emissions from the Emissions Trading Scheme were reduced by 24% and Effort Sharing Decision emissions were reduced by 12%, both relative to 2005 levels. Contributory factors include an uptake of renewable energy that has surpassed projections. The Commission analysis suggests that five Member States, including Ireland, are projected to miss their 2020 emission reduction targets.¹⁶ The EU is projected to meet and surpass its targets to 2020.

As part of its contribution to the Paris Agreement, by 2030 the EU will reduce its emissions by at least 40% relative to 1990 levels. This increase in ambition will be delivered by a reformed Emission Trading Scheme and through the establishment of binding Member State emissions reduction targets under the Effort Sharing Regulation.⁷ While the package is still subject to negotiation, it will include removals associated with land use and forestry.

The Council considers it urgent that additional and enhanced policies and measures are identified in the National Mitigation Plan. This will help to address the gap in emissions reductions required to meet the 2020 targets and ensure that the anticipated 2030 EU targets will be achieved as part of the low-carbon transition to 2050.

3.5. Advice and Recommendations

Ireland has, so far, met its annual emission targets and has accrued approximate savings of 10.1 million tonnes of carbon dioxide equivalent. These can be used for compliance in the period to 2020. However, Ireland's emissions are increasing and projections indicate that Ireland will fail to meet its 2020 targets through domestic actions. If rapid economic growth continues, in the absence of further policies and measures, the overshoot on emissions could be even larger than currently projected.

Compliance with the Effort Sharing Decision can be achieved through purchase of emission units to close the gap. Eligible emission units for compliance include Annual Emission Allocations (AEAs) purchased from other Member States or international credits representing investments in projects that have reduced emissions in developing countries or other developed countries. There are specific limits on the use of international credits for compliance with the Effort Sharing Decision. It is recognised that greenhouse gas emission reductions anywhere in the world contribute to avoiding dangerous climate change. However, international credits do not contribute towards the achievement of Ireland's national transition objective.

In 2014 the potential cost of purchasing compliance was projected, at the time, to be €90 million, which would be incurred over the period from 2021 to 2022.⁺¹⁸ Such Government expenditure to purchase compliance would represent the use of public funds with no local co-benefits or national investment in a low-carbon transition. Purchase of compliance does not avoid the costs of emission reduction but rather delays the cost to the post 2020 period when further emissions reductions are required. It also leaves an even bigger challenge to achieve our emissions reduction objective for 2030. Therefore, purchase for compliance is only cost-effective where the current marginal abatement cost is greater than the sum of the current price of carbon (unit compliance cost), the future marginal abatement cost and the potential value of co-benefits of action in the current period.‡

† Estimate was based on 2014 'with existing measures' projection which showed a 17.3 million tonnes of carbon dioxide equivalent cumulative gap to target, thus implying a carbon price of €5.20.

‡ In other words, where there are no abatement or mitigation options costing less than the price of carbon (P_c) plus the marginal abatement costs in the future period ($MAC_{i,t}$) plus the value of co-benefits or $\leq P_c + MAC_{i,t} + \text{co-benefits}$

Decisions taken on investments in infrastructure and assets will have an impact on emissions in Ireland for decades to come. A clear signal in the form of government policy on the planned move towards low-carbon transition allows investors to schedule transformation of their asset and infrastructure portfolio in a planned manner. Delays in providing an adequate policy signal may result in further investment in carbon-intensive infrastructure. Failure to undertake early action would require faster, deeper and likely more costly transformation after 2020.¹⁹ If action is delayed too long, the required concentrated investment may pose affordability issues for the government budget in fiscally constrained circumstances with an ageing population.

Strategic investments to reduce greenhouse gas emissions can achieve significant co-benefits in improved air quality, reduced congestion, green economy development, increased energy efficiency and health. Such investment reduces the emissions gap and enhances the affordability of longer term decarbonisation as envisaged in the low-carbon transition.

In its First Report the Council identified a range of policies and measures that would contribute to meeting 2020 and longer term targets. These are summarised in Box 3.1. Such policies and measures are required to reduce any gap to our 2020 target.

Given the inevitable uncertainty in projecting future emissions, the Council recommends that, as a basis for developing future policy, a range of emissions scenarios that reflect uncertainty across a number of dimensions be developed. Scenarios could explore the sensitivity of emissions outcomes to different factors, including behavioural response, different economic growth rates, technology uptake and fuel price variations. This would provide a wider evidence base for development of climate change policy.

Box 3.1: *Strategic issues identified in the First Report*

Renewable Energy

Policies to enable renewable energy deployment are essential. Wind energy deployment has progressed at considerable pace, with 2,400 megawatts installed by 2015; there is a requirement for a further 1,600 megawatts to be installed before 2020. This requires an increased pace of installation. Policies enabling increased community engagement and more efficient and effective planning and regulation may aid timely deployment.

Home Heating and Retrofits

The Sustainable Energy Authority Ireland has estimated that in order to achieve 2020 Energy Efficiency targets, around 75,000 homes per year will need energy efficiency upgrades between now and 2020. Factoring health and quality of life benefits into analysis of the cost of retrofitting of homes makes such investments more attractive.

Transport and Taxation

Progress in tackling transport emissions has been very limited. While an appropriate price signal is essential, many other supporting measures will be needed to address the factors that influence transport choices. The Council recommends that health and wider societal costs, such as congestion costs, should be factored into decision making on transport.

Lessons learned from the restructuring of motor and vehicle registration tax systems in the past point to how changes in the tax system can produce significant changes in behaviour, while also being revenue neutral.

Agriculture, Forestry and Land Use

The agriculture sector in combination with forestry and other land use categories will need to outline a pathway to achieve its contribution to the 2050 national mitigation objective. This should include actions to significantly reduce emissions and to enhance carbon uptake in soils and biomass through sustainable forestry and improved land management. Sustainable afforestation can make an important contribution to climate actions and have wider ecological, economic and societal benefits. These actions will need to be implemented in a measurable, reportable and verifiable manner. The Council recognises that more research and development is needed; however, land management practices will require change. A timeline for expected delivery of solutions from such investment should be provided in the National Mitigation Plan. Research has shown that a switch to lower emission fertilisers would be effective in reducing greenhouse gas emissions.

Pricing Carbon Emissions

The Council emphasises the importance of an effective price signal for carbon emissions. The Council is concerned that the EU Emissions Trading Scheme has, to date, failed to deliver the price signal that is essential to advance decarbonisation of the electricity sector in Ireland and across Europe. The recent increase in the carbon intensity of electricity generation in Ireland reflects the defective nature of the current EU Emissions Trading Scheme. In June 2016, the Council advised the government on the need to advance reforms of the EU Emissions Trading Scheme, including the establishment of an adequate price floor.

The introduction of a national carbon tax was a major step forward in putting a price on carbon for the rest of the domestic economy. This price must evolve to reflect the cost of achieving decarbonisation. The Council expects that the National Mitigation Plan will address the effectiveness of the current national carbon price and its future development.

Non-price Interventions

Price signals alone are not enough to incentivise sufficient decarbonisation. Individuals and companies respond in different ways to different policy instruments. As a result, a range of additional policies and measures are required to address behavioural barriers and promote the necessary behavioural change. These may include regulations, standards, education initiatives and targeted information campaigns.

Addressing Fossil Fuel Subsidies

There are many supports which either directly or indirectly subsidise the continued use of fossil fuels. The National Mitigation Plan should identify these subsidies and plan for their removal. In particular, the Council recommends that price supports for electricity generation from peat be removed as soon as possible, while also providing support for communities that may be adversely affected.

4. The National Transition Objective: Mitigation

This chapter provides an assessment of Ireland's progress in furthering the achievement of the mitigation component of the national transition objective: the low-carbon transition to 2050. Sectors identified in the National Policy Position are examined in light of progress made relative to 1990. Challenges associated with each sector's transition to a low-carbon pathway to 2050 are outlined. As signalled in the First Report, issues related to carbon neutrality in the agriculture and land-use sector are also considered. Specific advice on mitigation policy is provided in Chapter 5.

4.1. Background

The agreed national transition objective for mitigation of climate change in Ireland is that the country should "transition to a low carbon, climate resilient and environmentally sustainable economy by 2050" taking into account the objectives of the UNFCCC and existing obligations under EU law (see Chapter 3). The National Policy Position established the low-carbon transition to 2050, based on two components:

- ▲ An aggregate reduction in carbon dioxide emissions of at least 80%, compared to 1990 levels, by 2050 across the electricity generation, built environment and transport sectors.
- ▲ An approach to carbon neutrality in the agriculture and land-use sector, including forestry, which does not compromise capacity for sustainable food production.

The Council welcomes the distinction made between emissions of carbon dioxide from fossil fuel sources and the adoption of a comprehensive approach to land and agriculture activities. The Council considers that the level of ambition expressed is broadly in line with European and international objectives. The Council also recognises that further policy measures are essential and that these must be developed in the first and subsequent National Mitigation Plans.

4.2. Carbon Dioxide Emissions to 2050

Emissions of carbon dioxide peaked in 2005 at 48.0 million tonnes of carbon dioxide. Ireland's carbon dioxide emissions amounted to 38.4 million tonnes in 2015. This was 17% higher (5.6 million tonnes of carbon dioxide) than emissions in 1990. There have been significant changes in Ireland over the period from 1990 to 2015. Population has increased from 3.5 million to 4.6 million people, a 32% increase. In the same time period Ireland's gross national product (GNP) per capita in real terms increased from €17,761 in 1990 to €41,849 in 2015.^{†20}

Both population growth and economic growth are recognised as key drivers of greenhouse gas emissions.²¹ Per capita emissions of carbon dioxide peaked at 12.4 tonnes in 2001. Per capita emissions in 2015 were 8.2 tonnes a decrease of 12% from 9.3 tonnes in 1990.[‡] These data show that Ireland has made some progress in decoupling emissions from economic growth. However, these reductions were strongly influenced by the economic recession. Future reductions, of over 2% a year, similar to the rate experienced during the recession, will be required to achieve the low-carbon transition to 2050.²² Reductions on this scale will need to come from policy for sustainable economic development in combination with effective national climate policy.

A linear pathway for carbon dioxide emissions to 2050 is shown in Figure 4.1. This illustrates that

† In 2013 prices

‡ The EU average per capita carbon dioxide emissions was 6.9 tonnes 2015, with values ranging between 3.7 and 16.5 tonnes, in Latvia and Luxemburg respectively.

achieving the level of emissions reduction in the period up to 2050 would require average annual carbon dioxide emission reduction of 2.4%, relative to 2015 levels. Delay in reducing emissions would result in greater annual reductions being required in future years in order to achieve the low-carbon transition. The most recent projections¹⁵ indicate that carbon dioxide emissions will increase between now and 2035 (see Figure 4.1). If this trajectory is followed then achievement of the low-carbon transition would become increasingly difficult and the costs would likely increase over time as outlined in Chapter 3.

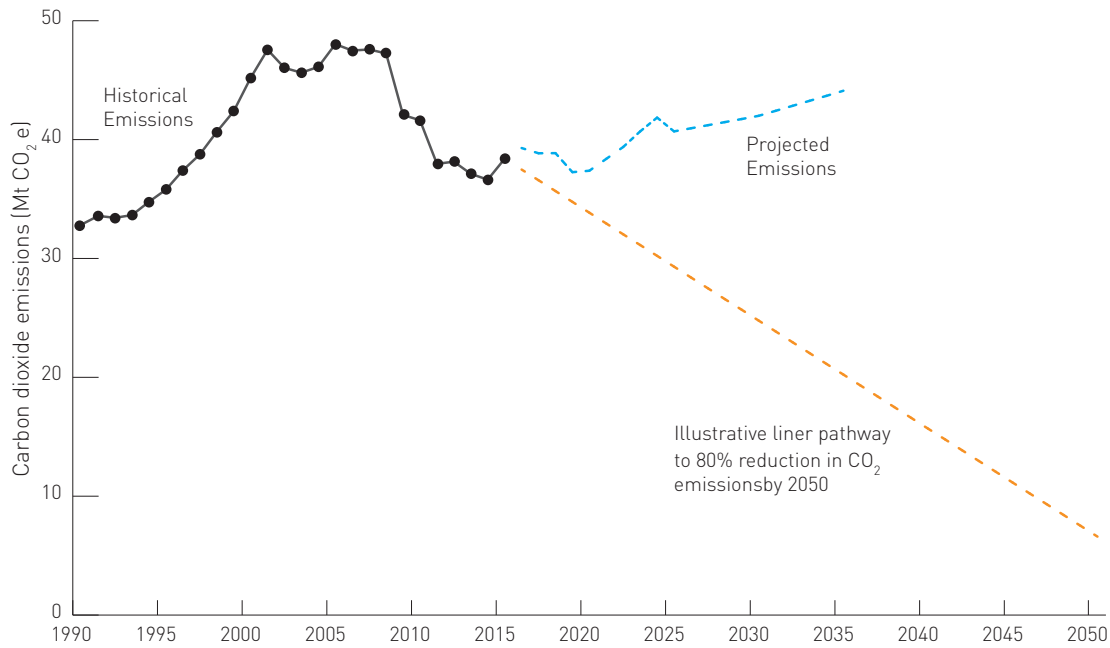


Figure 4.1: Emissions of carbon dioxide in Ireland from 1990 to 2015 (black line) and projections (‘with existing measures’; dashed blue line) from 2016 to 2035. An illustrative linear pathway (dashed orange line) for achievement of the low-carbon transition to 2050 is shown. **Data source:** EPA National Emissions Inventory 2017¹⁴ and Ireland’s Greenhouse Gas Emissions Projections 2016-2035.¹⁵

4.3. Sectoral Emissions of Carbon Dioxide

Three main sectors are identified in the National Policy Position; electricity generation, the built environment and transport. For completeness, the analysis provided here addresses all fossil carbon emissions in the National Inventory Report.¹⁴ The low-carbon transition for these sectors is illustrated in Figure 4.2. In this figure the “Other” sector encompasses the emissions that are not included in the three main sectors, such as those from industrial processing.† The Council considers that a national carbon budget and how it is used between and across sectors is a critical issue that should be addressed in the National Mitigation Plan.

4.3.1 Electricity Generation

Emissions from electricity generation made up approximately 28.9% of total carbon dioxide emissions in 2015. The carbon intensity of this sector almost halved between 1990 and 2015, decreasing from 900 to 470 grams of carbon dioxide per kilowatt hour (g CO₂/kWh).²³ This is principally attributed to fuel switching, in particular the uptake of gas,†²⁴ and the increasing

† This application of similar percentage reductions to each sector is done for illustrative purposes only.
 ‡ Natural gas power generation has increased from 27% to 45% of energy used for electricity generation in Ireland.

amount of renewable energy being used to generate electricity. There was a 2% increase in the carbon intensity of electricity generation in 2015 relative to 2014.²³ This increase is attributed to increased use of coal in electricity generation in 2015.²⁴ It reflects the failure to date of the EU Emissions Trading Scheme to provide an appropriate price for carbon.

There has been important progress in reducing the carbon intensity of electricity generation. Total carbon dioxide emissions from this sector in 2015 were similar to those in 1990. This has occurred while electricity generation has increased from 14 to 29 gigawatt hours from 1990 to 2015.²⁴

Decarbonisation of electricity generation is essential for economy-wide decarbonisation by 2050. The replacement of high-emission fuel types such as peat and coal with low-emission fuel types and energy sources is a crucial part of the low-carbon transition to 2050 for the electricity generation sector. This is especially important to advance decarbonisation in the linked areas of heating and transport where electrification is an important option. The Energy White Paper 2015²⁵ states that by 2050 fossil fuels will largely be replaced by renewable energy sources across all energy sectors. Significant national and local action is required for this transformation of electricity generation to be achieved.

4.3.2 *The Built Environment*

Emissions from the built environment sector were 19.8% of total carbon dioxide emissions in 2015 and have decreased by about 18% relative to 1990 levels, that is, from 9.3 to 7.6 million tonnes of carbon dioxide. This decrease has occurred over a period in which energy efficiency, particularly in buildings constructed since 2000, has improved significantly and is driven by improved building standard regulations first introduced in 1992 and most recently in 2013. Building Energy Rating data show a legacy issue in the older housing stock, which on average performs significantly worse on energy efficiency. It is encouraging that a number of buildings built before 1960 have been retrofitted to achieve an A Building Energy Rating.²⁶ This demonstrates that deep retrofit is technically feasible in many housing types. The rate of retrofit needs to be significantly scaled up to address legacy building stock. In addition alternative low-carbon energy sources are required to address the remaining demand for heat, light and services. While total emissions from this sector have decreased, the rate of decrease must be accelerated to achieve the required low-carbon transition.

4.3.3 *Transport*

The most significant increase in emissions since 1990 has occurred in the transport sector. Emissions have increased by 132% from around 5 million tonnes of carbon dioxide in 1990 to 11.7 million tonnes in 2015. Emissions peaked in 2007 at 14.2 million tonnes. Economic activity is the main driver of transport emissions. Both the number of vehicles on the road and kilometres travelled increased in this period. The growth in activity has outpaced significant improvement in efficiency of the national fleet resulting from the switch to more energy efficient vehicles supported by the taxation system. Emissions from this sector need to be reduced in line with the National Policy Position. This will involve a profound transition in the sector which reverses the current trend. This can be achieved through the adoption of zero and near zero carbon transport options across public and private transport modes and through enhanced transport management systems.

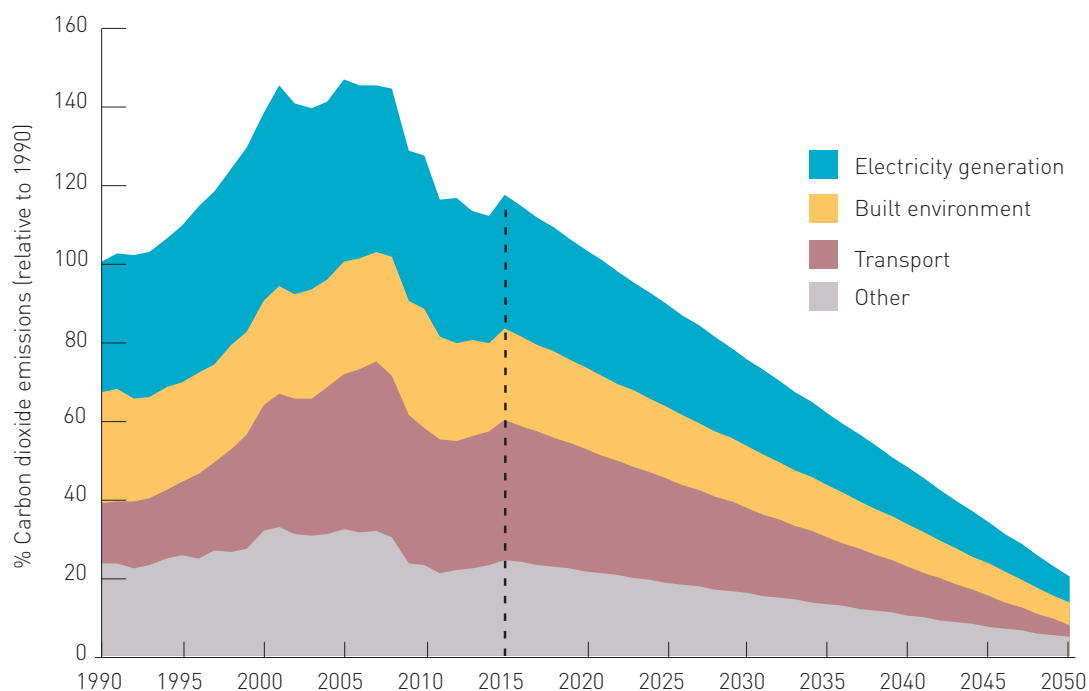


Figure 4.2: A 2050 roadmap for emissions of carbon dioxide across the sectors responsible for fossil carbon dioxide emissions. Historical emissions and an illustrative linear pathway to 2050 from 2015 for each sector are shown for achievement of an 80% reduction in carbon dioxide emission, relative to 1990 levels, from 2015. Dashed line represents the boundary between historical emissions and illustrative emissions reductions to 2050. **Data source:** EPA National Emissions Inventory 2017.¹⁴

4.4. Establishing a Pathway to 2050

The sectoral analysis above shows that there has been a degree of progress in all areas. However, the task of decarbonising the economy by 2050 remains challenging. Emissions have not been adequately decoupled from economic growth. Currently emissions are higher than those in 1990 and acceleration of actions is required by each of these sectors. The Council considers that development of decarbonisation pathways for these sectors to 2050 should be an important component of the National Mitigation Plan. These pathways should outline options and approaches to accelerating decarbonisation including consideration of how to:

- ▲ Address legacy issues and associated carbon lock-in.
- ▲ Take account of the different turnover times for assets and infrastructure.
- ▲ Address systemic issues in education, training, information and engagement.

These sectors do not exist in isolation. The overall National Mitigation Plan will need to ensure that each sectoral pathway matches up in an efficient and cost-effective manner. For example, progress in decarbonisation of the electricity sector can contribute to overall decarbonisation of the wider economy, especially in relation to heating and transport. However, electrification of heating and transport will only achieve the required emissions reduction if electricity generation is decarbonised. The Council recognises that a higher carbon price in the EU Emission Trading Scheme would accelerate decarbonisation of this sector to 2050. However, national approaches to accelerate decarbonisation need to be identified and implemented.

4.5. Carbon Neutrality for Agriculture and Land Use

The 2015 Paris Agreement includes a goal to “achieve a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century”. The National Policy Position specifies “an approach to carbon neutrality in the agriculture and land-use sector, including forestry, which does not compromise capacity for sustainable food production” in 2050. The outline of the 2050 neutrality challenge provided in the First Report is reproduced in Appendix 8. The concepts of greenhouse gas balance and neutrality will need to be further developed and examined in depth by the scientific community in the coming years and will be addressed in the Intergovernmental Panel on Climate Change’s Sixth Assessment Report. This is particularly important for land-use policy, which is currently envisaged as being a key part of managed carbon dioxide removal from the atmosphere.

Globally, and in Ireland, the links between climate change, food production and land use are complex. Effective management of land is needed to achieve the required levels of mitigation. Adaptation of food production systems will be required to ensure resilience to climate change and sustainability. In 2015, greenhouse gas emissions from the agriculture sector in Ireland were 19.8 million tonnes of carbon dioxide equivalent, approximately 32% of total emissions.¹⁴ These are primarily emissions of methane, 64%, and nitrous oxide, 34%. In 2015, the forest sink was 3.9 million tonnes of carbon dioxide equivalent.^{†27} However, some land uses are a source of carbon dioxide emissions; these include drained organic soils for various purposes and the harvesting of peat. The interplay between land use for food and energy production is likely to evolve over the coming decades. This is expected to include a greater appreciation of land based ecosystem services including carbon sequestration.

4.5.1 Steps Towards Neutrality

How the approach to the neutrality objective is to be achieved and how it will be verified needs to be determined. The objective implies that the greenhouse gas emissions and their influence on climate would be balanced by removal of an equivalent amount of carbon dioxide from the atmosphere. This requires development of pathways by which greenhouse gas emissions are reduced while removals are greatly enhanced. The Council recognises that assessment of neutrality is likely to include consideration of:

- ▲ Approaches to enhance management and sequestration of carbon in soils and biomass as well as the potential use of negative emissions technologies such as Bioenergy with Carbon Capture and Storage (BECCS).
- ▲ The need for reduction of emissions of methane and nitrous oxide through deployment of mitigation options including animal and plant breeding, genomics, management systems and technologies.
- ▲ Taking account of the characteristics of the key greenhouse gases including the lifetimes and potency of these gases. For example, methane is a more potent greenhouse gas than carbon dioxide, but has an atmospheric lifetime of approximately 12 years. Nitrous oxide is more potent than methane and carbon dioxide, and has an atmospheric lifetime of approximately 120 years.

† Due to current reporting rules covering emissions and removals for forestry, the total forest land removals figure differs from the accountable removals eligible under the Kyoto Protocol.

- ▲ Enterprise opportunities including diversification of land use, such as mixed-use and provision of ecosystem services.

There is an urgent requirement to address scientific gaps in understanding of emissions and removals from farm to national scales. This should include the impact of management practices and technologies across the range of agricultural and land use enterprises. This will also require provision of robust data collation and independent verification systems.

4.5.2 *Agriculture and Land-Use Emissions and Removals*

In Ireland the dominant greenhouse gas emissions from agriculture and land-use comprise methane and nitrous oxide. The characteristics of these gases and how they contribute to climate change is an important dimension to defining and acting on greenhouse gas neutrality.

Methane emissions are mainly associated with enteric fermentation in animals and manure management. Nitrous oxide emissions are associated with fertiliser use, manure management and land management.

Carbon is sequestered from the atmosphere and is, in part, stored in biomass and soils. The carbon stocks in biomass and soils are influenced by management systems, natural cycles and increasingly the impacts of climate change.

Ireland's land-use profile is dominated by agricultural grassland (60%), wetlands (17%) forestry (11%) and cropland (9%). The national forest is a significant carbon stock, and has the potential to increase further. The National Forest Policy²⁸ is to increase forest cover from 11% (768,000 hectares) to 18% by 2050. Successful implementation of the plan is important, and the possibility of greater ambition should be explored.

In general, agricultural soils in Ireland have high carbon stocks, with some potential for further enhancement.²⁹ There is considerable variation across Ireland and full science based quantification of this potential is still to be established. Organic soils, wetlands and peatlands represent the largest and most vulnerable stocks of soil carbon in Ireland. The treatment of these stocks will be a key factor for achievement of neutrality for the agriculture and land-use sector.

The systems to assess carbon sequestration in land uses, other than forestry, are not well developed. Steps to address this deficit are needed. Currently, Ireland reports ongoing emissions associated with agricultural land and peatlands caused by drainage of organic soils.

4.5.3 *Agriculture and Land-Use Diversification*

The links between emissions and removals activities within the land use, food and energy production, and other ecosystem services are illustrated in Figure 4.3. The definition and boundaries for land-use policy are not well defined and the links between the energy and other sectors, and the agriculture and land-use sectors are expected to evolve.

There are emerging opportunities for diversification of the rural economy to address a broader spectrum of economic and societal needs. Currently, many Irish farmers are locked into low-income, low-profit farming systems. Opportunities to provide alternative and more remunerative income opportunities for these groups may emerge, for example through alternative uses for grass, and conversion of land to renewable energy and biomass production. Actions at national and EU level, including reform of the Common Agriculture Policy, post-2020, may influence this transition.

As the bioenergy sector expands, links between agriculture, land use and energy may become more complex, for example creating a link between land-use changes driven by demand for bioenergy to displace fossil fuel. Potential links also exist between the construction and material sectors of the economy in terms of use of land resources to provide raw materials including wood products to displace materials with high embedded emissions. In this way, the activities and links illustrated in Figure 4.3 become increasingly focused on land management and ecosystems services.

There is a need to address emissions associated with harvesting of peat to meet other demands including for heating and horticulture. There are cultural and heritage drivers to the use of peat for residential heating. The use of peat for residential heating has declined significantly since 1990 because of fuel switching by households. This is likely to continue, but steps to accelerate this are needed. Emerging drivers of peat drainage and harvesting, for example horticulture, will need to be addressed. The future management of such carbon rich soils will be an important element in development of an approach to neutrality for the agriculture and land use sector.

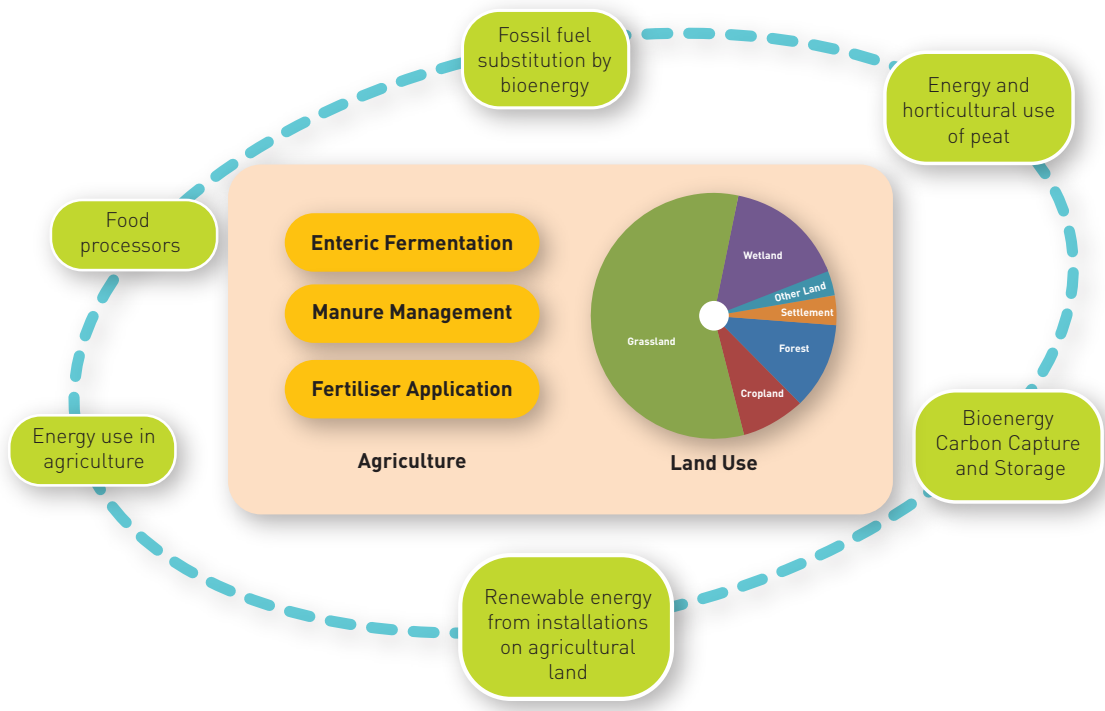


Figure 4.3: Schematic of the interactions between agriculture, land use and the energy sectors. The shaded areas are activities reported under agriculture and land use, land-use change and forestry. Other activities are reported within other sectors but depend on agriculture and land for resources and services.

4.5.4 Challenges for Ireland

Achievement of neutrality for the agriculture and land-use sector is complex and challenging. Ireland should be at the forefront of international efforts to determine a scientifically and environmentally robust pathway for approaching neutrality within these sectors. In doing this Ireland should also contribute to understanding how the global “balance” of greenhouse gas emissions and removals as envisaged in the Paris Agreement can be achieved.

The Council highlights the urgent need to address key information and analysis gaps that exist for agriculture and land-use sector as well as the need to develop a national land use strategy to 2050 which encompasses and enables an increasingly diverse rural economy and society.

The Council emphasises the need to achieve the overall national mitigation transition objective and reiterates its position that Ireland should have no further negative impact on the global climate by the middle of this century. Achieving the goal of approaching neutrality for the agriculture and land use sector should be a key part of this.

5. National Mitigation Plan 2017

The publication of the National Mitigation Plan on 17 July means that the Council had insufficient time to provide analysis and advice on its contents in this report. The draft National Mitigation Plan from the Department of Communications, Climate Action and Environment was published on 15 March 2017. In response to a request from the Minister, the Council established a process to engage with and provide advice to the key Departments that had contributed to the development of the draft National Mitigation Plan. Council correspondence providing its views and recommendations to these Departments is contained in Appendix 5.

The Council welcomes the announcement by the Minister of Communications, Climate Action and Environment that the Minister for Public Expenditure and Reform has initiated a review of the Public Expenditure Code and looks forward to considering the outcomes from the process.

The advice and recommendations contained in this chapter are provided as a response to the draft National Mitigation Plan. The Council was concerned at the lack of specific detail on new actions and commitments in the draft National Mitigation Plan. The National Mitigation Plan should provide specific detail on how the anticipated mitigation gap to 2020 will be addressed and outline pathways for achievement of the low-carbon transition to 2050. Common and overarching issues contained in the Council's correspondence with the Departments are briefly outlined here. We also address important gaps in the draft National Mitigation Plan.

2050 Pathway and Ambition

The 2050 national transition objective and the National Policy Position together provide the overall goal for the National Mitigation Plan and sectoral actions. The National Mitigation Plan should reflect their ambition. It should clearly signal the direction of travel for the main sectors and outline scenarios to 2050. These scenarios should make clear the required near-term policies, measures and actions to meet long-term goals. Such analysis would enhance clarity on policies and measures, providing greater certainty to the private sector and to the public. The National Mitigation Plan should provide a transparent and coherent framework for economy-wide actions towards 2030 and 2050 targets and goals. The response must enable an integrated and managed transition.

Ownership and Implementation

The Council considers that, in addition to the statutory processes identified in the Climate Action and Low Carbon Development Act 2015, high level ownership and management of this process is required to ensure that actions are progressed in a coordinated manner and their performance adequately measured.

Cross-Sectoral Approach

Addressing climate change provides a unique challenge for public policy. The response must be inherently cross-sectoral and it must provide an integrated and managed transition. Climate policy should be coherent with and inform development of related sectoral and cross-sectoral policies such as the National Planning Framework.

Given the major task that Ireland faces, it will be essential to use fiscal measures as a major cross-sectoral policy instrument in tackling the problem of climate change. Where market failures are established, other instruments will also be required. Overall the wider links between climate and fiscal policy need to be further developed.

Sectoral Goals

Sectoral goals that are consistent with and contribute to the achievement of the low-carbon transition for 2050 should be identified. These goals, in combination with milestones, provide increased clarity for stakeholders and the public by capturing the required low-carbon transformation in a more tangible and understandable manner. These goals should be established in a way that ensures a cost-effective reduction in emissions across all sectors.

Electricity Generation

Decarbonisation of electricity generation is essential for economy-wide decarbonisation by 2050. A sectoral goal for electricity generation for 2050 should be specified in the National Mitigation Plan. The recent increase in the carbon intensity of electricity generation in Ireland reflects the insufficient price signal from the EU Emissions Trading Scheme. Currently peat fired electricity generation receives price support from the Public Service Obligation (PSO) levy on all consumers' electricity bills. The planned phase-out of this subsidy by 2020 is an important step in decarbonising electricity generation.

The draft National Mitigation Plan highlighted the potential of Ireland's abundant indigenous renewable resources. Options to realise this potential, including the utilisation of emerging technologies and solutions for distributed generation, should be included in the National Mitigation Plan. Policies to enable renewable energy deployment with an increased pace of installation are essential. Increased community engagement and more efficient and effective planning and regulation may aid timely deployment.

Built Environment

A sectoral goal for the built environment is required that incorporates the expected performance level of buildings in 2050 in terms of heating, lighting and appliances. The EU Energy Performance of Buildings Directive requires all new buildings to be nearly zero-energy by the end of 2020.³⁰ The new Building Regulations set out this requirement for new buildings in Ireland. Retrofit of the existing building stock is the key challenge in addressing energy efficiency in the built environment. The goal should be deep retrofit of the existing building stock to near zero emission levels through energy efficiency retrofit and low-carbon energy sources. The Sustainable Energy Authority Ireland estimated in 2016 that in order to achieve 2020 Energy Efficiency targets, around 75,000 homes per year will need energy efficiency upgrades between now and 2020 but deeper retrofit is required for the 2050 low-carbon transition.

A strategy is required for taking the existing housing stock to the required performance levels by 2050 with near zero emissions and at minimum cost to the consumer. The strategy should address synergies and trade-offs between shallow and deep retrofits and should take on board lessons learned from existing retrofit programmes and behaviour, community and transitions studies to inform a cost-effective policy response. Factoring health and quality of life benefits into analysis of the cost of retrofitting of homes will make the required investment more attractive.

Transport

The National Mitigation Plan should outline a 2050 sectoral goal with short, medium and long-term milestones. This should include key transition points and clear options for the deployment of effective existing low and zero-emissions technologies. Key elements of the sectoral goal should include phase-out of the internal combustion engine in private transport and enhanced public transport provision. Innovative solutions and alternative fuels are required for the freight sector.

Transport investments, especially public transport, need to be integrated with spatial planning to reduce transport demand and maximise progress in reducing emissions. This integration should form a key part of the sector's plan. Market failures and critical constraints for provision and use of alternative energy sources also need to be identified, and fossil fuel lock-in avoided, enabling the full decarbonisation of future transport systems. Co-benefits like health, air quality and mobility are central to assessment of the costs and benefits of policies and measures in this sector.

Agriculture and Land Use

It is essential that options to reduce emissions and enhance removals associated with agriculture and other land uses are identified and deployed. Options for the diversification of farming and land management in the context of changing demand for products and services should be considered. Research to expand and improve the range of mitigation options is required including animal and plant breeding, genomics, management systems and other technologies. In Ireland, farming management practices are relatively efficient in terms of greenhouse gas emissions per unit product; however more efficiency gains can be made, particularly through knowledge transfer and deployment of best practice across a larger cohort of farm enterprises.

All land uses and types should be included in mitigation actions. Wetlands and peatlands need to be addressed in the National Mitigation Plan. Policies and practices to preserve and enhance these carbon stocks are needed as part of the overall achievement of neutrality for the agriculture and land-use sector.³¹ A large area of land is in direct or indirect state ownership. The State can provide leadership in development of approaches and strategies to maintain and enhance carbon uptake in these lands.

An implementation programme to quantify the progress towards neutrality should be developed which includes necessary measurement and observation systems. The Council has identified the need for the development of a national strategy for management of Ireland's land resources to encompass and enable an increasingly diverse rural economy and society that addresses multiple needs for food, energy, materials and ecosystem services.

Carbon Pricing

In its First Report the Council highlighted the importance of an effective price signal for carbon emissions in guiding how Ireland can meet its climate change objectives in the most cost-effective manner. In planning public investment it is essential that appropriate prices for carbon, and other significant co-benefits and externalities, are incorporated into decision-making. The Council is concerned that the existing carbon pricing mechanisms have, to date, failed to deliver an adequate price signal to advance decarbonisation across the economy, consistent with the low-carbon transition. Recent work by the High Level Commission on Carbon Prices, supported by the World Bank, concluded that "the explicit carbon-price level consistent with achieving the Paris temperature target is at least US\$40–80 per tonne of carbon dioxide (tCO₂) by 2020 and US\$50–100/tCO₂ by 2030, provided a supportive policy environment is in place."³² The Council has previously communicated its recommendation that the EU Emissions Trading Scheme needs reform, including the establishment of an adequate price-floor.³³ The Council further notes that provision of a clear signal from government, on the further development and increase of the carbon tax to 2030, would drive decarbonisation in the private sector. Carbon pricing is further discussed in Appendix 4.

Fossil fuel subsidies are a barrier to decarbonisation. They reduce the price of carbon emissions, and so make unsustainable consumption practices more attractive relative to sustainable alternatives. In Ireland, one example of a fossil fuel subsidy is the public price support for peat-fired electricity generation. There are other national supports which either directly or indirectly subsidise the continued use of fossil fuels. It is the view of the Council that the National Mitigation Plan should initiate a process to identify these in order to inform a strategy for their removal in an appropriate manner.

Engagement and Implementation

It is imperative that positive behavioural responses to decarbonisation interventions are supported across Irish society. The complex barriers to societal and behaviour changes will need to be identified and addressed in a positive and constructive manner in conjunction with relevant societal groups, so that public engagement is enhanced and high uptake or positive response to measures is achieved.

Market failures and critical constraints will need to be identified and addressed. Policy development should take on board lessons learned from a broad range of perspectives, including behavioural, community and transitions studies. This will inform a cost-effective policy response and support both a just transition to a low-carbon society and a just distribution of burdens and benefits resulting from policy interventions. Activities such as the Citizens' Assembly on Climate Change and the National Dialogue on Climate Change provide the initial building blocks for a climate-engaged society in Ireland, while long-term engagement and awareness strategies will need to be developed.

Societal Wellbeing and Co-benefits

The distributional effects, and the wider environmental and social costs and benefits, of the range of policies proposed need to be appropriately considered. The benefits and opportunities for health, wellbeing and sustainable development that arise from this transition warrant a much higher profile within the National Mitigation Plan. In assessing the costs and benefits of different proposed measures to address climate change, sectors should apply the appropriately modified Public Expenditure Code. The analysis of mitigation options should consider co-benefits, particularly with respect to other policy objectives, such as the areas of air and water quality, biodiversity, health and wellbeing. This would enhance consistency in decision making and thus help achieve a more cost-effective approach.

Strengths and Opportunities

Ireland has abundant indigenous renewable resources. Cost-effective options to realise this potential, including the utilisation of emerging technologies and solutions for distributed generation, should be included in the National Mitigation Plan. Existing strengths and assets such as the extensive and modern gas infrastructure, the strong information and communication technology industry and the building materials industry should be recognised and incorporated into planning.

6. The National Transition Objective: Adaptation

The National Policy Position identifies achievement of a “climate-resilient and environmentally sustainable economy by 2050” as a key part of the national transition objective.² This is to be achieved through a continuing, iterative and evolving process under the National Adaptation Framework. The National Policy Position also states that “the National Adaptation Framework will articulate a strategic policy context for appropriate action at a sectoral and local level, in response to the impacts of climate change in Ireland in the shorter and longer term”. The objective of the Framework will be “to inform and mobilise an integrated approach, involving all stakeholders on all institutional levels, to ensure that adaptation measures are taken and implemented, including through incorporation into future investment plans where appropriate, to manage and reduce sectoral and local vulnerability to the negative impacts of climate change”. It should also provide a clear mandate for “Government Departments, agencies and local authorities to develop and implement sectoral and local adaptation plans”.

The EU Adaptation Strategy 2013³⁴ provides a regional context and supports adaptation actions by Member States. The aim of the EU Strategy is “to contribute to a more climate-resilient Europe. This means enhancing the preparedness and capacity to respond to the impacts of climate change at local, regional, national and EU levels, developing a coherent approach and improving coordination”.

Adaptation is a central component of the Paris Agreement and EU policy. Article 7 of the Paris Agreement established a global goal of “enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change, with a view to contributing to sustainable development and ensuring an adequate adaptation response in the context of the temperature goal”.

Unlike mitigation of climate change, there is no generally accepted adaptation metric. In this context a range of indicators at local and sectoral levels are being developed to determine progress in adaptation actions. In addition, processes to identify and reduce risks associated with climate change through adaptation have been established under the UNFCCC and by the EU, including the EU climate adaptation preparedness scoreboard.³⁴ These utilise concepts such as exposure, vulnerability, risk and resilience, which are also expected to be a part of the National Adaptation Framework implementation process in determining progress on achievement of the national resilience objective as set out in the National Policy Position.

6.1. Global Context for Development of National Resilience

Ireland has a temperate marine climate³⁵ but it can experience considerable climate variability, and recent occurrences of extreme weather and climate events have highlighted vulnerabilities. Climate change is expected to affect climate averages and patterns, as well as increase variability, including shifts in weather patterns, changes in the frequency and intensity of weather extremes and other impacts including projected sea level rise and ecosystems changes.

The overall rate and magnitude of climate change impacts that Ireland experiences will be determined by the effectiveness of global mitigation actions under the Paris Agreement. The effectiveness of these actions may not be clear for some time. This introduces additional uncertainty into investments which have long lifetimes, including infrastructure.

The National Policy Position is focused on achieving resilience by 2050. In this period impacts and risks are projected to be largely similar regardless of the actual global emissions pathway

taken.^{36,37} The projected climate impacts for the rest of this century and beyond, and the level of adaptation needed to ensure resilience, are strongly divergent depending on the global emissions pathway.³⁸ The likely longer term impacts will become clearer over the coming decades as implementation of the Paris Agreement is progressed.

Ireland will continue to experience the effects of climate change, climate variability and associated uncertainties particularly in relation to extreme events. Investment decisions should be based upon informed understanding of current vulnerabilities, projected risks and their uncertainties.

6.2. National Capacity, Risk and Adaptation

The Council recognises that Ireland has built national capacity in the areas of research and analysis, and is continuing to do so. However, knowledge, information and skills gaps exist that need to be addressed. There is growing awareness of climate-related risks and the need to develop and expand appropriate skills across all sectors and response systems, particularly in public sector organisations and local authorities.

The development of the National Adaptation Framework and the increasing need to address socio-economic exposure, are primary drivers of capacity building in Ireland. Risk assessments are being developed to prioritise actions, and indicators are being developed to monitor progress on adaptation and the effectiveness of adaptation actions.

6.3. Progress Towards National Transition Objective

The 2015 Climate Action and Low Carbon Development Act requires the Council to review “progress made in furthering the achievement of the national transition objective”. The National Policy Position states that the National Climate Change Adaptation Framework will constitute a key pillar for developing and progressing adaptation policy to pursue and achieve transition to a climate resilient and environmentally sustainable economy by 2050.

The Council looks forward to the publication of the 2017 National Adaptation Framework which will frame and support adaptation measures and actions over the period to 2022 and establish a process to achieve climate resilience by 2050. The Council welcomes the efforts of a number of sectors in producing draft adaptation plans for consultation and the Council’s Adaptation Committee has consulted with and heard from a range of sectors.

7. National Adaptation Framework 2017

The 2017 National Adaptation Framework will be provided to government by the end of the year and will play a vital role in helping Ireland achieve its national transition objective. In this context the Council considers that the National Adaptation Framework will need to provide short, medium and long term perspectives which take account of risks and uncertainties for planning and investment cycles and decision making. This includes taking account of:

- ▲ Current and historic vulnerability to weather and climate variability and extremes as a basis for determining risks and exposure.
- ▲ Projected changes in vulnerability, risk and exposure.
- ▲ Slow-onset changes such as sea level and certain ecosystem responses.
- ▲ The potential for climate change to trigger events that are highly disruptive at national level.
- ▲ The occurrence of low-probability, high-impact events including the changes in the Atlantic Meridional Overturning Circulation or the loss of the Greenland Ice Shelf.

The National Adaptation Framework should enable a more integrated approach to adaptation planning in Ireland, ensuring the national action plan is coordinated and takes account of shared responsibilities and risks across stakeholders. A common framework for the prioritisation of investments in adaptive measures across all sectors should be established.

Guidance on National Adaptation Framework

The National Adaptation Framework should establish a management framework to bring sectors together in order to address cross-sectoral and cascading issues, prioritise those most in need of action and coordinate responses to them. In this context, the framework should promote and enable measures that are flexible, low-regret, provide multiple benefits and address current vulnerability while taking account of projections of future climate conditions and associated impacts, risks and associated uncertainties. In the absence of a draft National Adaptation Framework, the Council has identified a number of issues which it considers important for inclusion in the National Adaptation Framework.

Ownership and Implementation

The National Adaptation Framework should provide the necessary governance framework and implementation and delivery structures, including required short term policies, measures and actions. The Council considers that in addition to the statutory processes in the Climate Action and Low Carbon Development Act 2015, high level ownership and management of this process is required to ensure that actions are delivered in a coordinated manner and their performance adequately monitored and assessed.

2050 Pathway and Ambition

The National Adaptation Framework should provide a structure and process including criteria that can be used to identify what a climate resilient Ireland would look like in 2050. This should enable assessment of progress towards that goal. This may involve a statement of what constitutes a climate resilient economy and society, along with a framework that enables the responsible sectors to develop their own resilience goals.

Assessing Costs and Benefits

Assessing the costs, benefits and distributional impacts of adaptation measures is a key step in identifying a pathway and suite of measures to create an Ireland resilient to the impacts of climate change. The Office of Public Works has carried out in-depth analysis of the costs and benefits of a wide range of measures on a local area basis which could guide wider assessments.

Critical Infrastructure

Critical infrastructure across energy, transport, water, communications and other sectors are crucial for our economy and society to function. The resilience of these infrastructures and the services they provide will play an important part in determining how effective we are in adapting to climate change. A national assessment of critical infrastructure should be considered as part of adaptation planning under the National Adaptation Framework.

Health, Wellbeing and Social Impacts

In addition to the adverse impacts of climate change on health, the Council has noted that the positive impacts of climate action on health and wellbeing need to be incorporated into decision-making. It supports the development of synergies between adaptation policy, health, security and wellbeing. An integrated approach is required with an analysis of co-benefits and social impacts as part of ensuring an equitable transition. The Department of Health promotes a Health in All Policies³⁹ approach and climate change adaptation offers an opportunity for improving health.

Forecasting, Weather Warnings and Emergency Response

Effective national operational meteorological capability and emergency response measures will play a critical role in preparing for, learning from and responding to future weather patterns and the impacts of climate change, including extreme events. Extreme weather events can provide lessons on how to address new patterns of risk and vulnerability and to understand how to promote adaptation strategies in real world situations.

The Council welcomes Met Éireann's move to develop impact based weather and climate services and recognises the critical nature of national meteorological infrastructure and expertise needed for operational 'nowcasting', short-term forecasting and longer-range forecasts and projections.

Programs for Raising Awareness

The Council welcomes the National Dialogue on Climate Action as an opportunity for public engagement on the impacts of climate change and adaptation measures to build resilience.

Exposure to External Impacts

Ireland is a small open economy and will need to take account of the global impacts of climate change. The National Adaptation Framework should consider these issues.

Observations and Considerations from the First Report

The Council wishes to highlight a number of cross-cutting issues identified in the First Report by the Council's Adaptation Committee, which may assist in the National Adaptation Framework development process. These included:

Governance

There is a need for clarity on governance and ownership of implementation actions arising from the National Adaptation Framework process. The Council highlights that adequate financial and human resources are required in order to deliver, implement, monitor, evaluate and amend actions as necessary. In this context, the Council identified thematic and structural issues which can support an integrated approach to cross-cutting actions. These are restated in Appendix 6.

Learning Process

Adaptation to climate change is a continuous learning process. There is a pressing need to learn from both successes and failures. 'Learning well' may be key to 'adapting well'.

Managing Interconnectivities

There is a need to identify and manage the interconnectivities that exist across sectors, scales and levels of governance, including potential cascading of effects. Cascading effects are observed when the disruption of services from one sector or location leads to knock-on effects elsewhere.

Engagement, Awareness and Behavioural Measures

Positive engagement with citizens and stakeholders is essential in addressing the adaptation challenge through provision of information and identifying and tackling behavioural barriers. This will require mechanisms that facilitate exchange of information between stakeholders and communities, particularly addressing barriers to adaptation and approaches to tackling them together. There is an urgent requirement to raise informed awareness in all communities that climate change, with its impacts, is taking place and requires action, with the role of local authorities being critical. Local authorities will need to be fully equipped to play this important role in shaping local responses to climate change. Behavioural measures will have to play a key role in the development of actions to meet the national resilience objective.

Importance of Existing Systems

It is important to recognise the importance of existing systems and supports, including in forecasting, warning and response systems, and to build on and enhance these.

Authoritative Information – Climate Ireland

It is essential that adaptation planning is supported by authoritative, relevant information and analysis in a coherent and structured manner. The 'Climate Ireland' platform provides critical information to support planning by sectors and local authorities. The Council considers that this should evolve from research to an operational phase as a national information portal.

Draft Sectoral Adaptation Plans

Two draft sectoral adaptation plans were published for public consultation by the transport, and agriculture and forestry sectors. The Council reviewed the plans and the initial advice provided on these plans is included in Appendix 7.

The Council highlighted a number of general points for consideration by all sectors, including:

- ▲ The need for clear governance, ownership and engagement structures which should be developed and maintained as part of the overall National Adaptation Framework and for all sectors.
- ▲ The need to ensure that the sectors use consistent climate change data and analysis for their plans, including projections of future climate conditions
- ▲ In this context the need to support research to provide Ireland-relevant climate information over a range of temporal and spatial scales in order to assist decision making on adaptation.

8. Conclusions

Climate change presents unique challenges for public policy. The transformation required to meet the national transition objective is a different and more difficult task than any other area of public policy. The National Mitigation Plan and National Adaptation Framework will provide the conceptual basis for development of a low emission, climate resilient and environmentally sustainable economy and society by 2050. High level ownership and leadership of the implementation of these plans is necessary to ensure that:

- ▲ Those actions are progressed in a coordinated manner with performance measured and tracked against goals and targets.
- ▲ An integrated approach is taken to address the twin challenges of climate change in a comprehensive manner to ensure that actions are linked.

The aim should be to integrate climate change issues into standards, management, planning and investment decision making, enabling synergies and minimising negative trade-offs. This process should also ensure that co-benefits and opportunities, including for health, wellbeing and sustainable economic development that will arise from the low-carbon, climate resilient transition are realised.

The National Mitigation Plan and National Adaptation Framework are central to national policy for a planned transition to a low-emission climate resilient economy and society. Implementation of these plans in Ireland will take place in the context of regional and global transitions and changes, some of which may be globally disruptive. The regional and global context for actions needs to be an ongoing factor in implementation of these plans.

The global impacts of climate change are expected to continue and evolve throughout this century and in many cases beyond this century. These global changes can have significant local impacts, such as economic shocks and population migration, which can result in social tensions and economic difficulties. Ireland has a small open economy which depends to a large degree on international trade and Foreign Direct Investment. Export and import of goods and services is a significant proportion of Ireland's gross national product. Therefore global developments in climate and climate policy that impact other countries will likely have an indirect impact on Ireland. In addition, many multinational companies with investments in Ireland have made pledges to act on climate change. It is likely that foreign direct investment will be influenced by Ireland's reputation in addressing climate change.

It is in Ireland's interest not only that it is recognised as a positive participant in addressing climate change but also that this is part of a global effort. The development of international climate policy is relevant to consideration of how to address climate change domestically.

Implementation of policies, measures, and deployment of technologies to tackle climate change is a complex undertaking. Not all policies or technologies to date have achieved the desired uptake rate or outcome. Behavioural response is often a key factor in the success and effectiveness of particular solutions. Greater understanding of, and ability to respond to, the diverse and dynamic social, material and psychological drivers of behaviour is required. This can be advanced through community engagement and dialogue processes which can, in turn, inform effective policy making and measures. In general, policies and measures should be flexible and able to respond to, and evolve through, measured experience and learning. Enabling positive behaviour

change can enhance the effectiveness of existing measures and identify other measures that empower groups and communities at a range of scales. The envisaged National Dialogue on Climate Change can have a role in addressing these issues and can increase social awareness and responsiveness in addressing climate change. Such interventions need to be sustained in order for them to have enduring impact.

Social acceptance of the need to transition to a low carbon and climate resilient society and economy can accelerate actions. For this to occur, it requires the impact of policies and measures on different segments of society and on different communities to be identified and addressed. The development of a fair and equitable approach for transition is key to enhancing public acceptance. The distributional impact of measures – for example, a carbon tax – can fall more heavily on low-income groups. Such imbalances need to be addressed in a positive manner. Similarly, carbon intensive industries which are impacted by measures may need support to prepare for employment in alternative industries. The overall process should aim to enable a just and equitable transition and to address the distributional effects appropriately. Similarly, opportunities that arise from the transition to a low carbon, climate resilient and environmentally sustainable economy, need to have broad societal ownership.

References

- 1 Government of Ireland (2015) *Climate Action and Low Carbon Development Act 2015*, [Online]. Available at: <http://www.irishstatutebook.ie/eli/2015/act/46/enacted/en/pdf> [Accessed: 4 July 2017]
- 2 Department of Communications, Climate Action and Environment (2014) *Climate Action and Low Carbon Development National Policy Position*, [Online]. Available at: <http://www.dccae.gov.ie/en-ie/climate-action/publications/Pages/National-Policy-Position.aspx> [Accessed: 30 June 2017]
- 3 *Climate Change Advisory Council (2016) First Report*, ISBN: 978-1-84095-702-0, [Online]. Available at: <http://www.climatecouncil.ie/councilpublications/otherpublications/> [Accessed: 30 June 2017]
- 4 *United Nations Framework Convention on Climate Change (UNFCCC) (2015) Paris Agreement – 2015*, [Online]. Available at: http://unfccc.int/paris_agreement/items/9485.php [Accessed: 13 October 2016]
- 5 *United Nations Framework Convention on Climate Change (UNFCCC) (2017) Nationally Determined Contributions Registry*, [Online]. Available at: <http://www4.unfccc.int/ndcregistry/Pages/All.aspx> [Accessed: 30 June 2017]
- 6 The European Commission (2011) Communications from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. *A Roadmap for moving to a competitive low carbon economy in 2050*. 8 March 2011, [Online]. Available at: <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52011DC0112&from=EN> [Accessed: 26 June 2017]
- 7 European Commission (2016) *Proposal for a regulation of the European Parliament and of the Council on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 for a resilient Energy Union and to meet commitments under the Paris Agreement and amending Regulation No 525/2013 of the European Parliament and the Council on a mechanism for monitoring and reporting greenhouse gas emissions and other information relevant to climate change*. Brussels, [Online]. Available at https://ec.europa.eu/clima/policies/effort/proposal_en [Accessed: 30 June 2017]
- 8 The European Commission (2016) Communications from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions and the European Investment Bank. *Clean Energy For All Europeans*. 30 November 2016, [Online]. http://eur-lex.europa.eu/resource.html?uri=cellar:fa6ea15b-b7b0-11e6-9e3c-01aa75ed71a1.0001.02/DOC_1&format=PDF [Accessed: 26 June 2017]
- 9 The European Commission. *Climate Action: 2020 Climate & Energy Package*, [Online]. Available at: http://ec.europa.eu/clima/policies/strategies/2020/index_en.htm [Accessed: 26 June 2017]
- 10 Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC (Text with EEA relevance), [Online]. Available at: <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32003L0087> [Accessed: 30 June 2017]

- 11 Decision No 406/2009/EC of the European Parliament and of the Council of 23 April 2009 on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020, [Online]. Available at: https://ec.europa.eu/clima/policies/effort_en [Accessed: 30 June 2017]
- 12 Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC (Text with EEA relevance), [Online]. Available at: <http://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX:32009L0028> [Accessed: 30 June 2017]
- 13 Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 on the geological storage of carbon dioxide and amending Council Directive 85/337/EEC, European Parliament and Council Directives 2000/60/EC, 2001/80/EC, 2004/35/EC, 2006/12/EC, 2008/1/EC and Regulation (EC) No 1013/2006 (Text with EEA relevance), [Online]. Available at: https://ec.europa.eu/clima/policies/lowcarbon/ccs_en [Accessed: 30 June 2017]
- 14 Environmental Protection Agency (2017) *National Emissions Inventories*, [Online]. <http://www.epa.ie/climate/emissionsinventoriesandprojections/nationalemissionsinventories/> [Accessed: 26 June 2017]
- 15 Environmental Protection Agency (2017) *Ireland's Greenhouse Gas Emission Projections 2016-2035*, [Online]. Available at: <http://www.epa.ie/climate/emissionsinventoriesandprojections/nationalemissionsprojections/> [Accessed: 26 June 2017]
- 16 Regulation (EU) No 525/2013 of the European Parliament and of the Council of 21 May 2013 on a mechanism for monitoring and reporting greenhouse gas emissions and for reporting other information at national and Union level relevant to climate change and repealing Decision No 280/2004/EC (Text with EEA relevance), [Online]. Available at: <http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1400596096197&uri=CELEX:32013R0525> [Accessed: 30 June 2017]
- 17 Eurostat (2017) *Greenhouse gas emission statistics*, [Online]. Available at: http://ec.europa.eu/eurostat/statistics-explained/index.php/Greenhouse_gas_emission_statistics [Accessed: 30 June 2017]
- 18 Irish Government Economic and Evaluation Service (IGEES) (2014) *Future Expenditure Risks Associated with Climate Change/Climate Finance*, [Online]. Available at: <http://igees.gov.ie/wp-content/uploads/2013/10/Future-Expenditure-Risks-associated-with-Climate-Change-Climate-Finance1.pdf> [Accessed: 30 June 2017]
- 19 *Intergovernmental Panel on Climate Change (2014) Summary for Policymakers*. [Book auth.] Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White. *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. [Online] Available at: https://www.ipcc.ch/pdf/assessment-report/ar5/wg2/ar5_wgII_spm_en.pdf [Accessed: 04 July 2017]

- 20** Department of Finance (2017) Ireland: *Budgetary Statistics 2016*, [Online]. Available at: <http://www.finance.gov.ie/what-we-do/economic-policy/publications/data-statistics/budget-statistics-2016> [Accessed: 30 June 2017]
- 21** *Intergovernmental Panel on Climate Change (2014) Summary for Policymakers*. [Book auth.] Edenhofer, O., R. Pichs-Madruga, Y. Sokona, E. Farahani, S. Kadner, K. Seyboth, A. Adler, I. Baum, S. Brunner, P. Eickemeier, B. Kriemann, J. Savolainen, S. Schlömer, C. von Stechow, T. Zwickel and J.C. Minx. *Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. [Online] Available at: https://www.ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc_wg3_ar5_summary-for-policymakers.pdf [Accessed: 04 July 2017]
- 22** European Environment Agency (2016) *Trends and projections in Europe 2016 - Tracking progress towards Europe's climate and energy targets*, [Online]. Available at: <https://www.eea.europa.eu/themes/climate/trends-and-projections-in-europe> [Accessed: 26 June 2017]
- 23** Sustainable Energy Association Ireland (2016). *Energy in Ireland 1990-2015*, [Online]. Available at: http://www.seai.ie/Publications/Statistics_Publications/Energy_in_Ireland/Energy-in-Ireland-1990-2015.pdf [Accessed: 26 June 2017]
- 24** Sustainable Energy Association Ireland (2017) *Provisional-2016-Energy-Balance*, [Online]. Available at: http://www.seai.ie/Publications/Statistics_Publications/Energy_Balance/Provisional-2016-Energy-Balance-PDF.pdf [Accessed: 26 June 2017]
- 25** Department of Communications, Climate Action and Environment (2015) *Ireland's Transition to a Low Carbon Energy Future 2015-2030 (White Paper)*. Department of Communications, Climate Action and Environment, [Online]. Available at: <http://www.dccae.gov.ie/en-ie/energy/topics/Energy-Initiatives/energy-policy-framework/white-paper/Pages/White-Paper-on-Energy-Policy-in-Ireland-.aspx> [Accessed: 30 June 2017]
- 26** Sustainable Energy Association Ireland, *National Building Energy Rating Research Tool*, [Online]. Available at: http://www.seai.ie/Your_Building/BER/National_BER_Research_Tool/ [Accessed: 7 June 2017]
- 27** Environmental Protection Agency (2017) *National Inventory Report and Common Reporting Format, Ireland Submission to the UNFCCC*, [Online]. Available at: http://unfccc.int/files/national_reports/annex_i_ghg_inventories/national_inventories_submissions/application/zip/irl-2017-crf-12apr17.zip [Accessed: 30 June 2017]
- 28** Department of Agriculture, Food and the Marine (2014) *Forests, products and people Ireland's forest policy – a renewed vision*, Department of Agriculture, Food and the Marine ISBN 978-1-902696-73-7, [Online]. Available at: <https://www.agriculture.gov.ie/media/migration/forestry/forestpolicyreviewforestsproductsandpeople/00487%20Forestry%20Review%20-%20web%202022.7.14.pdf> [Accessed: 30 June 2017]
- 29** Royal Irish Academy Climate Change and Environmental Sciences Committee (2016) *The Potential of Irish Grassland Soils to Sequester Atmospheric Carbon, Expert Statement*, March 2016, Royal Irish Academy, [Online]. Available at: <http://www.ria.ie%2Fexpert-scientific-statement-potential-irish-grassland-soils-sequester-atmospheric-carbon&usg=AFQjCNEOS0GbvNYxuwGaGcFhyKIfIDlbYQ&cad=rja> [Accessed: 27 June 2017]

- 30** Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings, [Online]. Available at http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2010.153.01.0013.01.ENG&toc=OJ:L:2010:153:FULL [Accessed: 30 June 2017]
- 31** Renou-Wilson, F., D Wilson, C. Barry, B. Foy, and C. Müller (2015) *Carbon Loss from Drained Organic Soils under Grassland – CALISTO*, Environmental Protection Agency, Research Report 141, ISBN: 978-1-84095-571-2, [Online]. Available at: <http://www.epa.ie/pubs/reports/research/climate/research141carbonlossfromdrainedorganicsoilsonundergrasslandcalisto.html> [Accessed: 30 June 2017]
- 32** The High Level Commission on Carbon Prices is an initiative of the Carbon Pricing Leadership Coalition, a voluntary partnership of national and sub-national governments, businesses, and civil society organizations launched by the World Bank Group. Carbon Pricing Leadership Coalition (2017). *Report of the High-Level Commission on Carbon Prices* [Online]. Available at: <https://www.carbonpricingleadership.org/report-of-the-highlevel-commission-on-carbon-prices> [Accessed: 30 June 2017]
- 33** Climate Change Advisory Council (2016) *Letter to Minister Naughten regarding EU ETS* [Online]. Available at: <http://www.climatecouncil.ie/councilpublications/otherpublications/>
- 34** European Commission (2013) *An EU Strategy on adaptation to climate change*, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Brussels, 16.4.2013, COM(2013) 216 final, [Online]. Available at: <http://climate-adapt.eea.europa.eu/eu-adaptation-policy/strategy> [Accessed: 30 June 2017]
- 35** Met Eireann (2017) *Climate of Ireland*, [Online]. Available at: <http://www.met.ie/climate-ireland/climate-of-ireland.asp> [Accessed: 30 June 2017]
- 36** Nolan, P. (2015) *Ensemble of regional climate model projections for Ireland*, EPA Report 159, ISBN: 978-1-84095-609-2, [Online]. Available at: <http://www.epa.ie/pubs/reports/research/climate/research159ensembleofregionalclimatemodelprojectionsforireland.html> [Accessed: 30 June 2017]
- 37** Kirtman, B., S.B. Power, J.A. Adedoyin, G.J. Boer, R. Bojariu, I. Camilloni, F.J. Doblas-Reyes, A.M. Fiore, M. Kimoto, G.A. Meehl, M. Prather, A. Sarr, C. Schär, R. Sutton, G.J. van Oldenborgh, G. Vecchi and H.J. Wang (2013) *Near-term Climate Change: Projections and Predictability*. In: *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, [Online] Available at: http://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WG1AR5_Chapter11_FINAL.pdf [Accessed: 04 July 2017]
- 38** Collins, M., R. Knutti, J. Arblaster, J.-L. Dufresne, T. Fichet, P. Friedlingstein, X. Gao, W.J. Gutowski, T. Johns, G. Krinner, M. Shongwe, C. Tebaldi, A.J. Weaver and M. Wehner (2013) *Long-term Climate Change: Projections, Commitments and Irreversibility*. Eds: Stocker, T.F., Qin, D., Plattner, G.-K., Tignor, M., Allen, S.K., Boschung, J., Nauels, A., Xia, Y., Bex, V., and Midgley, P.M. In *Climate Change 2013: The Physical Science Basis. Contribution of Working*

Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, [Online] Available at: https://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WG1AR5_Chapter12_FINAL.pdf [Accessed: 04 July 2017]

- 39** World Health Organisation (2014) *Health in All Policies, Helsinki Statement, Framework for Country Action*, World Health Organisation, ISBN 978 92 4 150690 8 [Online]. Available at: <http://www.who.int/healthpromotion/frameworkforcountryaction/en/> [Accessed: 30 June 2017]

Appendix 1 Scientific Understanding

Please note that this appendix has been reproduced from Section 2 of the First Report.

The Council will use the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (AR5)⁽⁵⁾ as a primary source of scientific information and analysis. The Council will also consider authoritative updates of this report from other UN bodies, as well as major review papers and relevant findings from European and national research including work carried out or funded by the Environmental Protection Agency, the Sustainable Energy Authority Ireland, the Economic and Social Research Institute and Teagasc.

The main findings of the Fifth Assessment Report of the Intergovernmental Panel on Climate Change are well known and the full reports are readily available.⁽⁵⁾ Warming of the climate system is unequivocal and the human influence is clear. Impacts of this are apparent across all continents and oceans.⁽⁶⁾ The key driver of climate change is the additional energy being trapped in the Earth's climate system by the build-up of greenhouse gases in the atmosphere. Carbon dioxide, methane and nitrous oxide are the most important greenhouse gases (see Text Box 1). Global temperature has increased by almost 1°C since pre-industrial times. Future temperature increases will, primarily, be determined by historic, current and future emissions of carbon dioxide⁽⁷⁾ which build up, or accumulate, in the atmosphere. Even with effective global actions to reduce emissions of greenhouse gases, the impacts of climate change are projected to continue well into this century. Some, such as sea-level rise, are projected to continue into the next century.⁽²⁾

The extent to which Ireland will experience the impacts of climate change will be determined by the effectiveness of local, EU and global actions to reduce emissions of greenhouse gases and local actions to adapt to the evolving change. In a situation of such uncertainty it is essential to consider the risks associated with a range of greenhouse gas emissions scenarios ranging from successful and ambitious climate policy to 'business as usual' climate policy. The Intergovernmental Panel on Climate Change has provided such analyses for a range of emissions pathways: from keeping the global temperature increase below 2°C to 'business as usual' pathways, where the temperature increase is projected to greatly exceed 2°C.[†] This allows for comparative analysis of projected impacts, vulnerabilities, risks and costs associated with such climate futures. The impacts of climate change are expected to be experienced as a combination of gradual changes such as changes to ecosystems; slow onset changes such as sea-level rise; and changes in extremes such as an increase in the frequency and intensity of heavy rainfall events. The occurrence of low probability, high impact events, such as the changes in large scale ocean circulation (for example, the Atlantic Meridional Overturning Circulation, best known in Ireland through the effects of the Gulf Stream), should also be included in risk assessments. Vulnerabilities and levels of risk also vary by sector, location and through time, and are considered further in Section 5.

[†] The Intergovernmental Panel on Climate Change has adopted a series of Representative Concentration Pathways (RCPs) for this purpose. RCP2.6 represents the low emissions pathway while RCP8.5 is the 'business as usual' high emissions pathway.

Text Box A1: *Greenhouse gas emissions*

The Fifth Assessment Report from the Intergovernmental Panel on Climate Change shows that the global temperature increase will primarily be determined by the cumulative emissions of carbon dioxide; that is, the sum of historical, current and future emissions. This arises from the complex relationships between the atmospheric carbon cycle and those of the terrestrial and ocean systems. Consequently, a significant proportion of carbon dioxide emissions will perturb the atmosphere for centuries to millennia, with impacts that will persist for tens of millennia. Emissions of additional carbon dioxide therefore represent a substantial multi-century commitment to future climate change.

The Intergovernmental Panel on Climate Change has identified carbon dioxide budgets that would lead to stabilisation of the global temperature at specific levels. This implies that emissions of carbon dioxide have to be reduced to net-zero to stabilise the global temperature at any particular level.⁽⁷⁾ For a temperature increase of 2°C the cumulative emissions budget is between 2,500 and 5,000 billion tonnes of carbon dioxide since 1870. For a temperature increase of 1.5°C this is between 1,800 and 4,000 billion tonnes of carbon dioxide. The range is a result of scientific uncertainties about the Earth's response to the additional energy being trapped; for example, the climate sensitivity.[†] In 2010 the cumulative emissions of carbon dioxide are estimated to have been between 1,500 and 1,700 billion tonnes, with annual emissions being of the order of 37 billion tonnes. At this rate of emissions the budgets for 1.5°C and 2°C may be exceeded in the next 5 to 25 years, respectively. It is therefore likely that active interventions to reduce atmospheric carbon dioxide concentrations will be needed to stabilise the global temperature below 2°C. The need for such technologies is extremely likely if the global temperature is to be stabilised at 1.5°C. Such interventions include carbon dioxide removals by forests or other land sinks and the use of negative emissions technologies; for example, bioenergy coupled with carbon capture and storage. The Intergovernmental Panel on Climate Change has identified that large scale reliance on such approaches may entail significant risks.

Emissions of non-carbon dioxide greenhouse gases must also be addressed. The Fifth Assessment Report states that to keep the global temperature increase well below 2°C, net greenhouse gas emissions must be brought to near or below zero by the end of the century. It also recognised that it is not currently feasible to reduce all greenhouse gases to zero. After carbon dioxide, methane and nitrous oxide are the two most important greenhouse gases. Globally methane is emitted as a result of a diverse range of human activities including from fossil fuels, agricultural food production and waste management. In Ireland, methane and nitrous oxide mainly arise from agricultural activities. Current technological solutions for addressing these emissions are limited. Methane is a much more potent greenhouse gas than carbon dioxide but only remains in the atmosphere for a relatively short period, i.e. 12 years. Nitrous oxide is also a potent greenhouse gas. It has a longer atmospheric lifetime of 120 years. A range of industrial gases and air pollutants also impact on the climate system over short and long lifetimes. These are considered further in Appendices 1 and 2.

Neutralising or balancing emissions and removals of carbon dioxide and non-carbon dioxide greenhouse gases represents a considerable challenge but it is necessary at national and global levels.

† Climate sensitivity can be described as the temperature response of the Earth's climate system to a doubling of atmospheric carbon dioxide levels; the Fifth Assessment Report of the Intergovernmental Panel on Climate Change provided a likely range of 1.5°C to 4.5°C.

Appendix 2 Influences of Greenhouse Gases and Other Pollutants

Please note that this appendix has been reproduced from Appendix 1 of the First Report.

The Intergovernmental Panel on Climate Change determines the relative influences of greenhouse gases and other pollutants on the climate system by estimating their influence on the global energy balance since pre-industrial times, i.e. 1750. This is calculated as radiative forcing in watts per metre squared (Wm^{-2}). The estimates of this provided in the Fifth Assessment Report are shown in Figure A1.1.

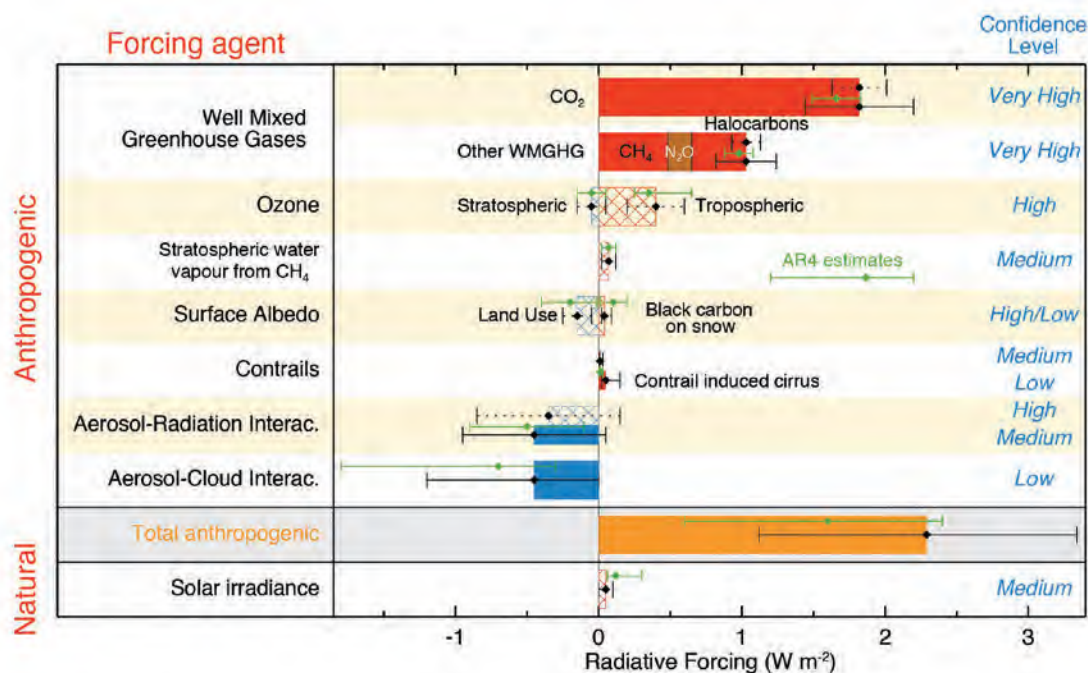


Figure A2.1: Radiative forcing of climate between 1750 and 2011. ⁽⁶⁾

It is notable that radiative forcing by carbon dioxide (CO_2) dominates this chart and that methane (CH_4) and nitrous oxide (N_2O) are the second and third most important greenhouse gases. The impact of a basket of industrial gases which include ozone depleting substances (ODS) and their replacement gases is also significant. While ozone depleting substances have been regulated under the Montreal Protocol and the Vienna Convention, their replacement gases, mainly hydrofluorocarbons (HFCs), are addressed under the UN Framework Convention on Climate Change. Moves to address these gases together under the Vienna Convention may be more appropriate from a policy perspective; however, the Council will aim to keep an overview of these emissions as part of its work. Also of note is the importance and variability of impacts of air pollution on climate. Increases in ground level ozone – a short-lived gas with an atmospheric lifetime of days to weeks – are significant. The impacts of other air pollutants are to cool the Earth by reflecting the energy from the sun directly as hazes or indirectly through influencing cloud characteristics. These impacts are short term but importantly have acted to mask some of the warming influences of greenhouse gases. It is noted that black carbon or soot is an exception to this, which acts to absorb solar energy and reduces the amount of energy reflected by snow and ice, leading to warming.

Appendix 3 Key Messages from the First Report

Please note that this appendix has been reproduced from the First Report.

The Council produced its First Report in November 2016.³ A summary of the main messages and recommendations from that report are included here in order to outline the Council's approach to the challenge of tackling climate change and to provide a context for the recommendations in this the Periodic Review Report.

Introduction and Context

The Council recognises the compelling messages on climate change from science (see appendix X) and the imperatives to address these through an effective policy framework from global to local levels. It welcomes the fact that these concerns are reflected in the Paris Agreement, the EU Climate and Energy Package and the National Policy Position.

The Council considers that, by the middle of this century, Ireland should aim to have no further negative influence on the Earth's climate system. This challenge of moving to a carbon neutral economy and society must be met, while simultaneously adapting to the adverse impacts of climate change which are now inevitable.

The transformation required in the Irish economy and society to meet this objective represents a different and more difficult task than any other area of public policy. The costs of inaction will fall much more heavily on future generations. The current generation in Ireland, and elsewhere, will have to be leaders in transforming the economy and society to halt the rise in global temperature, the most well-known measure of climate change.

The National Mitigation Plan should provide a roadmap to achieve the National 2050 mitigation objective and, in doing so, identify policies and measures to meet intermediate targets agreed at EU level for 2020 and 2030. It should establish the required stable policy framework at sectoral level needed to achieve the 2050 objective in a cost-effective manner. This framework should take account of other important environmental goals and it should support economic and social development.

The Council emphasises that meeting emissions targets to 2020 and 2030 is intrinsically linked to the overall 2050 transition and that these interim goals should be considered together when analysing the overall costs of actions or of delaying actions.

Cross-cutting Issues for Mitigation

Pricing Carbon Emissions

The Council emphasises the importance of an effective price signal for carbon emissions. The Council is concerned that the EU Emissions Trading Scheme has, to date, failed to deliver the price signal that is essential to advance decarbonisation of the electricity sector in Ireland and across Europe. The recent increase in the carbon intensity of electricity generation in Ireland reflects the defective nature of the current EU Emissions Trading Scheme. In June, the Council advised the government on the need to advance reforms of the EU Emissions Trading Scheme, including the establishment of an adequate price floor.

The introduction of a national carbon tax was a major step forward in putting a price on carbon for the rest of the domestic economy. This price must evolve to reflect the cost of achieving decarbonisation. The Council expects that the National Mitigation Plan will address the effectiveness of the current national carbon price and its future development.

Non-Price Interventions

Price signals alone are not enough to incentivise sufficient decarbonisation. Individuals and companies respond in different ways to different policy instruments. As a result, a range of additional policies and measures are required to address behavioural barriers and promote the necessary behavioural change. These may include regulations, standards, education initiatives and targeted information campaigns.

Addressing Fossil Fuel Subsidies

There are many supports which either directly or indirectly subsidise the continued use of fossil fuels. The National Mitigation Plan should identify these subsidies and plan for their removal. In particular, the Council recommends that price supports for electricity generation from peat be removed as soon as possible, while also providing support for communities that may be adversely affected.

Sector-Specific Issues

Renewable Energy

Policies to enable renewable energy deployment are essential. Wind energy deployment has progressed at considerable pace, with 2,400 megawatts (MW) installed by 2015; there is a requirement for a further 1,600 megawatts to be installed before 2020. This requires an increased pace of installation. Policies enabling increased community engagement and more efficient and effective planning and regulation may aid timely deployment.

Home Heating and Retrofits

The Sustainable Energy Authority Ireland has estimated that, in order to achieve 2020 Energy Efficiency targets, around 75,000 homes per year will need energy efficiency upgrades between now and 2020. Factoring health and quality of life benefits into analysis of the cost of retrofitting of homes makes such investments more attractive.

Transport and Taxation

Progress in tackling transport emissions has been very limited. While an appropriate price signal is essential, many other supporting measures will be needed to address the factors that influence transport choices. The Council recommends that health and wider societal costs, such as congestion costs, should be factored into decision making on transport.

Lessons learned from the restructuring of motor and vehicle registration tax systems in the past point to how changes in the tax system can produce significant changes in behaviour, while also being revenue neutral.

Agriculture, Forestry and Land Use

The agriculture sector in combination with forestry and other land use categories will need to outline a pathway to achieve its contribution to the 2050 national mitigation objective. This should include actions to significantly reduce emissions and to enhance carbon uptake in soils and biomass through sustainable forestry and improved land management. Sustainable afforestation can make an important contribution to climate actions and have wider ecological, economic and societal benefits. These actions will need to be implemented in a measurable, reportable and verifiable manner. The Council recognises that more research and development is needed; however, land management practices will require change. A timeline for expected delivery of solutions from such investment should be provided in the National Mitigation Plan. Research has shown that a switch to lower emission fertilisers would be effective in reducing greenhouse gas emissions. This switch should be made.

Adaptation

Ownership, responsibility and governance are essential for implementation of the National Adaptation Framework process. The National Adaptation Framework should provide clarity on these issues. It should also identify adaptation priorities and provide a common framework for investment decision making.

Authoritative Information – Climate Ireland

It is essential that adaptation planning under the National Adaptation Framework is supported by authoritative and relevant information over the range of climate scenarios that are relevant for Ireland. The Climate Ireland platform should be used to provide such information for planning by sectors and local authorities[†]. The Council considers that this should evolve from research to an operational mode in order to support the development of the National Adaptation Framework and implementation of adaptation actions under this framework.

Research and Systematic Observations

A well-structured and effective climate change research and innovation programme is an essential component of the national response to climate change. Critically this is needed to provide information and analysis for policy. It should also support innovation to develop and deploy climate solutions and services arising from the opportunities that the national and global transition will bring. The Council strongly recommends that there should be continued support for research and innovation, including observation systems, and the further development of these via a well-structured and effective climate change research programme.

The Council is concerned that the necessary modelling tools are not available to support government departments or the Council to do their work effectively. Suitable models and observation systems are needed to assess the full nature of the challenges facing us and to develop effective policies. These tools, along with observational and activity data, provide essential information for policy development over the short, medium and longer terms.

[†] Climate Ireland [website, created 2016]. Available at www.climateireland.ie/#/ [Accessed: 27 June 2017]

Appendix 4 Carbon Pricing

In its First Report the Council emphasised the importance of an effective price signal for carbon emissions. The term ‘carbon pricing’ is short-hand for putting a value on greenhouse gas emissions that aims to reflect, to some degree, the costs to society of climate change from those emissions. Carbon pricing ensures that some of the costs of climate change from greenhouse gas emissions are taken into account in the decisions of producers and consumers. Rather than a regulatory approach dictating how and where emissions are reduced, a carbon price gives an economic signal that potential polluters will incorporate to their decision-making framework. Typically, in response to increased costs, polluters will reduce overall emissions in the cheapest way. In this way, the overall environmental goal can be achieved in the most flexible and least-cost way to society.

There are three main tools for carbon pricing: carbon taxes, emissions trading systems, and shadow pricing in economic analysis and evaluation frameworks. Ireland collects a carbon tax and applies a shadow carbon price in cost-benefit analysis of public investments and expenditures. Ireland also participates in the EU Emissions Trading Scheme, which covered about 28% of emissions in Ireland in 2015.

Setting a Carbon Price: Setting Ambition

In theory, the carbon price and associated level of emissions should be set at the level where the cost of abating a unit of greenhouse gas emissions is equal to the value of the damage associated with that emission. However, constraints in knowledge and analytical resources mean that it is impossible to know with certainty where that optimum level is. There are two main analytical approaches to setting or choosing the appropriate level of carbon pricing. One approach is to estimate the marginal damage cost to society of each additional tonne of greenhouse gases emitted and to set this as the carbon price. The second approach, often characterised as the ‘target-consistent’ approach, is to estimate the abatement cost associated with an agreed emission reduction target. Both approaches generate a carbon price that increases over time either due to increasing impacts from a greater accumulation of greenhouse gases in the atmosphere, or due to increasing costs of abatement as lower cost options are exhausted. Given the difficulties associated with estimating marginal societal damage costs of climate change, the ‘target-consistent’ approach to setting a carbon price is a simpler approach, though it also presents difficulties.

The marginal abatement cost (MAC) curve informs the target-consistent approach. Marginal abatement costs rise with increased abatement/mitigation as illustrated in Figure A4.1. Each point on the marginal abatement cost curve shows the overall mitigation or abatement level associated with a carbon price. The higher the carbon price, the more low-carbon technologies or options become competitive and vice versa. Over time, the marginal abatement cost curve will evolve. The curve will shift towards the right as existing technologies fall in price (e.g. solar photovoltaic), and new technologies are developed. It might also change in shape as the very low or negative-cost options are implemented and thus no longer available. An effective carbon price can incentivise investment in research and development that lowers technology costs and develops new abatement options thus shifting the marginal abatement cost curve.

By setting a carbon price associated with a level of emissions, government shifts economic and financial decision-making frameworks, such as cost-benefit or net present value estimations,

towards low-carbon options. Depending on the level of the carbon price, high carbon options may still be chosen if they are significantly cheaper. It should be noted that price signals alone are not enough to incentivise sufficient decarbonisation. A range of additional policies and measures are required to address behavioural barriers and market failures.

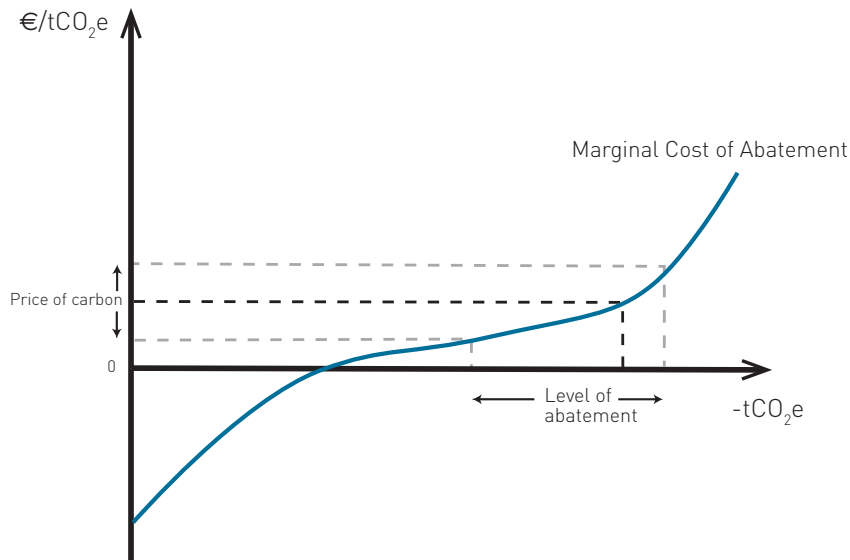


Figure A4.1: Illustrative marginal abatement cost curve.

Carbon Tax

A carbon tax sets a 'real world' price on carbon by defining a tax rate on emissions or, more commonly, on the carbon content of fossil fuels. The emission reduction outcome of a carbon tax is not known with certainty but is estimated based on the marginal abatement cost curve.

Ireland introduced a carbon tax in the 2010 Budget. Since then it has generated over €2 billion in revenue for the Irish government. The carbon tax applies to both liquid and solid fuels. Table A4.1 lists the carbon tax rates applied internationally. The Irish tax rate is approximately in the mid-range of rates applied. Some countries apply significantly higher rates.

Table A4.1 Carbon tax rates in 2015. Source: Partnership for Market Readiness (PMR) 2017.[†]

Country /Province	Price \$2015/tCO ₂ ea	Country	Price \$2015/tCO ₂ ea
British Columbia	22	Japan	3
Chile	5	Mexico	1 – 4
Denmark	31	Norway	4 – 69
Finland	48–83	Portugal	5
France	24	South Africa	8.50 ^b
Iceland	10	Sweden	132 ^c
India	6	Switzerland	87
Ireland	28 (€20)	United Kingdom	16

^a The carbon tax rates shown represent the tax rate in force in 2015, expressed in 2015 US dollars, at the then prevailing exchange rates.

^b This rate is the “headline” rate for the South Africa carbon tax. In the first phase of the tax (from its implementation up to 2020), liable entities are allocated tax-free allowances of 60– 95 percent, meaning that the effective tax rate paid by liable entities will be significantly lower than the headline rate.

^c Sweden currently still applies a lower tax rate to industry. However, as from 2018, the industry rate will rise to the same level as the general rate, and for that reason only the general rate is shown here.

Emissions Trading Systems

Emissions trading systems work on the ‘cap and trade’ principle. A cap is set on the total amount of certain greenhouse gases that can be emitted by installations covered by the system. The cap is reduced over time so that total emissions fall. Within the cap, companies receive or buy emission allowances which they can trade with one another as needed, leading to the emergence of a market carbon price. They usually can also buy limited amounts of international credits from emission-saving projects around the world. The limit on the total number of allowances available ensures that they have a value. After each year a company must surrender enough allowances to cover its emissions, otherwise fines are imposed. Trading brings flexibility that encourages emissions to be cut where it costs least to do so. The emissions reduction outcome of an emissions trading system is known with a high degree of certainty linked to the robustness of its measurement and verification systems. The market carbon price outcome of emissions trading systems can be estimated from the marginal abatement cost curve, but experience in the EU has shown this to be unreliable.

There are an increasing number of emissions trading systems in the world. The Republic of Korea, Switzerland, New Zealand, Kazakhstan, California, the seven largest Chinese cities and Québec have all introduced emissions trading. A number of other countries and regions, including China as a whole, are seriously considering the measure. The EU Emissions Trading Scheme, in which Ireland participates, is the largest emissions trading system in the world. It covers approximately

[†] Partnership for Market Readiness (PMR) 2017. Carbon Tax Guide: A Handbook for Policy Makers. World Bank, Washington, DC. Licence: Creative Commons Attribution CC BY 3.0 IGO. [Online]. Available at: <https://openknowledge.worldbank.org/bitstream/handle/10986/26300/Carbon%20Tax%20Guide%20-%20Main%20Report%20web%20FINAL.pdf?sequence=1&isAllowed=y> [Accessed: 30 June 2017]

11,000 power stations and manufacturing plants (installations) across the EU Member States as well as Iceland, Liechtenstein and Norway. The EU Emissions Trading Scheme trades in emission allowances called EUAs which each represent one tonne of carbon dioxide equivalent.

EUAs currently trade at approximately €5/tCO₂e.[†] Following progress in reform of the EU Emissions Trading Scheme in 2017, with both the European Parliament and the EU Environment Council agreeing positions in favour of reform, a survey of carbon market analysts found expectations of an annual average carbon price in 2019 of €7.12/tCO₂e (ibid). This expectation remains less than a quarter what the original analysis of the EU Commission suggested: a target-consistent, cost-effective carbon price of €30/tCO₂e in 2020 in the Emissions Trading Scheme.[‡]

Shadow Carbon Pricing

Shadow carbon pricing is one name for the application of an adopted or assumed carbon price in the analysis of costs and benefits, impact assessment or net present value (NPV) of policies, measures, actions and/or investments to inform better decision making.

In Ireland, the Department of Public Expenditure and Reform is responsible for the Public Spending Code. The Public Spending Code is a set of rules, methodologies and procedures for the analysis of policies, measures and investments. It includes national guidance on the monetisation or pricing of greenhouse gas emissions in appraisal of government spending, last updated in 2012. The recommended values per tonne of carbon dioxide equivalent (tCO₂e) for the post-2020 period are based on reference scenario values taken from the impact assessment of the EU 2030 Climate and Energy Framework.[§] The Commission analysis notes that the reference scenario modelled does not achieve the agreed EU target to reduce emissions by 40% from 1990 levels by 2030.

[†] Reuters (12 April 2017) Analysts up EU carbon price forecasts on market reform hopes, [Online]. Available at: <http://uk.reuters.com/article/uk-eu-carbon-idUKKBN17E1Q3> [Accessed: 30 June 2017]

[‡] European Commission (2008) Impact Assessment: Document accompanying the Package of Implementation measures for the EU's objectives on climate change and renewable energy for 2020 Staff Working Document DG Clima [Online]. Available at: https://ec.europa.eu/clima/sites/clima/files/strategies/2020/docs/sec_2008_85_ia_en.pdf [Accessed: 30 June 2017]

[§] European Commission (2014) Impact Assessment: Document accompanying the Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions A policy framework for climate and energy in the period from 2020 up to 2030; Commission Staff Working Document, [Online]. Available at: <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52014SC0015&from=EN> [Accessed: 30 June 2017]

Table A4.2: Shadow price of carbon, Source: Various, see footnotes.

	Ireland €2010/tCO ₂ e*	UK1 £/tCO ₂ e (low/central/high)	European Investment Bank2 €/tCO ₂ e (low/ central/high)	WB Commission on Carbon Prices*** US\$/tCO ₂ e
2020	€10	£0.00/£4.58/£9.14 traded** £30/£60/£90 non-traded £38.68/£77.37/£116.05 traded**	€15/€35/€60	\$40-\$80
2030	€35	£35/£70/£105 non-traded	€20/€45/€80	\$50-\$100
2050	€100	£100/£200/£300	€30/€65/€120	

* The public spending code suggests that “for sensitivity purposes, Departments/Agencies could use (i) the values for carbon that are put forward in the Impact assessment (2014) of the EU Framework for Climate and Energy Policies, and (ii) the projected values for carbon that emerge from the domestic low-carbon road-mapping and modelling process that is ongoing”.† ‡

** Estimates last updated in March 2017. The traded price relates to the price of carbon prevailing in the Emissions Trading Scheme sector, with the non-traded price representing the non-Emissions Trading Scheme sector.§

*** The conclusion of the High Level Commission on Carbon Prices regarding the explicit carbon-price level consistent with achieving the Paris temperature target, provided a supportive policy environment is in place.

† HM Treasury (2011) The Green Book; Appraisal and Evaluation in Central Government; TSO July 2011 [Online]. Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/220541/green_book_complete.pdf [Accessed: 22 June 2017]

‡ European Investment Bank (2013) “The Economic Appraisal of Investment Projects at the EIB”, (Projects Directorate), Page 25 [Online]. Available at: http://www.eib.org/attachments/thematic/economic_appraisal_of_investment_projects_en.pdf [Accessed: 22 June 2017]

§ Department for Business, Energy and Industrial Strategy (2017); Updated Short-Term Traded Carbon Values; Used for UK Public Policy Appraisal, [Online]. Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/600710/Updated_short-term_traded_carbon_values_for_appraisal_purposes_2016.pdf [Accessed: 22 June 2017]

Appendix 5 Letters to Ministers on Sectoral Actions Outlined in Draft National Mitigation Plan

Please note that the letters have been reproduced verbatim.

The Council reviewed the draft National Mitigation Plan with particular focus on sectoral actions outlined within the plan. Advice and recommendations provided to the Minister of Communications, Climate Action and Environment and Ministers responsible for the sectors are included here.

Mr Denis Naughten TD
Minister for Communications,
Climate Action and Environment
29 – 31 Adelaide Road
Dublin 2
D02 X285



4 May 2017

Dear Minister Naughten,

McCumiskey House
Richview
Clonskeagh road
Dublin 14
D14 YR62
Phone: 01 2680180
Email: info@climatecouncil.ie

RE: Council response to Draft National Mitigation Plan

The Climate Change Advisory Council welcomes the publication of the draft National Mitigation Plan (NMP) that was published on the 15th March 2017.

Following on from your correspondence dated the 23rd March, I wrote to the relevant Ministers and requested the Council Secretariat to meet with senior officials in the various departments that contributed to the draft NMP. A series of meetings have subsequently taken place. At its meeting on the 26th of April, the Council members were briefed on the outcomes from these engagements.

The Council welcomes the progression that is evident in the draft NMP. However, there are a number of important issues, which we had identified previously, that remain to be addressed. We hope that the first NMP will enhance clarity on policies and measures, the basis for their inclusion, and address gaps evident in the current draft. In this context the Council believes that the main messages and principles that are outlined in its First Report may further assist in this process.

The Council wishes to highlight the need for a transparent and coherent framework for economy-wide actions, including analysis of the price of carbon, in order to underpin actions over time horizons to 2030 and 2050.

The process for achievement of the national transition objective for 2050 should be a central component of the NMP. It should inform sectoral actions, frame shorter term actions to 2020 and 2030, including analysis of costs and benefits of policies, measures and investments. The NMP should clearly signal the direction of travel for the main sectors and outline associated approaches and scenarios to 2050. Sectoral goals that are consistent with and contribute to the achievement of the national transition objective should also be considered within this context.

In its First Report the Council highlighted the importance of an effective price signal for carbon emissions in guiding how Ireland can meet its climate change objectives in the most cost effective manner. Analysis of experience elsewhere in the EU may assist in this process: for example, the European Investment Bank applies a higher short term cost of carbon in its investment appraisal. The Council is concerned that the current assumptions about the cost of carbon are not clear and therefore may not be consistent with the national transition objective described in the National Policy Position or with the achievement of this objective in the most cost-effective manner.

The standard approach used by the Department of Public Expenditure and Reform to compare the costs and benefits of investment projects, involving a 5% discount rate, may be unsuitable for this analysis, given the time horizon over which the full effects of climate change are expected to materialise. Using a standard discount rate means that the long-term effects of climate change will effectively be ignored in investment planning.

Given the major task that Ireland faces, it will be essential to use fiscal measures as a major policy instrument in tackling the problem of climate change. Naturally where market failures are established, other instruments will be required, some of which are identified in the draft NMP. Overall the wider links between climate and fiscal policy need to be further developed and described in a transparent manner within the NMP.

As stated in the First Report, addressing climate change provides a unique challenge for public policy. The response must be inherently cross-sectoral and it must provide an integrated and managed transition. The NMP should provide the necessary governance framework and implementation structures and it should spell out the required near term policies, measures and actions.

The Council considers that, in addition to the statutory processes identified in the Climate Action and Low Carbon Development Act 2015, high level ownership and management of this process is required to ensure that actions are progressed in a coordinated manner and their performance adequately measured. This type of approach has been adopted for other national strategies and plans such as Food Harvest 2025.

In relation to shorter terms emissions reduction requirements to 2020 and 2030, the Council welcomes the details provided on the emissions budget in the draft NMP. It is anticipated that details on how this economy-wide budget will be managed, including at sectoral levels, will be provided in the first NMP.

The Council notes the range of policies, measures and technologies that are identified, some of which are quantified in terms of costs and emissions reductions. However, it is not clear if a consistent approach was taken by different Departments. It would be beneficial, and ensure greater consistency, if your Department could request and clarify that the sectors apply the Public Expenditure Code in assessing the full costs and benefits of different measures proposed to address climate change. The costs and benefits associated with air pollutants and other significant externalities should be calculated in every case.

Furthermore, the Council considers it timely to conduct a review of the cost of carbon, the cost of air pollutants and the discount rate captured in the Public Expenditure Code. The Council therefore recommends that your Department make a request to the Minister for Public Expenditure and Reform in this regard.

Implementation and deployment of policies, measures, and technologies to tackle climate change is a complex undertaking. Societal and behaviour issues will also need to be considered, with the overall process aiming to enable an equitable transition. The distributional effects of the range of policies proposed needs to be appropriately considered. The benefits and opportunities for health, wellbeing and sustainable development that arise from this transition also warrant a much higher profile within the NMP.

Finally the Council considers that the concept of a 'living document' needs to be defined in the NMP, along with the explanation of any revision process. This should take account of the need for the provision of a NMP every 5 years.

As your Department is also responsible for two key components of the NMP, decarbonising electricity generation and energy efficiency in the built environment, I would also like to convey the following advisory points from the Council on these areas:

Decarbonising Electricity Generation

The EU Emissions Trading Scheme has, so far, failed to provide an adequate price signal. Options to address such market failures need to be identified and advanced to facilitate a cost effective decarbonisation pathway to 2050. Decarbonisation of electricity generation is essential for economy-wide decarbonisation, especially in the areas of heating and transport. Further elaboration of these links and options to facilitate this in a cost effective manner is required.

The draft NMP highlights the potential of Ireland's abundant indigenous renewable resources. Options to realise this potential, including the utilisation of emerging technologies and solutions for distributed generation should be included in the NMP. Societal and behaviour issues and barriers will need to be addressed in a positive and constructive manner so that the opportunities that arise from the uptake of clean and renewable resources are realised at all scales.

Energy Efficiency and the Built Environment

Retrofit of the existing building stock is the key challenge in addressing energy efficiency in the built environment. A sectoral goal is required that outlines the expected performance level of buildings in 2050 in terms of heating, lighting and appliances. While the new building standards are welcome, a strategy is required for taking the existing housing stock to the required performance levels by 2050 with near zero emissions and at minimum cost to the consumer. The strategy should address synergies and trade-offs between shallow and deep retrofit programmes and should take on board lessons learned from behaviour, community and transitions studies to inform a cost-effective policy response.

For your information I have also included a copy of the letters sent to the other Ministers providing advice from the Council on their components of the draft NMP.

The Council plans to include this material in its first Periodic Review Report which will be provided to you by the 17th July. The production schedule for this report means that it will probably not be possible for the Council to comment on the finalised NMP which is due to be submitted to Government by mid-June 2017.

It would greatly facilitate our work, and it may be of value to your Department, if there are further meetings between the Secretariat of the Council and your officials over the next two months. This would allow your Department to follow our evolving thinking and help us to fully understand the approaches that you are taking in the final NMP.

Should you wish to clarify any of the points above, please contact myself directly or via the Climate Change Advisory Council's Secretariat via Claire Camilleri at C.Camilleri@epa.ie or phone 01 2680145.

Yours sincerely,

Prof. John FitzGerald

Chair

Climate Change Advisory Council

Mr Shane Ross TD
Minister for Transport,
Tourism and Sport
Leeson Lane
Dublin 2
Ireland D02TR60

04 May 2017



McCumiskey House
Richview
Clonskeagh road
Dublin 14
D14 YR62
Phone: 01 2680180
Email: info@climatecouncil.ie

Dear Minister Ross,

RE: Sectoral actions outlined in the draft National Mitigation Plan

I am writing to you to provide you with an outline of the outcomes from the Climate Change Advisory Council meeting on the 26th April which considered the draft National Mitigation Plan (NMP). At that meeting the Council members were also briefed on the outcomes from the Council Secretariat engagement with senior officials from your Department which was requested in our correspondence of the 7th April. In order to facilitate your Department's contribution to the further development of the NMP I will outline both the Council views on the full NMP which have been conveyed to Minister Naughten and specific advisory points on your sector.

In relation to the draft NMP that was published on the 15th March 2017, the Council welcomes the progression that is evident. However, there are a number of important issues, which we had identified previously, that remain to be addressed. We hope that the first NMP will enhance clarity on policies and measures, the basis for their inclusion, and address gaps evident in the current draft. In this context the Council believes that the main messages and principles that are outlined in its First Report may further assist in this process.

The Council wishes to highlight the need for a transparent and coherent framework for economy-wide actions, including analysis of the price of carbon, in order to underpin actions over time horizons to 2030 and 2050.

The process for achievement of the national transition objective for 2050 should be a central component of the NMP. It should inform sectoral actions, frame shorter term actions to 2020 and 2030, including analysis of costs and benefits of policies, measures and investments. The NMP should clearly signal the direction of travel for the main sectors and outline associated approaches and scenarios to 2050. Sectoral goals that are consistent with and contribute to the achievement of the national transition objective should also be considered within this context.

In its First Report the Council highlighted the importance of an effective price signal for carbon emissions in guiding how Ireland can meet its climate change objectives in the most cost effective manner. Analysis of experience elsewhere in the EU may assist in this process: for example, the

European Investment Bank applies a higher short term cost of carbon in its investment appraisal. The Council is concerned that the current assumptions about the cost of carbon are not clear and therefore may not be consistent with the national transition objective described in the National Policy Position or with the achievement of this objective in the most cost-effective manner.

The standard approach used by the Department of Public Expenditure and Reform to compare the costs and benefits of investment projects, involving a 5% discount rate, may be unsuitable for this analysis, given the time horizon over which the full effects of climate change are expected to materialise. Using a standard discount rate means that the long-term effects of climate change will effectively be ignored in investment planning.

Given the major task that Ireland faces, it will be essential to use fiscal measures as a major policy instrument in tackling the problem of climate change. Naturally where market failures are established, other instruments will be required, some of which are identified in the draft NMP. Overall the wider links between climate and fiscal policy need to be further developed and described in a transparent manner within the NMP.

As stated in the First Report, addressing climate change provides a unique challenge for public policy. The response must be inherently cross-sectoral and it must provide an integrated and managed transition. The NMP should provide the necessary governance framework and implementation structures and it should spell out the required near term policies, measures and actions.

The Council considers that, in addition to the statutory processes identified in the Climate Action and Low Carbon Development Act 2015, high level ownership and management of this process is required to ensure that actions are progressed in a coordinated manner and their performance adequately measured. This type of approach has been adopted for other national strategies and plans such as Food Harvest 2025.

In relation to shorter terms emissions reduction requirements to 2020 and 2030, the Council welcomes the details provided on the emissions budget in the draft NMP. It is anticipated that details on how this economy-wide budget will be managed, including at sectoral levels, will be provided in the first NMP.

The Council notes the range of policies, measures and technologies that are identified, some of which are quantified in terms of costs and emissions reductions. However, it is not clear if a consistent approach was taken by different Departments. It would be beneficial, and ensure greater consistency, if the Department of Communications, Climate Action and Environment could request and clarify that the sectors apply the Public Expenditure Code in assessing the full costs and benefits of different measures proposed to address climate change. The costs and benefits associated with air pollutants and other significant externalities should be calculated in every case.

Furthermore, the Council considers it timely to conduct a review of the cost of carbon, the cost of air pollutants and the discount rate captured in the Public Expenditure Code. The Council therefore recommends that your Department make a request to the Minister for Public Expenditure and Reform in this regard.

Implementation and deployment of policies, measures, and technologies to tackle climate change is a complex undertaking. Societal and behaviour issues will also need to be considered,

with the overall process aiming to enable an equitable transition. The distributional effects of the range of policies proposed needs to be appropriately considered. The benefits and opportunities for health, wellbeing and sustainable development that arise from this transition also warrant a much higher profile within the NMP.

Finally the Council considers that the concept of a 'living document' needs to be defined in the NMP, along with the explanation of any revision process. This should take account of the need for the provision of a NMP every 5 years.

I would also like to convey the following advisory points from the Council on the transport sector:

Decarbonising Transport

A pathway to 2050 with short, medium and long term goals is required in the plan, along with key transition points and clear options for the deployment of effective existing low and zero emissions technologies. The sector should also determine its contribution to the identified emissions budget for the periods to 2020 and 2030 in the NMP.

Transport investments, especially public transport, need to be integrated with spatial planning to maximise progress in reducing emissions. That integration should form a key part of the sector's plan. Market failures and critical constraints also need to be identified, and fossil fuel lock-in avoided to enable the full decarbonisation of future transport systems. Co-benefits like health, air quality and mobility should be central to assessment of the costs and benefits of measures to address barriers.

This letter will be copied to Minister Naughten and the Council plans to include this material in its first Periodic Review Report which will be provided to government by the 17th July. The production schedule for this report means that it will probably not be possible for the Council to comment on the finalised NMP which is due to be submitted to Government by mid-June 2017.

Should you wish to clarify any of the points above, please contact myself directly or via the Climate Change Advisory Council's Secretariat via Claire Camilleri at C.Camilleri@epa.ie or phone 01 2680145.

Yours sincerely,

Prof. John FitzGerald

Chair

Climate Change Advisory Council



Mr Simon Coveney TD
 Minister Housing, Planning, Community and Local Government
 Custom House
 Dublin D01 W6X0

04 May 2017

Dear Minister Coveney,

McCumiskey House
 Richview
 Clonskeagh road
 Dublin 14
 D14 YR62
 Phone: 01 2680180
 Email: info@climatecouncil.ie

RE: Sectoral actions outlined in the draft National Mitigation Plan

I am writing to you to provide you with an outline of the outcomes from the Climate Change Advisory Council meeting on the 26th April which considered the draft National Mitigation Plan (NMP). At that meeting the Council members were also briefed on the outcomes from the Council Secretariat engagement with senior officials from your Department which was requested in our correspondence of the 7th April. In order to facilitate your Department's contribution to the further development of the NMP I will outline both the Council views on the full NMP which have been conveyed to Minister Naughten and specific advisory points on your sector.

In relation to the draft NMP that was published on the 15th March 2017, the Council welcomes the progression that is evident. However, there are a number of important issues, which we had identified previously, that remain to be addressed. We hope that the first NMP will enhance clarity on policies and measures, the basis for their inclusion, and address gaps evident in the current draft. In this context the Council believes that the main messages and principles that are outlined in its First Report may further assist in this process.

The Council wishes to highlight the need for a transparent and coherent framework for economy-wide actions, including analysis of the price of carbon, in order to underpin actions over time horizons to 2030 and 2050.

The process for achievement of the national transition objective for 2050 should be a central component of the NMP. It should inform sectoral actions, frame shorter term actions to 2020 and 2030, including analysis of costs and benefits of policies, measures and investments. The NMP should clearly signal the direction of travel for the main sectors and outline associated approaches and scenarios to 2050. Sectoral goals that are consistent with and contribute to the achievement of the national transition objective should also be considered within this context.

In its First Report the Council highlighted the importance of an effective price signal for carbon emissions in guiding how Ireland can meet its climate change objectives in the most cost effective manner. Analysis of experience elsewhere in the EU may assist in this process: for example, the European Investment Bank applies a higher short term cost of carbon in its investment appraisal. The Council is concerned that the current assumptions about the cost of carbon are not clear and therefore may not be consistent with the national transition objective described in the National Policy Position or with the achievement of this objective in the most cost-effective manner.

The standard approach used by the Department of Public Expenditure and Reform to compare the costs and benefits of investment projects, involving a 5% discount rate, may be unsuitable for this analysis, given the time horizon over which the full effects of climate change are expected to materialise. Using a standard discount rate means that the long-term effects of climate change will effectively be ignored in investment planning.

Given the major task that Ireland faces, it will be essential to use fiscal measures as a major policy instrument in tackling the problem of climate change. Naturally where market failures are established, other instruments will be required, some of which are identified in the draft NMP. Overall the wider links between climate and fiscal policy need to be further developed and described in a transparent manner within the NMP.

As stated in the First Report, addressing climate change provides a unique challenge for public policy. The response must be inherently cross-sectoral and it must provide an integrated and managed transition. The NMP should provide the necessary governance framework and implementation structures and it should spell out the required near term policies, measures and actions.

The Council considers that, in addition to the statutory processes identified in the Climate Action and Low Carbon Development Act 2015, high level ownership and management of this process is required to ensure that actions are progressed in a coordinated manner and their performance adequately measured. This type of approach has been adopted for other national strategies and plans such as Food Harvest 2025.

In relation to shorter terms emissions reduction requirements to 2020 and 2030, the Council welcomes the details provided on the emissions budget in the draft NMP. It is anticipated that details on how this economy-wide budget will be managed, including at sectoral levels, will be provided in the first NMP.

The Council notes the range of policies, measures and technologies that are identified, some of which are quantified in terms of costs and emissions reductions. However, it is not clear if a consistent approach was taken by different Departments. It would be beneficial, and ensure greater consistency, if the Department of Communications, Climate Action and Environment could request and clarify that the sectors apply the Public Expenditure Code in assessing the full costs and benefits of different measures proposed to address climate change. The costs and benefits associated with air pollutants and other significant externalities should be calculated in every case.

Furthermore, the Council considers it timely to conduct a review of the cost of carbon, the cost of air pollutants and the discount rate captured in the Public Expenditure Code. The Council therefore recommends that your Department make a request to the Minister for Public Expenditure and Reform in this regard.

Implementation and deployment of policies, measures, and technologies to tackle climate change is a complex undertaking. Societal and behaviour issues will also need to be considered, with the overall process aiming to enable an equitable transition. The distributional effects of the range of policies proposed needs to be appropriately considered. The benefits and opportunities for health, wellbeing and sustainable development that arise from this transition also warrant a much higher profile within the NMP.

Finally the Council considers that the concept of a 'living document' needs to be defined in the NMP, along with the explanation of any revision process. This should take account of the need for the provision of a NMP every 5 years.

I would also like to convey the following advisory points from the Council on the built environment sector:

Energy Efficiency and the Built Environment

Retrofit of the existing building stock is the key challenge in addressing energy efficiency in the built environment. A sectoral goal is required that outlines the expected performance level of buildings in 2050 in terms of heating, lighting and appliances. While the new building standards are welcome, a strategy is required for taking the existing housing stock to the required performance levels by 2050 with near zero emissions and at minimum cost to the consumer. The strategy should address synergies and trade-offs between shallow and deep retrofit programmes and should take on board lessons learned from behaviour, community and transitions studies to inform a cost-effective policy response.

This letter will be copied to Minister Naughten and the Council plans to include this material in its first Periodic Review Report which will be provided to government by the 17th July. The production schedule for this report means that it will probably not be possible for the Council to comment on the finalised NMP which is due to be submitted to Government by mid-June 2017.

Should you wish to clarify any of the points above, please contact myself directly or via the Climate Change Advisory Council's Secretariat via Claire Camilleri at C.Camilleri@epa.ie or phone 01 2680145.

Yours sincerely,

Prof. John FitzGerald

Chair

Climate Change Advisory Council

Mr Michael Creed TD
Minister for Agriculture Food and the Marine
Agriculture House
Kildare St
Dublin 2
D02 WK12



04 May 2017

McCumiskey House
Richview
Clonskeagh road
Dublin 14
D14 YR62
Phone: 01 2680180
Email: info@climatecouncil.ie

Dear Minister Creed,

RE: Sectoral actions outlined in the draft National Mitigation Plan

I am writing to you to provide you with an outline of the outcomes from the Climate Change Advisory Council meeting on the 26th April which considered the draft National Mitigation Plan (NMP). At that meeting the Council members were also briefed on the outcomes from the Council Secretariat engagement with senior officials from your Department which was requested in our correspondence of the 7th April. In order to facilitate your Department's contribution to the further development of the NMP I will outline both the Council views on the full NMP which have been communicated to Minister Naughten and specific advisory points on your sector.

In relation to the draft NMP that was published on the 15th March 2017 the Council welcomes the progression that is evident. However, there are a number of important issues, which we had identified previously, that remain to be addressed. We hope that the first NMP will enhance clarity on policies and measures, the basis for their inclusion, and address gaps evident in the current draft. In this context the Council believes that the main messages and principles that are outlined in its First Report may further assist in this process.

The Council wishes to highlight the need for a transparent and coherent framework for economy-wide actions, including analysis of the price of carbon, in order to underpin actions over time horizons to 2030 and 2050.

The process for achievement of the national transition objective for 2050 should be a central component of the NMP. It should inform sectoral actions, frame shorter term actions to 2020 and 2030, including analysis of costs and benefits of policies, measures and investments. The NMP should clearly signal the direction of travel for the main sectors and outline associated approaches and scenarios to 2050. Sectoral goals that are consistent with and contribute to the achievement of the national transition objective should also be considered within this context.

In its First Report the Council highlighted the importance of an effective price signal for carbon emissions in guiding how Ireland can meet its climate change objectives in the most cost effective manner. Analysis of experience elsewhere in the EU may assist in this process: for example, the European Investment Bank applies a higher short term cost of carbon in its investment appraisal. The Council is concerned that the current assumptions about the cost of carbon are not clear and therefore may not be consistent with the national transition objective described in the National Policy Position or with the achievement of this objective in the most cost-effective manner.

The standard approach used by the Department of Public Expenditure and Reform to compare the costs and benefits of investment projects, involving a 5% discount rate, may be unsuitable for this analysis, given the time horizon over which the full effects of climate change are expected to materialise. Using a standard discount rate means that the long-term effects of climate change will effectively be ignored in investment planning.

Given the major task that Ireland faces, it will be essential to use fiscal measures as a major policy instrument in tackling the problem of climate change. Naturally where market failures are established, other instruments will be required, some of which are identified in the draft NMP. Overall the wider links between climate and fiscal policy need to be further developed and described in a transparent manner within the NMP.

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The Council considers that, in addition to the statutory processes identified in the Climate Action and Low Carbon Development Act 2015, high level ownership and management of this process is required to ensure that actions are progressed in a coordinated manner and their performance adequately measured. This type of approach has been adopted for other national strategies and plans such as Food Harvest 2025.

In relation to shorter terms emissions reduction requirements to 2020 and 2030, the Council welcomes the details provided on the emissions budget in the draft NMP. It is anticipated that details on how this economy-wide budget will be managed, including at sectoral levels, will be provided in the first NMP.

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Furthermore, the Council considers it timely to conduct a review of the cost of carbon, the cost of air pollutants and the discount rate captured in the Public Expenditure Code. The Council therefore recommends that your Department make a request to the Minister for Public Expenditure and Reform in this regard.

Implementation and deployment of policies, measures, and technologies to tackle climate change is a complex undertaking. Societal and behaviour issues will also need to be considered, with the overall process aiming to enable an equitable transition. The distributional effects of the range of policies proposed needs to be appropriately considered. The benefits and opportunities for health, wellbeing and sustainable development that arise from this transition also warrant a much higher profile within the NMP.

Finally the Council considers that the concept of a 'living document' needs to be defined in the NMP, along with the explanation of any revision process. This should take account of the need for the provision of a NMP every 5 years.

I would also like to convey the following advisory points from the Council on the agriculture, forest and land use sectors:

An approach to Carbon Neutrality for Agriculture, Forest and Land Use Sectors

The concept of neutrality within the agriculture, forestry and land use sectors should be elaborated and defined in the context of a pathway for the achievement of the national transition objective by 2050. This could include options for the diversification of farming and land management in the context of changing demand for products and services. The pathway should also determine how this sector will contribute to the identified emissions budget to 2020 and to 2030.

An implementation programme to quantify the progress towards neutrality should be developed which would include necessary measurement and observation systems. Market failures and critical constraints need to be identified and measures or processes to address these developed. The analysis of mitigation options should consider co-benefits, particularly with respect to other policy objectives, such as in areas of water quality, biodiversity, health and wellbeing.

This letter will be copied to Minister Naughten and the Council plans to include this material in its first Periodic Review Report which will be provided to government by the 17th July. The production schedule for this report means that it will probably not be possible for the Council to comment on the finalised NMP which is due to be submitted to Government by mid-June 2017.

Should you wish to clarify any of the points above, please contact myself directly or via the Climate Change Advisory Council's Secretariat via Claire Camilleri at C.Camilleri@depa.ie or phone 01 2680145.

Yours sincerely,

Prof. John FitzGerald

Chair

Climate Change Advisory Council

Appendix 6 Key Messages on Adaptation from the First Report

Please note that this appendix has been reproduced from the First Report.

The Council identified thematic and structural issues which can support an integrated approach to cross-cutting actions. These included:

- ▲ Ensuring that human health, security and wellbeing are central to the objectives of the National Adaptation Framework
- ▲ Recognising the need for resilience in both managed and particularly natural ecosystems and the potential of the ecosystem services they provide; for example, green infrastructure and natural capital solutions
- ▲ Enabling and building the capacity of existing governance and management structures to embrace adaptation planning and implementation; for example, local authority and river basin district management bodies
- ▲ Increasing the resilience of critical infrastructures and mapping risks in energy, transport, communications and water management, including freshwater and coastal marine water bodies
- ▲ The central roles of spatial planning, and updated building standards and regulations, in ensuring that future development and infrastructure take account of existing risks and the range of projected future risks arising from climate change
- ▲ Increasing capacity building, especially in support of front line actors in local authorities and other bodies leading on actions on the ground
- ▲ Providing a stronger central direction on the appropriate range of scenarios to be considered by sectors in their planning and the provision of a methodology for prioritisation of measures

The Council also wished to highlight both the importance of Ireland's coastal zones and their vulnerability to climate change impacts and sea level rise. Ownership of the coastal zone and the assets in this area is complex while many of the climate vulnerabilities and responses to those vulnerabilities are shared across established ownership boundaries – these issues need to be addressed as part of the National Adaptation Framework process.

Appendix 7 Letters on Draft Sectoral Adaptation Plans

Please note that the letters has been reproduced verbatim.

Two draft sectoral adaptation plans were published for public consultation by the transport, and agriculture and forestry sectors. The Council reviewed the plans and the initial advice provided on these draft plans is included here.

Ms M. Talbot
Department of Agriculture,
Food and the Marine
Kildare St
Dublin 2
D02 WK12

7 March 2017

Dear Ms. Talbot,



McCumiskey House
Richview
Clonskeagh road
Dublin 14
D14 YR62
Phone: 01 2680180
Email: info@climatecouncil.ie

CC: John O'Neill, Department of Communications, Climate Action and Environment

RE: Draft Sectoral Adaptation Plans

Thank you for the presentation on the Department of Agriculture's draft adaptation plan for the Agriculture and Forestry sector to the Climate Change Advisory Council's Adaptation Committee on the 26th January 2017. It was a welcome opportunity for the Adaptation Committee to engage with the Department regarding the draft plan. In turn, the Adaptation Committee made a recommendation to the Council to provide feedback not only on the agricultural sector plan, but on common themes that have been observed across all sectors.

The Climate Change Advisory Council is mandated to provide independent advice to help Ireland achieve its national transition objective on adaptation as outlined in the National Policy Position (2015). The Council believes that the sectoral planning process offers a valuable opportunity for sectors to build resilience to the impacts of climate change by identifying vulnerabilities, adaptive capacity, risks and opportunities and develop adaptation plans to address these.

In response to the consultation on the draft plan, the Council wishes to outline some initial observations of the Agricultural sector's draft adaptation plan:

- ▲ The Council commends the efforts invested in creating a coordination framework and listing of vulnerabilities for the sector. It looks forward to reviewing how these may be addressed through adaptation actions in the sectoral plan.
- ▲ Analysis of external factors is mainly absent in the draft plan. These factors may be an important future influence on the agricultural sector, for example disruption of supply chains, impacts on exports and imports (including certain feed stocks), and how climate change impacts on the world economy would affect the sector.
- ▲ In order to identify priorities and enable action on available adaptation measures/responses, an assessment of their costs and benefits in their broadest sense should be included in the plan.

- ▲ The need to target additional research, including on climate change impacts analysis for the agriculture and forestry sector and to examine and address cross-sectoral interdependencies and cross-cutting issues in the plan.
- ▲ Given the planned expansion of the dairy sector, the plan should include a more in-depth examination of the implications of that expansion in the context of a changing climate, for example, increased stresses on water resources.
- ▲ The importance of engaging with the many and varied stakeholders in, and linked to, the agriculture industry, including on ownership of adaptation. The Council would see this as a key tool to the success of implementing any adaptation measures.
- ▲ Synergies between mitigation and adaptation need to be identified as part of the plan and optimized in the sector. In this context the longer term impacts of future climate conditions and proposed adaptation measures on carbon stored in soils and biomass including forests may be vulnerable to direct and indirect climate change impacts.
- ▲ Insurance options for the sector should be examined as a means to address the costs of weather and climate extremes.
- ▲ The Department should aim to define what achieving resilience in the agriculture sector would look like, both to set their goal, set a clear pathway towards it, and to measure progress towards that goal. It is not clear whether the plan is targeted at meeting Ireland's climate change goals, at addressing food security and linked social issues, or at delivering the sector's growth strategy.

More general observations that have been identified across the sectors are provided in the appendix included in this correspondence.

We look forward to the statutory sector plan following completion of the National Adaptation Framework development process later in 2017.

Yours sincerely,

Prof. John FitzGerald

Chair

Climate Change Advisory Council

Appendix I

The Council would like to highlight a number of general points for consideration by all sectors, including:

- ▲ The need for clear governance, ownership and engagement structures which should be developed and maintained as part of the overall National Adaptation Framework and for all sectors.
- ▲ The need to ensure that the sectors use consistent climate change data and analysis for their plans, including projections of future climate conditions
- ▲ In this context there is a need to support research to provide Ireland relevant climate information over a range of temporal and spatial scales in order to assist decision making on adaptation.

Laura Behan
Climate Change Unit
Department of Transport
Leeson Lane
Dublin 2



7 March 2017

Dear Ms Behan,

McCumiskey House
Richview
Clonskeagh road
Dublin 14
D14 YR62
Phone: 01 2680180
Email: info@climatecouncil.ie

CC: John O'Neill, Department of Communications, Climate Action and Environment

RE: Draft Sectoral Adaptation Plans

Thank you for your presentation on the Department of Transport's draft transport sector adaptation plan to the Climate Change Advisory Council's Adaptation Committee on the 26th January 2017. It was a welcome opportunity for the Adaptation Committee to engage with you regarding the draft plan. In turn, the Adaptation Committee made a recommendation to the Council to provide feedback not only on the transport sector plan, but on common themes that have been observed across all sectors.

The Climate Change Advisory Council is mandated to provide independent advice to help Ireland achieve its national transition objective on adaptation as outlined in the National Policy Position (2015). The Council believes that the sectoral planning process offers a valuable opportunity for sectors to build resilience to the impacts of climate change by identifying vulnerabilities, adaptive capacity, risks and opportunities, and developing adaptation plans to address them.

In response to the consultation on the draft plan, the Council wishes to outline some initial observations of the Transport sector's draft adaptation plan:

- ▲ The Council commends the efforts taken in providing the draft adaptation plan as well as reported work by a number of agencies including Transport Infrastructure Ireland and Iarnród Éireann in taking positive steps towards building resilience in their areas of responsibility.
- ▲ Modelling of climate change impacts for the transport network as a whole should be coordinated across the transport sector to ensure more efficient use of resources and cross-agency coordination.
- ▲ An assessment of the projected costs and benefits of adaptation actions in their broadest sense, in addition to regular maintenance of transport networks and infrastructure, should

be addressed in the plan. This may include a strategic overview, including a stocktake of transport infrastructures, associated vulnerabilities and risks in order to assist in adaptation planning and prioritisation.

- ▲ In this context, a framework of approach for the prioritisation of funding for adaptation measures that includes recognition of investment cycles should be developed to provide adequate criteria and aid decision making. This should also ensure that the financial and non-financial costs of delaying action are accounted for in the decision making process.
- ▲ Given the complex relationships between transport and other sectors and actors, such as local authorities, there is a need for strategic directions to inform actions. As part of this, the plan should include proposals that can initiate and sustain dialogues on these relationships towards addressing cross-sectoral interdependencies and cross-cutting issues.
- ▲ Future infrastructure investments should be subject to risk analysis for potential climate change impacts under a range of scenarios.
- ▲ The potential of green measures as well as grey measures should be assessed comprehensively in selecting adaptation measures, while flexibility should be considered as a key element in assessing the appropriateness of new measures.

More general observations that have been identified across the sectors are provided in the appendix included in this correspondence.

We look forward to the statutory sector plan following completion of the National Adaptation Framework development process later in 2017.

Yours sincerely

Prof. John FitzGerald

Chair

Climate Change Advisory Council

Appendix I

The Council would like to highlight a number of general points for consideration by all sectors, including:

- ▲ The need for clear governance, ownership and engagement structures which should be developed and maintained as part of the overall National Adaptation Framework and for all sectors.
- ▲ The need to ensure that the sectors use consistent climate change data and analysis for their plans, including projections of future climate conditions.
- ▲ In this context the need to support research to provide Ireland relevant climate information over a range of temporal and spatial scales in order to assist decision making on adaptation.

Appendix 8 Outline of the 2050 Neutrality Challenge

Please note that this appendix has been reproduced from Appendix 2 of the First Report.

Current greenhouse gas emissions from the agriculture sector make up about 33% of total emissions.[•] These are primarily emissions of methane, around 64%, and nitrous oxide, around 35%.^{34%} In 2015, Ireland had an estimated total sink of carbon dioxide by forestry of 3.86 million tonnes of carbon dioxide equivalent.^{••} Estimates of other land sinks exist but these are not yet at the same level of scientific quality as those for forestry. Some land uses are also a source for carbon dioxide; these included drainage of wetlands, and harvesting of peat for energy generation.

Neutrality by 2050 implies that agricultural emissions could be offset by removals such as are currently provided by afforestation. However, this requires that emissions are reduced, as far as is possible, while removals are greatly enhanced. Enhanced carbon dioxide removals can also be achieved through management of non-forest biomass and soils. Understanding and quantification of these removals is both necessary and challenging. Ideally this should be achieved from farm to national levels.

A first step in achievement of neutrality is balancing of carbon dioxide emissions and removals. This may already be the case in certain situations but will need to be proven, i.e. robust quantification of negative emissions/removals of carbon dioxide is needed. This will be a key measure of to what extent remaining emissions of methane and nitrous oxide may be offset.

The issue of greenhouse gas neutrality or balance is likely to be examined in depth by the scientific community in the coming years and addressed in the IPCC Sixth Assessment Report. These discussions are likely to include consideration of issues such as metrics, lifetimes of greenhouse gases and their contribution to climate change. How neutrality or balance is to be achieved and what measurement reporting and verification systems will be used remains open. However, solutions identified by Ireland will be of global interest.

The atmospheric lifetime of methane is 12 years and therefore its impact on climate is related to the rate of emission from ongoing activities. Carbon dioxide emissions accumulate in the atmosphere, implying a long-term cumulative impact on climate change. An increase in methane emissions would require an equivalent removal of carbon dioxide from the atmosphere in order to achieve an effectively net-zero impact on climate.

The proposals under the 2030 EU Climate and Energy package provide for limited flexibility whereby Member States may use removals from LULUCF sector to towards their obligations under the Effort Sharing Regulation. Greater flexibility in this regard would be required to provide consistency with neutrality concepts.

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- ◆ "This is based on Global Warming Potential (GWP) values over 100 year time horizon provided in Forth Assessment Report of the Intergovernmental Panel on Climate Change.
 - ◆◆ Environmental Protection Agency (2017) National Inventory Report and Common Reporting Format, Ireland Submission to the UNFCCC, Table 4, [Online]. Available at: http://unfccc.int/files/national_reports/annex_i_ghg_inventories/national_inventories_submissions/application/zip/irl-2016-crf-15apr16.zip [Accessed: 4 November 2016]



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